Transport for London

Central London
Congestion Charging

Impacts monitoring

Sixth Annual Report, July 2008

MAYOR OF LONDON

Transport for London

Disclaimer
This publication is intended to provide accurate information. However, TfL and the authors accept no liability or responsibility for any errors or omissions or for any damage or loss arising from use of the information provided.

CCS0000148722

Table of contents

Overview

Congestion Charging was introduced into central London in February 2003. In July 2005 the basic charge was raised from £5 to £8 per day. In February 2007 the original central London congestion charging zone was extended westwards, creating a single enlarged congestion charging zone.

Congestion charging contributes directly to the achievement of four transport priorities, as set out in the current Mayor's Transport Strategy:

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

Furthermore, by reducing traffic levels it has also facilitated wider transport, safety and environmental improvements to central London. More generally, it also produces net revenues to support the Mayor's Transport Strategy.

This is the latest in a series of annual reports describing the impacts of congestion charging in and around central London. In June 2003 Transport for London published the *First Annual Impacts 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 and understood. Conditions before charging across a range of key indicators were set out, and information was given describing how and when any changes to these indicators would be measured.

Transport for London then produced second, third, fourth and fifth annual impacts monitoring reports at yearly intervals between 2004 and 2007. These described the emerging impacts of the original central London scheme, progressively building into a comprehensive appreciation of the impacts of congestion charging in central London. The *Fifth Annual Impacts Monitoring Report* also included a cost-benefit analysis of the original scheme and described TfL's monitoring approach to the western extension scheme. The monitoring of the impacts of the extension built on the programme applied to the original central London zone, and the *Fifth Annual Impacts Monitoring Report* set out a range of key indicators characterising conditions during 2005 and 2006, the two years before the introduction of the western extension.

This *Sixth Annual Impacts Monitoring Report* focuses on the impacts of the western extension after approximately one year of operation. It updates key indicators with measurements taken during 2007 and into 2008, and provides an initial interpretation of the impacts and wider effects of the extension. It also updates key indicators for 2007 in respect of the original central London congestion charging zone, and considers aspects of the interaction between the two parts of the extended central London charging zone.

A separate report is also available for TfL's London Low Emission Zone scheme, which involves the use of road user charging powers to influence the use of certain categories of vehicles within Greater London in order to improve air quality.

This overview section summarises the key contents of this *Sixth Annual Impacts Monitoring Report*.

Key traffic impacts of the western extension scheme

- The effect of the western extension on traffic volumes and traffic composition is in line with TfL's expectations, albeit towards the lower end of the expected reduction in vehicles entering the zone. As with the original central London zone, the traffic impacts of the extension scheme were immediate and the early impacts have been maintained.
- Traffic entering the extension zone during charging hours in 2007 (vehicles with four or more wheels) was down by 14 percent. This scale of reduction has been maintained into 2008, and compares with TfL's expectation for reductions in the range 13 to 17 percent.
- Traffic circulating inside the extension zone is down by about 10 percent, commensurate with the reductions in entering traffic but again towards the lower end of TfL's expected range.
- Traffic on the boundary route around the western extension has shown a small increase of up to 4 percent. This accords closely with TfL's expectation and has not led to any problems with traffic on the boundary route. The traffic signals on the boundary route were adjusted to the new traffic patterns ahead of the implementation of the extension scheme.
- Traffic volumes on the 'free passage route', running between the original and extended charging zones (Edgware Road, Park Lane, Victoria, Vauxhall Bridge Road), are effectively unchanged. Again this closely reflects TfL's prior expectation, and there are no problems with traffic on this route.
- TfL anticipated some secondary impacts on conditions in the original central London charging zone from the western extension scheme, primarily reflecting changed conditions for residents of the extension zone who, from October 2006, were able to benefit from the 90 percent residents' discount in respect of the whole of the extended charging zone.
- In the first few months of 2007 following the introduction of the extension scheme, traffic entering the original central London zone increased by up to 5 percent relative to 2006. Volumes for the later months of 2007 and into 2008 however appear to have settled back, cancelling out the extension-related initial increase. Average traffic volumes in the original central London zone during 2007 were therefore comparable to those of 2006 before the extension was introduced.
- As with the original central London scheme there have been some differential effects on traffic composition, with substantial reductions to potentially chargeable vehicles (cars, vans and lorries) being partly offset by increases to non chargeable vehicles (taxis, buses and two-wheeled vehicles).

- There have also been reductions to traffic volumes in the wider area surrounding the extension zone, reflecting fewer journeys to or from the extension zone.

Impacts on congestion – background trends

- Previous annual impacts monitoring reports have noted a trend towards increasing congestion and more variable network conditions in central and inner London. Given effectively stable traffic levels, this is believed by TfL to reflect a reduction to the effective capacity of the road network for general traffic. These capacity reductions are a consequence of the re-allocation of a proportion of the effective road space, together with a sharp rise in the incidence and intensity of road works.
- The capacity reallocations included pedestrian, cyclist and bus priority measures and several major urban realm improvement schemes – all of which have required either specific allocation of road space (eg bus lanes) or junction capacity (eg pedestrian 'all green' traffic signal phases). These initiatives, while generating beneficial effects, have reduced road capacity for general traffic and have increased congestion.
- Increased road works have primarily reflected an accelerated programme of infrastructure replacement by the utility companies – generally agreed to be an urgent priority – together with increased development and construction work reflecting recent buoyant economic conditions. A range of other factors are also considered to contribute towards increased congestion, including new security measures, changes to the composition of traffic (eg more buses and taxis) and various borough-sponsored schemes, taking advantage of reduced traffic levels to introduce urban realm or local highway network improvements in their areas.
- Reporting in TfL's *Third Annual Impacts Monitoring Report* on conditions following two years of operation of the original central London scheme, TfL observed consistent reductions to congestion of around 30 percent, against pre charging conditions in 2002 – towards the top end of TfL's range of expectation. By 2005 this percentage reduction had fallen to 21 percent. In 2006, following a significant deterioration in network performance over that year, TfL reported in its *Fifth Annual Impacts Monitoring Report* that congestion in the original central London zone during 2006 was only 8 percent below conditions in 2002 before the introduction of the scheme.
- TfL considered that, despite apparent acceleration during 2006, the general trend towards increased congestion was a long-standing one dating back perhaps two decades or more. Furthermore, as network conditions in the central zone had materially changed, with a proportion of the road network capacity made available by the scheme given over to other policy priorities, and an accelerated utility services renewal programme significantly impacting on traffic operation, comparison of prevailing conditions against a static pre charging baseline was increasingly inappropriate.
- Projecting forward likely conditions in central London in the notional absence of a scheme, TfL therefore concluded that traffic in the central London zone was still benefiting from comparable levels of congestion relief, in relative terms, to those seen shortly after the introduction of the scheme in 2003.

Congestion in the extended charging zone – trends in 2007

- TfL's existing measurements of congestion for the central zone have continued into 2007 and 2008. A full year of post-extension data is also now available from the additional congestion surveys implemented in 2005 in anticipation of the western extension scheme.
- Congestion results from the western extension show no clear pattern or trend. The early months of the scheme, during spring and summer 2007, benefited from significant congestion reductions as expected by TfL, of between 17 and 24 percent. However, conditions deteriorated rapidly in autumn and winter 2007, and this has persisted into 2008. Recent results have returned congestion values that are similar to pre-extension levels, indicating that the western extension is currently experiencing no material congestion relief, despite lower traffic levels prevailing.
- In the original central London charging zone, congestion has further intensified in 2007. The average measurement of congestion in the original central zone during charging hours in 2007 was identical to the representative value for 2002 used by TfL to reflect pre charging conditions. The early months of 2008 have seen no further material change.
- Given that traffic volumes in the western extension have been reduced consistently, as with the original central London zone, TfL has concluded that it must again be the case that the increased congestion from summer 2007 reflects removal of effective road network capacity, on a temporary (eg road works) or more permanent basis.
- TfL is redoubling its efforts to better understand the causes of these trends. It is nevertheless clear that conditions in the extension in 2007 have been particularly affected by works associated with a major property development and the utility infrastructure replacement programme.
- About one-third of the loss of congestion benefits inside the western extension is estimated by TfL as being due to the major development near the junction of Sloane Street with Brompton Road (the 'Scotch House Corner' junction) in Knightsbridge. This is a key junction within the western extension zone.
- Road works associated with this development have temporarily reduced effective capacity at the junction by up to one half. This reduction in capacity and associated traffic management has caused a proportion of drivers to divert to other parts of the network, with widespread effects throughout the extension zone. The resulting congestion in the southern area of the extension zone is further exacerbated by the limited alternative options for radial traffic, given the river to the south and Hyde Park immediately to the north, and other significant junction alterations at nearby Grosvenor Place.
- Perhaps another third or more of the loss of congestion benefits in the extension zone is again down to increased road and street works. For six months prior to August 2007 TfL sought to try and reduce the levels of road works in the western extension area for stability over the scheme implementation period. After this period there was a rapid increase in utility and other related works, with particular concentrations of activity on the main radial routes and in the north west of the

extension zone. Congestion survey data suggests that increased delays are largely experienced in the vicinity of locations with known works.

- The development at Scotch House Corner and the increased numbers and severity of street works are clearly major factors interacting to increase congestion, particularly in the southern half of the extension zone. On top of these main contributory factors, TfL has identified a wide range of other factors that are contributing to the erosion of congestion benefits.
- Collectively, these are having the effect of reducing the 'resilience' of the western extension network to disruption, meaning that the congestion impacts of specific interventions are magnified in comparison to what they otherwise have been. This process, combined with a degree of statistical uncertainty – given the limited available data so far – probably accounts for the remaining approximately one third of the loss of congestion benefits from the western extension during 2007.
- As ever, and as with other schemes, the impact of congestion charging is best assessed by looking at the position with and without the scheme, rather than comparing current circumstances with what happened before the scheme was introduced. This is particularly the case when, as in London, other 'background' circumstances have changed significantly over time.
- New measurements of uncongested (night-time) speeds suggest recent reductions to the 'base' capacity of the road network in the extended central London congestion charging zone. Although these new findings must be treated with caution at this stage (because the night-time survey is less intense and less frequent), they suggest that comparison of current conditions against a static baseline representing historic conditions is inappropriate.
- As with the original central London zone, if traffic levels in the western extension returned to those experienced before the introduction of charging, the congestion levels would be more severe than currently observed.

Public transport, road traffic collisions and the environment

- Bus services in and around the western extension were increased in advance of the scheme. This was intended to provide additional public transport capacity for road users who opted to travel by bus in preference to continuing to use the car. It also reflected a general policy of progressive improvement to the bus network across London.
- Surveys of bus patronage indicate that the additional capacity has catered for the additional demand, as average bus occupancies have fallen slightly, and there are no reports of capacity problems on the bus network that might be attributed to the scheme.
- In line with the deterioration in congestion noted above, key indicators of bus speeds and reliability do not show any material improvement in the western extension area, despite lower traffic levels. Average bus speeds in the western extension, excess waiting time (the 'additional' time that passengers have to wait for a bus because of disruption to the schedule) and the proportion of the schedule lost due to traffic conditions, are all either stable or have deteriorated slightly. Similar trends have continued to affect the bus network in the original central London charging zone.

- Patronage on the Underground and National Rail has increased, reflecting wider network trends. Although a proportion of this increase will reflect former car users who have transferred to public transport, this proportion is small in relation to the wider increase. There are no indications of specific rail capacity problems arising from the extension scheme.
- Numbers of reported personal injury road traffic collisions have reduced substantially in recent years across Greater London, reflecting a range of borough and mayoral road safety initiatives. Technical issues however affected the continuity of the data series during 2005 and 2006, making definitive comparisons of western extension impacts difficult at this stage. At present, TfL is not therefore able to discern any clear specific impacts from the extension scheme.
- There have been modest beneficial impacts to emissions of key road traffic pollutants, with estimated scheme-attributable reductions inside the western extension zone of 2.5 percent to oxides of nitrogen (NO_X), 4.2 percent to fine particles (PM_{10}), and 6.5 percent for carbon dioxide (CO_2).
- As noted in previous annual impacts monitoring reports, trends in measured ambient outdoor air quality across central and inner London continue to primarily reflect factors external to the scheme, such as the weather and vehicle technology changes, not all of which have been beneficial. No clear scheme impacts from either the original central or western extension zones can therefore be discerned.

Travel behaviour and the social impacts of charging

- New surveys with a range of groups of interest have investigated the changes to individual travel behaviour underlying the aggregate traffic changes from the western extension scheme, as well as the wider 'social' impacts of the scheme on aspects of people's daily lives.
- Findings from the travel behaviour surveys tended to mirror – and help explain – the aggregate traffic impacts observed in relation to the extension scheme.
- TfL estimates that around 30 percent of those previously driving a car in the western extension zone during charging hours prior to the introduction of charging do not do so any more. The majority of these are likely to have changed mode of transport. The remaining 70 percent continue to make their trip by car and pay the charge.
- The travel behaviour of residents in the extension zone was largely unaffected by the introduction of charging, although travel into the original charging zone, particularly for shopping and leisure purposes, increased with the introduction of the residents' discount for this group. Of those driving in the western extension zone after the introduction of charging, the majority had not considered any alternatives and one in three said they would simply not travel if a car was not available to them, rather than chose an alternative mode.
- Overall, there was evidence that those travelling in the western extension zone had reduced the frequency of trips made by car after the introduction of charging, but that this had not had a significant impact on the overall frequency of trips made by any mode, or on access to shops and services.

- Affording the cost of the congestion charge was difficult for a significant minority, but the introduction of charging had not had an impact on the general affordability of travel in London. As anticipated, the majority of London residents were unaffected by the introduction of charging, with around the same number stating that they had benefited as lost out, although those most directly affected were more likely to say that they had lost out than benefited.
- Overall, the evidence suggests that most London residents have been able to adapt to the introduction of charging in the western extension without any detriment to their quality of life, although some concerns remain about the impact of charging on the social interaction of vulnerable groups.

Business and economic impacts of charging

- The business and economic impacts of the original central London scheme have been assessed in previous annual monitoring reports, leading TfL to conclude that there had been no discernible effect on the central London economy.
- General economic trends were seen to have been the predominant influence on the performance of central London businesses over recent years, and the central London economy had actually performed particularly strongly since the introduction of congestion charging in 2003, which itself coincided with an economic upturn.
- This comparatively strong relative performance in central London continued into 2007, despite increasingly difficult conditions towards the end of the year.
- A cost-benefit analysis of the original central London scheme, reported in the *Fifth Annual Impacts Monitoring Report*, suggests that the identified benefits exceeded the cost of operating the scheme by a ratio of about 1.5 with the original £5 charge and, with less certainty, a ratio of about 1.7 with an £8 charge.
- The four quarters of weekday retail footfall traffic, since the start of charging in the western extension zone in February 2007, show a continuation of the downward trend which pre-dates the extension scheme. Weekend retail footfall data show comparable declining trends.
- In the six months after the introduction of charging, rental value growth of office properties in the western extension zone was stronger than in the rest of inner London and ahead of comparable locations such as Bromley, Kingston and Richmond.
- It is important to note the financial and business difficulties associated with the 'credit crunch' did not materially impact the property markets until around the fourth quarter 2007.
- Business owners and employers in the western extension zone reported weaker sales and profitability in 2007 compared to 2006 in a TfL telephone survey of local businesses.
- TfL on-street surveys found that over 90 percent of shoppers and diners in the western extension said that they had not changed their trip patterns since the introduction of charging. Of the approximately 10 percent of visitors who said they had changed, the most common responses were to use public transport instead of the car or to make fewer journeys to the area.

- TfL awaits the availability of aggregate independent datasets relating to business population, employees and VAT registrations that will enable a fuller assessment of the influence of the extension scheme on business performance, in the context of an increasingly turbulent macro-economic backdrop.

Scheme operation, enforcement and revenues

- The operation and enforcement of the scheme continues to work well, and the increased workload arising from the introduction of the western extension has been accommodated successfully.
- TfL continues to pursue improvements to the chargepayer-facing and operational elements of the scheme via its key service providers for the scheme. Overall satisfaction with the service provided by TfL increased to a new high of 82 percent in 2007, and compliance with the requirements of the scheme stood at 96 percent - this figure including the western extension.
- Total daily charge payments rose from typically 95,000 in 2006 to typically 150,000 in 2007, reflecting the direct impact of the introduction of the western extension. However, much of this increase reflected discounted western extension residents payments, at typically between 30,000 and 40,000 per day.
- Net revenues from the combined scheme in the 2007/08 financial year were provisionally £137 million, the majority of which was allocated to improvements to bus operations in Greater London.

1. Introduction

1.1 Orientation

This is a sixth annual report describing the impacts of congestion charging in central London. As with previous reports in this series, it provides a summary and interpretation of the growing body of evidence and insight from across the monitoring programme relating to congestion charging in general, and focuses in particular on the first year of operation of the western extension scheme.

Congestion charging was introduced into central London in February 2003, with an £5 daily charge. In July 2005 the standard daily charge was raised from £5 to £8. February 2007 saw the implementation of the western extension to the original central London congestion zone, with associated changes to the scheme operational hours. From 2007, both the original and western extension zones operated as one combined zone, known as the 'extended central London congestion charging zone'.

The contents of this report reflect the comprehensive programme of monitoring that accompanies TfL's road user charging schemes. This monitoring covers not only the more immediate traffic and transport impacts of charging, but also the wider social, economic and environmental impacts. It consolidates information from a large number of specially-designed surveys, while making full use of already established surveys and data resources. The scope of this work, and emerging findings from it, have been comprehensively described in previous annual reports in this series.

The scale 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 and emerging appreciations that are likely to be of most general interest.

1.2 Report contents

The remainder of this section summarises the key structural and operational features of the extended central London congestion charging scheme and outlines key developments to the scheme during 2007. This report is organised in terms of the following topics.

- **Section 2: Western extension: traffic patterns** looks at developments in traffic volumes and characteristics in and around the western extension zone following the introduction of charging in the extended zone in February 2007.
- **Section 3: Central zone: traffic patterns** reviews developments to traffic volumes and characteristics in the original central London zone during 2007, focusing on the impacts of the western extension on traffic conditions in the central zone.
- **Section 4: Congestion** summarises the latest data from TfL's congestion monitoring work, both within the original and extension zones, and more widely across inner London.
- **Section 5: Public transport, road traffic collisions and the environment** looks at developments in public transport patronage, road traffic collisions and air quality during 2007 in the original and extension zones.

- **Section 6: Travel behaviour** provides a summary of recent developments to TfL's understanding of the impacts of congestion charging on travel behaviour.
- **Section 7: Social impacts** takes a comprehensive look at feedback in relation to experiences of the western extension from TfL's social impacts surveys of Londoners, western extension users and other key interest groups.
- **Section 8: Western extension zone: business and economic impacts** reviews and updates the available evidence describing conditions applying up to 2006 before the introduction of the extension scheme, and looks at available data relating to 2007 on emerging business and economic trends post-dating the extension.
- **Section 9: Central zone: business and economic impacts** updates for 2007 previous evidence relating to the business and economic impacts of congestion charging on the central London economy.
- **Section 10: Scheme operations, compliance, enforcement and revenues** reviews key operational performance indicators for the scheme, looks at trends in chargepayer compliance and enforcement arising from the introduction of the western extension, and provides updated details for scheme net revenues and expenditure.

1.3 Overview of the monitoring programme

The introduction of congestion charging in central London in February 2003 was supported by an extensive programme of impacts monitoring. This reflected a commitment to the robust understanding and appreciation of the direct and indirect effects of this then novel and controversial scheme. The scope of the monitoring work for the original scheme was set out in TfL's *First Annual Impacts Monitoring Report* published in June 2003, and has been updated as necessary in subsequent annual reports.

In 2006, anticipating the introduction of the western extension to the original central London charging zone in February 2007, TfL's monitoring work was extended to give comprehensive coverage to the impacts of the extension zone, in the wider context of continuing work in the original central zone. This would allow examination of interactions between the original and extension zones, and ultimately allow 'steady state' monitoring of the operation of the combined extended central London congestion charging zone in the longer term.

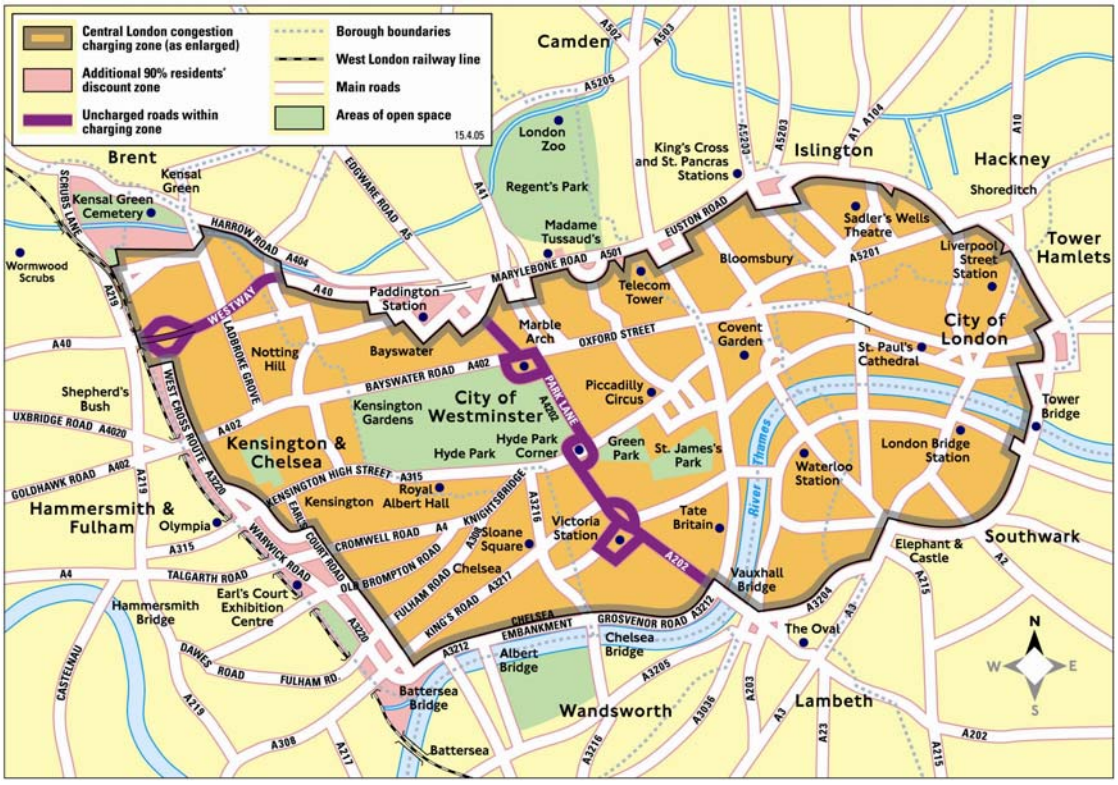
The monitoring work consists of five main work streams, designed to assess the range of traffic, other transport, social, economic and environmental impacts of congestion charging. It is managed by a team of permanent TfL staff, with independent contractors undertaking most of the data collection tasks. Key indicators relating to the operation and enforcement of the scheme are also available, primarily arising from the service providers for the scheme. This monitoring work takes place in the context of wider monitoring work in London, and full use is made of appropriate third-party datasets and sources.

1.4 Overview of the western extension

In September 2005, after extensive consultation, the Mayor of London confirmed the Scheme Order for the extension westwards of the original central London congestion charging zone. Following a period of preparation and testing, the extension scheme came into force on 19 February 2007. This section outlines the key features of the western extension that are relevant to an understanding of the monitoring programme that is associated with the scheme.

The extension created an 'extended charging zone' in central London, as shown by Figure 1.1.

Figure 1.1 The extended central London congestion charging zone.



The extension zone covers an area of inner west London of roughly equivalent size to the original central London zone. While the extension zone was determined, from TfL analysis, to suffer from high levels of all-day congestion, the characteristics of the extension zone are in some ways different to those of the original central London zone. For example, the extension zone carries about two-thirds of the traffic (in terms of vehicle-kilometres) of the original charging zone, and is typically more residential in character.

As with the original central London charging zone, a high-capacity boundary route is provided for drivers making trips with an ultimate origin and destination outside the zone, who wish to avoid paying the charge. This route joins with the Inner Ring Road around the original charging zone forming a continuous boundary route network. The portion of the Inner Ring Road that runs between the original and extended charging zones remains uncharged, and forms a 'free passage route' running from north to

south between the two zones. The elevated section of the A40 Westway running east to west through the extension zone is also uncharged, although it is not possible to either join or leave this road within the extension zone.

1.5 Overview of scheme operation

From the date of implementation of the extension scheme:

- Vehicles within either the original central London charging zone, the western extension zone or both are liable to a daily charge of £8. Weekly, monthly or annual payments are possible. Payment on the following day is permitted though the charge is £10.
- Payment of a daily charge allows drivers to make an unlimited number of trips from, to, within, or between both parts of the extended charging zone.
- The charging hours applicable to the original central London scheme – 07:00 to 18:30 on working weekdays – were revised to end at 18:00 when the western extension was introduced. This change applied to both parts of the extended charging zone.
- The extended charging zone operates as one zone, with the same charges, discounts and exemptions applying, no matter where or how far a vehicle is driven in the enlarged zone.
- A range of discounts and exemptions are available for certain groups and in respect of certain vehicles. This includes a 90 percent discount for residents of the extended charging zone, including residents in designated areas around the boundary of the extended zone. This and other discounts and exemptions are applicable to both parts of the extended charging zone so that, for example, residents of the western extension zone can now pay discounted charges to travel to, from, or within, the original central charging zone.

As with the original central London scheme, vehicles are identified using automatic number plate recognition cameras and are checked against a database of those who have paid the charge and those who do not have to pay the charge because they are exempt or registered for a 100 percent discount. Once a vehicle for which a charge has been paid has been successfully matched, the photographic images are automatically deleted from the database. For those vehicles observed within the zone for which a charge has not been paid, the photographic images are kept for enforcement purposes. Failure to pay the charge results in liability by the 'vehicle keeper' to a penalty charge.

1.6 Monitoring baseline: extended central London congestion charging zone

Following some preliminary monitoring work in the western extension zone during 2003 and 2004, TfL's monitoring work was significantly extended during 2005 and 2006 to gather comprehensive baseline 'before' data in anticipation of the implementation of the extension. Data gathered following implementation could then be set against this baseline, and an approach made to assessing the actual impacts of the scheme.

The general approach closely followed that previously adopted for the original central London zone, taking account of lessons learned and the specific characteristics of the extension zone. The scope and intensity of this work also took account of specific features of the western extension scheme that required adaptations to the ongoing monitoring work for the original central London charging zone. An example of this was the change to the charging hours which accompanied the introduction of the extension zone. In addition, the western extension was expected to have 'consequential' impacts on conditions in the original central zone. Although TfL expected these to be relatively small in scale, they also had the potential to be significant. An example here was the possibility of increased traffic levels in the original charging zone reflecting the expansion of the residents' discount to those living within the extension zone, who previously would have had to pay the full charge to drive in the original central zone.

On implementation of the extension scheme in February 2007, the area of the western extension underwent a 'step' change, reflecting the transition from uncharged area to charged area. The monitoring work during 2007 immediately following introduction of the extension therefore focused primarily on detecting changes in this area, as well as any consequential impacts in the original central charging zone. For the longer term, it is anticipated that monitoring will continue on a more general basis tracking the 'steady state' operation of the combined zones – the 'extended central London congestion charging zone'.

1.7 Findings from the monitoring work so far

Since the introduction of congestion charging in 2003, TfL has produced comprehensive annual reports detailing the findings from the monitoring work.

TfL's *First Annual Impacts Monitoring Report* described the core monitoring methodologies and set out 'baseline' data, for years before 2003, against which the impacts of the original central London scheme could be set. Subsequent annual reports described emerging results and these combined over several years into a comprehensive repository of data. This has helped TfL to understand the impacts of the scheme in the context of wider developments affecting central London.

TfL's *Fifth Annual Impacts Monitoring Report*, published in July 2007, brought a four-year 'after' perspective on the original scheme, described key methodologies for monitoring the impacts of the western extension scheme and set out baseline data describing conditions in the extension zone prior to the introduction of the scheme.

In relation to the original central London scheme, TfL was able to conclude that:

- The initial traffic volume changes resulting from the scheme established themselves very quickly. There had been no significant traffic-related problems arising from the scheme, and traffic trends since the introduction of the scheme have tended to reflect an ongoing and long standing trend towards year-on-year 'background decline' to traffic volumes in central and inner London.
- The initial congestion benefits of the scheme were towards the high end of TfL's prior expectations, but have since been eroded by a range of interventions and

incidents that have removed effective capacity from the central London road network.

- The scheme had a broadly neutral impact on the central London economy – other factors unrelated to charging having a much more pervasive influence on business performance in central London.
- The scheme delivered real benefits in terms of public transport capacity and performance, reduced road traffic collisions and improved air quality – in many cases accelerating already positive trends reflecting implementation of the wider set of policies contained in the Mayor's Transport Strategy.
- The key operational and enforcement elements of the scheme continued to work well.

Given a five-year view of the scheme in the wider context of transport developments in central London, it was clear that the scheme had tended to accentuate pre-existing positive trends (eg reduced road traffic collisions) and reversed negative trends (eg increasing congestion), while having a broadly neutral impact on the London economy and on social activities.

In terms of the monitoring baseline for the western extension, the *Fifth Annual Impacts Monitoring Report* noted that:

- The impacts of the extension scheme on traffic volumes and congestion were expected to be of a lower magnitude than those applying to the original central London scheme, reflecting the different characteristics of the extension zone and its interaction with the existing central zone.
- A series of 22 key traffic volume indicators were being monitored with two new moving car surveys measuring congestion. Data for these indicators, collected during 2005 and 2006 before the introduction of the extension scheme, had tended to show more variable conditions than were typical of the central London zone during 2001/02, perhaps reflecting the increasing pace of changes to the road network in central London.
- While fit-for-purpose, available pre-extension data relating to public transport and road traffic collisions featured apparent inconsistencies that were difficult to resolve fully prior to publication of the report.
- Work in relation to the original central London scheme to investigate changes in travel behaviour and wider social impacts had provided valuable but not wholly conclusive insights, and a comprehensive programme of new work to address these aspects was described.
- In terms of the business and economic impacts of charging the report noted, with reference to TfL's experience with the original central London scheme, that production lags with official economic statistics would mean that it would be eighteen months or more before definitive independent data on business performance post-extension started to be available.
- A cost-benefit analysis of the original central London scheme suggested that the identified benefits exceeded the cost of operating the scheme by a ratio of about

1.5 with the original £5 charge and, with less certainty, a ratio of about 1.7 with an £8 charge.

The *Fifth Annual Impacts Monitoring Report* also set out early data reflecting the first few months of operation of the western extension scheme. In summary the position at June 2007 was that:

- The initial traffic volume impacts of the scheme were towards the middle of TfL's range of prior expectations. As with the original central London scheme the key impacts had established themselves very quickly. There were no indications of significant traffic-related problems arising from the scheme. In particular the boundary and free passage route arrangements appeared to be functioning well.
- Initial surveys of congestion indicated reductions in line with TfL's prior expectation of around 20 percent.
- Key operational and enforcement elements of the scheme appeared to be working well.

This report focuses primarily on presenting a more comprehensive view of changes reflecting the first full year of operation of the western extension scheme. Most key indicators previously tracked for the original central London scheme are updated for 2007 and interactions between the extension zone and the original zone are described.

2. Western extension: traffic patterns

2.1 Introduction

This section describes the main findings from the traffic monitoring work associated with the western extension zone during 2007. For the purposes of this section the western extension zone is considered separately from the original central zone. The interactions between the western extension zone and the original central London zone in terms of traffic patterns are explored in the next section, along with an update on key traffic indicators for 2007 for the original central London zone.

TfL put in place an extensive programme of traffic surveys to monitor changes in traffic patterns to, from, within and around the western extension. These built on existing traffic monitoring arrangements for the original central London congestion charging zone, and are fully described, along with appropriate pre-extension baseline datasets, in TfL's *Fifth Annual Impacts Monitoring Report*.

2.2 The first year of the western extension

From the outset all aspects of the operation of the extension scheme functioned well and during the first year no major traffic operational issues were reported. TfL's expectations for the traffic volume impacts of the extension were outlined in the *Fifth Annual Impacts Monitoring Report*:

- For traffic entering the western extension (vehicles with four or more wheels) the projection was for a reduction between 13 and 17 percent during weekday charging hours.
- For cars the equivalent projection was a reduction between 22 and 28 percent; for vans between 6 and 12 percent, and for lorries between zero and 3 percent. Taxis were projected to increase by around 10 percent with buses and coaches increasing by between 10 and 15 percent – reflecting planned enhancements to the bus network.
- For traffic circulating within the western extension the projection was for a reduction of between 10 and 14 percent (vehicles with four or more wheels).
- Small increases to traffic on the western extension boundary route, of up to 4 percent, were projected, although traffic volumes on the free passage route running between the two zones were expected to remain substantially unchanged.

The traffic monitoring arrangements for the western extension are functioning well and a full set of indicators are available for 2007, the year following the introduction of the extension scheme. These show an internally-consistent and generally stable picture, which closely accords with TfL's expectations. As with the original central London scheme the traffic response to the introduction of the scheme was both clear and immediate, and there is no evidence of any significant traffic related issues arising from the introduction of the scheme.

Key findings for 2007 are as follows:

- Traffic entering the western extension during charging hours reduced by a representative value of 14 percent (vehicles with four or more wheels) compared with pre-extension conditions of 2005/06. This scale of reduction has been maintained into 2008. This compares with TfL's range of prior expectation for reductions between 13 and 17 percent and is therefore towards the lower end of the expected range.
- Traffic leaving the western extension during charging hours reduced by 14 percent (vehicles with four or more wheels).
- Available indicators of traffic circulating within the extension zone are somewhat variable, but consistently suggest reductions in circulating traffic during charging hours of the order of 10 percent. This compares with TfL's range of prior expectation for reductions in circulating traffic of between 10 and 14 percent, again therefore being towards the lower end of the expected range.
- The boundary and the free passage routes around the extension zone have functioned well and available indicators suggest traffic changes were very close to those anticipated by TfL with no significant traffic-related issues arising.
- Manual one-day traffic counts on the free passage route suggest small increases of 4 percent in vehicle-kilometres (vehicles with four or more wheels). However, comprehensive automatic traffic counts on the route suggest small but consistent declines in traffic of the equivalent magnitude. Therefore, TfL concludes that there has been no significant change to overall traffic volumes on this key route, in line with TfL's prior expectations.
- Indicators of traffic volumes on the wider 'western extension boundary route' around the extension zone again showed a mixture of small declines and small increases – leading TfL to conclude that traffic volumes on this route have not changed significantly overall in response to the extension scheme.
- Radial traffic in an annulus surrounding the western extension zone has reduced, in line with fewer journeys being made to or from the extension zone. Indicators for orbital traffic in the annulus are more mixed, with some indications of locally increased traffic on certain routes south of the river, although no significant traffic problems relating specifically to the extension scheme have been reported.

2.3 Traffic entering the western extension

Traffic entering the western extension zone is counted through comprehensive manual classified counts in spring and autumn each year. Figure 2.1 shows the available time-series by main vehicle type for traffic entering the western extension zone. TfL expected that the settled volumes of traffic entering the extension zone, in terms of vehicles with four or more wheels during charging hours, would reduce by between 13 and 17 percent against pre charging traffic conditions.

Approximately 195,000 vehicles with four or more wheels entered the western extension zone during charging hours on a typical weekday during 2007 – a reduction of 14 percent compared with pre charging conditions in 2005/06. The reduction in cars, including minicabs, was 21 percent. A 6 percent reduction in vans was observed,

while the number of lorries remained unchanged – leading to an overall reduction of potentially chargeable vehicles of 17 percent (annualised average values).

Non chargeable vehicles presented a variable picture with the number of pedal cycles entering the extension zone increasing by 12 percent. Numbers of buses increased by 4 percent and powered two-wheelers by 5 percent. Finally, the annualised figure for taxis entering the extension zone in 2007 was identical to 2005/06.

Figure 2.1 Traffic entering the western extension zone across all inbound roads. Charging hours, 07:00-18:00, 2003 to 2007.

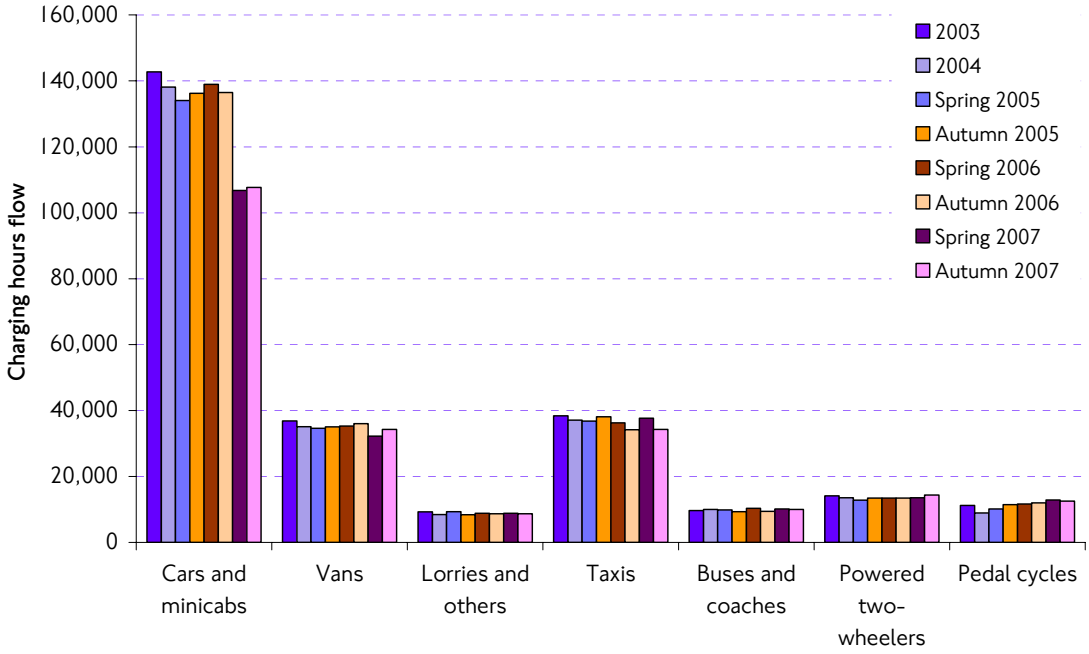


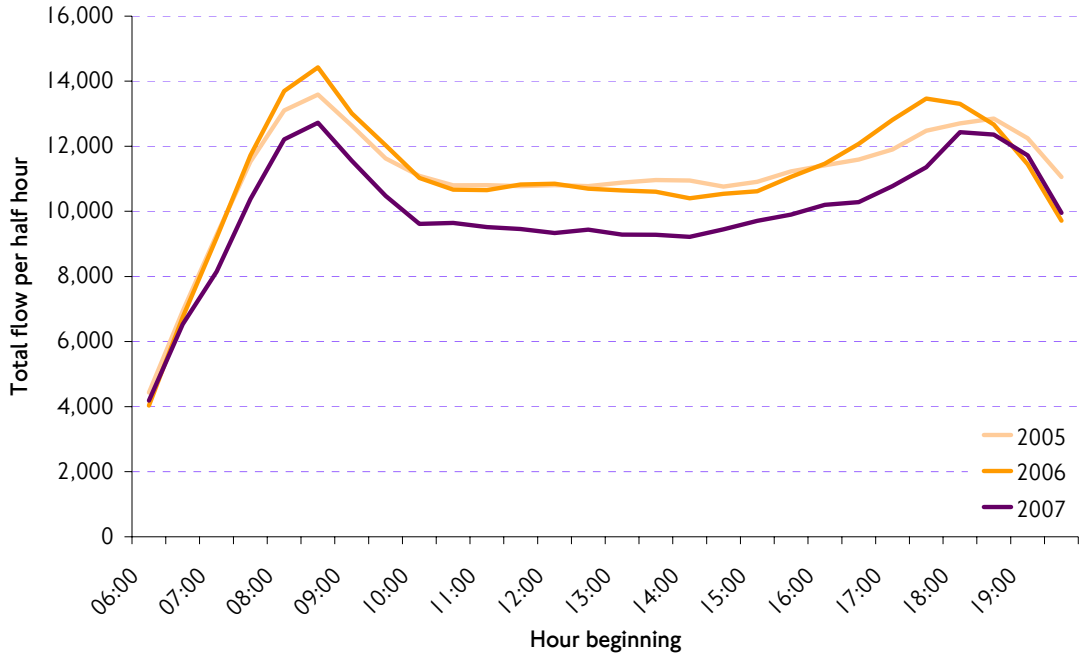
Table 2.1 compares traffic volumes and vehicle proportions entering the western extension before the introduction of the extension in 2005 and 2006 and during the first year of the extension in 2007. The effect of charging on the composition of traffic is evident both in absolute terms and in reducing the number of potentially chargeable vehicles. Volumes of non chargeable vehicles have increased, albeit to a significantly lower degree.

Table 2.1 Traffic entering the western extension zone across all inbound roads. Charging hours, 07:00-18:00, 2005 to 2007.

Vehicle type	2005 average (000s)	2006 average (000s)	2007 average (000s)	Percentage of total 2005	Percentage of total 2006	Percentage of total 2007
All vehicles	250	253	221	100%	100%	100%
Four or more wheels	226	228	195	90%	90%	88%
Potentially chargeable	179	182	149	72%	72%	67%
- Cars and minicabs	135	138	107	54%	55%	48%
- Vans	35	36	33	14%	14%	15%
- Lorries and others	9	9	9	4%	3%	4%
Non chargeable	71	70	72	28%	28%	33%
- Licensed taxis	38	35	35	15%	14%	16%
- Buses and coaches	10	10	10	4%	4%	5%
- Powered two-wheelers	13	13	14	4%	5%	6%
- Pedal cycles	11	12	13	4%	5%	6%

Figure 2.2 shows how the volume of traffic entering the western extension zone varies according to the time of day. The profile itself for 2007 is broadly similar to previous years; however the level of traffic entering the zone has reduced consistently during charging hours. There is no evidence of significantly increased 'excess' volumes of traffic entering the extension immediately following the end of charging hours, over and above levels comparable to those of previous years.

Figure 2.2 Traffic entering the western extension zone by time of day. Annualised weekdays, 2005 to 2007, all vehicles.



In addition to the manual classified counts, permanent automatic traffic counters have been placed at 21 higher-flow entry points to the extension zone to monitor traffic on a continuous basis. These counters were progressively installed during 2006 and therefore provide a partial baseline reflecting conditions before charging as well as providing a basis for longer-term tracking of traffic trends.

Figure 2.3 Weekly average daily flow across 21 representative major roads entering the western extension. Charging hours, 07:00-18:00, 2006 to 2008, vehicles with four or more wheels.

