Central London Congestion charging






Impacts monitoring

Third Annual Report

April 2005

MAYOR OF LONDON

Transport for London

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Overview

Congestion charging was introduced into central London in February 2003. It contributes directly towards the achievement of four of the Mayor's transport priorities:

- to reduce congestion;
- to make radical improvements in bus services;
- to improve journey time reliability for car users;
- to make the distribution of goods and services more efficient.

It also generates net revenues to support the Mayor's Transport Strategy more generally.

This is the third in a series of annual reports describing the impacts of congestion charging in and around central London.

In June 2003 TfL published the *First Annual Monitoring Report*. This described the scope of the monitoring work that had been put in place to ensure that the impacts of congestion charging were comprehensively measured. Conditions applying before charging across a range of key indicators were set out, and information given describing how and when any changes to these indicators would be measured.

In April 2004 TfL produced the *Second Annual Monitoring Report*. This described available information on the impacts of the scheme after approximately one year of operation. In January 2005 TfL produced a further *Summary Update*, reviewing developments during 2004.

This *Third Annual Monitoring Report* supersedes, updates and extends the material published since the *First Annual Monitoring Report*. It provides a full consideration of developments during 2004, alongside comparisons with the first year after charging (2003), and conditions before the introduction of the scheme in 2002. This Overview summarises the key contents of the *Third Annual Monitoring Report*.

Two years on

- During 2004, congestion charging has continued to meet its principal traffic and transport objectives; and the scheme continues to operate satisfactorily.
- Patterns of travel in and around the charging zone have remained stable throughout 2004, and closely comparable to those seen in 2003 shortly after the introduction of charging.
- Measured reductions in congestion within the charging zone have remained at an average of 30 percent since the introduction of the scheme.

- Bus services continue to benefit from significant improvements in reliability and journey time, particularly within the zone, but also outside it.
- Public transport continues to successfully accommodate displaced car users alongside ongoing improvements to bus services throughout London.
- A substantial body of analytical evidence now exists which demonstrates that the net impact of the scheme on the central London economy has been very marginal.
- Gains in road traffic accidents and reductions to emissions of key traffic pollutants in and around the charging zone continue to be apparent.
- The scheme provisionally generated net revenues of over £90 million in 2004/5, which have been spent largely on improved bus services within London.
- Intensive monitoring of a selected case study area adjacent to the boundary of the charging zone demonstrates a picture of generally neutral impacts, and an absence of 'boundary-related' problems.
- The operation and enforcement of the scheme are working well, with a continuation of the improvements in performance that followed the Supplemental Agreement with Capita, the main service provider for the scheme, in 2003.

Congestion

- Taking an average of all available post-charging congestion surveys, reductions to delays inside the charging zone during charging hours remain at around 30 percent compared to pre-charging conditions in 2002.
- These reductions continue to be towards the top end of TfL's range of expectation before the introduction of the scheme, with average excess delays typically around 1.6 minutes per kilometre, compared with 2.3 minutes per kilometre in 2002. More recent surveys have shown evidence of more variable conditions compared to those in 2003, and may suggest some increase in congestion.
- Surveys also demonstrate that charging is delivering decongestion benefits during the 'shoulder' periods before and after charging hours as a result of consequential traffic reductions at these times.
- TfL continues to measure overall reductions in congestion on both the Inner Ring Road (the non-charged route around the boundary of the charging zone) and the main radial routes approaching the charging zone, but these are now smaller than those seen in 2003 immediately following the introduction of the scheme.
- Measurements of congestion on main roads in inner London during 2004 suggest stable overall conditions, alongside stable or slightly declining traffic levels.

Traffic patterns

- Traffic patterns in and around the charging zone have continued to remain broadly stable throughout 2004. Available indicators of traffic volumes have been closely comparable to those recorded during 2003, and the traffic changes observed shortly after the introduction of charging have been maintained.
- The total volume of traffic entering the charging zone during charging hours in 2004 was identical to 2003, continuing to represent a reduction of 18 percent against pre-charging levels in 2002.
- Available indicators of traffic circulating within the charging zone for 2004 again suggest broadly stable or slightly declining traffic levels.
- Traffic on the Inner Ring Road fell very slightly during 2004, though this still represents a small net increase on pre-charging conditions in 2002 overall.
- Volumes of radial traffic approaching the charging zone in inner London in 2004 were almost identical to those seen after the introduction of charging in 2003.
- There is no evidence of detrimental traffic effects on roads outside of the charging zone resulting from diverting traffic.

Public transport and travel behaviour

- 2003 saw large-scale improvements to the bus network in London, these being particularly pronounced in and around the charging zone. Enhancements to the bus network had successfully accommodated the increased patronage resulting from charging, and also a wider general growth in bus use.
- 2004 has seen continued growth in both bus patronage and service levels in and around the charging zone; and the bus network continues to meet passenger demand effectively.
- Reliability of bus services in central London continues to improve, although given the general stability of traffic levels it is likely that these latest gains result from improved operational arrangements rather than traffic volume changes.
- The decline in Underground travel to central London observed in 2003 has been partly reversed. Underground trips to and from the charging zone have grown during 2004, but remain below levels seen before the introduction of the scheme in 2002.
- Counts of National Rail travel to and from central London corroborate TfL's earlier finding that there had been no significant overall change between 2002 and 2003.
- Although research is continuing to refine TfL's assessment of travel behaviour change resulting from the scheme, the monitoring data for 2004 are generally consistent with TfL's assessment as previously presented in the *Second Annual Monitoring Report*.

Social impacts

- In-depth surveys of residents of selected neighbourhoods in Greater London suggest that the actual impacts of the scheme on individuals in 2003 were of generally smaller magnitude than had been expected by the same respondents before charging started in 2002.
- Respondents living inside the charging zone were most positive about the change in their local area as a result of the scheme, particularly the reduction in congestion. Respondents to separate surveys on-street also perceived improvements in the general amenity of the area, air quality, noise, traffic levels and public transport provision.
- Transport issues that respondents felt most negatively about were largely unrelated to the scheme. Parking was a key concern: lack of spaces, excessive traffic warden activity and rising charges.
- There was little change in reported car use by charging zone respondents, who receive the 90 percent residents' discount. Respondents living outside of the charging zone reported significant changes in travel by car to and from central London that were generally in line with the aggregate travel effects reported elsewhere.
- The majority of all respondents felt that the charge was affordable. More respondents living within the zone reported finding the charge difficult to afford than respondents living in inner London, despite being in receipt of the 90 percent residents' discount, presumably reflecting the frequency of actual charge payment.
- In depth discussions with frequent users of the charging zone revealed that generally they felt that the scheme had been more successful than they had expected in reducing traffic congestion, and that their journeys had become more reliable.

Business and the economy

- At the time of the introduction of congestion charging the London economy was experiencing its biggest slowdown since the early 1990s. It has now recovered from that slowdown.
- Results from an extensive research programme suggest that congestion charging has had a broadly neutral impact on overall business performance in the charging zone.
- Measuring business performance in terms of variables such as employment, numbers of businesses, turnover and profitability fail to find evidence of an effect from the scheme.
- Data from the Annual Business Inquiry, the Beta Model database, the Dun and Bradstreet database and the London Annual Business Survey all support this conclusion.
- Studies of the commercial and residential property markets have not found any significant impact from the congestion charge.

- Sectoral evidence from the business performance research programme is inconclusive. Some sectors within the charging zone have shown better performance than outside the zone. Other sectors have performed worse inside the zone than outside. These differences are all relatively small, and are not consistent between different datasets. It is not possible to be certain what part of these small differences (positive or negative) result from the congestion charge.
- Data on central London retail sales from the London Retail Consortium show that after the dip in retail sales growth in early 2003, growth has since recovered.
- Econometric analysis of the impact of the congestion charge on overall retail sales using the same methodology as an earlier study on behalf of John Lewis looking at John Lewis sales only, suggests that the charge had no measurable effect on total central London retail sales.
- TfL's business attitudes surveys for 2004 suggest that there is continued recognition of transport benefits associated with the scheme, albeit at a slightly lower level than in 2003. A majority of businesses continue to support the scheme, provided that there is continued investment in public transport.
- The conclusion of this analysis is that congestion charging has had a broadly neutral impact on the economy of central London, and that any impacts on individual business sectors, including retail, are small.

Accidents and the environment

- The scheme has contributed towards the substantial reductions in road traffic accidents that have been seen across Greater London in recent years. Within the charging zone, TfL estimates that traffic changes brought about by the scheme have been responsible for between 40 and 70 additional accidents 'saved' per year in comparison with the background trend, broadly in line with TfL's prior expectation for the scheme.
- There is no evidence of detrimental trends that might be associated with the scheme: despite observed increases in two-wheeled traffic in and around the charging zone, collisions involving these vehicles have conformed to the general trend of reduced accidents. There is also no evidence that increased average traffic speeds, albeit mainly accounted for by reduced delays at junctions, have had any noticeable effect on the severity of casualties in and around the charging zone.
- Given the general stability in traffic and congestion in and around the charging zone during 2004, the traffic emissions reductions described previously have been maintained. These included estimated reductions of 12 percent in emissions of NO_x and PM_{10} from road traffic within the charging zone, and little overall change on the Inner Ring Road.
- Measured air quality during 2004 strongly reflects a return to more typical meteorological conditions, following the statistically unusual weather experienced during 2003. Levels of NO_x continue to decline steadily across London. The picture for NO_2 is mixed, with evidence at several

sites across London (both outside and within the charging zone) of unexpected recent increases that do not seem to be related to traffic volumes. PM_{10} concentrations (and episodes) have reduced to levels prevailing before charging.

- It is not possible to detect a 'congestion charging effect' in measured air quality data.
- There is no evidence from sample measurements of significant changes to the ambient noise climate that might be associated with traffic changes brought about by the scheme.

Boundary case study

- Intensive monitoring work in a case study area adjacent to the charging zone boundary in the boroughs of Islington and Hackney reveals an overall picture of neutral effects, with an absence of 'boundary related' problems.
- Despite the influence of the Shoreditch Triangle traffic management scheme, traffic changes in this area in response to the congestion charging scheme were comparable to those observed across the whole boundary area. Traffic entering the charging zone reduced considerably. Traffic on the sector of the Inner Ring Road within the case study area was stable overall. There is no evidence of significant adverse traffic change on local roads in the area that might be associated with charging.
- Local traffic management schemes were implemented by two London Boroughs in the case study area in collaboration with TfL as part of the wider preparations for congestion charging. These are proving to be highly successful in meeting their objectives, and are producing valuable benefits in removing extraneous traffic from local roads.
- Generally, there are no indications of adverse effects to public transport in the case study area that might be associated with the scheme. Changes to bus service provision and patronage observed elsewhere have been mirrored in the case study area and remain broadly in balance. Underground and rail patronage were affected by the temporary but prolonged closure of the Central Line in 2003.
- Findings from household-level research in the case study area confirm the overall direction and magnitude of the travel behaviour changes observed elsewhere, with fewer car trips to the charging zone overall and a marked shift from car to bus.
- Air quality measurements for the case study area closely follow those for the rest of London and are not indicative of any specific or detrimental effects. The number of road traffic accidents in the case study area has continued its recent trend of year-on-year decline, paralleling most other parts of London, and there is no evidence of emerging detrimental trends that could be associated with the introduction of charging.

Scheme revenues

- The scheme provisionally generated net revenues of over £90 million in 2004/5, which have been spent largely on improved bus services within London.

Scheme operation

- Charge payments remained very stable throughout 2004, at levels comparable to 2003. The benefits of TfL's Supplemental Agreement with Capita and other chargepayer improvements continue to be apparent, with significant improvements in call centre performance and enhancements to other payment channels. Over 80 percent of users surveyed are now satisfied with the service.

Enforcement

- There have been a number of improvements to the enforcement process throughout 2004. These improvements, combined with better public understanding of how the scheme works, have resulted in increased payment and compliance levels and reduced numbers of representations and appeals.

Monitoring programme

- The monitoring programme is proceeding according to the broad plan set out in the *First Annual Monitoring Report*. A number of adaptations have been made to reflect evolving priorities since the introduction of the scheme, but generally the arrangements that were put in place have proven to be appropriate and effective in enabling TfL to understand and interpret the changes that congestion charging has brought about.
- The monitoring work will continue during 2005, with further minor changes to address evolving priorities. One of these is to better characterise 'longer-term' adaptations to the scheme, which may be still evolving, as opposed to the shorter-term traffic impacts, which are now quite clear.
- Proposed developments or modifications to the central London scheme will require additional monitoring to be developed, and this will be taken forward if and when appropriate.

1 Introduction

1.1 Purpose

This is the third in a series of annual reports describing the impacts of congestion charging in central London. It summarises the growing body of evidence and insight from across the impacts monitoring programme, now reflecting two years of operation of the central London congestion charging scheme. It makes comparisons with conditions applying before charging started and, where appropriate, with Transport for London's (TfL's) expectations for the scheme before it was launched. Comparisons between conditions applying shortly after the introduction of charging in February 2003 and those prevailing in 2004 are now also possible.

The contents of this report reflect the Mayor and TfL's commitment to a comprehensive five-year programme of objective monitoring of the scheme. The programme extends from one year before to four years after the introduction of charging. The programme covers not only the more immediate traffic and transport impacts of the scheme, but also wider social, economic and environmental impacts. It consolidates information from over 100 specially-designed surveys, whilst making full use of already established surveys and data sources.

The scope of the material now available to TfL far exceeds what is possible to publish in a report of this nature. This report therefore provides a summary of key findings that are likely to be of most general interest.

1.2 The central London congestion charging scheme

Congestion charging was successfully introduced in central London in February 2003. It contributes directly towards the achievement of four of the Mayor's transport priorities:

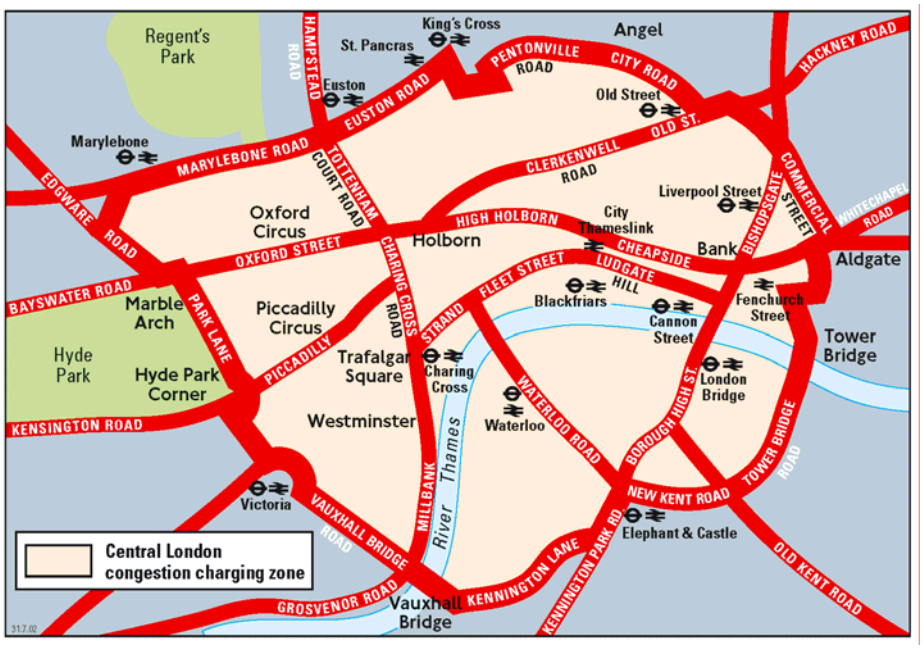
- to reduce congestion;
- to make radical improvements in bus services;
- to improve journey time reliability for car users;
- to make the distribution of goods and services more efficient.

It also generates net revenues to support the Mayor's Transport Strategy more generally.

The congestion charge is a £5 daily charge for driving or parking a vehicle on public roads within the congestion charging zone between 07.00 and 18.30, Monday to Friday, excluding weekends and public holidays.

The central London congestion charging zone is shown in Figure 1. It covers 22 square kilometres in the heart of London, including centres of government, law, business, finance and entertainment.

Figure 1 The central London congestion charging zone.



The Inner Ring Road forms the boundary of the congestion charging zone, and no charge applies to vehicles using this route.

Certain categories of vehicle, notably taxis, motorcycles, pedal cycles and buses, are exempt from the charge. Certain categories of vehicle users can register for discounts. For example, residents of the congestion charging zone can register for a 90 percent discount (for a minimum weekly payment), and disabled persons' Blue Badge holders and certain alternative fuel vehicles are eligible for a 100 percent discount.

1.3 Key developments with the scheme

The central London congestion charging scheme – including its associated traffic management and complementary public transport measures – is kept under continual review by TfL. Various adjustments have been made to the scheme since it was first formally proposed in a Scheme Order made by TfL in 2001 and confirmed by the Mayor in 2002. The Scheme Order is the legal framework for the congestion charging scheme and contains the definitions of what the charge is, where it applies, details on discounts and exemptions from the scheme, penalty charges, refunds and so on.

Since February 2003 a number of variations have been made to the Scheme Order, usually to improve or adjust the operation and payment arrangements or enforcement of the scheme. Changes to the Scheme Order are made through a procedure known as a Variation Order. Each Variation Order is subject to consultation before the Mayor considers the representations received and decides whether or not he wishes to confirm the change (with or without modifications) and make it part of the Scheme Order.

To date there have been ten Variation Orders confirmed. The changes confirmed include:

- Adding the National Health Service and Crown Estates Paving Commission to the list of those organisations eligible for a 100 percent discount for certain vehicles;
- Extensions to the residents' discount zone to cover those who reside outside the charging zone but who have no option but to park inside the zone due to controlled parking zone boundaries;
- Permitting vehicle fleets made up of owner-drivers or managed by logistics companies to be eligible for fleet account arrangements;
- Extending the SMS text messaging facility to include the payment of the £5 surcharge between 10pm and midnight on the day of travel;
- Increasing penalty and enforcement charges for non-payment of the congestion charge;
- Allowing payment by additional credit and debit card types; revising the definition of residents' vehicles;
- Removing the financial criteria for the National Health Service patients' reimbursement scheme;
- Lowering the threshold of the congestion charging fleet schemes from 25 vehicles to 10;
- Improvements to the 100 percent discount for registered holders of Blue Badges;
- Making the three charging days that fall between Christmas Day and New Year's Day 'non-charging' days;
- Raising the charge from £5 per charging day to £8 per charging day for those not on fleet schemes;
- Raising the charge from £5.50 per charging day to £7 for vehicles on the automated fleet scheme; and from £5 per charging day to £7 for vehicles on the notification fleet scheme;
- Discounting monthly and annual charges by 15 percent;
- Reducing a number of administrative charges.

TfL will continue to keep all elements of the congestion charging scheme under review and will recommend making further changes to the Scheme Order where appropriate.

1.4 Overview of the monitoring programme

The scope of the monitoring programme for the scheme was described in detail in the *First Annual Monitoring Report*. The monitoring programme consists of five key work streams, designed to assess the range of traffic, transport, social, economic and environmental effects. In addition, information from key scheme operational and enforcement functions is available.

The programme features over 100 directly-sponsored survey and research activities, designed to investigate specific issues and complement the wealth of information gathered by third-parties, such as the public transport operators and stakeholder groups.

The work is managed by a team of permanent TfL staff, with independent contractors undertaking most of the main data collection and analysis tasks. The TfL team is supported by a number of specialist external academic and professional advisers.

In general, the monitoring programme continues to proceed according to the programme set out in the *First Annual Monitoring Report*. However, a range of new activities are currently being defined in respect of potential developments of the scheme, and this will be taken forward if and when appropriate.

1.5 Findings from the monitoring work so far

In June 2003 TfL published the *First Annual Monitoring Report*. This described the scope of the monitoring work that had been put in place to ensure that the impacts of congestion charging were robustly and comprehensively measured. Conditions applying before the introduction of the scheme across a range of key indicators were set out, and information given describing how and when changes to these indicators would be measured.

Since the introduction of the scheme, TfL has produced a range of reports detailing emerging results from the monitoring work. Three summary update reports were produced during 2003 and into 2004, providing early feedback on the key impacts of the scheme. In April 2004, TfL published the *Second Annual Monitoring Report*, providing a comprehensive overview of key outcomes after one year of operation of the scheme. In January 2005, TfL produced a further *Summary Review* reporting on the position for the remainder of 2004. This *Third Annual Monitoring Report* builds on the material presented in the January 2005 *Summary Review*, giving a more comprehensive overview of conditions applying in 2004.

All of these reports now provide a good appreciation of the impacts of the scheme. During 2004, congestion charging has continued to meet its principal traffic and transport objectives and the scheme continues to operate satisfactorily.

1.6 Report contents

The remainder of this report presents a summary of findings from across the monitoring programme, combined with updates on key aspects of scheme operation and enforcement. There are ten sections:

- **Congestion.** This section updates key indicators of traffic congestion in and around the charging zone.
- **Traffic patterns.** The impacts of the scheme on traffic volumes and characteristics in and around the charging zone are described in some detail, drawing on comprehensive traffic surveys undertaken during 2004.

- **Public transport and travel behaviour.** Trends and developments in 2004 in relation to the scheme are reviewed, alongside established findings for 2003.
- **Social impacts**. Information now available from TfL's surveys of the social impacts of the scheme is summarised.
- **Business and economy.** This section reviews new and updated evidence relating to the impacts of the scheme on businesses and economic activity in central London.
- **Boundary case study.** This section examines interim findings from the research undertaken in a Boundary Case Study area, comprising parts of the boroughs of Islington and Hackney outside, but immediately adjacent to, the boundary of the charging zone.
- **Accidents and environment.** This section updates the position on key indicators of road safety, air quality and noise.
- **Scheme revenues.** This section summarises the financial effects of the scheme.
- **Scheme operation.** This section reviews key indicators relating to the operation of the scheme.
- **Enforcement.** This section reviews recent trends and developments in relation to the enforcement of the scheme.

1.7 Further information

The structure and content of the monitoring programme was fully described in the *First Annual Monitoring Report*, as were the principles for access to further data and results from across the programme.

During 2005 the TfL website will increasingly be used to publish a variety of technical reports and other materials from the monitoring work. If you have any queries relating to this report or the wider impacts monitoring programme, please e-mail TfL at ccsmonitoring@tfl.gov.uk

1.8 Wider transport and economic trends in London

Congestion charging was introduced against a backdrop of wider changes to travel patterns in London, brought about by social and economic change and the implementation of the other elements of the Mayor's Transport and other Strategies.

All of these will have had an effect on the measurements described in this report, which in general will reflect the net out-turn of a combination of traffic, transport and other effects, many of which are completely unrelated to the scheme. It is not therefore usually possible to identify precisely a 'congestion charging effect', although in many cases the available evidence allows a reasonable estimate to be made.

2 Congestion

2.1 Introduction

The principal objective of congestion charging is to reduce traffic congestion in and around the charging zone, mainly by reducing the amount of traffic within the charging zone.

Summary of key findings for 2003

The *Second Annual Monitoring Report* described TfL's findings to the beginning of 2004 based on key indicators of congestion in and around the charging zone. It was reported that:

- Overall reductions of 30 percent in congestion had been achieved inside the zone during charging hours, at the top of TfL's expected range of between 20 and 30 percent.
- Congestion reductions had also been recorded on the Inner Ring Road (the most obvious diversionary route around the charging zone). This contrasted with the possibility that 'diverting' traffic might lead to some deterioration of conditions on this key route. However, it seemed to reflect both comparatively small increases in traffic and the successful implementation of traffic management measures to cater for diversionary traffic.
- Radial routes approaching the charging zone in inner London also demonstrated reduced congestion.
- More general surveys of traffic speeds and congestion in inner London showed a relatively stable situation between 2002 (pre-charging) and 2003 (post-charging).

It was also noted that:

- The majority of the decongestion gains were in terms of reduced queueing time at junctions, rather than increases in driving speeds.
- Attitudinal and other travel surveys of Londoners suggested that congestion gains were being recognised, and demonstrated in analyses of journey times.

Key findings for 2004

The overall picture for congestion in 2004 has been broadly similar to that seen after the introduction of charging in 2003:

- Taking an average of the 12 available bi-monthly post-charging survey measurements, reductions in congestion inside the charging zone compared with pre-charging conditions in 2002 have been maintained at 30 percent during charging hours. However, data for recent surveys show evidence of more variable conditions.
- TfL continue to record overall gains in congestion on both the Inner Ring Road and on the main radial routes approaching the charging zone. These

are now less than in the first year of charging and surveys during 2004 are suggesting broadly comparable conditions to before the introduction of charging.

- Measurements of congestion on main roads in inner London for 2004 show comparable overall conditions to 2003.

2.2 Congestion within the charging zone

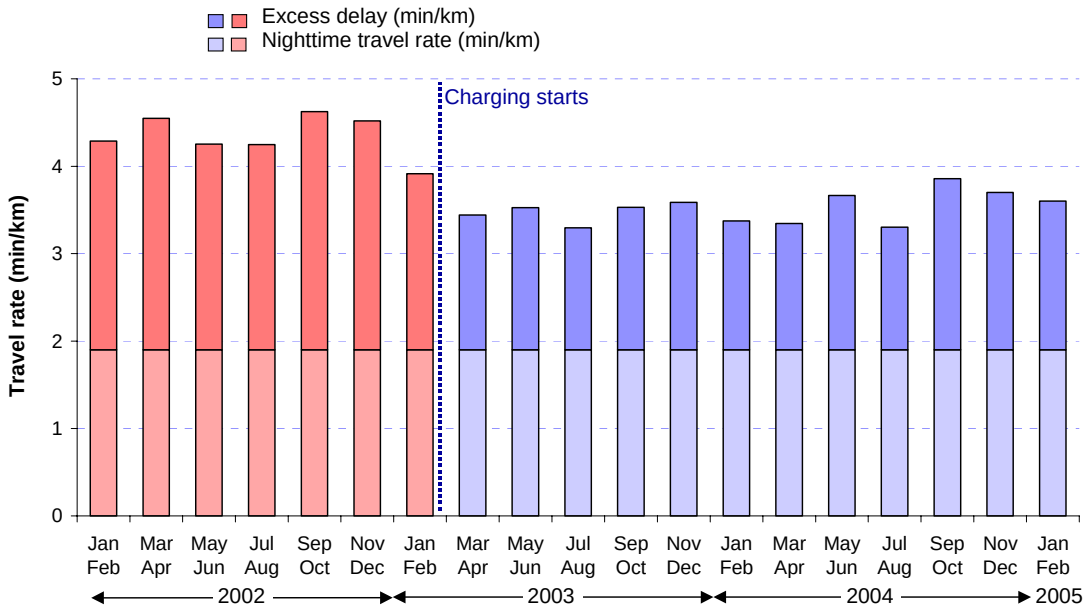
The *Second Annual Monitoring Report* described average reductions in congestion within the charging zone of 30 percent against a pre-charging reference value of 2.3 minutes per kilometre. This figure originated from regular bi-monthly Moving Car Observer speed surveys, which have continued throughout 2004.

Congestion in this context is defined as the ‘excess delay’ (expressed as minutes per kilometre) over and above that which would be experienced under ‘uncongested’ conditions (i.e. in the early hours of the morning). This ‘uncongested travel rate’ in the charging zone has been measured as 1.9 minutes per kilometre, both before and after charging started. TfL’s *First Annual Monitoring Report* gives a fuller explanation of these indicators.

The *Second Annual Monitoring Report* also made reference to the need to re-weight the post-charging time-series to take account of the fact that traffic patterns within the charging zone had changed since the introduction of charging. The speed surveys are 'flow-weighted' with reference to observed traffic volumes on each road.

Figure 2 shows the updated and re-weighted time-series, extending to the end of 2004, and including data from the first two months of 2005. As was expected, the re-weighting of post-charging surveys has had only a small effect on the comparison of conditions before and after the introduction of charging. However, the net effect was to marginally increase (by 3 percentage points) the average 30 percent reduction in congestion previously reported to end February 2004.

Figure 2 Congestion in the charging zone during charging hours.

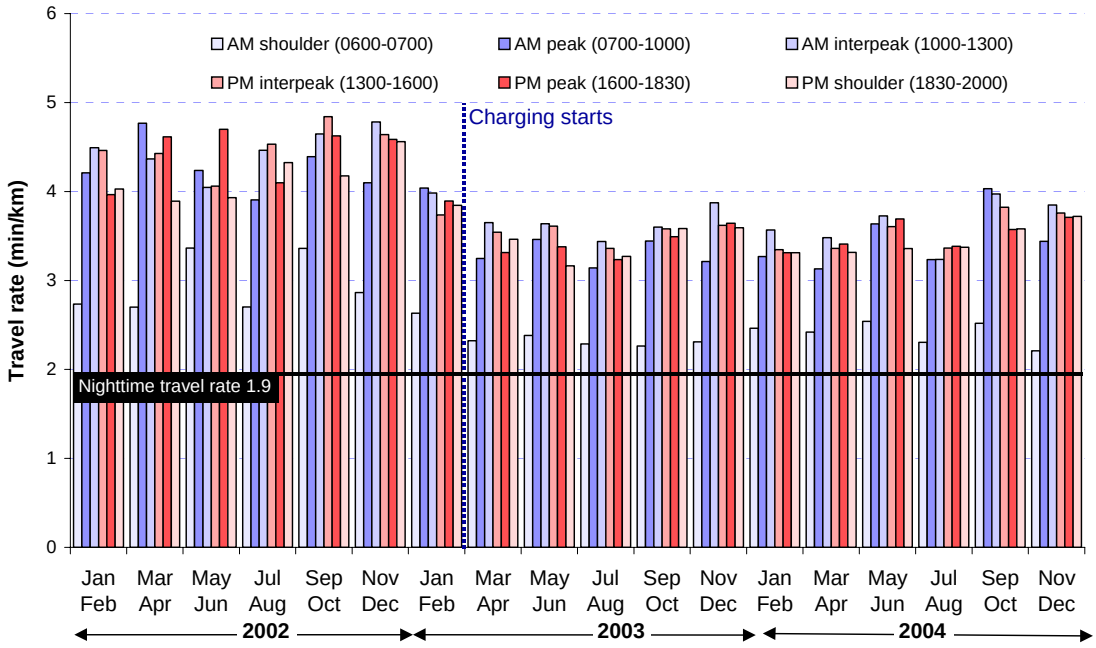


Individual bi-monthly surveys for the latter part of 2004 tended to produce more variable results, with some suggestion of an increase in congestion – the last three survey results indicating among the highest excess delays since charging started. However, considering all 12 available post-charging surveys up to January/February 2005, and using the re-weighted post-charging data, the average reduction in congestion remains at 30 percent.

Observed excess delays during charging hours remain typically between 1.4 and 1.8 minutes per kilometre (average of 1.6 minutes per kilometre), against the pre-charging reference value of 2.3 minutes per kilometre, which is unaffected by the re-weighting.

Figure 3 looks at these measurements in more detail, by presenting measured travel rates for each individual time period across the survey series to the end of 2004. In addition to the four charging hours time periods, data are included for the two ‘shoulder’ periods, the early morning period between 06.00 and 07.00, and the mid-evening period between 18.30 and 20.00 hours.

Figure 3 Travel rate by time period inside the congestion charging zone.



A notable feature of the graph is the similarity of levels of congestion at all times of the day, with the exception of the early morning 'AM shoulder' period. This is a feature of both the pre-charging measurements in 2002, and the post-charging measurements since February 2003. Also apparent are the overall reductions in congestion in each time period that have been achieved since the introduction of charging in February 2003.

Of interest are findings for the two 'shoulder' periods in Figure 4. These also show clear evidence of decongestion benefits, even though charging does not operate in these periods.

Figure 4 Average excess delays by time of day (minutes per kilometre). Inside the charging zone.

	Average excess delays (minutes per kilometre)	
Time period	**Before charging**	**After charging**
AM shoulder (0600 – 0700)	1.0	0.5
AM peak (0700 – 1000)	2.3	1.5
AM interpeak (1000 – 1300)	2.5	1.7
PM interpeak (1300 – 1600)	2.5	1.6
PM peak (1600 – 1830)	2.5	1.6
PM shoulder (1830 – 2000)	2.2	1.5

Note: this table uses an average of measured excess delays during 2002, rather than the established reference value of 2.3 minutes per kilometre for charging hours.

The traffic reductions associated with charging necessarily have implications outside of charging hours. For example, some of the vehicle trips deterred by charging would have reached the charging zone before the start of charging hours. This means that there is less circulating traffic in the very early

morning. Similarly, in the evening immediately after the charging hours, the reduction in circulating traffic inside the charging zone compared to pre-charging conditions would be at its greatest (see also Section 3). Traffic data show that volumes entering the zone at this time are comparable to those before charging in 2002, and the traffic reduction effect of charging persists well into the evening period.

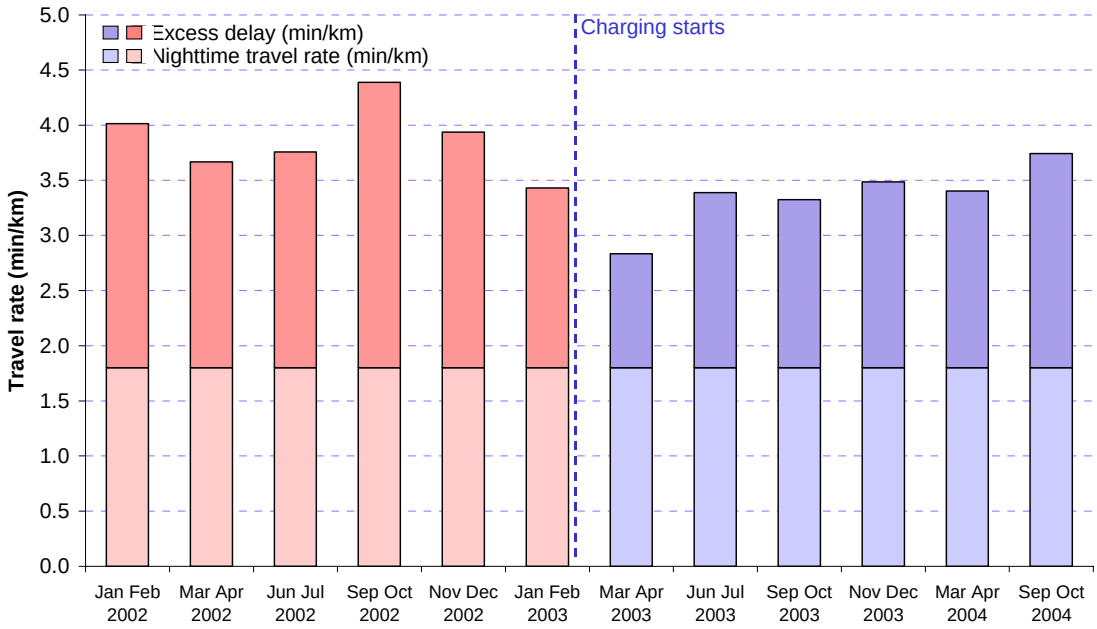
Congestion charging is therefore also leading to decongestion benefits outside of charging hours.

2.3 Congestion on the Inner Ring Road

The Inner Ring Road forms the boundary of the congestion charging zone. No charge applies to vehicles using this route. Concerns were raised before the introduction of charging that traffic diverting on to the Inner Ring Road to avoid paying the charge could lead to increased congestion. TfL expected that with the implementation of improved traffic management arrangements, there would be no overall increase in congestion on this route.

Congestion on the Inner Ring Road has been measured by dedicated speed surveys, which have been carried out at intervals since 2002. Six surveys have now been completed since the start of charging, and comparisons can be made with the six surveys that were carried out before charging was introduced (Figure 5).

Figure 5 Congestion on the Inner Ring Road during charging hours.



The measured uncongested travel rate on the Inner Ring Road is 1.8 minutes per kilometre. Observed levels of congestion have fluctuated considerably over the review period. A congested travel rate (i.e. excess delay) of 1.9 minutes per kilometre was taken as representative of pre-charging conditions in 2002.

Values for the surveys following the introduction of charging in 2003 were typically between 1.5 and 1.7 minutes per kilometre, representing reductions of between 10 and 20 percent in congestion.

Two surveys were undertaken in 2004. The first of these gives an excess delay of 1.6 minutes per kilometre, which is comparable to 2003. The later survey in Autumn 2004, however, gives an excess delay of 1.9 minutes per kilometre. This is identical to the pre-charging reference value, and is again suggestive of some recent increases in congestion. Further surveys will be undertaken during 2005 to measure longer-term developments in congestion on this key route.

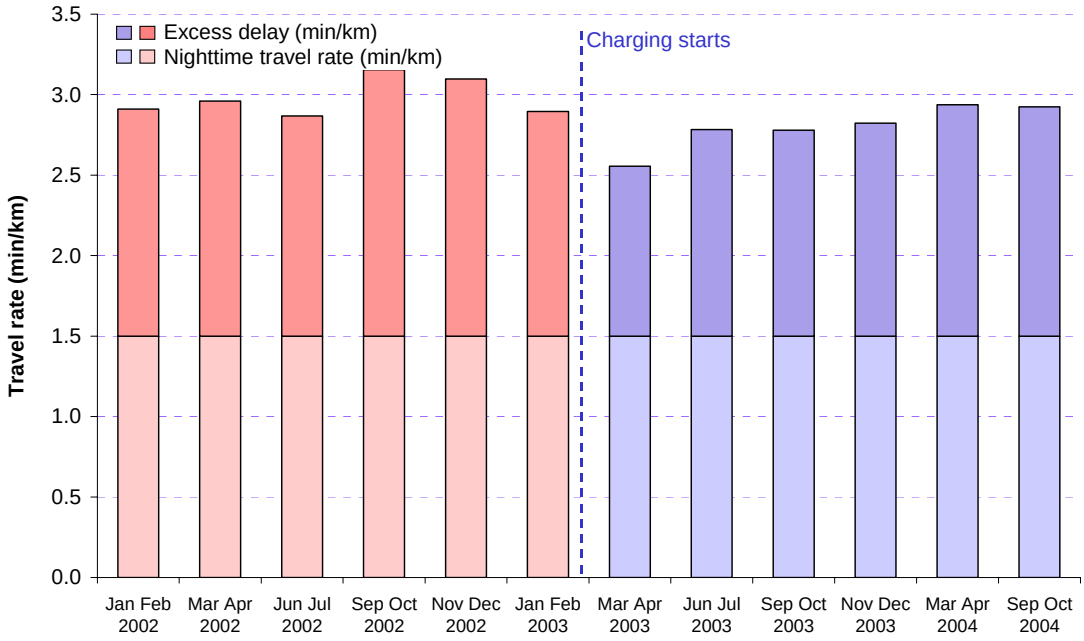
2.4 Congestion on radial routes approaching the charging zone

Congestion on main radial routes approaching or leaving the charging zone has been surveyed in both directions as part of the intensified Moving Car Observer survey arrangements for the Inner Ring Road. These surveys cover a representative selection of main radial routes up to a distance of three to five kilometres from the charging zone. TfL's *First Annual Monitoring Report* includes a map of the networks covered by these surveys. For the purpose of this report, the measured night-time travel rate for major roads in inner London of 1.5 minutes per kilometre is used to represent uncongested conditions, giving a representative value for congestion (i.e. excess delay) before charging, during charging hours, of 1.5 minutes per kilometre (Figure 6).

The 2003 surveys saw decreases in congestion on the main approach roads to the zone averaging 0.3 minutes per kilometre (reductions of up to 20 percent), with typical excess delay during charging hours then averaging 1.2 minutes per kilometre.

Two surveys have been undertaken in 2004. These produce identical results, with measured excess delay at 1.4 minutes per kilometre in both surveys. This is close to the pre-charging reference value of 1.5 minutes per kilometre. The 2004 surveys are therefore suggesting that conditions on the main radial approaches to the zone have become more congested than in 2003, and are now only marginally less congested than conditions before charging was introduced in 2002.

Figure 6 Congestion on main radial routes approaching the charging zone during charging hours.

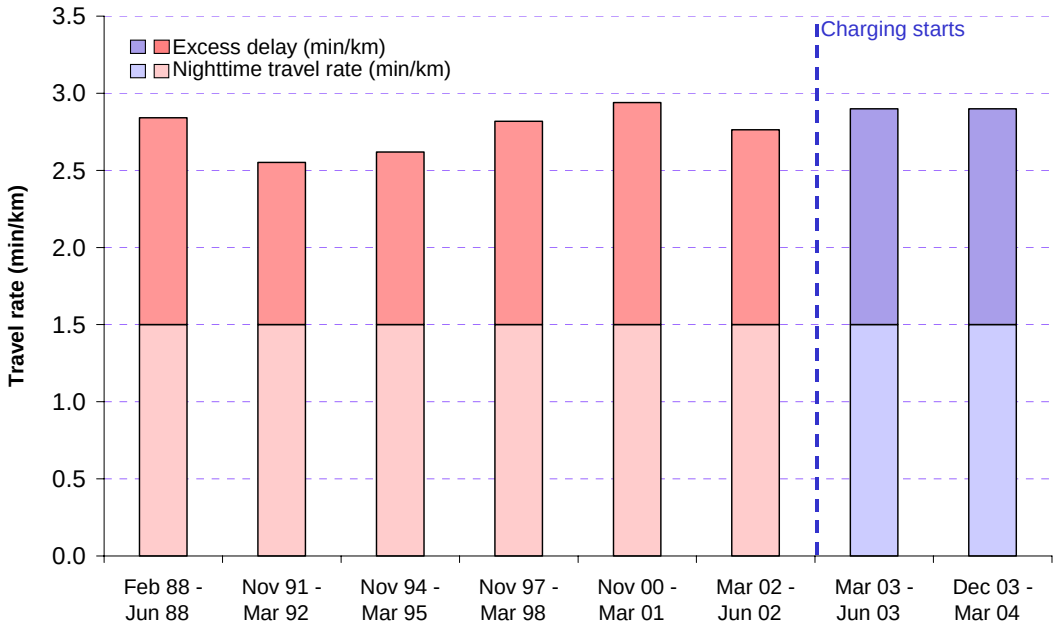


2.5 Congestion on main roads in inner London

Inner London in this context covers the network of main roads outside of the Inner Ring Road and its immediate environs, but within the North and South Circular Roads. TfL expected some reductions in congestion in inner London outside the congestion charging zone. These would arise from reduced overall traffic volumes, reflecting lower volumes of travel to and from the zone.

The Department for Transport (DfT) have measured night-time travel rates in inner London at 1.5 minutes per kilometre. TfL estimated representative pre-charging levels of congestion (i.e. excess delays) during charging hours to be 1.3 minutes per kilometre. Since the introduction of the scheme, two further inner London speed surveys have been carried out (Figure 7).

Figure 7 Congestion on main roads in inner London 1988 to 2004. Charging hours equivalent.

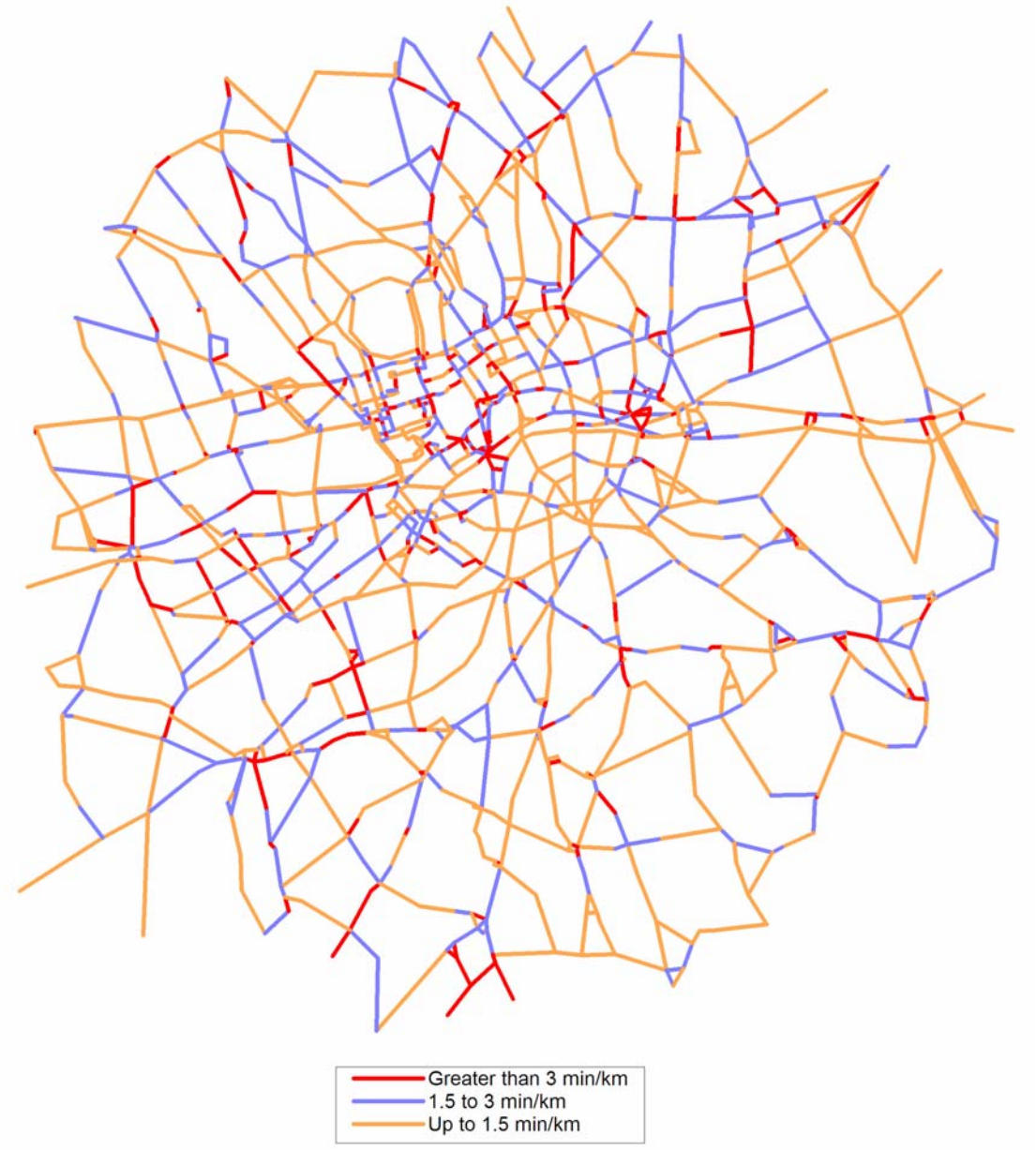


Both post-charging surveys return identical values for congestion in inner London, at 1.4 minutes per kilometre, slightly higher than the 'representative' pre-charging value of 1.3 minutes per kilometre. As described in Section 3, observed traffic volume changes in inner London following the introduction of charging have been broadly consistent with TfL's expectations. It is therefore unlikely that traffic changes associated with charging have been a primary factor in determining outturn congestion trends on major roads in inner London.

2.6 Patterns of congestion

Figure 8 shows the pattern of congestion across central and inner London since the introduction of charging. It is based on an average of several representative surveys from 2003 and 2004, and therefore gives a good spatial perspective of prevailing congestion patterns. It does not, however, take into account the absolute effect of congestion on drivers, as the size of the traffic flow experiencing congestion is not represented.

Figure 8 **Excess delay (minutes per kilometre) during charging hours in central and inner London. Average of March to June 2003 and December 2003 to March 2004 surveys.**



2.7 Future developments

In common with other local authorities, TfL has recently been provided with speed and congestion data from ITIS Holdings under a Department for Transport initiative. This uses Global Positioning System (GPS) satellite data to track appropriately equipped vehicles on a continuous basis.

In principle this will allow much more detailed analysis of congestion patterns. TfL is currently examining these data to see how they compare with established moving car observer speed survey methods.

3 Traffic patterns

3.1 Introduction

This section reviews the trends in traffic activity in and around the charging zone during 2004. It builds upon the analysis presented in TfL's *Second Annual Monitoring Report* and provides a perspective on two years of operation of congestion charging in central London.

Summary of key findings for 2003

Congestion charging was expected to deliver decongestion benefits by reducing the volume of traffic entering and circulating within the charging zone during charging hours. After one year of operation in early 2004, TfL observed that:

- Traffic had adjusted rapidly to the introduction of the scheme. There had been few operational traffic problems, and post-charging traffic patterns had remained relatively stable throughout 2003.
- Traffic circulating within the charging zone had reduced by 15 percent during charging hours (vehicle-kilometres driven by vehicles with four or more wheels). Traffic entering the charging zone during charging hours had reduced by 18 percent for vehicles with four or more wheels. Both of these outcomes were at the top end of the range of TfL's prior expectation.
- Although overall increases in traffic had been observed on the Inner Ring Road, these were smaller than TfL had expected and were not leading to traffic operational problems on this key diversionary route.
- There was no systematic evidence of increased traffic outside the scheme's operational hours or in the area surrounding the charging zone, and the balance of evidence pointed to overall 'background' declines in traffic in central and inner London.
- On a sample of local roads in boroughs in and around the charging zone no significant changes in overall traffic levels had been observed.

Traffic trends in 2004

TfL's traffic monitoring has continued throughout 2004, providing a comparable set of indicators to those available for 2003 (post-charging) and 2002 (pre-charging). Key findings for 2004 are that:

- Traffic patterns in and around the charging zone have remained broadly stable throughout 2004. The main indicators of traffic volumes are generally comparable to those recorded in 2003. The traffic changes observed with the introduction of charging have been maintained.
- The total volume of traffic entering the charging zone during charging hours in 2004 was almost identical to 2003, still representing a reduction of 18 percent against 2002 pre-charging levels.
- Available indicators of traffic circulating within the charging zone for 2004 again suggest broadly stable or slightly declining traffic levels. However,

roadworks and other changes to the network have affected the comparability of these counts, which therefore need to be interpreted with care.

- Measured vehicle-kilometres driven on the Inner Ring Road fell very slightly during 2004, compared to 2003.
- Volumes of radial traffic approaching the charging zone during 2004 across a cordon surrounding central London were almost identical to those recorded in 2003 following the introduction of the scheme.
- Analysis of longer-term traffic trends in the rest of Greater London points to overall 'background' reductions in traffic levels dating from the late 1990s. Although not connected with charging, these trends allow greater clarity in interpreting the role of charging in traffic change in London.
- Traffic levels on a sample of local roads in boroughs in and around the charging zone decreased slightly overall in 2004 compared to 2003, again suggesting an absence of any detrimental changes to traffic on roads immediately outside of the charging zone, and reflecting broader traffic trends in inner London.

3.2 Traffic entering and leaving the charging zone

Comprehensive counts of traffic entering and leaving the charging zone across all road-based entry and exit points are conducted each Spring and Autumn. The combined counts provide an 'annualised' estimate of traffic volumes for each year, i.e. the average of Spring and Autumn counts in each year. Similar counts have also been conducted at other times.

Figure 9 Traffic entering the charging zone during charging hours.

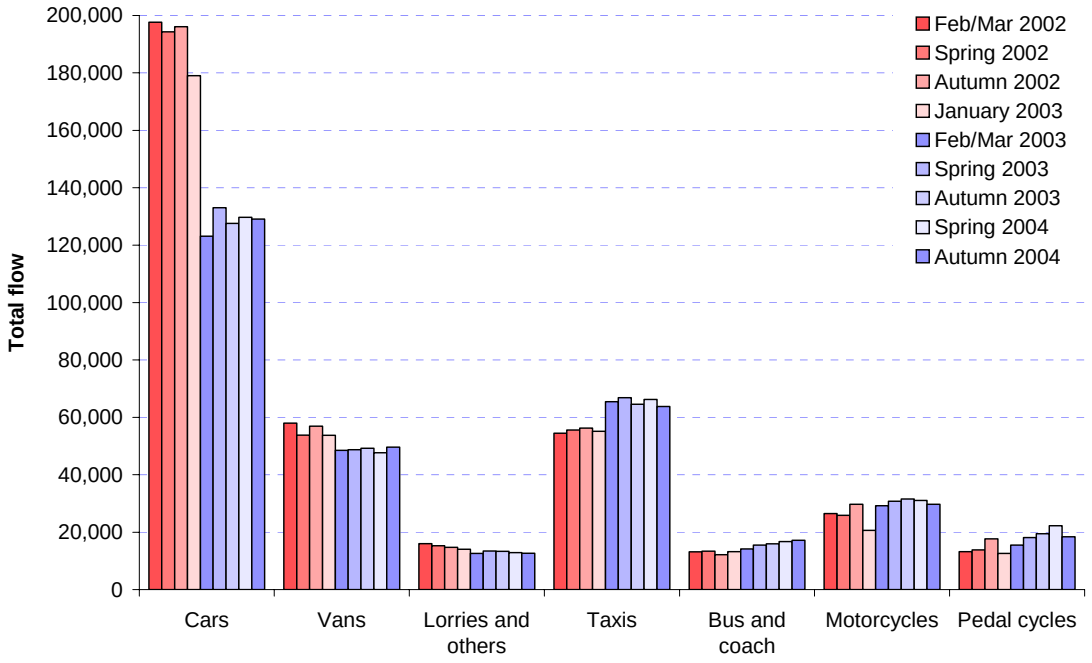


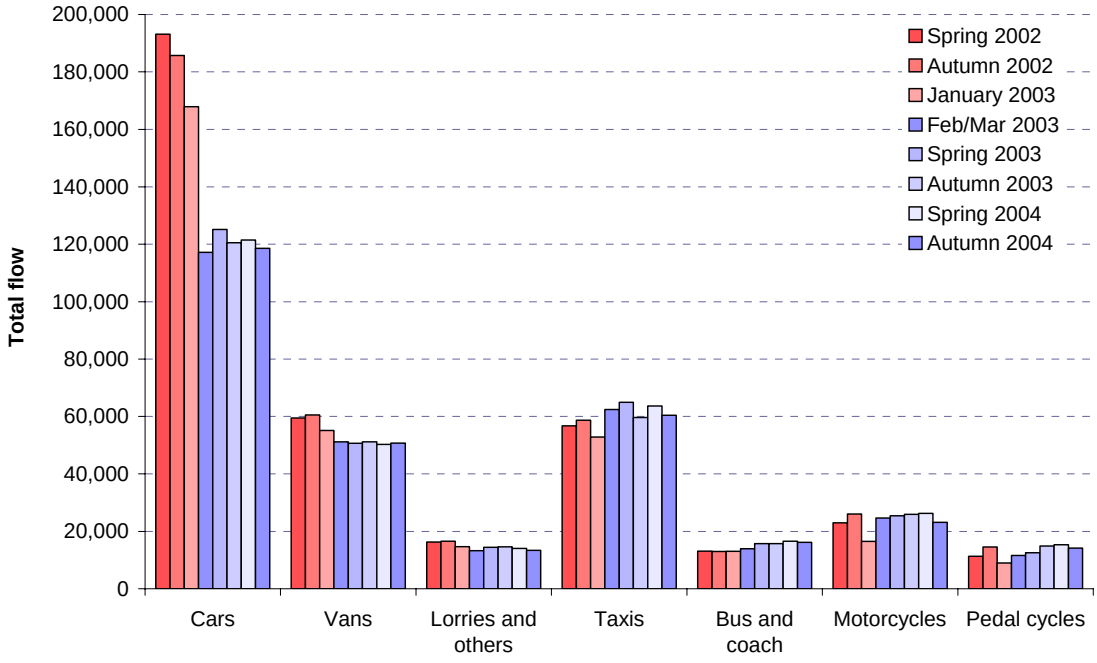
Figure 9 shows results from both the Spring and Autumn 2004 counts for traffic entering the zone, compared with equivalent counts for 2003 (post-

charging) and 2002 (pre-charging). Note that other pre-charging counts were also taken in 2002 and 2003. It is seen that levels of traffic overall, and for most of the individual vehicle types, have been very similar in 2004 to those observed in 2003. Therefore the overall changes to traffic entering the zone after the introduction of charging have been maintained.

For all traffic, and for vehicles with four or more wheels, the 2004 annualised estimate for vehicles entering the charging zone during weekday charging hours is effectively identical to that for 2003, at 323,000 and 273,000 vehicles respectively.

Very similar trends in total traffic and for the individual vehicle types have also been observed for traffic leaving the charging zone (Figure 10).

Figure 10 Traffic leaving the charging zone during charging hours.



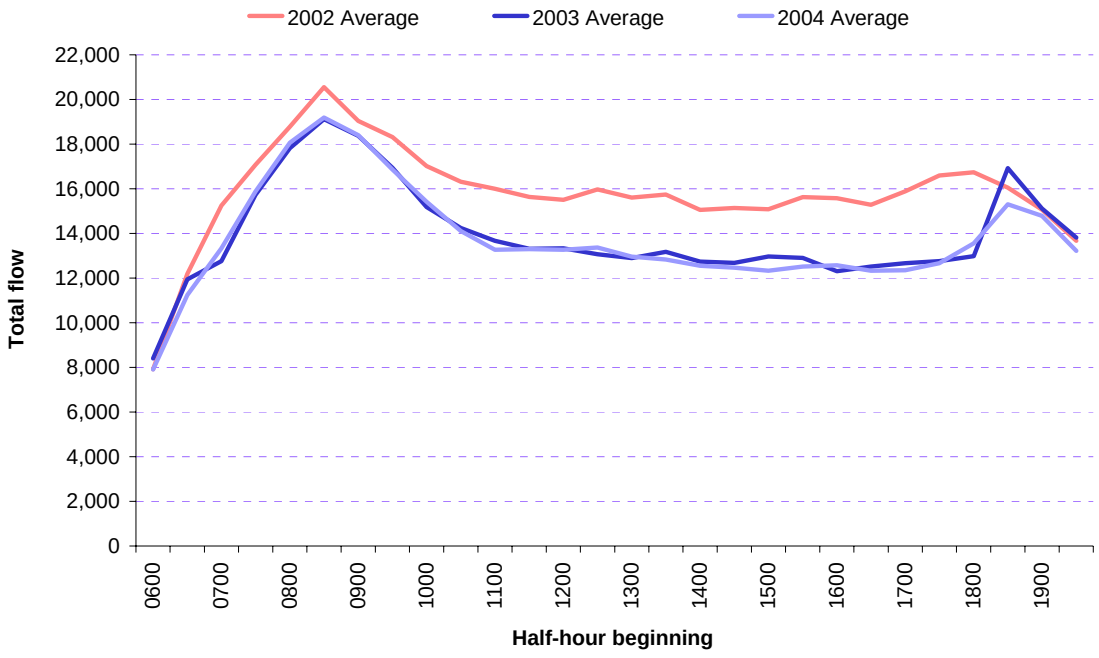
Within these overall totals, volumes of cars and vans crossing into and out of the charging zone are little changed compared with 2003 (Figure 11). There is some evidence of further declines in lorries, and of continued increases in buses and coaches and pedal cycles, although the changes between 2003 and 2004 are not generally statistically significant.

Figure 11 Key changes in traffic entering and leaving the charging zone during charging hours. Annualised weekday for 2002 (pre-charging), and 2003 and 2004 (post-charging).

Vehicle type	Change in inbound traffic **2003 versus 2002**	Change in outbound traffic **2003 versus 2002**	Change in inbound traffic **2004 versus 2003**	Change in outbound traffic **2004 versus 2003**
All vehicles	-14%	-18%	0%	-1%
Four or more wheels	-18%	-21%	0%	-1%
Potentially chargeable	-27%	-29%	-1%	-2%
Cars	-33%	-35%	-1%	-2%
Vans	-11%	-15%	-1%	-1%
Lorries and other	-11%	-12%	-5%	-5%
Licensed taxis	+17%	+8%	-1%	0%
Buses and coaches	+23%	+21%	+8%	+4%
Powered two-wheelers	+12%	+5%	-3%	-4%
Pedal cycles	+19%	+6%	+8%	+8%

Various presentations and analyses of these data are possible. Figure 12 shows how volumes of traffic entering the charging zone are distributed across the day. Noting that the 'counting day' extends either side of the charging hours (from 06.00 to 20.00 hours) and that the three lines represent 'annualised' counts for 2002, 2003 and 2004, the effect of charging in reducing traffic levels is clear.

Figure 12 Traffic entering the charging zone by time of day. Annualised weekday for 2002 (pre-charging), and 2003 and 2004 (post-charging).

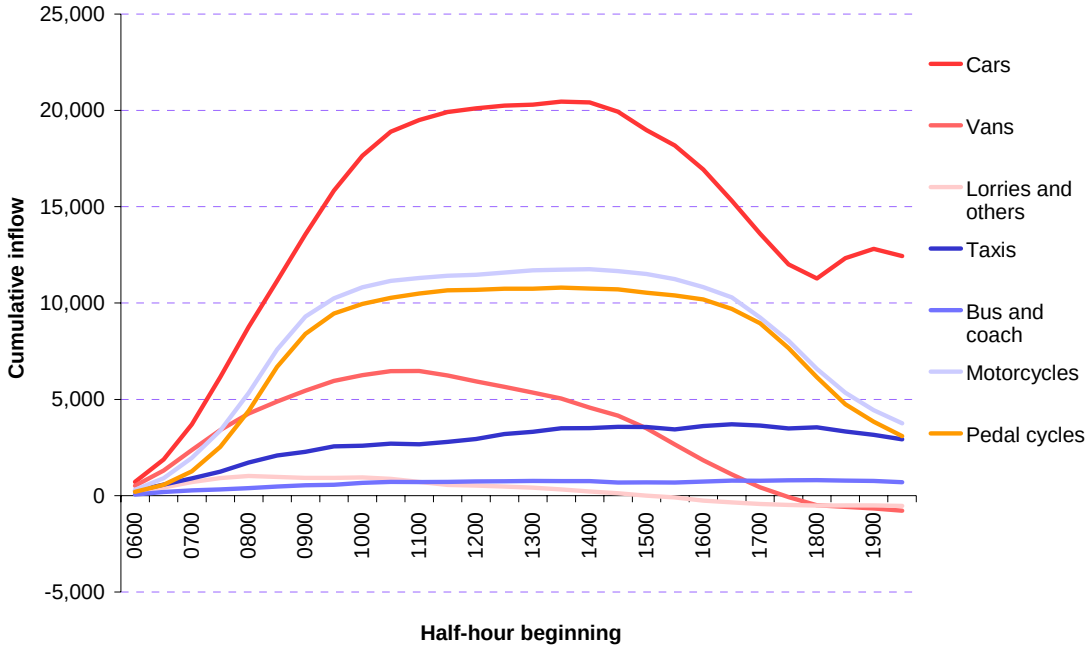


Across the whole of charging hours for 2003 and 2004, total volumes of entering traffic are substantially lower than recorded in 2002. The scale of the reduction tends to increase as the charging day progresses, being greatest in the late afternoon.

After charging hours (from 18.30) volumes of traffic entering the zone rapidly return to pre-charging levels, although it is notable that the early evening inflow in 2004 was marginally less than in both 2002 and 2003. Post-charging inbound traffic volumes at this time were no greater than in 2002, showing no evidence of drivers 'lurking' around the charging zone boundary awaiting the end of charging hours. Also, because the volumes of traffic circulating within the charging zone at 18.30 are substantially lower than before charging, decongestion benefits during this evening period are also to be expected (see Section 2).

Figure 13 looks at the cumulative number of vehicles that are present in the charging zone across the counting day for the combined Spring and Autumn 2004 boundary counts. It is based on the cumulative difference of inbound and outbound movements and so does not include 'internal' vehicles that are present throughout the counting day.

Figure 13 Balance between vehicle inflows and outflows. Traffic crossing the charging zone boundary, annualised counts for 2004.



This form of analysis, which is primarily useful for count validation purposes, takes as a starting point the artificial assumption that there are no vehicles already within the charging zone at 06.00. There is a gradual 'accumulation' of vehicles within the zone during the morning, as inflows exceed outflows. The reverse of this pattern occurs during the afternoon and evening, as outflows exceed inflows. It is nevertheless important to realise that the implied accumulations shown are only part of the story. There are vehicles already within the zone at 06.00 (for example, those of residents), and individual

vehicles (for example, buses) may cross into and out of the charging zone many times during the counting day.

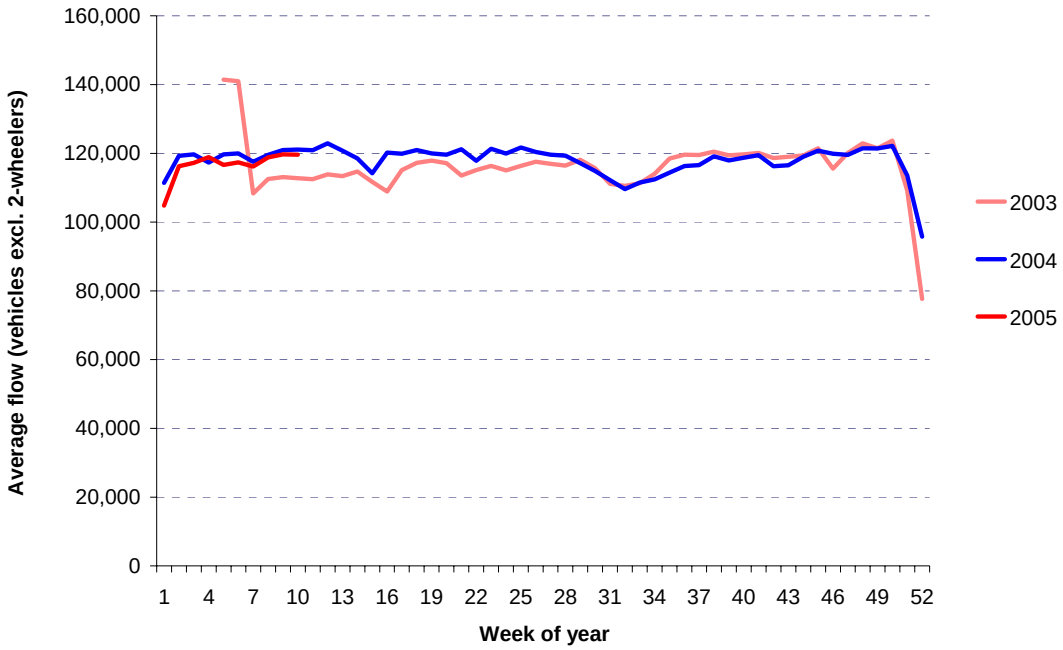
The graphic nevertheless displays several interesting features:

- Most vehicle types display curves of the expected form, with net inflows in the morning period and net outflows in the afternoon.
- For most vehicle types, there remain positive cumulative inflows at the end of the counting day (20.00), although these are small in relation to the total number of vehicles that enter the zone over the counting day. This is reasonably explained on the basis that the remainder of the evening would be expected to see continued net outflows of vehicles from the zone.
- At the end of charging hours, cars again see net inflows, reflecting the increase in inbound traffic displayed in Figure 12 (above).
- Curves for pedal cycles and powered two-wheelers are both very similar and closest to what would be the 'expected' pattern, reflecting the strong association of these modes with commuting trips during the two peak periods.
- Vans and lorries show net outflows after mid-day, both vehicle types ending the day with small negative cumulative inflows. This again reflects the previously observed concentration of trips by these vehicles in the morning period, including the night-time period before charging starts (see TfL's *First Annual Monitoring Report*).
- Buses and coaches show a relatively consistent balance between inbound and outbound crossings across the counting day, reflecting the organised service pattern for many of these vehicles. Taxis show a consistent small net inflow, again reflecting the trip characteristics of these vehicles over the counting day.

In addition to these periodic full manual traffic counts, traffic entering the charging zone is monitored on a continuous basis using permanent automatic counters at sixteen of the busier 'gateways', i.e. inbound routes just inside the Inner Ring Road. These collectively account for over 40 percent of traffic entering the zone during the morning peak period. Although they are therefore biased towards the busier roads, and two-wheeled vehicles are not included in these counts, they nevertheless provide a good indicator of both short- and long-term variations in traffic entering the zone.

Figure 14 shows weekly average flows during charging hours at these 16 gateways since shortly before charging began in early 2003. Complete data are available for every week up until early March 2005. Taking expected seasonal effects into account (for example Christmas and summer holiday periods), the overall picture is again of continued stability in this key indicator of traffic entering the charging zone. Inbound flows (vehicles with four or more wheels) are typically 15 percent lower than before the start of charging. This indicator closely corroborates the periodic manual counts described above, and is also very similar to trends in congestion charging payments, as described in Section 10.

Figure 14 Traffic entering the congestion charging zone across 16 busier inbound gateways. Weekday average flows, charging hours, vehicles with four or more wheels.



3.3 Traffic circulating within the charging zone

TfL previously reported a decrease of 15 percent in vehicle-kilometres driven within the charging zone (vehicles with four or more wheels, during charging hours), comparing annualised estimates for 2003 with equivalent estimates for 2002. This was at the top end of the range of TfL's prior expectation of between 10 and 15 percent. This finding was confirmed by an independent study undertaken by the Association of London Government (ALG) during 2004.

During 2004 TfL carried out equivalent counts within the charging zone to those undertaken during 2002 and 2003, providing comparable estimates of vehicle-kilometres driven and other supporting indicators.

Figure 15 summarises the results of the 2004 vehicle kilometre calculations by vehicle type.

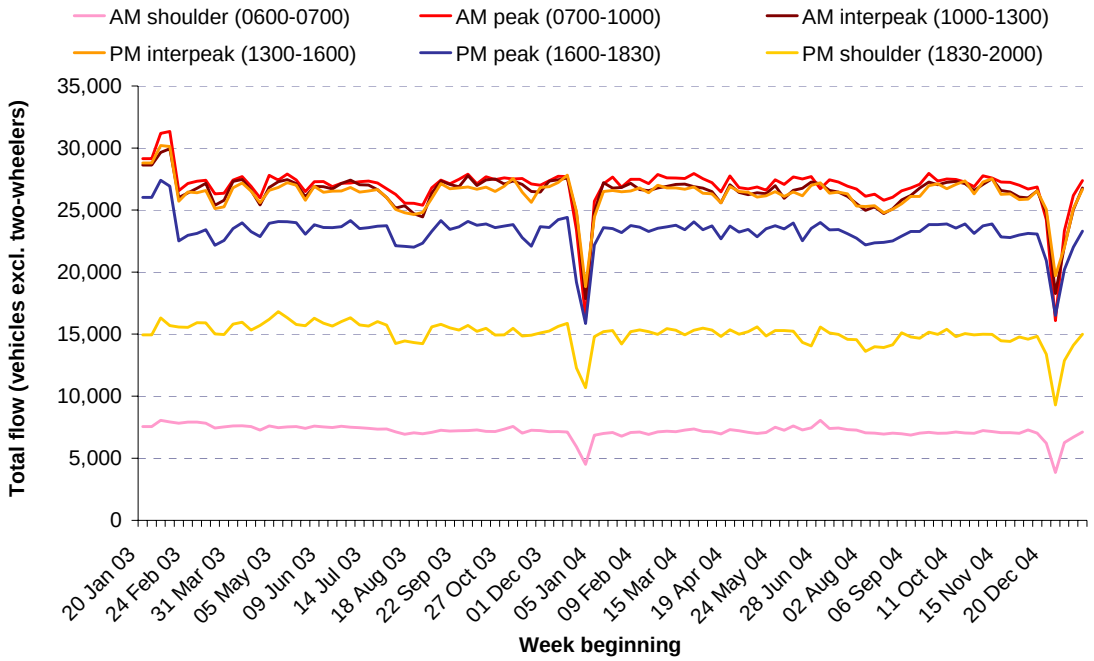
Figure 15 Vehicle-kilometres driven within the charging zone during charging hours, including percentage share of traffic. Annualised weekday for 2002, 2003 and 2004.

Vehicle type	2002 vkm (millions)		2003 vkm (millions)		2004 vkm (millions)		% change 02 to 03	% change 03 to 04
All vehicles	1.64	100%	1.45	100%	1.38	100%	-12%	-5%
Four or more wheels	1.44	88%	1.23	84%	1.16	84%	-15%	-6%
Potentially chargeable	1.13	69%	0.85	58%	0.80	58%	-25%	-6%
Cars	0.77	47%	0.51	35%	0.47	34%	-34%	-7%
Vans	0.29	18%	0.27	19%	0.26	19%	-5%	-4%
Lorries and other	0.07	4%	0.07	5%	0.06	5%	-7%	-8%
Licensed taxis	0.26	16%	0.31	21%	0.29	21%	+22%	-7%
Buses and coaches	0.05	3%	0.07	5%	0.07	5%	+21%	+5%
Powered two-wheelers	0.13	8%	0.14	9%	0.13	10%	+6%	-2%
Pedal cycles	0.07	4%	0.09	6%	0.09	7%	+28%	+4%

This indicator suggests that volumes of traffic circulating within the charging zone fell between 2003 and 2004 by a further 5 percent overall (6 percent for vehicles with four or more wheels). This indicated change is fairly consistent for all charging daytime periods and each of the major vehicle types, with the exception of buses and coaches and pedal cycles, which both registered small increases.

This result is unexpected, as generally the other indicators reported in this section are suggesting relatively stable traffic volumes in and around the charging zone. This includes continuous data since early 2003 from a representative sample of 15 permanent automatic traffic counters located within the charging zone (Figure 16). However it is also important to recognise the precision associated with this estimate such that, statistically, the indicated decline for all traffic (5 percent) could lie anywhere within the range minus 1 percent to minus 10 percent (at the 95 percent confidence level).

Figure 16 Traffic circulating within the charging zone as measured by a sample of 15 permanent counting sites. Average weekly flows, charging hours, vehicles with four or more wheels by time period.



These data indicate a general stability of post-charging traffic levels, with known 'seasonal' effects such as the Christmas holiday period. This stability is consistent across all time periods of the day.

Although the two indicators in Figures 15 and 16 are not directly comparable, for periods equivalent to those covered by the vehicle-kilometre count dataset, the data from automatic counters indicate a decrease of 1 percent between 2003 and 2004 (absolute flows, vehicles with four or more wheels). This indicator relates to a smaller, but nevertheless representative, selection of sites; but comparisons based on it have an indicative statistical precision of tighter than plus/minus 1 percent at the 95 percent confidence level.

The 2004 vehicle-kilometre counts have therefore been examined in more detail. It is clear from Figure 17 that, whilst the overall balance of the comparison suggests a decrease from 2003 to 2004, the largest percentage changes occur on the relatively small sample of manually-counted minor roads that are included in this stratified-random sample. It is also apparent that the total number of vehicles recorded across all 42 sites in the two years are rather more comparable than suggested by the vehicle-kilometre estimates, suggesting a decrease of just 3 percent. Note that the equivalent figure for the change from 2002 to 2003 was 11 percent, and that vehicle-kilometre calculations involve differential weighting by road type.

Figure 17 Characteristics of 2003 and 2004 internal charging zone traffic counts. Weekday charging hours, annualised total flows (vehicles with four or more wheels) for all sites within category, by road type.

Site Group	No.	2003 average	2004 average	Change (%)
TLRN roads (M)	8	16,235	15,773	-3%
TLRN roads (A)	4	19,027	18,231	-4%
A roads (M)	9	10,660	11,096	+4%
A roads (A)	7	9,352	8,828	-6%
Minor roads (M)	4	851	658	-23%
Minor roads (A)	4	1,598	1,598	0%
Thames Bridges (M)	3	18,907	17,466	-8%
Thames Bridges (A)	3	16,815	17,260	+3%
Total	42	93,445	90,910	-3%

Note: (A) are automatic traffic counts (M) are manual traffic counts.

Because the large majority of roads within the charging zone are classified as ‘minor roads’, the ‘scaling factor’ applied to these sites in arriving at an overall estimate of vehicle-kilometres driven is relatively large, even though each minor road only contributes a small proportion of the total circulating traffic. Furthermore, traffic flows on low-flow roads are known to be more variable on a day-to-day basis than more major roads, and there is some evidence that the 2004 counts may have been affected by roadworks in the vicinity of some of the minor road survey sites, thus temporarily reducing flows.

A similar analysis has been undertaken for the inbound and outbound gateway counts referred to above, primarily to explore further how flows have changed by road type. It is possible, for example, that overall reductions in traffic have made the more major roads relatively more attractive, thereby leading over time to further abstraction of traffic from the minor roads. This comparison is summarised in Figure 18 (with roads categorised both by class and flow volume, all counts being manual counts).

Figure 18 Characteristics of 2003 and 2004 inbound and outbound counts of traffic crossing the charging zone boundary. Weekday charging hours, annualised total flows by road type and flow volume.

Site group	No.	2003 total	2004 total	Change (%)
Inbound TLRN	9	76,568	74,401	-3%
Inbound A roads	18	125,768	127,690	+2%
Inbound minor roads	88	121,617	120,505	-1%
Total inbound	**115**	**323,952**	**322,596**	**0%**
Outbound TLRN	7	62,234	58,578	-6%
Outbound A roads	20	129,251	131,665	+2%
Outbound minor roads	100	116,997	114,684	-2%
Total outbound	**127**	**308,482**	**304,926**	**-1%**
Inbound <1,000	59	21,640	21,103	-2%
Inbound 1,000 - 2,500	15	24,228	23,786	-2%
Inbound 2,500 - 5,000	19	71,319	70,693	-1%
Inbound 5,000 - 10,000	14	108,069	107,848	0%
Inbound >10,000	8	98,696	99,168	0%
Total inbound	**115**	**323,952**	**322,596**	**0%**
Outbound <1,000	70	25,219	22,535	-11%
Outbound 1,000 - 2,500	17	27,156	27,609	+2%
Outbound 2,500 - 5,000	18	69,894	65,834	-6%
Outbound 5,000 - 10,000	18	132,904	133,058	0%
Outbound >10,000	4	53,309	55,891	+5%
Total outbound	**127**	**308,482**	**304,926**	**-1%**

With the exception of outbound flows on very low-flow roads, this comparison suggests that, at least at the gateways, there have been no significant further abstraction of traffic from minor roads between 2003 and 2004. The comparison is nevertheless of itself informative.

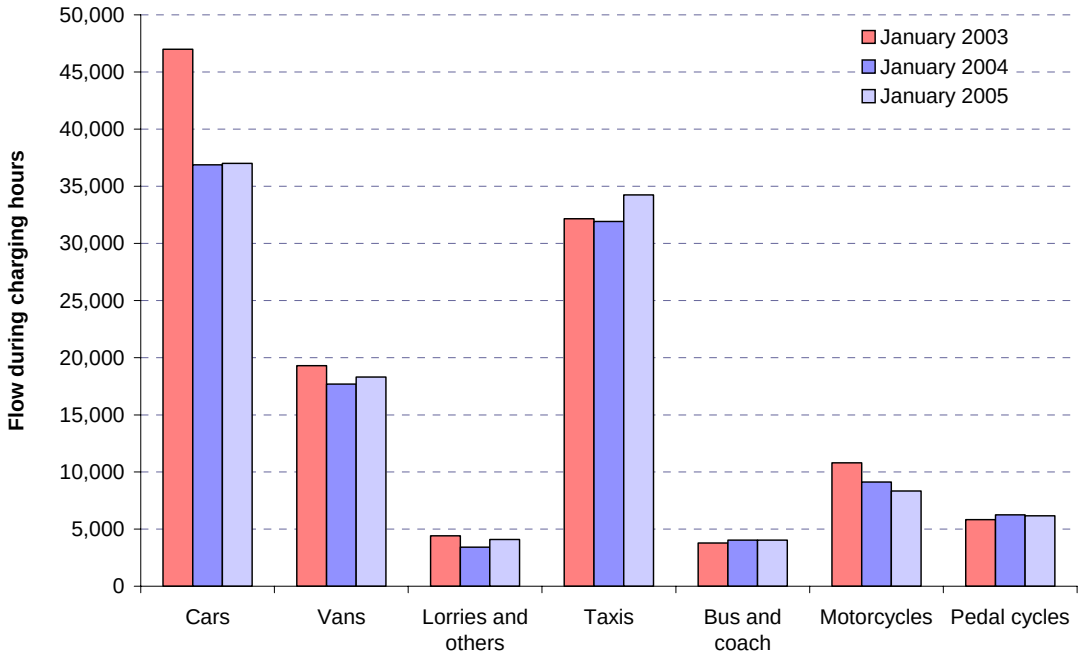
Other indicators of traffic within the charging zone are provided by counts of traffic across the six Thames bridges inside the charging zone (the Thames screenline), and also in relation to the portion of the TfL Northern screenline that lies within the charging zone to the north of the Thames.

For the Thames screenline, annualised counts for 2004 (which partly overlap with those referred to in Figure 17) are indicating a small increase of 2 percent over 2003 post-charging flows (for all vehicles), a 1 percent decrease in vehicles with four or more wheels, and a larger 5 percent reduction in potentially-chargeable vehicles (cars, vans and lorries). None of these changes are statistically significant at the 95 percent level, and the conclusion from this count must be that traffic levels crossing the Thames within the charging zone have been broadly stable, or perhaps (with the exception of two-wheeled vehicles) have declined slightly overall, between 2003 and 2004.

Northern screenline counts are taken in January of each year and the observed trends at this screenline are summarised in Figure 19. Overall, the January 2005 counts indicate (in comparison with January 2004 post-

charging) small increases in all vehicles (3 percent), vehicles with four or more wheels (4 percent) and potentially-chargeable vehicles (2 percent), although again these changes are generally not statistically significant.

Figure 19 Flows across the Northern screenline within the charging zone. January 2003, 2004 and 2005 compared.



The available evidence for charging zone traffic flows in 2004 is therefore somewhat inconclusive. The balance of available indicators are suggestive of small further declines in circulating traffic compared to the first year after charging in 2003. However, specific indicators are suggestive of stability or even small increases in circulating traffic.

TfL's view, considering all of the available evidence, is that charging zone traffic in 2004 has probably declined slightly, by between perhaps 1 and 3 percent, compared to the first year after charging in 2003.

3.4 Traffic on the Inner Ring Road

The Inner Ring Road forms the boundary of the charging zone and is the most obvious alternative route for through traffic wishing to avoid paying the charge. TfL expected that the scheme would result in some increases in traffic on this route, but that these increases would be dealt with by better operational management, such that overall congestion levels would remain broadly unchanged.

Comparing 2003 (post-charging) with 2002 (pre-charging), TfL had previously reported overall increases in vehicle-kilometres of 4 percent for all vehicles, and 1 percent for vehicles with four or more wheels. It was noted that these measured changes were towards the lower end of TfL's range of prior expectation, and that measured congestion on the Inner Ring Road had

actually reduced, due primarily to the implementation of effective traffic management on this key route (see Section 2).

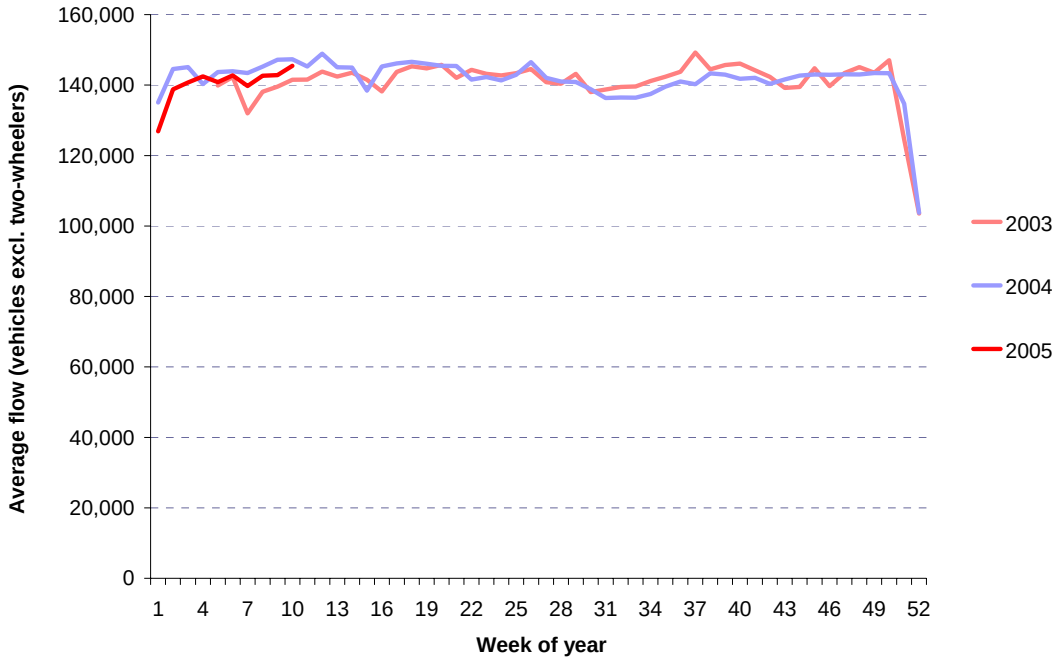
Measurements taken during 2004 suggest that traffic on the Inner Ring Road during weekday charging hours has declined very slightly overall compared to 2003. Overall recorded decreases of 2 percent for potentially-chargeable vehicles, 1 percent for vehicles with four or more wheels and 2 percent for all vehicles are too small to be statistically significant, albeit with some larger indicated changes for certain individual vehicle types and specific sites. These findings therefore broadly correspond to changes in other indicators described in this section.

Figure 20 Vehicle-kilometres driven on the Inner Ring Road during charging hours. Annualised weekday for 2002 (pre-charging) compared to 2003 and 2004 (post-charging).

Vehicle type	2002 vkm (millions)	2003 vkm (millions)	2004 vkm (millions)	Change (%) 03 to 04
All vehicles	0.65	0.68	0.66	-2%
Four or more wheels	0.61	0.62	0.61	-1%
Potentially chargeable	0.51	0.50	0.51	+2%
Cars	0.37	0.35	0.35	+3%
Vans	0.10	0.12	0.12	+1%
Lorries and other	0.04	0.04	0.04	-6%
Licensed taxis	0.08	0.09	0.07	-16%
Buses and coaches	0.02	0.03	0.03	0%
Powered two-wheelers	0.03	0.04	0.04	-7%
Pedal cycles	0.01	0.01	0.01	-14%

Data from permanent automatic counters located around the Inner Ring Road show a very similar picture, of comparative and continuing stability in total traffic flows (Figure 21).

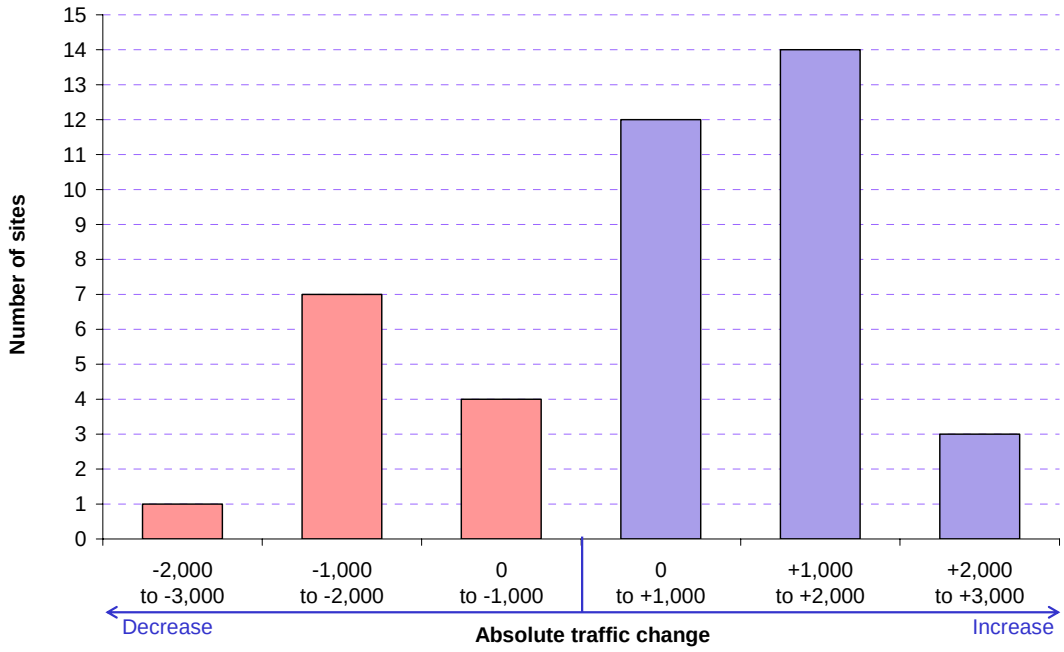
Figure 21 Traffic volumes on the Inner Ring Road. Weekday average flows, charging hours, vehicles with four or more wheels. Selection of one-way permanent monitoring sites.



It was noted in TfL's *Second Annual Monitoring Report* that aggregate traffic changes on the Inner Ring Road subsumed changes of larger magnitude at the more local scale.

Figure 22 is a frequency distribution showing the absolute change in traffic volume (vehicles with four or more wheels, charging hours only) across all 41 available Inner Ring Road survey sites. This compares traffic levels in 2002 against the average of post-charging flows recorded in both 2003 and 2004. For the purposes of clarity a site particularly affected by the Shoreditch Triangle scheme is excluded. Here, although the balance of the distribution is towards sites experiencing growth, the absolute amounts involved are comparatively small, considering that the mean 2002 flow across all sites was over 13,000 vehicles per day (range 2,000 to 32,000, vehicles with four or more wheels).

Figure 22 Frequency distribution of absolute change in directional traffic flows across 41 survey sites on the Inner Ring Road. 2002 compared to average of 2003 and 2004, vehicles with four or more wheels, charging hours.



TfL therefore concludes that, although congestion charging and related infrastructure changes clearly resulted in some redistribution of traffic on individual links during 2003, traffic volumes as a whole on the Inner Ring Road continue to show only small overall increases compared to pre-charging conditions in 2002.

3.5 Radial traffic approaching the charging zone

TfL expected that congestion charging would lead to a reduction in radial traffic on routes in inner London approaching the charging zone, particularly by cars. This would be a result of fewer journeys to and from other parts of London being made to and from the charging zone. The primary indicator of this impact is TfL's Central London cordon, for which a lengthy time-series of data exists. This cordon was modified for congestion charging monitoring purposes in 2002 to lie wholly outside of the charging zone. The following comparisons are based on this modified version of the cordon.

For 2003, TfL had reported overall reductions of 5 percent in total inbound traffic against pre-charging levels in 2002. It was noted that cars had reduced by 12 percent (since revised downwards slightly to 11 percent). Equivalent changes for the outbound direction were again 5 percent and 12 percent. Since they were first reported, the 2003 counts have been subject to minor corrections as they did not fully reflect network changes to the south of the charging zone. However, these corrections do not significantly affect the comparisons previously reported.

In interpreting these changes, TfL noted that whilst the overall magnitudes were consistent with the expected congestion charging impacts, they had also

to be seen against data from earlier years, which were indicating year-on-year declines of between 6 and 7 percent in total traffic at this cordon. It was not therefore possible in 2003 to determine the extent to which the observed reductions were related to congestion charging.

Figure 23 summarises the changes observed at this cordon between both 2002 and 2003, and 2003 and 2004. Overall, between 2003 and 2004, total traffic has declined by 1 percent in both inbound and outbound directions. This is consistent with indicators reported elsewhere in this section, but this change is not statistically significant. Radial traffic crossing this cordon to and from the charging zone has therefore effectively remained unchanged between 2003 and 2004.

Figure 23 Traffic changes at the TfL Central London cordon (extended version wholly outside the charging zone).

	Change in inbound traffic **2003 vs 2002**	Change in outbound traffic **2003 vs 2002**	Change in inbound traffic **2004 vs 2003**	Change in inbound traffic **2004 vs 2003**
All vehicles	-5%	-5%	-1%	-1%
Four or more wheels	-5%	-6%	-2%	-2%
Potentially chargeable	-8%	-9%	-1%	-2%
Pedal cycles	0%	+6%	+9%	+9%
Powered two-wheelers	0%	+3%	+3%	0%
Cars	-11%	-12%	0%	0%
Taxis	+10%	+11%	-9%	-2%
Buses and coaches	+20%	+24%	+2%	-3%
Light goods vehicles	+5%	+1%	-2%	-4%
Medium goods vehicles	-6%	-6%	-4%	-10%
Heavy goods vehicles	-7%	-3%	-14%	-15%

Given that congestion charging is a consistent factor between 2003 and 2004, the relative stability of this indicator tends to corroborate the picture of stable overall traffic levels reported elsewhere in this section. It is also notable that these results are, like several other indicators reported above, also suggesting further declines in goods vehicles and increases in pedal cycles during 2004.

3.6 Traffic on a sample of local roads surrounding the charging zone

Traffic on a sample of local roads surrounding the charging zone has been monitored at the request of individual boroughs. Figure 24 shows the average, seasonally adjusted traffic levels and year-on-year changes for all sites that have been monitored continuously and have comparable data.

These sites do not provide indicators of overall traffic change within a borough and will be affected by factors other than charging. However, they are collectively a useful indicator of traffic change on local roads surrounding the

charging zone that were thought likely to experience additional traffic as a result of the scheme.

In the first year after charging, monitored roads in Kensington and Chelsea, Southwark and Westminster experienced small net increases in traffic of between 2 percent and 6 percent. Monitored roads in Tower Hamlets and Camden saw net reductions of 4 percent and 6 percent respectively (all vehicles with four or more wheels).

In the second year after charging traffic on monitored roads has fallen further, by between 2 percent and 8 percent overall in all boroughs, with the exception of Kensington and Chelsea where there has been an increase of 1 percent (2004 annualised against 2003).

When comparing 2004 traffic levels with the year before charging (2002), there continue to be small net increases in Southwark, 4 percent, and Kensington and Chelsea, 5 percent, a 1 percent increase in Westminster, and noticeable decreases in Tower Hamlets, 7 percent, and Camden, 13 percent.

Figure 24 Traffic change on selected local roads surrounding the charging zone. Charging hours, vehicles with four or more wheels.

		Before charging 2003	After charging 2003	After charging 2004	Difference before and after 2003	Difference before and after 2004	Difference after 2003 and 2004
Southwark	Dunton Rd	9,000	9,700	10,100	+8%	+12%	+4%
	John Ruskin St	5,200	5,200	4,800	0%	- 8%	- 8%
	St James's Rd	15,100	16,000	15,500	+6%	+3%	- 3%
	Total	**29,200**	**30,900**	**30,300**	**+6%**	**+4%**	**- 2%**
Kensington & Chelsea	Abbotsbury Rd	6,600	6,700	6,300	+2%	- 5%	- 6%
	Addison Rd	4,600	4,900	4,900	+7%	+7%	0%
	Holland Park Ave	24,500	25,500	26,500	+4%	+8%	+4%
	Kensington Church St	11,900	13,500	13,200	+13%	+11%	- 2%
	Kensington High St	14,900	15,100	16,000	+1%	+7%	+6%
	North Pole Rd	13,000	13,200	12,400	+2%	- 5%	- 6%
	Total	**75,300**	**78,600**	**79,000**	**+4%**	**+5%**	**+1%**
Tower Hamlets	Bethnal Green Rd	8,700	8,200	8,200	- 6%	- 6%	0%
	Bow Common Lane	7,000	7,300	7,400	+4%	+6%	+1%
	Old Bethnal Green Rd	6,400	5,100	4,500	- 20%	- 30%	- 12%
	Poplar High St	5,000	5,300	5,200	+6%	+4%	- 2%
	Total	**26,900**	**25,800**	**25,100**	**- 4%**	**- 7%**	**- 3%**
Camden	Agar Grove	9,600	9,300	9,800	- 3%	+2%	+5%
	Warren St	1,800	1,800	1,700	0%	- 6%	- 6%
	Tavistock Place	9,900	8,800	6,400	- 11%	- 35%	- 27%
	Prince of Wales Rd	12,400	12,400	12,000	0%	- 3%	- 3%
	Prince Albert Rd	13,000	11,600	10,800	- 11%	- 17%	- 7%
	York Way	9,500	8,800	8,100	- 7%	- 15%	- 8%
	Total	**55,800**	**52,500**	**48,500**	**- 6%**	**- 13%**	**- 8%**
Westminster	Belgrave Rd	5,300	5,700	5,700	+8%	+8%	0%
	Prince Albert Rd	15,800	15,400	15,100	- 3%	- 4%	- 2%
	St George's Drive	4,700	4,800	4,800	+2%	+2%	0%
	St John's Wood Rd	13,100	14,200	13,600	+8%	+4%	- 4%
	Sussex Gardens	12,700	12,900	13,500	+2%	+6%	+5%
	West Carriage Drive	16,800	17,100	16,200	+2%	- 4%	- 5%
	Total	**68,200**	**69,900**	**68,600**	**+2%**	**+1%**	**- 2%**
All sites	**Total**	**255,200**	**257,400**	**251,300**	**+1%**	**- 2%**	**- 2%**

There have also been a number of sites monitored periodically within the boroughs of Wandsworth, Lambeth and Hackney. Data for these sites showed that, after charging, there was no net change in traffic levels on monitored roads in Lambeth, alongside net decreases of 6 percent on monitored roads in Wandsworth and 8 percent in Hackney.