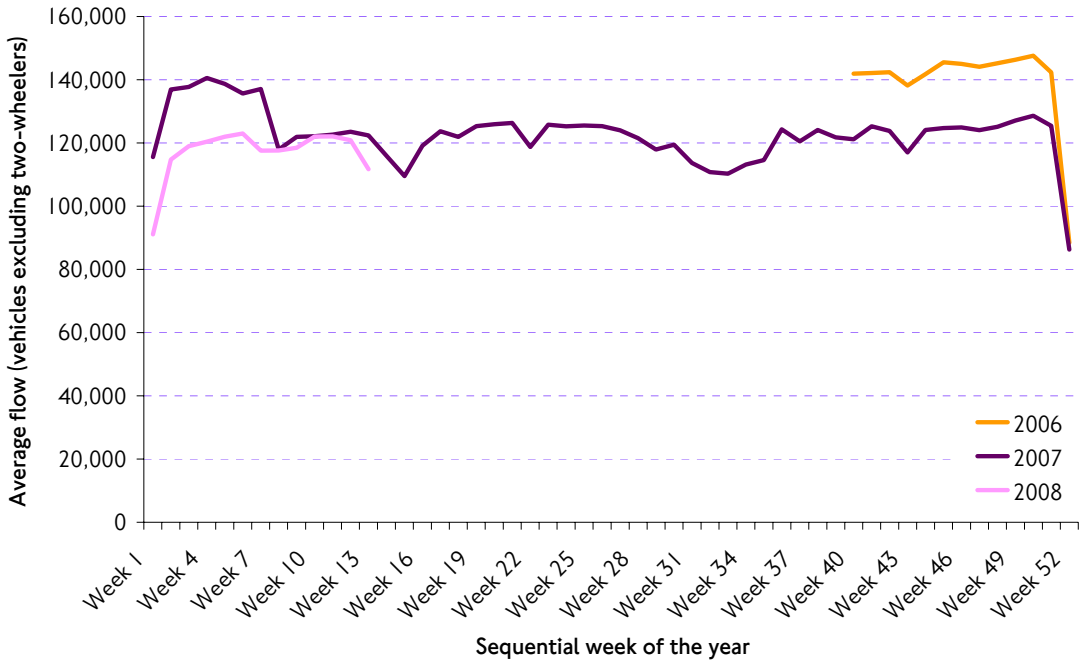


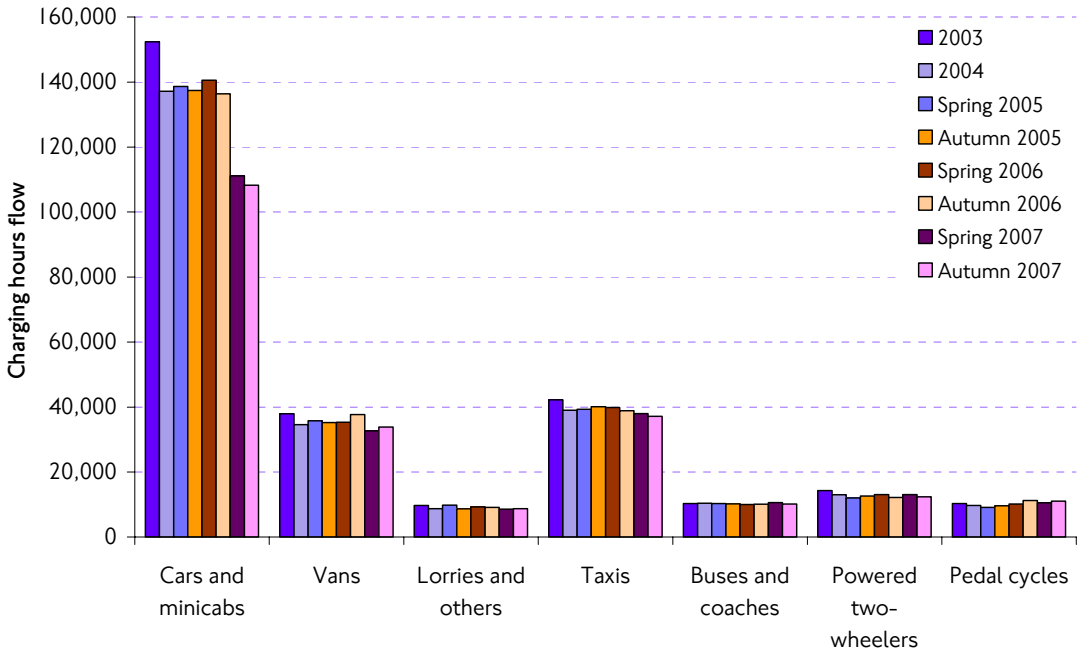
Figure 2.3 shows the average weekly charging hours flows across these 21 locations. The picture is broadly similar to that presented by the manual classified counts. Following the introduction of the western extension, traffic entering the extension zone typically reduced by 13 percent against equivalent weeks in 2006 (vehicles with four or more wheels). The general magnitude of the decline in traffic entering the extension zone immediately after the introduction of charging has been maintained throughout 2007 and into 2008.

2.4 Traffic leaving the western extension

Comprehensive manual classified counts were also undertaken at the 102 locations where motorised traffic could leave the western extension. As with entering traffic, these counts have been undertaken in the spring and autumn of each year since 2005 while comparable data for 2003 and 2004 are also available.

Figure 2.4 shows the available time-series by main vehicle type for traffic leaving the western extension zone. Approximately 224,000 vehicles left the extension zone during charging hours on a typical weekday during 2007 representing a reduction of 12 percent in all traffic and 14 percent in vehicles with four or more wheels (200,000 vehicles), compared with pre charging conditions in 2005/06.

Figure 2.4 Traffic leaving the western extension zone across all outbound roads. Charging hours, 07:00-18:00, 2003 to 2007.



The reduction for cars and minicabs was 21 percent; for vans 8 percent and for lorries 6 percent. In a similar way to traffic entering the extension zone, non chargeable vehicles presented a more variable picture with pedal cycles showing an increase of 7 percent and powered two-wheelers 2 percent. Volumes of licensed taxis decreased by 5 percent. Table 2.2 shows the available time series for traffic volumes and vehicle proportions leaving the western extension during charging hours.

Table 2.2 Traffic leaving the western extension zone across all outbound roads. Charging hours, 07:00-18:00, 2005 to 2007.

Vehicle type	2005 average (000s)	2006 average (000s)	2007 average (000s)	Percentage of total 2005	Percentage of total 2006	Percentage of total 2007
All vehicles	255	257	224	100%	100%	100%
Four or more wheels	233	234	200	91%	91%	89%
Potentially chargeable	183	184	152	72%	72%	68%
- Cars and minicabs	138	139	110	54%	54%	49%
- Vans	36	37	33	14%	14%	15%
- Lorries and others	9	9	9	4%	4%	4%
Non chargeable	72	73	72	28%	28%	32%
- Licensed taxis	40	39	38	16%	15%	17%
- Buses and coaches	10	10	10	4%	4%	4%
- Powered two-wheelers	12	13	13	5%	5%	6%
- Pedal cycles	9	11	11	4%	4%	5%

Figure 2.5 shows the half-hourly distribution for traffic leaving the western extension. The post-extension profile is comparable to previous years, albeit at consistently reduced absolute levels.

Figure 2.5 Traffic leaving the western extension zone by time of day. Annualised weekdays, 2005 to 2007, all vehicles.

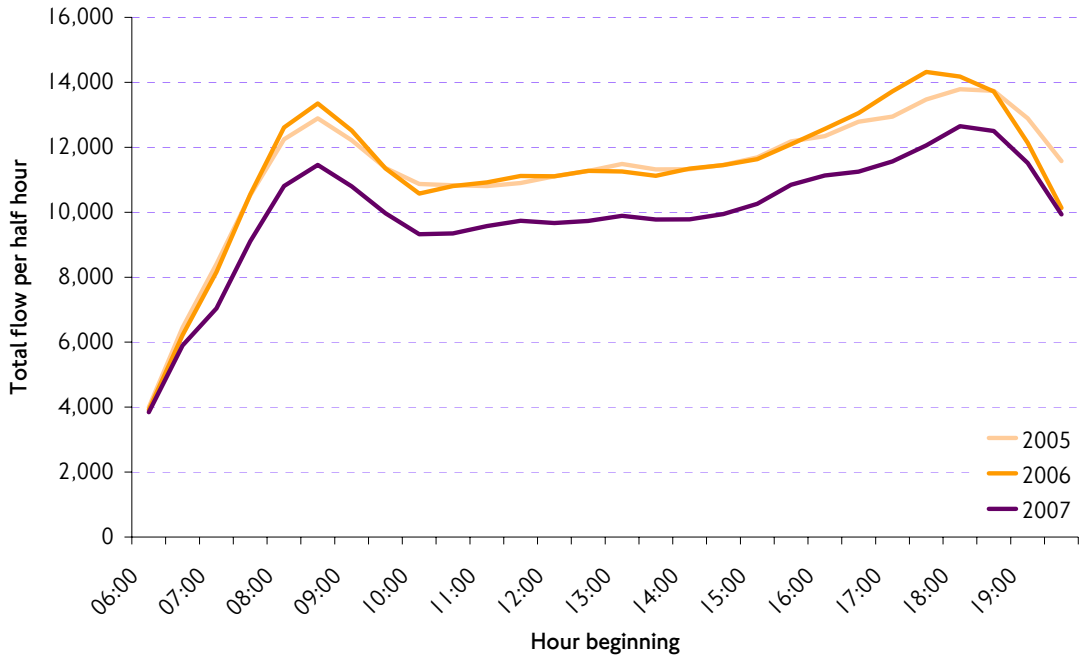
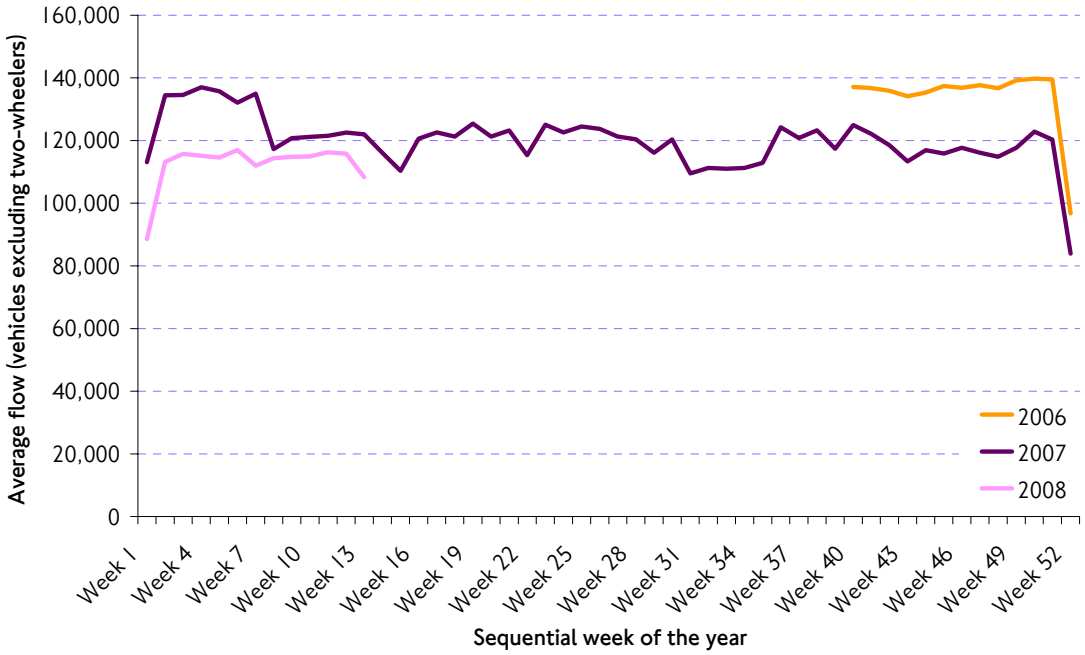


Figure 2.6 Weekly average daily flow across 20 representative major roads exiting the western extension. Charging hours, 07:00-18:00, 2006 to 2008, vehicles with four or more wheels.



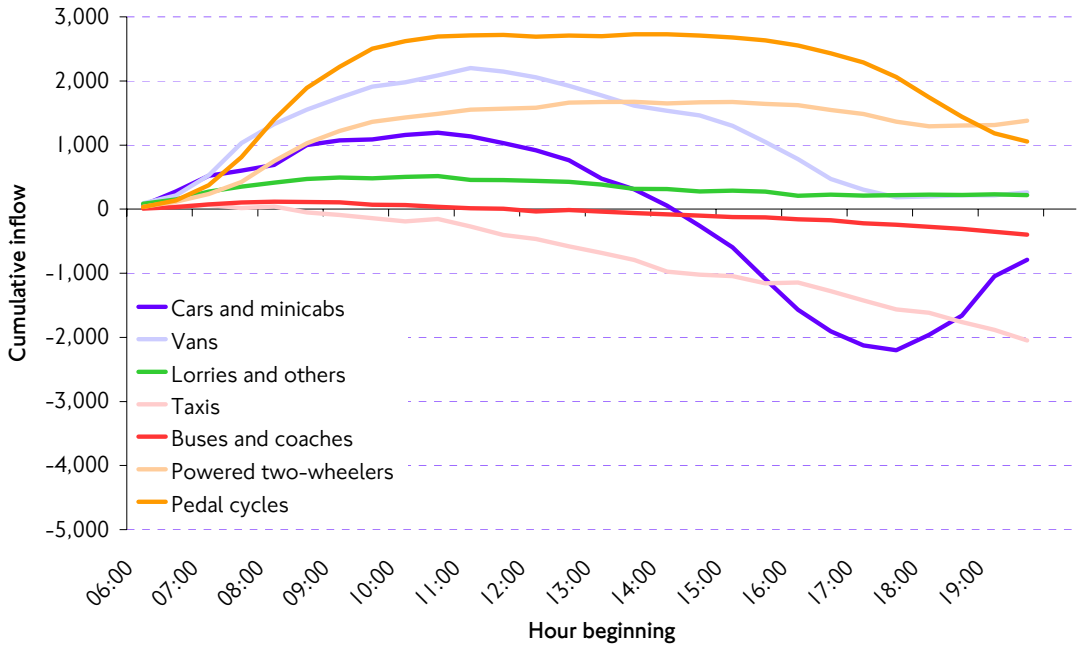
A comparable picture is seen in the automatic traffic count based indicator for traffic leaving the extension zone (Figure 2.6). The average reduction has settled at 13 percent fewer vehicles leaving the zone and is in line with the reduction seen in traffic entering the extension zone.

Balance of inbound and outbound flow

Figure 2.7 shows the cumulative number of vehicles that are present in the western extension across the day, calculated as the difference of the average of the spring and autumn 2007 inbound and outbound boundary counts. Vehicles exclusively circulating within the zone during the count period are not included in these figures.

For the majority of vehicle types, the pattern is not dissimilar to that of pre-extension conditions as presented in the *Fifth Annual Impacts Monitoring Report,* albeit that uncharged vehicles have increased as a proportion of the cumulative inflow throughout the day. The excess cumulative outflow of taxis reported in 2006 has reduced substantially, reinforcing the earlier conclusion that it reflected network changes in the Paddington area in relation to the re-opening of Bishop's Bridge. Note that, as previously observed, cars and minicabs show net cumulative outflows during the afternoon hours.

Figure 2.7 Balance between vehicle inflows and outflows. Traffic crossing the western extension zone boundary. Charging hours, 07:00-18:00, 2007 only.



2.5 Traffic circulating within the western extension

The changes to volumes of traffic circulating within the western extension zone are being monitored through a set of indicators comprising vehicle-kilometres driven within the extension zone, a north-south screenline running through the zone, a similar east-west screenline and a further screenline following the elevated section of the A40 Westway. It must be noted that each of these indicators is based on a

relatively small number of counting sites and is therefore subject to considerable variability. The best appreciation of scheme-related changes to traffic circulating in the extension zone can be gained by looking across all of the available indicators.

Vehicle-kilometres driven within the western extension

Table 2.3 summarises the calculated estimates of estimated vehicle-kilometres driven within the western extension by main vehicle type for 2006 and 2007. This indicator is based on traffic counts in spring and autumn of each year at 33 randomly spread sites across the extension area. This indicator is designed to give an indicative estimate of **change** in the amount of circulating traffic, rather than to give a precise estimate of the absolute level of vehicle-kilometres driven within the western extension.

In 2007 there was a reduction of 11 percent in the vehicle-kilometres driven by vehicles with four or more wheels in the western extension zone during charging hours on a typical weekday. This was at the lower end of TfL's expectations of between 10 and 14 percent.

Cars and minicabs have seen the greatest reduction, and in terms of traffic composition, they now make up about 54 percent of traffic in the western extension compared to 60 percent in 2006. Overall, the distance travelled by potentially chargeable vehicles has declined by 14 percent and they now comprise around 72 percent of the traffic circulating in the western extension.

Table 2.3 Indicative daily vehicle-kilometres driven (millions) within the western extension zone during charging hours, 07:00-18:00.

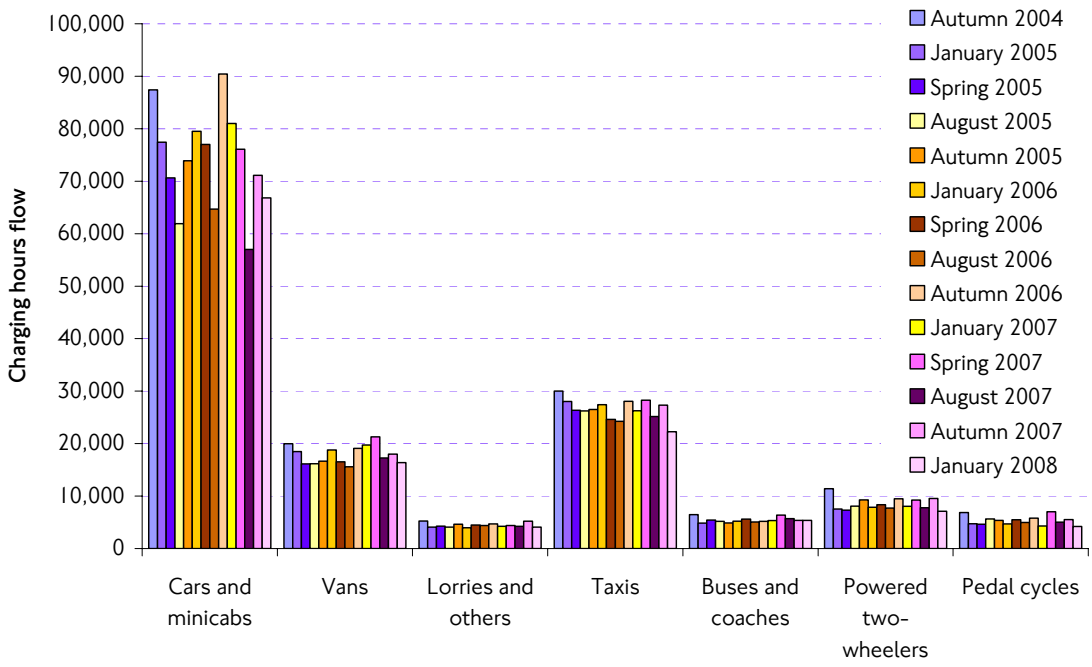
Vehicle type	2006 average	Percentage of total 2006	2007 average	Percentage of total 2007	2007 vs 2006
All vehicles	1.12	100%	1.02	100%	-10%
Four or more wheels	1.00	89%	0.90	88%	-11%
Potentially chargeable	0.85	76%	0.73	72%	-14%
- Cars and minicabs	0.67	60%	0.55	54%	-18%
- Vans	0.15	13%	0.15	15%	-2%
- Lorries and others	0.04	3%	0.04	4%	1%
Non chargeable	0.27	24%	0.29	28%	6%
- Licensed taxis	0.12	11%	0.13	13%	4%
- Buses and coaches	0.03	3%	0.04	4%	13%
- Powered two-wheelers	0.06	5%	0.06	6%	9%
- Pedal cycles	0.06	5%	0.06	6%	4%

Traffic crossing the north-south internal screenline within the western extension

The internal north-south screenline is part of the long-standing TfL central London cordon and is historically counted in autumn each year. As part of the monitoring arrangements for the western extension, it has been counted four times per year since 2005. Figure 2.8 shows flows by main vehicle type since autumn 2004.

Flows across this screenline have been quite variable during the last three years. Note that Figure 2.8 includes counts in August when flows across London are typically lower than the annual average, reflecting the summer holiday period. Flows in 2006 were typically 10 percent higher than 2005, for reasons that were not immediately evident, although road works were known to have intermittently affected traffic across this screenline. In 2007 there has been a consistent decline in flows relative to 2006, but at relatively low levels of reduction. Total annualised flows reduced by 3 percent while the reduction was more evident for cars and minicabs, which reduced by 12 percent in 2007 compared to 2006.

Figure 2.8 Traffic crossing the internal north-south screenline. Both directions combined, by main vehicle type. Charging hours, 07:00-18:00, 2005 to 2007.



Traffic crossing the east-west internal screenline within the western extension

The internal east-west screenline running from West Carriage Drive to Addison Road comprises seven survey sites and provides an indicator of traffic moving between the northern and southern parts of the western extension. Since 2005, the screenline has been counted four times each year (January, spring, August and autumn). Figure 2.9 shows the available time series by main vehicle type.

The general reduction in traffic crossing the east-west screenline since the introduction of the extension scheme is evident particularly for cars and minicabs. Comparison of the annualised flow for 2007 (based on the spring and autumn surveys) reveals a decline of 14 percent in potentially chargeable vehicles compared with the equivalent flow for 2006 – or a decline of 7 percent against 2005.

Figure 2.9 Traffic crossing the internal east-west screenline. Both directions combined, by main vehicle type. Charging hours, 07:00-18:00, 2005 to 2007.

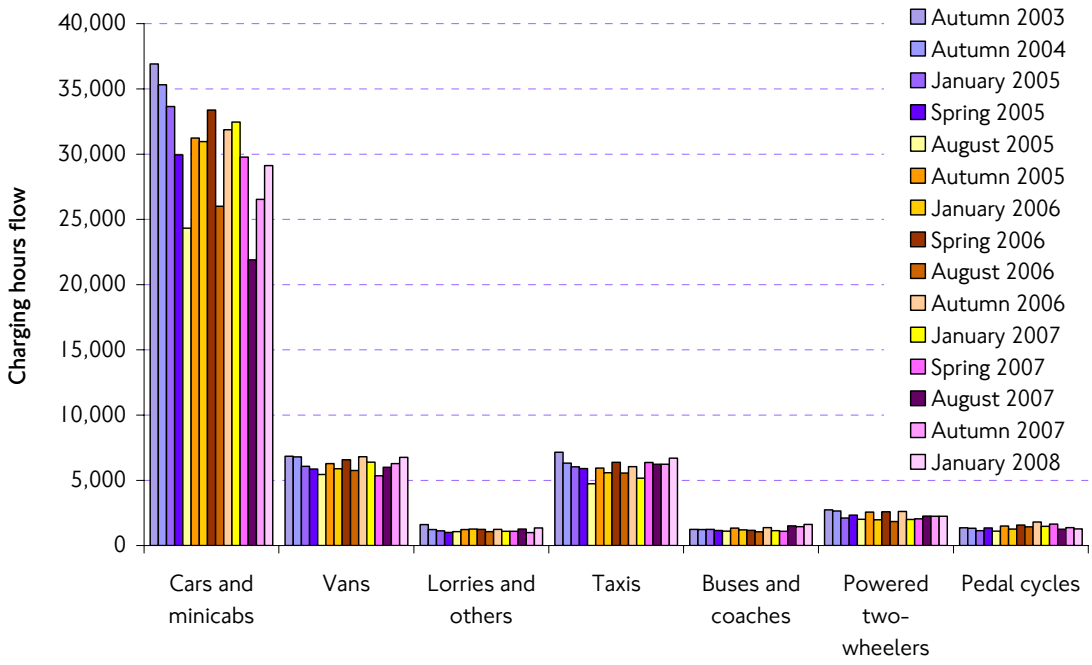
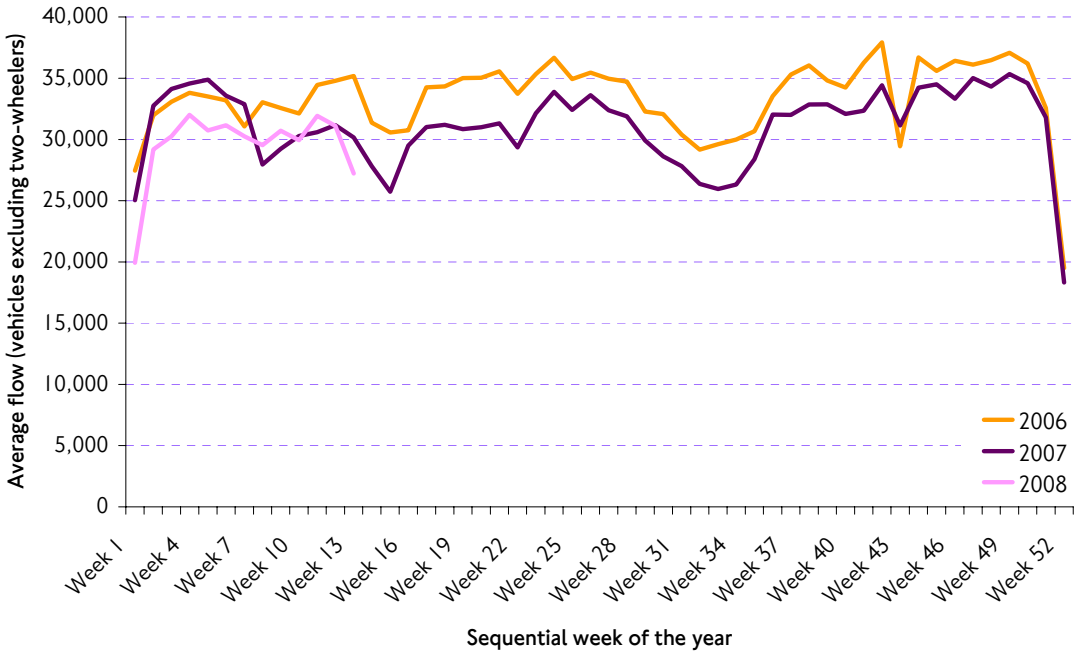


Figure 2.10 Weekly average daily flow across the internal east-west screenline. Charging hours, 07:00-18:00, 2006 to 2008, vehicles with four or more wheels.

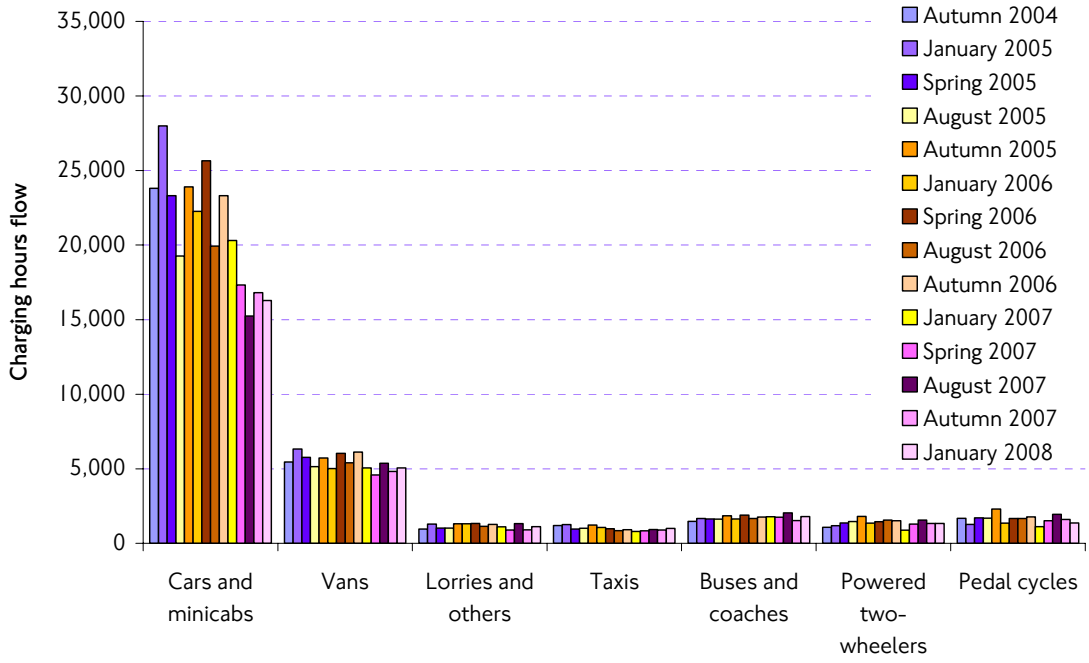


Similar results are presented in Figure 2.10 which shows the equivalent indicator, based on four automatic traffic counters for the east-west screenline. The typical reduction in traffic following the introduction of the extension was 8 percent.

Traffic crossing the A40 Westway screenline within the western extension

The A40 Westway screenline consists of five count sites and has been counted four times each year (January, spring, August and autumn) since 2005. Figure 2.11 shows traffic flows by main vehicle type across this screenline. Again, an overall reduction in traffic crossing the screenline following the introduction of the scheme is evident particularly for cars and minicabs. The decline in flow of potentially chargeable vehicles is 29 percent, based on annualised flows for 2007 and 2006.

Figure 2.11 Traffic crossing the A40 Westway screenline. Both directions combined, by main vehicle type. Charging hours, 07:00-18:00, 2005 to 2007.



2.6 Traffic on the boundary route

The boundary route of the western extension zone presents drivers making 'through' trips, and wishing to avoid the charge, with an alternative option. It comprises the following sections for monitoring purposes:

- The key 'free passage route' – the portion of the boundary route running between the original central London zone and the western extension zone.
- The remainder of the boundary route for the extension zone, excluding the free passage route portion (the 'western boundary').
- The elevated section of the A40 Westway, partly running through the area of the western extension zone, but uncharged under the arrangements for the extension scheme.

TfL expected small overall increases to traffic on the boundary route around the outside of the extension zone and the first year of operation of the extension has confirmed these expectations. The following subsections analyse each section of the boundary route in more detail.

Traffic on the free passage route

The 'free passage route' is the section of the boundary road running between the original and western extension zones from Edgware Road to Vauxhall Bridge. Upon implementation of the extension zone, TfL's expectation was for effectively no overall change to traffic on this route despite its key location running in between the two parts of the extended zone.

Two indicators based on 14 manual count sites which cover all the major links on the route are presented in Table 2.4 for the years 2005 to 2007. Firstly, the 'vehicle population' or the number of observed vehicles, and secondly, an estimate of vehicle-kilometres driven on this route. All sites are counted four times per year, with the key annual change indicator based on the average of the spring and autumn 'neutral period' counts in each year (ie 'annualised counts').

Table 2.4 Annualised vehicle population and estimated vehicle-kilometres (vkm) driven on the free passage route. Charging hours, 07:00-18:00, 2005 to 2007.

Vehicle type	2005 vehicle population (000s)	2005 estimated vkm (000s)	2006 vehicle population (000s)	2006 estimated vkm (000s)	2007 vehicle population (000s)	2007 estimated vkm (000s)
All vehicles	260	151	253	140	261	146
Four or more wheels	243	142	236	130	242	135
Potentially chargeable	181	108	176	99	177	101
- Cars and minicabs	125	77	120	68	116	67
- Vans	43	24	44	25	48	26
- Lorries and other	13	7	13	7	13	7
Non chargeable	79	44	77	41	84	46
- Licensed taxis	44	25	42	22	46	25
- Buses and coaches	19	10	18	10	19	10
- Powered two-wheelers	11	6	11	6	13	7
- Pedal cycles	5	2	6	3	7	3

Table 2.5 shows the year-on-year change in the vehicle population and estimated vehicle-kilometres. Flows increased somewhat in 2007, compared to 2006, bringing the overall number of vehicles with four or more wheels back to 2005 levels. This increase was mainly attributable to the higher number of vans and licensed taxis driving on the free passage route and to a lesser extent to the increase in the number of buses. The equivalent increase in the estimated vehicle-kilometres driven was 4 percent for vehicles with four or more wheels compared to 2006.

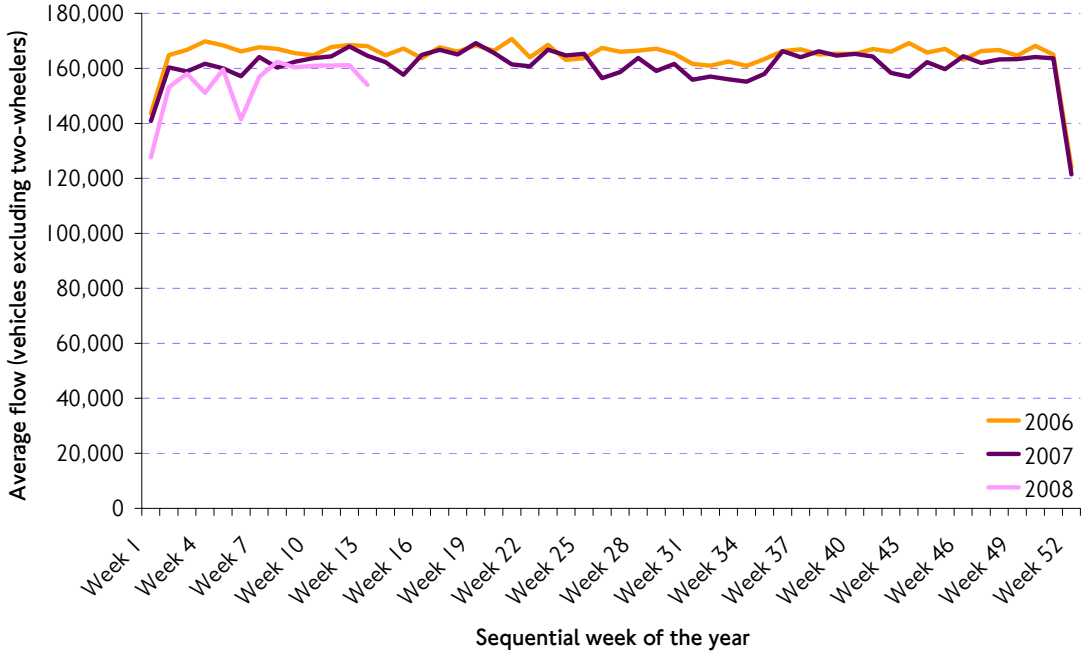
Table 2.5 Year-on-year changes in vehicle population and estimated vehicle-kilometres (vkm) driven on the free passage route, charging hours, 07:00-18:00, 2005 to 2007.

Vehicle type	2006 vs. 2005 population	2006 vs. 2005 vkm	2007 vs. 2006 population	2007 vs. 2006 vkm
All vehicles	-2%	-8%	3%	5%
Four or more wheels	-3%	-8%	2%	4%
Potentially chargeable	-2%	-8%	1%	2%
- Cars and minicabs	-4%	-12%	-3%	-1%
- Vans	3%	3%	9%	7%
- Lorries and other	-2%	-9%	5%	12%
Non chargeable	-3%	-7%	9%	12%
- Licensed taxis	-4%	-11%	9%	14%
- Buses and coaches	-5%	-6%	5%	5%
- Powered two-wheelers	1%	-3%	12%	21%
- Pedal cycles	7%	23%	18%	9%

Automatic traffic counters provide a further indicator of traffic levels on the free passage route. They are located on the six key links of the route; Edgware Road, Park Lane, Grosvenor Place, Grosvenor Gardens, Bressenden Place and Vauxhall Bridge Road. The counters were installed at the beginning of 2006 and Figure 2.12 shows a very stable picture for traffic levels both before and after the introduction of the western extension.

As with the Inner Ring Road around the central London charging zone, any additional traffic from drivers using the free passage route specifically to avoid paying the charge appears to have been largely cancelled out by reduced general traffic in the wider area of the extension zone.

Figure 2.12 Weekly average daily flow across six representative links on the free passage route. Charging hours, 07:00-18:00, 2006 to 2008, vehicles with four or more wheels.



Traffic circulating on the remainder of the boundary route excluding the free passage route (the 'western boundary')

The 'western boundary' consists of the remainder of the boundary route around the outside of the extension zone excluding the free passage route. TfL expected traffic to increase by up to 4 percent on this route as a result of general increases in traffic using this route to avoid paying the charge. An indicator based on 24 manual traffic count sites, covering all major links of the boundary route excluding the free passage route, has been counted since 2005 four times per year. The key annual change indicator is based on the average of the spring and autumn 'neutral period' counts.

Table 2.6 shows values for the vehicle population as well as the calculated vehicle-kilometres driven. Table 2.7 presents the year-on-year changes. The overall picture is one of remarkable stability for this section of the boundary route with a nominal decline of 2 percent for both the vehicle population and the vehicle-kilometres driven – both of which are within the statistical precision of this indicator.

Table 2.6 Annualised vehicle population and estimated vehicle-kilometres (vkm) driven on the boundary route (western boundary only). Charging hours, 07:00-18:00, 2005 to 2007.

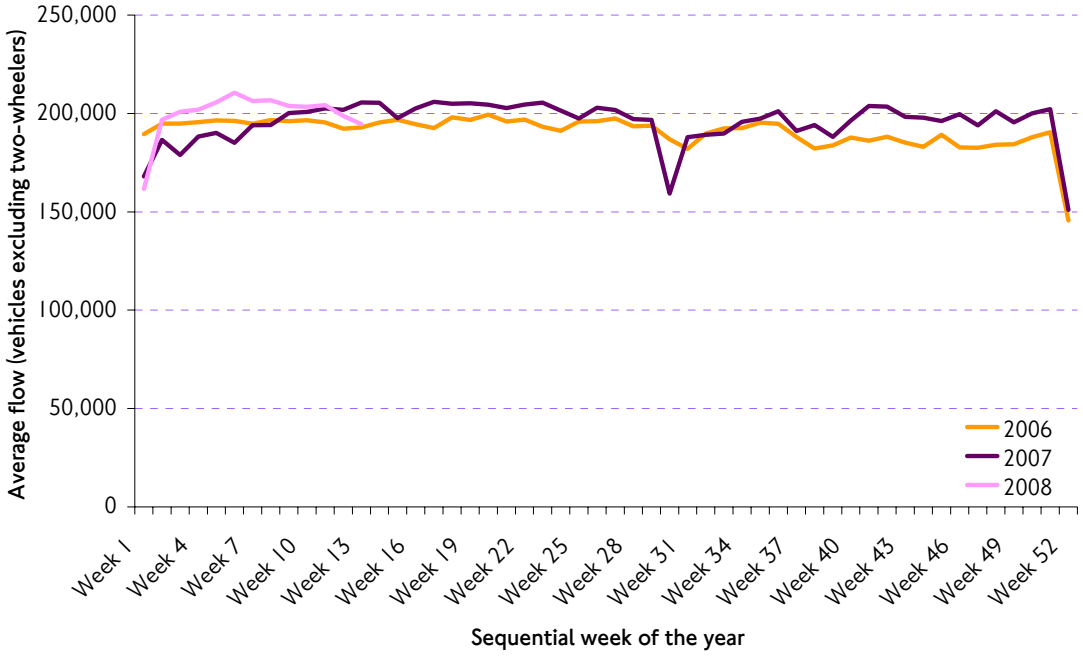
Vehicle type	2005 vehicle population	2005 estimated vkm (000s)	2006 vehicle population	2006 estimated vkm (000s)	2007 vehicle population	2007 estimated vkm (000s)
All vehicles	412	363	416	361	405	352
Four or more wheels	380	335	384	333	375	325
Potentially chargeable	357	316	357	311	352	306
- Cars and minicabs	255	225	255	222	245	215
- Vans	76	68	78	68	80	70
- Lorries and other	27	23	25	21	26	22
Non chargeable	55	48	59	50	53	46
- Licensed taxis	15	13	19	15	15	13
- Buses and coaches	8	7	8	7	8	6
- Powered two-wheelers	23	21	23	20	21	19
- Pedal cycles	9	8	9	9	9	8

Table 2.7 Year-on-year changes in vehicle population and estimated vehicle-kilometres (vkm) driven on the boundary route (western boundary only). Charging hours, 07:00-18:00, 2005 to 2007.

Vehicle type	2006 vs. 2005 population	2006 vs. 2005 vkm	2007 vs. 2006 population	2007 vs. 2006 vkm
All vehicles	1%	-1%	-3%	-3%
Four or more wheels	1%	-1%	-2%	-2%
Potentially chargeable	0%	-1%	-2%	-1%
- Cars and minicabs	0%	-1%	-4%	-3%
- Vans	2%	0%	4%	2%
- Lorries and other	-8%	-7%	8%	5%
Non chargeable	6%	6%	-9%	-9%
- Licensed taxis	23%	18%	-18%	-16%
- Buses and coaches	0%	1%	-1%	-3%
- Powered two-wheelers	-2%	-1%	-6%	-8%
- Pedal cycles	5%	7%	-7%	-6%

Finally, an indicator based on 11 automatic counters located on key roads on the western extension zone boundary route has been monitored since the start of 2006. This is shown in Figure 2.13. The picture is broadly one of stable traffic levels – albeit with small net increases rather than decreases. Following the introduction of the western extension, traffic increased by 4 percent compared with equivalent weeks in 2006 and has remained at broadly comparable levels since. It is worth noting that pre-extension traffic flows were affected by road works on this route during the summer and during the latter part of 2006 and by the poor weather conditions in the early part of 2007 – leading to atypically low flows during these periods.

Figure 2.13 Weekly average daily flow across 11 representative bi-directional links on the western extension boundary (excluding free passage route). Charging hours, 07:00-18:00, 2006 to 2008, vehicles with four or more wheels.



Traffic on the elevated section of the A40 Westway

The elevated section of the A40 is an uncharged route which runs through the northern part of the western extension. It is not possible to join or leave the A40 between Wood Lane and Paddington and therefore to either enter or leave the western extension. TfL undertook manual and video traffic surveys on the slip roads at these locations to be able to assess the interaction of this route with the extension zone. Only one pre charging survey of all slip roads, undertaken in autumn 2006, is available and it needs to be noted that road works and lane closures affected that survey. Comparing average 2007 flows with those in autumn 2006 suggests an overall reduction of 6 percent in total traffic on this route.

2.7 Wider indicators of the traffic impacts of the western extension

Traffic in the area immediately outside the western extension zone is likely to be affected by the scheme in two opposing ways. Firstly, some trips previously made to and from the extension zone may divert around the zone, using roads somewhat beyond the actual boundary route and leading to possible local increases in traffic. Secondly, radial trips no longer made to or from the extension zone will be removed from the road network, leading to an overall small decline in traffic in an 'annulus' around the zone.

TfL has developed a number of indicators to monitor these potential impacts, as described in the *Fifth Annual Impacts Monitoring Report*. The overall picture is one of general traffic reductions in the area although some indicators provide a more mixed picture.

West London Railway screenline

This screenline immediately to the west of the western extension consists of eight sites and records radial traffic approaching the extension zone from the west. It has been counted four times a year since autumn 2003. Comparison of the annualised traffic figures for 2007 with the equivalent 2006 figures reveals a significant decline in annualised flows of vehicles with four or more wheels of 14 percent. The decline can largely be attributed to the fall in the number of cars crossing this screenline.

Western extension annulus cordon

The annulus cordon monitors radial traffic approaching the western extension and consists of 37 sites which have been surveyed twice a year since spring 2005. The annualised two-way traffic flow for 2007 has declined by 11 percent for vehicles with four or more wheels. This is mainly due to the decline in cars and vans while non chargeable vehicle types showed small increase at the same time.

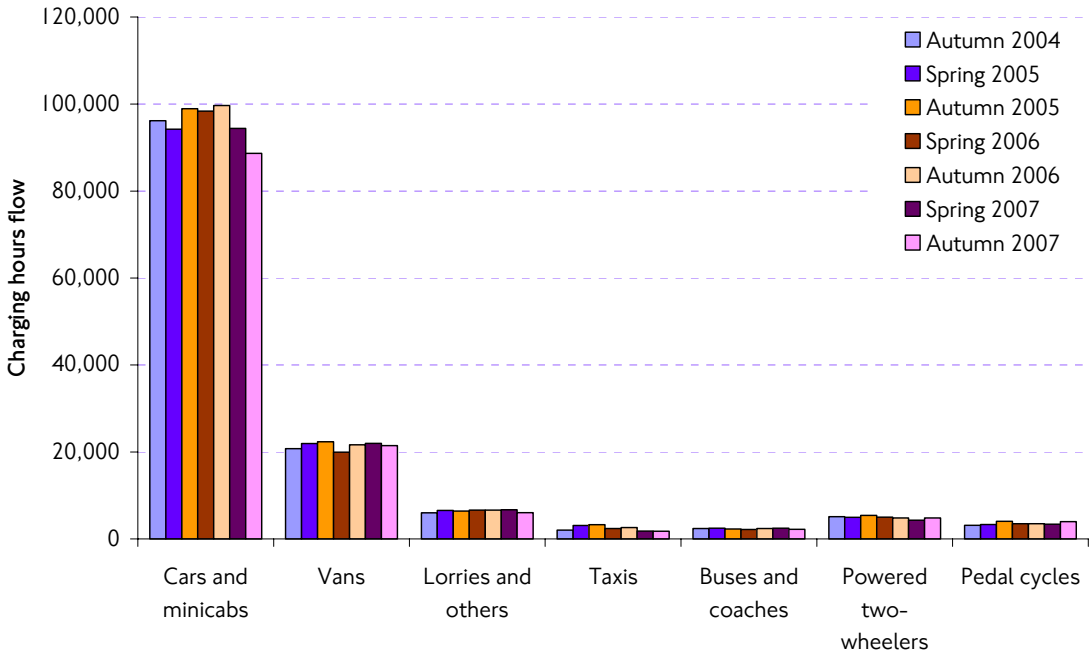
Western extension 'external' Thames bridges screenline

There are nine bridges over the Thames 'external' to the western extension zone but within the assumed area of influence of the extension scheme. These run from Kew Bridge in the west to Vauxhall Bridge in the east. Traffic crossing these bridges has been counted four times a year since 2005. Traffic crossing this screenline has been fairly stable and the comparison of the annualised flows for 2007 with the equivalent 2006 shows no significant changes.

External western screenline

This screenline monitors orbital traffic around the western extension and extends from Holland Road in the east to the North Circular Road in the west. It consists of 16 sites and has been surveyed twice-yearly since autumn 2004. In terms of changes during 2007 it is notable that the majority of vehicle types showed a decline compared with 2006. This led to an overall decline of 6 percent for vehicles with four or more wheels across this screenline (Figure 2.14).