Equivalent figures for 2004 show very little change over 2003, with no net change from 2003 on monitored roads in Hackney, and net decreases of 2 percent over 2003 on monitored roads in Lambeth and Wandsworth.

Overall, these results again do not show any evidence of systematic increases in traffic on monitored local roads outside of the charging zone, and also indicate further small overall declines in traffic in the annulus around the charging zone between 2003 and 2004.

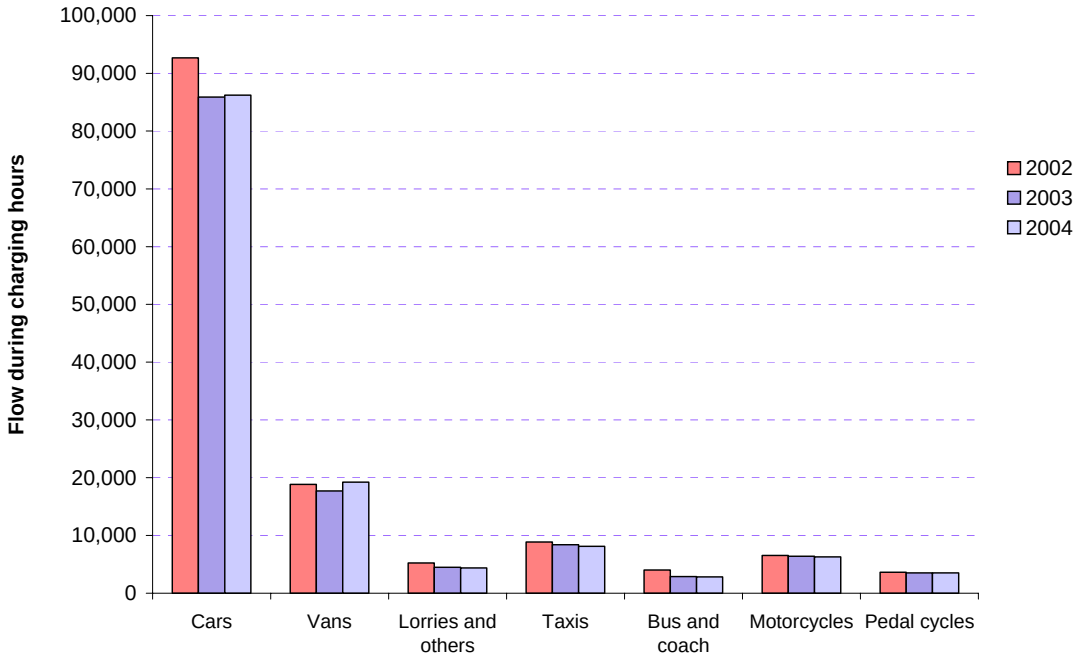
3.7 Wider orbital traffic in inner London

Some traffic previously making through journeys across the charging zone may have elected to divert to the wider network of orbital routes in inner London following the introduction of the scheme, potentially giving rise to small increases in traffic on these roads. To detect any changes, TfL established four radial screenlines extending outwards from the Inner Ring Road.

Comparing measurements for 2003 (post-charging) with 2002 (pre-charging), TfL previously reported stable or declining traffic flows across these screenlines. This finding seemed to reflect a general trend of background declines in traffic throughout inner London, as had been seen elsewhere in the data. There were no indications in 2003 of potentially adverse traffic changes resulting from the scheme.

In view of this finding, and proposals for a westwards extension to the charging zone, only the western screenline was surveyed in 2004. Results are shown in Figure 25.

Figure 25 Traffic change across the Western radial screenline. Autumn 2002, 2003 and 2004 compared.



The overall picture is of fairly uniform and relatively modest declines across all vehicle categories between 2002 (pre-charging) and 2003 (post-charging), and comparative stability between 2003 and 2004. The relatively large decline in buses and coaches recorded across this screenline between 2002 and 2003 has been attributed to technical issues relating to the 2002 (pre-charging) bus count at a specific site. TfL therefore concludes that the 2002 count for buses at this screenline is atypical, and that results from this screenline for 2003 and 2004 indicate generally stable orbital traffic in this part of west London.

3.8 Background traffic trends in London

Previous monitoring reports have referred to the need to consider 'background' trends for road traffic in London in any assessment of congestion charging impacts. In particular, available data for recent years are suggesting overall small declines in traffic across much of London, coupled with more intense declines in inner and central London since the late 1990s.

The monitoring data collected specifically for congestion charging in and around the charging zone made it clear that traffic adjusted both rapidly and in the expected magnitude to the introduction of charging in 2003. However, the extent to which this was influenced by – and contributed to – this longer-term picture was unclear.

Long-term traffic counts are conducted at three strategic cordons in London. These are:

- The London Boundary cordon, measuring traffic entering and leaving the Greater London area;

- The Inner London cordon, measuring traffic crossing a cordon roughly co-incident with the North and South Circular Roads and enclosing inner London;
- The Central London cordon, enclosing a wider definition of central London than the congestion charging zone and largely lying outside of the Inner Ring Road.

At the London Boundary Cordon, traffic grew on average by 2.2 percent per annum until the mid-1990s, in part influenced by the completion of the M25 orbital motorway around London in 1986. Thereafter, growth slowed to an annual average of 0.3 percent per annum.

At the Inner London Cordon, traffic grew at an average of 0.8 percent per annum up to 1990. Thereafter, traffic has fallen by an average of 0.3 percent per annum.

At the central London cordon, largely outside of the Inner Ring Road (unextended version), the long-term trend was for an average growth of 1 percent per annum until the end of the 1980s. Thereafter, traffic has fallen at an average rate of 1.9 percent per annum. As reported above, larger falls of greater than 5 percent were experienced between 2001 and 2002, and also between 2002 and 2003, paralleling the introduction of congestion charging. Between 2003 and 2004 however, traffic change at this cordon appears to have returned to the longer-term trend of small annual declines.

Further evidence of long-term traffic trends is provided by automatic traffic counters, one set being maintained by the DfT, and another being maintained by TfL. Although in both cases the number of counting locations is limited and the data should not be taken as representative of all traffic, counting has been continuous and provides a full picture of month-to-month changes at monitored sites over several years. Also, as the majority of these sites are located some distance outside of the charging zone, significant discontinuities associated with the introduction of congestion charging are not to be expected.

Data from DfT sites have been subjected to analysis designed to identify underlying trends. This indicates that traffic on monitored roads in inner London (7 major and 5 minor road sites) followed a broadly level trend in the late 1990s, followed by a period of decline setting in from the Autumn of 2000. There are no obvious discontinuities that could be associated with the introduction of charging in early 2003.

A broadly similar pattern of progressive decline is seen for equivalent outer London sites, although the magnitudes involved are less than in inner London, and 2003 and 2004 appear to have seen a return to broadly stable conditions following a period of comparatively lower flows during 2002.

Data from TfL counters broadly corroborates this pattern for years since 2000.

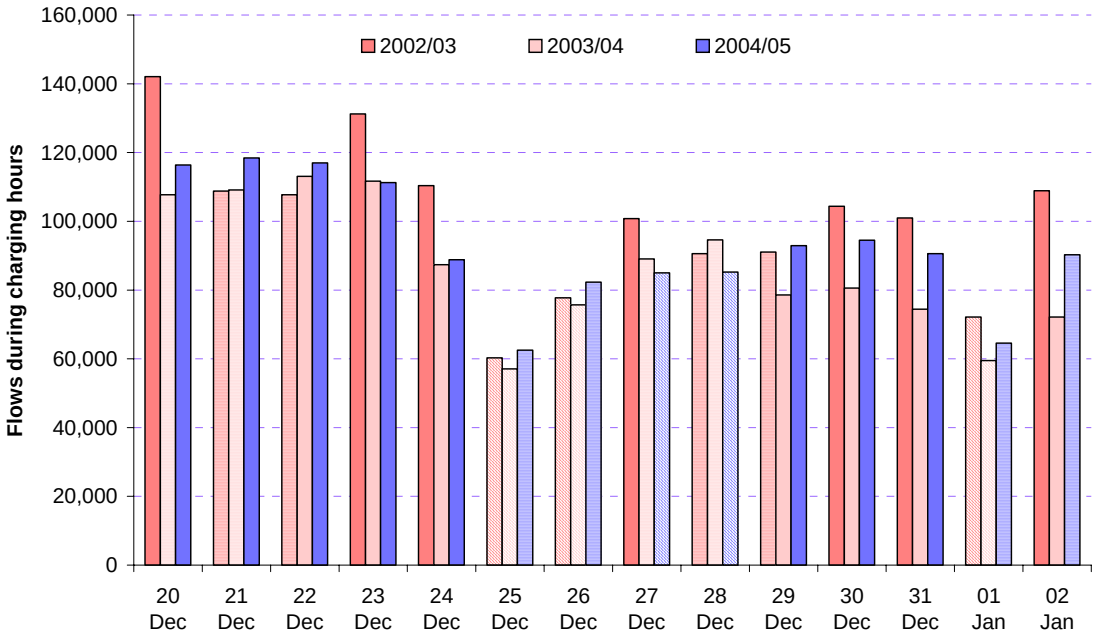
The factors underlying these trends are not immediately related to congestion charging, and TfL will be undertaking further research to more fully understand how these trends develop over the coming years.

3.9 Christmas 2004

In 2004 the Mayor confirmed a Variation Order, which had the effect of making the three former charging days that fall between Christmas Day and New Year's Day charge-free days. For Christmas 2004, it was of interest to observe how traffic responded to this change.

Automatic traffic counters measuring traffic entering the charging zone make possible a comparative analysis across 15 sample sites with consistent data for the 2002, 2003 and 2004 Christmas periods (Figure 26).

Figure 26 Traffic flows over the Christmas holiday period, 2002, 2003 and 2004. Traffic entering the charging zone across a sample of 15 high-flow sites. Vehicles with four or more wheels, charging hours or equivalent.



Note: Horizontal banding indicates Saturdays or Sundays.
Diagonal banding indicates Public Holidays on other weekdays.

Given that each year had a different combination of public holidays, 'normal' weekdays and weekends, the figure needs to be interpreted carefully. Nevertheless, the main features are clear:

- Traffic levels on equivalent days are lower in both 2003 and 2004 (post-charging) when compared to 2002 (pre-charging).
- Traffic on Christmas Eve 2004 was very similar to Christmas Eve 2003, and about one-quarter less than the 'normal' weekdays immediately preceding 24 December, and the equivalent pre-charging Christmas Eve.
- Traffic levels on Christmas Day, Boxing Day and New Year's Day were broadly comparable across all three years (charging has never applied on

these days), whilst 27 and 28 December were public holidays in 2004 (on which charging would not, in any case, have applied in 2004).

- For 29, 30 and 31 December 2004, the days on which the charge was removed for 2004, traffic entering the zone was about 20 percent higher than for equivalent days in 2003 (when charging applied), but still some 8 to 10 percent lower than equivalent days in 2002 (before charging was introduced).
- The equivalent indicator for the charging zone (circulating traffic) is very similar to that for traffic entering the zone. That for the Inner Ring Road shows that flows on non-holiday days in 2004 were only very slightly lower than those for the equivalent days in 2003 that were charged, despite no payment being required to enter the charging zone in 2004.

Therefore, although removal of charging from working weekdays across the Christmas period in 2004 has seen substantially increased traffic compared to equivalent days in 2003, traffic levels were still somewhat lower than the seasonally reduced levels in 2002 before charging was introduced.

It is of course the case that both before and after the introduction of charging, traffic flows on the days between Christmas and New Year are substantially lower than on typical weekdays, and therefore congestion will also be lower. This was the reason for introducing the Variation Order.

3.10 Longer-term traffic monitoring strategy

There is now a substantial body of evidence characterising the traffic impacts of congestion charging in central London and the key short and medium-term impacts are now quite clear.

Traffic patterns adapted quickly to the introduction of the scheme, and the data for 2004 suggest few significant changes in key indicators of traffic in and around the charging zone. It is nevertheless important that monitoring continues, so that any more progressive effects on travel patterns caused by adaptations to people's daily activities on a longer-term basis can be characterised. Potentially, these could explain some of the apparent small further declines in traffic observed in and around the charging zone during 2004.

The traffic monitoring arrangements for the scheme have proven to be generally appropriate, and the key indicators will be resurveyed again during 2005.

4 Public transport and travel behaviour

4.1 Introduction

It was expected that congestion charging would lead to increased travel by public transport to, from and within the charging zone, as former car occupants adopted alternative modes for their journeys. A high proportion of these former car travellers were expected to transfer to the bus network.

Substantial enhancements to the service were put in place, both to accommodate this anticipated additional demand and as part of a wider programme of improvements to the bus network throughout Greater London. Relatively smaller effects were anticipated on the Underground and National Rail networks. Reduced traffic congestion in and around the charging zone was also expected to bring substantial reliability benefits for buses and hence encourage some shifting of shorter distance Underground and rail trips to bus.

This section reviews and summarises developments in key public transport indicators following the introduction of congestion charging, including new data for 2004. A summary of TfL's assessment of overall travel behaviour change is also given.

Summary of key findings for 2003

One year after the introduction of the scheme, TfL observed that:

- Comparing 2003 with 2002, there had been an increase of 37 percent in the number of people entering the charging zone by bus during charging hours (an additional 70,000 passengers). Up to half of this increase was provisionally assessed as being primarily due to the introduction of charging. The remainder reflected a strong 'background' trend of growth in bus patronage, reflecting wider service enhancements.
- These enhancements also meant that there was no material change overall in average passenger loadings per bus, although some localised increases were observed. In other words, increased service provision in and around the charging zone had kept pace with the increased passenger demand.
- Bus reliability indicators showed that, on average, routes operating in and around the charging zone performed better than those in other parts of London, although a more general trend of improvement was also apparent.
- Contrary to expectations of a small net increase, TfL observed a substantial decrease in the number of passengers using the Underground to travel to the charging zone of about 7 percent. This decline seemed to be reflected, to a lesser extent, across most of the Underground network, strongly suggesting that factors other than congestion charging were responsible.
- This overall decline subsumed any small increase (projected to be up to 1 percent) from former car users transferring to the Underground, such that no additional capacity issues arose.

- TfL observed no overall change in the number of passengers using National Rail to travel to and from the charging zone.

Key findings for 2004

TfL's monitoring has continued throughout 2004, providing a comparable set of indicators to those available for both 2003 and 2002 (pre-charging). Key findings for 2004 are that:

- There has been a further increase in the number of bus passengers entering central London, with an increase of 12 percent compared with 2003 in the number of passengers crossing the Central Area Peak Count (CAPC) cordon just outside of the charging zone, inbound in the weekday morning peak period.
- Following major improvements in 2003, reliability of bus services continues to improve across the network, and particularly within the charging zone. However, as there has been little change to key traffic indicators, it seems likely that these continuing improvements primarily reflect improved scheduling and operational management of bus services, albeit assisted by improved conditions for buses arising from congestion charging.
- Underground patronage has seen a recovery, with usage across the network in 2004 returning to similar levels seen in 2002. In and around the charging zone, patronage remains below that of 2002, but has also experienced significant recovery since 2003.
- Counts undertaken by the Strategic Rail Authority generally corroborate a previous TfL assessment that there were no significant overall differences between 2002 and 2003 in the number of people using National Rail to travel to the charging zone.

4.2 Bus patronage

TfL's *Second Annual Monitoring Report* described the increases in bus passengers and service provision entering and leaving the charging zone in the first year after charging, as shown in Figure 27 below.

Figure 27 Bus passengers and buses observed crossing the charging zone boundary, Autumn 2002 and 2003, typical weekday.

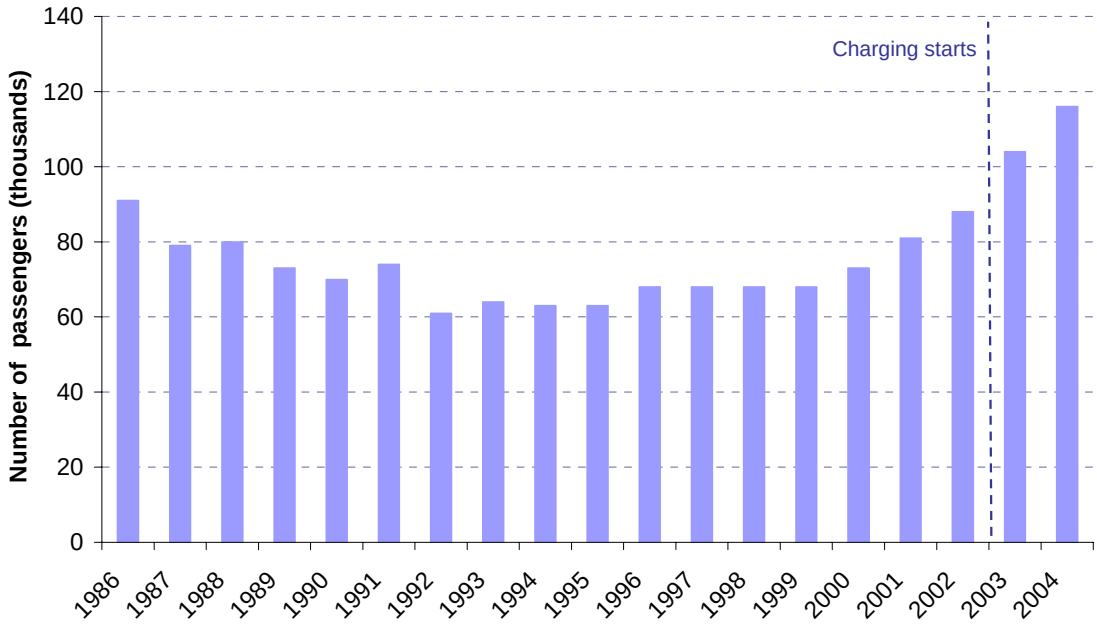
	Morning peak (0700 - 1000) Inbound			Charging hours (0700 - 1830) Inbound			Charging hours (0700 - 1830) Outbound		
	Passengers	Buses	Passengers per bus	Passengers	Buses	Passengers per bus	Passengers	Buses	Passengers per bus
Autumn 2002	77,000	2,400	32	193,000	8,280	23	163,000	7,800	21
Autumn 2003	106,000	2,950	36	264,000	10,500	25	211,000	9,900	21
Percentage difference	**+38 %**	**+23 %**	**+12 %**	**+37 %**	**+27 %**	**+8 %**	**+29 %**	**+26 %**	**+2 %**

Bus patronage and service provision had increased substantially, both as a direct response to the introduction of congestion charging and a more general response to large-scale London-wide improvements to the bus network. Overall bus loadings had however remained relatively stable, with additional

service provision generally keeping pace with this increased passenger demand.

A full count of bus passengers entering central London is undertaken each Autumn by TfL. This Central Area Peak Count (CAPC) measures passengers crossing a cordon just outside of the charging zone, in the inbound direction during the morning weekday peak period. Figure 28 clearly shows the pattern of strong growth in recent years. The measured increase, comparing 2004 with 2003, is 12 percent, with 116,000 passengers observed in 2004 compared with 104,000 in 2003.

Figure 28 Bus passengers, inbound, Central Area Peak Count, 0700 to 1000, Autumn counts, 1986 to 2004.



During 2004, further counts were undertaken at a sample of sites where buses cross into or out of the charging zone to determine if there have been any further changes in bus occupancies. There are 11 inbound sites and 9 outbound sites that are comparable over the last three Autumn counts. These sites are not wholly representative of all buses entering or leaving the charging zone and do not give a full passenger count, but they do give an indication of any year-on-year change in average occupancies.

The position in 2004 was broadly similar to that in 2003 as is shown in Figure 29. On average there were 24 passengers on each bus entering the charging zone during charging hours at the selected sites, compared to 25 in 2003 and 23 before charging in 2002. Outbound buses held on average 19 passengers, compared to 20 in 2003 and 21 before charging in 2002.

Figure 29 Bus passengers and buses observed at a selection of sites on the charging zone boundary, between 2002 and 2004, 0700-1830.

	Inbound			Outbound		
	Passengers	Buses	Passengers per bus	Passengers	Buses	Passengers per bus
Autumn 2002	102,300	4,450	23	64,650	3,050	21
Autumn 2003	146,600	5,900	25	77,800	3,900	20
Autumn 2004	149,200	6,100	24	77,150	4,100	19

Figure 30 Average number of passengers per bus, inbound, at a selection of sites on the charging zone boundary, 2002 to 2004 typical weekday.

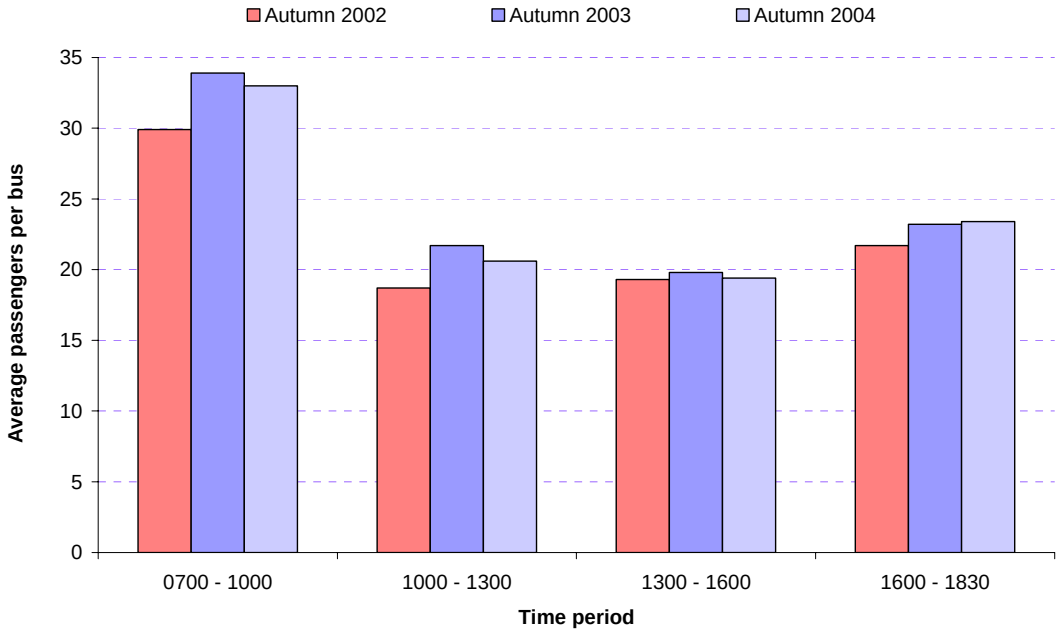


Figure 31 Average number of passengers per bus, outbound, at a selection of sites on the charging zone boundary, 2002 to 2004 typical weekday.

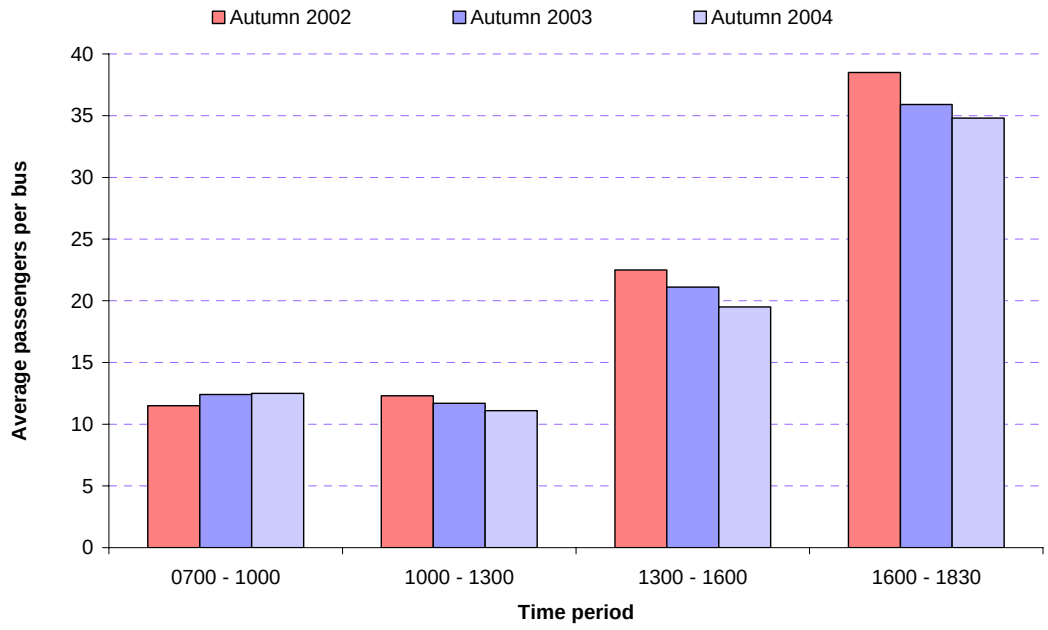


Figure 30 and Figure 31 illustrate these trends. It is seen that across the majority of time periods the average number of passengers in buses crossing the charging zone boundary decreased slightly in 2004. The exceptions to this are inbound in the evening peak and outbound in the morning peak, which are not ‘peak load’ directions.

Compared to 2002, before the introduction of the scheme, average occupancies on buses entering the charging zone are now only slightly higher, despite substantially increased patronage. In the outbound direction, with the exception of the morning peak period, average occupancies are now slightly lower than they were.

Similar trends are observed when looking at these average occupancies by bus type. Capacities of different buses vary. In general, the maximum capacity is 69 to 77 for Routemasters, 85 to 90 for the majority of double-deck buses, 50 to 60 for standard single-deck buses and approximately 140 for articulated ‘bendy’ buses.

Figure 32 and Figure 33, which include privately operated coaches show that, with the exception of articulated buses, the average number of passengers on each type of bus has reduced since Autumn 2003 at those selected sites. Inbound, bus occupancies tend to be slightly higher than they were before charging and outbound they tend to be slightly lower.

Articulated buses are the exception, and with increased numbers of these in operation average occupancies have increased over the last year. The number of articulated buses observed at these sites has more than doubled over the last year, inbound from 220 to 490, and outbound from 110 to 370, and the recorded increases in occupancies for this bus type are not indicative of any emerging capacity problems.

Figure 32 Average number of passengers on each of the main bus types, inbound. Selected sites on the charging zone boundary, charging hours, 2002 to 2004 average weekday.

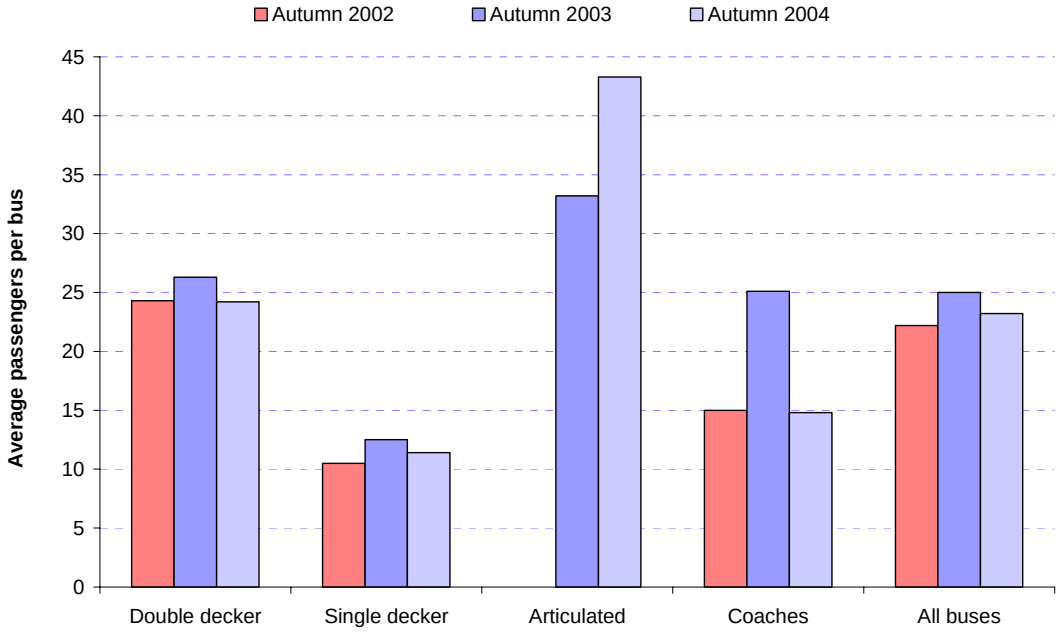
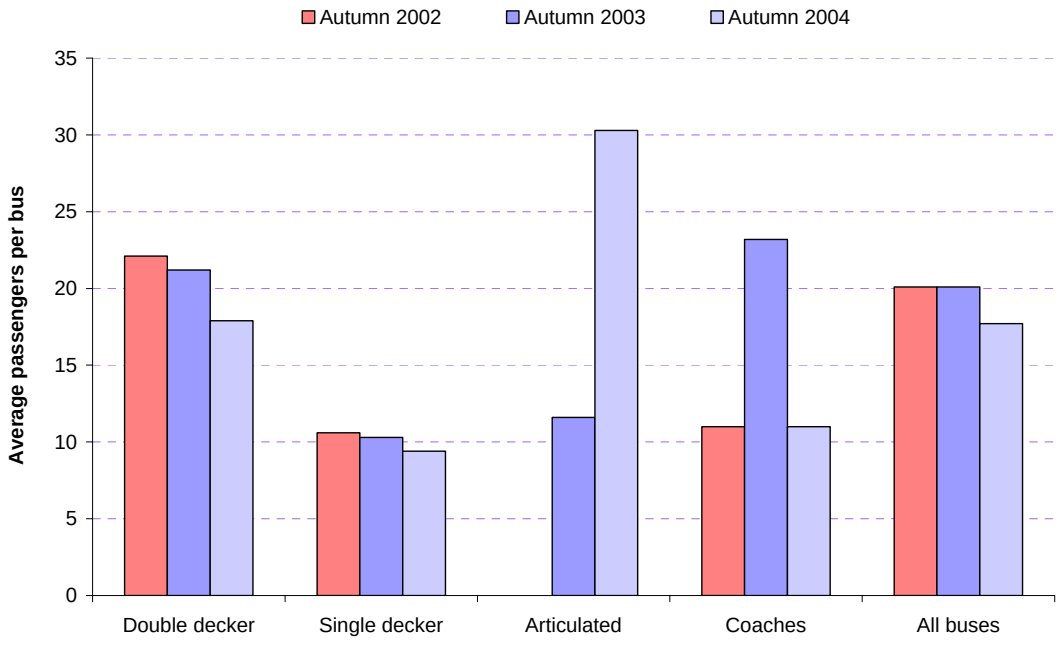


Figure 33 Average number of passengers on each of the main bus types, outbound. Selected sites on the charging zone boundary, charging hours, 2002 to 2004 average weekday.



The observations at these selected sites therefore indicate there has been a small reduction in average bus occupancies during 2004, largely due to greater service provision against relatively smaller observed passenger increases. At these sites at least, the bus network continues to successfully accommodate the increase in patronage seen over recent years.

4.3 Bus journey time and reliability

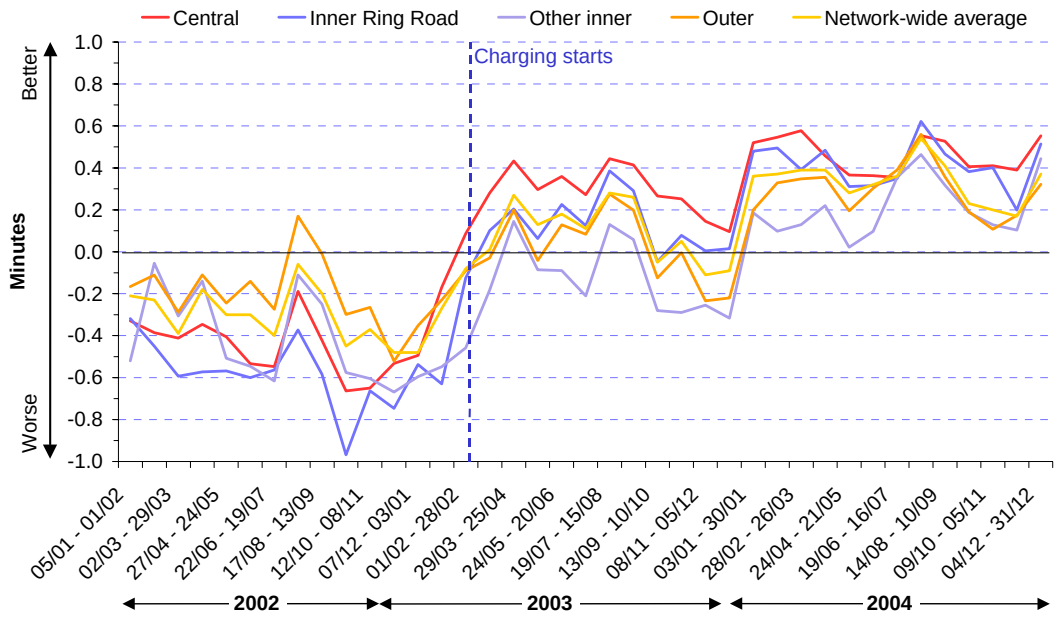
Improvements in bus reliability over recent years are due to a variety of factors. These include: increased investment in robust schedules, enhanced route supervision and the introduction of Quality Incentive Contracts; as well as the introduction of congestion charging that has reduced congestion and improved journey times in and around the charging zone.

The January 2005 *Summary Review* reported that in the first full year after the introduction of charging there was a reduction of 24 percent overall across Greater London in excess waiting time, the additional waiting time at bus stops experienced by passengers caused by service irregularity or missing buses. For passengers in and around the charging zone the improvement was greater, with a reduction in excess waiting time of over 30 percent compared to the previous year.

Considering more recent data spanning March to December 2004, bus passengers in and around the charging zone have benefited from a further reduction in excess waiting time of 18 percent compared with the equivalent period in 2003. There have also been similar improvements over the rest of the network.

London Buses sets the bus operators performance standards for excess waiting time based on the characteristics of the route. Figure 34 shows the decreases in actual excess waiting time relative to the minimum standards, which illustrates the ongoing improvements.

Figure 34 Bus Excess Waiting Time (weekday charging hours). Difference between Excess Waiting Time standards and actual Excess Waiting Time.



Other improvements to service reliability have arisen as a result of reduced traffic congestion. In the first year after charging (2003) there was a reduction

of nearly 40 percent across London in the amount of disruption to bus services caused by traffic congestion compared to the year before. Routes that operate in and around the charging zone experienced the greatest improvement, with reductions of over 60 percent.

For most of 2004 there was little change to the amount of service disruption caused by traffic congestion within the zone. Across London there has been continued improvement, with a further reduction in disruption of over 10 percent. Comparing the same periods in 2004 with those before charging, the improvement in and around the charging zone still outweighs that in other areas of London.

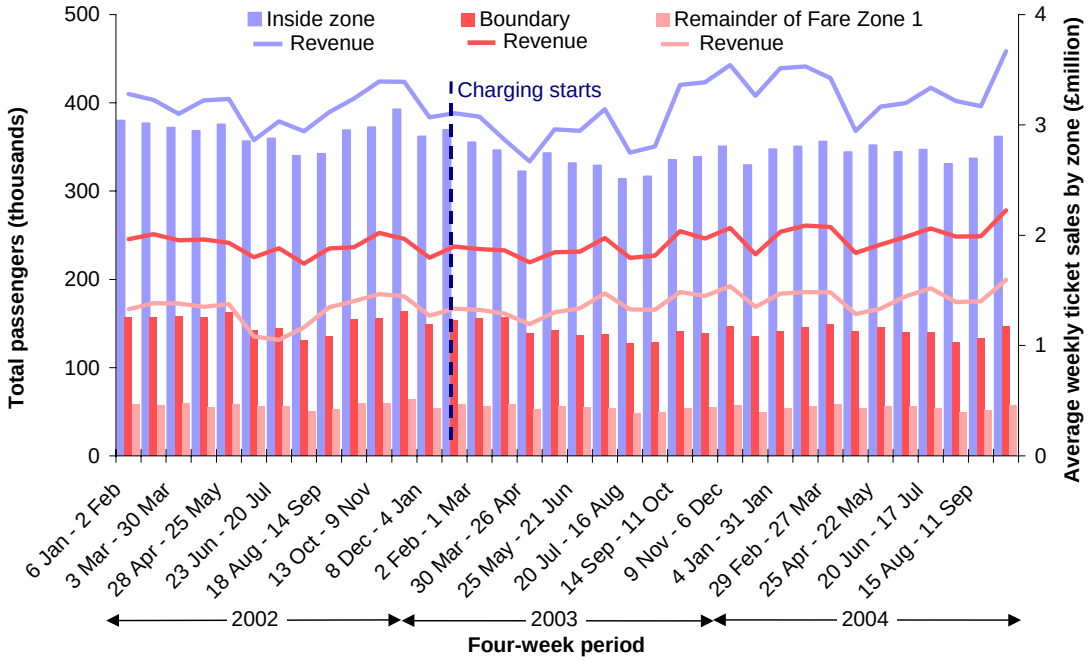
Overall, the impact that congestion charging has had on traffic and congestion within the charging zone has contributed significantly to improved operations on the bus network within that area. This has been supported by the improved scheduling and route supervision that has also been applied across the whole of Greater London. Over the last year, where traffic levels have remained fairly static within the charging zone, it is most likely these actions have been primarily responsible for the continued improvements within the zone, albeit that there may be greater opportunities to improve services due to reduced congestion.

4.4 Underground

The *Second Annual Monitoring Report* described overall declines in Underground passengers exiting stations in and around the charging zone as well as across the rest of the network. These overall reductions were largely due to factors unrelated to congestion charging, such as the temporary but prolonged closure of the Central Line, the transfer of passengers to buses and a general decline in tourism. Any small increase in passengers due to congestion charging was more than outweighed by these wider reductions, such that the introduction of the scheme in 2003 did not lead to additional capacity problems on the network.

Figure 35 updates the recent trend in Underground patronage in and around the charging zone (with Underground Fare Zone 1 divided into 3 sectors to reflect congestion charging geography), looking at estimates derived from passenger exits through automatic ticket gates and also at revenue taken.

Figure 35 Passengers exiting Underground stations and revenue trends in and around the charging zone and within the rest of Fare Zone 1, during the morning peak period (0700 to 1000).



Comparing the first 12 four-week monitoring periods following the introduction of charging (2003 into 2004) with the equivalent period in 2002/3, there were reductions in passengers of 8 percent during the morning peak period and 7 percent across weekday charging hours. This is slightly greater than the observed reduction across the whole Underground network of 4 percent during the morning peak and 5 percent over weekday charging hours.

Recent, comparable 12 four-week monitoring periods covering 2004 into 2005 have seen a substantial upturn in patronage. During the weekday morning peak period there has been an increase in the number of passengers exiting stations in and around the charging zone of 4 percent, and of 6 percent across the whole network.

Prior to the introduction of charging an average of 516,000 passengers exited stations in and around the charging zone during the weekday morning peak period. Measurements after charging showed this reducing to 473,000 passengers. Over the most recent 12 four-week periods this has now increased to 494,000 passengers. During charging hours patronage reduced from 1,275,000 passenger exits prior to the introduction of charging to 1,181,000 passenger exits in the period after charging. In the most recent 12 four-week periods in 2004 this has increased to 1,247,000 passengers exiting stations in and around the zone.

Overall, therefore, 2004 has seen a recovery of much of the patronage lost during 2003. Across the whole Underground network, patronage levels are now broadly similar to what they were in 2002 before the introduction of charging. In the charging zone itself, patronage still remains below that of 2002, but has nevertheless experienced substantial recovery during 2004.

Gross revenue data are more affected by seasonal trends and fares and ticketing changes. Despite fluctuations, the data for 2002, 2003 and 2004 are indicative of only very small changes overall in this indirect measure of Underground patronage.

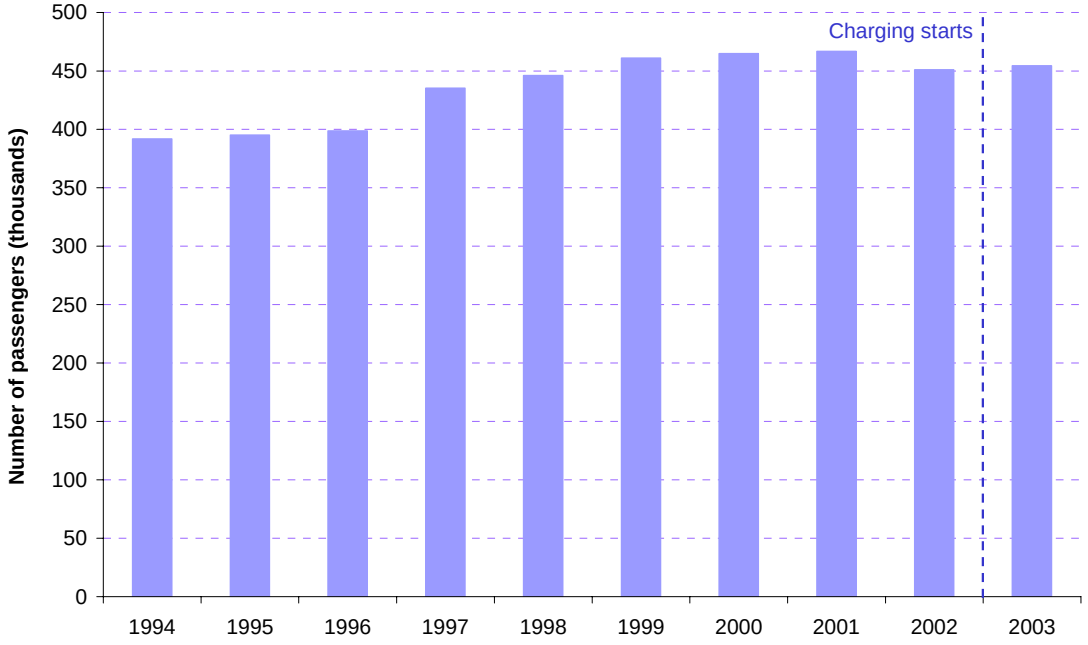
4.5 National Rail

It was considered that congestion charging might lead to some small increases to patronage of National Rail services to and from central London. Passenger counts were undertaken at all 22 central London National Rail stations in the Spring of 2002 and 2003 to assess this impact.

The results were illustrated in detail in TfL's *Second Annual Monitoring Report*. They showed that, despite variation at individual stations, there was no significant change overall in the number of passengers using National Rail to travel to and from the charging zone. The scheme had therefore not led to additional capacity problems on National Rail.

Figure 36 shows annual counts taken in Autumn of each year by the Strategic Rail Authority. This also indicates that there has been no significant change in the number of passengers entering central London by rail between 2002 and 2003, with 451,000 passengers counted in 2002 and 455,000 counted in 2003 during the morning peak period, an increase of 1 percent. This is only slightly different to TfL's Spring counts that reported a decrease of 1 percent in the morning peak period. The two sets of counts are therefore broadly corroborative in indicating stability in National Rail patronage to the charging zone across the period spanning the introduction of the scheme.

Figure 36 National Rail passengers entering central London, Autumn 1994 to 2003, 0700 to 1000. Strategic Rail Authority annual Autumn counts.



4.6 Travel behaviour

Travel behaviour change

TfL's *Second Annual Monitoring Report* provided an initial assessment of changes in travel behaviour in response to the introduction of the scheme. This was based on survey results from across the monitoring programme. Work to more fully assess these changes is continuing. This section summarises TfL's previously reported assessment.

TfL's assessment of aggregate travel behaviour change in response to the scheme

In 2003, TfL observed overall reductions in car movements crossing into the congestion charging zone during charging hours of between 65,000 and 70,000. Figure 37 summarises how these were assessed to have adapted to the introduction of the scheme.

Figure 37 Estimated net changes in car driver movements coming into the charging zone.

Total net reduction in car movements at zone boundary.	65,000 to 70,000
Through car movements – diverting around the charging zone, other changes.	15,000 to 20,000
Terminating car movements – transfers to bus, Underground, rail.	35,000 to 40,000
Terminating car movements – transfers to cycle, walk, motorcycle, taxi, car share	5,000 to 10,000
Terminating car movements – travelling outside charging hours.	Under 5,000
Travel to other destinations, reduced frequency.	Under 5,000

Through trips diverting around the charging zone

Some 20 to 25 percent or so of car drivers entering the charging zone before the introduction of the scheme in 2002 had been making movements having an ultimate origin or destination outside of the charging zone. Some of these movements would only have entered the charging zone incidentally, whilst others would have been making 'through' trips along one of the more attractive major routes from one side of the zone to the other.

These cars would not have generally been stopping within the zone, and in most cases it would have been straightforward for drivers making these trips to divert to other routes outside the zone, for example the Inner Ring Road, and thereby avoid incurring the charge.

TfL consider that the level of net diversion of incoming car movements during charging hours is between 15,000 and 20,000 per day.

Terminating car trips - transfers to bus, Underground and rail

The biggest change prompted by congestion charging is the transfer of car users to another mode of transport. Between 40,000 and 45,000 former terminating car movements (i.e. with a destination inside the charging zone), have transferred to another mode of transport. This accounts for between 60 and 70 percent of all former car movements who no longer enter or travel across the charging zone.

TfL estimates that of these former car drivers who have transferred to other modes of transport, around 40 percent have transferred to bus; up to around 50 percent to Underground or rail; and between 10 and 20 percent have transferred to walk, cycle, motorcycle, taxi or minicab. For public transport - bus, Underground and rail - this suggests a transfer of 35,000 to 40,000 car driver movements, equivalent to between 40,000 and 45,000 car occupants.

Terminating car trips - transfers to other modes

Various effects have been observed on modes other than public transport. Key ones include:

- increases in two-wheeled travel to the charging zone (pedal cycle and powered two-wheeler);
- substantial increases in taxi volumes, although not all of which will represent 'fare paying' journeys;
- some increases in average occupancies of cars that still enter the charging zone.

TfL's assessment is that the net effect of these changes is a reduction of between 5,000 and 10,000 car driver movements during charging hours.

Terminating car trips - travelling outside charging hours

Surveys indicate that around 10 percent of car drivers have responded to charging by changing the timing of their journey to outside of charging hours. This response is likely to apply to less-frequent trips so that the actual effect on car movements would be smaller. Assuming that between 5 and 10 percent of former terminating car driver movements have responded in this way, this would account for between 2,500 and 5,000 fewer car driver movements entering the charging zone during charging hours.

Terminating car trips - change of destination; trips no longer made

Change of destination to locations outside the charging zone is the stated response of around 5 percent of car drivers who have changed their travel arrangements in response to the charge. This change is more likely to apply to less frequent trips. Assuming a figure of 3 percent of the reduced terminating car driver trips divert to a destination outside the charging zone, this yields a reduction of up to 1,500 fewer terminating car driver movements entering the zone.

Surveys suggest that the equivalent of up to 10 percent of car drivers to the zone prior to charging who have altered their travel arrangements in response to congestion charging are also making fewer journeys to the zone. Assuming that these are making only half of their previous trips yields a reduction equivalent to 5 percent in terminating car driver trips, up to 2,500 per charging day.

The combined effect of these two adaptations – diverting to destinations outside of the charging zone, or making fewer trips to destinations in the charging zone – is less than 4,000 fewer car driver movements terminating in the charging zone. This combined figure represents car drivers who no longer travel to the charging zone during charging hours on a typical charging day as a result of congestion charging. With car passengers it is equivalent to up to 5,000 fewer people coming into the zone.

The small scale of this figure is one reason why the suggested impacts of reduced travel to central London due to charging are likely to be very small in overall terms (see also Section 6).

5 Social impacts

5.1 Introduction

This section sets out results from the social impacts monitoring programme. Surveys have examined the ways in which people felt they were affected by the congestion charging scheme and associated changes, both individually and as part of a household. They also looked at perceived changes to a range of local environmental attributes, daily activities and travel behaviour.

As with all other areas of the impacts monitoring programme a set of 'before' and 'after' surveys was required to get a comprehensive understanding of the impacts of the scheme.

The main social impacts survey involved a substantial number of interviews, both face-to-face in households and telephone surveys of individuals (over 2,000 households and individuals in each survey respectively). The data provided from a panel of respondents interviewed both before and after the introduction of charging allows TfL to understand both qualitatively and quantitatively what the key issues are and the ways in which different groups have responded over time. This work was also supplemented by a series of on-street surveys, undertaken at a range of high-profile locations in and around the charging zone, together with some focus group discussions.

5.2 Key findings

In 2003 after the introduction of charging:

- Negative expectations expressed by some panel members in 2002 as to how the scheme would affect them were generally not borne out in surveys following the introduction of the scheme. The majority of respondents felt that they had actually not been affected to any great extent by the scheme.
- Respondents living inside the charging zone were most positive about the change in their local area as a result of the scheme, particularly the reduction in congestion. Respondents to separate surveys on-street also perceived improvements in the general amenity of the area, air quality, noise, traffic levels and public transport provision.
- Transport issues that respondents felt most negatively about were largely unrelated to the scheme. Parking was a key concern: lack of spaces, excessive traffic warden activity and rising charges.
- There was little change in reported car use by charging zone respondents, who receive the 90 percent residents' discount. Respondents living outside of the charging zone reported significant changes in travel by car to and from central London that were generally in line with the aggregate travel effects reported elsewhere.
- The majority of all respondents felt that the charge was affordable. More respondents living within the zone reported finding the charge difficult to afford than respondents living in inner London, despite being in receipt of

the 90 percent residents' discount, presumably reflecting the frequency of actual charge payment.

- In depth discussions with frequent users of the charging zone revealed that generally they felt that the scheme had been more successful than they had expected in reducing traffic congestion, and that their journeys had become more reliable.

5.3 Main social impacts surveys

Two large-scale surveys were put in place. One involved face-to-face household based surveys of residents within the charging zone and in inner London. The other involved a similar interview, but telephone based, of individual residents in outer London and beyond the M25 who made journeys to the charging zone.

The surveys covered a wide range of topics, with the aim of more fully exploring the nature and diversity of impacts than would be allowed by adhering to a pre-determined set of issues. These included: impacts on the local area (of residence); accessibility into and within the charging zone; impacts on different activities undertaken; impacts on time and finances; and consequent or 'knock-on' impacts within households.

A panel of residents of central, inner and outer London were interviewed before charging started in 2002, and again in 2003 following the introduction of the scheme. Therefore, expectations in 2002 could be compared to actual perceptions of impacts in 2003.

Within the charging zone and inner London the survey was designed to allow comparison of results across a selection of neighbourhoods, and to assess how respondents were affected depending on the location of their neighbourhood, its affluence, transport accessibility and other social characteristics.

Therefore the results of these surveys are not representative of all Londoners, or even Londoners in any one area, but are comparable to each other in sampling terms. The survey neighbourhoods are shown in Figure 38.

For the survey of residents of outer London and beyond the M25, respondents were recruited whilst they were visiting the charging zone and thus represent a range of people who travel into the zone, but are not geographically clustered by place of residence.

The material in this section deals with the impacts on a relatively large but not wholly representative sample of Londoners. While it does not amount to a robust quantification of how people have been affected, its findings are nevertheless important to understanding the impacts of the scheme.

Figure 38 Map of selected neighbourhoods for social impacts studies within the charging zone and in inner London.

5.4 Findings by theme

This section summarises key findings from the main social impacts surveys organised by theme.

Conditions for residents of the charging zone

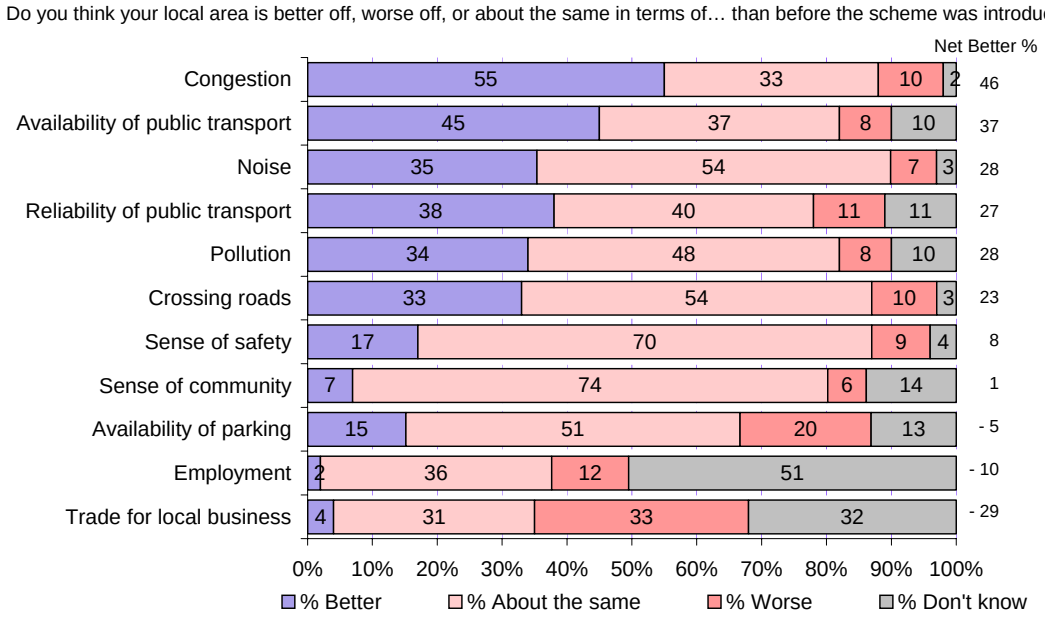
Respondents living in the charging zone neighbourhoods were generally positive about the change in their local area since the introduction of the scheme. The most positive impact of the scheme was perceived to be the reduction in congestion, with 55 percent of respondents mentioning this without prompting. Overall, half of charging zone respondents felt that travelling within the zone was now easier, while only one in twenty said it was more difficult. Many respondents reported spending less time travelling overall and for specific trips, with the majority of this change being directly attributed by respondents to the charging scheme.

On the whole, therefore, the benefits of the scheme appear to be recognised by respondents living within the charging zone.

Conditions within local area of residence

Most charging zone respondents had not perceived any change to their accessibility to local shops, facilities and services. Of those who did, three times as many said accessibility had got better as said it had deteriorated (19 percent compared to 6 percent). Of all the neighbourhoods surveyed, respondents in Holborn were most positive about changes in their area and changes in accessibility. Figure 39 shows how charging zone respondents thought their local area had or had not changed following the introduction of the scheme, demonstrating the extent of perceived gains across a range of transport and environmental attributes.

Figure 39 Views on local area, charging zone respondents.



Base: All charging zone panel respondents (430).

Inner London respondents were more likely than those in the charging zone to have said their local area had not changed since the introduction of the charging scheme (63 percent compared to 41 percent). Of those who did report change in inner London, slightly more said their neighbourhoods had deteriorated than improved between 2002 and 2003. When asked to 'rate' a list of transport and environmental attributes in their local area, more inner London respondents felt that the availability of parking, congestion, pollution, noise and sense of safety had deteriorated, than felt that these had improved. However, these changes are unlikely to have been brought about by the scheme.

Parking

Parking was clearly an important issue among respondents, although it would appear that in many cases this was not directly related to the charging scheme. For example, without prompting, over one quarter of inner London respondents cited fewer parking spaces, excessive traffic wardens or a rise in the cost of parking as one of the main reasons why their local area had deteriorated. However, it is unlikely that charging is a primary cause of this phenomenon in the inner London neighbourhoods surveyed. Three times as many inner London respondents said the sense of safety in their area had deteriorated than said that it had improved since the introduction of scheme (18 percent compared to 6 percent), although again this is unlikely to be caused by charging.

Public transport

Inner London respondents (particularly in Hoxton and Peckham) were positive about the change in public transport provision in their local area in terms of

greater availability and reliability. It is notable that fewer respondents expected this improvement when interviewed in 2002 before the scheme was introduced. Generally non-car owning households and respondents aged 55 and over are more favourable about the change in public transport than other groups. Measured changes to public transport in and around the charging zone are described in Section 4.

Travel for social purposes

Although the majority of all respondents felt that meetings with family and friends had not been materially affected by the charging scheme, a significant minority believed that friends and family now found it more difficult to visit them.

This impact was anticipated by the majority of respondents in 2002, although in fact fewer had actually found these visits more difficult than foreseen at that time. The cost of the charge and difficulty with parking were the main reasons why respondents said it was more difficult for family and friends to visit them.

Travel behaviour changes

On the whole, charging zone respondents reported having not greatly changed the number of journeys they made within the zone for various activities. Furthermore, there was little reported change in car use by charging zone respondents, who are eligible for the residents' discount.

In contrast, there was a significant reported fall in car use by inner London respondents (who in general have to pay the £5 daily charge to enter the zone), particularly for commuting and business trips (Figure 40). This was broadly consistent with the aggregate travel changes observed and reported elsewhere, and it is expected that the majority of these former car trips will have transferred to other travel modes.

Respondents living in outer London and beyond the M25 were less likely to drive into the zone for any of the activities asked about. Of the 70 percent who had driven into the zone on a recent occasion before the scheme was introduced, half said that their travel patterns (regarding where they drive or the times at which they drive) had been affected to some extent by the scheme. Of those respondents who report change in inner London, a slightly higher proportion say more time is spent travelling now by all modes than before the introduction of the scheme, in line with their prior expectations.

Figure 40 Activities undertaken by car, during charging hours, within the charging zone. Charging zone and inner London respondents.

	Charging zone respondents			Inner London respondents		
	Before charging (2002)	After charging (2003)	+ / -	Before charging (2002)	After charging (2003)	+ / -
Base (all panel)	430	430		678	678	
Main food shopping	20%	21%	+ 1 %	13%	8%	- 5 %*
Commuted to and from work	17%	14%	- 3 %	12%	9%	- 3 %
Visited friends/family	16%	17%	+ 1 %	10%	6%	- 4 %
Any health trips	12%	8%	- 4 %	9%	7%	- 2 %
Any business trips	10%	5%	- 5 %	8%	5%	- 3 %
Non-food shopping trip	10%	13%	+ 3 %	5%	3%	- 2 %
Any leisure trip	9%	10%	+ 1 %	3%	3%	0%
Trip for services or facilities	9%	7%	- 2 %	3%	2%	- 1 %
Escorted to/from school/nursery	9%	6%	- 3 %	2%	1%	- 1 %
To and from school/college	3%	2%	- 1 %	1%	1%	0%
Any activity	**42%**	**38%**	**- 4 %**	**37%**	**24%**	**- 13 %***

** Statistically significant*

Note: This table does not provide a representative assessment of travel behaviour by London respondents. Outer London respondents were not asked this question in 2002.

5.5 Cost of the charge

The majority of charging zone respondents reported finding the discounted 50 pence equivalent daily charge affordable. There were some clear differences between neighbourhoods and socio-economic groups: for example, respondents living in Borough were significantly more likely to have reported difficulty affording the charge than those living in the West End.

Despite having to pay the full £5 daily charge a smaller proportion of respondents living in inner London (compared to residents of the charging zone) said that they found the charge difficult to afford. Presumably, this at least partly reflects lower numbers of payments being made by individuals, these individuals not necessarily incurring the charge every day. Overall the majority considered it to be 'affordable', with many experiences in this regard better than anticipated in 2002.

Respondents living in outer London and beyond the M25 reported finding the charge significantly more difficult to pay than inner London respondents (28 percent compared to 18 percent). Outside the charging zone, around a quarter of frequent travellers (those paying the charge for more than 12 weeks per year) found it difficult to afford, compared with more than half who did not.

5.6 Balance of experience with the scheme

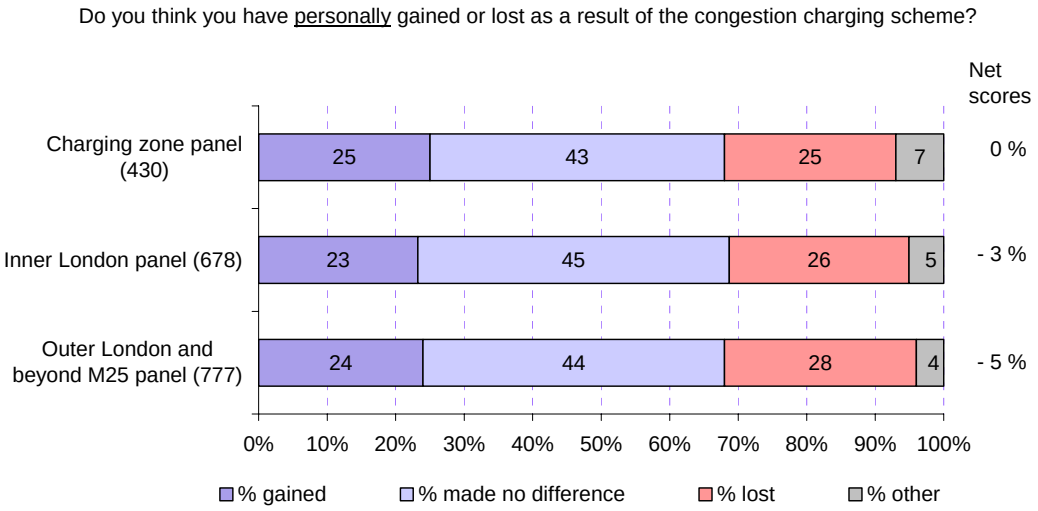
After six months or so of experiencing the scheme in 2003, an increased proportion of respondents felt they had 'gained' overall compared to expectations expressed in 2002, prior to the introduction of the scheme.

Overall, a significant proportion of respondents had changed their opinion about how the scheme had impacted on both them and their household, with the majority saying that the scheme had actually made no material difference

to them. It should be noted that respondents tended to be more negative about the overall impact of the scheme on their household than in terms of their own personal experience.

Figure 41 shows how, on average, respondents in each area of London felt the scheme had impacted on them. The pattern across all three survey areas is remarkably similar, and the balance of reported experience appears to be broadly equal overall, with 68 percent of respondents in each of the three survey areas saying either that they had gained overall from the scheme, or that it had made no difference to them.

Figure 41 Personal overall balance of experience as a result of the congestion charging scheme, all respondents.



In the charging zone, 68 percent of respondents said that they had gained overall from the scheme or that it had made no difference to them. Young people and older people were more likely to say that they had gained from the scheme or that it had made no difference to them, at 73 percent and 77 percent respectively. Across all groups, at least half of all respondents said that they had gained from the scheme or that it had made no difference to them, with householders with primary school children the least likely to do so at 50 percent.

In inner London, young people, those on a low income and older people were more likely to say that they had gained from the scheme or that it had made no difference to them, at between 75 and 76 percent. Across all groups, at least half of all respondents said that they had gained from the scheme or that it had made no difference to them, with householders with primary school children again the least likely to do so at 58 percent.

In outer London, women, young people, those on a low income and older people were more likely to say that they had gained from the scheme or that it had made no difference to them, at between 68 and 70 percent. Across all groups of outer London residents who made trips to the charging zone, at least half of all respondents said that they had gained from the scheme or that

it had made no difference to them, with black and minority ethnic respondents in this case the least likely to do so at 50 percent.

5.7 On-Street Public Space surveys

The On-Street Public Space surveys aimed to explore the social mix and usage patterns at a selection of key locations in and on the boundary of the charging zone, and characterise the experiences and perceptions of people 'on street'.

The surveys were carried out in the same sample locations before and after the introduction of the scheme. Ten minute face-to-face interviews were carried out with 8,800 respondents in the 'before' survey in late 2002 and 8,700 in the 'after' survey in late 2003. This was not a panel survey, and interviewees were systematically approached from all those crossing an 'imaginary line' at the survey location. Hourly indicative counts of the number of people on-street were also undertaken across the imaginary line at each site during fieldwork hours.

The survey took place at 24 locations in five 'functional' categories, including: places with a concentration of retailing; major tourist attractions; theatre and cinema areas; places with a high concentration of restaurants; business areas; and in a number of selected locations on the boundary of the congestion charging zone.

Quotas were set for respondent types and the data were weighted to the quotas to partly compensate for any response bias. Data were also weighted to match the proportion of visitors to each area, based upon the count data. The data is therefore representative of those on foot at the sample sites in the charging zone only, and not of all those present in the charging zone.

Travel to and from the charging zone

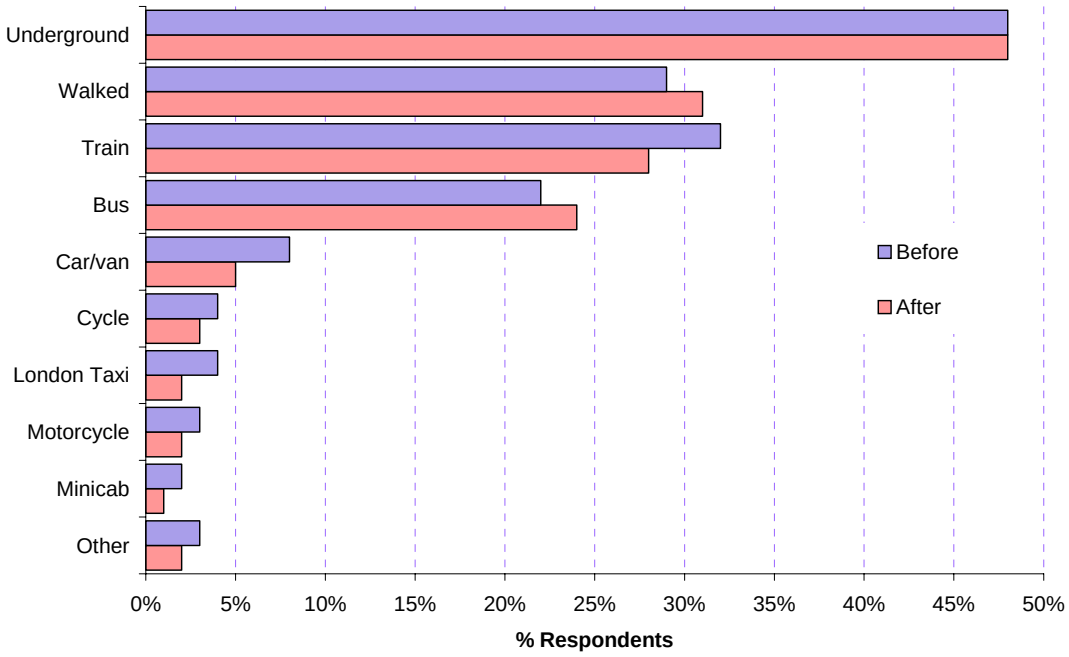
Figure 42 shows the modes used by on street survey respondents to travel to the survey location at the time of the survey. This does not amount to a statistical sample of mode share for travel to the charging zone, being representative only of the locations surveyed, and is a 'multi code' question, with all modes used being mentioned.

The majority of all respondents who had arrived in the zone during charging hours had travelled by public transport (75 percent in both 2002 and 2003). The proportion of respondents who had travelled to the zone on the interview day by car or van fell from 8 percent to 5 percent between the two survey waves, reflecting the reduction in car travel to the charging zone.

When asked to 'rate' overall conditions for the mode that they had travelled by on the survey day, all modes received slightly higher ratings in 2003 than in 2002, with the exception of powered two wheeler users. Walking and public transport were perceived to have particularly improved in comfort and overall quality. Cycle and powered two-wheeler safety were perceived to have improved. Bus, car, van and cycle speeds were also perceived to have

improved by those using these modes to travel to the interview location on the survey day.

Figure 42 Modes used to travel into or in the congestion charging zone during charging hours, before and after the introduction of charging. On-street survey respondents only.



Note: More than one mode could be mentioned, and so totals do not add up to 100 percent.

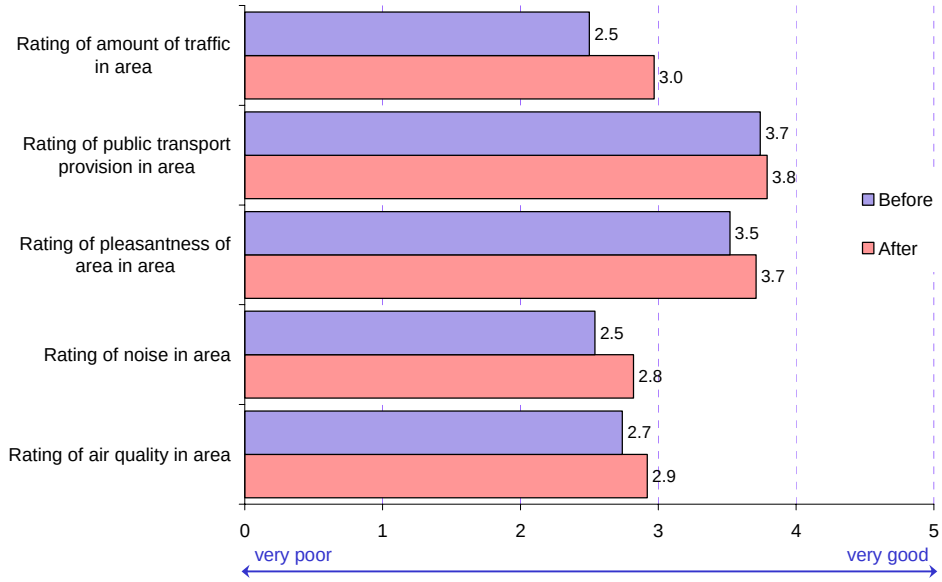
Amenity and environmental quality within the charging zone

Respondents were asked to 'rate' the area in which they were interviewed on five attributes (both in terms of a scalar score and in terms of nominating 'best and 'worst' attributes of the location). All of these attributes were perceived to have shown an improvement after charging in 2003 compared to 2002. The attributes were air quality; noise; overall pleasantness of area; public transport provision; and the amount of traffic.

In particular, in two types of area the improvement in the rating of the amount of traffic meant that the net rating changed from negative to positive overall. These were 'restaurant' and 'tourist' areas.

The 'best' and 'worst' aspects of the area (as nominated on average before charging in 2002) saw little change, with similar proportions citing the range of shops as the 'best' aspect and traffic and noise as the 'worst' aspects both before and after charging.

Figure 43 Ratings of selected attributes for sites inside the charging zone, before and after the introduction of charging. On-street survey respondents only.



Awareness of the congestion charging scheme

When asked if they were aware of the congestion charging scheme, nearly all UK resident respondents (97 percent) and nearly half of non-UK resident respondents (48 percent) said that they were.

5.8 Special Inquiries

A range of more in-depth studies was undertaken with selected groups of individuals over the period before the scheme was implemented, with follow-up work afterwards. The groups consisted of people who work or drive frequently within the charging zone and were familiar with the road and public transport networks in London, and included bus and mini cab drivers, traffic wardens, parking attendants and emergency services staff. This was so that they were able to provide a particularly informed view of impacts of the scheme, specifically in relation to traffic and transport in and around the charging zone.

It is important to realise that this is in-depth work with extremely small samples of specially-selected individuals whose experiences and views are not necessarily representative. Their reported views are important, but must be seen in this context and in terms of the wider body of measured findings reported elsewhere.

Congestion

The majority of respondents agreed that the scheme had been effective and that traffic and congestion within the zone had reduced, often to a greater extent than they expected prior to its introduction. They also felt their journeys were now more reliable. The extent to which this improvement has impacted

on their journeys varied, with some respondents quoting an improvement of 15 minutes and up to 10 percent.

Traffic changes and public transport

Most respondents commented on the increase in the number of pedal cycles and powered two wheelers as well as buses within the charging zone. The increase in the number of buses observed caused quite different reactions between respondents. Bus drivers tended to comment on the improvement in journey times, increase in passenger numbers and service enhancements whilst many of those working in the emergency services tended to think these increases were a negative factor from their point of view. Bus drivers also commented that 'cashless' buses and Oyster Cards were contributing towards improved bus journey times.

Many also felt that bus lanes were an issue of concern, although in which way varied between the groups. Not surprisingly, mini-cab drivers felt that mini-cabs should be allowed to use them, bus drivers felt no-one else should be allowed to use them and that there should be more of them, and those in the emergency services wanted them removed.

Traffic conditions

Respondents were generally positive about the scheme and agree that it has succeeded in reducing traffic within the zone – sometimes to a degree much beyond their prior expectations, although they do feel the level of traffic reduction has lessened over time. Respondents also felt that traffic conditions had not improved on the Inner Ring Road and that the scheme may have actually pushed traffic into the area outside the zone.

Parking

Parking was an issue across the various groups, particularly amongst couriers and mini-cab drivers who feel that despite their best efforts they are hindered from completing their work by over zealous traffic wardens. This is a theme continued from the 2002 surveys before the scheme was introduced, and is not likely to reflect the charging scheme itself.

Traffic wardens and parking attendants said that they felt they were generally writing fewer tickets than before the charge. There were also comments on parking levels outside the zone. Traffic wardens said that the free car-parks they are aware of outside the zone are visibly busier and mini-cab drivers had noticed an increase in parking just outside the zone.

Support and opinions

Few respondents felt that the congestion charge had impacted on their personal life to any great extent. With the exception of mini-cab operators the general feeling was that congestion charging has worked, and there was general support for the scheme.

6 Business and economic impacts

6.1 Introduction

This section reviews and updates the available evidence relating to the impacts of congestion charging on business and economic activity in central London. It presents the results of three years of research and monitoring of the business and economic impacts of the congestion charging scheme by Transport for London (TfL) and Greater London Authority (GLA) Economics. An extensive research programme drawing on a wide range of data and techniques has strengthened the evidence base on business and economic impacts of the scheme since the publication of TfL's *Second Annual Monitoring Report*.

The traffic effects of the scheme were relatively immediate. Although any effects on business will take some time to manifest themselves, at this stage, two years after the introduction of the scheme, any major impacts would be expected to show up in available economic data.

Achieving robust estimates of the nature and scale of any impacts is difficult; as there are limited hard data available that will allow the detection and attribution of these effects against a backdrop of other changes such as the economic cycle. Consequently, much of the commentary by business and others to date has had to be based on subjective or 'attitudinal' assessments of the impact derived from surveys of business rather than hard evidence.

Nevertheless, this report uses the data sets that are available to give as full an assessment as is possible at the present time. The balance of evidence again leads to the conclusion that the scheme had a broadly neutral impact on London's economy.

6.2 Key findings

- At the time of the introduction of congestion charging the London economy was experiencing its biggest slowdown since the early 1990s. It has now recovered from that slowdown.
- Results from an extensive research programme suggest that congestion charging has had a broadly neutral impact on overall business performance in the charging zone.
- Measuring business performance in terms of variables such as employment, numbers of businesses, turnover and profitability fail to find evidence of an effect from the scheme.
- Data from the Annual Business Inquiry, the Beta Model database, the Dun and Bradstreet database and the London Annual Business Survey all support this conclusion.
- Studies of the commercial and residential property markets have not found any significant impact from the congestion charge.

- Sectoral evidence from the business performance research programme is inconclusive. Some sectors within the charging zone have shown better performance than outside the zone. Other sectors have performed worse inside the zone than outside. These differences are all relatively small, and are not consistent between different datasets. It is not possible to be certain what part of these small differences (positive or negative) result from the congestion charge.
- Data on central London retail sales from the London Retail Consortium show that after the dip in retail sales growth in early 2003, growth has since recovered.
- Econometric analysis of the impact of the congestion charge on overall retail sales using the same methodology as an earlier study on behalf of John Lewis looking at John Lewis sales only, suggests that the charge had no measurable effect on total central London retail sales.
- TfL's business attitude surveys for 2004 suggest that there is continued recognition of transport benefits associated with the scheme, albeit at a slightly lower level than in 2003. A majority of businesses continue to support the scheme, provided that there is continued investment in public transport.
- The conclusion of this analysis is that congestion charging has had a broadly neutral impact on the economy of central London, and that any impacts on individual business sectors, including retail, are small.

6.3 Recent trends in the London economy

Context

A comparison of employee jobs (self-employed are not included) and business units (sites not companies) in the charging zone and Greater London is available using Annual Business Inquiry (ABI) 2002 data (2003 data is available, but 2002 is used to show the position before charging). Greater London is defined as the Government Office region and for the charging zone postcode sector definitions were used.

Figure 44 shows that Financial and Business Services account for the highest percentage of jobs in both Greater London (32 percent) and the charging zone (52 percent), although the proportion employed in the charging zone is much higher resulting in lower proportions of employees working in other sectors. As a result, the proportion of employees within the charging zone working in the Retail, Manufacturing, Construction, Wholesale, Education and Health sectors is around half that of Greater London. Each of the Retail, Manufacturing, Construction and Wholesale sectors account for under 5 percent of employees within the charging zone, less than a tenth of the proportion accounted for by Finance and Business Services.

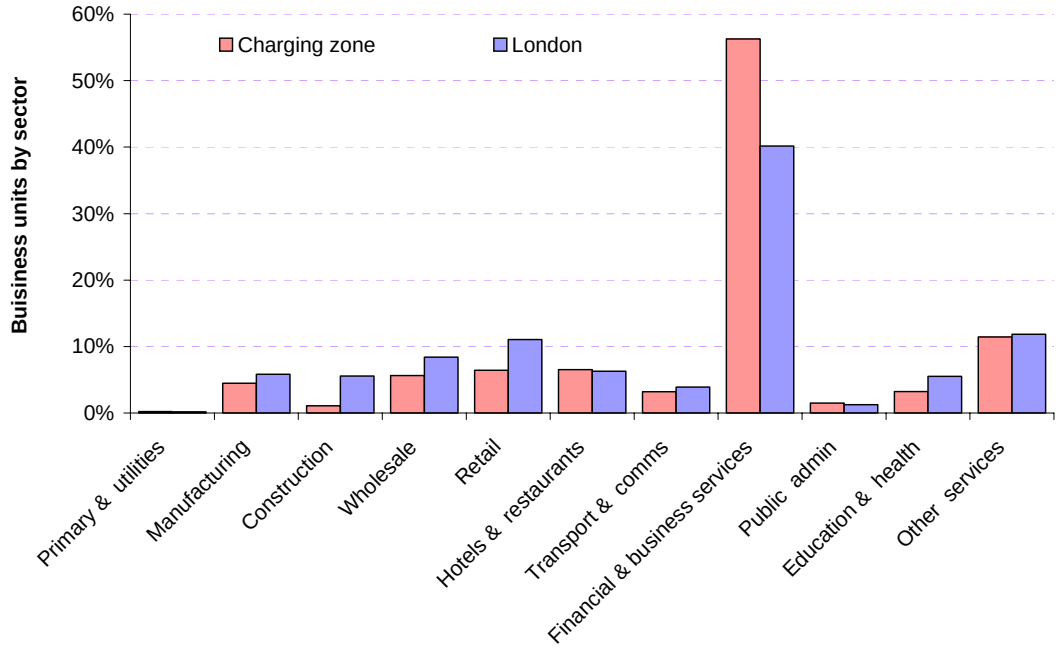
Figure 44 Sector profile – employee jobs by industry.

Sector	Charging zone		Greater London	
	Employee Jobs	Percentage of zone jobs	Employee Jobs	Percentage of London jobs
Financial & business services	584,000	+52.3%	1,257,000	+32.0%
Education & health	87,000	+7.8%	612,000	+15.6%
Other services	81,000	+7.3%	274,000	+7.0%
Hotels & restaurants	80,000	+7.2%	289,000	+7.4%
Transport & communication	73,000	+6.6%	306,000	+7.8%
Public administration	70,000	+6.3%	205,000	+5.2%
Retail	54,000	+4.8%	381,000	+9.7%
Manufacturing	39,000	+3.5%	236,000	+6.0%
Wholesale	34,000	+3.0%	224,000	+5.7%
Construction	12,000	+1.1%	135,000	+3.4%
Primary & utilities	3,000	+0.3%	12,000	+0.3%

Source: Annual Business Inquiry, ONS, 2002.

Figure 45 shows that, in terms of business units, both the charging zone and Greater London are dominated by Financial and Business Services at 56 percent and 40 percent respectively. Other Services account for the second highest proportion of business units in both the charging zone and Greater London and make up around one tenth. Proportionally there are more retail business units in Greater London at 11 percent whereas the charging zone has roughly half of that at 6 percent. Hotels and restaurants account for around 6 percent of units in both the charging zone and in Greater London. Manufacturing and Wholesale make up 5 percent and 6 percent respectively of charging zone businesses, and slightly more in Greater London. Construction, Education and Health make up around 6 percent each of Greater London business units, but are not as large in the charging zone.

Figure 45 Business units by sector.

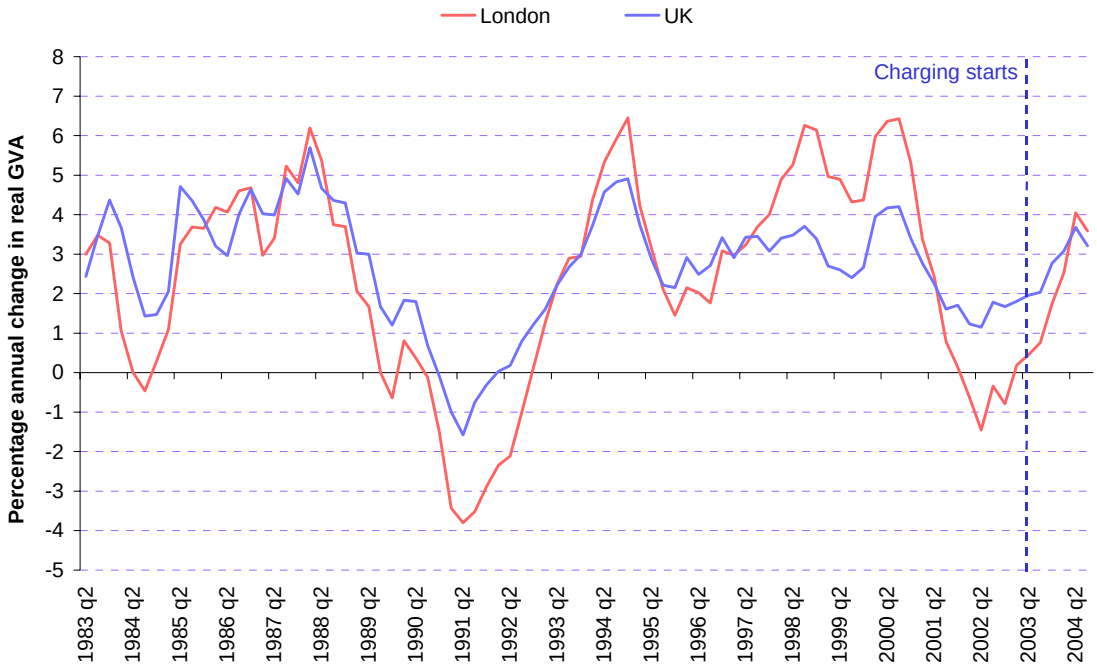


Source: Annual Business Inquiry, ONS, 2002.

Recent economic trends

Congestion charging was introduced at a time when the economy as a whole was slowing down. As Figure 46 shows, London's economy experienced four quarters of negative growth starting before the introduction of charging, in 2002. This was the most significant slowdown in the London and UK economies since the early 1990s. The economic slowdown was felt across all sectors. The timing makes the task of attempting to assess the separate impact of congestion charging particularly difficult.

Figure 46 Change in Gross Value Added (GVA), Greater London and UK.



Source: Experian Business Strategies.

The London economy showed a recovery at the end of 2003; and throughout 2004 estimates show it catching up with UK performance. In terms of employment, the slowdown in 2002 to 2003 did not lead to job losses on a major scale. Employee job numbers dipped in 2001 to 2003, but the latest official data suggest that London employee jobs have recovered to near year 2000 levels in 2004.

There is increasing evidence that consumer spending slowed down in 2004 as a result of monetary tightening by the Bank of England. The Bank raised interest rates four times during 2004 to 4.75 percent. House price inflation was also affected by this and started to slow during the latter part of 2004, with most economists predicting a gradual adjustment.

Tourism numbers have recovered significantly in the 12 months to the second quarter of 2004. However, overseas visitors to London are still below year 2000 levels. There have been no further transport network disruptions on the scale of the Central Line closure in 2003 and in fact transport use has

continued to grow at a healthy rate, adding to the evidence that London's economy is more or less back to business as usual.

In view of the strong cyclical pattern in this period, we need to examine the extent to which business performance in the charging zone differs from that in comparable areas and sectors. The next section looks at this issue in more detail.

6.4 Assessments of business change

A research programme was designed to draw on as many detailed business-related datasets as possible to look for signs of an impact of congestion charging. At the level of geographic and business category disaggregation that is necessary to investigate the impacts of the congestion charge, no existing single dataset will be able to deliver truly robust results. However, if a large number of different data sources show the same or similar results, we can be reasonably confident that our inferences are correct.

The main data sources used in this research programme were:

- The Annual Business Inquiry – Official data from the Office for National Statistics which enables comparison of employment and business units at an appropriate geographic and industrial disaggregation.
- The Beta Model – A private consultancy which uses a proprietary database of businesses based on Yell PLCs Yellow Pages Business Directories. It includes 90 percent of organisations in the UK with a business tariff telephone line.
- The Dun and Bradstreet database of businesses – A commercial database containing individual records for most businesses and workplaces in the UK. The database is generated from Companies House and Thomson Directories and is subject to continuous updating through telephone contact.
- The London Development Agency/Business Link for London, London Annual Business Survey – New since 2003, this annual survey with an achieved sample size of over 4,000 private sector businesses provides an additional, independent source of data.

The common approach of all these studies has been to compare aspects of business performance (measured by such variables as number of businesses or sites, numbers of employees, sales and profits) inside the congestion charging zone with business performance outside the zone both before and after the introduction of the scheme.

One key issue is to choose appropriate control areas. Business performance in the charging zone was compared across all sectors, with performance in those sectors in the rest of inner London and London as a whole. For individual sectors specific control areas were also selected which were as comparable as possible to the charging zone, apart from the charge itself.

All such tests are imperfect. There are a multitude of factors which might affect the charging zone differently from the rest of London, such as business composition, making central London different and therefore affected differently by, for example, the business cycle. However, this was the best way to test the hypothesis of a congestion charging impact on the basis of the available data.

The conclusion from all the studies is that it is difficult if not impossible to discern any significant impact on business performance from the scheme. This is not surprising. Business performance is likely to be affected by many different factors and it is unlikely that congestion charging would have a decisive impact even on any individual business sector, let alone the whole central London economy. Given the limitations of the data, the most reliable conclusion is that overall, business has not been significantly affected by the congestion charge.

The following summarises the results of the different studies under this section.

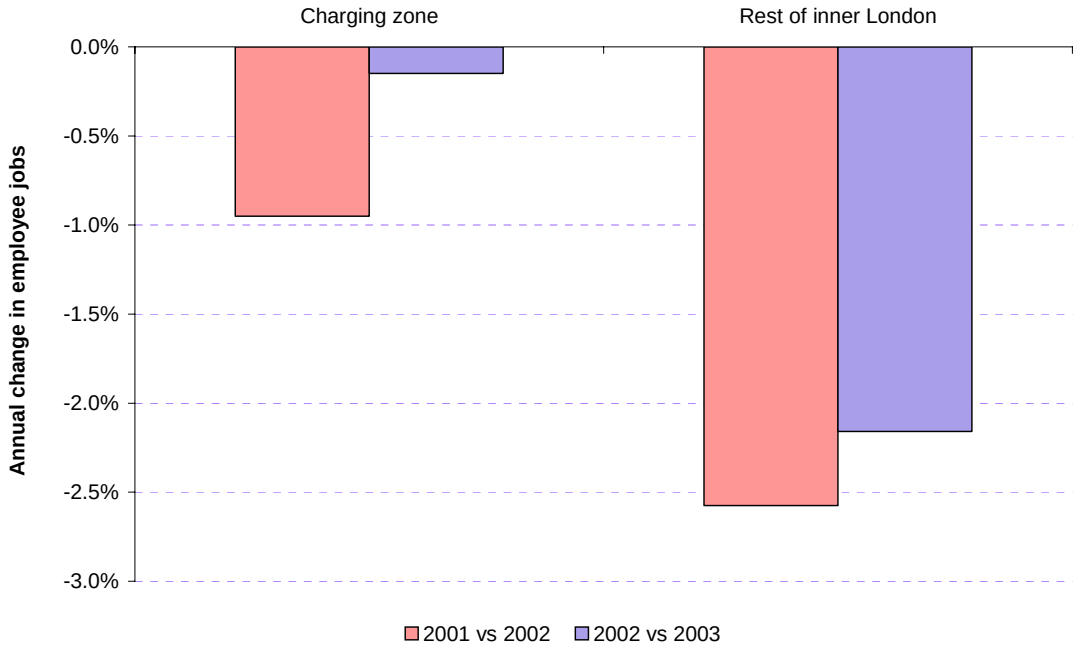
Annual Business Inquiry

The Annual Business Inquiry is a survey conducted by the Office for National Statistics. It has two parts – one which concentrates on employee and site data and another that deals with financial information. This analysis restricted itself to the employee and site data since this data can be obtained at detailed enough geographic level to separate the congestion charging zone from the rest of inner London. Detailed data for 2003 became available at the end of December 2004. An analysis of 2004 data will only be possible in early 2006.

The data was obtained at postcode sector level and a postcode sector definition of the charging zone was used for analysis.

The results of the analysis are presented in Figure 47 for employee jobs and Figure 48 for business units. Looking at the change in employee jobs in the charging zone as a whole there was a decline of around 0.2 percent between 2002 and 2003. However, this was a smaller decline than the decline between 2001 and 2002 (0.9 percent). The decline in 2002 to 2003 was also smaller in proportional terms in the charging zone than it was in the rest of inner London (2.2 percent). Whilst this could be interpreted as evidence for a small positive impact of congestion charging on jobs, TfL consider the most reliable conclusion is that there has been no significant impact from the congestion charge on employee jobs.

Figure 47 Employee annual change all sectors – charging zone and rest of inner London.

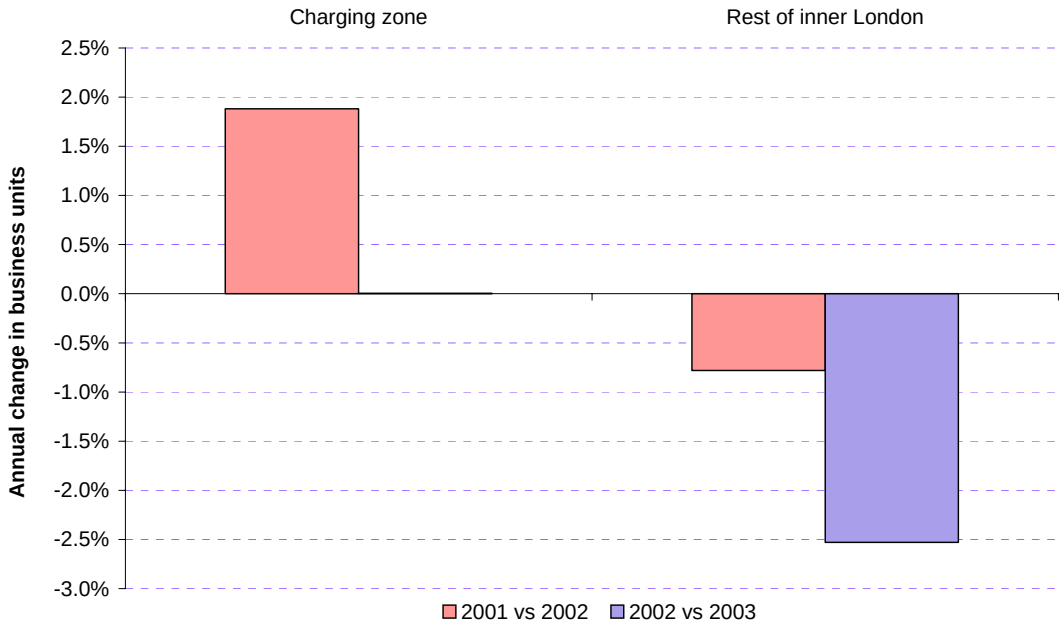


Source: Annual Business Inquiry (ABI), ONS, 2003.

Note: 'inner London' was here defined as the following boroughs – Camden, City of London, Hackney, Hammersmith and Fulham, Haringey, Islington, Kensington and Chelsea, Lambeth, Lewisham, Newham, Southwark, Tower Hamlets, Wandsworth, and Westminster. 'The rest of Inner London' was defined as 'inner London' minus the congestion charging zone.

A similar conclusion is reached from examining data on business units. Figure 48 shows annual change in business units for all sectors in the charging zone and for all inner London. The number of business units grew in 2002, but stayed constant in 2003 within the charging zone. In the rest of inner London a decline in 2002 became a greater decline in 2003.

Figure 48 Business units annual change all sectors – charging zone and rest of inner London.



Source: Annual Business Inquiry (ABI), ONS, 2003.

Note: 'inner London' was here defined as the following boroughs – Camden, City of London, Hackney, Hammersmith and Fulham, Haringey, Islington, Kensington and Chelsea, Lambeth, Lewisham, Newham, Southwark, Tower Hamlets, Wandsworth, and Westminster. 'The rest of Inner London' was defined as 'inner London' minus the congestion charging zone.

Breaking the data down further by sector shows that for some sectors (including retail) employee jobs within the charging zone increased between 2002 and 2003. Indeed, in 2003, inside the charging zone more sectors grew than declined, though the overall change was still negative. In 2003 in the rest of inner London more sectors declined than grew and overall employee jobs fell by 2.2 per cent. Figure 49 shows how employee jobs in each sector grew in 2002 (on 2001) and 2003 (on 2002). The fifth and sixth columns in the table compare performance in 2002 with performance in 2003 for the charging zone and the rest of inner London.

For both the charging zone and the rest of inner London, performance (annual change in employee jobs) improved between 2002 and 2003. In each area, just under half of the sectors improved between 2002 and 2003. However, not all sectors showed the same pattern with Construction, Manufacturing and Public Administration improving their performance the most, and performance declining the most for Utilities, Other Services, Finance and Transport & Communication among charging zone sectors. In the charging zone, retail sector performance declined by less than the rest of inner London.

This variety of results between sectors suggests that congestion charging can only have had a minor role to play in business performance. TfL considers the most reliable conclusion is that it has no significant effect overall, and at most small effects within individual sectors.

Figure 49 Annual employee change by sector – charging zone and the rest of inner London.

Industry	Charging zone		Inner London (excluding charging zone)		Charging zone	Inner London (excluding charging zone)
	2002	2003	2002	2003	2003-2002	2003-2002
	Annual change in employee jobs				*Difference between 2003 and 2002*	
Retail	+3.3%	+1.9%	-3.5%	-6.5%	-1.4%	-3.0%
Manufacturing	-5.4%	+1.2%	-9.1%	-3.3%	+6.6%	+5.8%
Utilities	-10.1%	-24.0%	-7.9%	-15.6%	-13.9%	-7.8%
Construction	-3.2%	+9.3%	-0.2%	-9.6%	+12.5%	-9.4%
Wholesale	+1.2%	+0.1%	-3.3%	-5.1%	-1.1%	-1.8%
Hotels & restaurants	+6.5%	+4.7%	+4.4%	+0.9%	-1.8%	-3.5%
Transport & Communication	-0.3%	-4.6%	-10.2%	-6.1%	-4.3%	+4.1%
Finance	+1.3%	-3.2%	-10.6%	-3.5%	-4.4%	+7.1%
Business services	-3.9%	+0.1%	-5.0%	-4.3%	+4.0%	+0.7%
Public administation	+0.0%	+5.7%	+3.9%	+13.6%	+5.7%	+9.7%
Education	+0.4%	+1.9%	+5.3%	+4.4%	+1.4%	-0.9%
Health	+4.1%	+6.9%	+3.5%	+4.3%	+2.8%	+0.8%
Other services	-1.1%	-6.2%	-3.5%	-10.1%	-5.1%	-6.6%
Total	**-1.0%**	**-0.1%**	**-2.6%**	**-2.2%**	**+0.8%**	**+0.4%**

Source: Annual Business Inquiry (ABI), ONS, 2003.

Note: the base for the charging zone for 2002 is 1,117,000 and for 2003 it is 1,115,000 (total number of jobs). The base for inner London less the charging zone for 2002 is 1,176,600 and for 2003 it is 1,151,000 (total number of jobs).

Beta Model

The company Beta Model Limited were commissioned to compare the performance of enterprises within the charging zone with those outside. The Beta Model uses a combination of a high quality business database (from Experian/Yell) and a series of analytical tools for reconciling business and economic trends. Its focus is on comparing trends between different areas and its reports are built up from information on individual businesses, of which there were over 2.1 million on its UK database in April 2004.