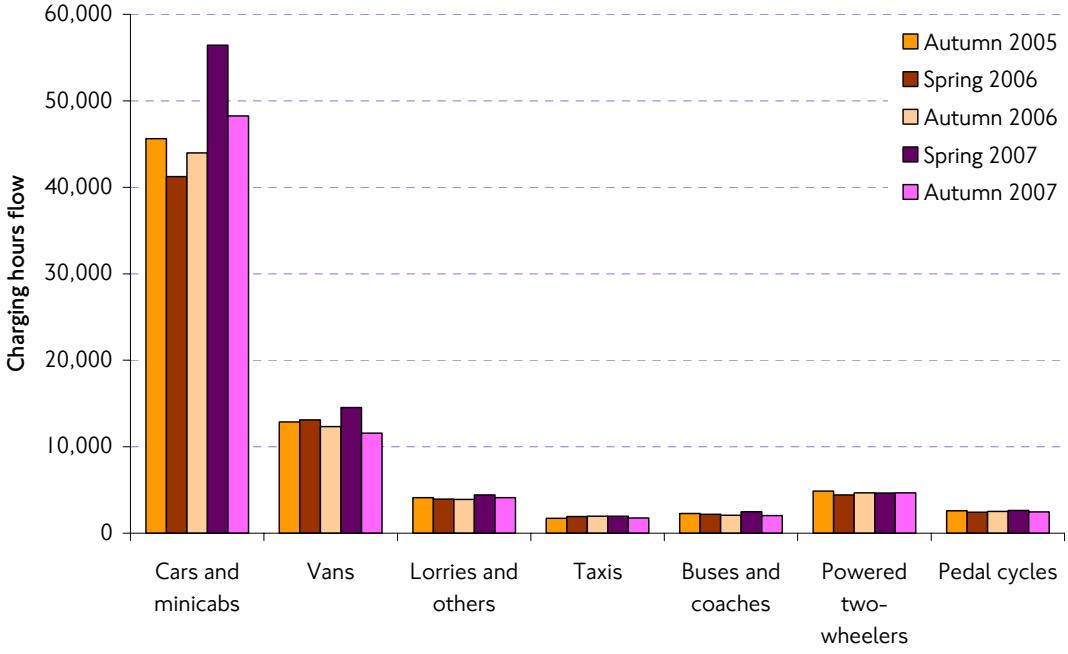
Figure 2.14 Orbital traffic flows across the western extension external western screenline. Charging hours, 07:00-18:00, 2004 to 2007, combined directions.



Southwest screenline

This screenline monitors orbital traffic around the outside of the extension zone. It runs from Cheyne Walk to Battersea Rise in South London and consists of five sites, which have been counted twice a year since autumn 2005.

Figure 2.15 Orbital traffic flows across the external southwest screenline. Charging hours, 07:00-18:00, 2005 to 2007, combined directions by vehicle type.



There were no road works or diversions recorded in the immediate vicinity of the count locations which could explain this considerable increase. However, there were road works on Putney High Street and Putney Bridge during the spring of 2007 and it is possible that drivers heading for central London from the southwest changed routes, in order to use the bridges between Battersea and Vauxhall, to avoid delays associated with the road works.

Boundary route approach cordon

This cordon measures radial traffic approaching the western extension boundary route from inner London outside the extension zone. It consists of 95 sites and has been surveyed twice yearly since spring 2006. In terms of inbound traffic crossing this cordon there was a significant decline of 14 percent in cars and minicabs during 2007, leading to an overall decline of 10 percent for vehicles with four or more wheels. Outbound traffic on the other hand reduced to a lesser extent with cars and minicabs down by 10 percent and vehicles with four or more wheels down by 6 percent. Table 2.8 shows the results from these four surveys in more detail.

Table 2.8 Radial traffic flows across the western extension boundary route approach cordon. Charging hours, 07:00-18:00, 2006 and 2007.

Vehicle type	2006 average inbound flow (000s)	2006 average outbound flow (000s)	2007 average inbound flow (000s)	2007 average outbound flow (000s)
All vehicles	363	345	332	326
Four or more wheels	331	313	297	293
Potentially chargeable	278	262	244	241
- Cars and minicabs	205	193	176	174
- Vans	59	55	53	52
- Lorries	15	15	15	15
Non chargeable	85	82	87	85
- Licensed taxis	42	39	41	39
- Buses and coaches	12	11	12	12
- Powered two-wheelers	19	19	20	19
- Pedal cycles	13	13	14	14

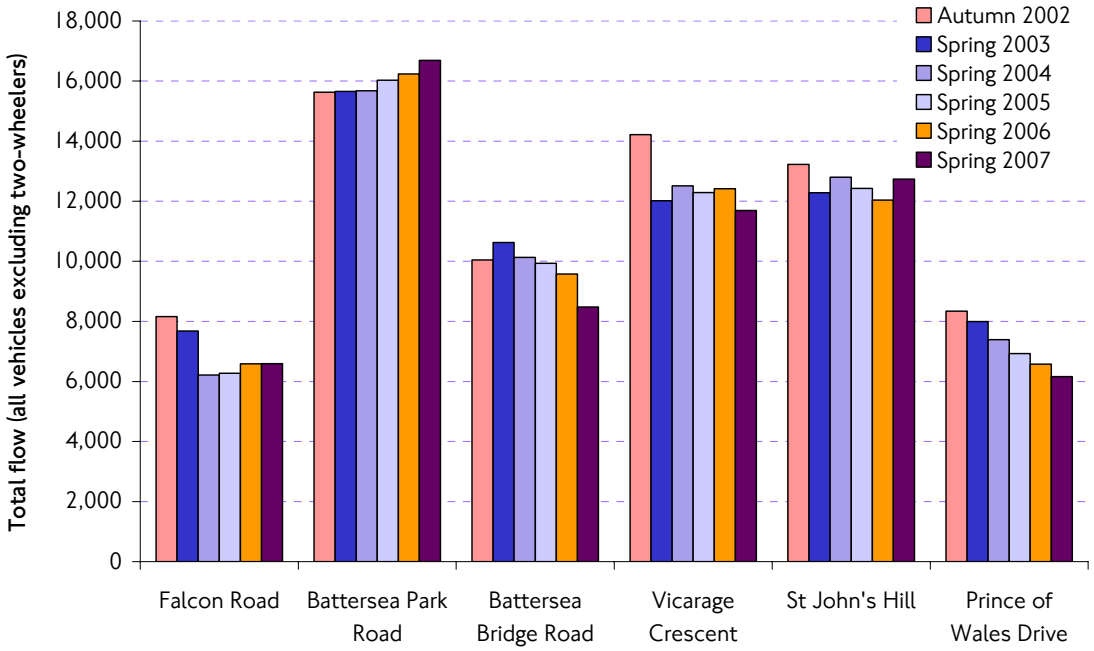
Northern screenline

This screenline monitors orbital traffic moving around the combined original and western extension zones in inner north-west London extending from Marylebone Road to the North Circular Road. It consists of 19 sites that have been counted in autumn each year since 2005. From these three surveys, traffic crossing the northern screenline appears stable, with no significant changes recorded for any vehicle type.

Traffic on selected roads in the London Borough of Wandsworth

Traffic on six roads in the London Borough of Wandsworth has been monitored since 2002 as part of the monitoring arrangements for the original congestion charging zone. These sites are also relevant to the western extension. Figure 2.16 presents the available time series for these counts. The picture for 2007 is quite variable from site to site, with Battersea Bridge Road at one extreme showing an 11 percent decline in traffic during charging hours, and St John's Hill at the other, showing a 6 percent increase against 2006. Aggregate flows across all sites were marginally lower during 2007 – leading to the conclusion that the western extension has no significant traffic volume impact in this area.

Figure 2.16 Traffic changes on local roads in Wandsworth. Charging hours, 07:00-18:00, weekdays, 2002 to 2007. All vehicles excluding two-wheelers (tube automatic traffic counters).



2.8 Observed traffic impacts compared to TfL's prior expectation

In the *Fifth Annual Impacts Monitoring Report*, Table 9.2 set out TfL's projections for the overall traffic volume impacts of the western extension scheme, based on **traffic model assessments** and in terms of 'high' and 'low' sensitivity scenarios, reflecting a range of assumptions about the sensitivity of the various categories of drivers to the charge.

Table 2.9 revisits these earlier projections in terms of the **observed traffic volumes** both before and after the introduction of the extension. The values in the table represent TfL's current 'best assessment' of the changes, looking across the available traffic volume data but also drawing on camera-based analyses of trip patterns and changes to charge payment patterns, as tracked by the operational processes for the scheme.

In terms of TfL's projections, as previously published, the observed changes generally lie towards the lower sensitivity end of the range, reflecting the balance of the observed traffic change data that is suggesting impacts towards the lower end of TfL's anticipated range. More than expected of the vehicles entering the western extension zone are eligible for the residents' discount or other exemption.

Table 2.9 Observed traffic entering the western extension during charging hours - with estimates of fully chargeable vehicles.

Trip type	Cars	Vans	Lorries	*Estimated fully chargeable vehicles*	Taxis	Buses and coaches	Total 4(+) wheeled vehicles
Before western extension							
Central zone users	47,000	17,000	5,000				
Non-central zone users							
- Exempt, discounted	31,000	2,000					
- Terminating	47,000	13,000	3,000	*64,000*			
- Through	13,000	3,000	1,000	*17,000*			
Observed total	138,000	36,000	9,000	*81,000*	35,000	10,000	227,000
After western extension							
Central zone users	50,000	17,000	5,000				
Non-central zone users							
- Exempt, discounted	31,000	2,000					
- Terminating	21,000	11,000	3,000	*36,000*			
- Through	4,000	3,000	1,000	*8,000*			
Observed total	107,000	33,000	9,000	*44,000*	35,000	10,000	195,000
Percentage change	**-22%**	**-7%**	**0%**	***-45%***	**0%**	**2%**	**-14%**

2.9 Summary

A full range of traffic volume indicators reflecting the first year of operation of the western extension are now available. These show a satisfactory overall picture that relates well to TfL's expectations for traffic volume change in relation to the scheme. Substantial reductions to traffic of 14 percent (vehicles with four or more wheels) entering the extension zone have been achieved. Indicators of circulating traffic tend to be more variable, but collectively indicate traffic reductions of around 10 percent. Traffic on the key boundary routes has been effectively stable with no reported traffic problems, and there have been overall reductions to traffic across a wider area around the outside of the extension zone.

3. Central zone: traffic patterns

3.1 Introduction

This section gives an update on traffic activity in and around the original central London congestion charging zone during 2007. Building upon previous analysis it provides a comprehensive perspective following five years of charging in central London.

3.2 Key developments during 2007

The main development in the central London congestion charging scheme in 2007 was the extension of the charging zone westwards. The western extension was implemented on 19 February 2007. The interaction between the two zones was expected to affect traffic patterns in the central zone in two ways. Firstly, from late October 2006, residents in the western extension and certain buffer areas outside the zone were able to register for a residents' discount which also allowed them to travel to the original zone with a 90 percent discount to the daily charge. Secondly, drivers using the previously uncharged western extension area who chose to continue to drive and pay the charge were now able to drive in the original charging zone at no extra cost. Some small increases in traffic in the original charging zone were therefore anticipated from the introduction of the western extension. TfL's expectation was for a net increase in traffic entering the original zone of 2 percent as a direct consequence of the extension.

A further development in 2007 associated with the western extension was the change to charging hours, which were reduced by 30 minutes. Since 19 February 2007 the operating hours of the entire extended central London congestion charging zone have been 07:00 to 18:00 instead of 07:00 to 18:30.

TfL has been monitoring traffic patterns in the original zone closely since 2002 and has continued to do so in 2007. The results show that the operation of the original charging zone experienced no net negative traffic volume impact since the introduction of the western extension. The following section summarises key traffic indicators for the original central zone for 2007, and considers the impact of the western extension on traffic in this area.

In summary:

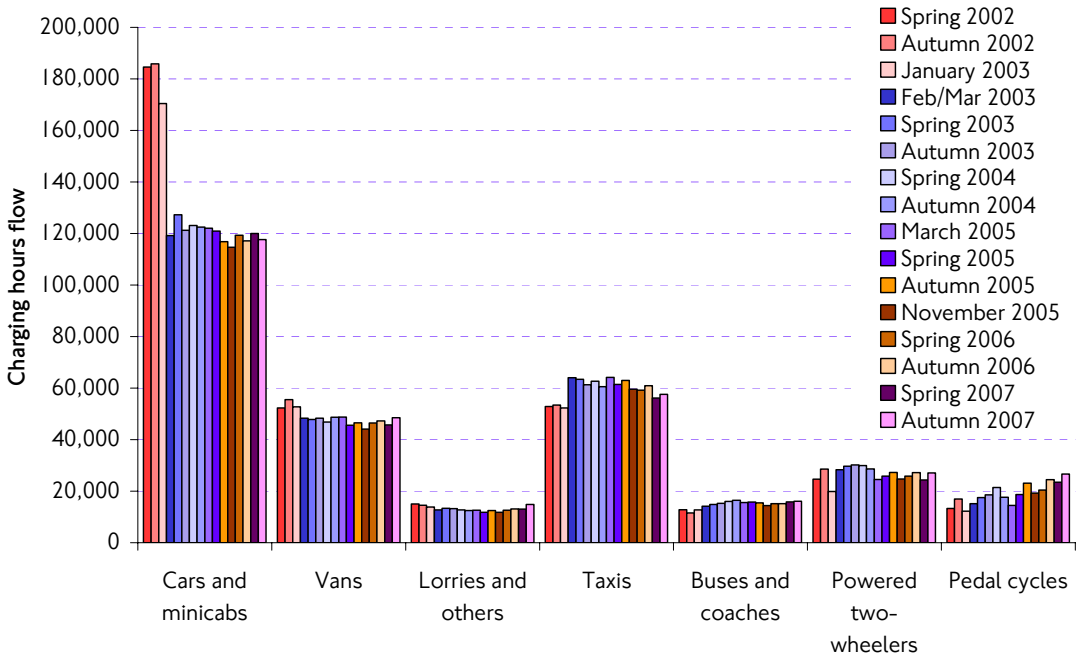
- Key 2007 indicators for traffic entering and leaving the original central London charging zone show little overall change from 2006. There is evidence of additional traffic entering the zone from the south and west, which appears to reflect changed conditions from the introduction of the western extension, but these changes appear to have been subsumed by wider background trends leading to reduced overall traffic levels in central and inner London.
- Indicators of traffic circulating within the original charging zone for 2007 are somewhat variable, but suggest a generally stable picture overall.
- Levels of traffic on the Inner Ring Road in 2007 were effectively identical to those of 2006.

- The traffic reduction benefits of charging in the central zone have therefore been maintained, and there are no indications of significant overall traffic impacts resulting from the introduction of the western extension scheme in February 2007.

3.3 Traffic entering the original charging zone

Since 2002, traffic entering and leaving the original charging zone has been monitored through manual classified counts undertaken at least twice-yearly in spring and autumn. This indicator is complemented by 18 permanent automatic traffic counters located at a sample of high-flow entry points to the zone. Figure 3.1 shows the available time-series from manual classified counts for vehicles entering the charging zone.

Figure 3.1 Traffic entering the central London charging zone (across all inbound roads), Charging hours, 07:00-18:00, 2002 to 2007.



Traffic has been relatively stable across most vehicle types in all post charging years. The annualised total for the 2007 counts is comparable to 2006 figures, demonstrating no net impact from the western extension on a year-by-year basis. The anticipated increase of 2 percent as a result of the introduction of the western extension is not immediately visible from the data – which probably reflects the continuing background decline in traffic volumes in central and inner London, as described in previous annual monitoring reports.

Annualised results for 2007 compared with pre charging conditions in 2002 reveal reductions of 16 percent in total vehicles, 21 percent in vehicles with four or more wheels and 29 percent in potentially-chargeable vehicles, as shown in Table 3.1. The traffic reductions achieved in 2003 in the months after the introduction of charging in the original central zone have therefore been maintained. Note that this and other indicators in this section have been re-based to reflect the revised charging hours.

Table 3.1 Key year-on-year changes to traffic entering the central London charging zone during charging hours, 07:00-18:00.

	2003 vs 2002	2004 vs 2003	2005 vs 2004	2006 vs 2005	2007 vs 2006	2007 vs 2002
All vehicles	-14%	0%	-2%	0%	0%	-16%
Four or more wheels	-18%	-1%	-2%	-1%	0%	-21%
Potentially chargeable	-27%	-1%	-3%	0%	1%	-29%
- Cars and minicabs	-33%	-1%	-3%	-1%	0%	-36%
- Vans	-11%	-1%	-4%	2%	1%	-13%
- Lorries and other	-10%	-5%	-4%	6%	9%	-5%
Non chargeable	17%	1%	-1%	-1%	-1%	15%
- Licensed taxis	17%	-1%	1%	-3%	-5%	7%
- Buses and coaches	23%	8%	-4%	-3%	5%	31%
- Powered two-wheelers	13%	-2%	-9%	0%	-3%	-3%
- Pedal cycles	20%	8%	7%	7%	12%	66%

Figure 3.2 shows volumes of traffic entering the original charging zone by time of day. The lines in the graph, which represent annualised counts based on comparable spring and autumn counts of each year, show that traffic reductions have been sustained. Also evident is the continuing trend of small year-on-year reductions in traffic entering the central charging zone, reflecting the now well-recognised trend towards general background decline to traffic volumes in central and inner London.

The effect of the change of charging hours is also evident in terms of a clear shift in traffic entering the zone during the 18:00-18:30 period. Traffic entering the zone during the evening peak period follows a flatter profile than in the previous years with no distinct additional peak reflecting drivers awaiting the end of charging hours. The continued reduction of this effect – a persistent feature of the year-on-year comparisons – is a key post charging trend.

In addition to these periodic manual classified traffic counts, traffic entering the charging zone is monitored on a continuous basis using permanent automatic counters at eighteen of the busier inbound roads. This indicator as reported in previous annual monitoring reports has been re-based to take account of the changed operating hours of the scheme and the addition of two automatic counters for western extension monitoring purposes.

Figure 3.2 Traffic entering the central London charging zone by time of day. Annualised weekdays for 2002 (pre charging), and 2003 to 2007 (post charging), all vehicles.

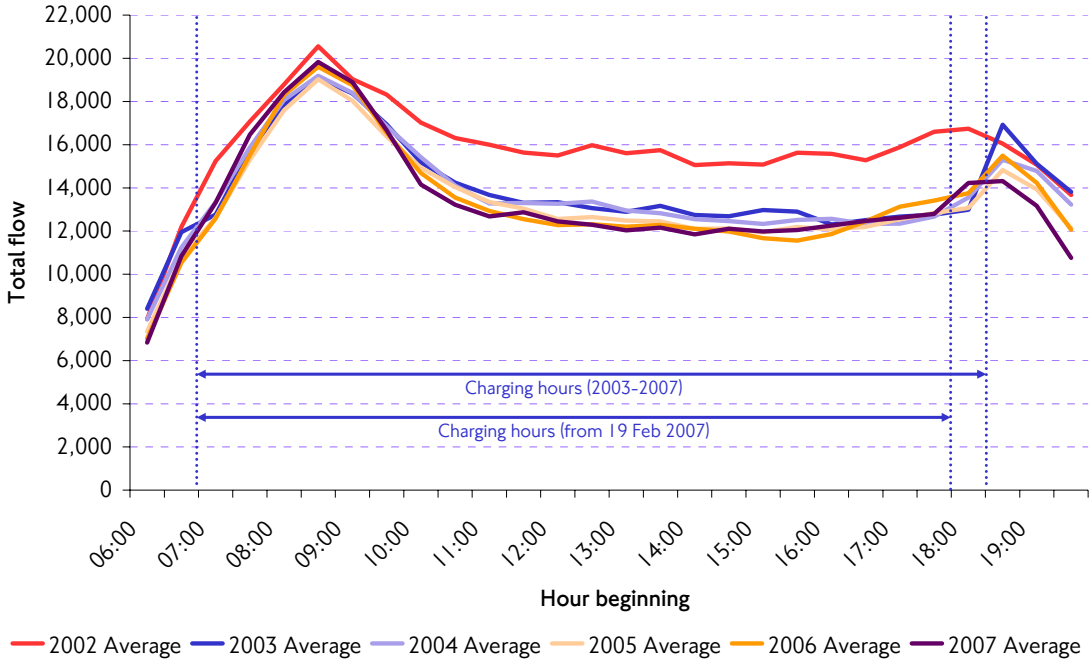
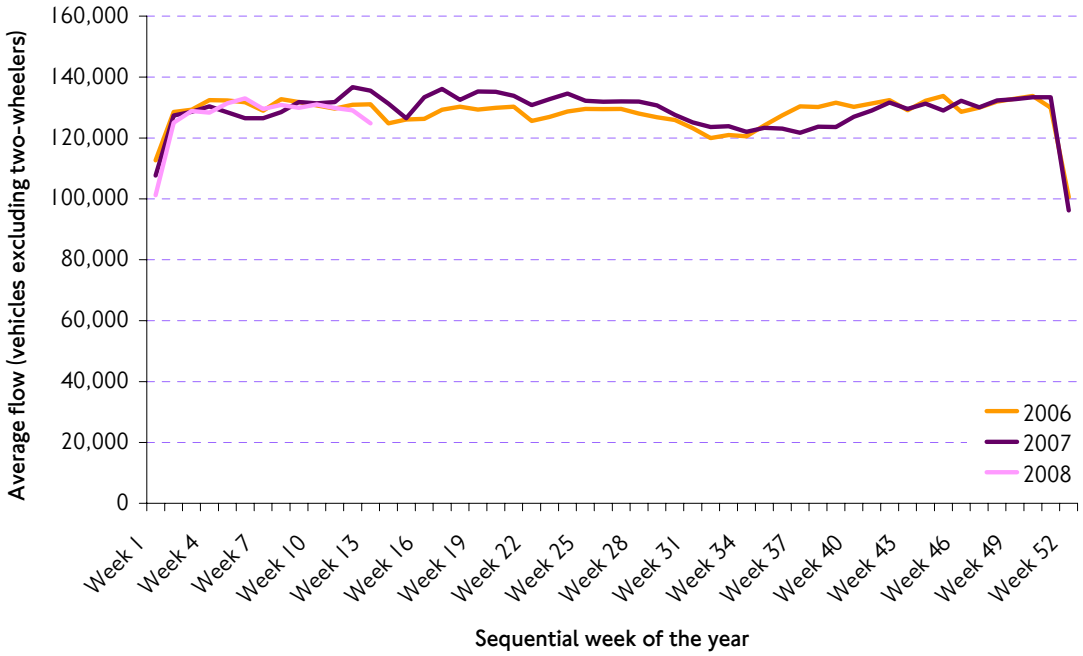


Figure 3.3 shows the available time series for this indicator. Following the introduction of the western extension in February 2007 traffic entering the original zone increased by up to 5 percent compared with equivalent weeks in 2006.

Figure 3.3 Weekly average daily flow across 18 major roads entering the original central London congestion charging zone. Charging hours, 07:00-18:00, 2006 to 2008, vehicles with four or more wheels.



However, from the summer of 2007 onwards traffic entering the original zone has settled at or below 2006 levels, this trend being maintained into 2008. It therefore appears from this indicator that the introduction of the western extension did have an initial material impact on volumes of traffic circulating in the original charging zone. However, this was a transitory phenomenon, possibly reflecting an acceleration to the previously observed trend of background decline to traffic volumes in central and inner London. Confirmation of this assessment will however need to await the availability of the full range of wider London traffic indicators for 2007 and 2008.

Interaction between the central zone and the western extension

The indicators described above demonstrate that the central zone has seen no lasting adverse impact following the introduction of the western extension. TfL has set up specific indicators to examine more closely the interaction in terms of traffic between the original and extended charging zones and to determine more accurately the effects of the extension.

By analysing the manual classified counts on the central zone boundary by geographical sector it is possible to identify any increases in traffic entering the central zone from the west. Table 3.2 shows the difference between 2006 and 2007 annualised flows entering the charging zone from the north, south, east and west sectors by vehicle type. While there are no overall changes in the total number of vehicles entering the zone the picture is more variable when traffic is broken down by geographical sector.

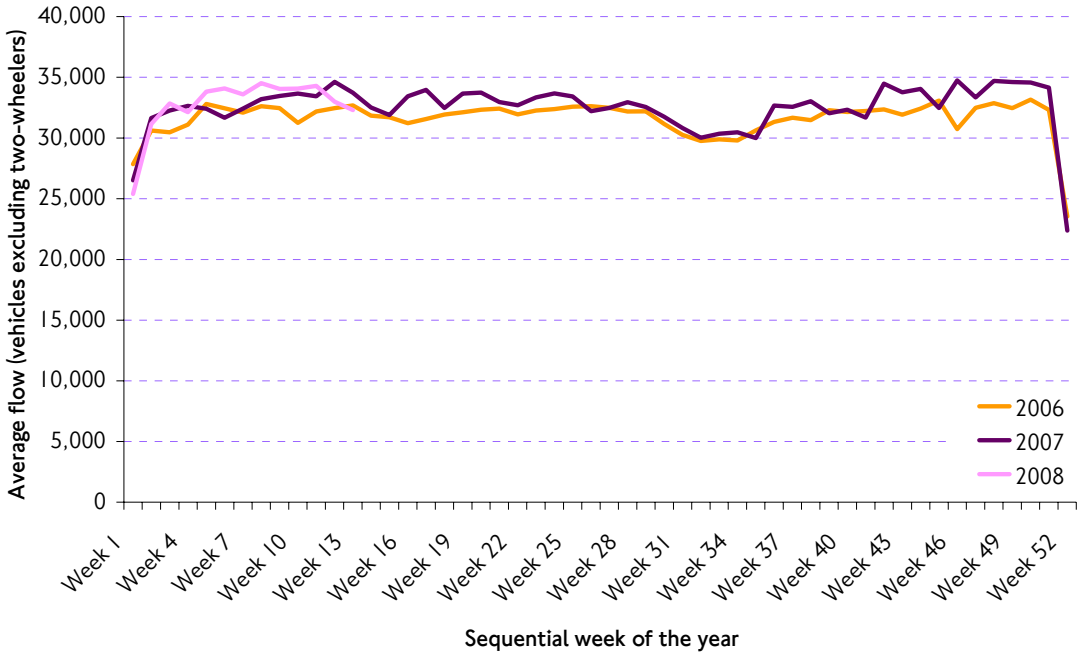
Table 3.2 Percentage change in traffic entering the central London charging zone during charging hours, 07:00-18:00, by geographical sector. Annualised 2006 and 2007 only.

	Geographical sector				
	North	East	South	West	All
All vehicles	-4%	-1%	9%	1%	0%
Four or more wheels	-4%	-1%	5%	1%	0%
Potentially chargeable	-2%	-2%	4%	5%	1%
- Cars and minicabs	-3%	1%	-1%	5%	0%
- Vans	0%	-11%	8%	6%	1%
- Lorries and other	-1%	14%	24%	1%	9%
Non chargeable	-6%	1%	19%	-4%	-1%
- Licensed taxis	-11%	0%	19%	-6%	-5%
- Buses and coaches	1%	7%	8%	5%	5%
- Powered two-wheelers	-6%	-10%	21%	-10%	-3%
- Pedal cycles	5%	13%	27%	5%	12%

Potentially chargeable vehicles entering the zone from the west have increased by 5 percent, reflecting the changed conditions in the western extension. This is compensated by a reduction in taxis, leading to only a slight net increase in vehicles with four or more wheels. This indicator also shows net increases to traffic entering the original charging zone from the south, which may also be connected to the changed conditions in the western extension.

A further indicator based on a small subset (four) of the 18 permanent automatic traffic counters measuring traffic entering the zone from boundary points adjacent to the free passage route is shown in Figure 3.4. Some increases in traffic entering the zone from these locations has been observed although due to the small number of sites this indicator is prone to volatility. According to this indicator, on average there has been an increase of 3 percent in traffic entering the central zone from the free passage route.

Figure 3.4 Weekly average daily flow across four major roads entering the original central London charging zone from the free passage route. Charging hours, 07:00-18:00, 2006 to 2008, vehicles with four or more wheels.



3.4 Traffic leaving the original charging zone

Figure 3.5 presents a re-based time series, to reflect the new operating hours of the scheme, for total number of vehicles leaving the central zone. Aggregate and individual vehicle flows are comparable to those of 2006. The profile of traffic leaving the zone by time of day also remained broadly unchanged (Figure 3.6). It is also worth noting the apparent increase in traffic leaving the zone during the latter part of the day since 2006.

Figure 3.5 Traffic leaving the central London charging zone (across all inbound roads). Charging hours, 07:00-18:00, 2002 to 2007.

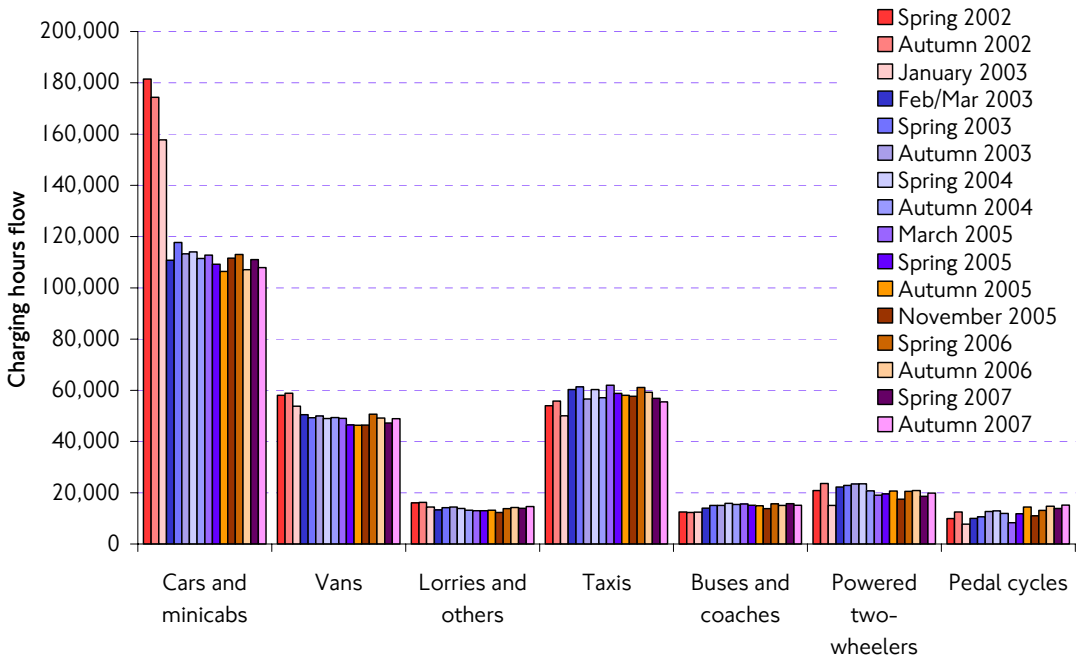
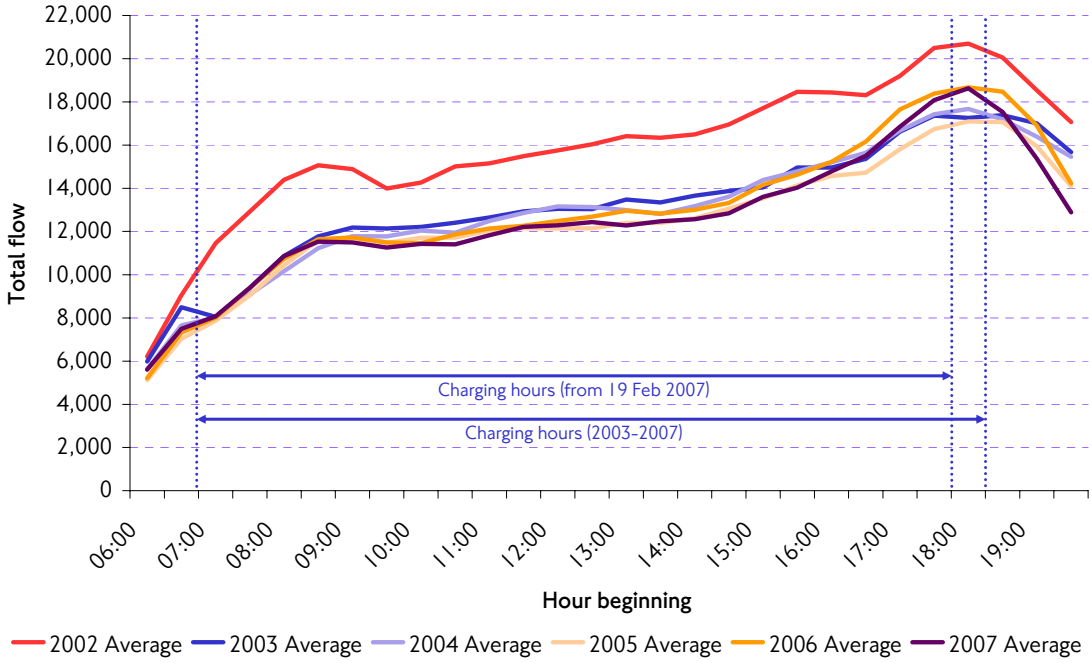


Figure 3.6 Traffic leaving the charging zone by time of day. Annualised weekdays for 2002 (pre charging), and 2003 to 2007 (post charging), all vehicles.



3.5 Traffic circulating in the central zone

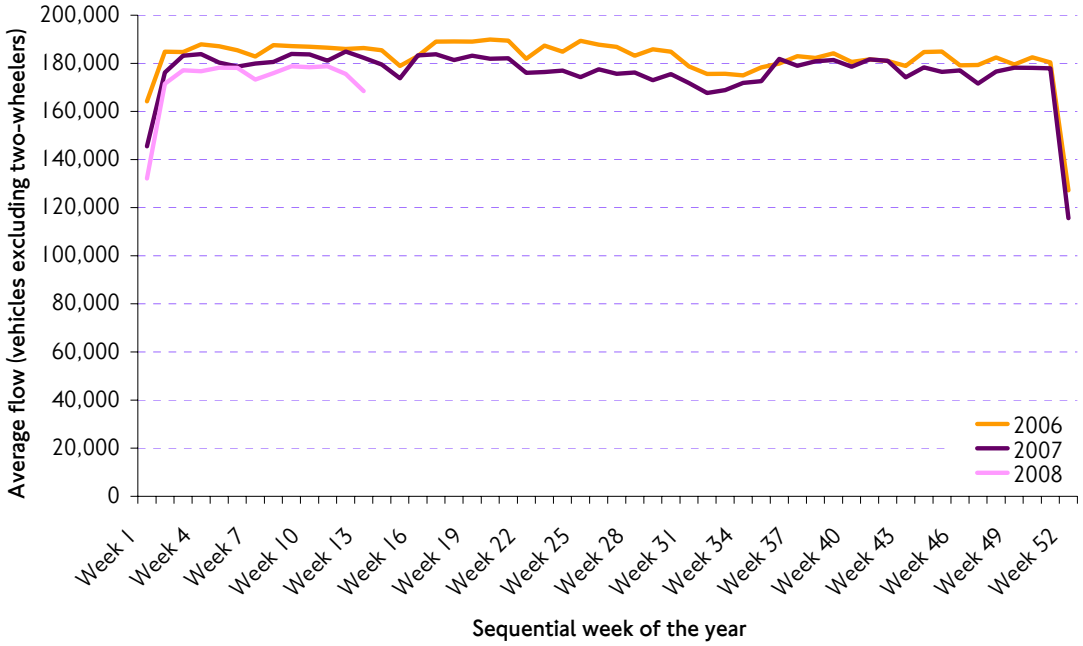
One of the main indicators used to monitor traffic circulating within the original charging zone is an estimate of vehicle-kilometres. This indicator has been re-based from 2005 onwards to account for the change in operating hours of the scheme and the re-based time series is shown in Table 3.3. There has been very little change in the estimated vehicle-kilometres driven in the central zone during 2007 compared with equivalent figures for 2006.

Table 3.3 Vehicle-kilometres (vkm) within the central London congestion charging zone and percentage contribution to total traffic during charging hours, 07:00-18:00. Annualised weekdays for 2005, 2006 and 2007.

	2005		2006		2007		% change 05 to 06	% change 06 to 07
	vkm (000s)	% of Total	vkm (000s)	% of Total	vkm (000s)	% of Total		
All vehicles	1.33	100%	1.34	100%	1.34	100%	1%	0%
Four or more wheels	1.11	83%	1.12	84%	1.10	83%	1%	-2%
Potentially chargeable	0.76	57%	0.78	58%	0.77	58%	3%	-1%
- Cars and minicabs	0.44	33%	0.46	34%	0.44	33%	4%	-4%
- Vans	0.25	19%	0.25	19%	0.25	19%	3%	0%
- Lorries and other	0.07	5%	0.07	5%	0.07	5%	2%	9%
Non chargeable	0.57	43%	0.56	42%	0.57	42%	-3%	2%
- Licensed taxis	0.29	22%	0.27	20%	0.27	20%	-5%	-1%
- Buses and coaches	0.06	5%	0.07	5%	0.06	4%	4%	-11%
- Powered two-wheelers	0.13	9%	0.12	9%	0.12	9%	-4%	2%
- Pedal cycles	0.09	7%	0.09	7%	0.11	8%	-1%	17%

Figure 3.7 shows equivalent data from permanent automatic traffic counters located at a representative selection of sites within the charging zone. Traffic flows in 2007 seem to be comparable to the previous year and there is no apparent 'western extension' effect, although the trend towards lower relative volumes in 2007 and into 2008 is clearly visible.

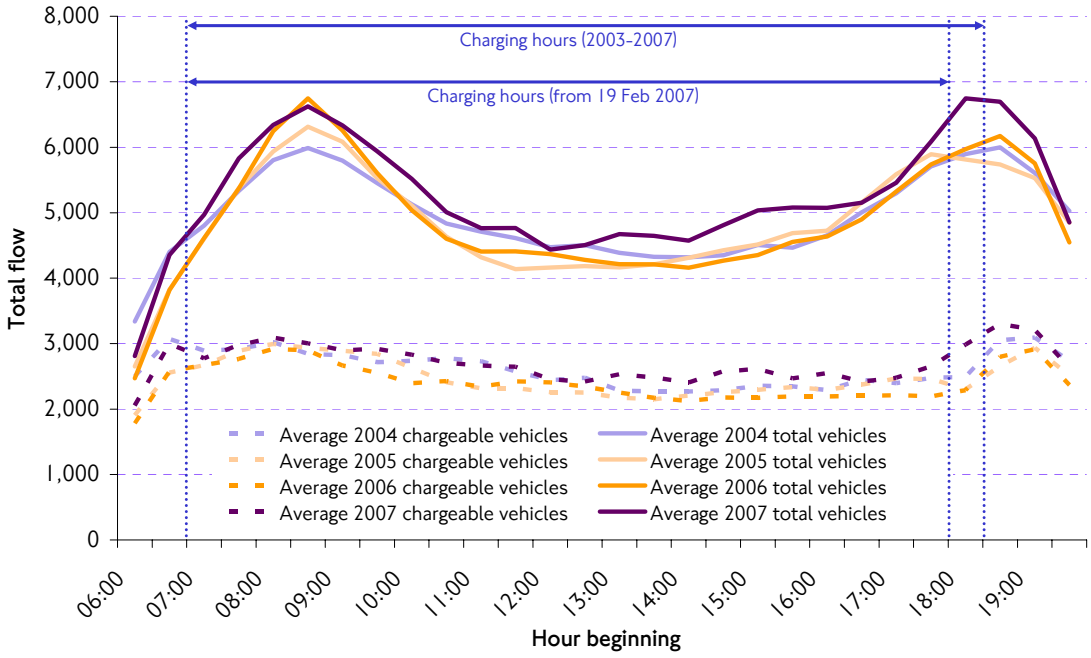
Figure 3.7 Traffic circulating within the central London congestion charging zone across a sample of 30 one-way permanent counting sites. Average weekly flows, charging hours, 07:00-18:00, vehicles with four or more wheels.



Thames bridges screenline

Another indicator of traffic circulating within the charging zone is provided by counts of traffic crossing the six Thames bridges inside the charging zone (the Thames screenline). This is shown by Figure 3.8.

Figure 3.8 Flows across the Thames screenline within the central London congestion charging zone, by time of day, 2004 to 2007.

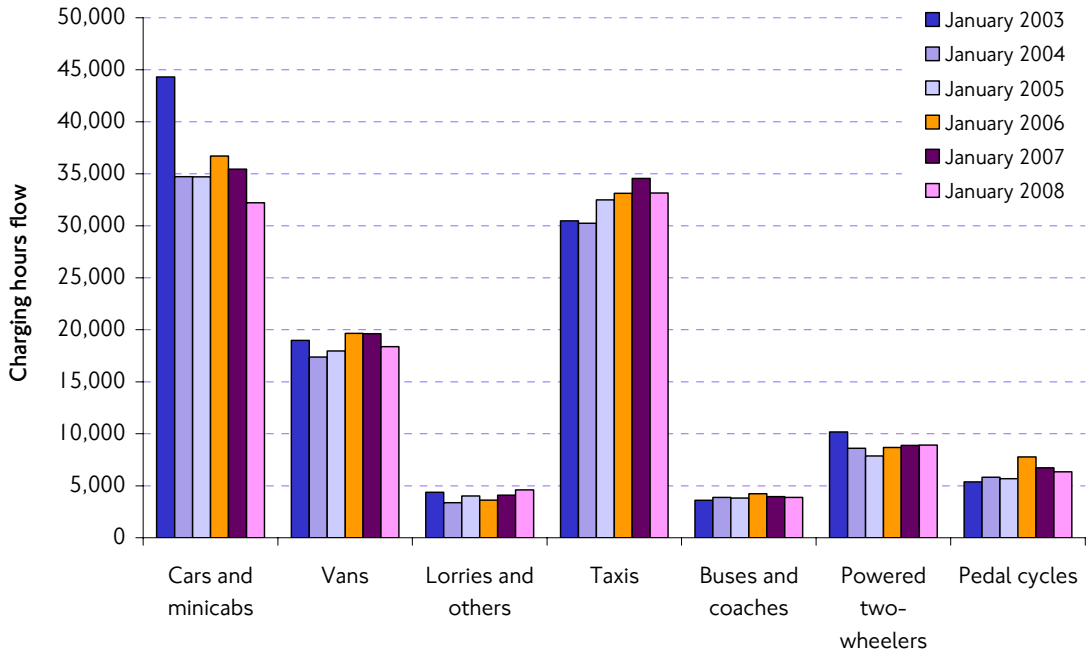


In contrast to the indicators of circulating traffic just considered, a trend towards higher volumes across the Thames in 2007 is evident with an indicated 7 percent overall increase during charging hours during 2007 relative to 2006. Vans and lorries increased by the greatest amount, leading to an increase of potentially chargeable vehicles of 11 percent.

Northern screenline

A further indicator of traffic circulating within the central zone consists of the portion of the 'northern screenline' that lies within the charging zone running from a point north of the Thames on the Victoria Embankment to near St Pancras station. Counts along this screenline are undertaken in January of each year. The available data series is presented in Figure 3.9. These exclude flows on the Inner Ring Road itself at St Pancras. The 2008 traffic flows appear to be very similar to 2007 immediately before the introduction of the western extension, although some reduction to cars and minicabs are evident.

Figure 3.9 Flows across the northern screenline within the charging zone. Charging hours, 07:00-18:00, January 2003 to January 2008.



3.6 Traffic on the Inner Ring Road

The Inner Ring Road comprises the 'free passage route' between the two charging zones and the remaining 'eastern' section around the original central London charging zone. As the boundary route of the central congestion charging zone it offers drivers, making through trips and wishing to avoid paying the charge, an alternative route. As reported previously in the *Fifth Annual Impacts Monitoring Report* traffic levels on this key route for all years following the introduction of the original scheme in 2003 were comparable to pre charging levels in 2002. This picture has continued in 2007. TfL expected this route to be largely unaffected in terms of overall traffic by the introduction of the western extension.

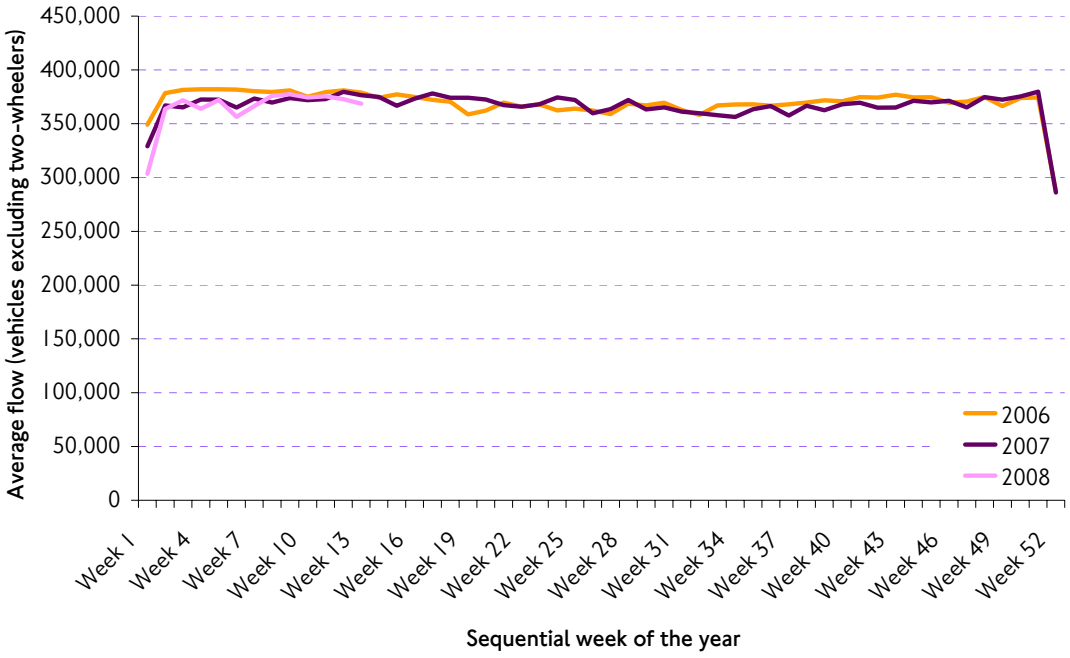
Table 3.4 shows the estimated vehicle-kilometres driven on the Inner Ring Road by main vehicle type. The indicator shows remarkable stability overall with only a statistically significant increase in vehicle-kilometres by two-wheeled vehicles in 2007 compared with 2006.

Table 3.4 Estimates of vehicle-kilometres driven (vkm) on the Inner Ring Road during charging hours, 07:00-18:00. 2005-2007.

	2005 vkm (000s)	2006 vkm (000s)	2007 vkm (000s)	% change 05 to 06	% change 06 to 07
All vehicles	0.62	0.63	0.63	0%	0%
Four or more wheels	0.58	0.58	0.58	-1%	-1%
Potentially chargeable	0.48	0.47	0.47	-2%	-1%
- Cars and minicabs	0.34	0.32	0.32	-4%	-2%
- Vans	0.11	0.11	0.11	-1%	2%
- Lorries and other	0.03	0.04	0.04	11%	0%
Non chargeable	0.14	0.16	0.16	9%	2%
- Licensed taxis	0.08	0.08	0.08	6%	-2%
- Buses and coaches	0.03	0.03	0.03	7%	-3%
- Powered two-wheelers	0.03	0.03	0.04	11%	12%
- Pedal cycles	0.01	0.01	0.01	33%	7%

Figure 3.10 shows data from the 17 permanent automatic traffic counters located on main links along the Inner Ring Road. Again no significant changes to traffic are evident. TfL therefore concludes that overall traffic on the Inner Ring Road has been unaffected by the introduction of the western extension.

Figure 3.10 Weekly average traffic flows on the Inner Ring Road. Charging hours, 07:00-18:00, 2006 to 2008, vehicles with four or more wheels.



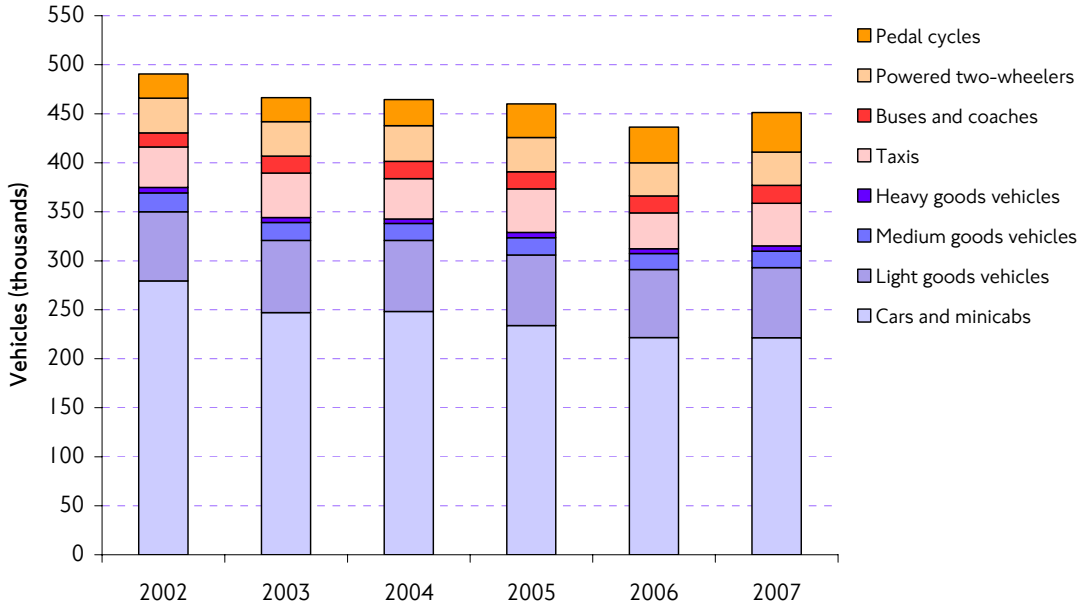
3.7 Radial traffic approaching the charging zone

The extended version of the TfL central London cordon which lies wholly outside the central congestion charging zone is the primary indicator for measuring radial traffic approaching the zone. Following an initial decline in 2003 of 5 percent in traffic on inner London radial routes and fairly stable levels in 2004 and 2005, TfL reported a further large decline in 2006 in the *Fifth Annual Impacts Monitoring Report*.

The reasons for this decline (7 percent in vehicles with four or more wheels) were not clear, especially since it was not reflected in counts around the central zone boundary. The data for 2007 suggest traffic in the inbound direction has increased somewhat over 2006, although it still remains below 2005 levels. Figure 3.11 shows flows in the inbound direction at this cordon re-based to reflect the new operating hours of the scheme.

Comparing 2007 with 2006 flows there is a 3 percent increase in vehicles with four or more wheels. Cars and minicabs and powered two-wheelers have remained stable while light and medium goods vehicles and buses have seen slight increases. The vehicle types with the most substantial increases however have been pedal cycles (up by 11 percent), heavy goods vehicles (up by 12 percent), and taxis (up by 19 percent). The recent year's trend could be explained by considering 2006 atypical. In that case, the comparison of 2007 with 2005 would reflect a pattern of small year-on-year background decline to traffic which is in line with the overall pattern of background decline to traffic as observed elsewhere. Note that this cordon also passes through the western extension zone, forming the 'internal north-south screenline' (see Section 2.5).

Figure 3.11 Traffic at the central London cordon (extended version wholly outside the original central London charging zone). Inbound direction only, charging hours, 07:00-18.00. Autumn surveys.



3.8 Traffic on selected local roads

Traffic continues to be monitored on a selected local roads around the original central London congestion charging zone at the request of the boroughs. The locations have been selected to specifically detect the possibility of increased traffic on local roads relating to the charging zone and for this reason they do not provide a statistically robust indicator of traffic changes in any of the individual boroughs. The boroughs include the City of Westminster and the Royal Borough of Kensington and Chelsea, which now falls within the western extension to the charging zone.

TfL reported previously that the picture on these local roads was one of slowly declining traffic, concluding that there has been no adverse impact from the introduction of charging in the original central zone. This picture continues in 2007, although the introduction of the western extension complicates interpretation.

Table 3.5 Traffic changes on selected local roads surrounding the original central London charging zone. Charging hours, 07:00-18:00, 2006 to 2008, vehicles with four or more wheels.

Borough and number of sites	2003 versus pre charging	2005 versus pre charging	2007 versus pre charging	2006 versus 2005	2007 versus 2006
Southwark (2)	1%	-1%	-4%	-1%	-2%
Kensington & Chelsea (5)	-1%	-2%	-21%	-2%	-17%
Tower Hamlets (4)	-6%	-4%	-8%	-1%	-3%
Camden (4)	-7%	-10%	-14%	1%	-5%
Westminster (6)	-2%	-3%	-15%	-5%	-8%
All sites (21)	-3%	-4%	-15%	-2%	-9%

3.9 Summary

TfL's traffic monitoring arrangements in respect of the original central London congestion charging zone have continued in 2007. The overall picture is one of stable traffic volumes, with no apparent significant net overall impact from the introduction of the western extension scheme in February 2007. However, relatively small scale spatial and temporal effects reflecting changed conditions resulting from the introduction of the extension zone are nevertheless visible in the data in the months immediately following the introduction of the extension scheme. Although somewhat variable at the detailed level, indicators for 2007 of traffic entering and leaving the original charging zone, circulating within it or making radial or orbital movements outside it are broadly comparable to 2006.

4. Congestion

4.1 Introduction

This section reviews trends in congestion in and around the extended central London congestion charging zone, updating and extending the material presented in previous reports in this series, and reviewing the first full year of the western extension scheme. This section first reviews recent trends in congestion in central London, as reported in TfL's *Fifth Annual Impacts Monitoring Report*. Updated congestion measurements for 2007 are then presented across the range of relevant indicators. These are followed by an updated analysis considering recent trends in the light of developments related both to the charging scheme itself and also more widely in central London.

4.2 Key findings from previous reports

Previous annual impacts monitoring reports have described how TfL defines and measures congestion in relation to the scheme. In summary, key indicators are provided by a series of moving car observer surveys of road network speeds. Congestion is measured in terms of an **excess travel rate** (expressed as minutes per kilometre – the inverse of speed). This is defined pragmatically as the difference between the travel rates in the early hours of the morning, representing nominally uncongested conditions, and those during charging hours.

TfL's previous reports have set out trends and analysis in relation to congestion in and around the original central London charging zone. TfL's *Fifth Annual Impacts Monitoring Report*, reporting primarily on conditions up to and during 2006 and in relation to the original central London charging zone, noted that:

- Although congestion charging delivered substantial decongestion benefits during 2003, 2004 and 2005, in line with TfL's prior expectations of reductions between 20 and 30 percent, network conditions during 2006 in the original charging zone appeared to change significantly.
- TfL observed a tendency towards sharply increased congestion in central London and more variable network conditions in relation to the earlier years of the scheme. Average congestion in the original charging zone during 2006 was 8 percent lower than the value representing conditions before implementation of the original scheme in 2002, compared with typical reductions in the 20 to 30 percent range in earlier years.
- This change occurred despite traffic levels remaining broadly stable – strongly suggesting that changes to effective network capacity were primarily responsible.
- Exploratory analysis was presented, looking at the prevalence of road and street works and changes to traffic signal prevalence and timings within the original charging zone. TfL observed a general correlation between the prevalence and intensity of these interventions, and the corresponding congestion measurements. It was however clear from the exploratory analysis that other factors were also involved, although systematic analysis of these factors would necessarily be a longer term process.

- Increased road and street works were widely acknowledged to be significantly affecting the performance of the central London road network. These reflected developments such as the systematic replacement of sub-surface infrastructure by utility companies – generally agreed to be an urgent priority – together with increased building, construction and development work reflecting recent buoyant economic conditions.
- The relationship of changes to other features of the network, such as traffic signal timings and junction capacity, was less clear. The increasing extent of these changes was generally acknowledged as reflecting contemporary policy priorities, such as prioritisation for buses, cyclists and pedestrians, and wider improvements to the urban realm.
- TfL identified more than 20 other categories of intervention or incident that could be contributing to the observed congestion trends, and embarked on a thorough but necessarily long-term research project to enable it to more fully understand the factors influencing network performance.
- Importantly, exploratory modelling work suggested that the impact of these various interventions and incidents was strongly compounding rather than simply additive, and that widespread incremental removal of network capacity was reducing the 'resilience' of the network and its ability to accommodate out-of-course events. Therefore, understanding the interaction of various combinations of interventions or incidents was fundamental to facilitate improved future network planning.
- It was also clear from the range of other indicators presented in the report that gradually increasing congestion was a widespread and longer-term feature in London, and that these trends were largely independent of trends in traffic flow.
- Given this backdrop, TfL considered that comparison of congestion indicators for 2006 against the original pre charging baseline in 2002 was increasingly inappropriate, and presented analysis comparing observed conditions in 2006 against a projection of what conditions would have been like in the absence of congestion charging, all other things being equal. This analysis suggested that road users in the original charging zone were receiving comparable **relative** congestion relief to that applying in the earlier years of the scheme – in the sense that congestion would be significantly worse in the absence of the scheme.

4.3 Key developments during 2007

Established moving car observer surveys of congestion in and around the original central London charging zone continued during 2007 and into 2008. As well as monitoring ongoing trends, these surveys would have a specific role in relation to identifying any changes in network performance inside the original central London charging zone that might have resulted from traffic volume changes associated with the introduction of the western extension in February 2007. The range of new surveys, designed specifically to monitor the western extension zone and fully described in the *Fifth Annual Impacts Monitoring Report*, have also now produced a comprehensive set of measurements of congestion in and around the western extension, reflecting the first year or so of operation of the extended scheme.

Key findings for 2007 are that:

- Conditions in the original central London charging zone continue to be comparable to those observed in 2006, with highly variable network conditions and levels of congestion substantially higher than those observed during the early years of the scheme. As discussed in Section 3 of this report, traffic volumes in the original central zone are similar overall to those of 2006, with no significant lasting traffic volume impact from the western extension.
- By comparison with likely conditions in the absence of charging, road users in the zone might be considered to benefiting from levels of congestion reduction comparable to those initially achieved. However, the absolute level of congestion during 2007 was effectively identical to the representative value for conditions before the scheme was introduced in 2002. This compares to reductions of 30 percent during the initial years of the scheme. In other words, journey times inside the zone during 2007 were comparable to those prior to charging.
- Conditions on the Inner Ring Road around the original charging zone, part of which also forms the 'free passage route' between the original and western extension charging zones, were comparable in 2007 to those in earlier years. Drivers on this route are still benefiting from some small reductions in absolute levels of congestion.
- Post-implementation measurements of congestion in the western extension zone are highly and unexpectedly variable, despite sustained reductions to traffic. Results from surveys taken shortly after implementation had shown significant congestion reductions of the order expected by TfL. However, more recent surveys of the western extension have returned measurements that are more closely comparable to those applying before the introduction of the scheme during 2005 and 2006. Given the volatility of this measure, it is too early as yet to establish whether or not the apparent trend is a real or enduring one, or to comprehensively understand the factors responsible.
- Surveys of congestion on the boundary route surrounding the western extension show comparable conditions to those applying before the introduction of the extension scheme and there are no indicators of adverse effects from changed traffic flows on this route.
- Although the traffic data discussed in Section 2 of this report suggests small increases to traffic volumes on the western extension boundary road, as anticipated by TfL, it seems that small increases are being satisfactorily accommodated by the traffic management arrangements put in place by TfL in advance of the extension scheme.
- Surveys of congestion on main radial routes approaching both the original central London charging zone and the western extension zone show small reductions in congestion, reflecting overall reductions to traffic moving to and from the respective parts of the extended charging zone, together with improved traffic management arrangements.
- A 2007 survey of congestion on main roads in inner London, of which the western extension zone forms a significant part, shows reductions over the previous survey in 2006, and broadly comparable conditions to those prevailing in 2005.

- Comprehensive re-surveys of the key networks during the overnight uncongested periods reveal sharp and comprehensive falls in average night-time speeds. These speeds are used pragmatically to provide the 'base' uncongested network travel rates against which traffic delay or congestion is measured. These findings differ from previous experience of stable overnight conditions, and are strongly indicative of widespread changes to the effective capacity of the main road networks in central and inner London.
- Although at this stage these new measures of overnight speeds require confirmation and further research, and must therefore be treated with caution, they have implications for the comparative assessment of pre and post charging congestion levels in both parts of the extended charging zone.
- An exploratory analysis method has been used to examine the statistical patterns of the component data underlying the aggregate measurements of congestion. This suggests that, in addition to reductions in network capacity, out-of-course disruptions associated with temporary interventions and incidents such as street and road works are a significant determinant of the variability that is a feature of recent congestion measurements in and around the extended charging zone.

The following sections review and update the available congestion indicators for 2007, present the results of some exploratory analysis of the congestion data, and discuss relationships to principal causative factors.

A note about charging hours

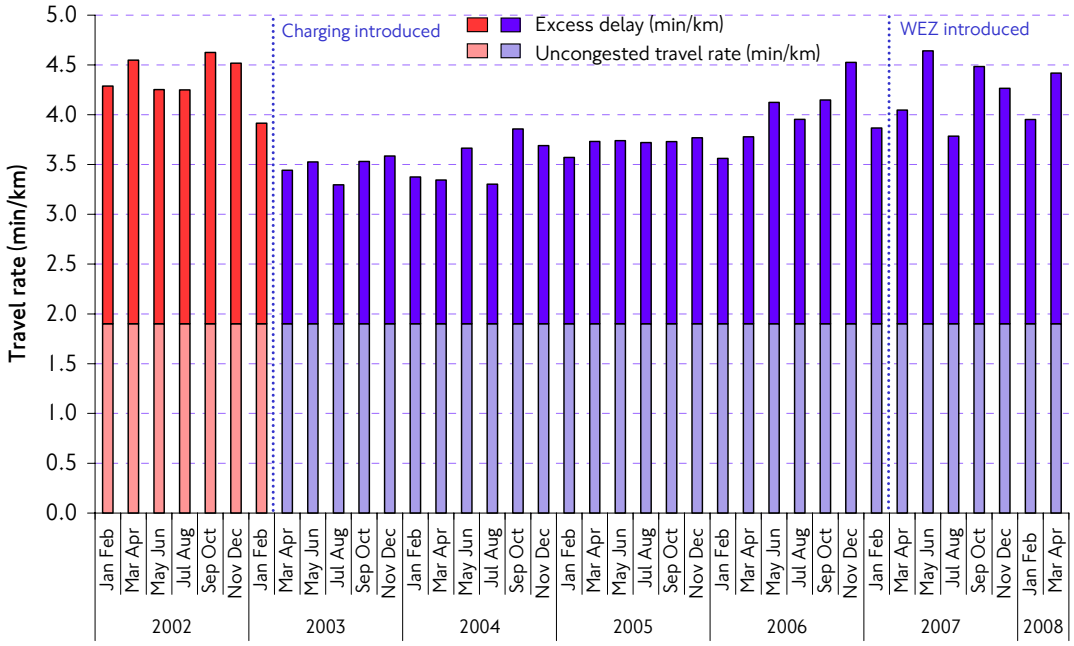
With the introduction of the western extension in February 2007, charging hours for the whole extended central London congestion charging zone were revised to end earlier in the evening, as discussed in Section 1. This created a minor complication for the congestion measurements in that the time window to which the PM peak period survey applied was reduced. Methodologically, however, this does not affect the comparability of the aggregate results as survey 'runs' were in both cases timed to end before 18:00. No re-basing of the time series for these measurements is therefore required.

4.4 Congestion inside the original central London charging zone

Figure 4.1 shows updated results from TfL's bi-monthly moving car observer speed survey of congestion inside the original central London charging zone. The intensity of congestion is shown by the relative height of the dark blue portion of the bars.

The trend towards increased congestion and more variable network conditions, first observed in 2006, has continued during 2007 and into 2008. Average levels of congestion in the 2007 calendar year, measured against an uncongested travel rate of 1.8 minutes per kilometre, were identical to the representative level applying before the introduction of the scheme in 2002. Average excess travel rates were 2.3 minutes per kilometre. This compared to reductions of 8 percent in 2006, and typical reductions of up to 30 percent in the early years of the scheme.

Figure 4.1 Congestion in the original central London charging zone during charging hours. Moving car observer surveys.



A variety of comparisons are now possible using these data. Table 4.1 sets out the more relevant of these.

Table 4.1 Comparative congestion statistics for the original central London charging zone. Moving car observer surveys. Charging hours.

Averaging period	Number of surveys	Mean excess travel rate (minutes per kilometre)	Difference 2002 representative value (%)
2002 calendar year – observed average	6	2.5	+ 8%
2002 calendar year – representative level	6	2.3	base
2003 post charging	5	1.6	- 30%
2004 post charging	6	1.6	- 30%
2005 post charging	6	1.8	- 22%
2006 post charging	6	2.1	- 8%
2007 post charging	6	2.3	0%
2008 January – April	2	2.3	0%

In brief:

- Congestion in the original charging zone has been assessed against a selected 'representative' value for conditions in 2002 of 2.3 minutes per kilometre. This is lower than that actually observed – 2.5 minutes per kilometre (see TfL's *First Annual Impacts Monitoring Report*), to avoid the effect of what were regarded as abnormal conditions caused by road works in 2002, some of which were connected with the introduction of the original charging scheme.
- 2003 and 2004, the years immediately following the introduction of the original scheme, saw average reductions in congestion of 30 percent against the representative 2002 baseline. This was towards the top end of TfL's range of expectation, of between 20 and 30 percent.
- The average reduction for the 2005 calendar year was 22 percent, lower than 2003/04 but still within TfL's original range of expectation.
- 2006 and 2007 however saw accelerating loss of the original congestion benefits. Average congestion in 2006 was just 8 percent below pre charging levels. Average congestion in 2007 was identical to representative pre charging values. This is in spite of sustained reduction in the volume of traffic circulating within the original charging zone.
- Neither the charge increase from £5 to £8 in July 2005, nor the introduction of the western extension in February 2007 and associated extension of residents' discounts, were associated with visible discontinuities in the time series of congestion measurements, suggesting that any impacts arising from these changes were subsumed by more pervasive 'background' influences on congestion.
- The new data on night-time speeds in the original central London congestion charging zone (see Section 4.13) suggests that, over the period covered by Figure 4.1, the 'base' network conditions against which the amount of congestion is assessed, have deteriorated.
- This means that comparison of recent congestion levels against static pre charging conditions is inappropriate and that, for the more recent surveys in Figure 4.1, the proportion of the total travel rate accounted for by the light-blue portion of the bars should be higher, and the dark-blue proportion lower, than is shown. It is not however possible to quantify this exactly at this stage.
- TfL are treating the night-time speed data with caution. Night-time speeds have been very close to constant between the 1970s and 2004, and the most recent data point (for 2007) would represent a significant departure that is so far not fully explained.

4.5 Congestion on the Inner Ring Road

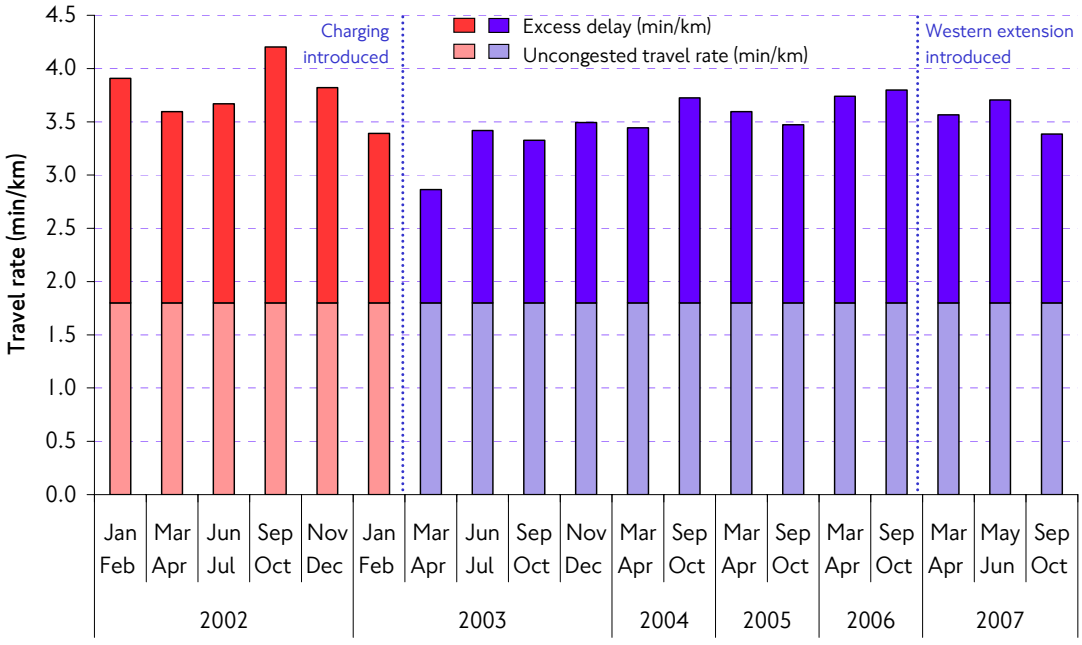
The Inner Ring Road forms the boundary of the original central London charging zone. No charge applies to vehicles using this route. The western portion of the Inner Ring Road, between Edgware Road and Vauxhall Bridge, also forms the 'free passage route', running between the original and extended charging zones.

Concerns were raised before the introduction of the original charging scheme that traffic diverting on to the Inner Ring Road to avoid paying the charge could lead to increased congestion on this key route. However, improved traffic management arrangements, combined with broadly unchanged aggregate traffic levels, meant that TfL in fact initially recorded reductions in congestion of up to 20 percent compared with pre charging conditions in 2002. As more generally in central London more recent measurements have suggested levels of congestion that are closely comparable to those applying before the introduction of the original scheme, again in the context of generally stable traffic volumes on this key route.

Similar concerns were raised in relation to the free passage route prior to the introduction of the western extension in February 2007, although TfL again expected that traffic re-distribution around the extended charging zone combined with further improved traffic management arrangements would lead to broadly unchanged conditions on this part of the boundary route.

Figure 4.2 shows updated results from TfL's periodic moving car observer speed survey of congestion on the Inner Ring Road. Results for 2007 following the introduction of the western extension are broadly comparable to those applying in 2006, suggesting stable overall conditions with no apparent net deterioration that might be attributable to the western extension scheme. Compared to conditions before the introduction of the original scheme in 2002, users of the Inner Ring Road continue to benefit from small overall reductions in congestion. In contrast to the equivalent indicator for congestion inside the original central London charging zone, there is no evidence of deterioration to conditions during 2007 on this route.

Figure 4.2 Congestion on the Inner Ring Road during charging hours. Moving car observer surveys.



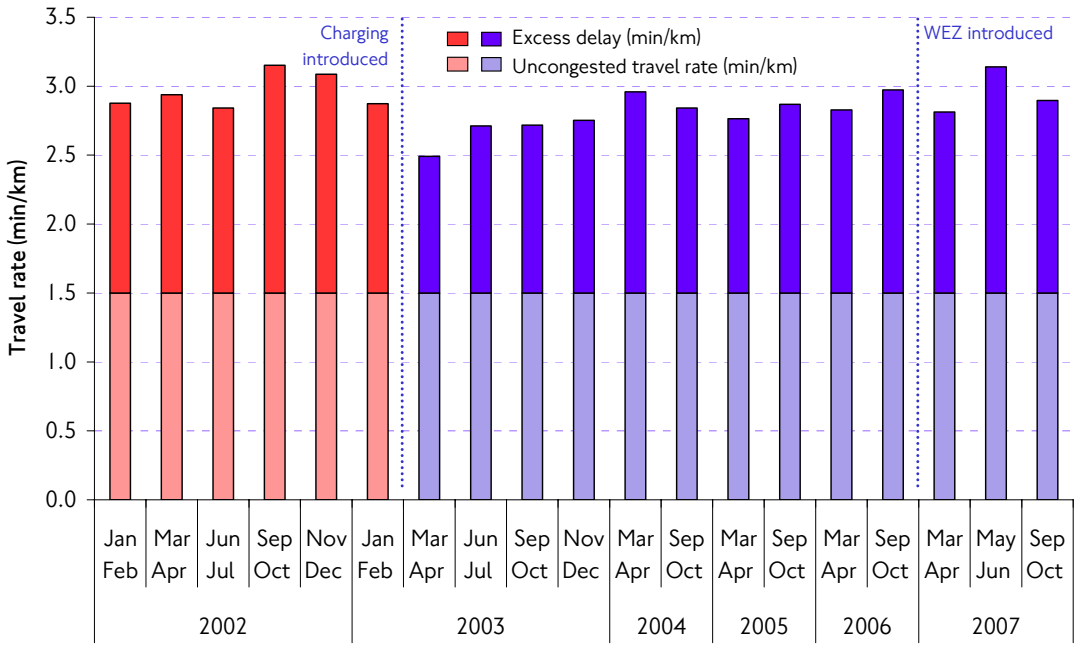
4.6 Congestion on radial routes approaching the original central London charging zone

Congestion on main radial routes approaching the original central London zone has been surveyed as part of the moving car observer survey arrangements for the Inner Ring Road. This survey covers a representative selection of main radial routes up to a distance of several kilometres from the original charging zone. It is intended to measure any effects arising from changes to traffic moving to or from the original charging zone.

Figure 4.3 shows the available time series for this survey. Surveys to the end of 2006 typically indicated continuing small reductions to congestion over conditions prior to the introduction of the original scheme in 2002, with average delays of 1.4 minutes per kilometre comparing to typical pre charging delays of 1.5 minutes per kilometre.

Three surveys were undertaken during 2007, and it should be noted that some of the routes external to the original central London zone that are covered by this survey lie inside the western extension zone. Results are broadly comparable to previous surveys, with the exception of the May/June 2007 survey which, as in the original charging zone itself, recorded comparatively high levels of congestion. Typical delays on these routes nevertheless remain below the representative pre charging value of 1.5 minutes per kilometre.

Figure 4.3 Congestion on main radial routes approaching the original central London charging zone during charging hours. Moving car observer surveys.

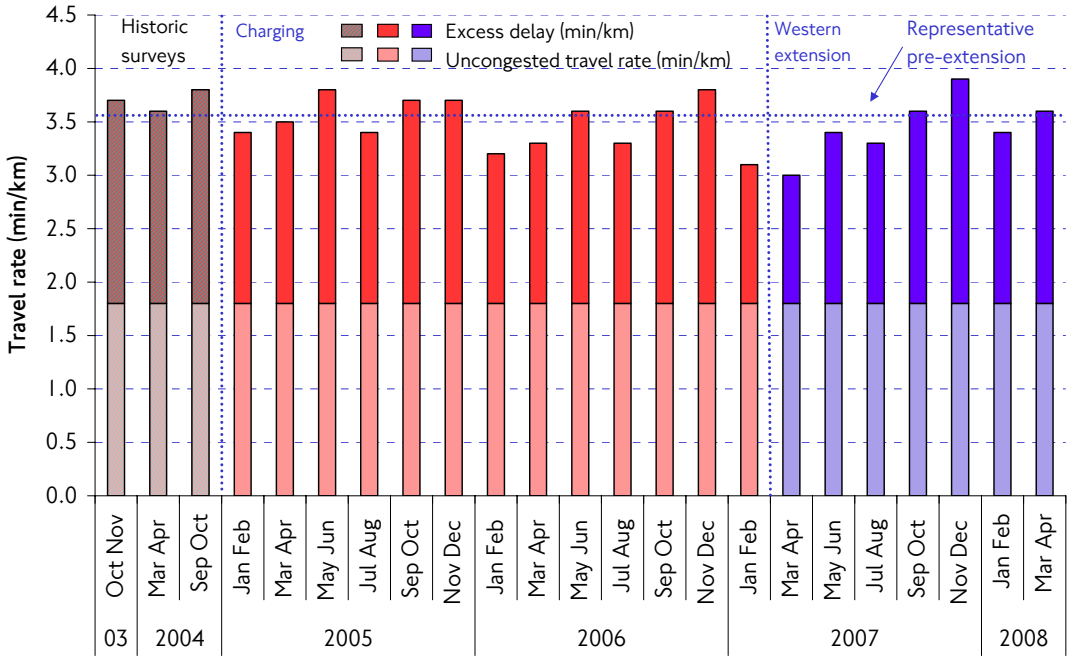


4.7 Congestion inside the western extension zone

TfL's *Fifth Annual Impacts Monitoring Report* described the new moving car observer surveys that TfL had put in place to monitor congestion in and around the western extension zone. Regular surveys were to be conducted within the extension zone itself, on the boundary route and in a wider annulus surrounding the extension zone. These surveys were similar in scope and intensity to those continuing to be applied to the original charging zone, allowing comparability between the different indicators.

The report also set out comprehensive measurements of congestion inside the extension zone, taken before the introduction of the extension scheme, against which results following the introduction of the scheme could be compared. Figure 4.4 extends these measurements to include all of the post-extension results that are now available.

Figure 4.4 Congestion in the western extension zone during charging hours. Moving car observer surveys.



In considering pre-extension conditions during 2005 and 2006, TfL's *Fifth Annual Impacts Monitoring Report* put forward the following values to represent pre-extension conditions:

- A night-time (uncongested) travel rate of 1.8 minutes per kilometre. New evidence on this is presented in Section 4.13.
- An 'excess' travel rate during charging hours of 1.75 minutes per kilometre, based on 12 surveys taken during 2005 and 2006.
- An average network speed during charging hours of approximately 17 kilometres per hour.

It was noted that the individual bi-monthly surveys had tended to indicate quite variable conditions, with apparent seasonal effects. Excess travel rates for individual surveys varied by up to 20 percent from the mean value. It was also noted that factors leading to a deterioration in congestion in the original charging zone during 2006 did not seem to have applied to the western extension – with apparently stable levels of congestion between 2005 and 2006. Extension of the SCOOT traffic signal management system (see Section 4.18) around the western extension ahead of the implementation of the extension may be one possible reason for this.

TfL expected congestion within the extension zone to reduce by between 17 and 24 percent following the introduction of the western extension, measured against the representative pre-extension value of 1.75 minutes per kilometre.

It is clear from Figure 4.4 that post-extension conditions have been highly variable. The first three post-extension surveys returned values that were substantially lower than the pre-extension representative value and consistent with the observed reductions in flow. The reductions in congestion were of the magnitude expected by TfL – albeit that seasonality could be a confounding factor. Surveys from and including September/October 2007 have tended to indicate levels of congestion that approach or exceed the pre-extension representative value – failing to show any consistent decongestion benefit from the extension scheme, despite the fact that traffic levels have remained low.

The average excess delay during charging hours, across all seven available post-charging surveys is 1.7 minutes per kilometre. This gives an average reduction in congestion, since the implementation of the extension, of 3 percent. This is below TfL's range of expectation for the extension scheme, and below the reduction that could be expected from the observed reductions in traffic circulating in the western extension (see Section 2).

However, the recent measurements of night-time speeds in the extension zone are relevant to interpretation of Figure 4.4, just as they are to congestion in the original central London zone. Between the start and finish of the period covered by Figure 4.4, absolute travel rates inside the extension zone have not changed significantly. However, the new night-time speed measurements, if applied to the graphic, would have the effect of increasing the proportion of the total travel rate accounted for by 'base' network capacity (ie uncongested conditions – the light blue portion of the bars), and correspondingly reducing the proportion accounted for by congested conditions (dark blue portion).

This would be consistent with the traffic volume reductions observed on the introduction of the western extension scheme, and the evidence on reduced capacity presented elsewhere in Section 4. Both of these, and the fall in night-time speeds, imply that drivers in the extension zone are benefiting from a degree of congestion relief compared to the absence of charging. In other words, if the traffic removed by charging returned, congestion levels would be higher than those observed before the introduction of the extension.

4.8 Congestion on the western extension boundary route

The boundary route for the western extension is shown in Figure 1.1, Section 1. It includes (working clockwise) the free passage route, Chelsea Embankment, both arms of the Earls Court One Way System, Holland Road, the West Cross Route, Scrubs Lane and Harrow Road. Two moving car observer surveys cover this route, as described in TfL's *Fifth Annual Impacts Monitoring Report*. Each covers a slightly different pattern of movements in relation to this route.

Figure 4.5 shows the available time series for congestion measurements on the boundary route from the main western extension survey. This survey is optimised to monitor typical conditions for drivers travelling what might be regarded as 'typical' distances along the route itself and making movements that cross the boundary.

Figure 4.5 Congestion on the western extension boundary route during charging hours. Main western extension moving car observer surveys.

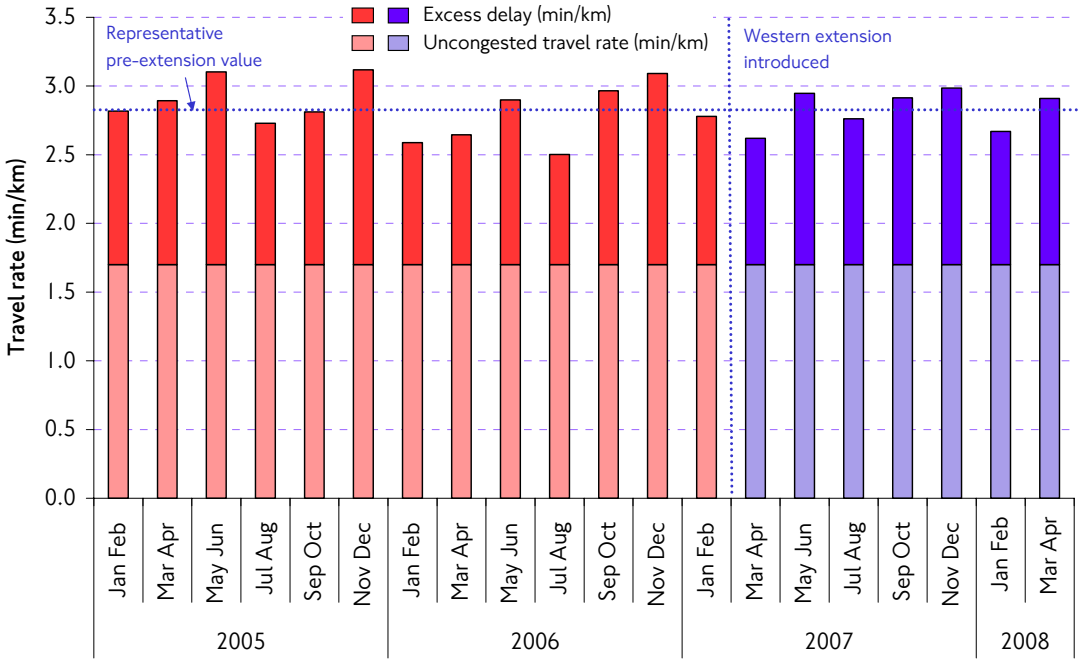
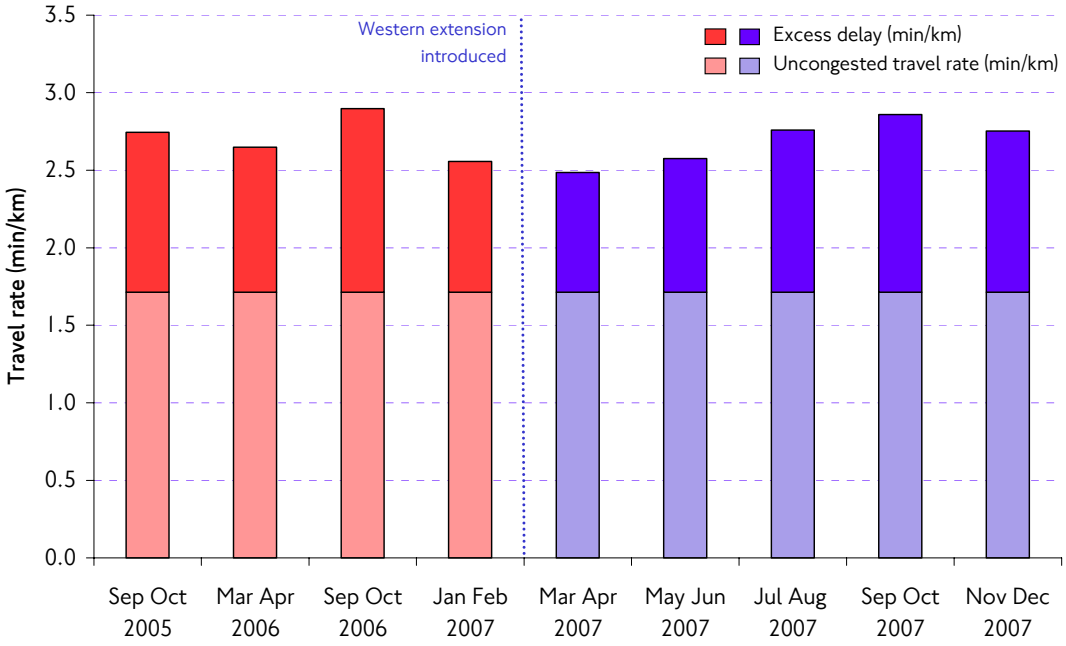


Figure 4.6 shows the available time series from the more detailed western extension boundary route survey. This survey is optimised to monitor conditions for drivers making more frequent turning movements on to, or from, the boundary route, and has a greater intensity of coverage of the key boundary route links themselves.

Figure 4.6 Congestion on the western extension boundary route during charging hours. Western extension boundary route moving car observer surveys.



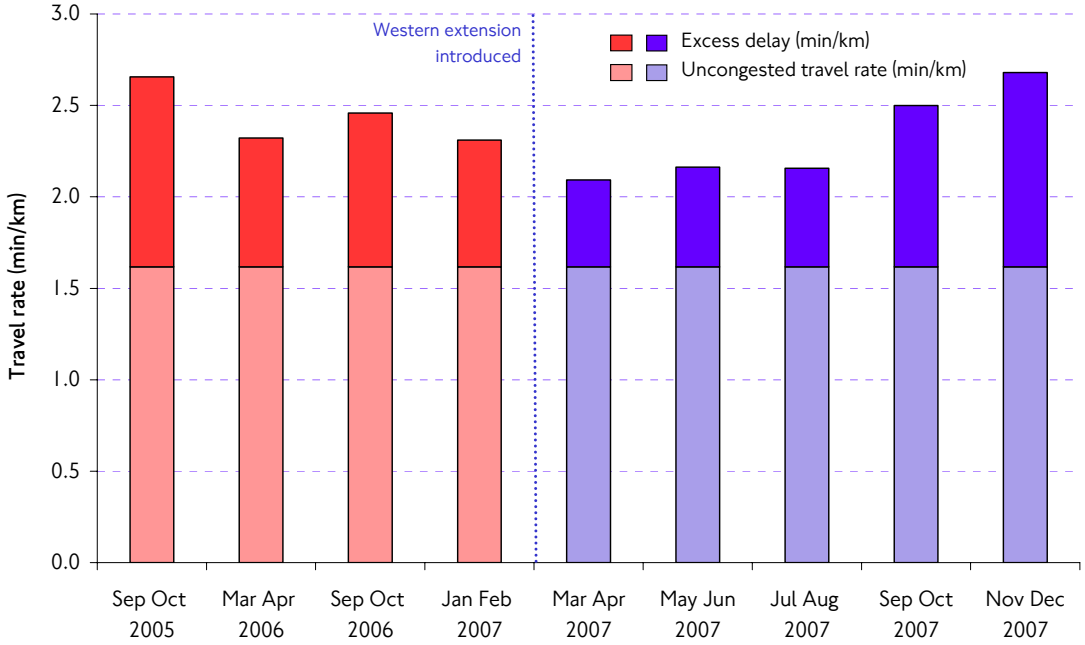
The picture to emerge from both surveys is of stable or slightly improved conditions on the western extension boundary route. Average post charging delays from the main western extension survey are 1.1 minutes per kilometre. The corresponding value for the western extension boundary route survey is 1.0 minutes per kilometre. Compared to representative pre-extension excess delay values of 1.15 and 1.0 minutes per kilometre respectively, these indicate broadly unchanged delays. A key influence here is likely to be enhanced traffic management arrangements for the boundary route, in a similar way to that seen for the Inner Ring Road around the original charging zone, apparently successfully accommodating the small net increases to traffic on this route as observed in Section 2 of this report.

4.9 Congestion on main routes to the western extension zone

TfL also surveys congestion on main radial routes approaching the western extension (excluding those from the east, ie those within the original charging zone). Figure 4.7 shows the available time series for this survey.

TfL expected some small reductions to congestion on these routes, reflecting reduced volumes of traffic moving to and from the extension zone. Figure 4.7 however shows a highly variable picture. Conditions on these routes during the early months of the extension schemes showed marked improvements compared to the pre-extension conditions. However, in the latter part of 2007, congestion reasserted itself in parallel with the pattern observed inside the extension zone.

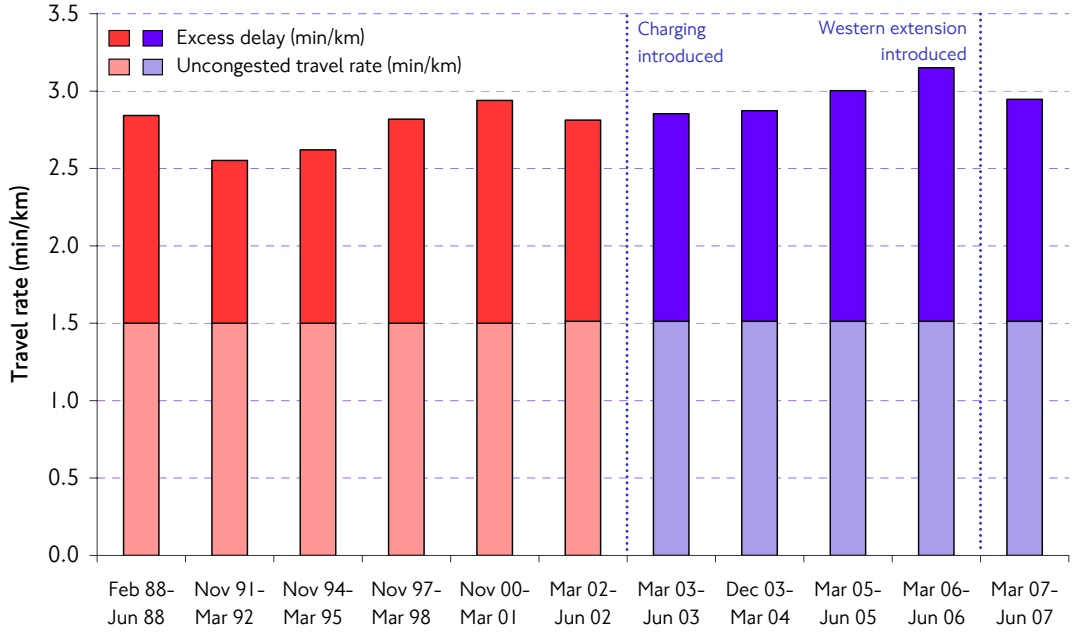
Figure 4.7 Congestion on main radial routes approaching the western extension zone during charging hours. Western extension boundary route moving car observer surveys.



4.10 Congestion in inner London

TfL measures congestion on main roads in inner London, covering an area extending outwards from a point typically one to two kilometres beyond the Inner Ring Road towards the North and South Circular roads.

Figure 4.8 Congestion on main roads in inner London, 1988-2007. Charging hours equivalent. Moving car observer surveys.