Data was analysed for the period April 2003 to April 2004, to identify changes in the business environment that have occurred since the congestion charge was introduced, and for the period April 2001 to April 2004 to identify longer term trends. Congestion charging can only be said to have had an impact if it is associated with a significant deviation from the established trend. Six business sectors were examined with data on the number of enterprises, one-year survival rates and measures for formation and deformation rates. The Beta Model's preferred measure of performance is the rate of annual change in the number of businesses within the congestion charging zone relative to the rate of change within London as a whole.

The main conclusion is that the introduction of charging has not had any identifiable effect upon the total number of businesses relative to the rest of London. The analysis showed that the number of enterprises declined within the charging zone relative to the rest of London during April 2003 to April 2004, but that this was a continuation of a trend already seen over the previous two years. Since the congestion charge does not seem to have

affected the pre-existing trend, there is no evidence that it has had an overall impact.

> ***" …the implementation of the charging zone does not appear to have had an impact on the ongoing decline in numbers of enterprises in the area. The low comparative growth rate is a persistent problem and more likely to be structural than policy related. "***

Source: The Beta Model. An analysis of the impact of the congestion charge on enterprise in London (to be published).

Dun and Bradstreet

One of the advantages of the Dun and Bradstreet database is that it contains data on turnover and profits which is difficult to get from other data sources at such a detailed geographic level. However, companies report this at a company level. It is not possible to get this data separately for individual sites. Hence, organisations will report turnover and profits for the group as a whole and it is not possible to get separate data on only that portion of, for example, turnover which was generated within the congestion charging zone.

The strategy adopted to get around this problem was to exclude from the analysis companies with a turnover of over £1 million, as separate evidence has shown that most companies below this threshold are likely to be single site companies and so the effects captured would be associated with the charging zone. However, this does exclude quite a large proportion of central London businesses.

The results on turnover and profitability are presented in Figure 50 and Figure 51. They show that, for most sectors, the charging zone has performed better or as well as comparable areas outside the zone. In terms of sales, retail does better inside the zone than in an area of west central London (Knightsbridge and High Street Kensington) or in the rest of inner London. In terms of profit, retail in the central zone performs less well than the rest of inner London, but about the same as the selected area of west central London. This data therefore supports the view that there are no significant impacts of congestion charging on business overall or within individual sectors.

Figure 50 Change in sales value (percentage change 2002 to 2003): businesses with less than £1 million turnover.

	Charging zone (2,722)	West central London (1,124)	Other inner London (3,262)	Other outer London (3,984)
Financial and business services	+32.7	+30.8	+30.7	+43.0
Hotels and restaurants	+21.1	-3.3	+2.9	+2.1
Manufacturing & construction	+22.6	+15.0	+13.6	+10.8
Other services	+21.9	+14.3	+26.9	+22.6
Public administration	+22.1	-6.5	+27.5	+26.8
Retail	+15.0	+4.4	+7.8	+7.0
Transport and communications	0.0	+77.2	+20.1	+11.5
Wholesale and other distribution	+15.9	+13.7	+12.4	+23.5
Total	+23.4	+24.9	+20.6	+20.8

Source: Dun and Bradstreet.
Note: these figures may be inflated by the effect of corporate re-structuring such as takeovers or mergers which can result in very large increases in sales which do not reflect underlying performance. Total number of businesses are given in the column headings.

Figure 51 Change in profits (percentage change 2002 to 2003): businesses with less than £1 million turnover.

	Charging zone (2,722)	West central London (1,124)	Other inner London (3,262)	Other outer London (3,984)
Financial and business services	+32.8	+17.6	+40.7	+33.1
Hotels and restaurants	-23.0	-27.7	-17.8	+14.8
Manufacturing & construction	-4.5	-11.4	+8.9	+13.9
Other services	+12.4	+31.0	+8.8	+22.7
Public administration	+20.6	+47.7	+26.7	+40.1
Retail	-28.9	-30.3	+17.3	+23.0
Transport and communications	+15.6	+24.1	-6.1	+7.0
Wholesale and other distribution	+6.0	-14.1	+13.6	+35.7
Total	**+13.0**	**+13.0**	**+17.8**	**+24.8**

Source: Dun and Bradstreet.
Note: these figures may be inflated by the effect of corporate re-structuring such as takeovers or mergers which can result in very large increases in sales which do not reflect underlying performance. Total number of businesses are given in the column headings.

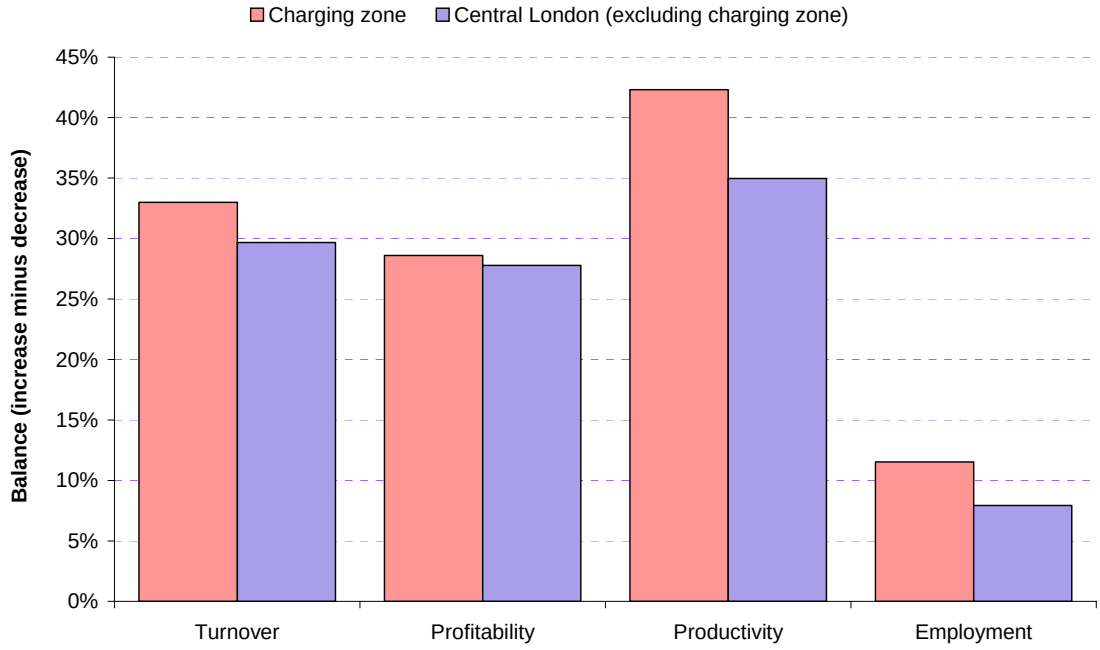
London Annual Business Survey

The London Development Agency and Business Link for London introduced a large scale survey of businesses in London in 2003. The second London Annual Business Survey was conducted in 2004. The survey consisted of telephone interviews with an achieved sample of over 4,000 private-sector businesses. GLA Economics have analysed the results, splitting the respondents into those based inside the charging zone and comparing these

to businesses based in the rest of central London. The charging zone was as before defined using postcodes. The achieved sample for the charging zone was around 380 businesses, whilst that for central London (defined in Figure 52) was around 550.

Figure 52 shows the balance of businesses reporting increased versus decreased business performance across indicators such as turnover, profitability, productivity and employment. Businesses within the charging zone seem to have performed slightly better than businesses in the rest of central London (although the differences are small and are within the margins of error of the estimates). Once again, no effect of the congestion charge can be detected in these data.

Figure 52 Business performance in the charging zone and the rest of central London. Balance of businesses reporting increases minus those reporting decreases over the past 12 months in turnover, profitability, productivity and employment.



Source: London Development Agency and Business Link for London, London Annual Business Survey 2004.

Note: Response refers to change over the last 12 months from the survey (i.e. Summer 2003 to Summer 2004). Central London is here defined as the eight central boroughs – Camden, City of London, Islington, Kensington & Chelsea, Lambeth, Southwark, Wandsworth and Westminster. The rest of central London is then central London minus the charging zone.

6.5 Property prices

Property prices and rental yields are useful indicators of economic performance and provide another method of estimating differences in performance between the congestion charging zone and the rest of London. As with other indicators, charging was only one of several possible influences on property prices during 2003, and it seems reasonable to conclude that

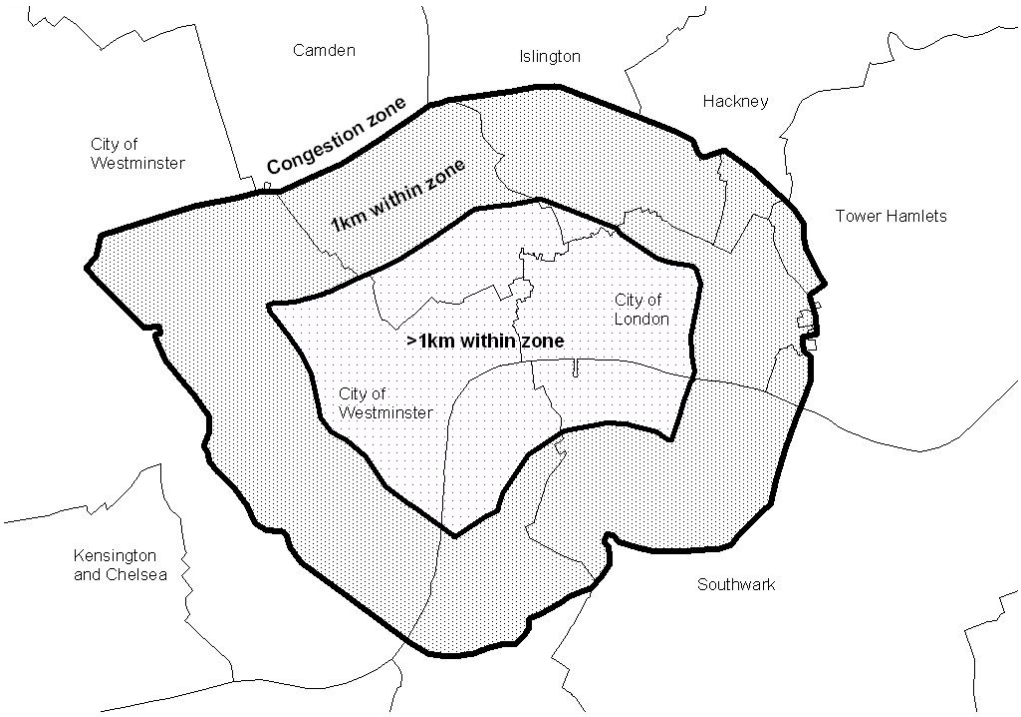
investor sentiment would also have been affected by factors such as the Iraq War.

Commercial property prices

The approach to testing the impact of congestion charging on both the commercial and residential property markets was to compare performance since the introduction of the scheme with recent background trends, using appropriate control areas. The conclusion of the study is that there was no strong evidence of a positive or negative impact of the charge on the property market in or around the charging zone.

Analysis was carried out by the Investment Property Databank (IPD) on their own database of property prices to examine the investment performance of shops and offices situated within the congestion charging zone. Rental growth rates and yield movements were examined in two locations – the area situated 1km from the periphery of the boundary of the zone (inside the zone) and the area within the inner core of the zone (see Figure 53). These data were then compared with inner London outside the charging zone.

Figure 53 Map of analysis areas for commercial property price trends – 1 km within zone and the inner core.



Isolating the impact of the congestion charge on rental values and yields from other market influences is extremely difficult, and particularly so in 2003. In 2003 the strength of investor demand bore a powerful influence on retail and office yields. In addition, central London office markets were experiencing their highest vacancy rates since the early 1990s recession and the falls in rental values were particularly steep.

Although the analysis cannot therefore be conclusive, by examining trends between properties within the zone and benchmark areas, it is possible to determine whether the data are consistent with charging having had a negative or positive effect. These relative impacts from the analysis are summarised below:

Figure 54 Rental growth and yield impact on capital value, charging zone compared to rest of inner London (effects of all factors), 2003.

	Rental growth	Yield impact on capital value
Shops within 1km of zone periphery	Marginally negative	Marginally negative
Shops situated in inner charging zone	Negative	Negative
Offices within 1km of periphery of zone	Positive	Negative
Offices situated in inner charging zone	Negative	Positive

Rental growth

Over the last few years there has been a trend in weaker retail rental values in the charging zone and inner London and this appears to have been primarily due to weak international tourism. However, in 2003 inner London's retail rental growth showed an improvement on 2002, but the charging zone's retail rental growth continued to weaken.

Given that the downturn in office rental values pre-dated the introduction of the scheme by 12 months and that the overall fall has been almost as severe outside the zone as inside, it is clear that any impact that charging may have had on demand from office occupiers so far has been marginal.

The negative differential in rental growth between the charging zone and the rest of inner London could be viewed as evidence that the scheme has had a negative impact, but as in the retail market, the gap was greatest in the inner core area which might be expected to have been less affected than locations within 1km of the boundary. It is quite possible that the variation in rental growth is more a function of differences in occupier demand between core and fringe office locations, with businesses in the rest of inner London less affected by the recent global downturn than those inside the zone.

Yield movements

The difference in yield movements – a measure of investor sentiment – between shops inside and outside the charging zone in 2003 was too small to be interpreted as robust evidence that investor sentiment has turned for or against retail property in the charging zone.

The difference in yield movements between office locations outside the zone and the 1km annulus just within the charging boundary was also marginal. While the relatively large fall in office yields in the inner core area could be interpreted as a positive impact with investors anticipating the benefits of an

improvement in public transport, in all likelihood it was more a sign of the very strong appetite of foreign investors for high value buildings in prestigious locations.

Residential property prices

To better understand the trends in residential property prices in London, analysis of the volume of residential property sales and the average residential property sale value was undertaken. This analysis compared the congestion charging zone, the boundary area and the remainder of Greater London, prior to and following the introduction of the scheme. The main data source was HM Land Registry.

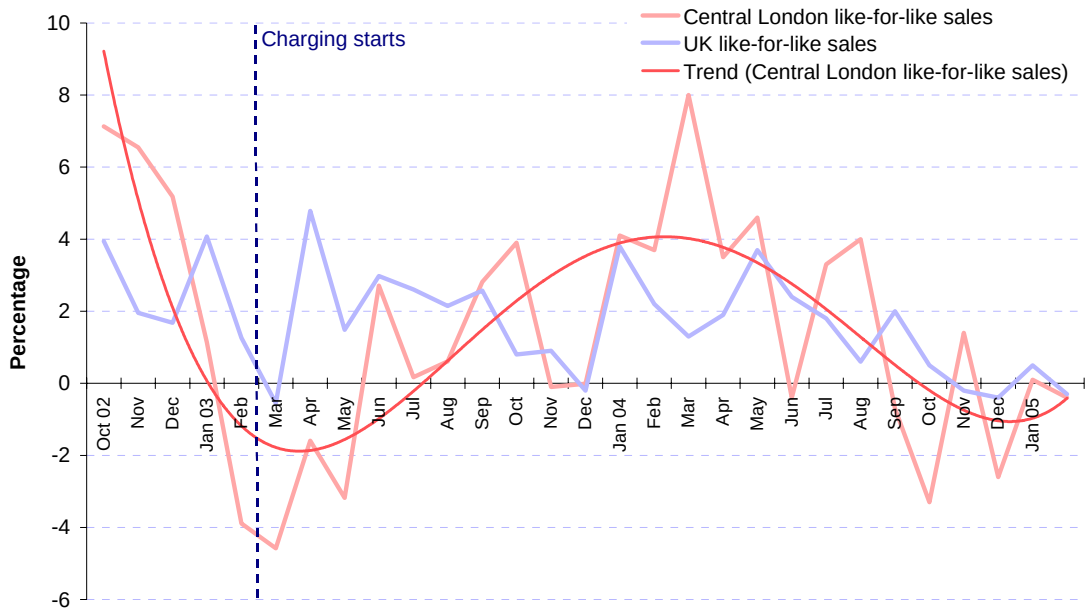
This work concluded that the introduction of congestion charging has not had an identifiable effect on residential property values or volumes of residential property sales in any part of London.

6.6 Recent retail trends

Retail accounts for only 5 percent of jobs within the charging zone (Figure 44). This section analyses trends in the retail sector in London in more detail. Figure 55 shows the percentage change in year-on-year retail sales value for central London and the UK as a whole to January 2005. The figure shows that:

- Trends in central London retail sales are more volatile than the UK as a whole.
- Central London retail sales growth declined around late 2002 (before the introduction of charging) and recovered by Autumn 2003, when a period of positive growth ensued. This growth seems to now be slowing. These trends seem to reflect wider economic factors, as charging has been a consistent factor since early 2003.

Figure 55 Percentage change in year-on-year retail sales growth.



Source: LRC London Retail Sales Monitor, February 2005.

Trends in shopper numbers are shown in Figure 56, which shows the SPSL retail traffic index. This index is a measure of the number of potential shoppers rather than actual retail sales in the charging zone and the UK.

Figure 56 SPSL Retail Traffic Index – charging zone compared with UK.

Source: SPSL Retail Traffic Index.
Note: The index remains provisional until confirmation of sample representation.

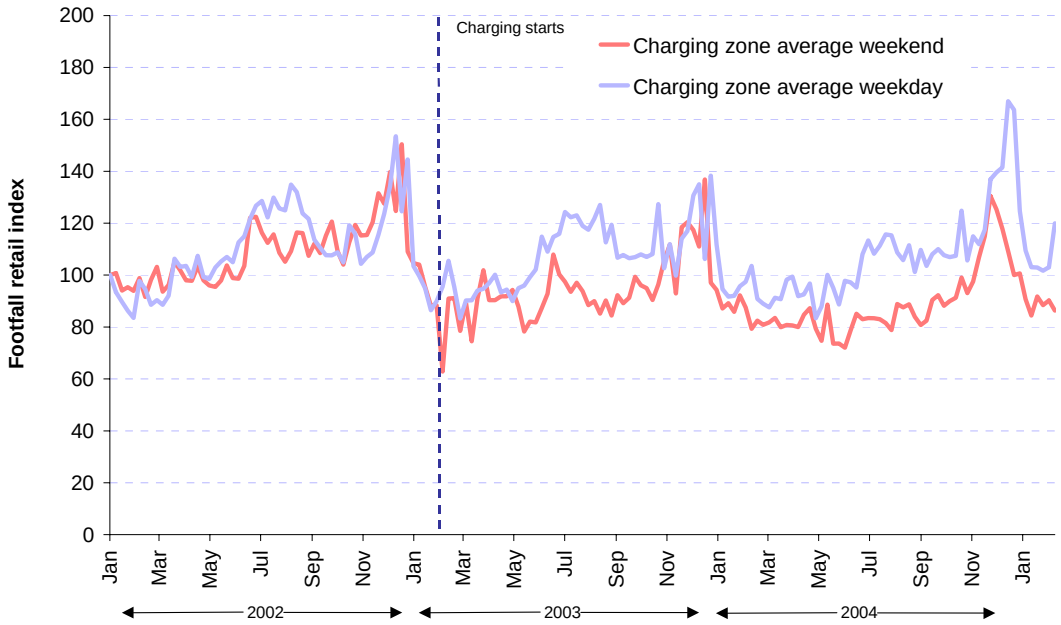
Charging zone retail footfall was below the rest of the UK from before charging started in 2002 and for much of 2003. However, the latter half of

2003 saw the charging zone outperforming the rest of the UK and returning to a pattern of year-on-year growth. This trend has continued throughout most of 2004, with the exception of June, September and October 2004 which experienced negative growth. February 2005 shows a period of negative growth, but this can be explained by February the previous year showing a high year-on-year increase.

The 2004 recovery in retail footfall inside the charging zone strongly implies that factors other than charging were responsible for the downturn, given that congestion charging has remained a constant factor in the zone since early 2003. This is further supported by the trend in UK retail pedestrians, which also experienced a period of decline in 2003, and a recovery in 2004, suggesting that the recent charging zone retail footfall trend is strongly reflective of wider national trends.

The FootFall index, as shown in Figure 57, is another measure of the number of shoppers present in the charging zone but does not directly reflect the level of spending in the zone. The index shows an average reduction in 2003 and 2004 compared with 2002, which is smaller for weekdays than weekends.

Figure 57 FootFall London congestion charging zone index, weekends and weekdays.



Source: FootFall London Congestion Charging Zone Index, February 2005.

6.7 Econometric tests of the impact of congestion charging on retail sales

In Spring 2004 Bell *et al* published an econometric study of the impact of congestion charging on John Lewis's Oxford Street store on the basis of sales data provided by John Lewis. They found a statistically significant effect of the charge on sales at this store.

Bell *et al* have revisited the question in collaboration with economists from GLA Economics (*Bell et al, The impact of the congestion charge on retail: the London experience), GLA Economics Working Paper, to be published*). Two types of model were tested – one on John Lewis sales, and one on total central London retail sales. The model of total central London retail sales finds no significant impact from the congestion charge. The model for John Lewis Oxford Street store found a negative impact on sales of that particular store.

It was not possible to control for the effect of competition between retailers within the model, which means that the John Lewis model result may at least in part reflect a decline in John Lewis' share of the central London retail market.

6.8 TfL case studies and other developments

Since the publication of the *Second Annual Monitoring Report* a number of other studies have been completed that help to clarify the extent of congestion charging impacts on particular elements of the central London economy. These include research by the Society of London Theatre and case studies undertaken by TfL on Smithfield and New Covent Garden wholesale markets, as well as schools and NHS hospital trusts in response to particular concerns expressed about the potential impact of congestion charging.

Theatre attendance

Theatres are a very important contributor to the London economy. The Arts Council of England's *Economic Impact Study of UK Theatre* (2004) estimated that West End theatres generate £1.5 billion annually for the UK economy in addition to the income derived directly from the sales of tickets, making this contribution through ancillary audience spending, and expenditure by theatres on staff wages, goods and services.

The Society's recent *West End Theatre Audience Report (2003)* indicated that in 2003, as in 1997, two-thirds of theatregoers ate out as part of their theatre experience. The report says that "*fears that the congestion charge might impact on the proportions of theatregoers who eat out do not appear to have been borne out, as the proportion who do so has not shifted significantly since 1997*".

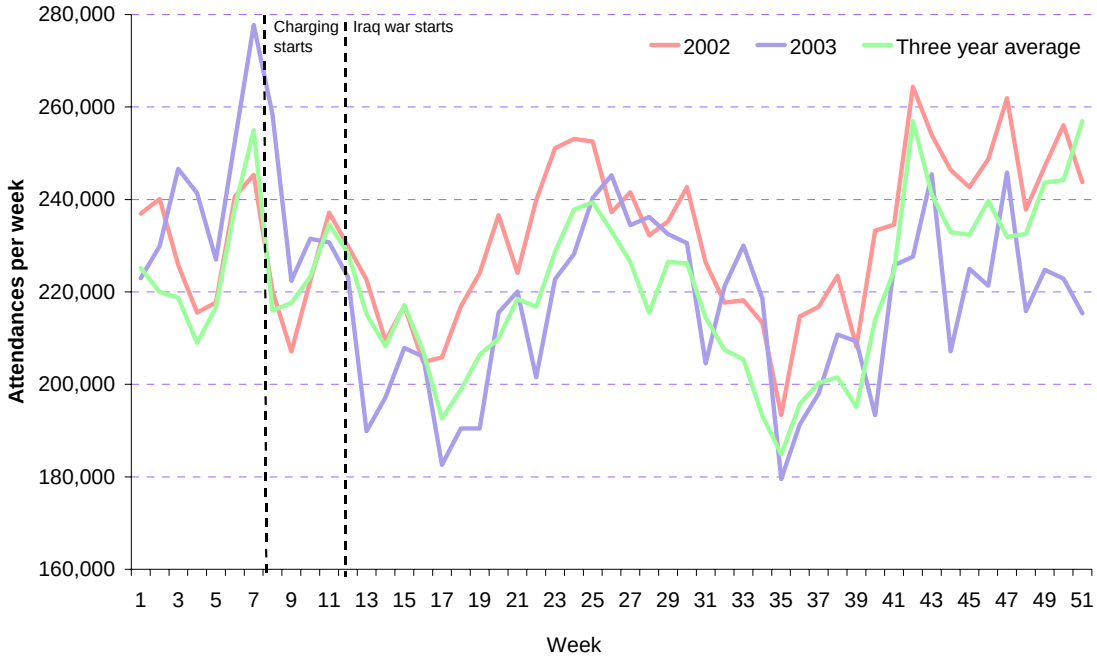
Revenue and attendance data for 2003, provided in the Society of London Theatre's *Box Office Data Report (2003)*, supports the view that congestion charging had no marked impact when it was introduced in February 2003 (Figure 58).

The first week of charging saw the second highest week in revenue for theatres in 2003. In contrast, the beginning of the Iraq War shortly before the introduction of charging saw both a decline in attendance and revenue, which can largely be accounted for by the reduction of international travel and tourism, particularly from North America. The Society, however, cautioned against assigning changes in audience numbers to specific factors, the

market being affected by a broad range of influences such as the opening and closing of specific shows, school holiday dates and general economic trends.

It is nevertheless clear that trends in attendance during 2003 are more related to other factors than the introduction of congestion charging, and there is no evidence of a congestion charging effect on theatre attendance.

Figure 58 2002 and 2003 weekly attendance at Society of London Theatre member theatres.



Source: The Society of London Theatre/MORI, Box Office Data Report 2003.

Smithfield Market

The Smithfield market is located within the congestion charging zone within the City of London.

Overall, quantitative evidence on Smithfield market sales turnover showed no significant long term effect of charging, with trade one year after the introduction of charging higher than before charging started.

In terms of the impacts of congestion charging on the market, four areas of potential effects were investigated:

- operating hours;
- staff recruitment and retention;
- business costs;
- sales turnover.

TfL has analysed the limited quantitative evidence available, and also considered the views of market traders and other relevant third party data.

One effect of the congestion charge has been to change the hours of operation and to compress them into the hours before the charge takes effect. Traders view this as a negative effect which makes life more difficult by creating a more pronounced peak in their activity.

There is no quantitative evidence of a loss of staff. The research indicates that the majority of employees are faced with paying the congestion charge because they generally leave work after the start of charging hours, mostly live some way outside the charging zone, and need to travel when public transport is not considered to be a viable alternative.

It appears that the employees are paying the charge rather than being reimbursed by employers.

For those minority traders who have their own delivery vehicles, they are having to pay the congestion charge, but should also be gaining some benefits from reduced congestion.

The quantitative data supplied by the Corporation of London shows lower trade for the year following congestion charging compared with the previous year, but more recent data shows trade has recovered and is now higher than before the introduction of the scheme. Furthermore, interviews with meat buyers (butchers, catering companies and restaurateurs) did not support the view that the congestion charge is a major influence on their choice of supplier.

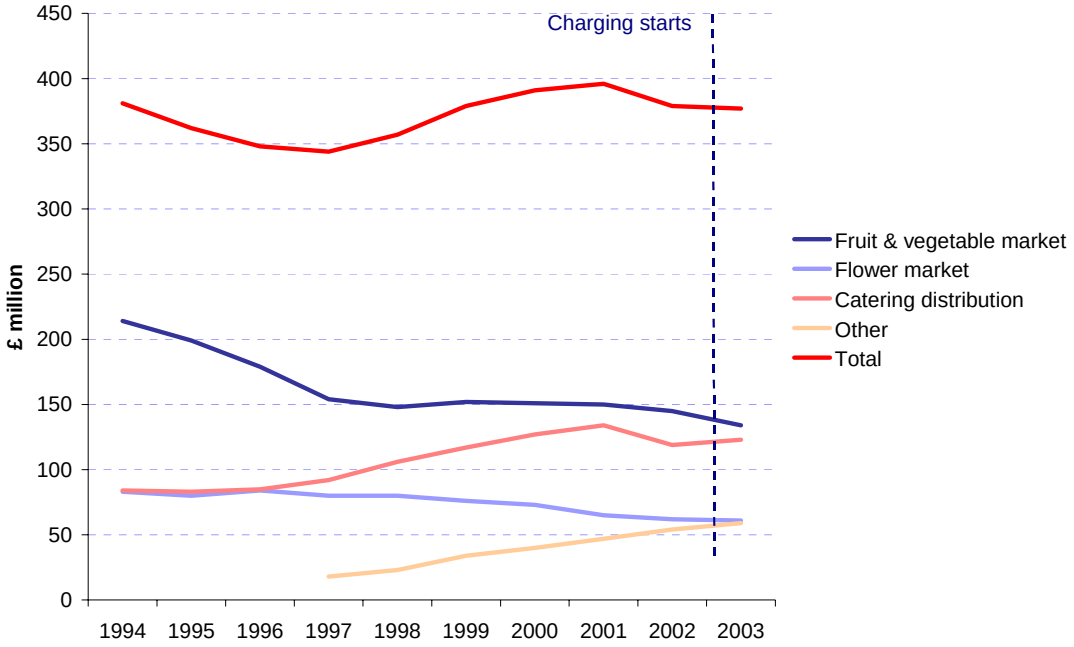
There is therefore no quantitative evidence of a significant adverse impact from the scheme, and the fact that trade in March 2004 is higher than before the start of charging supports this conclusion.

New Covent Garden Market

New Covent Garden Market is located just outside the charging zone in Nine Elms, in inner London. The TfL case study of New Covent Garden Market raises similar issues to that for Smithfield, albeit that as New Covent Garden Market is just outside of the charging zone, there is less likely to be any direct impact from the charge.

As Figure 59 shows, the total value of business conducted at the market remained broadly stable between 2003 and 2004, following a relatively sharp decline in 2002 the year before charging was introduced. These stable aggregate turnover figures do not show any evidence of a congestion charging effect.

Figure 59 New Covent Garden Market turnover, 1994 to 2003, (£ million).



Source: Covent Garden Market Authority Report and Accounts for the accounting period from 1st April 2003 to 31st March 2004.

One aspect that it is important to understand is the influence of underlying trends impacting on the market. One key trend is the increasing dominance of supermarkets, which have been capturing market share from smaller greengrocers and florists. This has a negative impact on the market because the supermarkets purchase direct, by-passing the wholesale markets.

The impact of these changes in the distribution chain have been mitigated to a degree by underlying growth in consumer demand for fresh fruit and vegetables, and for cut flowers.
Nevertheless, New Covent Garden Market itself has seen an underlying decline in both its traditional fruit and vegetable and flower wholesaling activities. This has been counter-balanced by a growth in the catering distribution business, and expansion into new areas including meat product distribution and miscellaneous activities such as ice sculpture.

There is no clear evidence that congestion charging has led to a significant loss of staff. It is important to bear in mind that employees do generally have the option of driving round the charging zone in order to avoid paying the charge, as the market is outside the charging zone.

Overall, therefore, there is no hard evidence that in economic terms the charge has had anything more than a marginal impact on the market.

Schools

Three schools in central London, two inside the charging zone and one outside, participated in some exploratory work to look at the impacts of the scheme on their staff and pupils.

In overall terms the measurable effect of congestion charging on the three case study schools was assessed as being minimal. However, the possibility of longer term effects on staff and pupil numbers cannot be completely ruled out and TfL will be investigating this further.

National Health Service Hospital Trusts

It is important to appreciate that only a small minority of staff and patients use a car to get to hospitals in central London. In addition, certain NHS staff in the course of their work and chronically sick patients who are assessed as being too weak to travel by public transport and require regular treatment are entitled to a 100 percent reimbursement of the charge.

A key overall finding from this work was that many concerns held by National Health Service staff prior to the introduction of the scheme have not materialised, and there had been a softening of initially negative attitudes towards the scheme, such that overall attitudes to the scheme are now marginally positive.

Prior to the introduction of congestion charging there were serious concerns about the possible impact on staff and on the operation and finances of the hospitals. These do not appear to have materialised to the extent feared, though some concerns do still remain. At the same time, the improvements to road congestion and bus services are now quite widely appreciated, whereas before congestion charging started these were treated with scepticism.

6.9 TfL surveys of business views

As set out in preceding sections, the available quantitative evidence indicates that congestion charging has had a broadly neutral effect on business and the economy. In addition to these quantitative analyses of the objective economic data, TfL also investigated the perceptions of people conducting business within the charging zone and just outside, and this section summarises the results from this attitudinal research. Overall it is evident that in some areas there is a significant gap between the effects of the charge, as assessed through the quantitative analyses, and the more negative perceptions of some businesses regarding the impacts of the charge, particularly businesses in parts of the retail sector.

The 2004 survey was timed to capture the views of charging around a year and a half since its introduction in February 2003. The response rate for the survey was 39 percent.

The sample was stratified by location (500 metres inside the zone, 500 metres outside the zone, and the remainder in the core of the zone, defined as ‘inner’

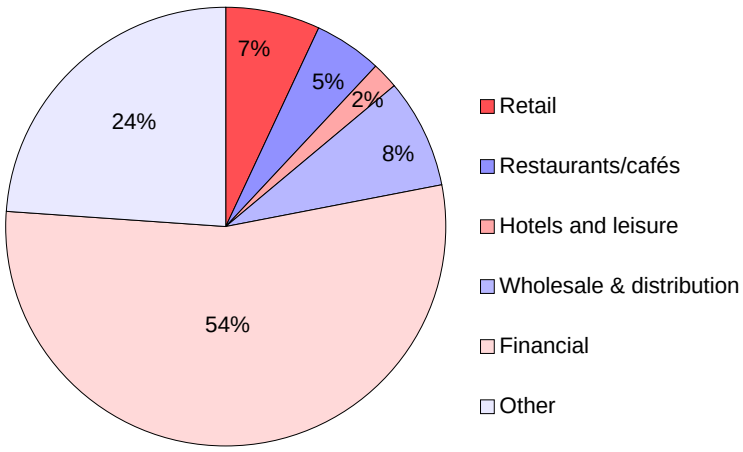
in the figures) and by business sector, with businesses selected randomly from each strata. The six business sectors were:

- financial and business services;
- retail;
- restaurants and cafés;
- hotels and leisure;
- wholesale and distribution;
- other including public sector and not for profit organisations.

Since the sample contained a disproportionate number of shops, restaurants, leisure businesses, wholesalers and distributors, the results were weighted to obtain a representative sample reflecting the business make up of central London.

Figure 60 shows each business sector as a proportion of the total business units in the sample area. These proportions were used in the weighting of the survey data. Over half of the business units in and around the charging zone are from the Financial and Business services sector, with the other sectors making up a much smaller proportion of total businesses in the sample area.

Figure 60 Industry sector as a proportion of total business population inside and just outside the congestion charging zone.



Source: Dun and Bradstreet and Annual Business Survey

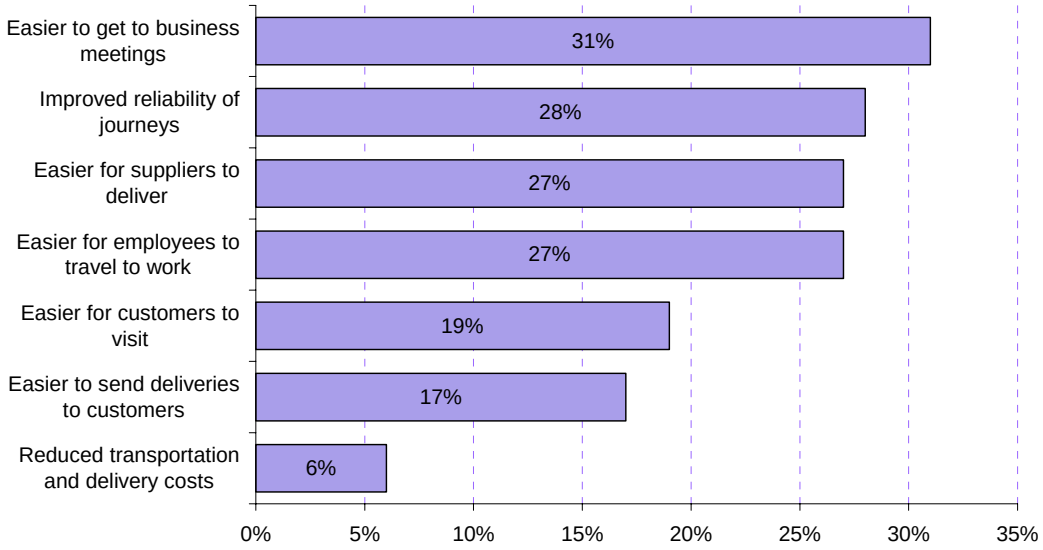
The main findings of the survey are presented and discussed below under the following six headings:

- benefits of decongestion;
- impact of congestion charging;
- business performance;
- costs to business;
- attitudes.

Views on benefits of decongestion

Businesses were asked whether they had experienced various decongestion benefits as a result of the scheme. These results are presented in Figure 61. A number of benefits appear to have materialised with many respondents acknowledging the benefits to their business as a result of reduced congestion. The most widely accepted benefit, amongst all businesses, was that charging has made it easier to get to business meetings.

Figure 61 Percentage of businesses recognising benefits of reduced congestion, 2004.

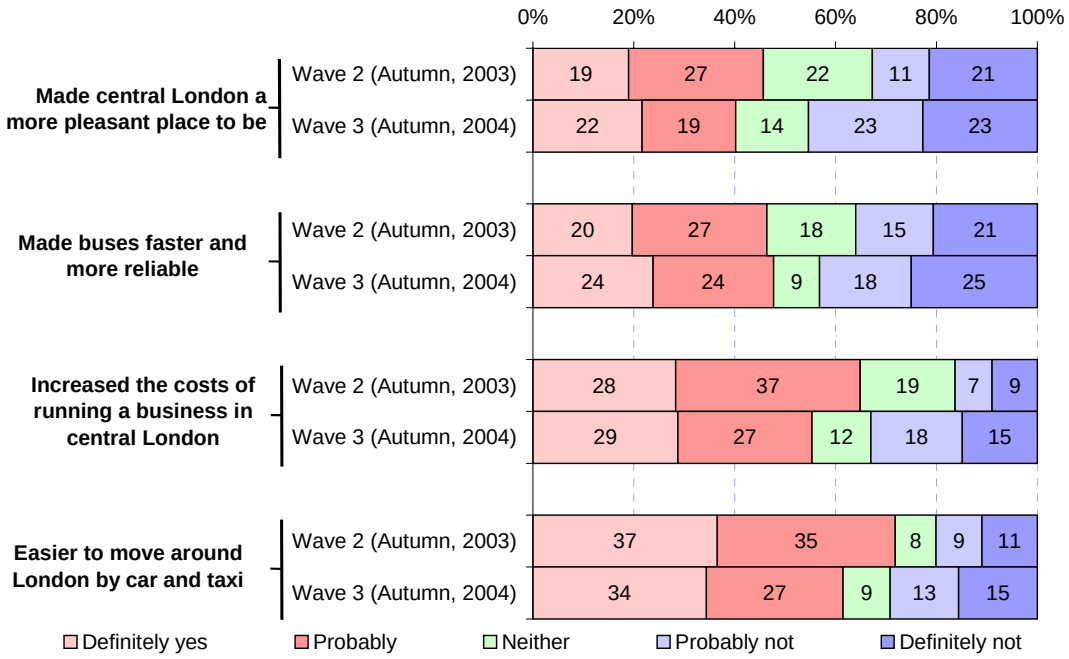


Note: Base 1228 businesses across all sectors.

Views on impact of congestion charging

Businesses were asked a number of questions about the effects of congestion charging in both 2003 and 2004. Respondents' views are summarised in Figure 62 and compared with responses from the wave two post-charging survey in 2003. There was a net overall agreement that congestion charging has made it easier to move around London by car and taxi, though agreement with this statement had decreased from the previous wave. There was net agreement that the charge has increased businesses costs, though support for this statement has also reduced from the previous wave.

Figure 62 Trends in views about the effects of congestion charging, change in post-charging surveys only.

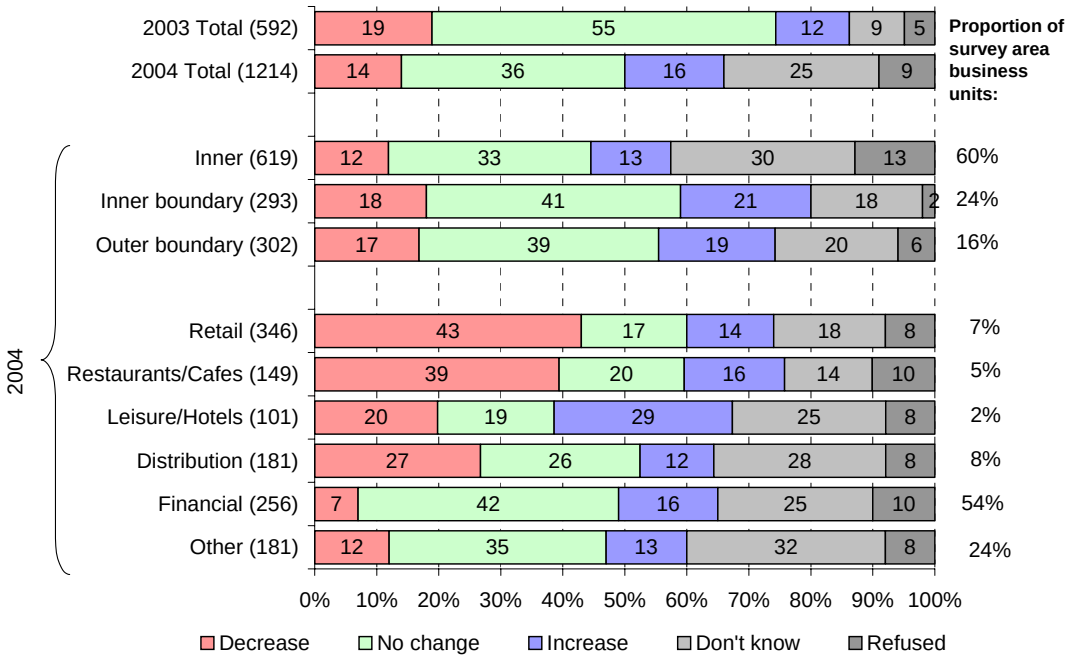


Views on business performance

This section examines how businesses consider their performance has changed over the last two years and possible explanations for any changes to performance.

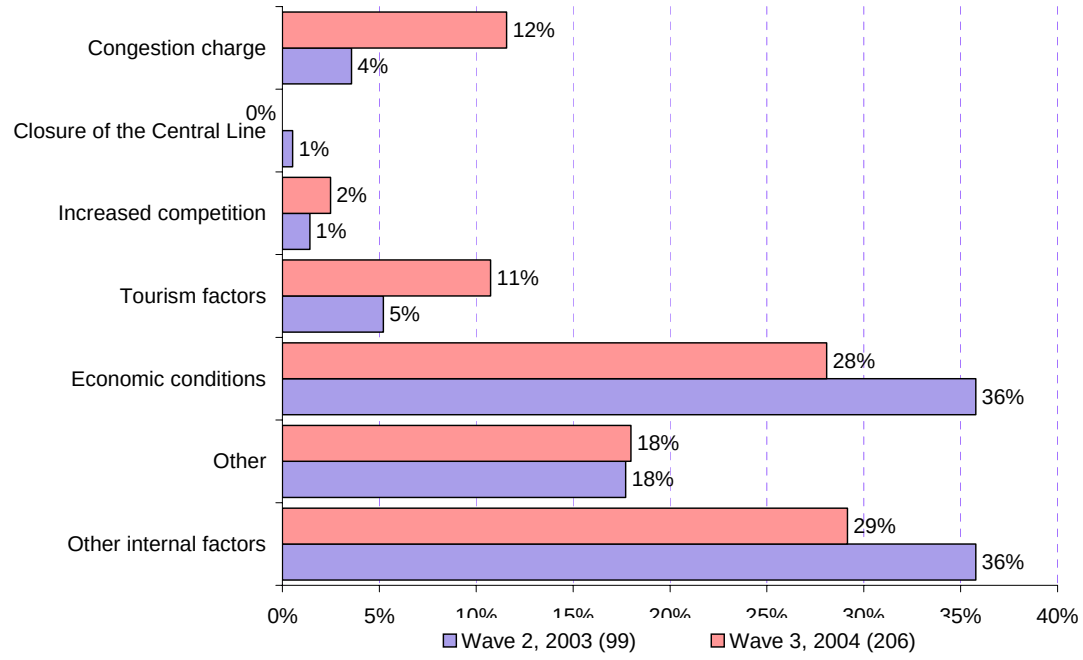
Figure 63 shows how businesses perceived changes in sales comparing the first six months of 2002 (pre-charging) with the same period in 2004 (post-charging). The figure shows that, in 2004, a quarter of respondents were unable to answer this question and 9 percent refused to answer. Overall just over one-third indicated no change in sales at the site, 16 percent indicated an increase in sales and 14 percent a decrease in sales. Taken overall, a greater proportion of the Finance, Leisure and hotels and Other services sectors reported net increases in sales. Retail sector, Restaurants/cafés and the Distribution sector respondents were more likely to report decreases in sales.

Figure 63 Change in sales at business site, first half of 2003 and 2004 compared with first half of 2002.



All businesses were asked about the influences on their business performance over the last year. Those businesses reporting an increase in sales between 2003 and 2004 were asked about the possible influences on their business performance. Figure 64 summarises the response and compares with stated influences from the first (2003) post-charging survey.

Figure 64 Share of influences on businesses reporting increased sales between 2003 and 2004, unprompted.

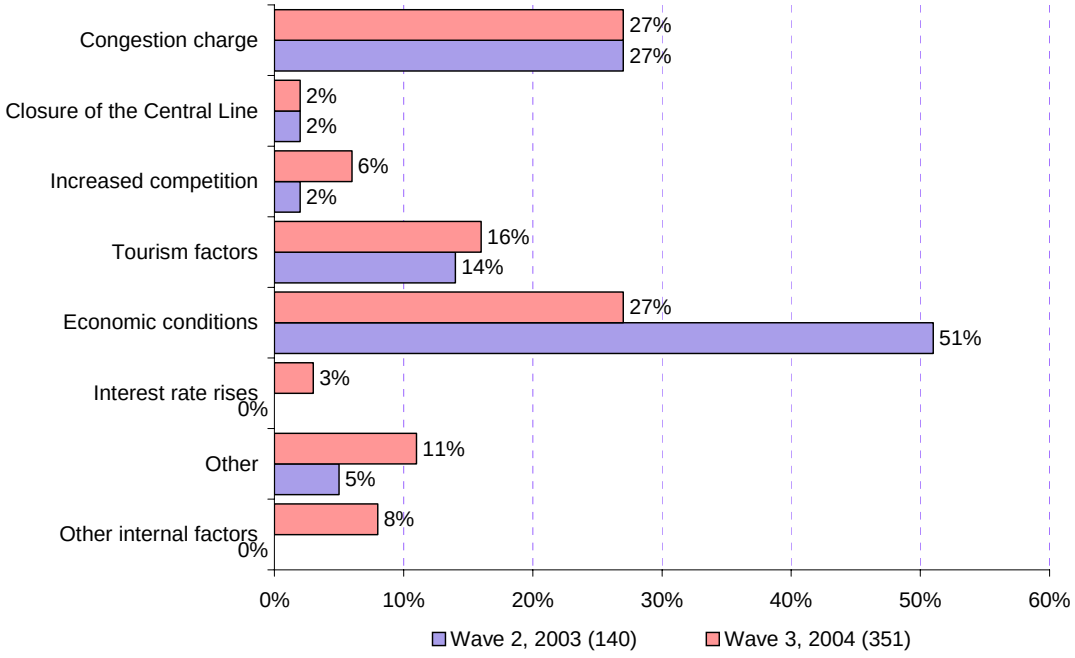


In 2003 economic factors and internal factors were the most commonly cited influence on businesses reporting increased sales, followed by other factors and tourism factors with congestion charging being indicated as an influence by 4 percent. In 2004 economic factors and other internal factors remained the most commonly cited followed by other factors, but congestion charging increased its prominence as an influence and was cited by 12 percent of businesses reporting increased sales.

Similarly, those businesses reporting a decline in sales between 2003 and 2004 were asked about the possible influences on their business performance. These are summarised in Figure 65 and compared with stated influences from the first (2003) post-charging survey.

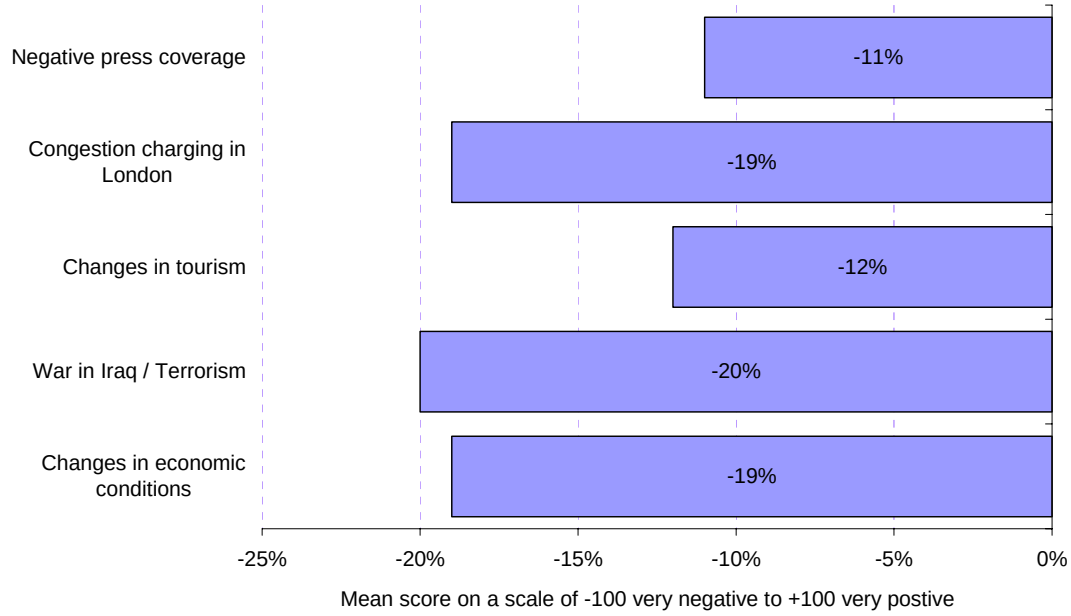
In 2003 economic factors were the most commonly cited influence, with congestion charging the second most common response. The proportion citing congestion charging in 2004 was unchanged from 2003, but economic conditions were less frequently cited than in 2003, being replaced by a variety of other factors such as increased competition.

Figure 65 Share of influences on businesses reporting decreased sales in 2003 and 2004, unprompted.



In addition to the unprompted question on businesses influences, all respondents were asked to ‘rate’ the impact of various prompted influences on their business performance. Results for these questions are summarised in Figure 66. The figure shows that many factors are perceived to have a negative impact on business performance, with the war in Iraq/Terrorism ranking the highest, closely followed by economic conditions and congestion charging.

Figure 66 Importance of prompted influences on business performance, 2004.

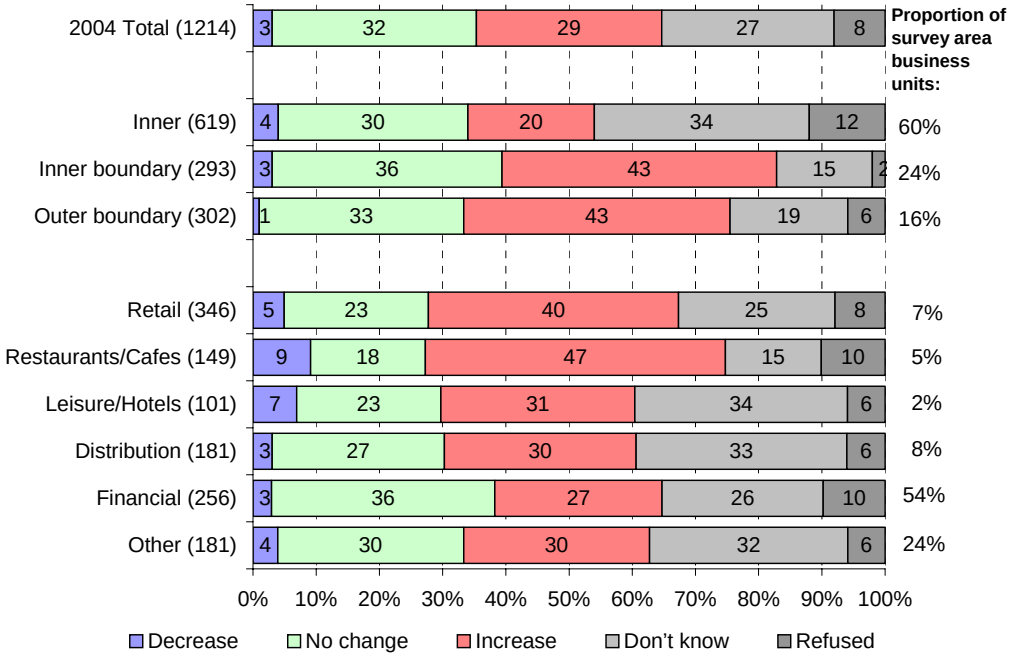


Views on costs to businesses

As well as the decongestion benefits mentioned earlier, the scheme has financial and administrative cost implications for some businesses. Figure 67 below shows how businesses perceived changes in costs comparing the first 6 months of 2002 (pre-charging) with the same period in 2004 (post-charging). A smaller proportion of businesses in the inner part of the charging area report overall cost increases than those situated in the inner and outer boundaries, outside the charging zone.

Restaurants and cafés were the most likely sector to report an increase (just under half) or a decrease in their costs (9 percent). In the retail sector, 40 percent reported increases in costs.

Figure 67 Change in overall costs at site, first half of 2004 compared to first half of 2002.



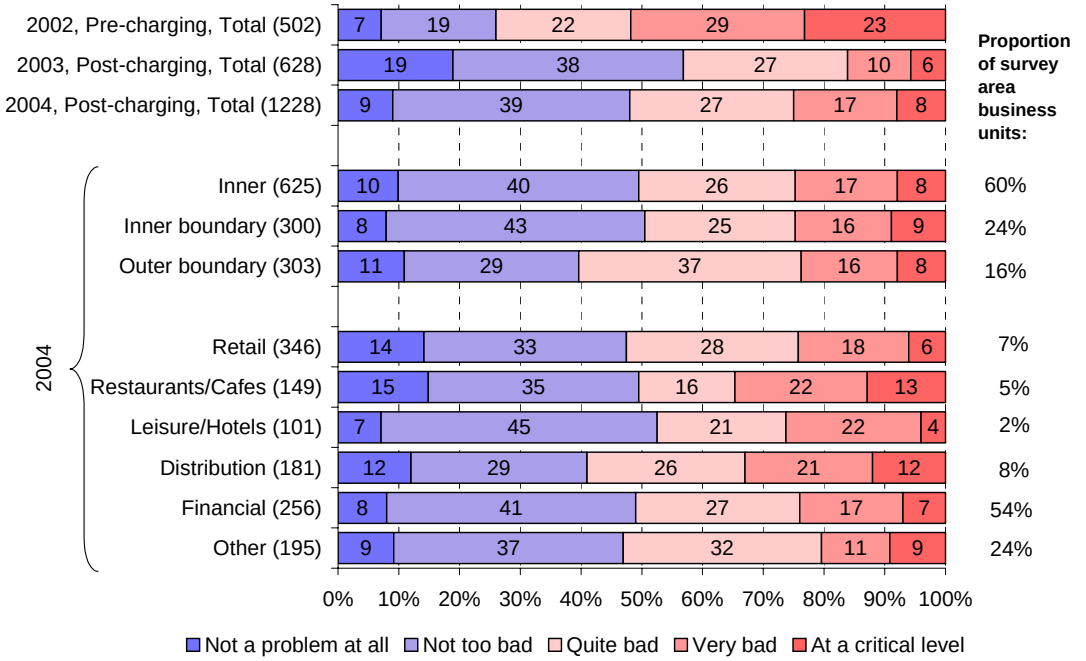
Attitudes on transport issues

In both post-charging surveys in 2003 and 2004, respondents were asked a number of questions regarding their attitudes to congestion, difficulties in travelling to work and the scheme itself. These can be compared to expectations expressed in response to similar questions in 2002 before charging was introduced. It is important to bear in mind that the strength of perception of congestion charging impacts is likely to diminish over time, and the results below partly reflect this.

Figure 68 shows attitudes towards congestion in central London, comparing attitudes in 2002 pre-charging with post-charging results for both 2003 and 2004.

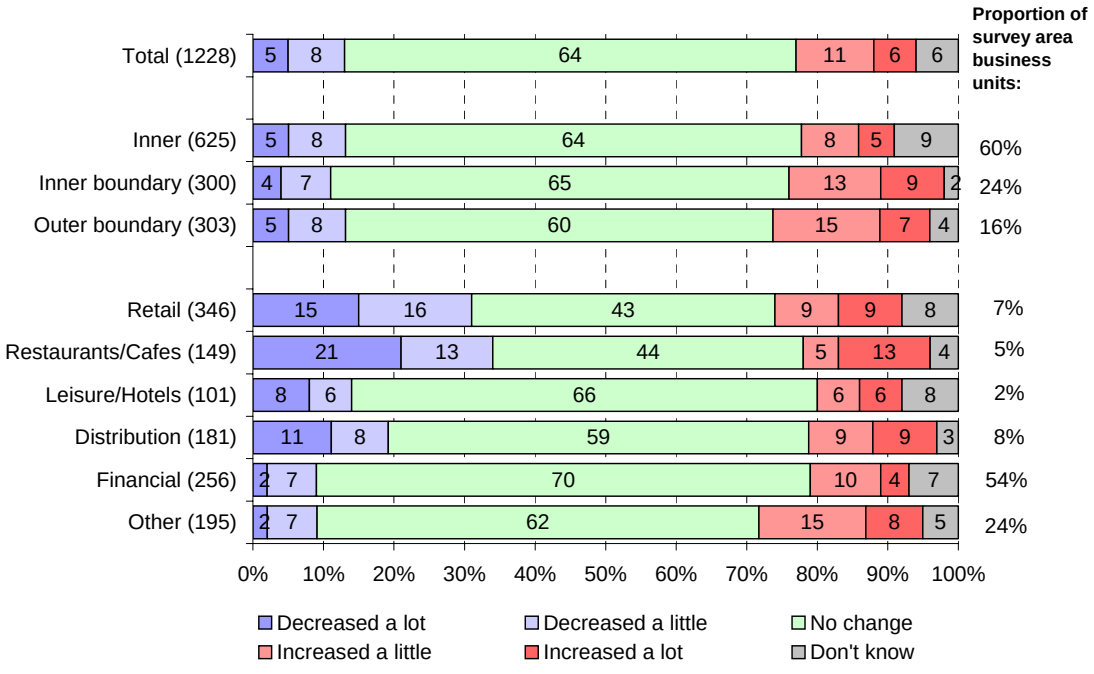
It is interesting to see that prior to the introduction of charging, congestion, during the peak period, was considered 'very bad' or 'at a critical level' by just over half of those surveyed. After nearly one year of charging this perception was held by only around one in six surveyed, and around one in five believed congestion was 'not a problem at all'. In 2004 a quarter of respondents believed congestion was 'very bad' or 'at a critical level' and only 9 percent thought it was 'not a problem at all', still reflecting significant gains on 2002. Trends in measured congestion in and around the zone are discussed in Section 2.

Figure 68 Perceived level of congestion during the peak period.



Businesses in 2004 were also asked about any change in their perceived transport difficulties over the last two years. These results are presented in Figure 69. Across all businesses just under two-thirds indicated that there had been no change to their perception of travel difficulties, 17 percent thought it had become more difficult and 13 percent thought the difficulty had decreased.

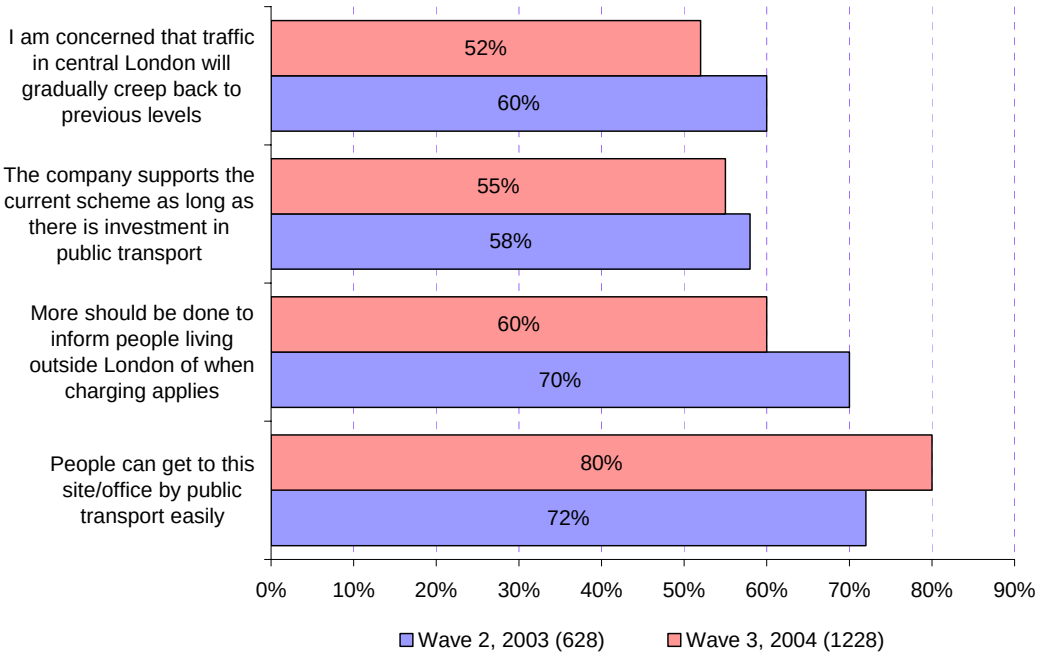
Figure 69 Transport difficulties experienced by businesses over the last two years, Autumn 2004.



Respondents were asked to indicate if they 'agreed' or 'disagreed', or 'neither agreed or disagreed' with the four attitude statements in Figure 70 regarding the scheme. The figure presents their net level of agreement and compares these with the results from the second wave survey carried out in Autumn 2003.

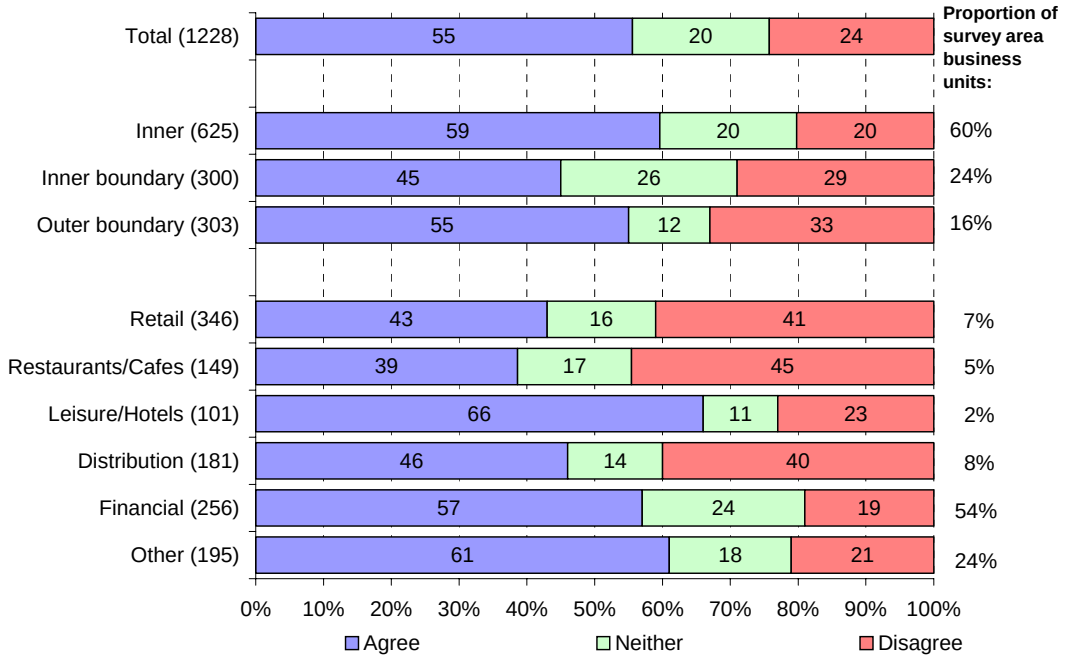
The results show that, although slightly reduced compared to a year ago, there remains concern that traffic congestion in central London will return to previous levels and that more should be done to inform people outside of London of when charging applies. Support for the scheme, as long as there is investment in public transport, remains at just over half of those surveyed. There has also been an increase in the proportion of respondents, to 80 percent, indicating that it is easier to travel to their business site or office by public transport.

Figure 70 Summary of attitudes towards congestion charging, comparison of 2003 and 2004, percentage agreeing with statement.



Support for the scheme is looked at in more detail by location and sector in Figure 71. Support for congestion charging was highest among the Leisure/hotels, and Financial sectors, and lowest amongst Restaurants/cafes, Retail, and Distribution. Restaurants/cafes (which account for just 5% of survey area business units) is the only sector where opposition to the scheme was stronger than support.

Figure 71 Support for current scheme as long as there is continued investment in public transport, 2004.



7 Accidents and the environment

7.1 Introduction

This section first considers trends in reported road traffic accidents since the introduction of congestion charging. This now benefits from the availability of a longer time-series of post-charging data, allowing earlier provisional conclusions about accident trends to be based on a firmer footing.

It then looks at recent trends in air quality and noise in and around the congestion charging zone, updating the analysis presented in TfL's *Second Annual Monitoring Report*.

TfL estimated that congestion charging would lead to between 150 and 250 fewer road traffic accidents per year across the whole of Greater London, resulting primarily from reduced traffic volumes. Perhaps one third of this reduction would have occurred in the charging zone itself, with the remainder reflecting small reductions in traffic across a much larger area.

It was also expected that reduced volumes of traffic circulating more efficiently would lead to reductions in road traffic emissions inside the charging zone, and possibly to small changes to the ambient noise climate. However, it was also recognised that changes to both emissions and noise were unlikely to be of a scale that would enable them to be detected against the backdrop of variation caused by other factors over the medium term.

Summary of key findings for 2003

In 2003 TfL observed that:

- Against an established backdrop of declining road traffic accidents across the whole of Greater London, there was evidence that the declines seen in the charging zone since the introduction of charging were greater than might otherwise have been expected.
- There was no evidence of disproportionate or detrimental changes to the number of reported collisions involving two-wheeled vehicles in or around the charging zone.
- By reducing the overall volumes of traffic within the charging zone, and increasing the efficiency with which it circulates, congestion charging had been responsible for estimated reductions of 12 percent in emissions of key pollutants Oxides of Nitrogen (NO_x) and fine particulate matter (PM_{10}) from road traffic within the charging zone. TfL also estimated that charging had led to reductions of up to 20 percent in both fossil fuel use and emissions of Carbon Dioxide (CO_2) from road traffic within the charging zone.
- Measurements of actual air quality across London in 2003 strongly reflected the statistically unusual weather patterns that prevailed for much of the year, and it was not therefore possible to identify a 'congestion charging effect' in the measured data.

- Limited sample surveys of noise in and around the charging zone suggested that there had been no material change to the noise climate corresponding with the introduction of charging.
- Surveys of Londoners 'on-street' in and around the charging zone suggested that the beneficial effects of congestion charging and other initiatives on environmental quality were being recognised.

Key findings for 2004

- Reported road traffic accidents across London have continued to reduce significantly during 2004, continuing the established recent trend.
- Analysis of accident trends in the charging zone for the first year after charging and in relation to those elsewhere in London confirm significant additional reductions compared to the background trend. This equates to between 40 and 70 additional fewer accidents per year, roughly in line with TfL's range of prior expectation.
- There remains no evidence of disproportionate or detrimental changes to the number of reported collisions involving two-wheeled vehicles in or around the charging zone.
- Traffic levels and average traffic speeds within the charging zone and on the Inner Ring Road have remained broadly stable in 2004 compared with 2003. Initial estimates of emissions change for 2004 are therefore within plus/minus 1 percent of 2003, for both NO_x and PM_{10}, and the 12 percent emission gains observed following the introduction of charging have continued.
- Measurements of air quality across Greater London continue to reflect ongoing background influences, with steady reductions in NO_x and PM_{10}, and a mixed picture for Nitrogen Dioxide (NO_2). Elevated levels of PM_{10} experienced in 2003, primarily due to the unusual weather, have receded during 2004. However, there is increasing evidence of a recent trend of increasing NO_2 across Greater London that seems to be related to changes to the vehicle fleet.
- It is not possible to detect changes in measured air quality that could be associated with the introduction of congestion charging in February 2003
- Limited sample measurements of ambient noise continue to indicate a stable picture and do not suggest a detectable congestion charging effect.

7.2 Overall trend in road traffic accidents

Accident statistics are supplied by the Metropolitan Police to the London Road Safety Unit in TfL. Data up to November 2004 is now relatively complete for accidents resulting in personal injury across London. However, it must be noted that data for the 2004 calendar year is not yet considered finalised and the following analysis must still be regarded as provisional. In addition, the introduction of congestion charging in mid February 2003 introduces a discontinuity in any year-on-year comparison.

Figure 72 through to Figure 74 show trends in personal injury accidents, by time period, for the charging zone, the Inner Ring Road and the rest of Greater London since the start of 2001.

Figure 72 Road traffic accident casualties in the charging zone. Monthly totals by time period.

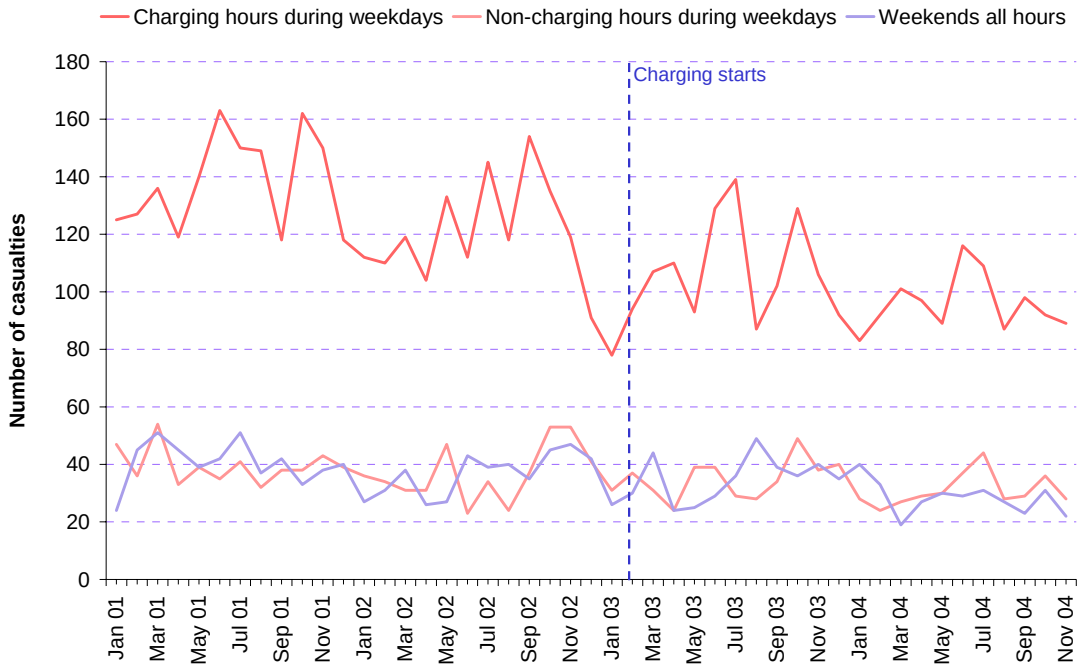


Figure 73 Road traffic accident casualties on the Inner Ring Road. Monthly totals by time period.

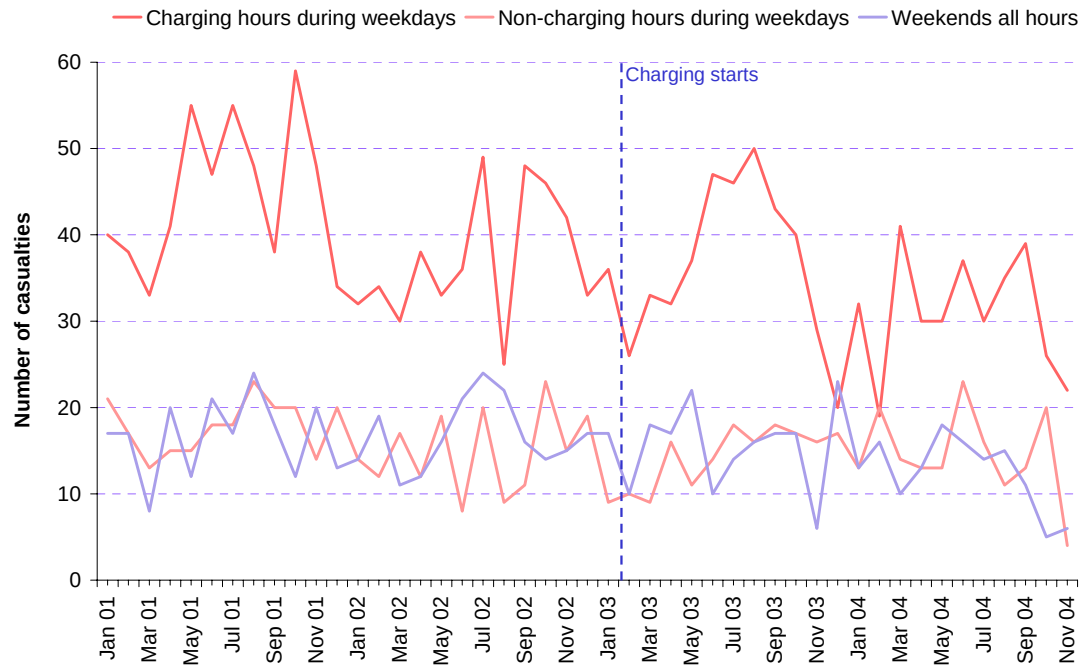
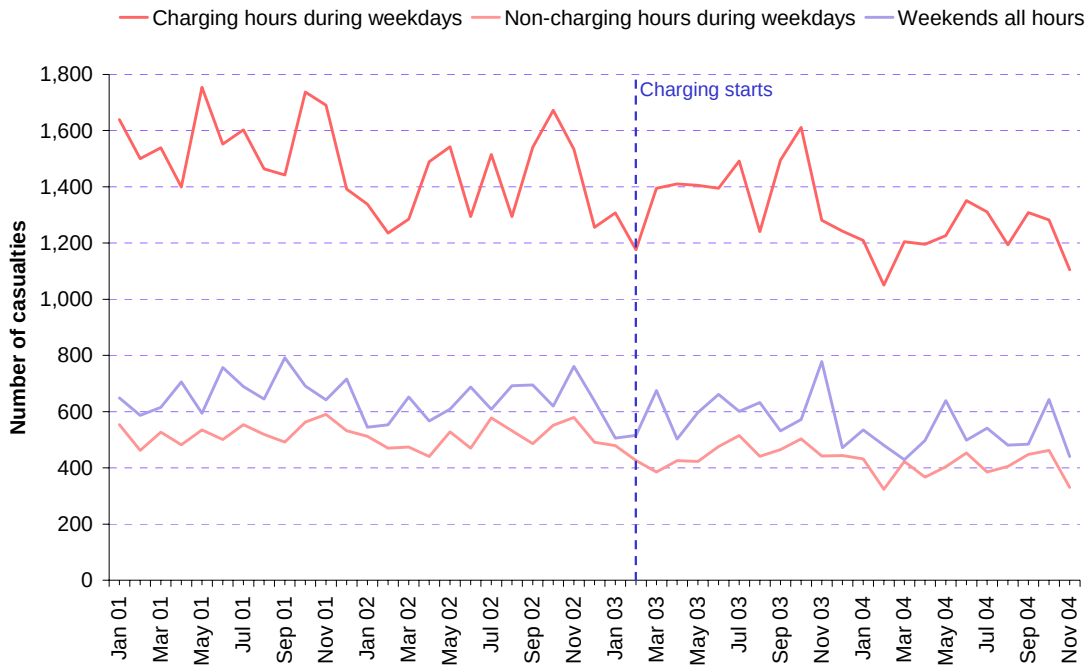


Figure 74 Road traffic accident casualties in Greater London, excluding the charging zone and the Inner Ring Road. Monthly totals by time period.



Each of the above graphs shows a general downward trend in the number of casualties, starting from well before the introduction of charging in February 2003, although there is significant variation in the monthly figures. These 'background' trends are thought largely to reflect various accident reduction measures, such as extensive media campaigns and traffic calming measures.

Given these background trends, and the availability of 'control' data from areas outside of the charging zone, the following are the pertinent questions in relation to congestion charging:

- Have changes to traffic volumes and characteristics within and around the charging zone (particularly on the Inner Ring Road) led to identifiable differences between trends here and across the rest of London?
- Is there any evidence of adverse trends in accidents resulting from these changes, for example in relation to measured increases in two-wheeled traffic or average traffic speed?

The following sections consider these issues in more detail. Because of limitations with the available data, two different, but complementary analyses are possible. One looks at data for comparable 12-month periods either side of the introduction of charging. This provides a straightforward, equivalent comparison of pre- and post-charging conditions. This comparison was used as the basis for TfL's January 2005 *Summary Review*, and is to be preferred when considering trends in the total number of accidents.

A second analysis, necessarily confined by available data to four equivalent nine-month periods (March to November in each year) is also now possible, extending the analysis to November 2004. This to be preferred when

considering changes to accident attributes such as severity and modal involvement.

To give a more representative picture of the totality of congestion charging impacts, much of the following commentary considers trends for the charging zone and the Inner Ring Road combined.

7.3 Accidents involving personal injury

Comparing the number of accidents within the charging zone and on the Inner Ring Road combined for the 12 months after the introduction of charging with the same period before, there was an overall reduction in accidents of 9 percent (175 accidents) during charging hours. Outside charging hours the reduction was about 4 percent (27 accidents). In the rest of London the equivalent change was a reduction of about 7 percent (2,099 accidents).

For the purposes of this provisional comparison it is assumed that there is little or no change to traffic outside the Inner Ring Road and outside of charging hours as a result of the scheme. Therefore trends in accidents outside of the zone or outside charging hours would primarily reflect 'background trends' and other initiatives, such as road safety measures. Likewise, in simple terms, any deviation from these background trends observed in the charging zone and on the Inner Ring Road during charging hours could be indicative of a congestion charging effect.

Figure 75 shows that, in general, the 'background' reductions in accidents are between 4 and 7 percent, but it may be that in smaller areas or over shorter time periods there are greater variations. During charging hours within the charging zone and on the Inner Ring Road combined, Figure 75 shows reductions in accidents of about 9 percent. This is greater than the 'background' trend, implying that congestion charging has been associated with ‘additional’ reductions in accidents of between 2 percent and 5 percent, equating to between 40 and 70 fewer accidents involving personal injury a year.

Figure 75 Total reported personal injury road traffic accidents by area, 12 month periods either side of the introduction of charging.

		Charging zone	Inner Ring Road	Rest of London	Total
2001	**Weekdays 0700-1900**	**1,644**	**528**	**18,410**	**20,582**
(Feb 2001 - Jan 2002)	Weekdays 0000-0700;1900-0000	464	207	6,269	6,940
	Weekends all day	490	196	7,979	8,665
	Total	**2,598**	**931**	**32,658**	**36,187**
2002	**Weekdays 0700-1900**	**1,418**	**450**	**16,964**	**18,832**
(Feb 2002 - Jan 2003)	Weekdays 0000-0700;1900-0000	439	174	6,078	6,691
	Weekends all day	439	204	7,588	8,231
	Total	**2,296**	**828**	**30,630**	**33,754**
2003	**Weekdays 0700-1900**	**1,266**	**427**	**16,222**	**17,915**
(Mar 2003 - Feb 2004)	Weekdays 0000-0700;1900-0000	402	185	5,277	5,864
	Weekends all day	429	189	7,032	7,650
	Total	**2,097**	**801**	**28,531**	**31,429**

Figure 76 compares the number of accidents within the charging zone, on the Inner Ring Road and in the rest of London over the same time periods (March to November) for 2 years before and 2 years after the introduction of charging, extending the time-series to November 2004.

Figure 76 Total reported personal injury road traffic accidents by area, March to November, 2001 to 2004.

		Charging zone	Inner Ring Road	Rest of London	Total
2001	**Weekdays 0700-1900**	**1,287**	**424**	**14,180**	**15,891**
Mar - Nov	Weekdays 0000-0700;1900-0000	353	156	4,763	5,272
	Weekends all day	378	152	6,131	6,661
	Total	**2,018**	**732**	**25,074**	**27,824**
2002	**Weekdays 0700-1900**	**1,139**	**347**	**13,166**	**14,652**
Mar - Nov	Weekdays 0000-0700;1900-0000	333	134	4,638	5,105
	Weekends all day	340	151	5,892	6,383
	Total	**1,812**	**632**	**23,696**	**26,140**
2003	**Weekdays 0700-1900**	**1,002**	**357**	**12,724**	**14,083**
Mar - Nov	Weekdays 0000-0700;1900-0000	311	135	4,075	4,521
	Weekends all day	322	137	5,549	6,008
	Total	**1,635**	**629**	**22,348**	**24,612**
2004	**Weekdays 0700-1900**	**878**	**290**	**11,178**	**12,346**
Mar - Nov	Weekdays 0000-0700;1900-0000	288	127	3,677	4,092
	Weekends all day	239	108	4,652	4,999
	Total	**1,405**	**525**	**19,507**	**21,437**

In 2004 there was a further decrease of 14 percent in the number of accidents reported during charging hours in the charging zone and on the Inner Ring Road combined. Reductions of broadly comparable magnitude are also observed outside charging hours and in all time periods across the rest of London. Therefore, although the background trend of reduced accidents across Greater London has continued during 2004, and the additional gains seen in the charging zone in 2003 have been maintained, the trend for accidents in the charging zone in 2004 has been broadly similar to the rest of London.

TfL expected that, across the whole of Greater London, congestion charging would lead to between 150 and 250 fewer accidents per annum. The large majority of vehicle-kilometres driven in London occur outside the charging zone, and the effect of charging on traffic patterns, and hence any beneficial effect on accidents, will diminish rapidly with distance from the charging zone. Nevertheless, it is considered that a small proportion of the reduction in accidents observed in the rest of London would have resulted from charging-related traffic changes. TfL therefore considers that the effect of congestion charging on overall levels of road traffic accidents is consistent with the range of prior expectation.

7.4 Pedestrian and non-pedestrian involvement

Accidents can be classified as either involving pedestrians or vehicle occupants (non-pedestrians).

Figure 77 indicates that although there has been an overall reduction in numbers of accidents, there has been no noticeable change in the proportion of accidents involving pedestrians and non-pedestrians during charging hours in any of the areas considered.

Figure 77 Accidents involving personal injury, 0700 to 1900, between March and November, 2001 to 2004.

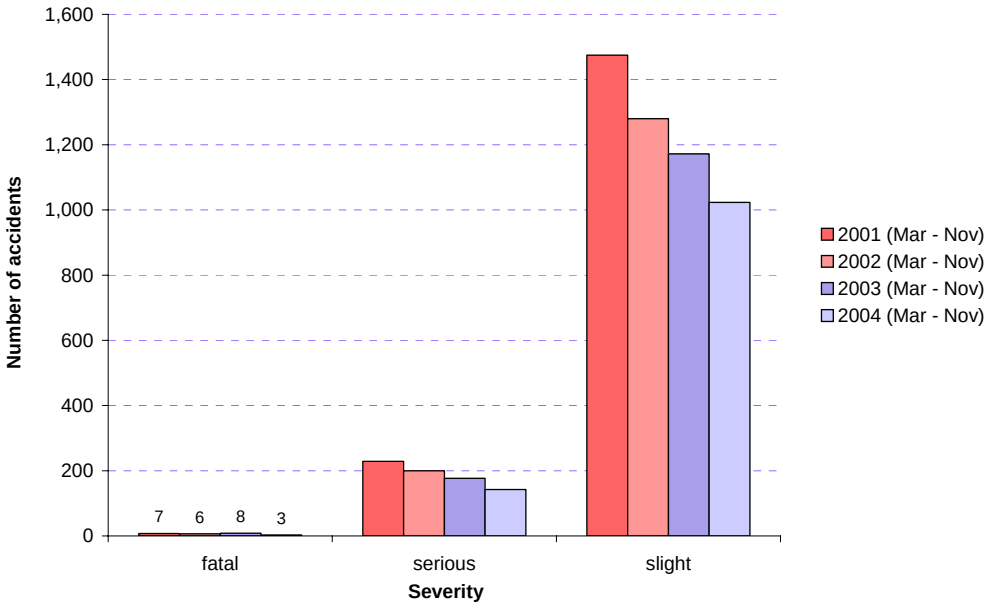
	Charging zone		Inner Ring Road		Rest of London	
	Pedestrian	Non-pedestrian	Pedestrian	Non-pedestrian	Pedestrian	Non-pedestrian
2001 (Mar - Nov)	406 (32%)	881 (68%)	86 (20%)	338 (80%)	2,097 (22%)	11,083 (78%)
2002 (Mar - Nov)	356 (31%)	783 (69%)	66 (19%)	281 (81%)	2,879 (22%)	10,287 (78%)
2003 (Mar - Nov)	322 (32%)	680 (68%)	69 (19%)	288 (81%)	2,726 (21%)	9,998 (79%)
2004 (Mar - Nov)	292 (33%)	586 (67%)	54 (19%)	236 (81%)	2,387 (21%)	8,791(79%)

Interestingly, despite the possibility of increased pedestrian activity within the charging zone after the introduction of the scheme, the absolute reductions in accidents involving pedestrians is remarkably similar across all areas across the two post-charging years.

7.5 Severity of accidents

Figure 78 shows the absolute number of accidents within the charging zone and on the Inner Ring Road (combined) by severity. It is clear that there has been a general reduction in the number of accidents at each level of severity, with no evidence of detrimental effects (for example differential increase in more severe accidents possibly resulting from faster average traffic speeds). Indeed, further analysis has shown that overall there has been a greater reduction in the level of fatal and serious accidents within the charging zone and on the Inner Ring Road compared to other parts of London.

Figure 78 Reported personal injury road traffic accidents, on the Inner Ring Road and within the charging zone, 0700 to 1900, March to November, 2001 to 2004.

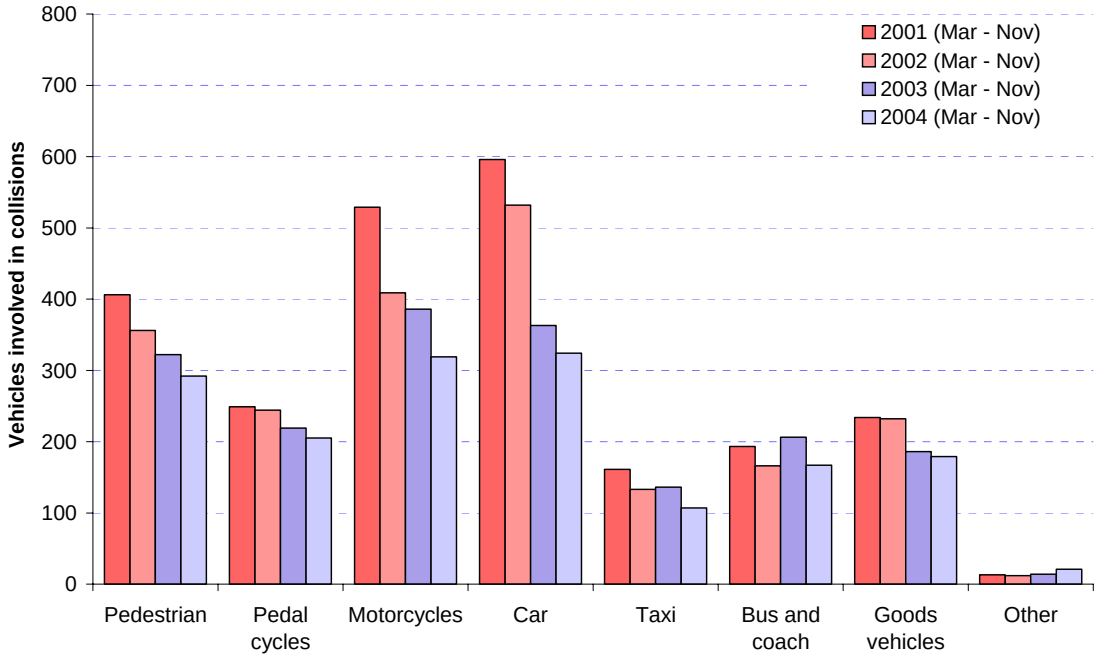


7.6 Accident involvement

Figure 79 shows that within the charging zone there has been a reduction of all modes involved in collisions. In the first year since charging there has been a decrease in the number of cars involved in collisions proportional to the reduction in the number of cars entering the charging zone. Likewise the change in the number of buses involved in accidents is also proportional to the increase observed entering the zone. Although there has been a slight increase in the number of taxis involved it is at the most only one quarter of the observed increase in taxi traffic. Similarly, the percentage decrease in goods vehicles involved in collisions is nearly twice the reduction in numbers entering the zone. Most noticeable was the decrease in the involvement of pedal cycles and powered two-wheelers despite the significant increase in the numbers of these observed in traffic counts (Section 3).

Further analysis indicates that the reduction in involvement of powered two-wheelers and chargeable vehicles (including cars, lorries and vans) after the introduction of the scheme was significantly greater within the charging zone than across the rest of London. However, for other non-chargeable vehicles this was not the case.

Figure 79 Accident involvement by vehicle type within the charging zone, 0700 to 1900, March to November, 2001 to 2004.



7.7 Air quality – emissions

TfL's *Second Annual Monitoring Report* included an initial assessment of the impact of the scheme on key road traffic emissions (NO_x, PM_{10} and CO_2) within the charging zone and on the Inner Ring Road. This was based on the observations of a 15 percent reduction overall in road traffic circulating within the zone during charging hours, and a 30 percent reduction in congestion, which were also described in detail in this report.

After one year of operation, TfL had concluded that:

- On major roads within the charging zone, between 2002 (pre-charging) and 2003 (post-charging), total primary emissions of both NO_x and PM_{10} fell by 16 percent (annual average day).
- Of this overall change, 12 percentage points were due to traffic changes (volume and speed) brought about by congestion charging. The remaining 4 percentage points resulted from 'background' changes such as improvements to vehicle technology standards as the fleet was progressively renewed.
- The 15 percent overall reduction in circulating traffic comprised a variety of effects on individual vehicle types. Any negative emissions effects of increased buses and taxis were more than cancelled out by reduced cars, vans and goods vehicles. Congestion gains, mainly reflected in reduced queueing time at junctions rather than increased straight-line speeds, were particularly important in reducing overall emissions.
- On the Inner Ring Road, TfL calculated only small changes to emissions between 2002 (pre-charging) and 2003 (post-charging). These comprised increases and decreases of just over 1 percent to NO_x and PM_{10} respectively.
- TfL also calculated that traffic changes resulting from the scheme had led to reductions of 20 percent in Carbon Dioxide (CO_2) emissions, and 19 percent in fossil fuel use, within the zone.

For 2004, TfL is still undertaking a comprehensive re-working of the London Atmospheric Emissions Inventory (LAEI) to more fully incorporate recent traffic changes, both in the charging zone and throughout the rest of London. TfL and GLA are also including a number of technical enhancements as part of the LAEI updating cycle on behalf of the London Boroughs. A definitive estimate of emissions changes for 2004 will not therefore be available until later in 2005.

However, based on the observed traffic changes for 2004 reported elsewhere in the document, it is possible to make a preliminary estimate of more recent changes to emissions. This starts from the following observations:

- Overall traffic levels within the charging zone and on the Inner Ring Road have remained broadly stable or declined very slightly, with some larger (and mainly counter-balancing) changes to the individual vehicle types.
- Although the calculated 30 percent reduction in congestion since the introduction of charging remains unchanged (Section 2), average network speeds for the whole of 2004 are very slightly slower than the dataset used for the 2003 emissions calculations.

Both of these would suggest that, excluding any 'background' gains from year-on-year turnover in the vehicle fleet, changes to emissions previously reported in 2003 will have been broadly maintained and this is confirmed by TfL's preliminary calculations for 2004.

These indicate that, within the charging zone in 2004, primary emissions of NO_x from road traffic have increased by 0.6 percent against 2003, and primary emissions of PM_{10} have decreased by 0.7 percent (annual totals). These changes do not therefore indicate significant change in the position previously reported of benefits compared to pre-charging conditions.

Relationship between emissions change and measured air quality

Data for the majority of air quality monitoring sites in London are available through the London Air Quality Network. TfL's *First Annual Monitoring Report* set out those sites that would be used for congestion charging monitoring purposes, the sites being grouped into 'site classes' to reflect congestion charging geography.

Most sites benefited from the existence of a lengthy time-series of data describing 'background' trends over the previous five years or so. The inclusion of sites well outside of the charging zone would also allow the effect of changes to background concentrations (for example secondary or 'imported' air pollution and year-on-year changes in the vehicle fleet) to be assessed. Data from these sites accumulate on a continuous basis.

Previous reports have described the indirect relationship between calculated changes to road traffic emissions, and measured air quality as experienced by individuals. It was explained that:

- Although road traffic is a very important source of emissions, other sources also contribute to total observed pollution.
- Congestion charging only operates for approximately one-third of the hours of the year, and therefore (in simple terms) the traffic changes also only apply during this time.
- Air quality measurements (particularly of PM_{10}) are very susceptible to the influence of 'secondary' or 'imported' pollution from elsewhere. This is particularly important during periods of unusual weather, when this component of the total pollution load can dominate recorded levels.

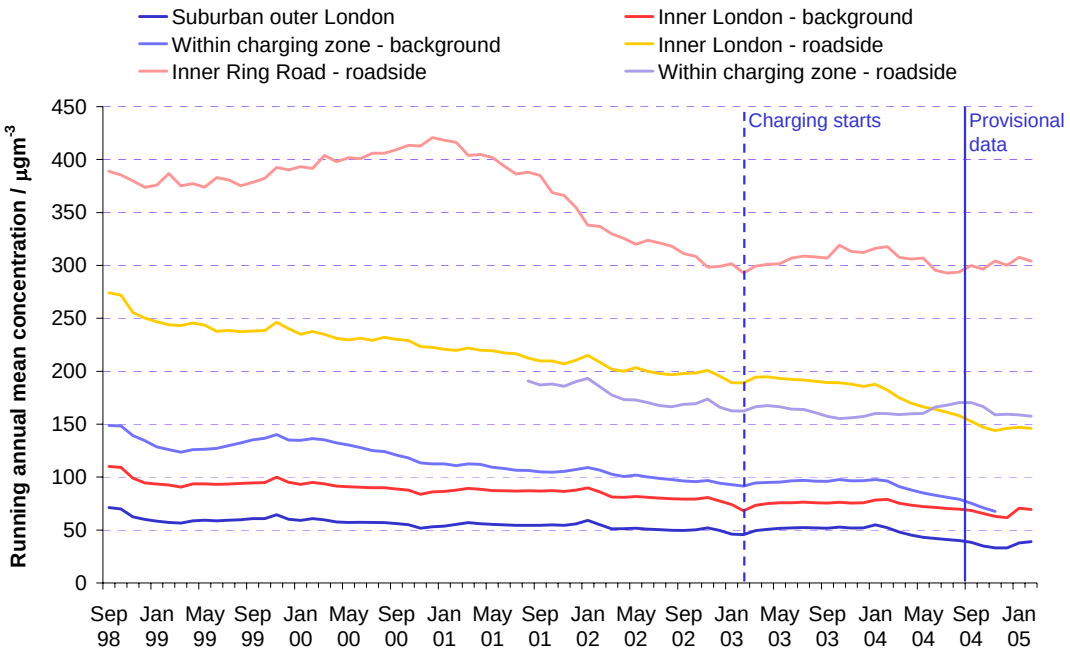
All of these mean that the impact from the substantial emissions reductions brought about by congestion charging within the charging zone would be very much diminished at air quality monitoring sites, and would therefore be difficult to detect in the medium-term.

This indirect relationship was particularly apparent in 2003. TfL's *Second Annual Monitoring Report* described how measurements of air quality across London in 2003 had strongly reflected the statistically unusual weather patterns that had prevailed for much of the year. These had overwhelmed any smaller-scale effects that may have been caused by congestion charging, such that it was not possible to identify a 'congestion charging effect' in the available dataset of air quality measurements, either for the charging zone or the Inner Ring Road.