This survey has been undertaken annually in recent years. Note that the western extension lies within the area covered by this survey, and therefore changes in relation to the extension scheme could be a significant influence on the overall congestion statistic for inner London. Figure 4.8 shows the available time series of measurements from this survey.

TfL had previously noted a tendency towards increased congestion on main roads in inner London, and had drawn parallels with similar trends in both central and outer London. The 2007 survey differs from the recent trend in suggesting a small overall reduction to congestion compared to the previous survey in 2006. In this respect it is unique among the recent congestion surveys – albeit that the measured value for 2007 is not dissimilar to those typical of recent annual surveys. It is possible that the western extension has influenced the aggregate result for inner London as this survey was undertaken in the months immediately following the introduction of the extension scheme.

4.11 Other measures of congestion and congestion trends

Previous annual monitoring reports have identified several other secondary indicators of congestion levels and trends in and around central London. These have tended to corroborate the moving car observer survey estimates in also indicating sharply deteriorating network conditions from 2006. However, for 2007, few such independent data are available. This reflects technical issues relating to camera-based observations in and around the extension and with third-party satellite tracking (GPS) data. Nonetheless, there are two useful independent indicators which are again corroborative of the trends identified by the congestion charging monitoring surveys:

- An independent moving car observer survey of the central London road network, undertaken in June/July 2006, for use by the Department for Transport, showed that average travel rate during charging hours had increased from 3.5 minutes per kilometre to 3.9 minutes per kilometre since the previous comparable survey in June/July 2003. Both the absolute average speed – and the indicated substantial reduction from the previous value – are very similar to those recorded above for central London.
- Sections 5.6 and 5.7 of this report, which deal with bus network speeds and reliability, tend to corroborate the above findings for general traffic more directly. They show continued deterioration to the performance of buses in the original charging zone, and an absence of apparent longer term benefits to buses from the western extension.

4.12 Analysis and assessment – TfL's approach

In view of these confusing results, which generally indicate a continuation and intensification of the recent trends towards increased congestion in central London despite traffic levels having fallen, TfL has undertaken further analysis of the data. The aims of this were to:

- Explore the survey data to better understand the nature and possible causes of increased delays.

- Continue the work, first outlined in TfL's *Fifth Annual Impacts Monitoring Report*, to assess and quantify possible causative factors, and relate them to the observed congestion trends.

The next subsections set out some recent developments with this work.

4.13 Night-time (uncongested) speeds

Congestion or delay to users on a road network is determined by the performance of the network (network delay) and the level of traffic activity (traffic delay or congestion). The benchmark against which traffic congestion is traditionally defined is network average speeds or travel rates at times when traffic is at its lightest. In practical terms in London this is taken to be the early hours of the morning (02:00-05:00) on a typical mid-week night. Ideally, this benchmark would be a measure of conditions with zero traffic, although such idealised conditions do not occur in central London, and there is of course still an element of traffic and other activity on the network in the small hours of the morning.

In this way the effect of differing levels of traffic activity is notionally removed, and a moving car survey should deliver a pragmatic estimate of network average speeds that reflects the inherent performance characteristics of the road network, as free as possible from delays or congestion caused by the presence of other traffic. In other words, a survey car correctly executing the rules of the survey would legitimately be 'delayed' by network features such as speed limits, traffic signals, large scale infrastructure works and the survey rules in relation to what (relatively little) other traffic is travelling on the network at the same time. It would not however be delayed over and above this by queues caused by elevated daytime levels of traffic. Several important points follow from this:

- First, different survey networks will have different night-time speeds, and notionally-equivalent daytime conditions will give different increments over the night-time travel rate. It is not, therefore, generally appropriate to compare absolute estimates of congestion across different networks.
- Second, if the effect of variable demand can be removed, and the effect of traffic demand on the travel rate is constrained to be as low as possible, then changes to the recorded night-time travel rates would tend to reflect changes to the inherent – or 'base' – capacity of the survey network, such as changes to traffic signals and junction capacity.
- Third, in the daytime case, and all other things being equal, such changes to the base performance or capacity of the network, would be reflected in higher relative congestion values for an equivalent level of traffic. This is similar to what has been observed in central London over the last two years, and more widely throughout London across a longer time period.

Because base network conditions are usually considered to change only very slowly, night-time speed surveys have traditionally only been carried out infrequently, typically once every few years. Previous surveys of night-time speeds have tended to bear this out, typically returning results that are closely comparable to established values, even over gaps as long as ten years.

Reflecting the possible role of changes to basic network capacity in deteriorating congestion levels, TfL undertook new surveys of night-time speeds in the original and extended congestion charging zones, as well as on main roads in inner London, during 2007. The findings were both significant and relatively unexpected. All of the new measurements of night-time speeds, reflecting the 'base' performance of the survey networks, fell substantially in relation to previous surveys (Table 4.2).

Table 4.2 Surveys of night-time (uncongested) conditions. Original charging zone, western extension and main roads in inner London. Moving car observer surveys. Travel rate (minutes per kilometre).

Survey network	2004 travel rate (min/km)	2004 speed (km/h)	2007 travel rate (min/km)	Speed (km/h)	Percentage difference travel rate (min/km)
Inside original charging zone	1.9	33	2.3	26	+21%
Whole central London survey	1.8	33	2.2	27	+22%
Inside western extension zone	1.8	32	2.2	27	+22%
Whole western extension survey	1.7	35	2.0	30	+18%
Main roads in inner London	1.5	40	1.7	34	+13%

Clearly, such a finding is potentially very relevant to explaining the observed daytime congestion trends, and it is therefore of interest to understand more clearly the nature of the changes to network performance under uncongested night-time conditions. A note of caution here is that values for night-time speeds are based on only one set of survey 'runs', as opposed to similar statistics of charging hour speeds which are based on four runs per survey, which are then averaged across several surveys. There is thus a greater degree of statistical uncertainty attached to these estimates of night-time speeds.

4.14 Exploratory data analysis – method

The detailed data underlying these estimates, and the corresponding daytime congestion trends, are profitably explored by making use of two statistical properties – skewness and kurtosis. These ideas are used here to explore differences in the distribution of link transit times between individual speed surveys.

- **Skewness** as applied to these comparisons can be considered as the tendency for equivalent values in one distribution (the 'test' distribution) to be systematically higher or lower than values in a comparator distribution. Comparing the distribution of observed survey link transit times between the recent surveys and the previous (benchmark) surveys, a 'test' distribution that is 'skewed to the right' in comparative terms (ie systematically slower) would be characterised by the majority of values (link transit times) being higher, although not necessarily dramatically so, than the equivalent values in the comparator survey. Distributions showing this feature could, in the night-time case, be indicative of general and widespread changes to network performance, such as changes to traffic signals or speed limits, or a change to traffic activity (vehicles either moving or parking) on the network. In the daytime case, distributions showing this feature could also be

suggestive of demand-related effects, such as higher or lower prevailing traffic levels or, possibly, more subtle features such as changes to the nature and composition of traffic (eg more buses, more parked vehicles, more pedestrians and cyclists).

- **Kurtosis** can be considered here as the tendency for the mean of a distribution to be influenced by a small number of extreme values, as opposed to a larger number of smaller incremental changes. In this context, a kurtosis effect on a 'test' distribution would be recognisable as a relatively small number of individual survey links showing extreme changes in relation to the comparator distribution. Distributions showing this feature would, in both night-time and daytime cases, be suggestive of location-specific events or incidents causing undue or 'out-of-course' delays. Typically, these would be road or street works, road traffic collisions or other specific incidents of various kinds.

In practice, most comparisons will reveal degrees of both skewness and kurtosis, but it is the extent to which one or the other dominates the comparison that is potentially informative. Before considering the following analysis, there are three important methodological points to bear in mind.

- First, it is necessary to recall the 'survey rules' for the moving car observer surveys. These dictate, broadly, that surveyors should attempt to follow the defined survey route unless this is impossible (ie the road is closed) or otherwise infeasible (ie a temporary incident causing localised grid lock and likely to last for an extended period of time). The imperative is that the surveyors emulate as far as possible the behaviour of other drivers on the network. So, in these circumstances, either signed or improvised diversionary routes can be followed, as per general traffic, and time and distance is calculated on the basis of the actual kilometres run and assigned to the original survey network. In simple terms, the surveyors' tolerance for, and response to, network disruptions is aligned to be closely comparable to that of general traffic, and consequently, while comparatively lengthy delays might be typical, very extreme delays should be rare or absent.
- A second, related point is that, while within the scope of the above rules, it is quite feasible for a survey to produce results that are considerably slower (in terms of speed at the level of the individual survey link) than might be typical, the reverse is not the case. It is readily possible to experience individual link transit times that are several orders of magnitude slower than a typical average (eg severe but localised congestion). However, it is not possible, even in the notional absence of other traffic, to perform the same transit appreciably faster. Speed limits (which, in the context of the traffic platoon of which the survey car is part, have to be obeyed) are the most obvious reason why this is so. It follows that any 'kurtosis effects' in the comparisons would be a negative feature, indicating substantially slower conditions on the affected links.
- A third point relates to the effects of averaging. Broadly, any one survey will be characterised by considerable variability for each survey link. Averaging surveys would tend to reduce this variability as links with, for example, comparatively low speeds in one survey may have comparatively high speeds in another survey. Averaging across more surveys means that variability is dampened and the visibility of extreme, but temporary events, is lost. In practical terms this means

that the more highly averaged a comparison, the less variable the distributions would tend to be, and 'kurtosis effects' would consequently tend to be less visible. However, averaged comparisons are well suited to detecting systematic skew – that is persistent network-wide features such as changes in speeds reflecting changed network conditions or traffic flows.

Furthermore, to aid interpretation:

- The 'links' used in this analysis are determined by the topology of the survey network and the various individual runs, interlaced so as to ensure complete and representative coverage. They are therefore somewhat shorter than might be expected, consisting of sections of physical 'roads' and are uni-directional.
- Of several possible indices that could be used for this analysis, link transit time is the simplest and most appropriate. It is not generally meaningful to calculate indices of traffic congestion at this fine level of network disaggregation.
- For the **prior** comparator speed survey, usually an average of several similar surveys, links are ranked in ascending order of link transit time and shown as a smooth line. Note that link length remains a variable and so longer transit times (higher positions in the ranking) would largely reflect longer links, all other things being equal.
- For the **test** comparator speed survey, shown here as a variable line – equivalent values are plotted for each link in the prior comparator speed survey in the ranked order of the prior survey. That shows how the 'test' survey deviates from the (usually averaged) comparator survey.

4.15 Exploratory data analysis – night-time speed surveys

Figure 4.9 shows an exploratory analysis plot for the 2007 night-time moving car observer survey for the original charging zone (variable line). It is compared to average values for identical surveys undertaken in 2001 and 2004 (smooth line). It is seen that:

- For the large bulk of the distribution, link values for the 2007 survey are systematically higher than the earlier surveys – ie the mean of the blue line is above the red line. This suggests a network-wide influence in increasing transit times in the 2007 survey relative to 2004.
- As would be expected for a correctly executed survey under night-time conditions, few links in the 2007 survey showed significantly quicker transit times (faster speeds) than the 2001/2004 average, although it is noticeable that links with longer transit times appear to be more closely comparable between the two surveys than links with shorter transit times.
- Links that show large increases in transit times in 2007 (extreme positive spikes indicating kurtosis) are relatively few. Therefore out-of-course incidents, although present, do not appear to be the most pervasive factor determining the network-wide average speed in the original charging zone. This would be an expected feature under night-time traffic conditions.

Figure 4.9 Original central London charging zone. Plot comparing night-time moving car observer speed surveys for an average of 2001 and 2004 with 2007.

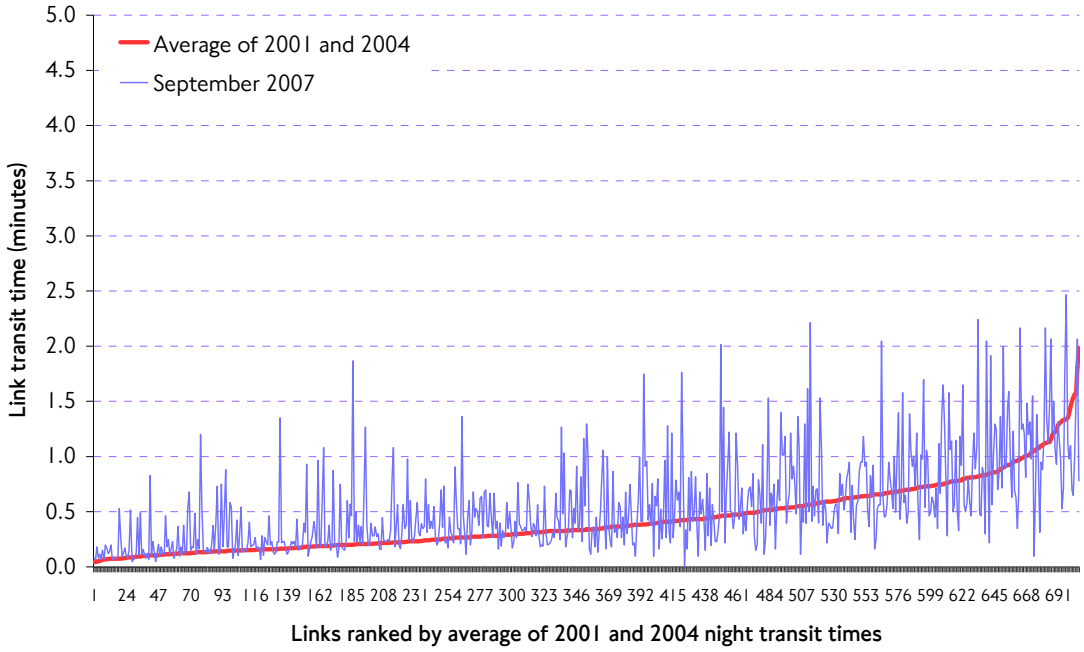
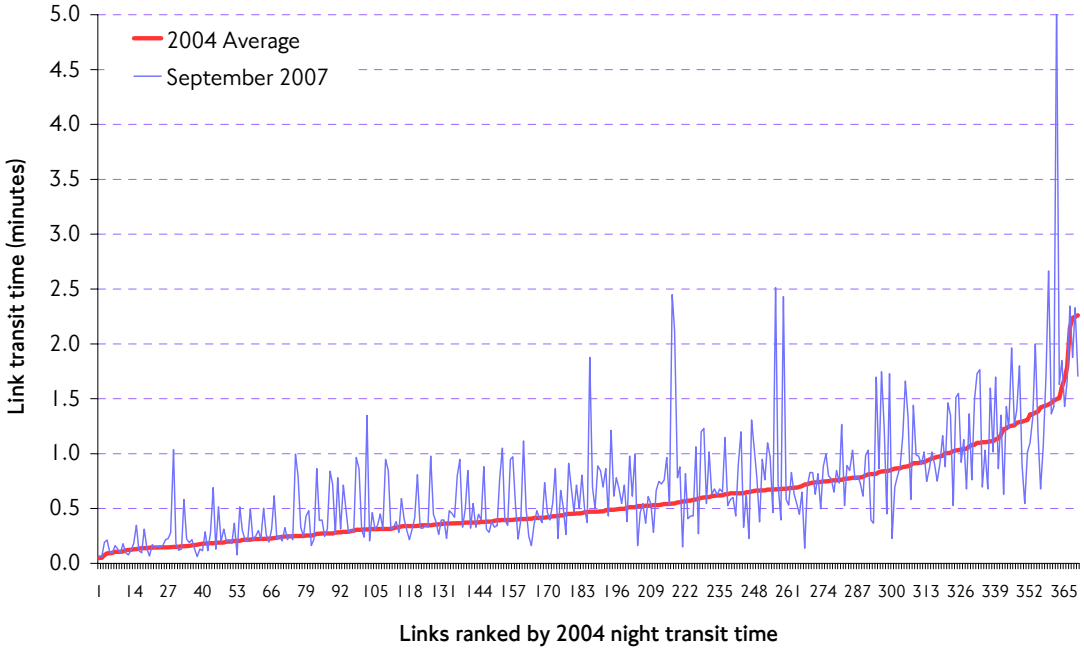


Figure 4.10 shows the equivalent plot for the 2007 night-time survey for the western extension zone. In this case the 2007 survey (blue line) is compared to the average of an equivalent pair of surveys undertaken in 2004 (red line).

Figure 4.10 Western extension zone. Plot comparing night-time moving car observer speed surveys for 2004 and 2007.



Here:

- The general tendency is towards 'right-hand skew', with a majority of link transit times slower than the 2004 survey.
- There is greater prevalence of out-of-course delays than for the equivalent survey of the original central London zone, but again the conclusion would be that the comparative distributions show strong evidence of a small, but very widespread network-wide deterioration in base performance or traffic capacity.

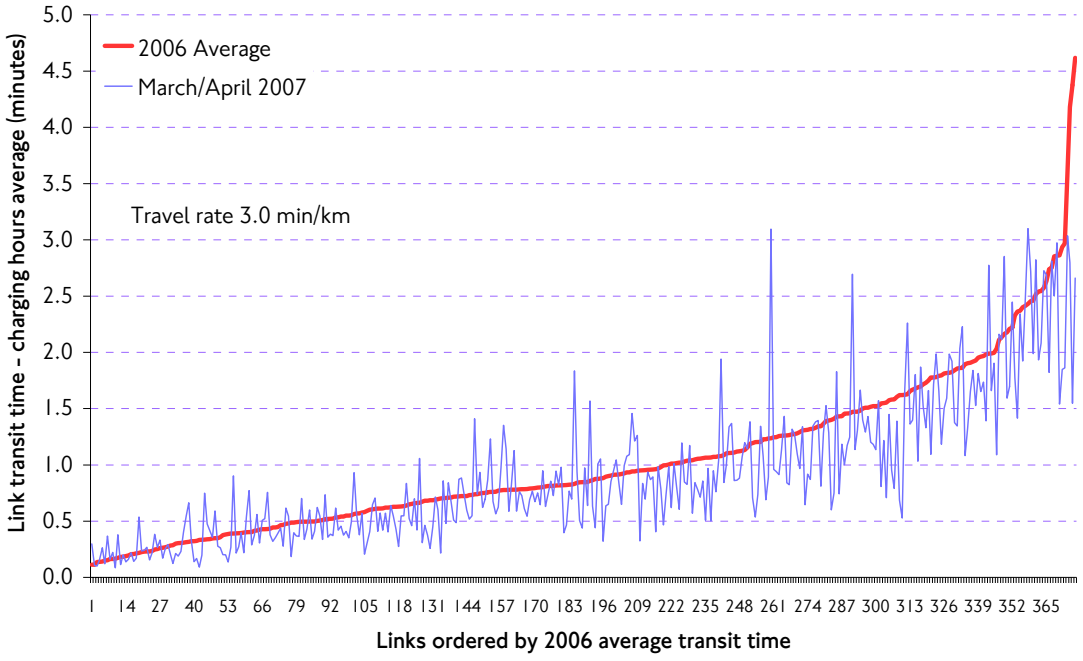
4.16 Exploratory data analysis – daytime speed surveys

The skewness/kurtosis analysis can be extended to examine distributions of link transit times during charging hours. Note here that charging hours speeds comprise four runs on each survey link. There will therefore be an element of averaging across multiple runs in the 2007 'test' survey, as well as in the comparator surveys. Many specific comparisons are possible – the following look at two extreme examples for the western extension zone.

Immediate impact of the western extension compared to 2006

Figure 4.11 compares the March/April 2007 survey for the western extension zone against average values for all of the baseline surveys undertaken during 2006. In contrast to the night-time surveys (above), this graphic demonstrates 'left-hand skew', with virtually all link transit times being slightly faster in the 2007 survey than is typical for 2006.

Figure 4.11 Western extension zone. Analysis of link transit times. March/April 2007 versus 2006 average. Moving car observer speed surveys.

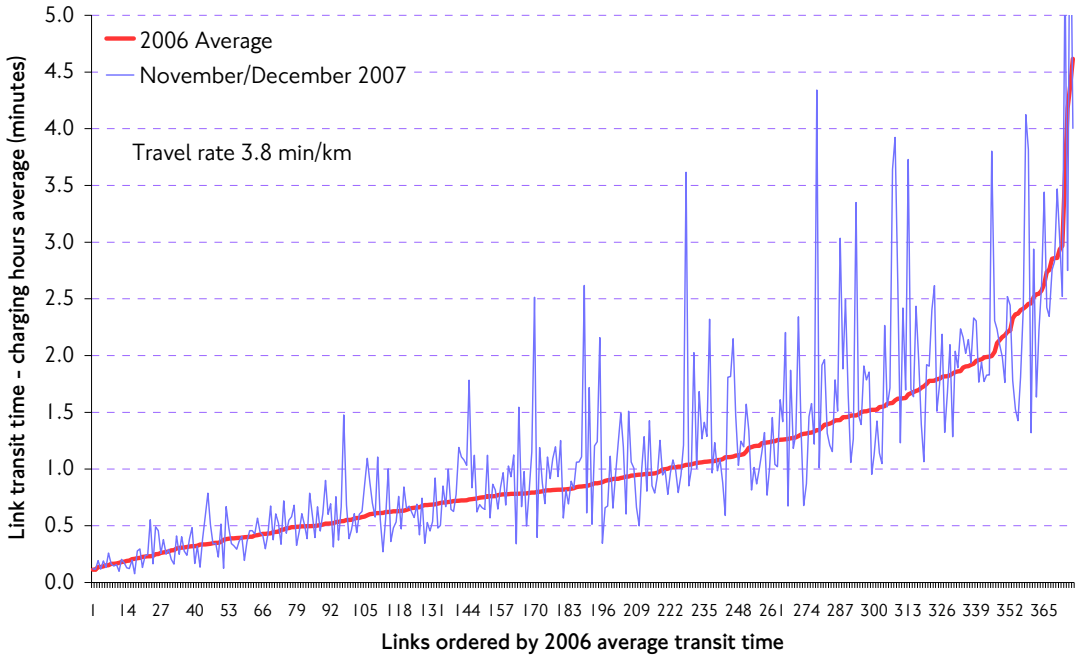


The March/April 2007 distribution also shows little evidence of disruptive out-of-course incidents. This survey of course reflects conditions immediately after the introduction of the western extension scheme, showing general and widespread reductions in congestion, and among other things reflecting a reduction to most road works inside the extension zone across the period of implementation of the scheme.

November/December 2007 western extension survey compared to 2006

Figure 4.12 compares the November/December 2007 survey for the western extension zone against average values for 2006. It can be seen from Figure 4.4 that this survey, taken some eight to nine months after the introduction of the extension scheme, returned a value for congestion inside the zone that was **higher** than the representative pre-extension baseline value. This indicates an overall deterioration in congestion against pre-extension conditions. As well as showing a consistent 'right-hand skew' throughout the middle part of the distribution, the network average is clearly influenced by numerous out-of-course events.

Figure 4.12 Western extension zone. Analysis of link transit times. November/December 2007 versus 2006 average. Moving car observer speed surveys.



Each of these out-of-course events can be located and, in principle, records of known interventions such as major road works can be correlated with the speed survey results. In general, a close association has been evident between the occurrence of location specific delays (kurtosis spikes) and known road works activity. However, the preceding analysis of night-time speed changes suggests that this is not the only factor at work.

4.17 Assessment and evaluation

This section reviews the key outcomes from TfL's investigations of the possible causative factors underlying the observed trends in congestion inside the western extension zone.

TfL's general approach to further understanding this issue is described and previous conclusions are briefly reviewed. Recent congestion trends for the western extension zone are then considered in the light of a range of possible causative factors that are known to have applied during 2007 and into 2008.

TfL's previous assessment

In the context of the original central London congestion charging zone, the analysis presented in TfL's *Fifth Annual Impacts Monitoring Report* identified a wide range of factors that might be making a contribution to **reducing** the effective capacity of the road network.

Some of these were relatively obvious and corresponded to widely-acknowledged general trends affecting the central London road network. Increased road and street works was a primary example. Others were potentially more subtle, for example, changes to the mix of different vehicles within stable overall traffic volumes. It was recognised that some of these factors, which numbered in excess of 20 in total, were probably more significant than others in affecting congestion levels, and that the impact of different interventions was likely to be compounding, rather than simply additive. It was also felt that all of the identified factors were operative to some degree and that several had intensified significantly over the period since 2005.

Furthermore, there were few examples of factors or inventions that had an effect of **increasing** the effective capacity of the road network. On the contrary, major permanent schemes such as the remodelling of Trafalgar Square and the accelerated replacement of infrastructure by the utility companies implied significant long-term reductions to the effective capacity of the road network. The main thrust of TfL's traffic signal management effort was therefore orientated towards mitigating, as far as was possible, the acknowledged negative affects of these various interventions on day-to-day network operation.

In recognition of the need to better understand these effects, TfL specified a long-term research project which would ultimately allow it to understand the relative impact of specific interventions, and hence facilitate better network management and planning on a London-wide basis. This project is making good progress with initial outputs expected in autumn 2008.

In relation to the loss of congestion benefits initially achieved with congestion charging in the original central London zone during 2005 and 2006, TfL presented an analysis in the *Fifth Annual Impacts Monitoring Report* that argued that:

- Increasing congestion and static or declining traffic flows were a long term feature of the road network in London, although the trends appeared to have accelerated since the year 2000.

- In view of changed priorities for the use of the road network in central London, reflecting various mayoral and borough initiatives, continued comparison of post charging conditions against a static baseline reflecting conditions in 2002, before the introduction of the original scheme, was increasingly inappropriate.
- A more appropriate comparison was therefore against conditions that would have prevailed in the notional absence of congestion charging – given similar competing demands on road network capacity as were seen in 2005 and 2006.
- Viewed in these terms, road users in the original central London congestion charging zone were therefore experiencing congestion reductions that could be considered broadly equivalent to the 30 percent reduction achieved in the first year or so of operation.
- A substantial increase in road and street works, reflecting the sub-surface infrastructure replacement programme, had been an important factor contributing to the deterioration of conditions in the original central London zone in 2005 and 2006. The urgency of the infrastructure replacement programme was not disputed; and a degree of disruption was an inevitable consequence.

In addition, these competing uses of the road network had delivered substantial benefits in respect of other Mayoral transport priorities. Among the most visible and valuable were the reductions that have been achieved in reported road traffic collision casualties, both in central London and more widely; and the adjustments to road layouts, signal timings and other elements of the streetscape that have made conditions easier for pedestrians and cyclists. These interventions broadly reflected both TfL and borough policies, of which congestion reduction was only one element, albeit an important one.

Assessment of recent congestion data

Bearing in mind TfL's previous conclusions, the new insights from the more recent data for 2006 and 2007, as described earlier in this section, are as follows:

- Conditions in the original central zone remain comparable to those of the previous year, with a sustained general loss of congestion benefits and a highly variable network performance.
- After an initial period when congestion in the western extension reduced in line with TfL's expectations for the scheme and commensurately with the observed reduction in traffic flows, conditions from autumn 2007 rapidly deteriorated.
- From autumn 2007 to spring 2008 travel rates for traffic within the western extension zone have displayed similar characteristics to that of the original central zone. Despite the persistence of the reduced traffic flows achieved with the introduction of the scheme, congestion has deteriorated. Again this suggests that the effective capacity of the road network in the western extension has been reduced by other interventions.
- Also comparable with the original charging zone has been the general stability of conditions on the boundary route of the western extension; suggesting that these other interventions have been less intense or have been otherwise mitigated around the boundary of the extension zone.

- The rapidity of the deterioration in conditions inside the western extension is striking, suggesting that large-scale individual interventions are likely to be a significant factor.
- New data on night-time speeds are significant in that they appear to indicate a substantial loss of basic network capacity over an extended period. This could also be a significant factor in understanding daytime congestion trends. However, the statistical robustness of these new night-time data is less than the equivalent daytime data - and further survey and analysis work is necessary before these apparent trends can be confirmed and fully quantified.

4.18 Possible causes of recent congestion trends in the western extension

As is demonstrated in previous sections, the western extension clearly reduced the volume of traffic circulating in the zone during charging hours. Although the achieved reductions were towards the lower end of TfL's range of expectation, they were still significant (above 10 percent) and, importantly, they have been consistently maintained over the whole period during which the extension scheme has been in operation.

The relationships between traffic volume and congestion are well-established. All other things being equal, a reduction in traffic of 10 percent in central London will lead to a journey time improvement of about 10 percent. The equivalent reduction in congestion would be about 20 percent – expressed as an excess travel rate. However, all other things are not equal, and other factors have intervened to increase congestion. The mechanism by which this has been brought about is through interventions external to the scheme decreasing the effective road network capacity for general traffic. The recent congestion trends suggest that this reduction in effective road network capacity has been broadly equivalent to that created in the first place by the traffic reduction effects of the scheme – ie about 10 percent.

There are clear indications from elsewhere in London that progressive erosion of road network capacity is a pervasive feature, and will have been a factor in the western extension over the period since the extension scheme was introduced. However, the rapidity of the overall change suggests that this is a relatively minor component of the change measured in the latter half of 2007. TfL's investigation has focused on three areas:

- The major development near the Scotch House Corner junction, Knightsbridge.
- The role of traffic signals.
- The role of increased road and street works in the western extension.

The next sections review each of these factors in terms of their contribution to recent congestion trends.

The major development at Scotch House Corner junction, Knightsbridge

Late summer 2007 was the start of the observed deterioration in performance of the road network inside the western extension. It also coincided with the start of street works associated with a major mixed-use development near one of the key road junctions within the extension zone: Knightsbridge/Brompton Road/Sloane Street, known as 'Scotch House Corner'. The development has required significant temporary modifications to the junction including lane closures and consequent adjustments to traffic signals. These modifications are estimated to have removed up to half of the effective vehicular capacity of this key junction. A sense of the scale of the development can be gained from the photograph in Figure 4.13.

Figure 4.13 Scotch House Corner junction, Knightsbridge, July 2008.

Another key junction, close by on the boundary route at Grosvenor Place/Hobart Place/Lower Grosvenor Place/Grosvenor Gardens, was the subject of significant signal timing adjustments in June 2007 to bring the pedestrian crossing timings up to current standards. The junction is close to Victoria Station and caters for significant volumes of pedestrians. However, the timing adjustments have reduced the effective capacity for vehicular traffic.

Using an established traffic model, TfL have simulated the combined temporary impact of the works at Scotch House Corner and the permanent impact of the additional pedestrian time at the nearby Grosvenor Place junction on the traffic performance of the western extension road network. The key conclusions from this exercise were that:

- The impacts of the temporary and permanent traffic signal adjustments at these two junctions are significant. It is estimated that they are directly responsible for

about one-third of the loss of congestion benefits from traffic reductions inside the western extension.

- The model suggests the reduction in capacity at these junctions is causing a proportion of traffic to divert away from this locality, thereby placing an additional traffic load on other parts of the western extension road network.
- This is corroborated by the incidence of congestion recorded by the moving car observer surveys, which show a general deterioration across the network, rather than an exaggerated impact at the locality itself.
- The traffic management arrangements to accommodate the temporary work at Scotch House Corner have tended to favour traffic moving between Brompton Road and Hyde Park Corner. While this is rational in traffic management terms, it would tend to further exacerbate the 'wider network' impact of these works.

Furthermore, it is likely that the 'geography' of the road network inside the western extension will exacerbate these impacts. There are a limited number of east-west radial routes through the zone, with Hyde Park located immediately to the north of Brompton Road, and the River Thames to the south. The Scotch House Corner Junction is located at the convergence of three of these major roads – Sloane Street, Brompton Road and Knightsbridge – while capacity for east-west traffic has also been reduced at the Grosvenor Place/Hobart Place junction.

Work at the Scotch House Corner site is expected to continue until the end of 2009 and therefore it will be a significant factor affecting performance of the western extension road network for some time.

Traffic signals, urban traffic control and SCOOT

Traffic signal timings are crucial in determining junction and hence urban road network capacity. They are also a vital management tool through which TfL and other agencies can pursue their objectives for road network management. TfL is the traffic signal authority for Greater London, though many of the schemes implemented by TfL reflect the priorities of the individual London boroughs, for which TfL acts as agent.

The possible role of changes to traffic signals in relation to observed congestion trends was explored in TfL's *Fifth Annual Impacts Monitoring Report*. It was noted that there had been a significant number of traffic signal schemes in the original central London charging zone since charging was first introduced in 2003. The overwhelming majority of these had the effect of removing effective capacity from the network, in some cases by up to 20 percent. Although it could not be quantified, it was considered that these interventions – reflecting either essential traffic management or other transport priorities such as pedestrian safety – were a significant factor in determining congestion trends.

TfL has continued to examine these matters in the context of emerging congestion data from the western extension. The majority of traffic signals inside the western extension are part of a coordinated urban traffic control system; a proportion, including most of those on the boundary route, are under 'SCOOT' control and so are

directly responsive to changing traffic patterns. In any event the timings at every signalled junction are periodically reviewed by TfL. The objective of these reviews is to assess whether the signal settings remain appropriate to local conditions.

The majority of traffic signals inside the western extension have been reviewed by TfL in the period since charging was introduced. Table 4.3 shows the outcome of these reviews.

Table 4.3 Traffic signal reviews inside the western extension, March 2007-March 2008. Impact on effective vehicular capacity of junctions.

Slightly increased	10
Broadly unaffected	83
Slightly reduced	2
Significantly reduced	2
Other traffic signals not reviewed	52

The two junctions where vehicular capacity has been significantly reduced are Scotch House Corner and Grosvenor Place/Hobart Place, discussed above.

In considering this table, it is important to recognise that 'capacity' in traffic signal terms is not necessarily the same as 'effective network capacity'; though for traffic signals within an urban traffic control system the coordination process normally seeks to achieve the best timings for the network as a whole, within practical local constraints.

SCOOT is an advanced form of urban traffic control where a series of individual junction signal timings are automatically and dynamically coordinated within a 'SCOOT region' according to changing traffic patterns. This system is particularly useful for dealing with daily peaks in traffic, and should optimise performance across groups of several junctions, albeit that individual SCOOT regions act independently. SCOOT was widely applied to the boundary route around the western extension in preparation for the introduction of charging. This was specifically to assist with the management of additional traffic making 'orbital' movements around the extension zone to avoid paying the charge.

The traffic patterns described in Section 2 of this report demonstrate that traffic inside the extension zone has reduced substantially, and that small increases have been observed on the boundary route. Therefore, SCOOT will have acted to re-allocate a degree of effective network capacity away from links inside the zone – specifically, those in SCOOT regions around the boundary of the zone in favour of orbital traffic on the boundary route (see Figure 4.14).

Figure 4.14 SCOOT controlled regions (in red) around the western extension.

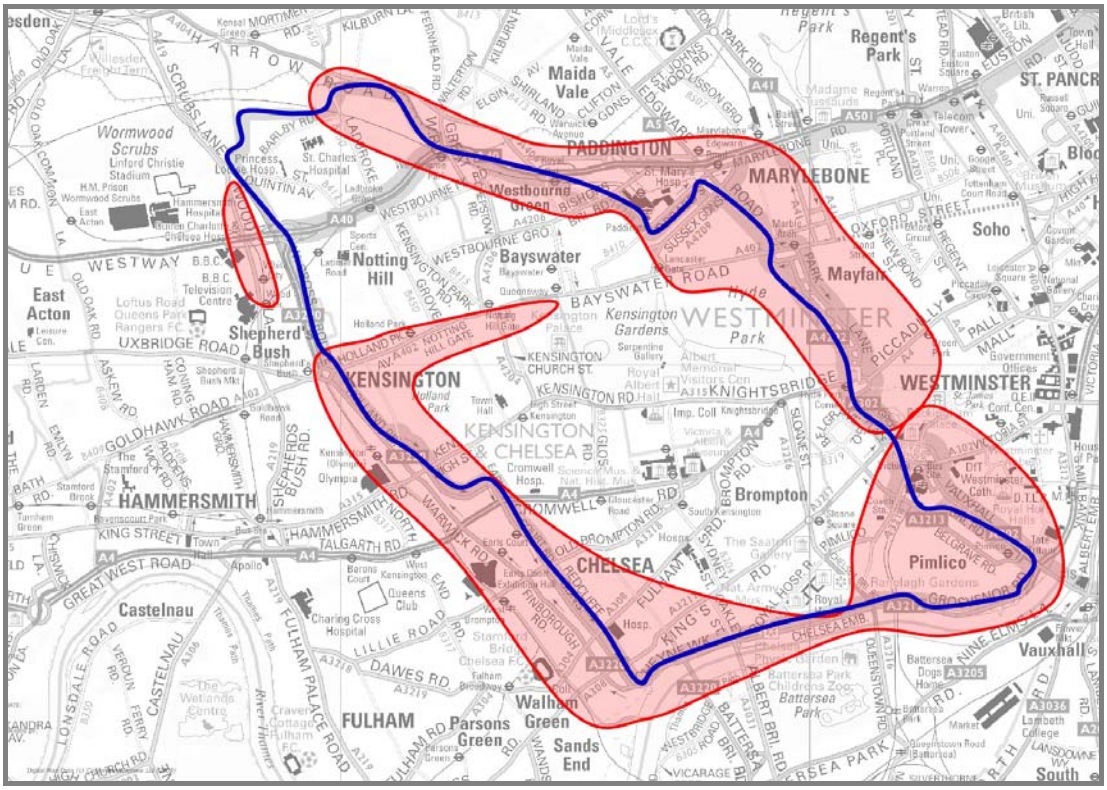


Figure 4.6 suggests that congestion trends on the boundary route have not followed those observed inside the extension zone, despite quite different traffic impacts from the extension. A similar pattern was observed previously in relation to the original central London congestion charging zone (see Figure 4.2). SCOOT is likely to be a significant factor in this differential impact – but at the possible expense of some effective capacity for traffic moving into and out of the western extension zone.

SCOOT also produces output in terms of indices of 'congestion'. It is important to realise that SCOOT measures of 'congestion' are not the same as those used throughout this section so far. The moving car observer and related measurements quantify aggregate delay at the network level; that is, they aim to replicate conditions experienced by an 'average' driver. The SCOOT measure, on the other hand, effectively quantifies the length of traffic queues only at the approach to junctions that are equipped. This has two main implications:

- The SCOOT indicator of 'congestion' is highly non-linear. All other things being equal, an across-the-board reduction in traffic of 10 percent or more should be reflected in a proportionately greater reduction in SCOOT 'congestion' than might be expected from the moving car observer surveys.
- Because SCOOT measures 'congestion' at a point, disruptions elsewhere in the network will not be 'seen' by this indicator. In simple terms and in relation to Figures 4.11 and 4.12, negative skew (reduced congestion) should be emphasised, whereas kurtosis effects would be largely invisible. Indeed, the effect of local disruptions in the vicinity of SCOOT junctions may even be to reduce traffic levels further (as drivers divert away from the disruption), further increasing the tendency of SCOOT to show reduced 'congestion'.

Figure 4.15 SCOOT indicator of 'congestion', links inside the western extension zone at 20 SCOOT equipped junctions around the zone boundary. January 2006-May 2008.

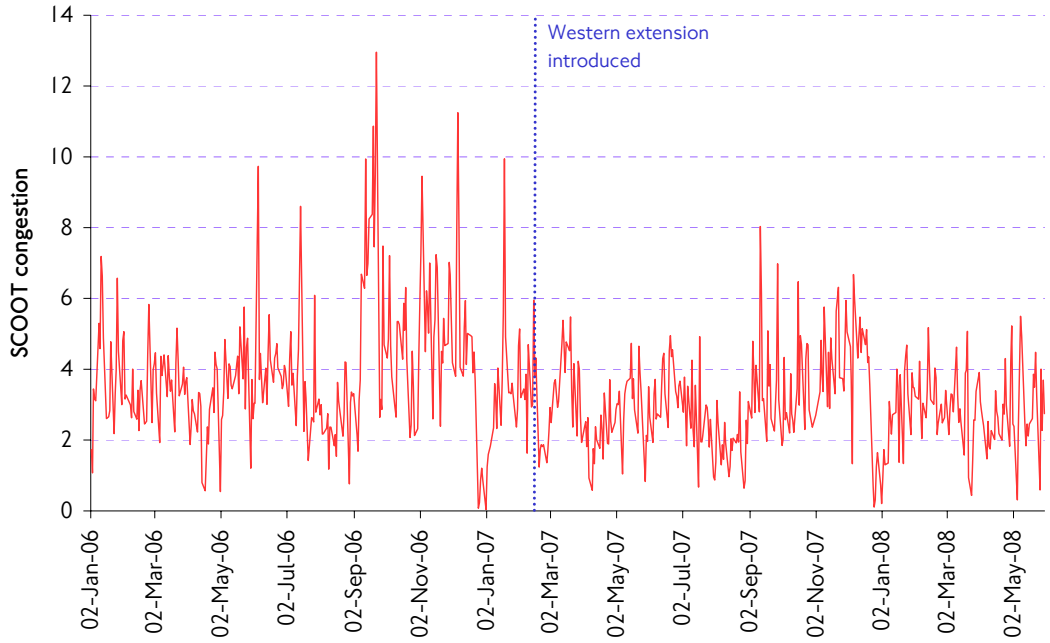


Figure 4.15 shows average SCOOT congestion from 20 equipped junctions (links inside the zone only) over the implementation period for the western extension. Bearing the above points in mind, the picture is one of modest reductions in congestion. Again, in simple terms, drivers are experiencing shorter delays on these links. However, the degree of reduction is less than what would be expected from the traffic reduction effects of the scheme and the links that contribute to this analysis are atypical, being located almost exclusively around the boundary of the extension zone.

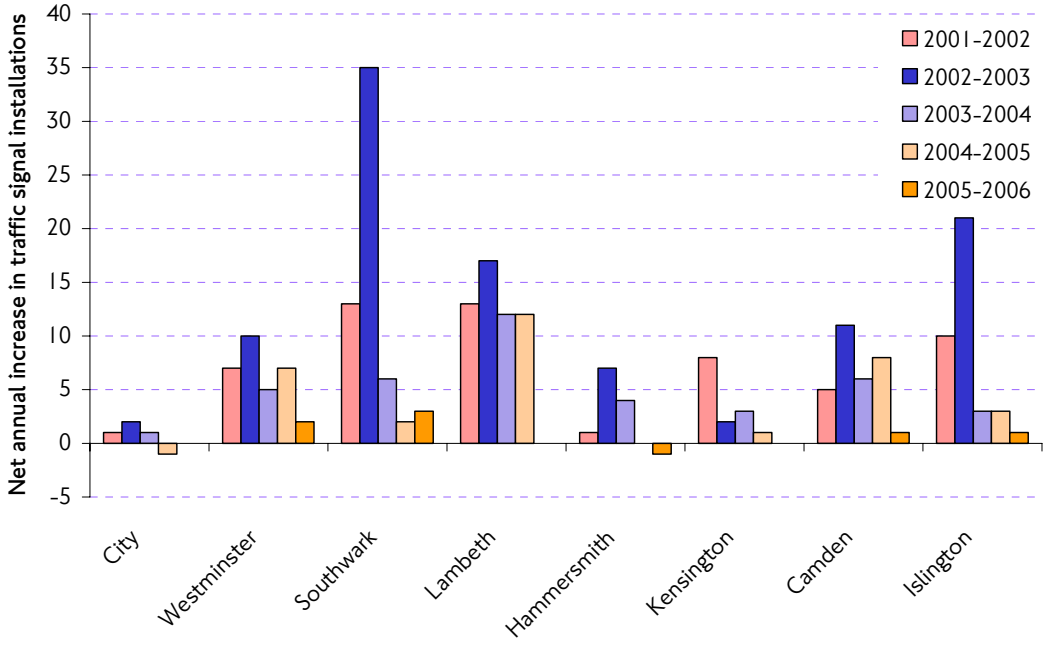
Nevertheless, and in contrast to the moving car observer data, SCOOT does suggest some sustained, yet relatively small, congestion benefits in the western extension.

In terms of night-time speeds, available moving car observer data span a longer timescale back to 2001. Changes to traffic signals are undoubtedly one contributor to the trend in night-time speeds, but it is not possible to establish the degree to which this is so. Figure 4.16 shows the net increase in traffic signal installations for selected central London boroughs over the period of interest. The balance is overwhelmingly towards more traffic signals.

Most of these new installations reflect requests made by individual boroughs in pursuit of their local road network management priorities. Interestingly, the net increase in installations in both the City of Westminster and the Royal Borough of Kensington and Chelsea has been comparatively modest, perhaps reflecting the relatively high existing numbers of signals.

From these data, while it is possible to associate a proportion of the observed deterioration in night-time speeds to the increase in the numbers of traffic signals, this would seem to have been a relatively minor factor in affecting night-time speeds in the western extension zone during 2007.

Figure 4.16 Net annual increase in traffic signal installations. Selected central London boroughs, 2001-2006.



In conclusion, TfL's traffic signal interventions in the western extension zone since the implementation of the scheme have been relatively modest and, with two exceptions, should not have led to widespread increase in congestion. SCOOT indicators of congestion, while limited in several respects, suggest some congestion gains from the extension scheme, but these are in atypical locations and are of a smaller scale than might otherwise have been expected.

Increased road and street works and the utility infrastructure replacement programme

The *Fifth Annual Impacts Monitoring Report* identified increased road and street works as a key contributor to observed congestion trends in the original central London zone. The recent drive to replace ageing water and gas infrastructure across London is well known and generally viewed as an urgent priority. In planning these works, TfL works with the other agencies involved to minimise disruption so far as possible. Nevertheless, the central London road network has been impacted both significantly and over prolonged periods by major works.

In order to facilitate preparation for the introduction of the western extension, TfL agreed to try and reduce non-essential road works in and around the western extension. This lasted approximately six months – three months either side of the implementation date for the scheme. The end of this period, in July 2007, coincides with the sharp deterioration in network conditions in the extension zone.

Taking Figure 4.12, which is an example of several similar analyses, the 'kurtosis spikes' can be identified in terms of their location. In general, each of these spikes can be related to locations known to be experiencing works-related disruption at the time of the survey. It can therefore be concluded that the large majority of the spikes in these graphics are attributable to road and street works, or other comparable disruptions (emergency service incidents etc).

It is therefore possible to quantify the contribution of the 'kurtosis effect' in each distribution to the change in the overall mean network delay. Taking Figure 4.12, and assuming that variability of up to 70 percent is 'within the bounds of what would be considered normal', given the short length of the survey links, the more extreme variability accounts for up to one third of the total increased delay experienced by the survey car. On this basis, works-related disruption is seen to be a major contributor to increased delay – on a scale comparable to that attributed to the major development at near the Scotch House Corner junction (above), albeit that additional delays relating to this specific development will in turn contribute a proportion of the 'kurtosis effect' observed.

Key conclusions – the causes of the loss of congestion benefits in the western extension

TfL's analysis has identified three groups of factors that have contributed to the loss of congestion benefits inside the western extension.

The major development near the Scotch House Corner junction in Knightsbridge is a major factor in reducing the congestion benefits arising from the western extension scheme. TfL estimates that this intervention, coupled with the changes to the nearby junction at Grosvenor Place, is responsible for perhaps one third of the observed loss of congestion benefits. By causing traffic to redistribute across the road network in the extension zone – bounded on one side by the river and the other by Hyde Park – and with schemes having the effect of reducing effective capacity on the remaining west-east routes, the impact of this intervention is spread widely throughout the extension zone.

The exploratory data analysis presented in this section suggests that, as well as general network-wide effects resulting in slower speeds, congestion trends in the western extension also reflect a significant component of 'out-of-course' delays, reflecting road works and other similar temporary interventions. Analysis of the data suggests that delays from these causes may account for about another one third of the observed loss of congestion benefits.

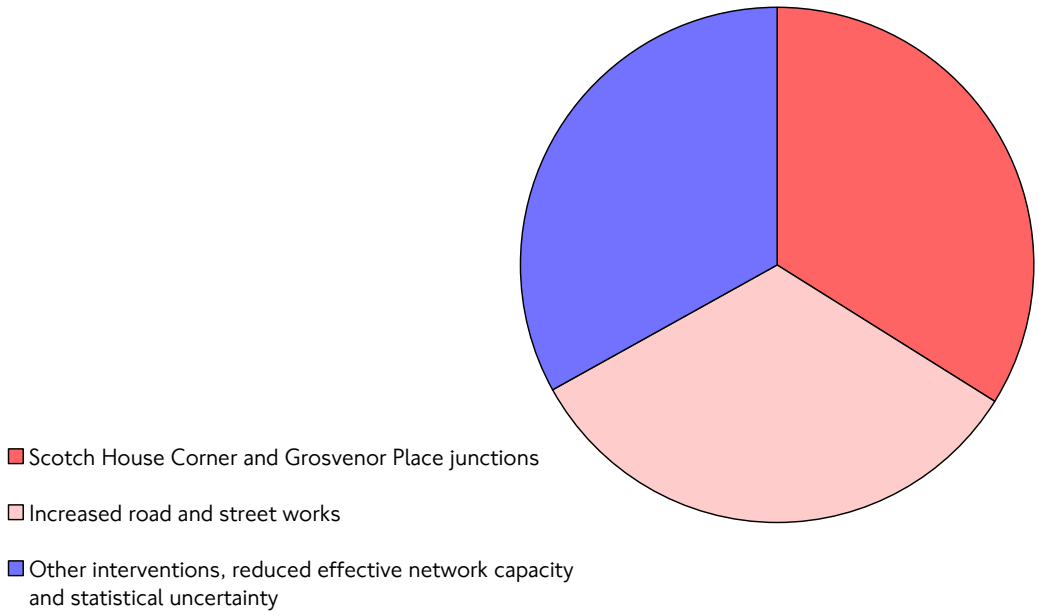
TfL has reviewed the impact of traffic signal interventions in contributing to observed trends in both daytime and night-time congestion. The conclusion here is that known interventions in the period following the introduction of the scheme are not such as to have caused large or widespread effects. However, the balance of both the signal schemes themselves and the actions of urban traffic control systems in adjusting to the changed traffic flow will have been more likely to have a small negative impact, on balance, than a positive one.

The quantifiable effects of both the development near Scotch House Corner and road works together may therefore account for approximately 60 to 70 percent of the observed loss of congestion benefits. These are not the only factors determining network conditions in the extension zone. All of the other categories of intervention previously highlighted by TfL have also been operating. These – individually minor – impacts may well have accumulated and compounded over time, themselves collectively contributing materially to congestion trends, but also having the effect of exacerbating the larger specific interventions.

This 'loss of network resilience' means that the road network is less able to deal with the effects of short term disruptions, and the impact of these are correspondingly magnified. This could well be the most significant factor accounting for the underlying 'skew', in relation to the first post western extension survey, in Figure 4.12.

Figure 4.17 summarises these effects, in terms of TfL's assessment of the main contributors to the loss of congestion benefits from the western extension during the latter part of 2007 and into 2008.

Figure 4.17 Indicative attribution of causes of loss of congestion benefits inside the western extension zone.



5. Public transport, road traffic collisions and air quality

5.1 Introduction

This section reviews important secondary indicators of the impact of congestion charging in the extended central London congestion charging zone. It focuses primarily on the first year of the operation of the western extension scheme but also provides an update on these key indicators for the original central London charging zone.

TfL expected increases in the use of buses in and around the western extension as a result of charging and introduced enhancements to the bus network in the months prior to implementation (see TfL's *Fifth Annual Impacts Monitoring Report*). Much smaller net impacts were anticipated on the patronage of the Underground and National Rail networks.

The anticipated overall traffic reductions in and around the western extension were also expected to have beneficial implications for road traffic accidents or collisions and vehicle emissions. In terms of road traffic collisions, the new traffic patterns were expected to lead to a reduction in collisions involving personal injury, although this would take place alongside the wider backdrop of general year-on-year reductions to reported road traffic collisions in London over recent years. In terms of vehicle emissions, lower volumes of traffic circulating more efficiently would have the effect of reducing overall emissions of nitrogen oxides, particulate matter and carbon dioxide from road traffic. This too would parallel a wider trend of year-on-year reductions, reflecting technology improvements to the vehicle fleet, although the impact was unlikely to be immediately apparent in measured (ambient) air quality.

5.2 Key findings from previous reports

In relation to the original central London charging zone TfL's *Fifth Annual Impacts Monitoring Report* concluded for these secondary indicators that:

- The introduction of charging in 2003 had contributed to a wider trend of significant increases to both bus network capacity and patronage. Improvements to bus services in London were an acknowledged Mayoral transport priority and the majority of net revenues from the scheme had been allocated to bus operational measures. TfL estimated that congestion charging in central London was responsible for up to one-half of the bus patronage increases seen over the period 2002-2003.
- Congestion reductions resulting from the scheme in the original zone had contributed to significant improvements to bus reliability, alongside wider operational bus initiatives. However the impact on this, particularly on bus kilometres lost due to traffic delays, have diminished in line with the deterioration in general traffic conditions as reported in Section 4.
- Patronage on the Underground and National Rail in central London had tended to reflect wider economic conditions and no disproportionate impacts from the original central London scheme were visible.

- Recent years have seen significant reductions to reported personal injury road traffic collisions, reflecting wider TfL and borough road safety initiatives. TfL estimated that the charging scheme had contributed to an additional reduction of between 40 and 70 collisions involving personal injury per year in the central London charging zone and on the Inner Ring Road over and above what would have been expected from these wider background trends. There was no evidence of disproportionate change to the number of collisions involving two-wheeled vehicles in or around the charging zone that might have been attributable to the traffic impacts of the scheme, with increases to numbers of these vehicles following the introduction of charging.
- By reducing the volume of traffic circulating within the charging zone and improving the efficiency with which it circulates, it was estimated that congestion charging had been directly responsible for reductions inside the original charging zone of; 8 percent in road traffic emissions of oxides of nitrogen (NO_X); 7 percent in emissions of fine particulate matter (PM_{10}), and 16 percent in emissions of carbon dioxide (CO_2). These attributable reductions have diminished as congestion levels increased from 2006 onwards but have long since been overtaken in magnitude by the beneficial impact on year-on-year improvements to the general emissions performance of the vehicle fleet.
- Even so, trends in actual measured air quality continued to primarily reflect the diversity and dominance of external factors in determining pollution concentrations and, as such, did not allow the identification of a clear 'congestion charging effect'.

5.3 Key developments for 2007 following the introduction of the western extension

The western extension was introduced in February 2007 and available indications post-dating the introduction of charging in both parts of the extended zone show that:

- 2007 saw an increase in bus passengers entering the western extension zone – with a 6 percent increase during charging hours, and a 9 percent increase in the morning peak period. Bus network capacity increased by around 17 percent, resulting in a reduction to average bus vehicle occupancies.
- There were therefore no indications of adverse impacts on the bus network from the additional passengers, some of whom will have switched modes of transport as a response to the extension.
- TfL's annual Central Area Peak Count survey of buses entering a somewhat wider definition of central London showed continued stability in both numbers of buses and bus patronage.
- Bus network speeds continued their recent trend of decline with further falls in the average speed of buses serving the original central London charging zone. Average bus speeds on routes serving the western extension were unchanged in 2007 compared with 2006 and no specific gains from the extension scheme are visible.

- Indicators of bus network reliability, particularly bus kilometres lost due to traffic delays, again showed further deterioration in the original central London charging zone. This is in line with wider indicators of traffic conditions. In the western extension for 2007 the equivalent indicators were unchanged – or had even deteriorated slightly – in relation to conditions in 2006 before the extension was introduced.
- Available indicators of the performance of buses in the western extension were therefore suggesting that no overall benefit to bus passengers has arisen from the substantial traffic reductions brought about by the extension scheme and appeared in several other respects to mirror the available indicators of general traffic conditions.
- 2007 saw widespread general growth in Underground and National Rail patronage, with 8 percent more people entering the western extension by Underground during charging hours. Although a small proportion of this increase reflects former car users who transferred to Underground, background trends were by far the more pervasive influence as reflected across the entire Underground network.
- There have been some consistency issues with the available time-series of road traffic collision data for the extended charging zone. Accounting for these, while partial data for 2007 indicates reductions in most categories of collision in and around the western extension compared to 2006, the magnitude of these changes is small in relation to equivalent changes in the original central London charging zone, and in Greater London more generally. It is therefore not yet possible to give a full appreciation of the impact of the western extension on road traffic collisions. Within the original charging zone there was a small increase in personal injury collisions in 2007 that can largely be attributed to the normal year-on-year variability inherent in collision statistics.
- Initial estimates of the impact of the traffic changes brought about by the scheme on emissions of key air pollutants suggest that the extension scheme has led to reductions inside the extension zone of 2.5 percent in emissions of NO_X, 4.2 percent in emissions of PM_{10} and 6.5 percent in emissions of CO_2 inside the extension zone itself. These reductions are smaller in magnitude than those associated with the original central zone in 2002/03, largely reflecting the impact of 'background' improvements to the performance of the vehicle fleet in the intervening period, and the exclusion of traffic speed changes, given the inconsistency of this measure during 2007.
- Long-run trends for measured air quality show a continuation of the patterns described in previous annual impacts monitoring reports, with effectively stable average concentrations of key pollutants. Absolute pollutant concentrations and trends at individual site groups largely reflect site-specific influences as well as medium-run weather patterns. These influences are again seen to be considerably more significant in determining concentrations than any impacts from charging.

5.4 Bus patronage in the western extension

TfL's *Fifth Annual Impacts Monitoring Report* set out counts of bus passengers entering the western extension zone during charging hours between 2004 and 2006. An equivalent post-implementation survey was carried out in 2007. TfL had previously noted that the patronage data between 2004 and 2006 were indicating a downward trend in passenger numbers, and that this appeared to be contrary to wider indicators of bus patronage across London that were suggesting substantial increases over the same period.

Following publication of the *Fifth Annual Impacts Monitoring Report*, TfL thoroughly reviewed the available data. This has resulted in some small changes to the previously-published figures for 2006 but the changes do not alter the overall picture of apparent decline from these counts. TfL has also looked at 'whole route' estimates of patronage from passenger boardings on routes affected by the western extension, averaged over a longer timescale than the one-day patronage counts. These suggests much more stable patronage trends over the period between 2004 and 2006.

The available pre-extension data are therefore somewhat inconsistent. However, for 2007, both indicators are suggesting substantial increase in bus patronage in relation to the western extension over 2006, and also that these increases are being satisfactorily accommodated by additional bus service provision.

From the one-day western extension bus counts, in Tables 5.1 and 5.2, the number of passengers entering the western extension zone in the morning peak period (07:00-10:00) in 2007 was 37,200. This is an increase of 9 percent compared with 2006. The equivalent increase to the number leaving the zone was 2 percent. During charging hours the equivalent numbers were 102,000 passengers entering – an increase of 6 percent on 2006, and 94,200 passengers leaving – an increase of 5 percent.

Table 5.1 Number of bus passengers and buses observed crossing the western extension zone boundary in the morning peak period. 07:00-10:00, 2004 to 2007.

	Inbound			Outbound		
	Passengers	Buses	Passengers per bus	Passengers	Buses	Passengers per bus
2004	36,800	1,430	26	23,000	1,310	18
2005	33,100	1,390	24	23,000	1,270	18
2006	34,100	1,370	25	24,300	1,330	18
2007	37,200	1,610	23	24,900	1,450	17

Table 5.2 Number of bus passengers and buses observed crossing the western extension zone boundary during charging hours. 07:00-18:00, 2004 to 2007.

	Inbound			Outbound		
	Passengers	Buses	Passengers per bus	Passengers	Buses	Passengers per bus
2004	105,200	4,870	22	95,200	4,630	21
2005	100,400	4,750	21	94,400	4,440	21
2006	96,500	4,760	20	90,100	4,580	20
2007	102,000	5,540	18	94,200	5,210	18

Table 5.3 shows the equivalent estimate from bus passenger boarding data. The table also shows derived estimates of passenger kilometres (across the whole network of routes affected by the western extension), alongside statistics for bus kilometres operated and average passenger load per bus. Here, the estimated growth in passengers between 2006/07 and 2007/08 is smaller than that indicated by the counts of passengers crossing the boundary of the western extension, as the estimates apply to the whole length of the routes involved. The general trends towards increased bus kilometres operated and stable average loadings are nevertheless apparent.

Table 5.3 Estimates of bus patronage on routes affected by the western extension, 2004/05 to 2007/08. 24-hour average day.

	2004/05	2005/06	2006/07	2007/08
Passenger journeys	291,000	313,000	309,000	314,000
Passenger kilometres (thousands)	1,032	1,110	1,096	1, 114
Bus kilometres operated (thousands)	45.3	47.0	47.6	50.2
Average passengers per bus	22.7	23.6	23.0	22.2

TfL anticipated an increase in bus passenger demand from the scheme as a proportion of former car users changed mode. A number of planned improvements to the bus network were therefore introduced before the start of the scheme, as described in the *Fifth Annual Impacts Monitoring Report*. This has led to more buses entering and leaving the extension zone, which has had the effect of reducing average bus occupancy, as shown by Figures 5.1 and 5.2.

Therefore, although there are inconsistencies in the bus patronage data for the pre-extension period, first-year findings in terms of bus service provision, patronage and average vehicle occupancy are positive – with observed changes largely corresponding to TfL's expectations for the scheme.

Figure 5.1 Average number of passengers per bus, inbound, crossing the western extension zone boundary, 2004 to 2007. Charging hours.

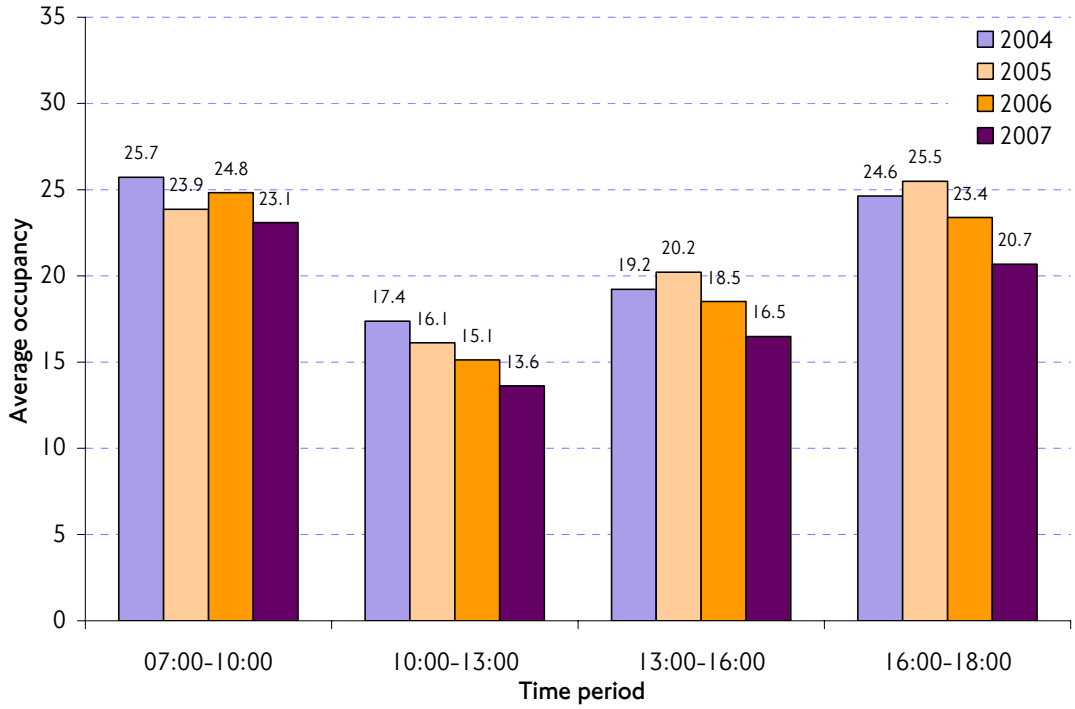
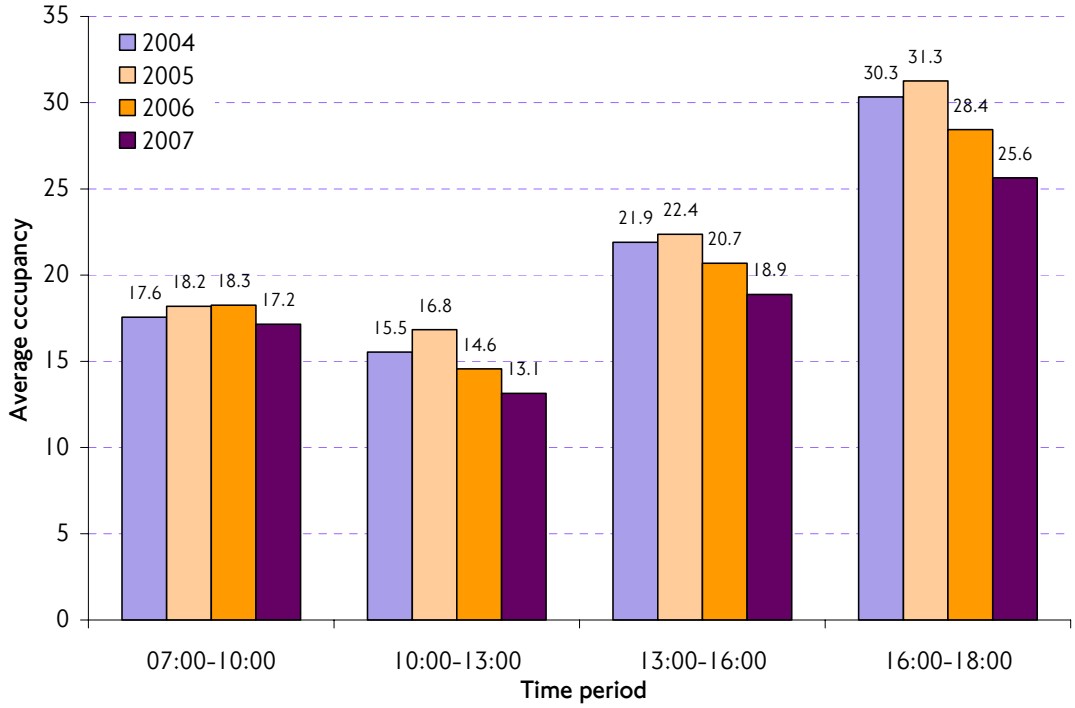


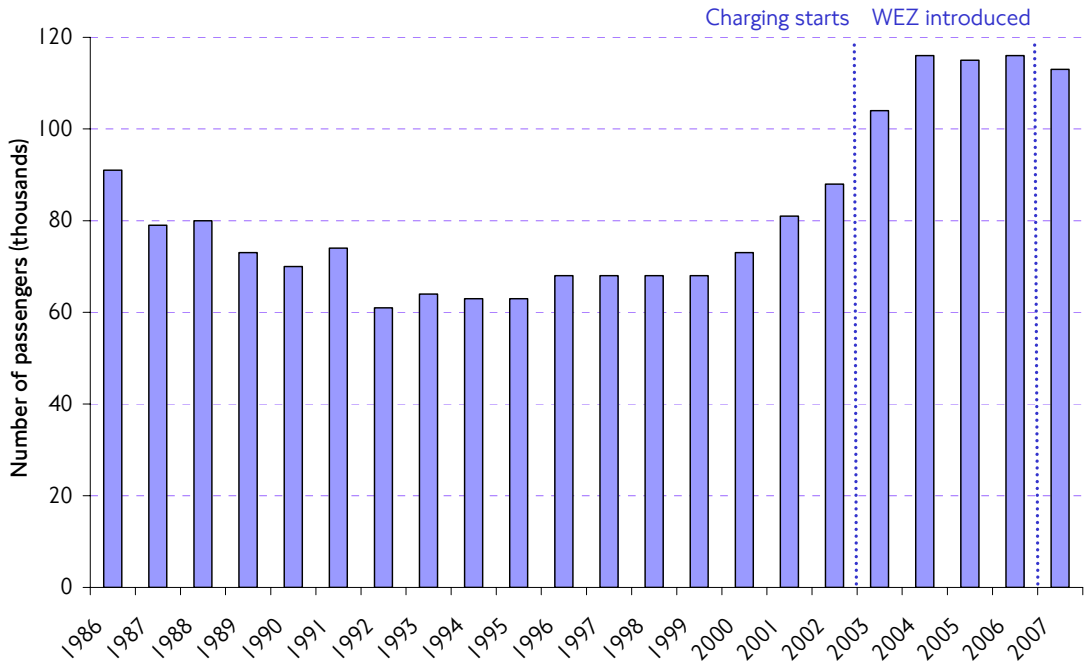
Figure 5.2 Average number of passengers per bus, outbound, crossing the western extension zone boundary, 2004 to 2007. Charging hours.



5.5 Bus patronage in the original central London charging zone

Results from TfL's regular Central Area Peak Count survey of bus passengers entering central London (covering an area wider than, but subsuming, the original charging zone) are shown in Figure 5.3. Following substantial increases in 2003 and the years immediately beforehand, the number of bus passengers entering central London has tended to be relatively stable over the last four years. In 2007, 113,000 passengers were counted entering central London in the morning peak period.

Figure 5.3 Bus passengers entering central London, 07:00-10:00. Autumn counts, 1986 to 2007. TfL Central Area Peak Count.



5.6 Bus network speeds

TfL monitors bus speeds using sample data from automatic vehicle location systems. Routes in and around the charging zone have been grouped and sub-divided by geographical segment to aid interpretation. Figure 5.4 shows bus speeds in and around the western extension across four-week periods for a period of two years either side of the introduction of the western extension. Note that routes along sections of road on the western extension zone boundary and on sections of route on main orbital roads close to the western extension zone are combined to improve the robustness of the sample used.

In 2007 the average speed of buses travelling on sampled roads inside the western extension was 10.6 kilometres per hour – practically unchanged compared with the previous year before the introduction of the scheme. Although average bus speeds are determined by a range of factors other than general traffic conditions, eg adherence to the schedule, this is nevertheless unexpected and suggests that buses operating in the extension zone are not deriving operational benefits from the scheme. However, it does tend to reflect the trend in congestion data for general traffic in the zone, as described in Section 4 of this report.

There is some evidence of increases in bus speeds on routes serving the boundary roads, the main orbital routes close to the extension zone, and on routes further away from the western extension. This may reflect a combination of traffic signal optimisation measures relating to the boundary route, delays from road works occurring the months prior to the scheme and, possibly, reduced traffic circulating in the area outside the extension zone (see also Section 2). Again, this tends to reflect the aggregate congestion trends for these locations as discussed in Section 4.

Figure 5.4 Average bus journey speeds for selected sections of road. January 2006 to February 2008.

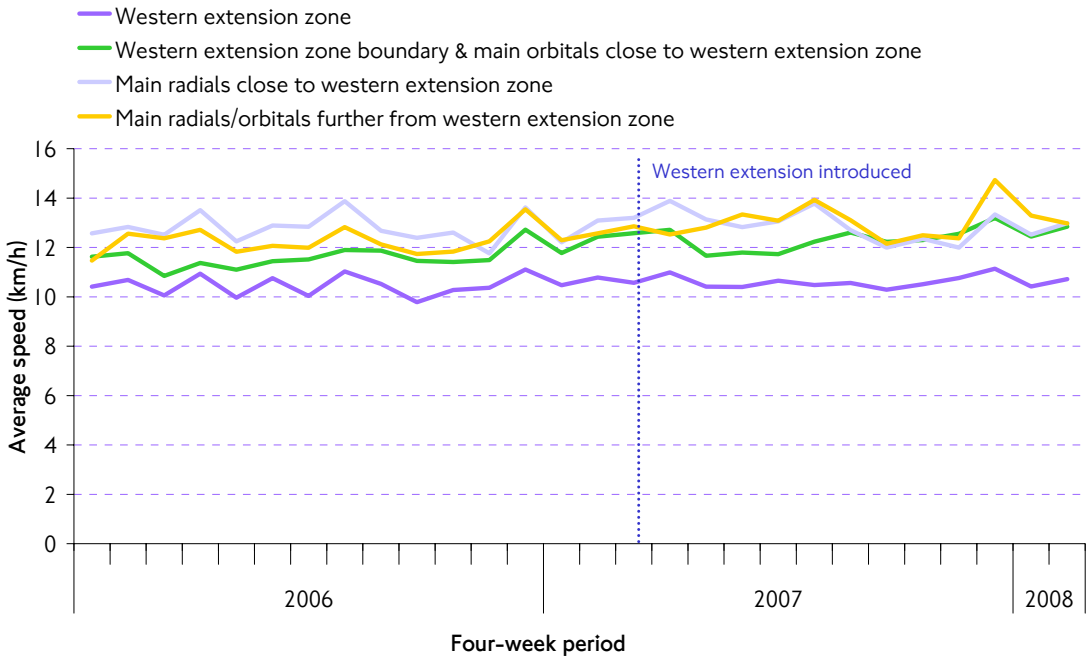


Figure 5.5 Average bus journey speeds for selected sections of road in and around the original central London congestion charging zone, 2002 to 2007.

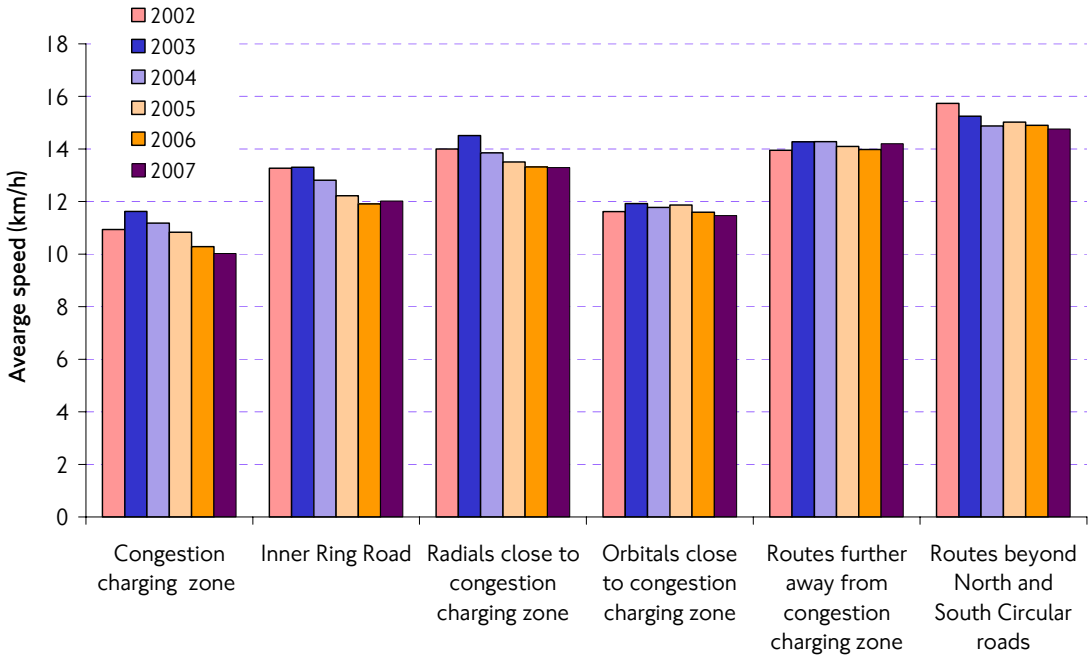


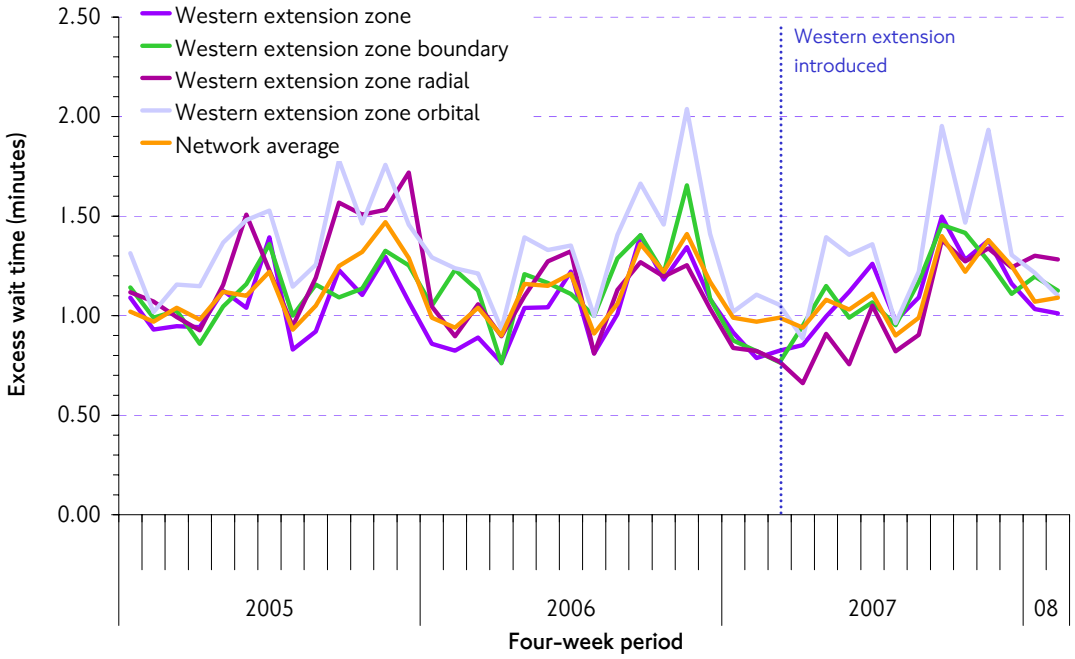
Figure 5.5 shows bus speeds in and around the original central London charging zone from 2002 to 2007. The trend of declining bus speeds since 2003, already established and noted in previous annual monitoring reports, has continued with speeds in the original zone falling by a further 3 percent. At the same time, bus speeds on routes on the Inner Ring Road and on radial route segments close to the original charging zone were more stable. Since 2003 the overall reduction in bus speeds within the central zone has been 14 percent. Buses here are now 8 percent slower than before charging was introduced in 2002.

5.7 Bus network reliability

To measure bus reliability **excess waiting time** is used. This is the additional waiting time at bus stops experienced by passengers above that which would be experienced if the service ran exactly as scheduled. High frequency routes are grouped to assist interpretation. Note also that the progressive introduction of Quality Incentive Contracts and other initiatives to improve reliability are also important when considering changes in this measure over time.

Figure 5.6 shows the excess waiting time for four-week reporting periods from the beginning of 2005 for routes affected by the western extension. There has been an increase in the excess waiting time for bus routes serving the extension zone of 6 percent during 2007, reflecting a small deterioration to bus service reliability. Routes on the western extension boundary road and radial routes have shown an improvement in bus reliability in the order of 3 percent and 6 percent respectively. Excess waiting time for orbital services has remained largely unchanged.

Figure 5.6 Bus excess waiting time – high frequency routes in and around the western extension zone, weekday charging hours. January 2005 to January 2008.

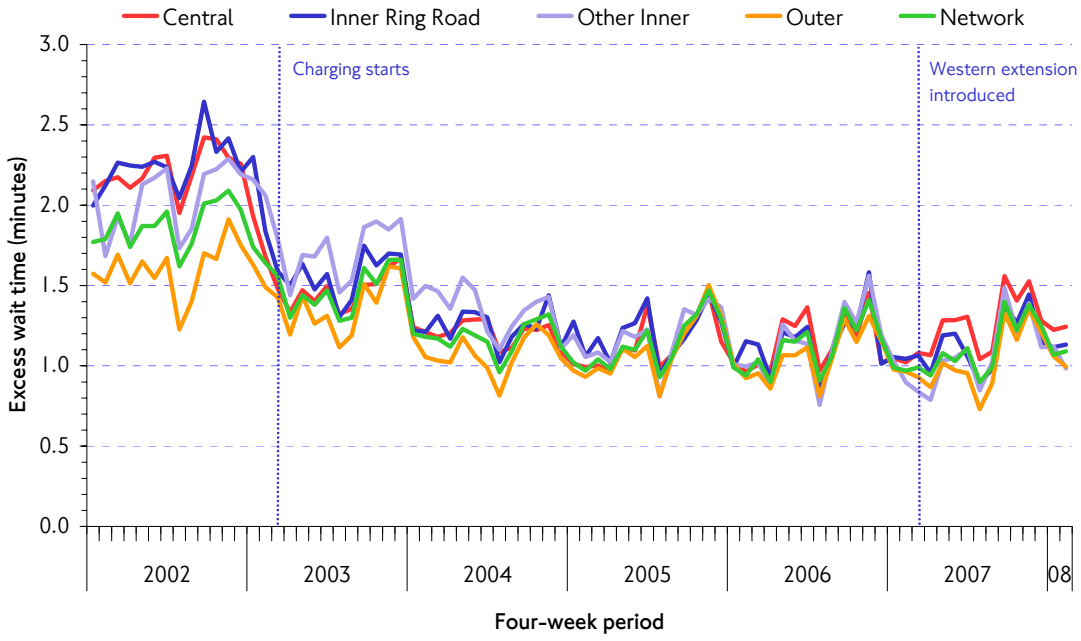


Looking more closely at this time series, it is again evident, as suggested by the general congestion data described in Section 4 of this report, that the early months immediately following the introduction of the extension scheme during spring 2007 saw relative gains against conditions in the same period a year earlier. However, these fell away sharply during the latter part of the year.

Different route groupings are used to monitor bus reliability in the original central London congestion charging zone. Figure 5.7 shows excess waiting time by route segment grouping since 2002 prior to the introduction of the original charging scheme.

Substantial benefits were visible in 2003, reflecting the introduction of congestion charging but also reflecting the introduction of Quality Incentive Contracts for bus operators. Excess waiting time decreased by over 30 percent in 2003 in relation to 2002 and by a further 18 percent in 2004 in the original central zone. However, since 2006, conditions have deteriorated – reflecting more general traffic conditions, with excess waiting time increasing by 8 percent in 2007 alone. Routes in the remainder of Inner London, further out from the Inner Ring Road, tended to show small reductions in excess waiting time at around 5 percent. All other areas, including the network wide average, showed small reductions of between 1 and 3 percent.

Figure 5.7 Bus excess waiting time – high frequency routes in and around the original central London charging zone. Weekday charging hours, 2002 to 2008.



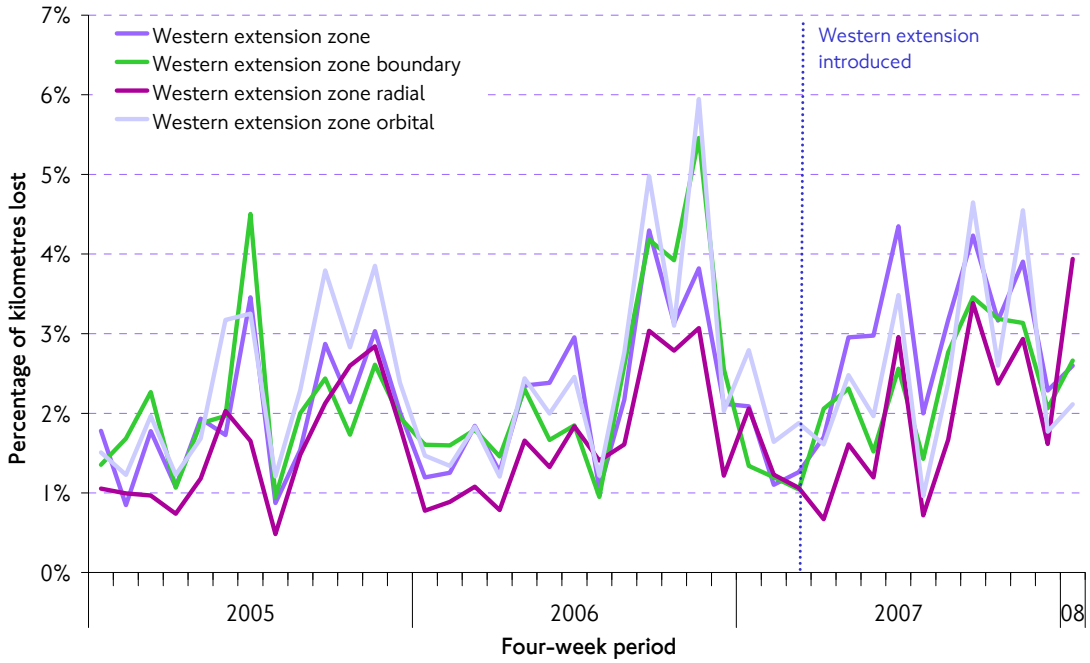
Another indicator of bus reliability is kilometres lost due to traffic congestion. These are scheduled bus service kilometres that are not operated, as a proportion, due to poor traffic conditions (eg turning back a bus before it has reached its ultimate intended destination).

Figure 5.8 shows that the proportion of lost kilometres in and around the western extension has been increasing since the start of 2005. In the first year of charging in

the western extension this trend continued, with 17 percent more kilometres lost due to traffic congestion than the previous year. Similarly, radial bus routes just outside the extension showed an increase of 10 percent in kilometres lost. In common with excess waiting time, it was possible that some of the deterioration was due to operational conditions within the central area given that many of the routes serve both areas. Bus routes on the boundary road on the other hand showed improvements in the order of 6 percent while orbital routes improved by 7 percent.

In considering these data it should be recognised that the absolute level of lost kilometres is very small in relation to that scheduled for the whole service. Nevertheless, this is clearly an adverse development that reflects the wider traffic and congestion issues considered in this report.

Figure 5.8 Percentage of bus kilometres lost due to traffic delays. Western extension related routes. January 2005 to January 2008.



In the original central London charging zone the substantial gains achieved in 2003, when there was a 60 percent decline in the proportion of bus kilometres lost due to traffic congestion, have in part reversed. The latest year saw a further substantial increase in the kilometres lost of around 30 percent. This represents 3 percent of the scheduled bus kilometres that are not operated because of congested traffic conditions, and again is reflective of the trends in congestion for general traffic.

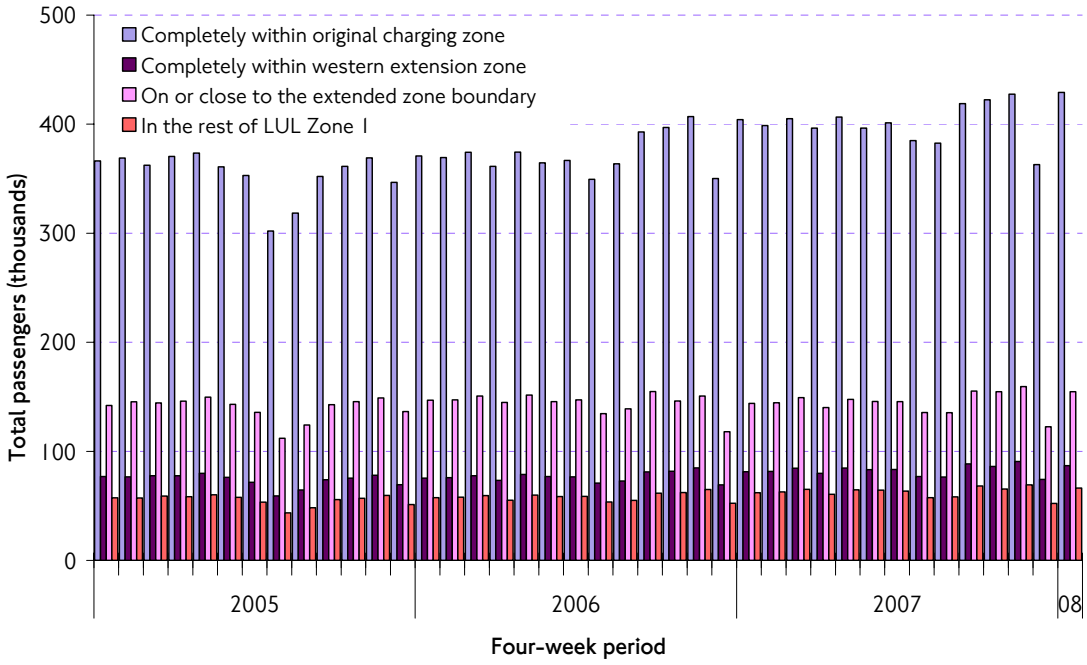
5.8 Underground patronage

Underground patronage is monitored through analysis of passenger exits through automatic ticket gates for stations grouped to reflect the geography of the extended congestion charging zone. Stations in Fare Zone 1 are divided into four groups which include: stations completely within the original central London zone, stations completely within the western extension zone, stations on or close to the extended congestion charging zone boundary, and stations in the rest of Fare Zone 1.

Patronage of the Underground has steadily increased in the past few years across the entire network. Figure 5.9 shows the number of passengers exiting Underground stations during the weekday morning peak period. In the last year, Underground patronage at stations within the central zone increased by 7 percent to 403,000 passengers exiting the stations in the morning peak.

This level of patronage, the highest in the past six years, represents an increase of 10 percent compared to 2002, prior to the introduction of charging in central London. This follows a substantial decline in 2003 due to factors other than charging (primarily the prolonged closure of the Central Line following the Chancery Lane derailment and wider economic factors) and continues the steady pace of increase seen in recent years.

Figure 5.9 Passengers exiting Underground stations in and around the extended congestion charging zone during the weekday morning peak period, 07:00-10:00.



TfL expected that the western extension could lead to a small net increase in Underground patronage, reflecting an element of modal shift to Underground by former car users, counterbalanced by a shift away from Underground to buses, in response to bus network improvements. Given the general rate of increase in the number of passengers using the Underground it is difficult to differentiate and quantify any specific impact of charging.

During 2007 the number of passengers exiting stations within the western extension increased by 8 percent to 83,000, compared to 77,000 the previous year. But this needs to be set alongside an equivalent increase of 7 percent at stations in the original charging zone, and therefore appears to largely reflect the wider 'background' increases in Underground patronage.

5.9 National Rail patronage

TfL anticipated that some car users could transfer to National Rail services as a result of the introduction of charging in the western extension. This was based on the experience in the original zone in 2003, although TfL recognised that the provision and role of rail services in the western extension is substantially different, so that any incremental effect from the scheme was likely to be very small in terms of the absolute number of rail passengers travelling to or from the zone.

TfL undertook one day passenger counts in spring 2006 and spring 2007 at all National Rail stations in or on the boundary of the extension zone. The character of these stations and their catchments varies considerably, from major central London termini on the one hand to primarily local stations on orbital rail routes on the other.

Tables 5.4 and 5.5 show the available time-series for annual passenger counts at Victoria and Paddington main terminal stations. It is immediately clear that there is substantial variability in the time series, which is known to reflect, to a degree, specific 'on-the-day' incidents affecting the rail networks served by these stations. While corroborative of wider data suggesting general increases in National Rail patronage over recent years, it is not possible to arrive at any firm conclusions about the impact of charging-related mode change in contributing to these aggregate results, except that TfL would consider any impact to be relatively minor.