Measured air quality – Oxides of Nitrogen (NO_x)

The *Second Annual Monitoring Report* described how the positive effects of a general, London-wide decrease in emissions of NO_x from road traffic were being countered by other factors producing an increase in NO_2 concentrations. Figure 80 and Figure 81 extend graphics previously presented to early 2005 for NO_x and NO_2 respectively (note provisional data from September 2004).

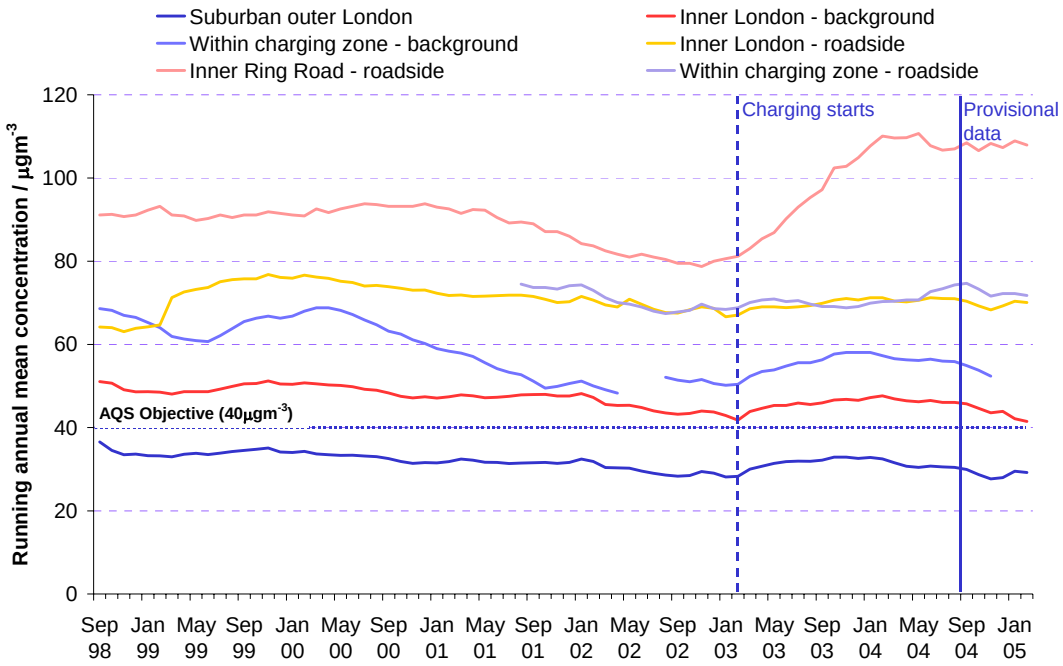
Figure 80 Trends in running annual mean NO_x concentrations at selected air quality monitoring sites.



For NO_x, the overall trend throughout London is one of continuing gradual decline (running annual mean concentrations). There is no evidence of an identifiable 'congestion charging impact' for NO_x in terms of the within-zone indicator sites responding directly to reduced traffic levels during 2003. However, it is apparent that a number of site groups show accelerated recent declines dating from early 2004, one year after charging was introduced, including 'background' but not roadside sites within the charging zone.

Bearing in mind that a running annual mean indicator would require a full year for any 'step' changes to progressively work through the trend, and that similar trends are also seen outside of the charging zone, it is unlikely that they are directly related to the immediate traffic changes brought about by congestion charging. Nevertheless, if confirmed, these more recent trends are encouraging.

Figure 81 Trends in running annual mean NO_2 concentrations at selected air quality monitoring sites.



Note: AQS Objective refers to the UK National Air Quality Objective.

At all classes of 'background' sites, annual mean NO_2 increased by between 8 and 9 percent during the first 12 months following the introduction of the scheme. This was followed by decreases of between 6 and 7 percent during the following 12 months, leading to small net overall increases of between 3 and 5 percent since the introduction of charging.

This pattern is generally followed at roadside sites, with greater inter-site variability. The Marylebone Road site has experienced an exceptional increase of 33 percent over the two years since the introduction of charging despite a 4 percent decrease in NO_x at the same site, and relative stability in traffic flows. Analysis suggests that this was a step change, not directly related to traffic volumes and not co-incidental with the introduction of the charging scheme.

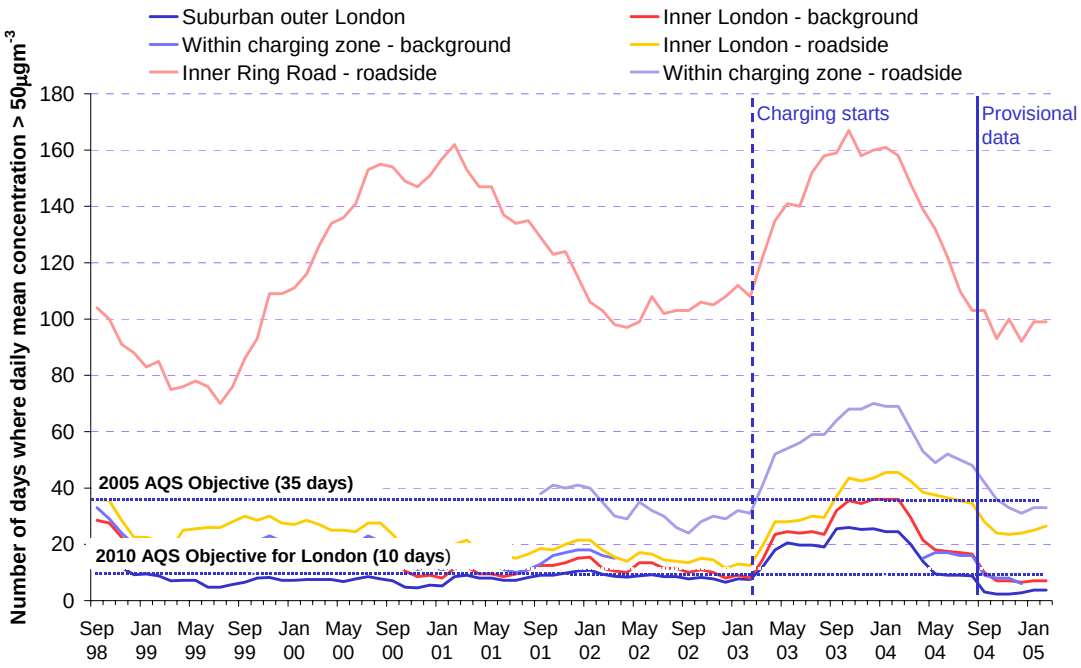
NO_2:NO_x ratios continue to rise at many roadside sites during 2004 departing from long-established trends. This phenomenon has prevented a London-wide decrease in NO_2, despite a significant downward trend in NO_x, and is the subject of ongoing investigation.

Measured air quality – fine particles (PM_{10})

The *Second Annual Monitoring Report* described how unusual meteorological conditions had been primarily responsible for the large number of PM_{10} 'episodes' in London following the introduction of charging in 2003. This resulted in large increases in days when recorded PM_{10} levels exceeded the National Air Quality Objective ('exceedence days'), as shown by Figure 82. Running annual mean concentrations also increased, but by a smaller amount

(typically just over 10 percent), the difference between the two indicators reflecting the close proximity of prevailing PM_{10} levels to the Objective.

Figure 82 Trends in running annual mean PM_{10} concentrations at selected air quality monitoring sites .



Note: AQS Objective refers to the UK National Air Quality Objective.

Meteorological conditions in 2004 have been much closer to the long-run average, and the increases in both PM_{10} concentrations and exceedence days recorded in 2003 have been countered by equally-significant decreases in 2004. The overall change in PM_{10} concentrations during the two years since the introduction of charging is generally less than plus/minus 5 percent at the large majority of indicator sites. The return to more typical conditions in 2004 demonstrates that the increases observed in 2003 were not caused by traffic changes brought about by charging, which have been maintained during 2004.

Again, both sites within the charging zone and on the Inner Ring Road (Marylebone Road) behave in a similar way to other sites in the rest of London, although Marylebone Road, due to its high traffic volumes and kerbside location has always tended to show more extreme patterns. While there is a suggestion in the very latest data of some disproportionate reductions within the charging zone, this cannot yet be statistically confirmed.

7.8 Ambient noise

This section updates TfL's sample surveys of noise measurements taken at a small number of selected sites in and around the charging zone. Data are now available for five relevant sites over the four years 2001/2 to 2004/5, all measurements being taken over the winter period of each year.

Measured traffic changes described elsewhere in this document would be unlikely of themselves to give rise to significant changes in ambient noise. In addition, the sample measurements described would not be expected to give statistically-robust measures of either the overall noise climate in the charging zone, or changes from year to year. Nevertheless, the results are useful in an indicative sense.

Figure 83 updates a table presented in previous reports to include data from surveys in late 2004/5. Comparable L_{den} values for all four available years are included, these include differential weightings for evening and night-time noise to reflect greater noise sensitivity at these times.

Figure 83 Sample noise measurements dB(A). Congestion charging monitoring sites, winter 2001/2, 2002/3, 2003/4 and 2004/5 compared.

Site number	Index	2001/2	2002/3	2003/4	2004/5	Difference dB(A) 2004/5 vs. average 01/02, 02/03 & 03/04
Site 5	L_{Aeq}, 16 hour Day	73.0	74.4	73.8	74.6	+0.9
	L_{Aeq}, 8 hour Night	71.1	72.9	71.1	72.4	+0.7
	L_{den}, normalised	80.4	82.0	81.1	82.0	+0.8
	L_{den}, free-field	77.9	79.5	78.6	79.5	+0.8
Site 6	L_{Aeq}, 16 hour Day	70.2	69.6	69.1	73.5	+5.5
	L_{Aeq}, 8 hour Night	66.9	65.2	66.7	68.9	+3.9
	L_{den}, normalised	76.3	74.9	75.9	76.2	+0.6
	L_{den}, free-field	76.3	74.9	75.9	76.2	+0.6
Site 7	L_{Aeq}, 16 hour Day	57.4	61.0	58.7	63.3	+4.3
	L_{Aeq}, 8 hour Night	50.9	52.2	51.1	55.7	+4.3
	L_{den}, normalised	65.1	67.4	65.9	67.5	+1.4
	L_{den}, free-field	62.6	64.9	63.4	65.0	-1.6
Site 16	L_{Aeq}, 16 hour Day	71.7	72.5	72.5	74.0	+1.8
	L_{Aeq}, 8 hour Night	72.3	71.5	71.5	72.7	+0.9
	L_{den}, normalised	79.1	79.2	79.2	79.4	+0.2
	L_{den}, free-field	79.1	79.2	78.8	79.4	+0.4
Site 19	L_{Aeq}, 16 hour Day	62.6	63.4	62.2	-	-
	L_{Aeq}, 8 hour Night	57.6	59.1	57.2	-	-
	L_{den}, normalised	71.1	72.4	70.8	-	-
	L_{den}, free-field	68.6	69.9	68.3	-	-

* The L_{Aeq} values quoted in are free-field values normalised to a distance of 10 metres from the kerb.

Site 5: Marylebone Road (Inner Ring Road)
Site 6: Farringdon Street (within charging zone)
Site 7: Central Street (within charging zone – 'background' site)
Site 16: New Kent Road (radial road approaching Inner Ring Road)
Site 19: Berkley Square (within charging zone – data not available for 2004/5)

Looking at the changes between 2002/3 (before charging) and 2003/4 (after charging), TfL's *Second Annual Monitoring Report* previously concluded that there was no evidence of significant discontinuities at these sites that might have been associated with the introduction of charging.

The comparison between 2003/4 and 2004/5 surveys is more mixed, with suggestions of overall increases at some sites. The reasons for this are being investigated further. Again, however, as overall traffic conditions have remained broadly stable over this period TfL do not consider that charging has been a primary factor in these apparent trends.

8 The boundary case study – interim findings

8.1 Introduction

During the development of the central London congestion charging scheme, a number of issues were identified relating specifically to the boundary area – including the area just inside the charging zone, the Inner Ring Road itself and the area beyond. These ranged widely across traffic effects associated with diversion around the boundary of the charging zone, through economic and social effects associated with the geographical discontinuity represented by the charging zone boundary, to public transport and environmental consequences arising from the changed travel and activity patterns.

Clearly, any changes instigated by the scheme would take place against the backdrop of more general change and, for most attributes, the area outside of the charging zone would not be expected to be affected to the same degree as the charging zone itself.

It was determined that these possible effects should be monitored through an intensive 'case study' of a relatively small area adjacent to the boundary. Because of the diversity of inner London, any one area could not be wholly representative of the entire boundary 'annulus'. Focusing on a specific area would, however, allow realistic use of resources and allow observed effects to be related to a specific set of geographical and socio-economic conditions. Information gathered here would be complemented by extension of many other aspects of the monitoring work to inner London more generally.

8.2 The boundary case study area

The area selected for this work lay to the north of the charging zone, broadly bounded in the south by the charging zone itself; in the west by Upper Street; in the east by Kingsland Road; and in the north by St Paul's Road and Balls Pond Road (see Figure 86 for a map of the case study area). The monitoring work consisted of extensions to the core programme deployed inside the charging zone, covering key traffic volume, congestion and public transport studies, alongside surveys of businesses and households, and studies of key environmental impacts.

This section summarises the interim findings from this work after approximately one year of operation of the central London scheme. It concludes that the impacts of charging on the boundary area appear to be largely neutral, with some transport gains and a general absence of traffic, transport, congestion and environmental problems attributable to charging. However, the social and economic research reveals several complex issues.

The findings of this work will inevitably reflect two significant 'external' factors that will have affected travel patterns in the case study area during 2003. The first of these is the Shoreditch Triangle traffic management scheme, which involved substantial changes to the configuration and operation of the Inner Ring Road, together with a range of other improvements and renewals. The work for this scheme mostly took place during 2002, thus potentially affecting

'before' measurements in the monitoring data. This would have particularly affected traffic conditions on the Inner Ring Road itself, and perhaps also on approach roads to the charging zone in the eastern part of the case study area.

The second issue was the temporary but lengthy suspension of the Central Line in the first half of 2003, following the Chancery Lane derailment. Although the Central Line does not pass through the case study area, the Victoria Line provided a potential alternative Underground route, and some bus routes passing through the area may also have provided suitable alternative routes for the duration of the closure. This would therefore have potentially impacted on patronage levels on 'alternative' bus and rail services passing through the case study area during the period of the 'after' monitoring.

Also important will be the impacts of several local traffic management schemes implemented in and around the case study area, mainly by the London Borough of Islington. These schemes were specified and funded as 'complementary measures' to congestion charging, and were implemented progressively between 2002 and 2004.

8.3 Summary of findings

This section summarises interim findings so far from the boundary case study, reflecting one year of operation of the scheme. The overall picture to date is one of broadly neutral effects. The key findings can be summarised as follows:

- Overall strategic level traffic changes in the case study area broadly follow those observed and reported elsewhere in the monitoring work: reduced radial traffic crossing into the charging zone; comparatively stable orbital traffic; an absence of large scale temporal or geographical displacement, and changes to the mix of vehicle types in the traffic.
- Emerging results from the local traffic management schemes implemented in the case study area indicate that they have been highly successful in meeting their objectives.
- Although limited by measurement issues, the balance of the evidence suggests that congestion in the case study area is either stable or has deteriorated marginally, but there have been large gains in the short-term on the Inner Ring Road, most probably associated with the Shoreditch Triangle traffic management scheme.
- Bus services and bus patronage in the case study area have both increased markedly. There is some evidence to suggest that patronage is rising at a faster rate than service supply in this area, and this needs to be kept under close review going forward. There is no evidence of problems or issues on the Underground or National Rail, but service disruptions in 2003 mean that these data cannot yet be conclusive.

- Surveys of residents in the case study area broadly corroborate the observed changes to travel patterns and volumes, and provide detailed information relating to individual experiences with the scheme.
- Most businesses, whether within the charging zone, in the boundary annulus or in the case study area, report no significant change to business performance between 2002 and 2003.
- There is no evidence to suggest that air quality in the case study area is behaving significantly differently to inner London in general, and it is not possible to observe discontinuities in the measurements corresponding to the introduction of congestion charging. Similarly, road traffic accidents within the case study area are continuing the recent trend of reductions, in common with inner London in general.

These overall findings are not unexpected, given that:

- the case study area is largely outside of the charging zone, and is therefore in general not likely to be directly affected by the scheme;
- the general absence of boundary-related traffic problems, the lack of any 'excess' geographically displaced traffic and the smooth operation of the Inner Ring Road have all been observed elsewhere in the monitoring work.

Nevertheless, it is clear that these overall conclusions subsume a very diverse range of changes, which relate in varying degrees to the introduction of the charging scheme and other changes affecting the area. The next stage of this work will be to consolidate these initial findings by gathering and analysing more data for 2004, focusing on specific issues that have arisen from this work so far.

8.4 Impacts on traffic patterns

This section considers the principal strategic-level traffic changes observed in relation to the boundary case study area. A following section looks in more detail at emerging results from some of the local traffic management ‘complementary measures’ implemented by the London Borough of Islington.

The introduction of charging was expected to lead to a reduction in journeys by potentially chargeable vehicles (cars, vans and lorries) to, from and within the charging zone. There was also expected to be some ‘diversion' of traffic along the boundary route (the Inner Ring Road), as drivers opted to avoid the charge by driving around the boundary of the charging zone.

This would affect traffic volumes in several different ways. First, there would be a general reduction in traffic on radial routes to and from the charging zone. Second, traffic on the Inner Ring Road might have been expected to increase overall. Third, there was the possibility of some increased traffic on more local roads just outside the boundary, as drivers opted to divert around the charging zone at some greater distance from the boundary.

Fourthly, there was the possibility of a range of more subtle or 'secondary' effects. For example, there may have been 'temporal displacement' of trips to periods outside of weekday charging hours.

Additionally, as part of the preparations for the scheme, a number of local traffic management schemes were put in place in the case study area in part at least to facilitate and deal with the anticipated traffic flow changes arising from charging. These would have their own impacts on traffic, and would complicate the interpretation of 'direct' charging effects.

A framework of traffic surveys measuring before and after conditions in the case study area was put in place. Key findings after approximately one year of operation are summarised below.

Traffic entering and leaving the charging zone

Continuous trend data from automatic counters located at some of the busier entry and exit points to the charging zone show overall reductions in traffic entering the zone of comparable magnitudes to those reported in Section 3, and previously reported in TfL's *Second Annual Monitoring Report*. They also confirm that the observed reductions correspond with the introduction of charging in February 2003. It is notable that the magnitude of traffic reduction varies among the available sites. In the initial months of charging, for example, the St John's Street site showed typical reductions of up to 20 percent in total traffic entering and leaving the charging zone during charging hours. This compares to Old Street, where reductions in entering traffic were typically below 10 percent – both reductions relating to flows recorded in the weeks before charging started.

Common to all of the sites is a comparative stability of traffic volumes on Saturdays and Sundays, and a degree of variation over the period since charging associated with seasonal and local traffic factors. In the first months of 2004 (i.e. one year on), overall levels of traffic entering and leaving the charging zone at St John's Street and City Road continuous monitoring sites were very similar to that observed during the first few weeks of charging, showing sustained overall reductions. However, at Old Street, flows are very similar to pre-charging levels, this probably being related to traffic flow changes associated with the Shoreditch Triangle traffic management scheme.

Manual classified counts, taken during Spring and Autumn each year at all entry and exit points from the zone within the case study area, provide further information on flows entering and leaving the charging zone. Overall, for traffic entering and leaving the charging zone through the case study area (vehicles with four or more wheels, weekday charging hours), a reduction of 22 percent has been observed comparing annualised estimates for 2002 (pre-charging) with 2003 (post-charging). This compares to equivalent reductions of 18 percent (entering) and 21 percent (exiting) across the whole of the charging zone boundary as reported in the *Second Annual Monitoring Report*. As Figure 84 shows, changes by individual vehicle type are also broadly similar to those observed across the whole of the charging zone boundary, although

the results for the individual vehicle types will be subject to considerable statistical uncertainty.

Figure 84 Changes in traffic entering and leaving the charging zone during charging hours within the boundary case study area.

Vehicle type	2002 flow case study area only	2003 flow case study area only	Percentage change case study area only	Percentage change charging zone (comparison)
Cars	37,500	23,600	-37%	-34%
Buses and coaches	2,200	2,600	+19%	+22%
Licensed taxis	6,900	7,800	+13%	+13%
Vans	12,800	11,000	-14%	-13%
Lorries	3,000	2,900	-4%	-11%
Two wheeled vehicles	10,100	10,600	+6%	+10%
All vehicles	72,500	59,200	-18%	-16%
Vehicles 4+ wheels	62,500	48,500	-22%	-19%
Potentially chargeable vehicles	53,400	37,500	-30%	-28%

Radial traffic approaching the charging zone

For radial traffic approaching the charging zone (as opposed to crossing into it), the portion of the TfL central cordon within the case study area records overall reductions of 6 percent (vehicles with four or more wheels, inbound and outbound combined, weekday charging hours comparing 2003 post-charging with 2003 pre-charging). Here, however, the reduction in potentially chargeable vehicles (cars, vans and lorries) is 11 percent. These results are again comparable to changes previously reported for 2002/2003 across the whole of the TfL central London cordon.

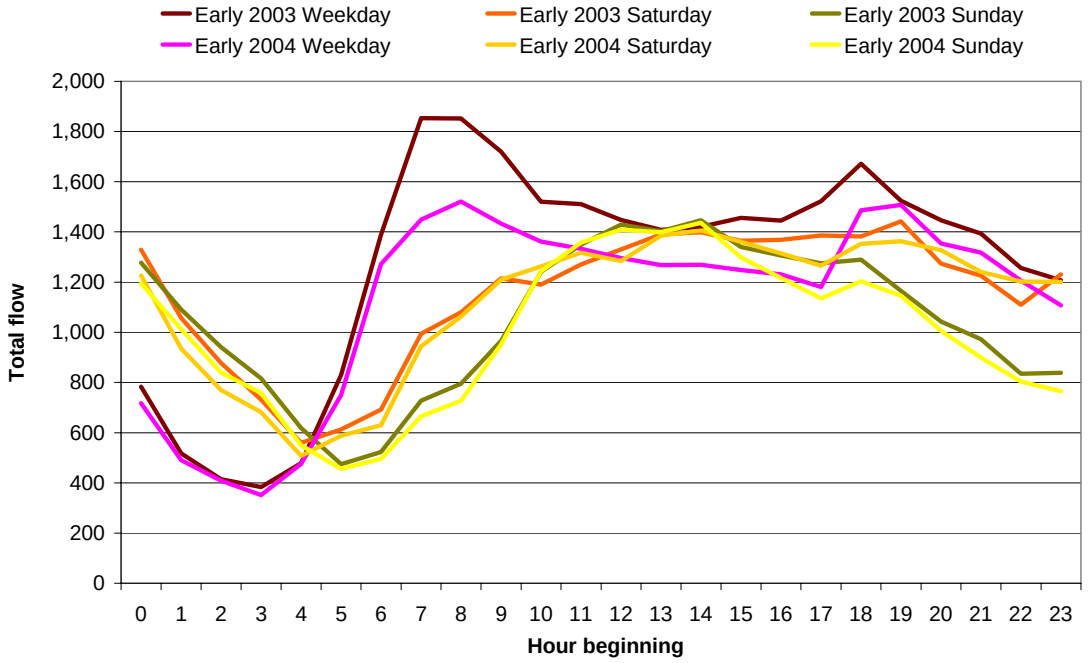
Traffic on the Inner Ring Road

Continuous traffic flow data from the automatic counter site on City Road show stable flows, both spanning the introduction of charging itself and more recently. Typical flows here are now very marginally above those recorded in the weeks before charging started, a very similar picture to that observed on the Inner Ring Road as a whole. Interestingly, although geographically removed, the daily traffic trend at this site does not show any visible discontinuities associated with the Shoreditch Triangle traffic management works.

Temporal displacement of trips

Figure 85 shows an indicative hourly flow profile for traffic entering the charging zone, from available continuous monitoring sites in the case study area over representative periods in early 2003 (pre-charging) and early 2004 (post-charging). The picture is very similar to that observed across the whole of the charging zone boundary, with overall reductions in traffic during charging hours, combined with a general absence of changes at other times.

Figure 85 Indicative hourly flow profile of traffic entering the charging zone within the boundary case study area (typical days, vehicles with four or more wheels only).



Key conclusions – traffic patterns

The following key conclusions relating to traffic patterns in the case study area may therefore be drawn at this stage:

- Overall strategic level traffic changes in the case study area are generally in line with those observed elsewhere in the monitoring work.
- Changes to traffic across the charging zone boundary, on radial routes approaching the charging zone, and on the Inner Ring Road are similar to those observed more widely, as reported in TfL's *Second Annual Monitoring Report* and also reviewed for 2004 in Section 3.
- There is no evidence of significant adverse traffic consequences from the introduction of charging.

8.5 Impacts of local traffic management schemes

In common with other locations in the boundary area, TfL and the boroughs co-operated in the installation of local traffic management schemes. These were introduced in parallel with the introduction of charging, and in part were designed to help minimise potential adverse traffic effects on local areas arising from charging.

In the part of the case study area covered by the London Borough of Islington, extensive changes to the local road network in Canonbury East, Canonbury West and St Peters were primarily designed to discourage potential 'rat-running' through residential areas of traffic displaced by charging.

In the portion covered by the London Borough of Hackney, schemes emphasised controlled parking zones in the primarily residential area adjacent to the Kingsland Road, designed among other things to better control potential 'commuter' parking from drivers who elected to terminate their car journey short of the charging zone (thereby avoiding the charge).

The scope of the local traffic management schemes introduced is shown in Figure 86.

Figure 86 Scope of local traffic management schemes introduced in the boundary case study area.

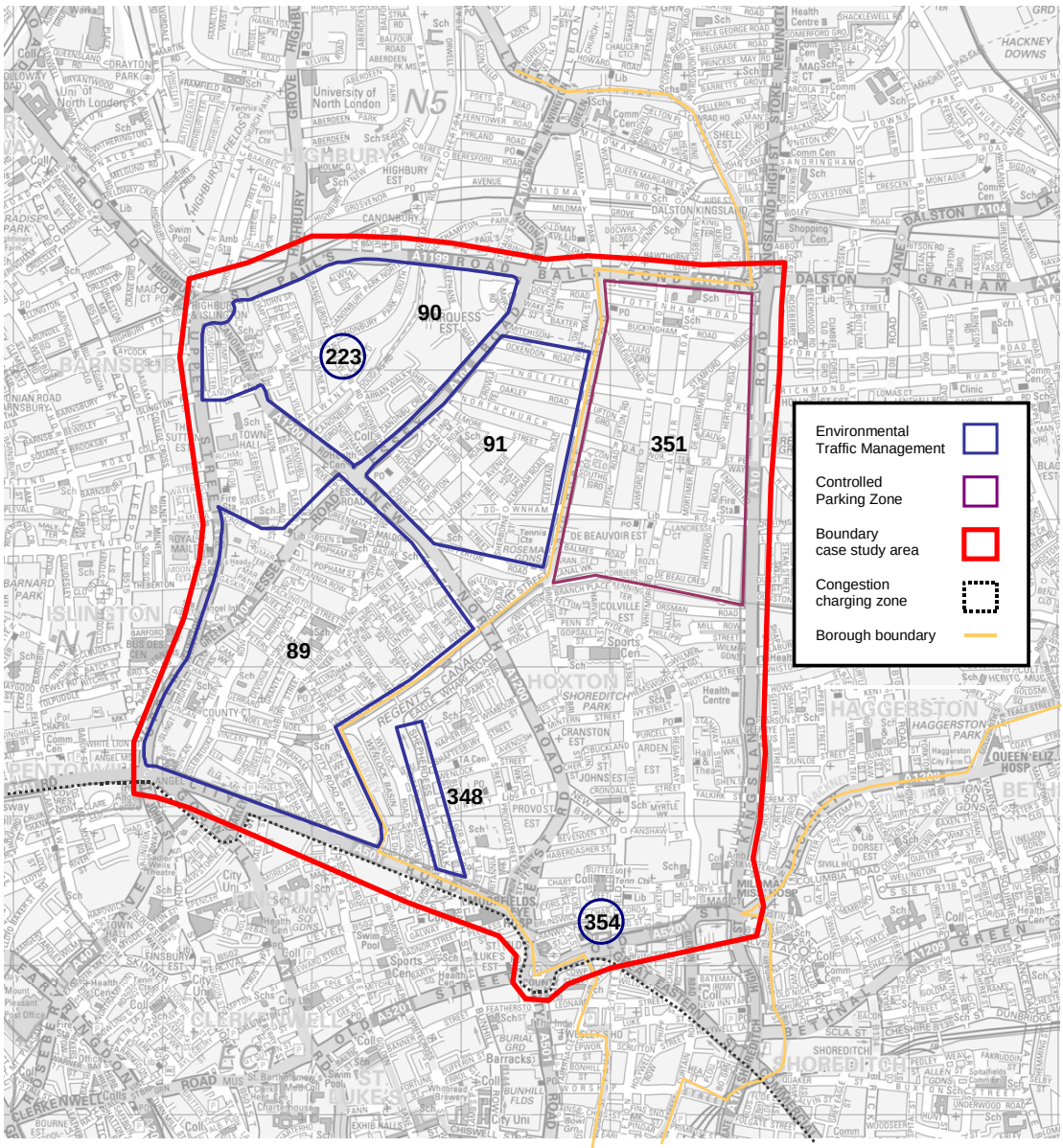


Figure 87 Description of local traffic management schemes introduced in the boundary case study area.

Ref	Borough	Scheme	Description
89	Islington	St Peter's Area Traffic Reduction Scheme	20 mph zone (32 km/h) with traffic calming measures.
90	Islington	Canonbury West Traffic Reduction Scheme	20 mph zone (32 km/h) with traffic calming measures.
91	Islington	Canonbury East Traffic Reduction Scheme	20 mph zone (32 km/h) with traffic calming measures.
223	Islington	Willow Bridge permanent closure	Permanent closure of Willow Bridge to through traffic except pedestrians and cyclists.
351	Hackney	De Beauvoir controlled parking zone	A controlled parking zone in the De Beauvoir area.
354	Hackney	St Charles Square Environmental Traffic Management Scheme	Traffic management scheme in the St Charles Square area to reduce potential 'rat-running'.
348	Hackney	Shepherdess Walk Environmental Traffic Management Scheme	Traffic management scheme in the Shepherdess Walk area to reduce potential 'rat-running'.

In most cases, TfL included funding to provide for the monitoring of before and after traffic effects. Discussions with the boroughs indicate that the schemes have generally been successful, although full data from all schemes are not yet available. The London Borough of Islington have, however, reported on several of their schemes, and some highlights from their findings for two schemes in the case study area – the East and West Canonbury Traffic Reduction Schemes – are summarised below.

East Canonbury Traffic Reduction Scheme

The East Canonbury Traffic Reduction Scheme is located in the area bounded by Essex Road, New North Road, Shepperton Road, Southgate Road and Ockendon Road. This scheme covers the area denoted by the reference 91 on Figure 86 (above). The scheme was devised to tackle existing 'rat-running' problems with through traffic in the area and to protect against any diversion from Essex Road and New North Road as a result of congestion charging.

Measures implemented in the scheme included: raised zebra crossings, speed tables and cushions, footway extensions and 'build-outs', including side road entry treatments, and width restrictions. In addition, the zone was designated a '20 mph zone' (32 km/hour).

Comprehensive before and after surveys of traffic volumes and speeds were undertaken. The monitoring has revealed that very significant traffic volume and speed reductions have been achieved in the area by the implementation

of the traffic measures. Traffic volume reductions are in excess of 40 percent across the whole scheme.

Perhaps the most successful aspect of the scheme is the large reductions in Heavy Goods Vehicle (HGV) volumes in the area (up to 75 percent). The results would tend to show that HGV movements in the area have been reduced to only those actually delivering in the area, and HGV 'rat-running' has been virtually eradicated.

Traffic speeds between junctions have also been significantly reduced, from a range (85th percentile) of between 26 and 43 km/hour before the implementation of the scheme, to between 26 and 35 km/hour after (a decrease of between 15 and 25 percent). This is even lower than can be expected for a typical 20 mph (32 km/hour) zone.

West Canonbury Traffic Reduction Scheme

The West Canonbury Traffic Reduction Scheme lies to the east of Upper Street in the area bounded by St Paul's Road, Compton Road, Canonbury Road, Essex Road, Canonbury Street and Douglas Road. This scheme covers the area denoted by the reference 90 on Figure 86 (above). The scheme was devised to tackle existing 'rat-running' problems with extraneous through traffic in the area and to protect against any diversion from Upper Street and St Paul's Road as a result of congestion charging.

Measures implemented in the scheme included: raised zebra crossings, speed tables and cushions, footway extensions and 'build-outs', including side road entry treatments, width restrictions, priority give-ways, staggered parking bays and various changes to the configuration of junctions. In addition, the zone was designated a '20 mph zone' (32 km/hour).

As with East Canonbury, comprehensive before and after surveys of traffic volumes and speeds were undertaken. The monitoring has again revealed that very significant traffic volume and speed reductions have been achieved in the area by the implementation of the traffic measures, with the anticipated volume reductions of 30 percent comfortably achieved across the area.

Traffic speeds, although already low in the area, have been reduced still further by the measures implemented, with 85th percentile speeds reduced on average to between 27 and 37 km/hour (a decrease of between 15 and 25 percent). This is again generally below what might be expected for a typical 20 mph (32 km/hour) zone.

As in East Canonbury, the permeability and attractiveness of routes in the area to heavy goods vehicles has been significantly affected by the measures, with a general absence of HGV 'rat-running' and virtual complete elimination of HGV journeys not having local business.

Figure 88 Example of local traffic management scheme in the boundary case study area: Canonbury East Traffic Reduction Scheme.

8.6 Impacts on congestion

Congestion charging was intended to significantly reduce traffic congestion within the charging zone. Overall reductions in congestion measured since charging began have been around 30 percent (see also Section 2).

The traffic changes outside the zone would also be expected to lead to corresponding, though smaller changes in congestion – some positive (such as on radial routes approaching the zone) and some potentially negative (such as additional delays from traffic diverting around the boundary of the charging zone). Overall, net gains were expected, although it was recognised that the extent of preparatory traffic management (particularly the Shoreditch Triangle scheme) and other works in the case study area would make comparison of before and after measurements difficult.

As inside the charging zone, traditional Moving Car Observer (MCO) speed surveys have been combined with ANPR (Automatic Number Plate Recognition) equipped cameras to measure changes to traffic speeds and congestion.

Although extensions of techniques used successfully within the charging zone, neither of the available survey methods would in the event provide entirely robust measures of congestion change in the case study area. The MCO surveys are limited by the sparseness of the survey network and the ANPR data by the availability of very limited 'before' data and – significantly – by the occurrence of large scale utility works at several points in the case study area following the introduction of charging.

Moving Car Observer surveys

The more major roads in the case study area are covered by several of the MCO surveys described elsewhere in the report. These include the Inner Ring Road and the network directly affected by the strategic traffic management scheme at Shoreditch Triangle.

Comparison of measured levels of congestion for Spring 2002 (before charging) against Spring 2003 (after charging) on this network show overall reductions during weekday charging hours of around 30 percent, a change similar to that recorded *inside* the charging zone itself. Reductions in congestion of around 20 percent were also observed in the 'shoulder' periods immediately outside charging hours, suggesting the operation of wider factors than charging itself, given that the ‘shoulder effects’ of reduced charging-hours traffic highlighted in Section 2 would not have operated to the same extent outside the charging zone.

Average network speeds increased from around 15 to around 18 kilometres per hour within charging hours, and from around 14 to 17 kilometres per hour in the 'shoulder' periods outside charging hours, although the statistical uncertainty associated with these estimates is very large, given the sparsity of the network.

Gains were anticipated from reduced radial traffic approaching the charging zone, with some offsetting losses from increased traffic on the Inner Ring Road and more widely, a loss of capacity on local 'orbital' routes resulting from the local traffic management schemes described above.

Further examination of these data, including observed reductions in congestion of up to 35 percent on the Inner Ring Road in the case study area, and comparison with the ANPR data (below), suggest that a large proportion of these apparent gains may have resulted from the successful implementation of the Shoreditch Triangle traffic management scheme. In particular, the 'before' measurements were taken at a time when disruption from the implementation of this scheme was at its highest. If this is the case, then the observed gains should be regarded as at least partly 'artificial' and probably atypical of the boundary area as a whole.

Camera surveys

ANPR cameras give a different, although not directly comparable, picture of congestion changes in the case study area. Here, measurements are taken over a 'basket' of routes, defined by camera pairs, with results expressed as changes in average speed for traffic observed travelling between each camera of the pair. Data have been analysed for a two-week window immediately before the introduction of charging in early 2003, and compared to an equivalent period after charging in November 2003.

Here, a more mixed picture is revealed, the cameras corroborating large gains (up to 25 percent increases in average speeds) in the immediate Shoreditch Triangle area, although throughout the remainder of the case study area the

overall picture is one of marginally decreasing average speeds, particularly for journeys involving Upper Street (Islington).

Key conclusions – congestion

- Available measurements of congestion changes in the case study area are limited by a variety of coverage and data limitations, in particular those associated with the large scale traffic management scheme at Shoreditch Triangle.
- The balance of evidence suggests significant short-term, atypical improvements on the Inner Ring Road that are probably directly associated with completion of this scheme, coupled with stable or marginally worse conditions elsewhere in the case study area.
- There is no evidence of systematic congestion problems arising directly from increased traffic, but TfL is aware that several localised problems have been reported during the period under review, which the boroughs concerned have largely attributed to temporary utility road works.

8.7 Effects on public transport

Congestion charging was implemented against the backdrop of radical and ongoing improvements to buses in and around central London. Charging was expected to result in increased travel by bus and – to a lesser extent – Underground and National Rail to the charging zone. Some improvements to buses were directed towards accommodating this increased patronage. This section summarises observed changes to public transport patronage, supply and performance following the introduction of charging. In representing these findings, consideration must be given to the likely effects of the prolonged temporary closure of the Central Line in the first half of 2003, which would have been expected to have affected travel from north-east London towards the charging zone.

8.8 Bus supply and patronage

Bus routes that pass directly through the case study area have seen overall increases of 40 scheduled buses per hour during the morning weekday peak period in 2003. The majority of these were in preparation for the charging scheme and were implemented over the period mid-2002 to late 2003. There has also been a parallel move towards the introduction of buses with higher passenger capacities on some of the routes in the area.

London Buses ‘Keypoints’ surveys in 2003 recorded increases in buses of generally between 10 and 20 percent, although surveys at some locations indicated increases in buses in the weekday AM peak period of between 60 and 80 percent. Generally, established radial corridors have seen the lower increases in scheduled buses. Other surveys confirm that changes between 2002 and 2003 are part of a longer-term trend towards increased bus services, both in the case study area and more widely.

A basic question is whether this increased capacity has kept pace with increased patronage. The balance at individual Keypoints sites across the case study area is somewhat variable. To some extent this will be due to 'normal' day-to-day variation affecting the specific days on which the Keypoints surveys were carried out.

There is however evidence, particularly at Old Street and Angel, of possible disproportionate increases in patronage compared to changes in service provision. Closer examination of these two sites reveals that average bus occupancy is still within planning standards, especially taking into account the substitution of certain buses at these points by buses of increased capacity, particularly with the new Route 205. It is also likely that prolonged closure of the Central Line may have affected bus patronage at these points during 2003, and also perhaps the shorter-term problems on the Northern Line.

Nevertheless, there is a requirement for bus capacity at these locations to be kept under review.

Bus journey times and reliability

Changes in general traffic congestion described above might be reflected in bus operations, but the relationship is complex. Buses operate to a schedule and there are limitations to the extent that they can benefit from improved overall traffic conditions. Increased overall traffic speeds would mainly feed through to improved reliability. Further, several bus priority measures have been put in place in and around the case study area that would have the effect of assisting bus operations while reducing capacity for general traffic.

Sample measurements of bus speeds on key radial corridors in the case study area show increases of about 5 percent, broadly in line with what might be expected given favourable general traffic conditions and scheduling considerations, and comparable with that measured inside the charging zone (6 percent).

A better measure of the operational performance of bus services is reliability, conventionally measured in terms of Excess Waiting Time (EWT – simply, the difference between scheduled and actual waiting time for 'representative' passengers at bus stops on a survey day). In common with the rest of the bus network, routes in the case study area have seen substantial reductions in EWT. EWT for high-frequency radial routes has decreased by 38 percent, as compared to average equivalent improvements of around 30 percent within the charging zone, and about 20 percent across the rest of London.

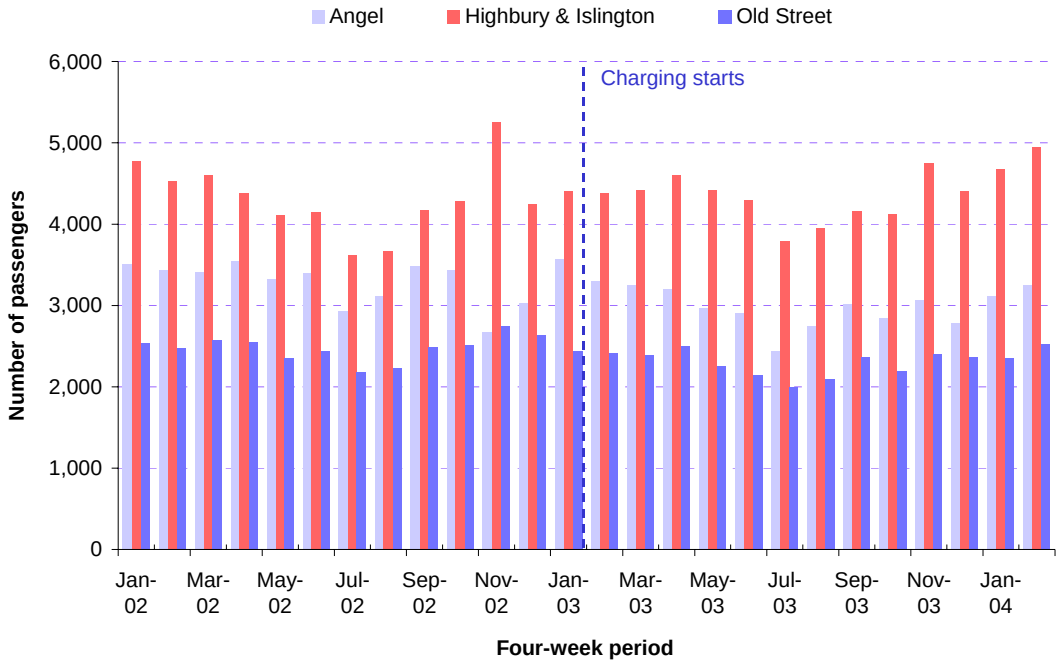
Although these changes suggest significantly improved traffic conditions in the case study area, this is not wholly borne out by the measurements of general traffic congestion described above. As with the charging zone, it is likely that the wider range of measures to assist the operation of buses are significant factors in bringing about these improvements.

Underground patronage

Underground patronage was affected by a variety of 'external' factors in the first half of 2003, such as the prolonged closure of the Central Line from January to May and shorter-term closure of the Northern Line. These have made it very difficult to identify a specific 'congestion charging effect' on Underground patronage, which in any case was expected to be relatively small.

There are three Underground stations within the case study area. Ticket-gate based patronage data are compared for one complete year either side of the introduction of charging.

Figure 89 AM peak passenger entries at Underground stations within the boundary case study area.



Patronage at Highbury and Islington (Victoria Line and National Rail North London Line) increased slightly between 2002 and 2003. However, patronage at Old Street (Northern Line City Branch and National Rail) and Angel (Northern Line City Branch) were both down by around 10 percent, mirroring the overall network-wide trend of falling patronage described in the *Second Annual Monitoring Report*.

It is possible that the increases at Highbury and Islington primarily reflect displacement from the Central Line, and that in the absence of this, overall patronage here would have reduced, as seen elsewhere. Trends at the Northern Line stations may also have reflected the temporary closure affecting this line. However, in common with the wider central London Underground network, 2003 saw relatively large overall falls in patronage, meaning that any residual passenger increase arising from congestion charging is being readily accommodated.

National Rail

Patronage at Old Street National Rail station was surveyed in 2002 and 2003 as part of the charging zone programme. Here, increases of 11 percent (morning peak arrivals, from 1,740 to 1,940 passengers) and 26 percent (all-day departures) compare with increases and decreases of 1 percent respectively across all National Rail stations in and immediately around the charging zone. It is therefore likely that changes at Old Street are atypical, and due either to local or 'on-the-day' survey factors, or possibly associated with the Central or Northern Line closures, but this should be verified by further counts.

Key conclusions – public transport

- The boundary case study area has benefited from large-scale enhancements to the bus network, corresponding with the introduction of congestion charging.
- As a result both of this additional capacity, former car trips displaced by charging and extraneous factors such as the prolonged closure of the Central Line, bus patronage in the boundary case study area has also increased substantially.
- Overall, capacity is keeping pace with demand, although there is some evidence that general bus occupancy levels in the boundary case study area have risen, and there is a need for continued monitoring of occupancy levels in this area.
- Taking possible temporary effects associated with the closure of the Central Line into account, there is no evidence of detrimental changes to Underground patronage. Underground patronage in the boundary case study area is falling for a variety of factors not connected with charging – as observed elsewhere in and around central London.

8.9 Social impacts – survey of boundary case study area residents

The traffic and transport changes observed in conjunction with the introduction of congestion charging are the aggregate result of changed travel behaviour by individuals. Furthermore, changed travel behaviour could have wider implications for people's daily lives and their residential environment. This area of the work sought to better understand these processes for residents of the case study area, through in-depth interviews before and after charging with the same households.

Travel behaviour

Although not a rigorous means of quantifying actual travel, it is clear that the general picture to emerge from household interviews is that case study area residents report making fewer trips overall to the charging zone in 2003 as compared to 2002. The balance of evidence from the survey reveals that a little over half of the reported change was directly associated with charging.

It also appears that residents from Canonbury Ward report a greater effect to those from neighbouring Wenlock Ward. This could reflect socio-economic differences between the two wards affecting levels of car ownership and use. There has also been a clear shift in the use of modes away from private car and towards (in particular) bus for trips to the charging zone. It is not possible to relate these effects directly to changes in traffic and public transport observed at the charging zone boundary, but they appear to be broadly compatible.

Transport and environmental quality

Typically, almost half of interviewed residents thought that traffic congestion had improved on their nominated journeys. Almost a fifth, however, reported deterioration in conditions since the introduction of the scheme. Because the selected journeys ranged widely over central and inner London and involved all modes, these findings cannot be compared directly to the congestion measurements described above, but they are indicative of generally improved traffic conditions.

43 percent of case study respondents thought that the public transport options available to them had improved since the introduction of the scheme. This is rather more than the average for all sampled inner London neighbourhoods (32 percent).

In terms of general quality of the neighbourhood as a place to live, roughly equal proportions of case study area respondents claimed improvement as deterioration, about 20 percent in each case. This 'neutral' result compares to a more negative bias for the other sampled neighbourhoods in inner London, and a markedly positive bias for neighbourhoods within the charging zone itself where 40 percent of respondents reported improvements against 10 percent reporting a deterioration.

When respondents in the case study neighbourhoods who reported positive change were asked the primary reasons for their view, the introduction of residents' parking, less traffic and congestion and improved bus services were the three most frequently-cited improvements. Curiously, the most frequently cited reasons for perceived negative change were the reverse of the above (more traffic and congestion and more difficult parking), suggesting that change has both perceived positive and negative effects, depending on the disposition of the individuals concerned.

People's daily lives

Congestion charging will have directly and indirectly affected the daily lives of many people. However, the scheme is only one of a range of possible influences, and in general the effects of the scheme will have been small. Nevertheless, it is useful to understand the overall scale and scope of perceived effects and, in particular, to establish whether the scheme is causing any generic or disproportionate issues.

In the Wenlock and Canonbury East survey neighbourhoods, around one-third of respondents claimed that the scheme had affected them personally (either positively or negatively) to a 'fair' or 'great' extent, whilst almost half claimed no significant effects – findings that are broadly replicated across all sampled areas within the charging zone and inner London.

The social surveys cover a wide scope of other impacts, for example possible 'severance effects' relating to the boundary and 'secondary' consequences of transport mode change. The 'individual' nature of these impacts means that they are not amenable to simple quantification, but the results contain a wealth of data that is currently undergoing further analysis.

Key conclusions – social impacts

- Findings from household-level research in the case study area confirm the overall direction and magnitudes of travel behaviour change observed elsewhere in the monitoring work, with fewer trips to the charging zone overall and a marked shift from private car to bus.
- In relation to selected nominated journeys made both before and after the introduction of the scheme, residents of the case study area report reduced traffic congestion and improved public transport options and service quality since the introduction of the scheme.
- It is difficult to isolate the perceived impacts of the scheme on the local neighbourhood. This is because of the wide range of other factors involved in determining local 'quality of life', and the fact that many of the changes most closely associated with charging are perceived – in roughly equal measure – to have had both positive and negative consequences by different people.
- A more detailed level of analysis is currently underway to explore the diverse range of specific impacts reported, but currently there are no systematic indications of unexpected 'generic' difficulties.

8.10 Impacts on business and the economy

Inside the charging zone, congestion charging was expected to encourage greater productivity and efficiency by making journeys by road both faster and more reliable. Gains in congestion of the order expected prior to the introduction of the scheme have been demonstrated elsewhere.

In the boundary area, the key expected effects were rather different. The predominating small, customer-facing enterprises in this area could potentially have faced either small increases or reductions in 'passing trade', depending upon which side of the boundary they were located, reflecting the changed travel patterns. It was also foreseen that increases in congestion on roads around the boundary might result from increased traffic on these roads. In addition, of course, these businesses would be expected to interact with the charging zone to some degree, both in terms of customers, suppliers and deliveries.

To approach these issues, a supplementary survey of small and medium-sized businesses in the case study area was undertaken as an adjunct to the 2003 round of TfL business surveys reported in the *Second Annual Monitoring Report*. This covered similar ground to the main survey, and involved discussions with around 50 small and medium sized customer-facing businesses. This survey was in addition to 'just inside' and 'just outside' strata of the main 2003 business survey sample, these in both cases covering the whole of the boundary annulus and involving about 100 businesses of all types.

It is very important to note that the focus of the case study area business surveys on these types of business mean that findings from this survey are not directly comparable to those from the charging zone, as they only consider a sub-set of the business population in the case study area.

Figure 90 Components of business surveys in boundary case study area.

Congestion charging zone	In-depth surveys of approximately 100 businesses plus similar telephone surveys of approximately 600 businesses. Representative sample stratified by activity sector. Includes both inside and outside boundary annulus businesses unless stated otherwise.
Boundary annulus	A component of the main business surveys described above, involving approximately 100 businesses (representative sample) each side of the charging zone boundary.
Boundary case study area sub-sample	In-depth interviews with approximately 50 businesses within the case study area only, focusing on small/medium customer-facing enterprises (for example retail) only.

Key influences on business performance

In the charging zone and the whole boundary annulus, a majority of businesses (around 60 percent) reported no significant change in business performance between 2002 and 2003. For the boundary case study area (in-depth sample), the equivalent figures were 45 percent 'no change', 38 percent 'decrease' and 15 percent 'increase'.

Across the whole boundary annulus (telephone survey – all businesses), general economic conditions were by far the most frequently cited influence on business performance, cited in about half of cases in all areas. Congestion charging was only very marginally more likely to be cited as a key influence in the whole boundary area, compared with businesses within the charging zone.

Implications of congestion charging for business

In common with businesses within the charging zone, businesses in the boundary area have recognised improvements to traffic congestion since the introduction of charging. However, over half of the boundary case study business in-depth sample claimed that their business could not take advantage of reduced congestion, perhaps reflecting the generally small-scale 'local' nature of these businesses.

Considering the in-depth samples for the boundary case study and charging zone, around half of surveyed businesses stated that congestion charging had led to no change in the running costs of the business. However, whereas less than one-third of charging zone businesses indicated an increase in costs, just over half of boundary case study indicated that costs had increased.

Attitudes towards congestion charging

Since the introduction of the scheme there has been an increase in the proportion of businesses that believe that it has been effective in reducing congestion. However, small businesses in the boundary case study area, and retailers especially, were less likely to support congestion charging in 2003 than in 2002. Even so, more than half (55 percent) of businesses still support the scheme, provided that they can see parallel investment in public transport.

Businesses across the whole boundary annulus were, on balance, slightly less supportive of the scheme in 2003 than in 2002, although the large majority had not changed their view of the scheme, and some were more supportive. 58 percent supported the scheme in 2003 (provided that there was continued investment in public transport) – this level of support being very similar whether businesses were located just inside or just outside of the charging zone.

Key conclusions – business impacts

- Most businesses, whether within the charging zone, in the whole boundary annulus or in the boundary case study area, report no significant change to business performance between 2002 and 2003.
- Businesses in the case study and wider boundary area recognised improvements to traffic conditions arising from the scheme.
- Congestion charging appears to have contributed to increased running costs for some businesses in the case study area and the boundary annulus, but there is no indication that this has been the case for the majority of businesses.
- Most businesses in the whole boundary annulus or in the case study area support congestion charging as long as there is continued investment in public transport.

8.11 Air quality and road safety

Traffic changes brought about by charging may have affected the environment, primarily air quality, and also have contributed to trends in road traffic accidents within the case study area.

In both cases however, the traffic changes observed in the case study area (as opposed to the charging zone itself) have been relatively mixed, such that it would be unlikely that sharp changes in air quality or accidents would be observed, at least directly as a result of charging.

Air quality

Trends in ambient air quality in the case study area can be inferred from the monitoring site on Upper Street, Islington, an inner London 'background' site. This is one of 80 or so sites across London affiliated to the London Air Quality Network. Continuous trend data for key pollutants at this site can be obtained and compared with similar data at other sites to examine how air quality at this site behaves in relation to trends elsewhere. (See also Section 7.)

Overall, air quality at the Islington site has behaved broadly as would be expected, given the absence of significant traffic effects, and the 'background' trends observed elsewhere in London.

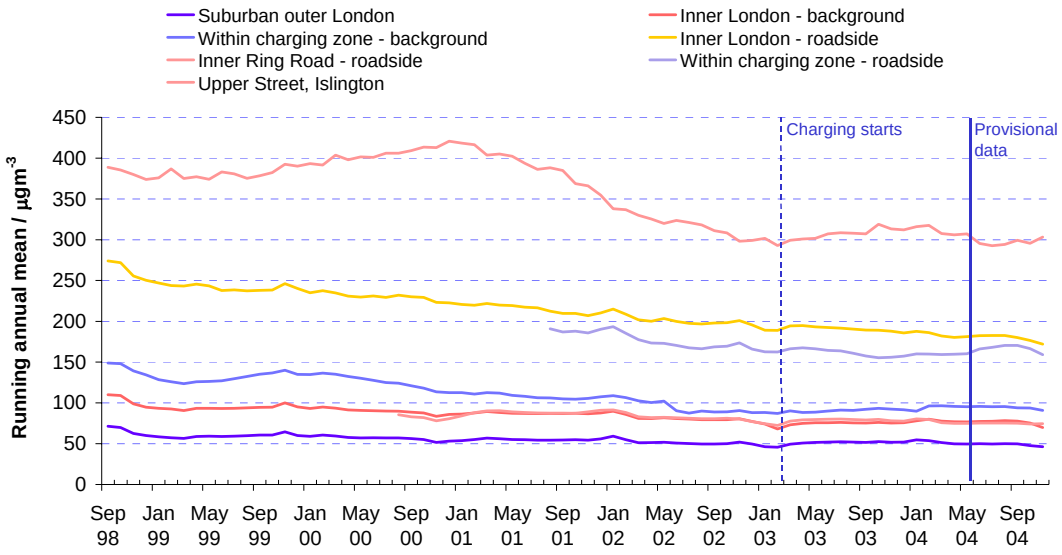
In the case of Oxides of Nitrogen (NO_x – a fairly 'direct' indicator of road traffic emissions) running annual mean concentrations have been very stable for several years (at around 80 $\mu g/m^{-3}$). The Islington site is very close to the average for inner London 'background' sites, showing concentrations lower than 'background' sites within the charging zone. There is no visible indication of changes NO_x levels coinciding with the introduction of charging (Figure 91).

In the case of NO_2 (Nitrogen Dioxide – a 'secondary' pollutant from road traffic), running annual mean concentrations since 2000 have again been remarkably stable at this site. They are again very close to the inner London 'background' average and below the equivalent sites within the charging zone. There is again no visible response to the introduction of charging and – unlike some other roadside sites across London – no evidence of recent rises in NO_2 concentrations (see also Section 7).

In the case of PM_{10} (fine particulate matter – a proportion of which originates from road vehicle emissions), running annual mean concentrations have been broadly comparable with typical 'background' values for inner London sites.

In common with most sites across London, elevated levels of PM_{10} were experienced throughout 2003, associated primarily with unusual weather patterns, although this did not lead to a breach of the future 2005 Air Quality Objective at this site.

Figure 91 Trends in running annual mean NO_X concentrations. Upper Street Islington compared with other sites.



Road traffic accidents

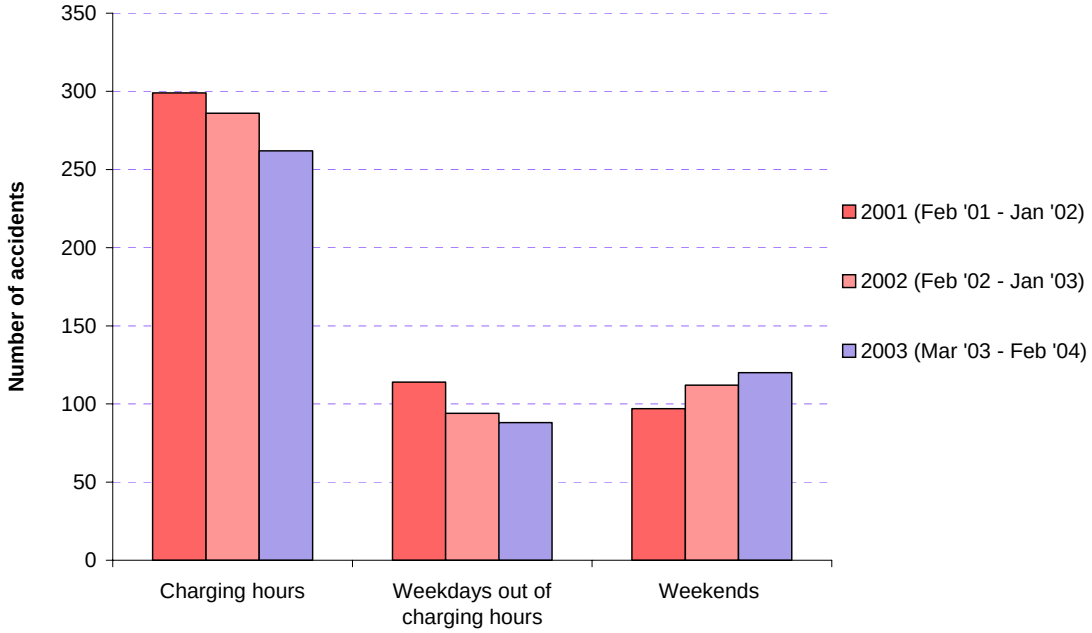
Although approximately one year of validated post-charging data on road traffic accidents is available, the boundary case study area is a relatively small area and accidents are relatively infrequent events. Comparisons between these limited datasets therefore need to be treated with caution. Also relevant are the 'background' trends in accidents that have seen overall reductions across London for the last few years (see also Section 7). Given the observed traffic changes previously described, the primary issue is whether post-charging trends in the case study area are out of step with recent trends or comparable areas.

Figure 92 shows that the total number of recorded collisions in the case study area during weekdays decreased by about 8 percent between 2002/3 (before charging) and 2003/4 (after charging). This is slightly less than the equivalent 10 percent decrease observed within the charging zone itself, and slightly more than the reduction observed in the case study area in the year 2001/2.

Similar reductions have been observed in the case study area during weekdays outside of charging hours, but an opposing trend of year-on-year increases in accidents has been observed at weekends, which is unlikely to be associated with the charging scheme.

There is no evidence of disproportionate changes to the severity of road accidents in the case study area, or of detrimental changes to collisions involving two-wheeled vehicles, whose numbers have been observed to increase since the introduction of charging.

Figure 92 Recent trends in road traffic accidents in the boundary case study area.



Key conclusions – environment and road safety

- Data from the Upper Street monitoring site suggests that air quality in the case study area has behaved in a very similar way to the rest of inner London. There is no evidence of changes in NO_x, NO_2 or PM_{10} levels coinciding with, or that could be attributed to, the introduction of charging.
- The number of road traffic accidents in the case study area has continued its recent trend of year-on-year decline, paralleling most other parts of London. There is no evidence from the data of emerging detrimental trends that could be associated with, or attributed to, the introduction of charging.

8.12 Perceptions and activities of people 'on-street'

As part of a wider programme of On-Street attitudinal research, approximately 1,500 people were interviewed at five sites within the boundary case study area. This work gathered information on the attitudes of people 'on-street' in the boundary case study area towards aspects of the central London scheme and their local environment, usually expressed in terms of a five-point 'rating'. Topics covered by this work relate to most of the substantive areas described above. The following is a summary of key findings from this work.

Perception of traffic and congestion

- In 2003, fewer respondents (16 percent) thought that charging had led to increased traffic levels in the case study area, compared to the expectation before charging started (27 percent).

- Mean ratings for the amount of traffic in the case study area and the speed and comfort car travel around the boundary case study area improved very marginally between 2002 and 2003.
- Similarly, in 2003, 9 percent of respondents thought that the scheme had led to increased congestion in the case study area – rather fewer than the 23 percent who anticipated this as a probable outcome in 2002.

Perception of public transport changes

- For respondents who had used bus to travel to the case study area, there were substantial gains in perceptions of bus speed, reliability and comfort.
- Ratings of speed, reliability and comfort of Underground services all improved slightly following the introduction of charging, in line with the wider picture inside the charging zone.
- There is some evidence of marginal gains in the perception of National Rail services in the case study area.

Social and economic impacts

- Activities undertaken in the case study area during charging hours remained very similar following the introduction of charging, with shopping being the most frequently cited 'main activity' among those interviewed 'on street', accounting for about one-third of all respondents, followed by travelling to or from work.
- There was very little change in the reported average level of spend among on-street respondents between 2002 and 2003.

Environment

- One-fifth of respondents felt that congestion charging had had no effect on the general environment in the case study area, compared to about 5 percent of respondents who thought that this would be the case before charging started.
- There was evidence of overall gains in respondent's perceptions of traffic and congestion, but (in comparison with surveys before charging started) evidence of deterioration in the perception of parking availability and the overall attractiveness of the area.
- On-street respondents were asked to 'rate' the features of the boundary case study area. Mean ratings for air quality and noise in the boundary case study area improved slightly between 2002 and 2003. However, the net ratings for both were still 'poor' overall.

9 Scheme revenues

A key impact of the scheme is the surplus revenues it generates. By law these must be spent on measures to further the Mayor's Transport Strategy in accordance with an appendix to the Scheme Order approved by the Secretary of State for Transport. TfL is required to report every four years to the Secretary of State on the expenditure of scheme revenues.

Originally, the revenues from the scheme were only available to TfL – i.e. hypothecated – for the first ten years of the scheme's operation. However, TfL have now been advised by Government that a longer period of hypothecation would apply if the scheme were enlarged in accordance with the Revised Transport Strategy, published in August 2004.

For the periodic reports to the Secretary of State the cumulative costs and revenues would be presented. For this report Figure 93 reflects a more straightforward approach based on provisional outturn figures for financial year 2004/05, comparing scheme revenues with scheme operation costs.

Figure 94 provides a provisional indication of the allocation of net revenues to transport programmes in 2004 to 2005.

Figure 93 Provisional scheme revenues and costs, 2004 to 2005 (£ million).

Revenues	
Charges - £5	98
Charges - £5, £5.50, fleet vehicles	17
Charges - residents	2
Enforcement income	72
Total revenues	**190**
Costs	**92**
Net revenues	**97**

Figure 94 Provisional application of scheme revenues 2004 to 2005.

Bus network improvements: Contributions to programmes to increase bus frequencies, to provide additional routes, to ensure enhanced route supervision and to support the move to articulated buses on key routes – in part to support the transfer of car users to bus as a result of charging.	**80%**
Road safety: Contributions to programmes of research and analysis, to accident remedial measures and to education programmes and campaigns – part of the London Road Safety Plan to meet the Mayor's 10-year targets of reducing casualties by 40 percent.	**11%**
Safer routes to schools: Contributions to initiatives to encourage sustainable means of getting children to and from school and reducing child accidents across London.	**2%**
Walking and cycling: Contributions to a programme of schemes on London's roads, as well as the production and dissemination of information to encourage more people to walk and cycle throughout London.	**6%**
Distribution and freight: Contribution to measures to make the distribution of goods into and around London more sustainable – in collaboration with freight organisations and London boroughs, including a review of the London Lorry Ban.	**1%**
Total	**100%**

10 Scheme operation

The operation of the scheme has improved significantly during 2004 as demonstrated by range of access, quality and chargepayer satisfaction measures.

10.1 Service provision and Capita's performance

The foundation of the improvements to the quality of operation of the scheme are the revisions to the contract with the main service provider, Capita, which were introduced in stages between September 2003 and April 2004.

These changes, and a number of others introduced outside the contract revision have focused on improving the quality of operations across the board. They have resulted in, for example:

- Improved accessibility to the call centre. There are now few problems in getting through to the call centre. The time that a chargepayer had to wait to get through to the call centre has been consistently below 20 seconds between February 2004 and February 2005. Similarly the number of abandoned calls has been below 1 percent of total calls since January 2004.
- Tighter monitoring of calls received by a dedicated Quality Monitoring Team.
- Implementation of an ongoing package of staff training enhancements, which include checking of the syntax of Vehicle Registration Numbers (VRMs) to reduce errors which may result in the issue of Penalty Charge Notices (PCNs), and checking each VRM against the Driver and Vehicle Licensing Agency (DVLA) database.
- A reduction in the number of errors made in call centre payment processing – errors now account for 0.01 percent of all payments processed.
- Introduction of 'mystery shopping' in the call centre and in retail outlets where the congestion charge can be purchased.
- Introduction of improved mailroom procedures to track and scan each item of mail received, including rejected discount applications.
- Improvements to the Blue Badge and resident registration application process.
- Introduction of improved finance processes, including banking of payments and more timely refunds.
- Increased opportunity to use the automated fleet scheme as a result of reducing the threshold of vehicles from 25 to 10 from December 2004.

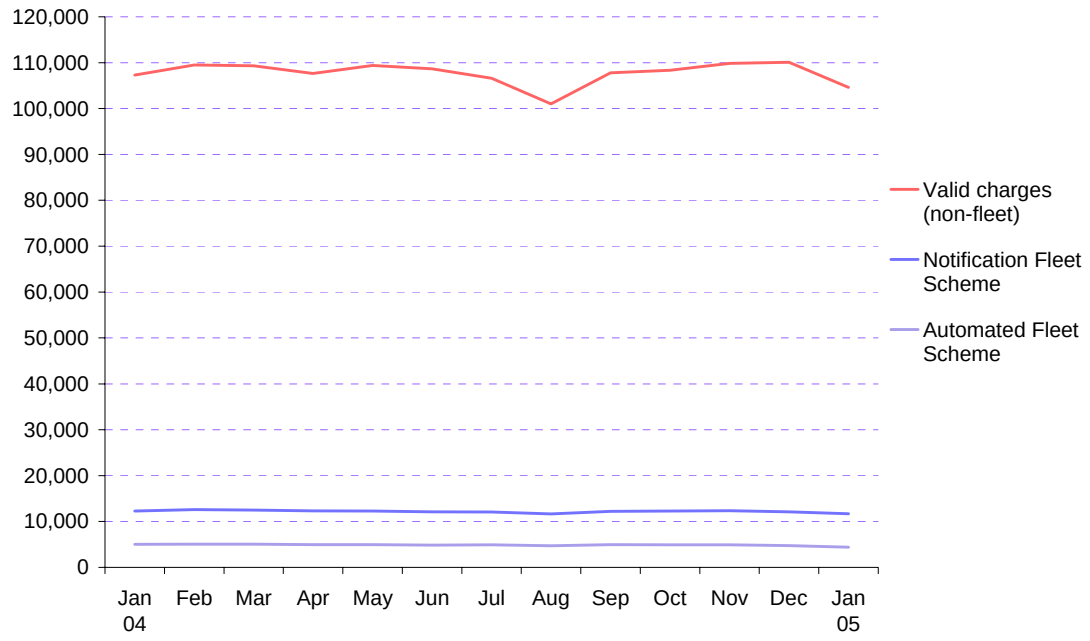
10.2 Congestion charge payments

Charge payments (excluding fleet payments) have remained very stable at around 96,000 per day. This is very similar to the level prevailing throughout 2003. There are small minor seasonal variations.

Charge payments for both the notification and automated fleet schemes have also remained stable at an average of 4,000 payments per day for the notification scheme and 7,000 payments per day for the automated scheme.

Of the payments, 16 percent are made in respect of vehicles registered for the 90 percent residents' discount, 11 percent are made for fleet vehicles and 73 percent are made in respect of other vehicles. The proportions are very consistent, and Figure 95 makes an interesting comparison with Figure 14 and Figure 16 in Section 3.

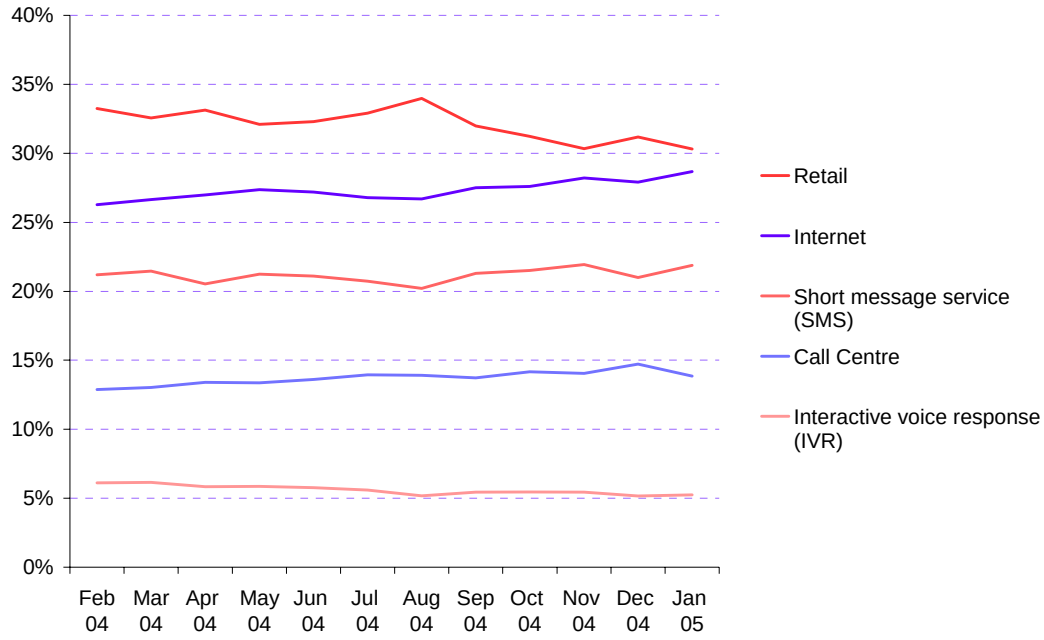
Figure 95 Average number of valid charges on each charging day, January 2004 to January 2005.



The volume of charges by payment type also remains very consistent with 82 percent of full charge payments being 1-day (daily), 9 percent being 5-day (weekly), 6 percent being 20-day (monthly) and 2 percent being 252-day (annual). These figures represent the split for non-discounted charge payments only, hence they are different from those previously quoted in TfL's January 2005 *Summary Review*. Of the resident discount payments, 18 percent are 5-day (weekly), 22 percent are 20-day (monthly) and 60 percent are 252-day (annual).

While the payment split is well established, since the start of the scheme there has been a consistent slow pattern of migration between payment channels. The retail channel, which at the start of 2004 was used by 35 percent of chargepayers, was by January 2005 used by only 30 percent. This decline corresponds to the growth of the web and mobile phone text message payment channels (Figure 96). At the current rate of change, web will overtake retail as the most popular channel in the second quarter of 2005.

Figure 96 Charge transactions by channel.



The growth in the mobile phone text message payments is driven by the speed and ease of use of the service. Over 90 percent of text message users are satisfied with the service compared to 80 percent overall.

Payment of the charge via the contact centre has remained stable over the year with a small increase for payments by an agent and a small decline for payments via the automated interactive voice response service.

The breakdown of payments through retail outlets has remained consistent with 91 percent made through PayPoint machines located in shops and petrol stations. On average over the past twelve months some 23 percent of PayPoint retail payments are made at petrol stations and 41 percent at other PayPoint outlets inside the charging zone.

The remaining 9 percent of retail payments are made using the Metric self service terminals mostly located in car parks in and around the congestion charging zone.

10.3 Quality of service

Call centre results have been good throughout 2004, and show a marked improvement over the performance in 2003. Average queuing times have consistently been below 20 seconds since February 2004. As a consequence, the levels of callers abandoning or unable to get through to the call centre have been well below 1 percent. The volume of calls handled by the call centre remains very consistent at between 250,000 and 300,000 calls a month. Some 70 percent of these are payment calls, with 30 percent of calls being enquiries and complaints.

The major focus during 2004 has been to improve the quality of service particularly within the call centre. TfL has worked with Capita to implement improved processes, backed up by enhanced training and management of increased numbers of staff. The impact has been measured through increased recording and monitoring of both calls and letters, and the implementation of a 'mystery shopping' regime for the call centre. The results from these activities feed back into the ongoing training plan.

The quality of service has improved significantly. This has been reflected in complaint levels reducing by over half, and chargepayer satisfaction increasing to 75 percent for those making an enquiry (up from 49 percent in March 2004) and 87 percent for those making a payment (up from 81 percent).

Key further improvements being progressed in 2005 include improving the functionality and usability of the www.cclondon.com website, speeding up the automated Interactive Voice Response service, simplifying the registration and renewal procedure for residents' discount applications and further improvements to the fleet schemes.

To aid a high level of understanding of when and where the scheme operates and how to pay, a series of ongoing public information campaigns through a variety of media aimed at both regular and irregular users have been carried out in 2004. In addition, starting in December 2004, all vehicle tax reminder letters sent out by the DVLA have included a leaflet giving some information about the scheme.

10.4 Registrations and discounts

Registrations for fleet accounts have remained stable in 2004, with 1,000 automated scheme accounts and almost 800 notification scheme accounts. The number of activated accounts for both schemes has also remained steady throughout the year. In February 2005, the vehicles using the Notification fleet scheme numbered some 4,500 per day and the number of vehicles using the automated fleet scheme numbered some 7,400 per day.

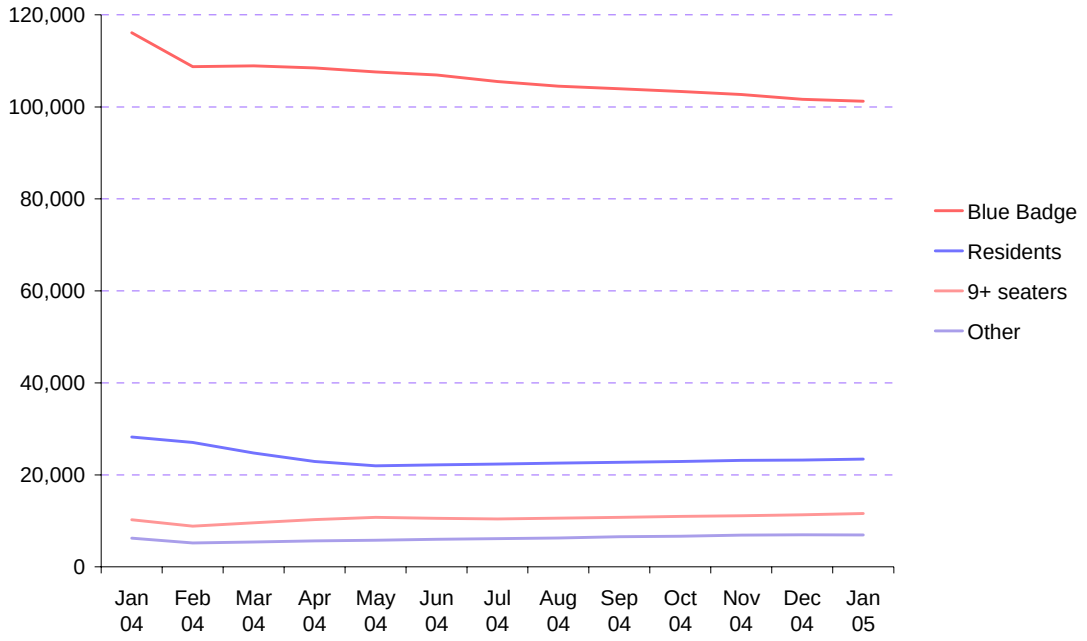
To be eligible for the notification scheme, a minimum of 25 vehicles in a fleet must be registered. This scheme is open to all vehicle types, but is primarily aimed at fleets of cars.

From December 2004, to be eligible for the automated scheme a minimum of 10 rather than 25 commercial vehicles in a fleet must be registered. This scheme is open to light vans, light goods vehicles and heavy goods vehicles, based on body type, but currently not cars. It is expected that the volume of fleet vehicles will increase substantially throughout the course of 2005 as a result of this reduction in the eligibility threshold.

Residents, 9+ seater and other (mainly alternative fuel) vehicle discounts decreased at the end of the first year of operation as some users did not renew their discounts. Since then, there has been a steady increase of new discount holders as a result of new applications for the discounts. The trend in

Blue Badge discounts reflects the non-renewal of a proportion of these discounts, coupled with improvements to the registration process.

Figure 97 Discounts by type, 2004 and January 2005.



11 Enforcement

As with charge payments, enquiries and registration services the quality of the enforcement service has improved significantly during 2004. This again is as a result of better chargepayer understanding of the scheme, improved processes, IT systems and management, additional and better trained staff, closer monitoring and a tough contract performance regime.

11.1 Background

There are no tollbooths or barriers around the congestion charging zone and no paper tickets or licences. Instead, drivers or vehicle operators pay to register their vehicle registration number on a database for journeys within the charging zone during charging hours for single or multiple charging days. Receipts (or receipt numbers) are available and on occasion are vital for proving payment of the charge for the correct vehicle on the date of travel.

Cameras at every entry and exit point, and on key routes within the zone, capture images of vehicles entering and travelling within the charging zone during the hours of operation (07.00 to 18.30) every charging day. The images are continually fed through to a central processing centre where Automated Number Plate Recognition systems (ANPR) interpret the number plate of every vehicle captured by the cameras.

Once a registration number has been interpreted a complex process of confidence measurement of the images takes place during the day. At the end of the day, only the best, highest quality interpretation is used for checking against the database of paid, exempt, 100 percent discounted or fleet vehicle registrations. Once a match against the database is made the vehicle details and the images are automatically removed from the database. Images of all vehicles where there is no matching record on the database are then sent through to the next stage of the process.

By 02.00 on the next working day after the charging day, all the vehicle registration numbers for those vehicles where no match was made are sent to the Driver and Vehicle Licensing Agency. By 07.00 on the same day the Agency supply TfL with the name and address of the registered keeper and vehicle details including the make and model of the vehicle.

The final stage of the process before issue of any Penalty Charge Notice (PCN) involves a 100 percent manual check of all the images of vehicles identified as possible evaders of the congestion charge. Trained staff check that the ANPR camera systems have correctly interpreted the number plate. If there is any doubt that they have not, the case is rejected for re-interpretation or deletion.

Failure to pay the congestion charge or pay or register correctly for a discount results in a PCN of £100 being issued to the registered keeper of the vehicle as supplied by the DVLA. This amount is reduced to £50 for prompt payment within 14 days. Failure to pay the PCN within 28 days results in the amount due being increased to £150.

11.2 System improvements

There have been a significant number of changes and improvements to the enforcement process and operation during 2004. These include:

- The inclusion of images of the vehicle on the PCN itself from July 2004. This has led to increased awareness and understanding by the keeper of the vehicle in relation to the offence committed. It is also useful in highlighting the very small percentage of processing mistakes, such as incorrect interpretation of the number plate, that are not identified in the manual checking process. Since its introduction there has also been a 50 percent reduction in the number of Data Protection Subject Access Requests from keepers wanting to see copies of the images of their vehicle and an increased proportion of PCN payments at the discounted rate.
- The inclusion of a short, clear and simple information leaflet with the PCN from July 2004, regarding the enforcement process. It explains why the penalty was issued, how to pay or make a representation and the implications of no action. This improvement was introduced as a result of comments received on the complexity of the PCN and the need to include a significant amount of legal 'jargon' to comply with the Regulations that govern the enforcement process. Since its introduction there has been an increased proportion of PCN payments at the discounted rate and an on-going reduction in representations and appeals. There has also been an increase in payments made through the Internet, which is highlighted on the information leaflet as being a convenient way of paying PCNs.
- Continuing review of enforcement processes, staffing levels and systems improvements to ensure that the processing of representations and appeals is fairly, efficiently and consistently applied.
- Introduction of a dedicated team of enforcement staff responsible for dealing with escalated calls from the call centre regarding more complex enforcement issues such as appeals, and bailiff and on-street enforcement action. This service has resulted in the provision of more accurate information and guidance to chargepayers of the enforcement process and the steps required to resolve outstanding issues.
- Introduction of dedicated Hire and Lease Company Teams responsible for processing representations, appeals, complaints and queries from hire and lease companies who are registered keepers of vehicles issued with PCNs. This has led to improvements in the level of understanding within the hire and lease companies, increased compliance with the evidence required from hire companies to transfer liability to the hirer of the vehicle at the time, and a reduction in the number of appeals made to adjudicators from such organisations.

11.3 Penalty Charge Notice issue and payments

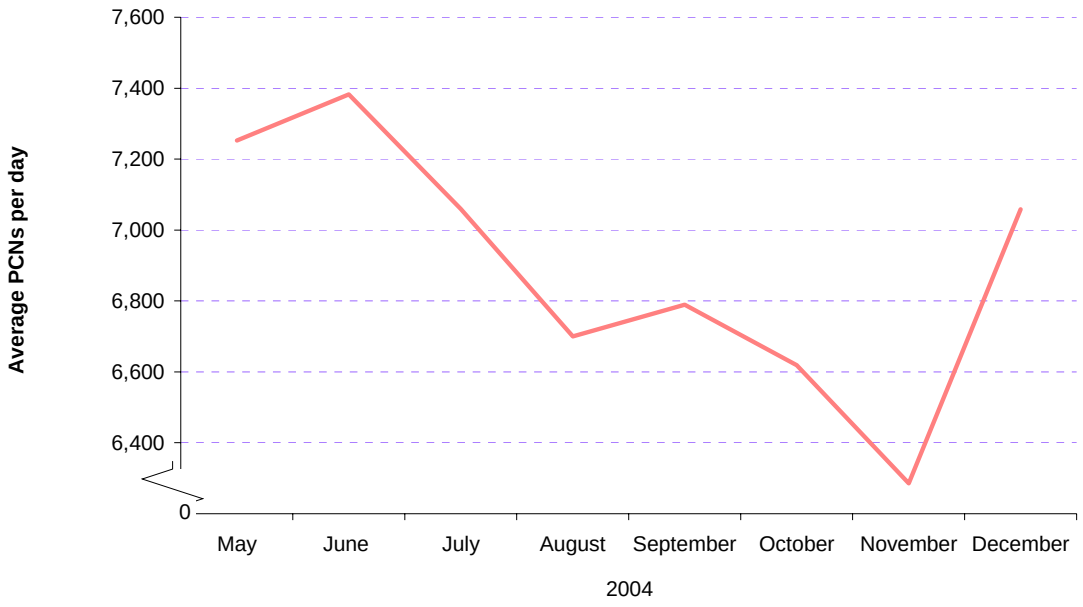
The number of Penalty Charge Notices (PCNs) issued has gradually reduced and compliance improved over the course of 2004 as Figure 98 illustrates.

The number of PCNs issued per charging day has fallen from some 8,000 in March 2004 to 5,865 in February 2005 as a result of various factors including:

- improvements to the services as detailed above;
- improved awareness by chargepayers of the payment and enforcement processes, common mistakes and awareness of the scheme;
- increase in the Penalty Charge from £80 to £100 in July 2004.

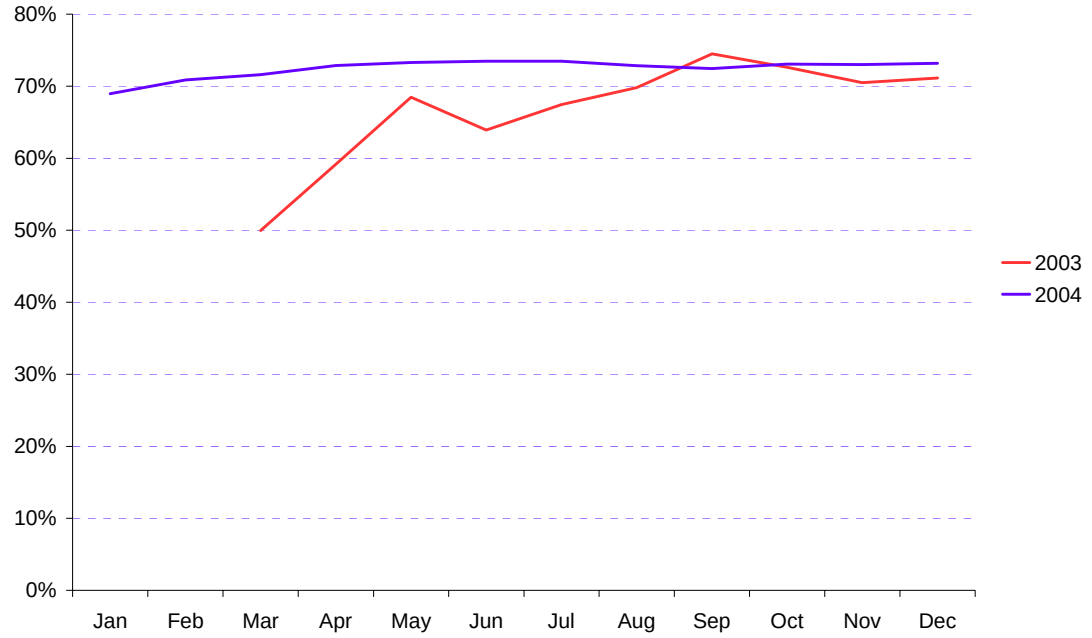
The volume of PCNs issued in December 2004 was slightly higher than expected, at 7,050, owing it is thought to some confusion over the charge-free days between Christmas and the New Year. TfL expects that this general trend of improved compliance will continue with a further reduction predicted as a result of the reduced fleet threshold and, subject to consultation and Mayoral approval, the introduction of the proposed further enhancements to the fleet scheme and discounts for monthly and annual payments.

Figure 98 Average daily PCNs issued, 2004.



The percentage of recovered PCNs and level of payment have continued to increase since the start of the scheme. Average PCN payment rate for PCNs issued in 2004 is 73 percent. Average payment values are some £49 for PCNs issued between January and July 2004 (£80 full rate) and currently some £57 for PCNs issued between August and December 2004 (£100 full rate).

Figure 99 PCNs paid as percentage of PCNs issued per month.



Note: The figures shown in this chart are based on the date of contravention and are therefore subject to change over time.

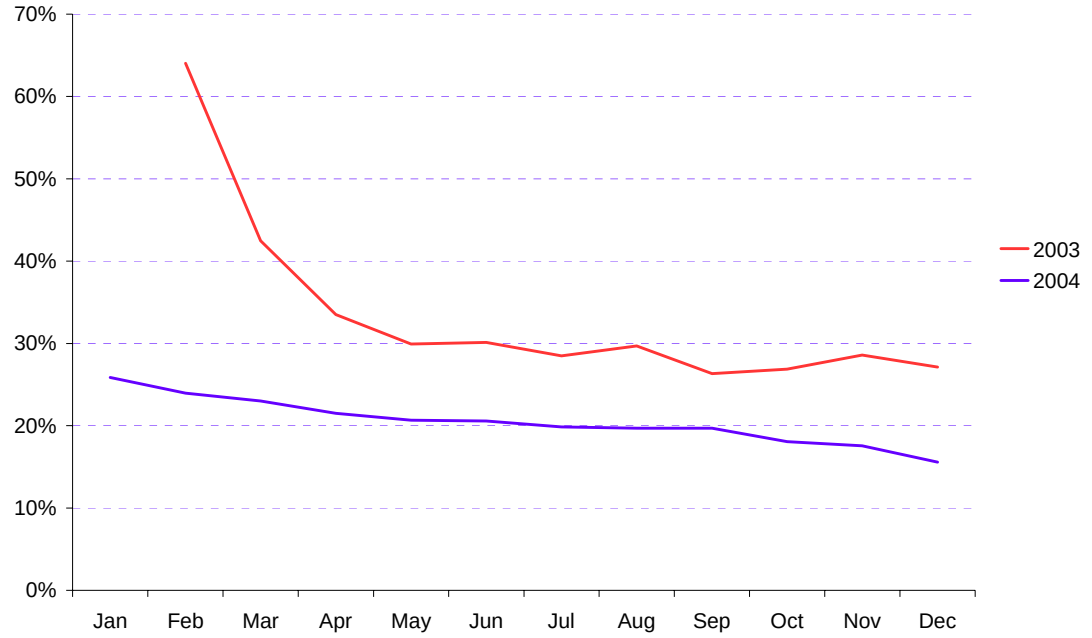
11.4 Representations made against PCNs

Every recipient of a PCN has the right to challenge its issue through a written representation to TfL. A representation must be made within 28 days of the date of receipt of the PCN and must be made by or via the written permission of the registered keeper of the vehicle.

In the first year of congestion charging the key reasons for representations against PCNs were as a result of errors by chargepayers or Capita in paying the charge for the correct vehicle registration number or date of travel or incorrectly registering or processing discounts or exemptions.

The percentage of representations made is now significantly lower than in 2003 from a high of 64 percent to current levels of 20 percent or lower, demonstrating improved processing by Capita and a better understanding of the scheme and the enforcement process by chargepayers. The current key reasons for representations relate to the transfer of vehicle ownership and hire car companies transferring liability to the hirer. In addition, despite the improvements and ongoing public information campaigns there is still a sizeable proportion of representations made as a result of simple errors, such as incorrect vehicle registration errors or date of travel errors. TfL continues to seek to reduce these instances.

Figure 100 Percent of representations made against PCNs issued.



Note: The figures shown in this chart are based on the date of contravention and are therefore subject to change over time.

11.5 Appeals

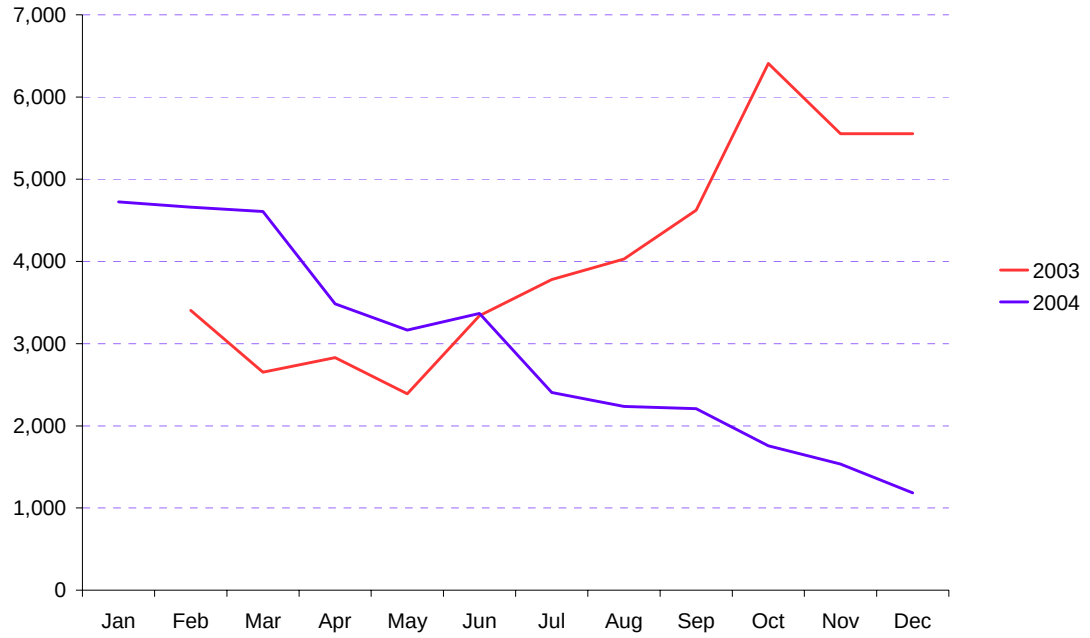
The keeper of any vehicle related to a representation that TfL has considered but rejected may appeal against this decision to the Parking and Traffic Appeals Service (PATAS). All appeals are considered by independent adjudicators.

As with representations, the improvements delivered as a result of the Supplemental Agreement with Capita, on-going improvements and increased quality monitoring by TfL have had a significant impact on the volume of appeals being made and appeals 'lost' at hearings by TfL.

The volumes of appeals received has consistently reduced from a high of around 3.8 percent of PCNs issued in October 2003 to a rate of 1.3 percent in October 2004. The percentage of appeals 'won' by TfL has also improved and is currently consistently 70 percent or higher.

TfL will continue to seek to improve the quality of the enforcement service and respond to issues that emerge from adjudicators' decisions on appeals. In addition, as part of plans to increase the efficiency of the scheme TfL is currently working with PATAS on the development of an electronic interface to transfer all appeals packs and thus improve the service and reduce the administrative burden. This is due to be implemented in 2005.

Figure 101 Appeal volumes received by PCN contravention date.



Note: The figures shown in this chart are based on the date of contravention and are therefore subject to change over time.

11.6 Debt collection and persistent evasion

Where a PCN remains unpaid and there is no outstanding representation or appeal then the debt is registered at County Court and a warrant passed to bailiffs for recovery of the debt. The registration process does not result in a County Court Judgement or contribute to credit history or ratings.

As at December 2004 some 316,000 warrants had been issued to bailiffs for recovery of the outstanding debt. TfL have four bailiff companies who, through the warrant, have the power to seize goods to the value of the debt outstanding plus a defined set of additional fees incurred in the recovery of the debt. Since the start of congestion charging in February 2003 an average of 13 percent of warrants issued have resulted in payment – an increase of 4 percent since February 2004. It is expected that the recovery rate will continue to improve and stabilise at around 20 percent over the course of 2005.

In addition to bailiff recovery, TfL also carries out on-street enforcement using powers provided though the Regulations to clamp and remove vehicles that are persistent evaders of the congestion charging scheme. A persistent evader is defined as a vehicle that has three or more outstanding PCNs with no representation or appeal outstanding. Currently around 200 vehicles are clamped and/or removed every month. The on-street enforcement service is also effective in the enforcement of vehicles that are not registered with the DVLA.

TfL's ability to identify persistent evaders and enforce against them has also improved over 2004. Up to the end of December 2004 TfL had clamped or

removed 1,537 vehicles resulting in the recovery of over £850,000 in otherwise 'lost' revenue.

In addition to the clamping and removal of persistent evaders TfL and its scheme providers are involved in monthly on-street 'filter' operations with the Metropolitan Police and other enforcement agencies such as the DVLA and the Vehicle Inspectorate. These exercises co-ordinate intelligence-led enforcement activities to target vehicles that are of interest to TfL, the Police and the other enforcement agencies.

During 2004, 29 such operations were carried out that resulted in the identification of 170 persistent evaders, 31 tampered number plates, 19 vehicles being driven without insurance, and 282 vehicles without road fund licence. The exercises have also proven helpful to the Police in the identification of more serious criminal activity such as burglary, assault, drug-related crimes and weapons. Through the experience gained in running such activities TfL expects the joint exercises to continue throughout 2005 with increasing effectiveness.

TfL has recently requested delegated powers from the DVLA to take enforcement action against vehicles that are found on-street without tax. Given that a large percentage of these vehicles are likely to be unregistered with the DVLA or have incorrect address details held, such enforcement is expected to have a long-term positive impact on the accuracy of the DVLA database. This will have a long term and positive impact on the ability of TfL and Local Authorities to issue PCNs to the correct keepers of vehicles, and improve the overall enforcement of traffic, parking and congestion charging Regulations. TfL commenced operating these powers in March 2005.