Table 5.4 Passenger flows at Victoria National Rail station by year, one day counts.

	2002	2003	2006	2007
Inbound (07:00–10:00)	52,000	58,000	50,000	60,000
Outbound (06:00–20:00)	97,000	88,000	103,000	91,000

Table 5.5 Passenger flows at Paddington National Rail station by year, one day counts.

	2002	2003	2006	2007
Inbound (07:00–10:00)	20,000	18,000	21,000	25,000
Outbound (06:00–20:00)	53,000	46,000	49,000	52,000

Additional counts carried out at the remaining four smaller stations inside the extension zone again suggest small overall increases in patronage between 2006 and 2007 (Tables 5.6 and 5.7).

Table 5.6 Passengers arriving at western extension National Rail stations, morning peak period, 07:00-10:00, one day counts.

Year	Victoria	Paddington	Willesden Junction	Kensington Olympia	West Brompton	Kensal Green
2006	50,000	21,000	3,000	2,000	1,300	350
2007	60,000	25,000	3,000	2,000	1,500	440

Table 5.7 Passengers departing from western extension National Rail Stations by time period, one day counts.

Time Period	Victoria		Paddington		Willesden Junction		Kensington Olympia		West Brompton		Kensal Green	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
AM Peak Period (07:00-10:00)	9,000	8,000	8,000	9,000	4,000	4,000	1,000	200	400	1,000	2,000	2,000
16:00-18:00	38,000	33,000	14,000	14,000	2,000	2,000	1,000	1,000	1,000	1,000	300	500
All day (06:00-19:00)	103,000	91,000	49,000	52,000	11,000	11,000	3,000	3,000	2,000	3,000	3,000	4,000
Charging hours	69,000	64,000	37,000	39,000	9,000	8,000	2,000	2,000	2,000	2,000	3,000	3,000

5.10 Road traffic collisions in the original central London charging zone

The following data cover collisions involving personal injury reported to the police in the original charging zone and on the Inner Ring Road, continuing the series of full year reporting as described in previous annual monitoring reports. To bring the analysis in line with the change to the charging hours introduced in February 2007, the 2005 and 2006 data have been re-based to reflect the new charging hours of 07:00-18:00, replacing the previous reporting hours of 07:00-19:00. This means that figures reported in previous annual monitoring reports will not be directly comparable with this report. Examination of trends in collisions reflecting the early months of the western extension scheme requires that a different time-series is used, and this is considered in Section 5.11.

Due to the lag in data provision reflecting police investigations, the collisions data presented in the remainder of this section relate to 2006. This was the fifth year of charging in the original central London zone and the final year before the introduction of the western extension. There were no major changes to the operation of the scheme during this period.

It should also be noted that the London Accidents Analysis Unit who supply these data noticed the appearance of unusually low numbers of collisions in the early 2005 data, referred to in the *Fifth Annual Impacts Monitoring Report*, which may unfavourably affect 2006 comparisons. Investigations found that, although concurrent with a change in reporting procedures for collisions, there was no evidence of systematic error. TfL nevertheless concluded the 2005 data were likely to include an element of under-reporting.

Collisions involving personal injury in the original central London charging zone

Perhaps reflecting the lower-than-usual 2005 figures, collisions within the original charging zone in 2006 increased by 6 percent overall, with the largest increase seen during weekends – a 17 percent increase. On the Inner Ring Road, total collisions fell by 6 percent during charging hours but, again, rose at weekends by 9 percent.

Total reported road traffic collisions in Greater London were down by 6 percent on average during 2006, or 8 percent during charging hours. Given effectively stable traffic conditions in the original charging zone these recent changes would appear to largely reflect non-scheme related factors.

Table 5.8 Total reported personal injury road traffic collisions by time period. March 2005-February 2007.

		Original charging zone	Inner Ring Road	Greater London
2005	**Weekdays 07.00-18.00**	**891**	**308**	**13,585**
	Weekdays 00.00-07.00;18.00-24.00	431	177	6,544
	Weekends all day	307	147	6,137
	Total	1,629	632	26,266
2006	**Weekdays 07.00-18.00**	**925**	**289**	**12,554**
	Weekdays 00.00-07.00;18.00-24.00	443	172	6,068
	Weekends all day	359	160	5,981
	Total	1,727	621	24,603

Note: The reporting year runs from March to February.

Involvement in personal injury collisions in the original central London charging zone

As Table 5.9 illustrates, the proportion of road traffic collisions involving a pedestrian in the original charging zone remained unchanged from the year before; and pedestrian involvement collisions on the Inner Ring Road were down as both a number and a proportion of all collisions. Within Greater London the proportion of reported collisions involving pedestrians remained steady.

Table 5.9 Collisions involving personal injury by pedestrian involvement, 07:00-18:00. March 2005-February 2007.

		Charging zone	Inner Ring Road	Greater London
2005	Pedestrian	312 (35%)	64 (21%)	3,188 (23%)
	Non-pedestrian	579 (65%)	244 (79%)	10,397 (77%)
2006	Pedestrian	321 (35%)	52 (18%)	2922 (23%)
	Non-pedestrian	604 (65%)	237 (82%)	9,632 (77%)

Note: The reporting year runs from March to February.

Severity of collisions in the original central London charging zone

Collisions involving injury are classified by the severity categories of: 'fatal', 'serious' or 'slight'. One trend for 2006, that is suggested in Table 5.10, is the aggregate increase in reported injuries classified as 'serious' across Greater London. This increase is reflected in the original charging zone. Most of the additional reported collisions involved serious injuries, with smaller increases in the other categories of injury. On the Inner Ring Road, there were three more reported fatalities than in 2005, albeit in the context of very small absolute numbers, but a 7 percent decrease in both serious and slight injuries.

Table 5.10 Reported personal injury road traffic collisions within the central London charging zone and on the Inner Ring Road combined by severity class. 07:00-18:00, March 2005-February 2007.

	Original charging zone		Inner Ring Road		Greater London	
	2005	2006	2005	2006	2005	2006
Fatal	2	3	1	4	83	78
Serious	111	136	44	41	1,563	1,604
Slight	778	786	263	244	11,939	10,872
Total	891	925	308	289	13,585	12,554

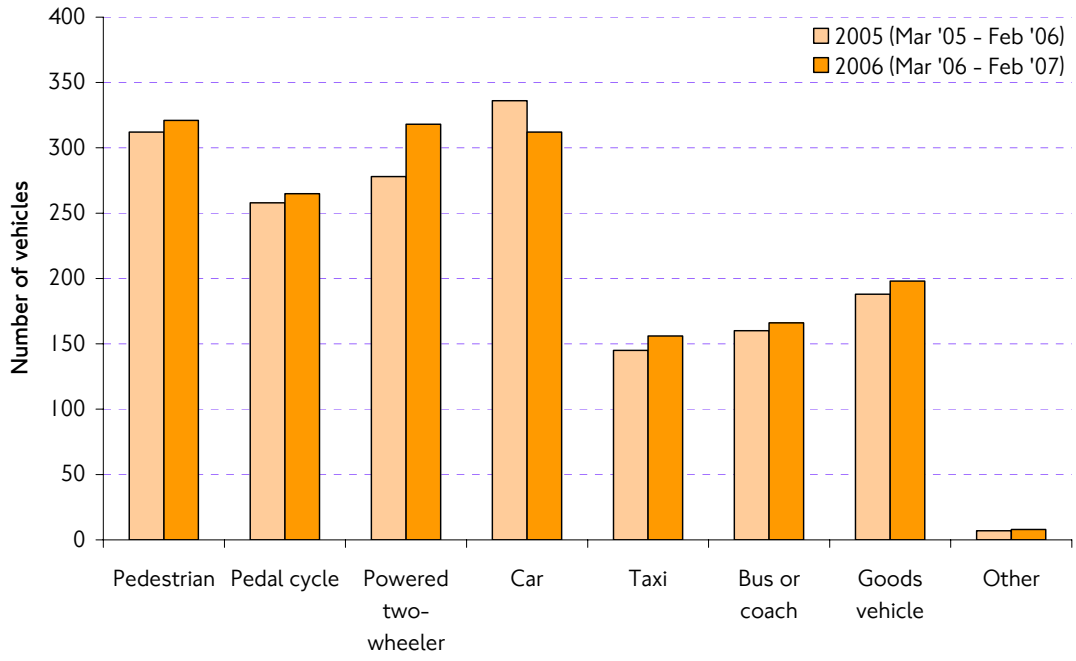
Note: The reporting year runs from March to February.

Vehicle involvement in collisions in the original central London charging zone

Figure 5.10 compares the reported vehicle types involved in collisions in 2006 within the original charging zone with the previous year. It is apparent that the increase in reported collisions during charging hours involved all categories of vehicle with the exception of cars, which account for about one-third of the circulating traffic during charging hours.

The largest percentage increase in collisions was for those involving powered two-wheelers – which had previously fallen by 26 percent in 2005. There were 7 percent more collisions involving taxis, a slower rate of increase than the previous year. Collisions involving goods vehicles were up by 5 percent; those involving buses and coaches by 4 percent; and pedestrian and pedal cycle involvement collisions increased by 3 percent each.

Figure 5.10 Involvement in personal injury collisions by vehicle type within the original charging zone, 07:00-18:00, March 2005-February 2007.



5.11 Road traffic collisions in the western extension zone

To provide some early consideration of any effect of the western extension upon road traffic collisions, some preliminary analysis was carried out to compare the provisionally reported personal injury events for the first ten months after charging was introduced in February 2007 with the comparable period the previous year. These investigations considered the overall level of collisions within the zone and its boundary roads by time of day, and a closer investigation of collisions during charging hours; in terms of the proportion of collisions where a pedestrian is involved, the degree of injury sustained, and the vehicle types involved.

Particular care is needed when considering these early findings for a number of reasons. Firstly, the absolute number of collisions for the western extension area is comparatively small, of the order of a third to a half of those of the original charging zone. Thus, changes that may be well within the 'expected' range of inter-year differences may appear to be large fluctuations. The short data collection period (ten months instead of the usual full year) further limits the ability to generalise from these initial findings.

A further complication arises from anomalies in the data time-series for the period before the introduction of the extension, as referred to previously. As with the data for the original central London charging zone (above), the comparisons that follow have been re-based to reflect the change in charging hours from the date of the introduction of the western extension scheme.

Collisions involving personal injury in the western extension zone

Table 5.11 compares the number of reported injury collisions from March to December 2007, after the introduction of charging, with the equivalent period in 2006, by time of day. The parallel figures for the original charging zone, Inner Ring Road and Greater London are given for comparison. There was an overall decrease in collisions in the western extension area of 2 percent, with collisions during charging hours increasing by a negligible amount. Those on weekdays outside charging hours showed a 15 percent reduction. There was a 7 percent increase at weekends.

Around the western extension boundary, there were fewer collisions for all time periods, with a 9 percent decrease during charging hours. On the free passage route between the western extension and the original charging zone, there were three more collisions during charging hours, and three less during weekends – differences which are not statistically significant.

Table 5.11 Total reported collisions involving personal injury by area and time period. March to December, 2006 and 2007.

		Western extension zone	Western extension boundary	Free passage route	Original charging zone	Inner Ring Road	Greater London
2006	**Weekdays 07.00-18.00**	**337**	**216**	**71**	**808**	**251**	**10,826**
	Weekdays 00.00-07.00;18.00-24.00	187	102	37	380	149	5,194
	Weekends all day	150	100	44	304	145	5,171
	Total	674	418	152	1,492	545	21,191
2007	**Weekdays 07.00-18.00**	**339**	**197**	**74**	**761**	**258**	**10,147**
	Weekdays 00.00-07.00;18.00-24.00	159	89	37	349	159	4,845
	Weekends all day	161	93	41	249	128	4,765
	Total	659	379	152	1,359	545	19,757

In relation to the original central London charging zone there were more substantial reductions – equating to 6 percent fewer collisions during charging hours and 9 percent fewer collisions overall. This compares to equivalent reduction of 6 percent and 7 percent respectively for the whole of Greater London.

In terms of the absolute number of collisions involving personal injury in 2007, therefore, the recent trend of substantial year-on-year reductions, reflecting TfL and borough road safety initiatives, appears to have continued. However, the magnitude of the reductions in both the original and extended charging zones was smaller than that at the Greater London level. It is again possible that data anomalies are affecting the integrity of the data time-series for the western extension, but at this stage it is not possible to discern a clear 'additional' beneficial effect on aggregate numbers of road traffic collisions in the western extension zone that might directly reflect the introduction of charging.

Involvement in collisions in the western extension zone

Comparing 2007 with 2006, Table 5.12 shows the proportion of reported personal injury collisions where a pedestrian was involved. On the western extension zone boundary and free passage route, a higher share of collisions involved pedestrians in 2007 than in 2006, whereas in the western extension, a slightly lower proportion of collisions did so. It should be noted that the actual number of road traffic collisions involving pedestrians on these roads was small in absolute terms, and therefore subject to more fluctuation.

Table 5.12 Pedestrian and non-pedestrian reported injury collisions by area, 07:00-18:00. March to December, 2006 and 2007.

		Western extension zone	Western extension boundary	Free passage route	Charging zone	Inner Ring Road	Greater London
2006	Pedestrian	96 (28%)	29 (13%)	8 (11%)	283 (35%)	47 (19%)	2,502 (23%)
	Non-pedestrian	241 (72%)	187 (87%)	63 (89%)	525 (65%)	204 (81%)	8,324 (77%)
2007	Pedestrian	85 (25%)	38 (19%)	20 (27%)	238 (31%)	63 (24%)	2,370 (23%)
	Non-pedestrian	254 (75%)	159 (81%)	54 (73%)	523 (69%)	195 (76%)	7,777 (77%)

Severity of collisions in the western extension zone

Table 5.13 shows the breakdown of collisions during charging hours by severity. Despite the overall stability in number of collisions over all time periods, there was a small increase in 'serious' collisions after the introduction of charging. These preliminary findings are not consistent with the pattern shown in the original charging zone or with TfL's expectation and again may reflect data anomalies. Elsewhere on the western extension boundary and free passage route injuries of all severities declined.

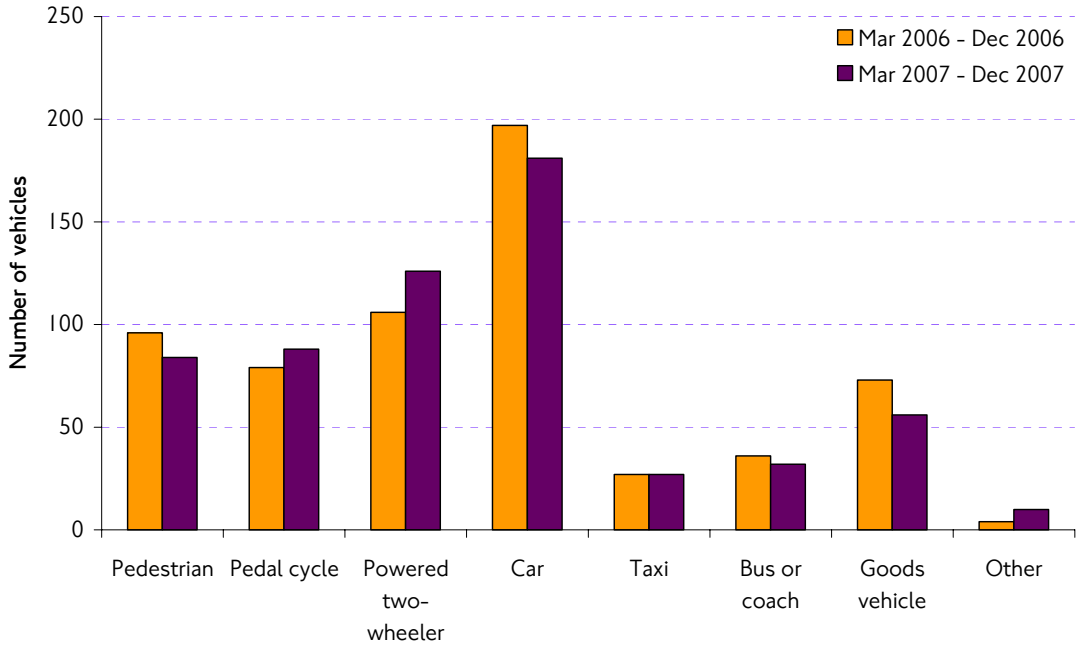
Table 5.13 Reported personal injury road traffic collisions by area and severity class, 07:00-18:00. March to December, 2006 and 2007.

	Western extension zone		Western extension boundary		Free passage route		Original charging zone		Inner Ring Road		Greater London	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Fatal	2	4	1	0	1	0	2	2	2	1	64	72
Serious	43	54	36	31	11	11	118	104	33	38	1,361	1,329
Slight	292	281	179	166	59	63	688	655	216	219	9,401	8,746
Total	**337**	**339**	**216**	**197**	**71**	**74**	**808**	**761**	**251**	**258**	**10,826**	**10,147**

Vehicle involvements in collisions in the western extension zone

Road traffic collision reports include the type of every vehicle involved, allowing an examination of involvement by vehicle category. Figure 5.11 shows the early analysis of vehicle types and pedestrians involved in collisions before and after the introduction of the western extension, demonstrating small increases for some vehicle types, and decreases for others.

Figure 5.11 Involvement in collisions by vehicle type within the western extension zone, 07:00-18:00. March to December, 2006 and 2007.



Following charging, there was a decrease in collisions involving pedestrians, and those involving all 'chargeable' vehicle types. However, there was an additional 9 collisions involving a cyclist, and an additional 20 involving a powered two-wheel vehicle. Both categories of vehicle are not subject to the charge but have increased in number, although not markedly, since charging was introduced in the western extension. Both the number of taxis entering the zone and the number involved in collisions remained unchanged from the previous year.

5.12 Emissions from road traffic

TfL's *Fifth Annual Impacts Monitoring Report* reviewed developments to road traffic emissions of key pollutants – oxides of nitrogen (NO_X), particulate matter (PM_{10}) and carbon dioxide (CO_2) – in and around the original central London charging zone. It was noted that:

- Congestion charging reduced emissions inside the original central London charging zone by reducing the volume of circulating traffic, and allowing the remaining traffic to move around more efficiently.
- The beneficial impacts of the scheme occurred between 2002 and 2003. These were estimated at scheme-attributable reductions of 8 percent to emissions of

NO_X, 6 percent to emissions of PM_{10} and a reduction of 16 percent in emissions of CO_2. All these figures were for emissions from all road traffic sources (only), on an annual total basis.

- All other things being equal, these reductions will have persisted in the years after 2003, but would not show up as a year-on-year 'step' change. However, although the traffic volume changes brought about by the scheme have been maintained, the decongestion benefits seen in 2003 have been progressively eroded. This means that the emissions reductions observed in 2003 will have correspondingly reduced in intensity over subsequent years.
- These scheme-related changes took place against the wider backdrop of technical improvements to the emissions performance of the vehicle fleet, reflecting new vehicle purchases conforming to higher 'Euro' emissions standards.
- Between 2003 and 2006, annual improvements from this source in central London were of the order of 6 percent for NO_X, 7 percent per year for PM_{10} and 1 percent per year for CO_2. Over time therefore, and while valuable, the emissions benefits from the scheme became subsumed within the wider trend towards reduced road traffic emissions in London.
- A combination of traffic volume, congestion and vehicle mix effects meant that there were no significant emissions impacts, either positive or negative, arising on the Inner Ring Road – the boundary route around the original central London congestion charging zone. However, this route has also benefited from wider trends towards improved vehicle emissions performance.

As part of the consultation process for the western extension, TfL made projections of the impact of the extension scheme on emissions. It was noted that the degree of change to be expected from the scheme was less intense than for the original central London scheme between 2002 and 2003. This reflected, in part, changes to the estimation methodology; the smaller degree of traffic volume and speed changes expected to result from the extension scheme; and the considerable background improvement to the emissions performance of the vehicle fleet between 2002 and 2007.

Table 5.14 is based on the observed traffic impacts of the scheme between 2006 and 2007. Note that three categories of change – traffic volume and composition, traffic speed, and background vehicle fleet turnover – are accounted for separately.

In terms of **traffic volume and composition change**, the area inside the extension zone is benefiting from significant reductions to emissions of key pollutants. Emissions of oxides of nitrogen (NO_X) have reduced by 2.5 percent; particulate matter (PM_{10}) by 4.2 percent; and emissions of carbon dioxide (CO_2) by 6.5 percent. The impacts are broadly neutral on the western extension boundary route (within plus/minus 1 percent). These reductions relate to an annual average day, for road traffic emissions only, and include non-exhaust road traffic PM_{10} emissions.

Table 5.14 Principal changes to emissions of NO_X, PM_{10} and CO_2 in relation to the western extension. Percentage change, 2007 compared with 2006. Annual average day, all road traffic emissions.

Change	Inside western extension zone (%)			Western extension boundary road (%)		
	NO_X	PM_{10}	CO_2	NO_X	PM_{10}	CO_2
Flow change – motorcycles	1.9	2.0	2.0	-5.0	-5.0	-5.2
Flow change – taxis	0.0	0.0	0.0	-7.9	-7.6	-7.7
Flow change – car	-10.6	-10.6	-10.9	-1.4	-1.4	-1.4
Flow change – bus and coach	1.5	1.4	1.4	-1.4	-1.4	-1.4
Flow change – light goods	-4.1	-3.3	-4.4	1.5	1.1	1.7
Flow change – rigid heavy goods	0.0	0.0	0.0	4.2	4.2	4.2
Flow change – articulated heavy goods	0.0	0.0	0.0	4.0	4.0	4.0
Traffic volume and composition change	**-2.5**	**-4.2**	**-6.5**	**0.9**	**-0.3**	**-0.5**
Speed change	-2.7	-1.4	-2.8	-0.9	-0.6	-1.1
Traffic volume/composition and speed change	-5.2	-5.7	-9.2	-0.1	-0.9	-1.6
Vehicle stock change 2007 versus 2006 (without WEZ)	-7.2	-6.9	-2.0	-7.3	-5.5	-1.7
Vehicle stock change 2007 versus 2006 (with WEZ)	**-6.8**	**-6.5**	**-1.8**	**-7.3**	**-5.4**	**-1.6**
Vehicle stock + volume and speed WEZ change 2007 versus 2006 (with WEZ)	-12.0	-12.2	-11.0	-7.3	-6.3	-3.2

Note: Western extension boundary route excludes the Free Passage Route.

In view of the variability in traffic speeds and congestion during 2007, as described in Section 4 of this report, it is not possible to give a meaningful 'annual average' effect on emissions from the **traffic speed changes** brought about by the extension scheme. The changes attributable to higher traffic speeds shown in Table 5.14 relate to the representative projected congestion reduction of 20 percent, which was achieved in moving car observer surveys of congestion immediately following implementation of the scheme. However, conditions during the later part of 2007 were suggesting that there had been very little overall congestion impact from the scheme. As it stands, the most objective assessment of the emissions impact of the western extension scheme is therefore confined to the consideration of the traffic volume and composition change only.

As is usually the case when comparing between years, the **background change** to the emissions performance of the vehicle fleet is significant, reflecting the purchase of newer, more environmentally-friendly vehicles and correspondingly removal of older ones.

5.13 Trends in measured air quality

Previous annual monitoring reports have shown that although congestion charging and other changes originally led to reductions in emissions, this did not feed through to observable improvements to measured air quality. This was to be expected, for reasons explained in previous reports. However, all other things being equal, reduced emissions will feed through to **relative** improvements in outdoor air quality, against conditions in the hypothetical absence of the scheme. Nevertheless, measured outdoor air quality is the first point of reference for considering the impact of this and other interventions, and this section provides an update of trends in measured concentrations of key pollutants, relating both to the original and extended congestion charging zones.

Table 5.15 summarises the revised indicator sites used in this report.

Table 5.15 Summary of congestion charging indicator monitoring sites.

Site grouping	Individual monitoring site	Pollutants measured
Within central charging zone – background	Russell Square, London Borough of Camden	PM_{10}, NO_X, NO_2
	Horseferry Road, City of Westminster	NO_X, NO_2
	Queen Victoria Street, City of London	NO_X, NO_2
Within central charging zone – roadside	Shaftesbury Avenue, London Borough of Camden	PM_{10}, NO_X, NO_2
Within western extension charging zone – background	North Kensington, Royal Borough of Kensington and Chelsea	PM_{10}, NO_X, NO_2
Within western extension charging zone – roadside	Cromwell Road, Royal Borough of Kensington and Chelsea	PM_{10}, NO_X, NO_2
	Knightsbridge and King's Road, Royal Borough of Kensington and Chelsea	NO_X, NO_2
Inner Ring Road – roadside	Marylebone Road, City of Westminster	PM_{10}, NO_X, NO_2
Inner London – roadside	Swiss Cottage, London Borough of Camden	PM_{10}, NO_X, NO_2
	Acton Town Hall, London Borough of Ealing	PM_{10}, NO_X, NO_2
	Holloway Road, London Borough of Islington,	PM_{10}, NO_X, NO_2
	Chiswick High Road, London Borough of Hounslow,	PM_{10}, NO_X, NO_2
	Mile End Road, London Borough of Tower Hamlets	NO_X, NO_2
Inner London – background	Poplar and Bethnal Green, London Borough of Tower Hamlets	PM_{10}, NO_X, NO_2
Suburban outer London	Slade Green, London Borough of Bexley	PM_{10}, NO_X, NO_2
	Kingsbury, London Borough of Brent	PM_{10}, NO_X, NO_2
	Eltham, London Borough of Greenwich,	PM_{10}, NO_X, NO_2
	Cranford, London Borough of Hounslow,	PM_{10}, NO_X, NO_2
	Thornton Heath, London Borough of Croydon	PM_{10}
	Teddington, Richmond upon Thames	NO_X, NO_2

The introduction of the western extension has meant that some of the inner London monitoring sites considered in previous monitoring reports are now located within the extension zone itself. These have therefore been reported as additional site groups in the analysis that follows. Also, two sites (Upper Street in the London Borough of Islington and Pembroke Road, in the Royal Borough of Kensington and Chelsea) closed during the past year, so these are no longer reported.

5.14 Trends in ambient PM_{10}

Figure 5.12 shows running annual mean PM_{10} concentrations at the indicator sites and Figure 5.13 is an equivalent graphic in relation to the National Air Quality Strategy PM_{10} exceedence day statistic. This measures the number of days in each year that the average concentration of PM_{10} was greater than 50 µg m^{-3}. The objective is for this to be exceeded on no more than 35 days per year.

Figure 5.12 Running annual mean PM_{10} concentrations at congestion charging indicator sites.

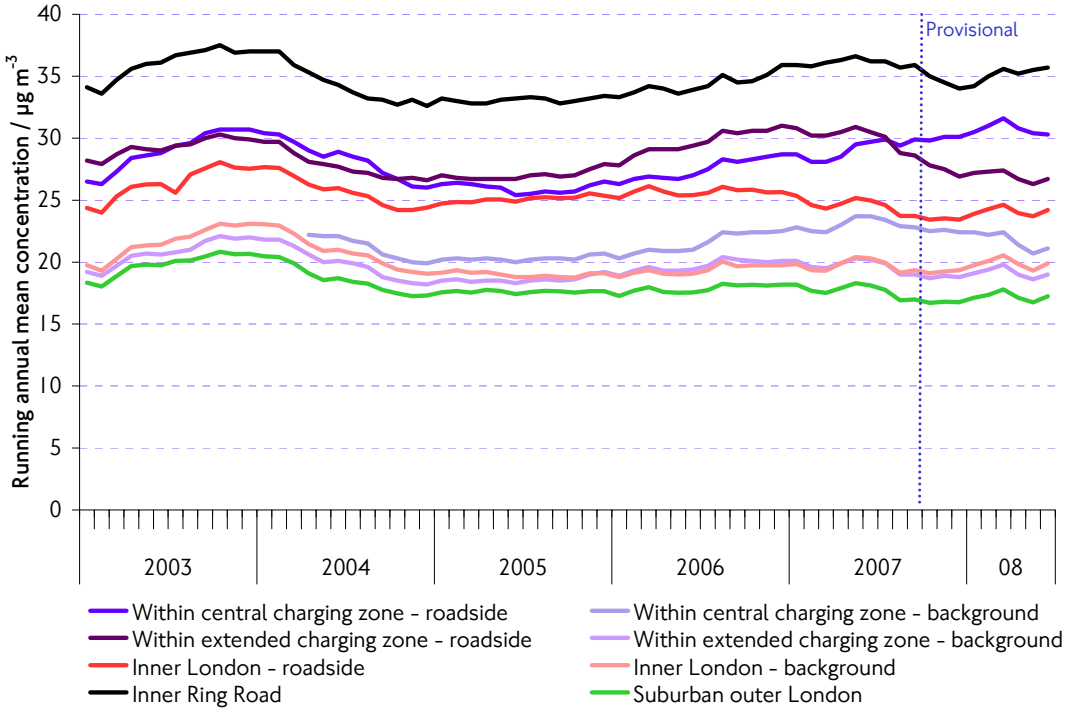
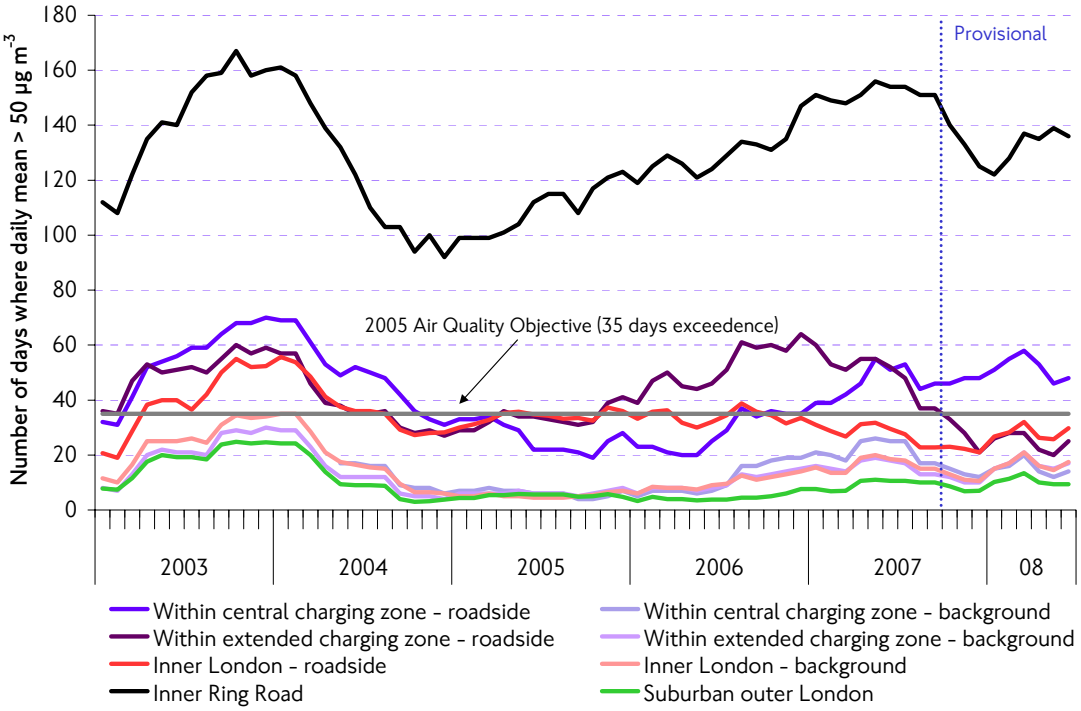


Figure 5.13 Running annual mean count of PM_{10} exceedence days at congestion charging indicator sites.



The following observations can be made in comparison to the previous annual monitoring reports:

- Overall, **concentrations** of annual average PM_{10}, expressed as running annual means, at all indicator sites groups are below the national air quality objective and have barely changed over the time period 2003-2008, despite some seasonal and yearly fluctuations associated with the weather (Figure 5.12).
- There have been more substantial fluctuations in the number of **exceedence days**, particularly in 2003 and again in 2007. This has lead to a small upward trend in annual average concentrations from late 2007 at many of the sites, back up to levels in 2003 (Figure 5.13).

The figures show that the concentrations at the roadside site within the original central London charging zone (Shaftesbury Avenue) and at the roadside site within the extended charging zone (Cromwell Road) show quite noticeable deviations away from the general trends. The reasons for this are likely to be due to the presence of major construction and road works during 2007 at both sites. By spring 2008, concentrations at the extension zone roadside site were back to similar levels to other inner London roadside sites.

5.15 Trends in ambient NO_X and NO_2

Figure 5.14 shows running annual mean concentrations of NO_X, and Figure 5.15 is an equivalent graphic for NO_2.

Figure 5.14 Running annual mean NO_X concentrations at congestion charging indicator sites.

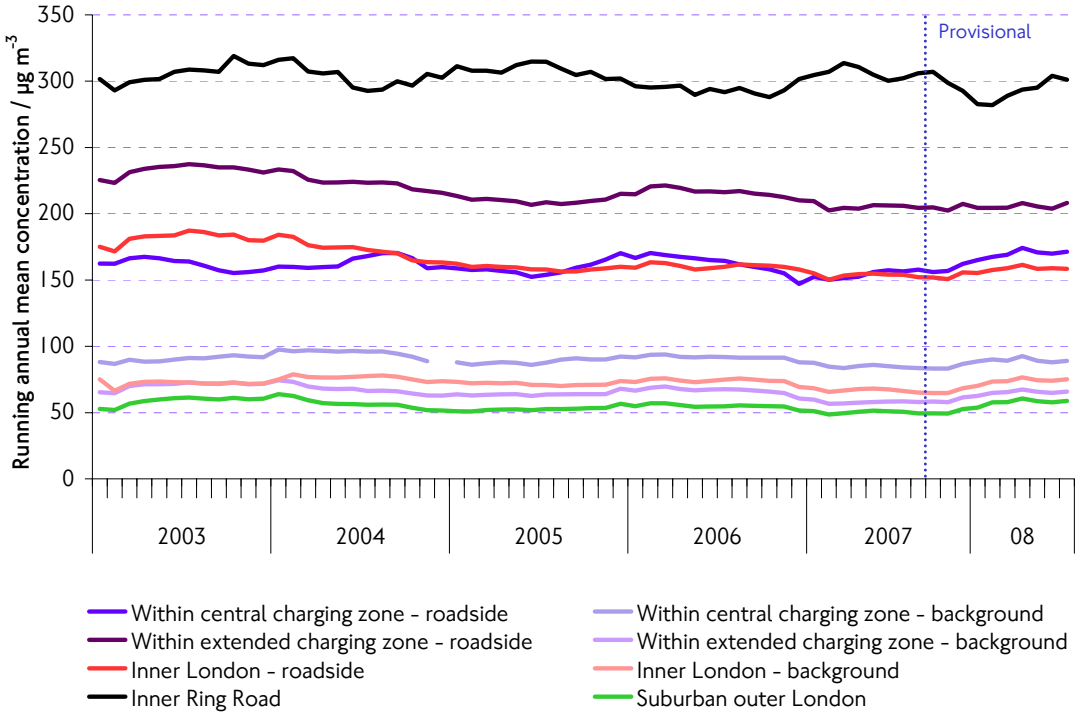
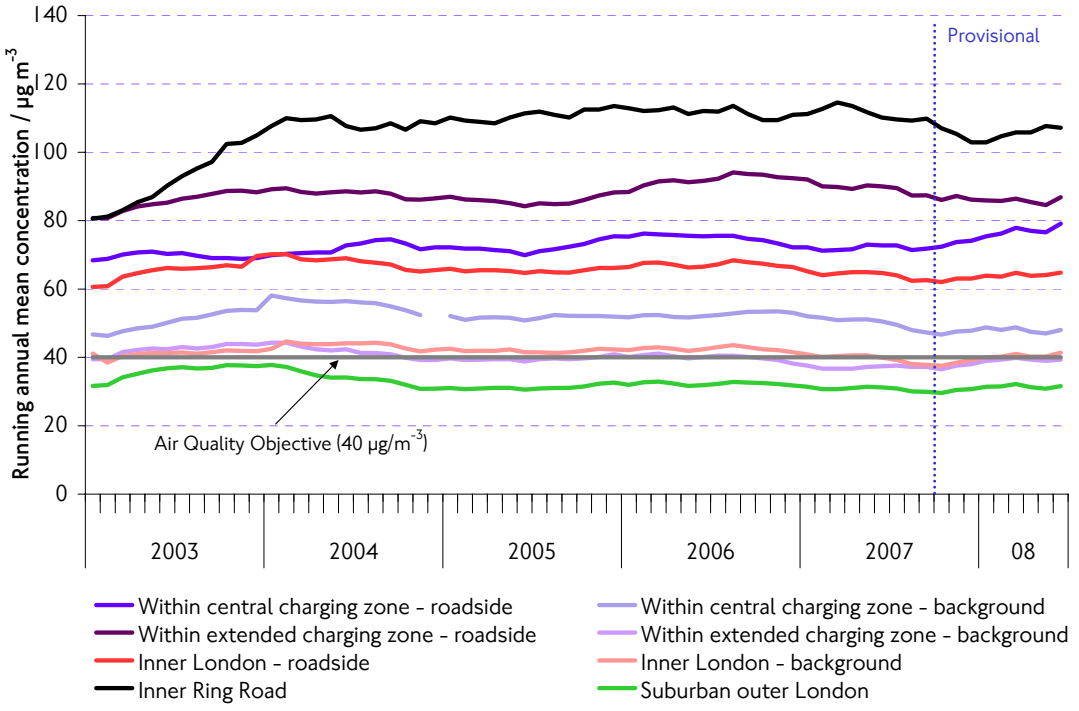


Figure 5.15 Running annual mean NO_2 concentrations at congestion charging indicator sites.



The updated trends for NO_X up to 2008 as shown in Figure 5.14 are very similar to previous annual reports, with a continuation of the pattern of small year-on-year reductions. The larger decline seen at the end of 2007 in the western extension zone is likely to be due to the inclusion of Cromwell Road in this site grouping, which showed a decline in all pollutants due to the cessation of road works at the site.

In terms of NO_2 concentrations (Figure 5.15), TfL had previously reported how the positive effects of a general, London-wide reduction in NO_X concentrations from road traffic were being limited by other factors producing an increase in NO_2 emissions. This is explained more fully in the *Fifth Annual Impacts Monitoring Report*, but the evidence for 2007 and 2008 shows that NO_2 concentrations continue to show more of a flat trend compared to NO_X. It is clear that this is not confined to the charging zone and TfL is continuing to contribute to the research effort investigating these wider trends.

5.16 Summary

The first year of charging in the western extension led to substantial increases in the number of bus passengers travelling in and out of the zone. This was accompanied by equivalent enhancements to service provision, such that increased demand was met comfortably and there have been no reported overcrowding issues.

Bus speeds and reliability in the western extension have not however reflected the beneficial traffic reduction effects of the scheme, while equivalent data for the original central zone suggest a continuing pattern of deterioration. These bus operational trends are reflective of the more general deterioration to traffic conditions described elsewhere in this report.

The effect of charging on Underground and National Rail patronage will have been fairly minimal of themselves, but any such effects have been subsumed in a wider picture of strong growth between 2006 and 2007.

The comparability of trends in reported road traffic collisions has been affected by data consistency issues between 2005 and 2006. Given this backdrop, while the western extension zone shows no evidence of adverse effects arising from the extension scheme itself, it is also not yet possible to identify any clear beneficial impacts.

TfL has estimated small overall emission reductions of key road traffic related pollutants reflecting the immediate traffic volume impacts on the western extension. It is important to recognise that these have been calculated on the basis of a significantly cleaner vehicle fleet to that prevailing when the original central London scheme was introduced in 2003. The variability in traffic speeds and congestion within the western extension since the extension scheme was introduced means that it is not possible at this stage to robustly attribute a positive speed related change to emissions from the extension.

Despite substantial reductions to road traffic emissions in London, trends in measured air pollution remain broadly static. This confirms the important role of

non-charging related 'background' factors in determining overall air quality in London, as referred to in previous annual monitoring reports.

6. Travel behaviour and travel behaviour change

6.1 Introduction

This section describes travel behaviour patterns of those travelling to and from the western extension by road and identifies changes made as a result of the introduction of congestion charging. The introduction of charging encouraged travellers to think about the trips they make and discouraged the use of the car (as driver) during charging hours.

6.2 Survey structure

The more subtle impacts of charging on travel behaviour were only partially understood following the introduction of the original central London scheme in 2003. To help improve TfL's understanding, a programme of surveys was put in place to monitor the choices made by travellers to the western extension zone after the introduction of the scheme in February 2007. The surveys aimed to understand what travel behaviour choices drivers made; why they made these choices; and what impact this has had on traffic, in terms of the origin and destination, purpose, time of day and distance of trips made by car or van.

The longitudinal travel behaviour patterns of western extension zone drivers have been monitored through a related range of five roadside interview and household surveys in 2006-2008. These surveys are listed below and the purpose, methodology and results from each are discussed in this section.

- Road side interviews around the western extension boundary.
- Road side interviews of traffic entering the original central London charging zone from the free passage route.
- Survey exploring travel behaviour change among those who drove in the western extension prior to the introduction of congestion charging.
- Survey exploring travel behaviour change among western extension residents who drive in the zone.
- Survey exploring travel behaviour patterns among drivers in the western extension zone after the introduction of charging.

Note that sample sizes for the household surveys are often small; that any assessment of travel behaviour change relies on the recall of respondents; and on respondents' interpretation of their own behavioural patterns and choices. As such, they provide a representation of responses to the scheme, which can only be considered indicative of actual changes.

6.3 Key findings

- An aggregate decline in car driver trips with an origin outside and a destination inside the extension zone was observed from traffic counts and roadside interviews before and after the introduction of the extension scheme.

- The aggregate volume of car driver trips made into the original congestion charging zone from the western extension increased after the introduction of charging. However, this has not itself led to a significant increase in overall traffic volumes in the original zone.
- Increased car driver travel into the original central zone by western extension residents was reflected in an increase in the proportion of car driver trips made for shopping and leisure purposes.
- Household surveys indicated that around half of car drivers resident outside the extension, faced with paying the full charge to continue driving in the western extension zone, chose to pay the charge. Including residents of the extension zone, the proportion is higher at 65-70 percent of drivers. Of those deterred by the charge, about 40 percent are estimated to have changed to a different mode of transport and 30 percent are estimated not to have made the trip at all. These are broadly consistent with the observed traffic impacts described in Section 2 of this report.
- Non-resident 'driver-deciders', who paid the full cost of the charge themselves, were the most likely to make a change to avoid paying the charge; more than half did so. Around eight in ten of those who had the cost of the charge paid for or reimbursed, or who were entitled to the residents discount, chose to continue driving in the western extension zone and pay the charge.
- The frequency of residents' travel by car in the western extension zone for different purposes was largely unchanged after the introduction of charging, with respondents more than twice as likely to report an increase than a decrease in the frequency of travel by car (14 percent and 6 percent respectively).
- Lower income respondents were more likely to report that their travel by car had increased or decreased, and less likely to say it had remained the same. This suggests that those on a lower income place a higher value on the cost of the charge, both encouraging them to avoid paying it but, where this is not possible, to ensure that it is not 'wasted'.
- A quarter of western extension residents reported that they had increased their car travel to the original charging zone, particularly for shopping and leisure purposes, corroborating findings from the roadside interview surveys.
- Drivers who had chosen to continue driving in the western extension after the introduction of charging and pay the charge tended to do so because they were travelling on behalf of their employer, because they felt they had no choice, or because it was easier or more convenient and to save time.
- The majority of drivers who had chosen to drive in the western extension zone and pay the charge had not considered any alternatives for their most recent trip. Of those who had considered another option, travelling by a different mode was commonly considered. Those who would not use public transport even if services were improved or who considered driving in London to be a necessity were the least likely to have considered any alternatives.
- Around a quarter of western extension resident drivers and around four in ten western extension chargepayers said that they found the charge difficult to afford.

Unsurprisingly, those on a lower income were more likely to say that they found the charge difficult to afford.

6.4 Roadside interview surveys – traffic leaving the western extension

An extensive programme of roadside interviews was carried out around the boundary of the western extension with the aim of detecting changes in driver behaviour as a result of the introduction of charging there. The vehicle types in scope for the survey included all private vehicles including bicycles and motorcycles. The surveys were undertaken at 24 sites on the western extension boundary in autumn 2006 and repeated in spring 2007. In the autumn 2006 programme 13,800 interviews were achieved and in spring 2007, 16,600 surveys were achieved. The main objective of these surveys was to establish changes in travel patterns across the zone boundary to help understand some of the less direct impacts of the scheme on factors like travel behaviour choice and impacts on business and the economy.

The survey locations were selected in order to provide a good representation of traffic entering or leaving the extension zone, taking into account road classification and traffic flow. The 24 sites accounted for approximately 68 percent of the total outbound flow across the zone boundary. All surveys were undertaken in the outbound direction between 07:00 and 19:00, complemented by fully classified manual traffic counts undertaken between 06:00 and 20:00 on the survey day and on a different day in order to identify the volume of drivers avoiding the site, a common driver response to knowledge of a survey in progress. The non-survey day counts provided a basis for expansion of the interview data at a site level.

An independent count on all 115 roads leading into or out of the western extension zone was carried out and interviews were expanded to the total flow (following expansion to the total site flow) to give a quantification representative of traffic crossing the extension zone boundary.

To fulfil an objective of better understanding the economic and business impacts of the western extension, the questionnaire was developed to include a number of questions not typically asked in roadside surveys. Such questions include the detailed classification of work based trips by economic sector and, for business trips, who bore the cost of the congestion charge.

The surveys were designed to provide a good quantitative representation of all vehicle-based users of the original congestion charging zone and the western extension, with the exception of bus and coach drivers and passengers. The users of goods vehicles, taxi drivers and occupants, and users of two-wheeled vehicles were included within the survey scope.

The results here need to be interpreted in the context of the traffic reductions achieved in the western extension. For traffic leaving the western extension zone the observed reduction was 14 percent, in vehicles with four or more wheels and 21 percent for cars and minicabs.

Origin and destination of trips crossing the western extension boundary

Trips with an origin or destination in the western extension were expected to reduce following the introduction of the extended scheme as a result of drivers transferring to other modes of transport, avoiding the zone or making other changes. At the same time, more use of the central zone by drivers in the western extension was expected as these drivers would either be residents in the extension and therefore benefit from the 90 percent residents discount or would have already paid the charge for entering the western extension.

- The proportion of surveyed trips originating in the western extension zone decreased by 4 percent with 48 percent of vehicles surveyed in 2006 having started their trip in the extension compared with 44 percent in 2007. The actual volume of trips from the extension declined from 125,000 to 101,000 – down by 20 percent.
- The proportion of surveyed trips originating in the original charging zone increased slightly from 11 to 12 percent, while the number of observed trips reduced by 4 percent from 28,500 to 27,500.
- Similarly, surveyed trips with a final destination in the western extension declined by 20 percent from 36,000 to 29,000.
- Surveyed trips with a destination in the original central zone increased by 3 percent, from 45,000 to 46,000 while as a proportion of all trips they increased, from 17 percent in 2006 to 20 percent in 2007.

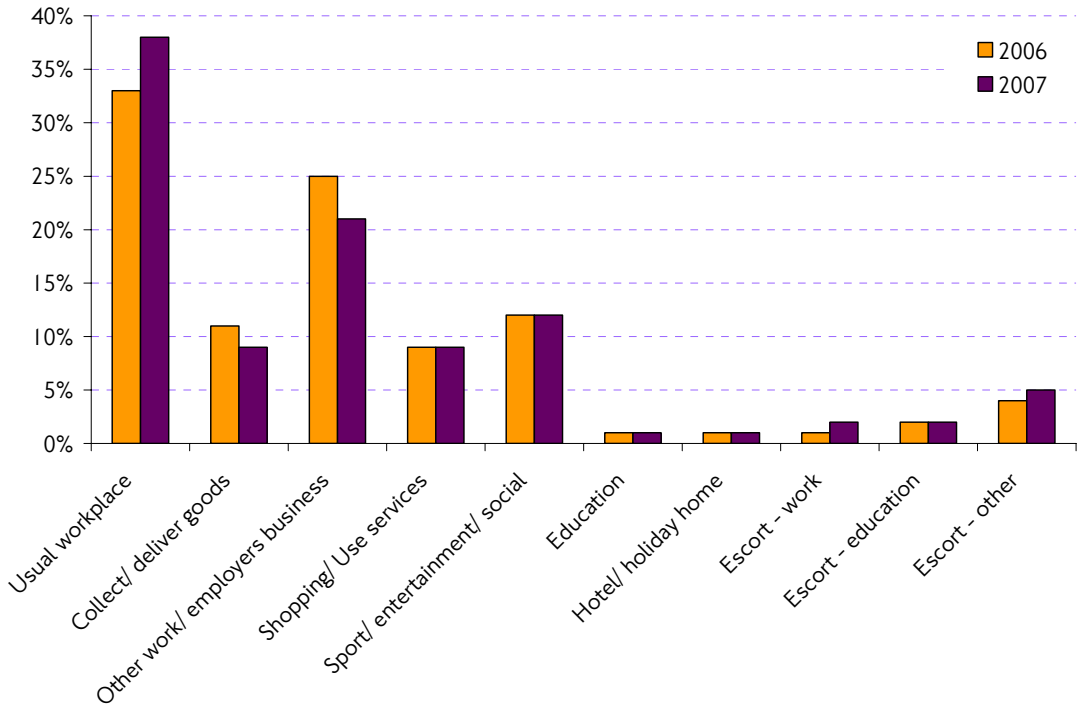
As the survey was undertaken in the outbound direction, trips with a final destination in the western extension represented a low proportion of surveyed trips; only one in eight trips had a final destination in the western extension.

Journey purpose of trips crossing the western extension boundary

TfL expected to see differential influences on trip types, with work based and other essential trips being more 'resilient' to charging compared with trips related to discretionary activities. Thus, work-related trips would be expected to increase as a proportion of the total. Figure 6.1 shows the proportion of different journey purposes for trips crossing the western extension boundary by private vehicles.

- Contrary to expectations, the charge resulted in a decline in surveyed proportion of work based trips and trips including the collection and delivery of goods. Further investigations to the dataset are trying to establish the validity of this counterintuitive result.
- However, the volume of commuting trips increased from 33 percent to 38 percent; this was in accordance with expectations.
- The proportion of escort trips to work almost doubled although they still represent a very small proportion of trips overall.

Figure 6.1 Proportion of trips crossing the western extension boundary by journey purpose, all trips by private vehicles. 06:00-20:00, 2006 and 2007.



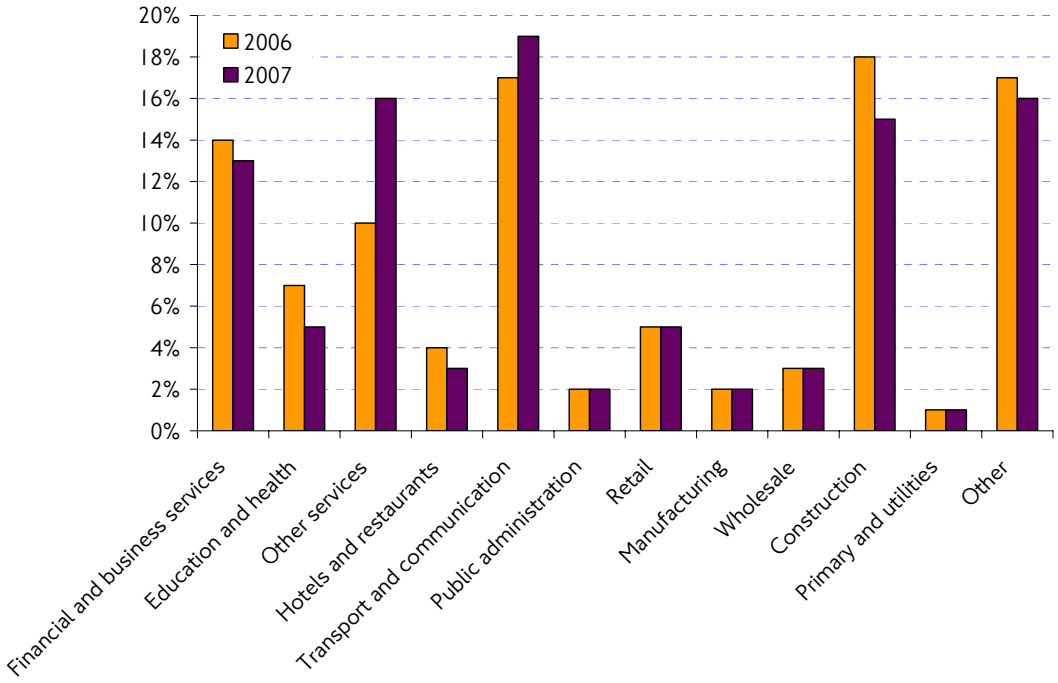
Industry sector of business trips crossing the western extension boundary

Drivers interviewed while making a commuting, collection/delivery or other work based trip, were asked to provide information on the industry sector they work in. Approximately two thirds were asked this extra question, intended to shed further light on the business and economic impacts of the scheme.

The introduction of the western extension had a greater effect on car/van/lorry trips made by drivers from certain industry sectors, as shown by Figure 6.2.

- 'Construction' sector trips decreased by 26 percent in terms of volume and by 18 percent in proportion between 2006 and 2007.
- 'Education and health' trips showed the greatest decline, with a 29 percent drop in terms of absolute numbers and a 21 percent drop in proportion.
- 'Other services' was the only sector to experience an increase between 2006 and 2007, with over 40 percent more trips being made post charging. This equated to an increase in the proportion of trips represented by this sector (from 10 to 16 percent).

Figure 6.2 Proportion of trips crossing the western extension boundary by industry sector, all trips by private vehicles. 06:00-20:00, 2006 and 2007.



Length of trips crossing the western extension boundary

Short distance trips reduced substantially following the introduction of the western extension; in particular trips of under a kilometre declined by almost a quarter. Medium distance trips of between 2.5 and ten kilometres continued to represent half of the trips made across the western extension boundary. Note that these statistics are based on a much reduced sample (approximately half), as only those surveys that contained detailed enough origin and destination information to enable the estimation of the trip lengths could be included in the analysis.

Summary of findings of roadside interviews – traffic crossing the western extension boundary

As anticipated, trips with an origin or destination in the western extension area reduced following the introduction of the western extension scheme. Commuting trips increased, while other work based trips including collection/delivery of goods declined. Business trips in the sectors 'education and health' and 'construction' appear to have declined disproportionately.

6.5 Roadside interview surveys – traffic entering the original central London zone from the free passage route

Further roadside interviews, following a similar methodology, were carried out with vehicles entering the original congestion charging zone from the free passage route in autumn 2006 and spring 2007. Surveys were carried out at six sites; five 'inbound' to the charging zone and one 'outbound'. In 2006, 1,700 interviews were achieved followed by 3,000 interviews in 2007. The surveys were designed to explore

interaction between the original and extension zones and the changing profile of travellers. Of particular interest was the changing use of the original zone by western extension zone residents. The data has been weighted to reflect the total traffic flow at each site, by vehicle type and time of day.

Traffic entering the original charging zone has remained stable following the introduction of the western extension (see also Section 3). Therefore changes detected from the roadside interviews, mainly on the composition of traffic, need to be interpreted in that context.

Origin, destination and home location of trips entering the original central London zone from the free passage route

Overall, the absolute number and proportion of western extension residents making trips entering the original zone from the free passage route has increased since the introduction of charging in the western extension:

- In total, 22 percent of surveyed drivers travelling inbound were resident in the extended zone, up from 17 percent in 2006.
- This equates to an increase of 35 percent in the actual volume of vehicles belonging to residents of the western extension crossing into the original congestion charging zone (31 percent outbound), against relative stability in the overall volume of traffic crossing the boundary.

There appears to have been a decline in movements into the charging zone from the free passage route that travel through the original zone to a destination elsewhere (from 45 percent to 31 percent). However, surveys suggest an increase from 53 percent to 67 percent in movements to a destination inside the zone.

Length of trips entering the original central London zone from the free passage route

The proportion of surveyed drivers making very short trips has reduced by more than a third to just under one in ten in 2007. The proportion making long trips of 20 kilometres or more increased by a comparable amount to 20 percent in 2007. More than half the vehicles surveyed were making trips of between two and ten kilometres.

Occupancy of vehicles entering the original central London zone from the free passage route

After the introduction of charging in the western extension, a higher proportion of vehicles contained more than one person, up from 24 percent in 2006 to 28 percent in 2007.

Journey purpose of trips entering the original central London zone from the free passage route

Figure 6.3 shows the proportion of vehicles by trip purpose, by time period, for the six survey sites in 2006 and 2007. There is evidence of an increase in the proportion of trips for ‘employers business’ and for ‘shopping and leisure’ purposes.

Figure 6.3 Purpose of trips crossing the six sites on the free passage route road side interview survey, all trips by private vehicles. 06:00-20:00, 2006 and 2007.

Summary of findings of roadside interviews – traffic crossing the free passage route

In summary, the roadside interview surveys confirm an anticipated increase in travel into the original charging zone by western extension residents. The increase is primarily for discretionary shopping and leisure trips.

6.6 Survey of response to charging by those driving in the western extension zone prior to charging

Roadside interviews provide an insight into the changing profile of trips made into the western extension zone. However, they do not reveal anything about what people have done instead of making their trip by car during charging hours. To this end, TfL commissioned a behavioural survey with drivers who had made a trip into or within the western extension zone in the period before implementation of the western extension scheme.

This survey was specifically designed to provide a 'before and after' picture of intended and actual behavioural change among those driving into, within and through the western extension zone. Twelve hundred drivers were included in the 2006 survey, of whom just over 700 agreed to be re-contacted for a second wave. Of these, about 400 were interviewed in autumn 2007, after the introduction of the extension scheme.

Respondents were selected from two sources: the road side interviews carried out around the boundary of the western extension zone in autumn 2006, and the western extension 'users' survey panel, as described in Section 7 of this report. As the sample

is relatively small and derived from multiple sources, it cannot be considered fully representative of the population and all findings should be treated with appropriate caution. The data has been expanded to the total number of car and van trips made crossing the boundary, derived from manual classified traffic counts. TfL estimates that around 42 percent of trips crossing the boundary were liable for the charge; non chargeable vehicles include emergency services vehicles, minicabs, Blue Badge holders and those eligible for an exemption.

Nature of trips made prior to the introduction of charging

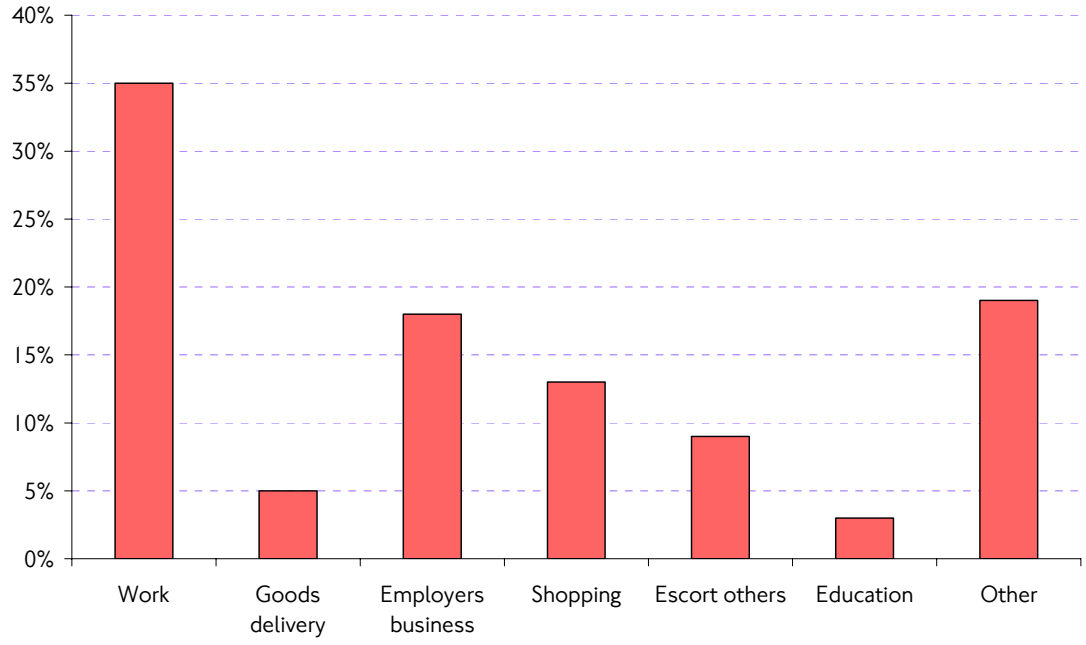
Table 6.1 shows the origin and destination of the most recent trip made into, within, or through, the western extension by survey respondents.

Table 6.1 Origin and destination of private vehicle trips made prior to charging.

Within the western extension	13%
Within the extended charging zone	9%
From the western extension to elsewhere	16%
From elsewhere to the western extension	29%
'Through' trips (origin and destination outside the western extension)	33%

Figure 6.4 below shows the purposes of trips made into, within or through the western extension in 2006, the year before the introduction of the extension scheme. A third were made for work, with a further quarter for employers business or deliveries. The majority of trips took more than half an hour, including 37 percent taking between half an hour and an hour, and 36 percent taking over an hour. Only 8 percent of trips were shorter than 15 minutes.

Figure 6.4 Purpose of most recent trip made into, within or through the western extension zone, all trips by private vehicles. 06:00-20:00, 2006.



In 2006, one third of drivers paid for parking at their destination, at an average cost of just over £10. Five percent were eligible for a Blue Badge and would therefore be exempt from the future congestion charge, 24 percent had the cost of the charge paid or reimbursed by their employer, and 37 percent were residents of either the original or extended zone.

Stated intentions and retrospective stated intentions

In the western extension behavioural survey carried out in 2006, prior to the introduction of charging, selected respondents defined as 'driver-deciders' were asked to consider their likely response to the future charge, or their 'stated intentions'. 'Driver deciders' were considered to be those paying the cost of the charge themselves, including those who pay the charge but receive a reimbursement from their employer, but excluding any whose employer paid the charge directly. Table 6.2 shows the estimated breakdown of all travellers by these segments; these estimated proportions were applied to the analysis of the survey findings.

Table 6.2 Estimated breakdown of traveller segments entering the western extension. Private vehicle trips during charging hours.

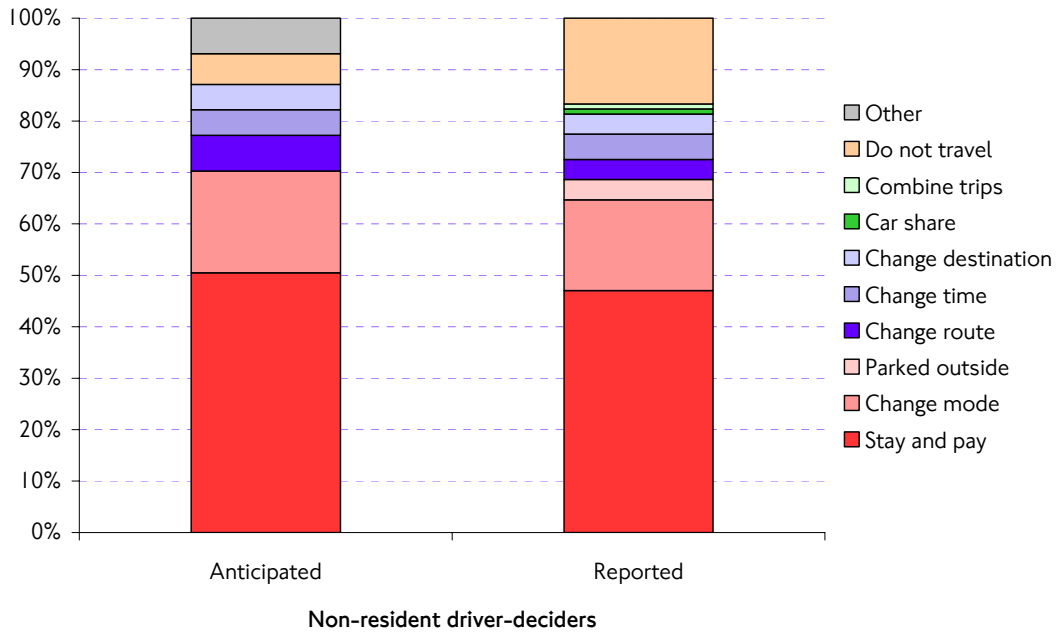
	Percent
Non-resident driver-deciders	37%
Resident driver-deciders	13%
Non-driver-deciders	50%
Total car and small van trips	170,000

In the survey carried out in 2007 after the introduction of charging, all respondents were asked how they had thought, prior to the introduction of charging, that they would respond; this can be described as a **retrospective stated intention** exercise. For non-resident 'driver-deciders', the data provided by the 'retrospective stated intention' exercise in 2007 was compared with their actual 'stated intentions' derived from the 2006 survey. At an aggregate level, the results had a high level of consistency and therefore the retrospective stated intention data is considered reliable.

Stated and actual intentions of non-resident 'driver-deciders'

Figure 6.5 shows that, before the introduction of the scheme, the sampled non-resident 'driver-deciders' in aggregate tended to slightly over-estimate in the 'before scheme' case the extent to which they would continue to drive and pay the charge for the trip in question, and under-estimate the extent to which they would change mode or simply not travel. After the introduction of charging, just under half of the non-resident 'driver-decider' sample chose to continue to make their trip by car and pay the cost of the charge. Given that respondents were asked about their most recent trip, the sample is biased towards the more frequent trip types.

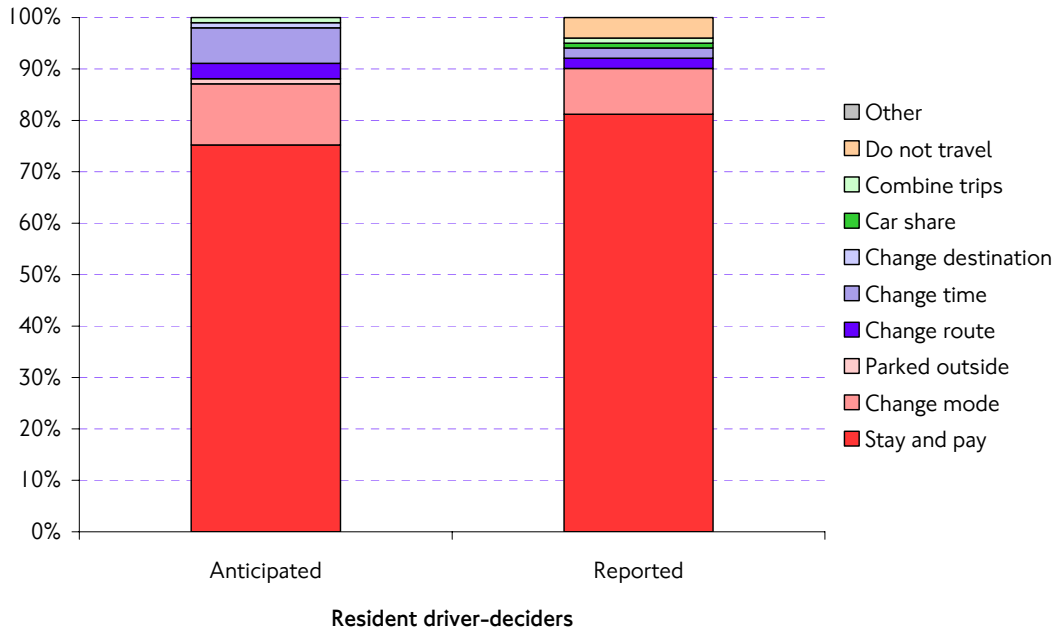
Figure 6.5 Comparison of anticipated and reported behaviour, non-resident 'driver-deciders'. Charging hours equivalent, 2006 and 2007.



Stated and actual intentions of resident 'driver-deciders'

Figure 6.6 shows that the sample of resident 'driver-deciders' in aggregate marginally under-estimated the extent to which they would choose to stay and pay the charge. It is striking that about a fifth reported a change to their trip in someway to avoid paying the charge, despite the 90 percent resident's discount.

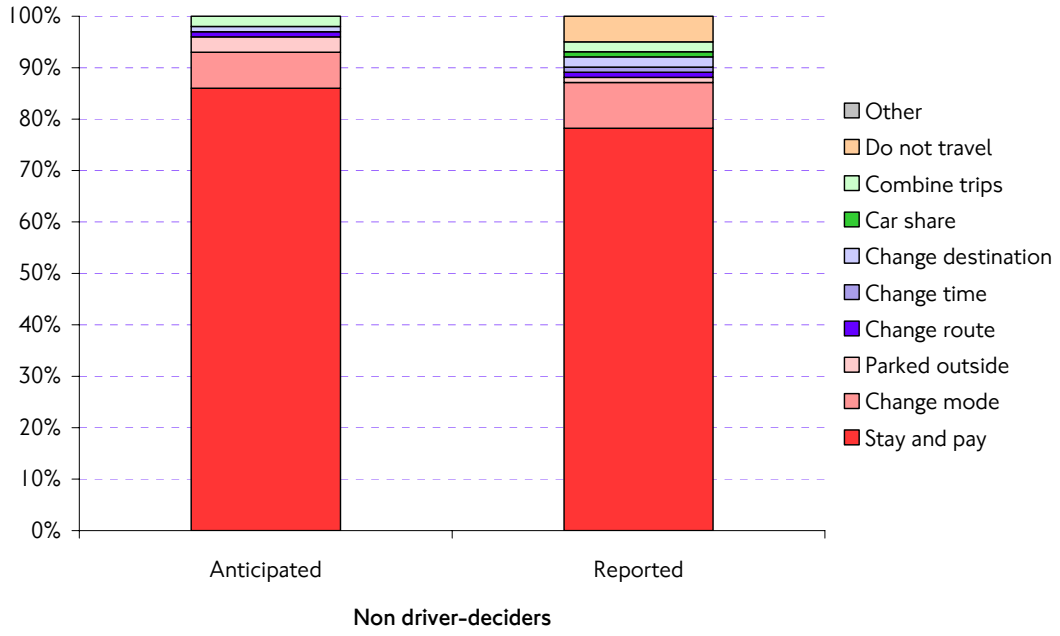
Figure 6.6 Comparison of anticipated and reported behaviour, resident 'driver-deciders'. Charging hours equivalent, 2006 and 2007.



Stated and actual intentions of 'non-driver-deciders'

As with the non-resident sample, 'non-driver-deciders' in aggregate tended to slightly over-estimate the extent to which they would stay and pay the charge. Figure 6.7 shows that around a fifth chose to change their trip to avoid paying the charge. Given that for this group the cost will generally be borne by a company rather than an individual, it confirms that some business and commercial travel is also sensitive to the introduction of charging.

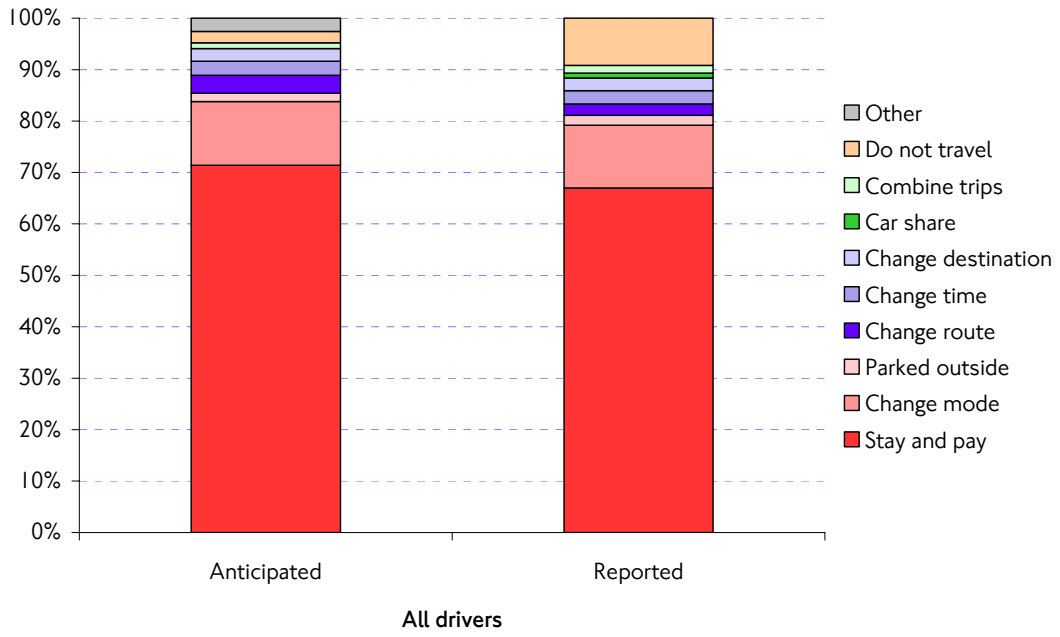
Figure 6.7 Comparison of anticipated and reported behaviour, 'non-driver-deciders'. Charging hours equivalent, 2006 and 2007.



Comparison of stated and actual intentions for all drivers

Overall, Figure 6.8 shows that 68 percent of sampled drivers reported that they chose to stay and pay for their 'most recent' trip, based on weighting to reflect the estimated breakdown of traveller segments as detailed in Table 6.2. Twelve percent changed to an alternative mode, 9 percent chose not to make the trip at all and the remainder made other choices, such as changing the time, route or destination of their trip. Again, this finding reflects the observed aggregate traffic volume impacts.

Figure 6.8 Comparison of anticipated and reported behaviour, all drivers. Charging hours equivalent, 2006 and 2007.



6.7 Survey of western extension residents registered for a residents' discount

Residents of the extended congestion charging zone are eligible for a 90 percent discount on the cost of the charge, available on a weekly, monthly or annual basis. There are more than 50,000 residents of the western extension zone registered for the discount. Residents of the western extension area were able to register for the discount from October 2006, in order to facilitate the introduction of the scheme.

The impact of congestion charging on the travel behaviour of residents of the western extension is subject to sometimes contradictory factors:

- All trips made by car to and from their home and within their local area within charging hours are now subject to a charge, albeit at a discounted rate.
- If residents travel by car on one day of the week, they are required to purchase a charge for the whole week, at a cost of £4, effectively meaning that trips made on other days are effectively 'free'.
- Residents are now able to travel within the original central London charging zone at a reduced cost.

Given the complexity of the potential impact on residents' travel behaviour, a specific survey was put in place to explore their experiences of the scheme. The survey was carried out by telephone in early 2008, after the introduction of the charging, with a sample of around 1,000 respondents drawn from TfL's database of registered chargepayers.

Residents' travel in the western extension prior to the introduction of charging

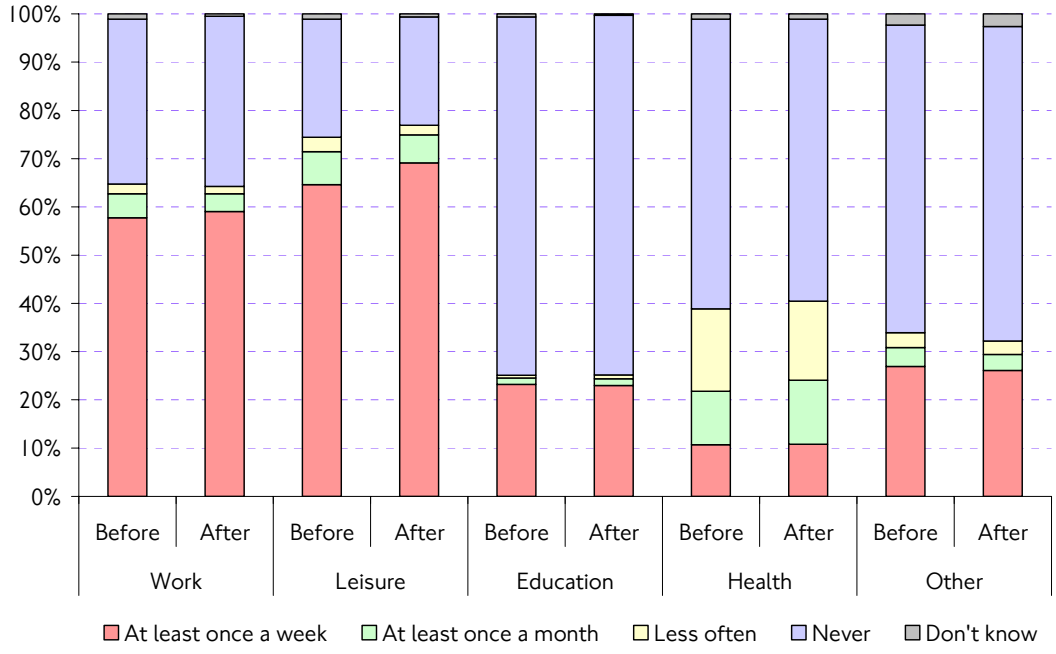
Residents participating in the survey were asked how often they had travelled by car for different journey purposes in the western extension zone during charging hours before the introduction of charging. Two thirds had travelled at least once a week for leisure purposes, just under six in ten for work or business purposes, a quarter for education and one in ten for health purposes. A quarter had also travelled at least once a week by car for other reasons.

Most respondents said that they had also travelled by other modes during charging hours – only 8 percent said that they did not travel by any other mode. In terms of trip frequency, walking was the most common form of transport used, with three quarters of respondents travelling by this mode. Around seven in ten also used the bus and tube to travel around the western extension prior to the introduction of charging, so we can see that most were familiar with the local public transport network.

Residents' travel in the western extension after the introduction of charging

The western extension residents travel behaviour survey included only those with a car in the household and registered for the residents discount; in other words, those most likely to be affected by the introduction of charging. Despite this, nearly half said that the scheme had no impact on their travel patterns and they made the same journeys as always. Just under a quarter said that they had changed their travel patterns significantly as a result of the introduction of charging.

Figure 6.9 Comparison of the frequency of car travel in the western extension zone by journey purposes before and after charging, western extension residents, 2006 and 2007.

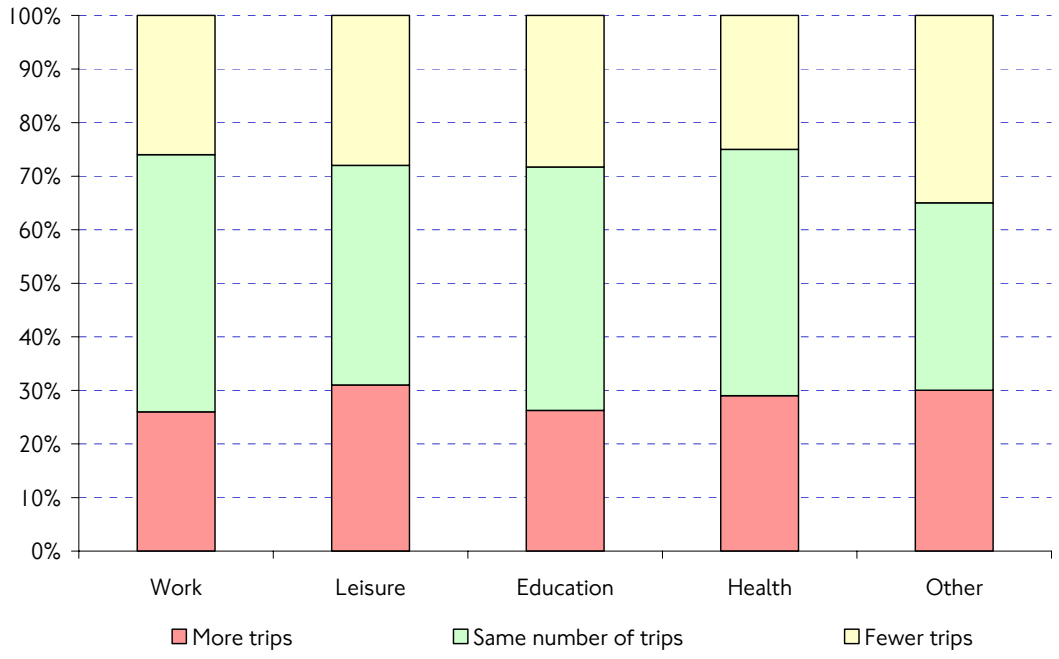


Frequency of residents' travel by car in the western extension zone for different journey purposes was largely unchanged after the introduction of charging, as seen in Figure 6.9. As before, around six in ten respondents travelled once a week or more for work, a quarter for education and other purposes, and one in ten for health purposes.

The use of alternative modes by western extension zone residents to travel in the western extension during charging hours has increased, with those who 'ever' use buses by 6 percent, the Underground by 4 percent, and walking by 4 percent. There were particularly strong increases in cycling (increase of 15 percent in those who 'ever' travel), taxi and minicab (15 percent increase) and rail (16 percent increase). In total, 70 percent of respondents stated that they had alternative forms of transport available to them when making their journeys and most said that they make use of these modes. The reasons most commonly given for choosing to travel by car instead of by an alternative mode were convenience, reliability, because the car is less stressful, and to save time.

By comparing respondents' reported travel patterns before and after the introduction of charging, we can gain a sense of the degree of 'churn' within these aggregate findings. So, although the overall pattern of frequency of travel for each purpose has remained stable, we can see from Figure 6.10 that more than half actually changed the frequency with which they travel. This change was often largely unanticipated by respondents, with only around half correctly predicting their future travel patterns. It is remarkable that despite high variability at an individual level, overall conditions remain stable and aggregate patterns are largely as anticipated by respondents.

Figure 6.10 Actual change to car trips made in the western extension by journey purpose, western extension residents, 2007.

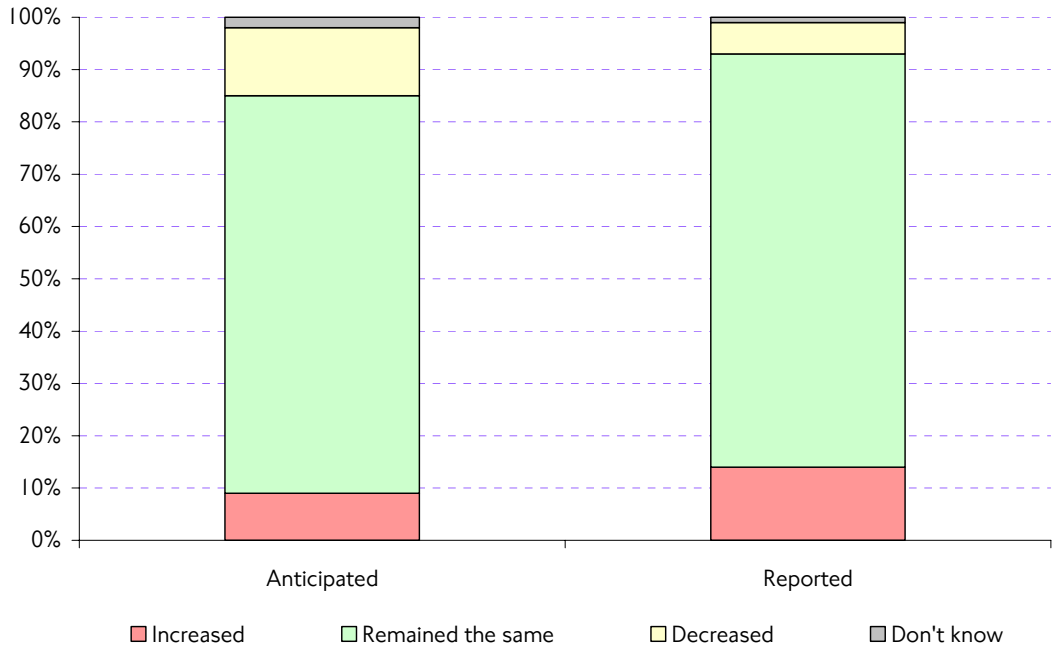


Anticipated and actual impact of the scheme on residents' travel by car in the western extension

Three quarters of respondents had thought that the introduction of congestion charging would make no difference to the number of journeys they made by car in the western extension. Those on lower household incomes of £20,000 or less were more likely to have thought that they would make fewer journeys (23 percent) than those on higher household incomes of £75,000 or more (10 percent). About one in ten respondents had thought that they would make more journeys after the introduction of charging, mainly because they would have to pay the charge anyway so might as well make more use of their car.

Figure 6.11 shows that, when asked about their actual behaviour in response to the scheme, respondents were more likely to say that their travel by car had remained the same or had increased, and less likely to say that it had decreased, than they had anticipated.

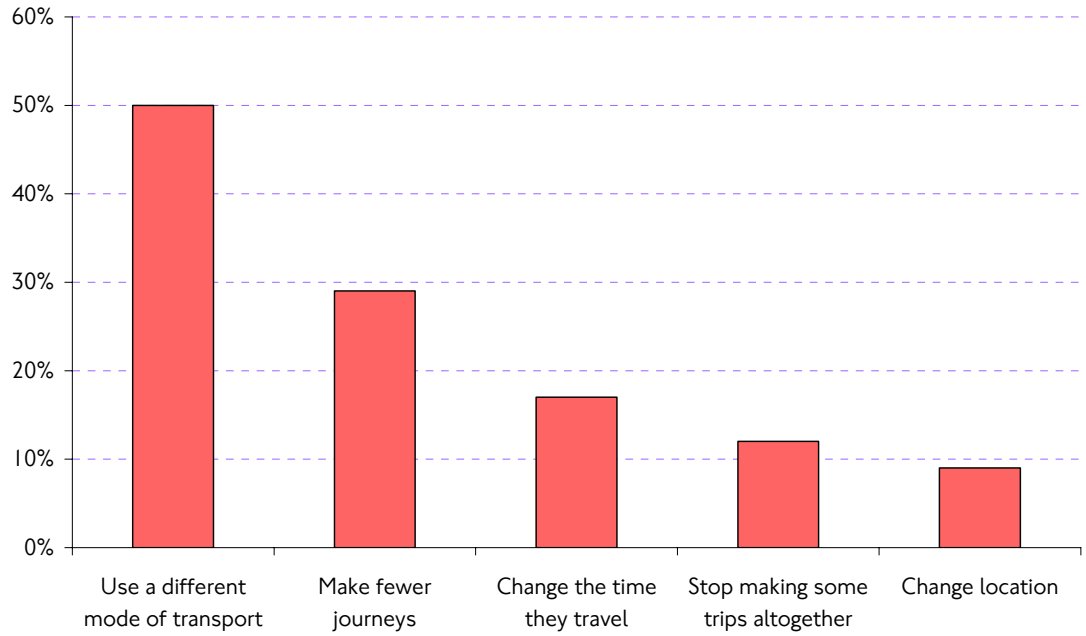
Figure 6.11 Comparison of anticipated and actual change in travel by car in the western extension, western extension residents, 2006 and 2007.



Forty percent of respondents from low income households reported that they had changed their car use since the introduction of charging compared to 17 percent with a higher household income. Lower income respondents were equally likely to have increased as decreased their travel by car. The most commonly cited reason for increasing travel by car was to 'make the most' of paying the charge, so it might be concluded that those on a lower income place a higher value on the cost of the charge, both encouraging them to avoid paying it but, where this is not possible, to ensure that it is not 'wasted'.

Figure 6.12 shows the travel behaviour choices of those who had reduced their car travel in the western extension. This group were most likely to have stopped making shopping and leisure trips (67 percent), social (42 percent) and work trips (38 percent). The majority of respondents stated that they had reduced their car travel because of the cost of the charge. They were most likely to have changed to a different mode of travel (50 percent) or started making fewer journeys.

Figure 6.12 Travel behaviour choices made by those reducing their car travel in the western extension, western extension residents, 2007.



Note: six percent of respondents reported a decrease in car travel.

Anticipated and actual impact of the scheme on residents' travel by car in the original central zone

Seven in ten respondents said that they had thought that their car travel within the original central zone would not change after the introduction of charging in the western extension; two in ten thought that their travel would increase and one in ten that it would decrease. The main reasons give for increasing their car travel was because they would have paid the charge anyway or because it would be cheaper for them to do so with the residents' discount.

In the event, only 4 percent of respondents said that they had reduced their car travel to the central zone, and nearly a quarter said that they had increased the number of trips made by car. One in ten said that they had substantially increased the number of trips. In particular, respondents said they had made more trips for shopping, leisure and social purposes.

Payment of the congestion charge by residents

Six in ten respondents paid the congestion charge on an annual basis, representing 37 percent of those with a household income of £20,000 or less and 71 percent of

those with a household income of £75,000 or more. Around a quarter said that they found the charge difficult to afford, rising to over 50 percent of those with a household income of £20,000 or less.

6.8 Survey of charge paying western extension drivers

A telephone survey was carried out with drivers who have chosen to continue driving within the western extension zone and pay the charge, after the introduction of charging in February 2007. The sample of just over 300 drivers was drawn from the roadside interview surveys carried out in spring 2007 and post-weighted to be representative of the driver population. The aim of the survey was to improve TfL's understanding of the characteristics and travel behaviour patterns of those who choose to 'stay and pay'.

Trips made into the western extension

Survey respondents, identified as entering the western extension zone during charging hours in 2007, were asked about their most recent car trip in the zone. Two thirds were travelling for work purposes and a further quarter for shopping and leisure purposes. The remainder were travelling for other purposes, including taking their children to school and attending medical appointments.

The large majority of those travelling for work purposes were travelling alone, 83 percent compared to 36 percent of those travelling for other purposes. Half of those travelling for work purposes said that their employer had paid the cost of the charge, whereas nine in ten of those travelling for shopping and leisure purposes had paid the charge themselves.

The most commonly cited reasons for choosing to 'stay and pay' were:

- because they were travelling for work purposes (38 percent);
- because they had no choice (15 percent);
- for convenience or ease (15 percent);
- and to save time (12 percent).

Travelling with other people or goods was also commonly cited reason; several respondents mentioned that they needed to carry goods, equipment or luggage (11 percent), deliver goods or people to a destination (6 percent) or had children in the car (4 percent).

Consideration of alternatives to the car

Six in ten respondents stated that they had not considered any alternatives for their most recent trip, representing seven in ten of those travelling for work purposes and four in ten of those travelling for leisure purposes. For those who had considered an alternative option, two in ten had considered changing mode and just over one in twenty had considered not making the trip or changing the time of travel.

Those whose employer paid the cost of the charge were much less likely to have considered an alternative than those who paid it themselves (78 percent compared to 55 percent). Those who had travelled to the western extension from outside the M25 were the least likely to have considered an alternative.

Attitudes towards congestion charging, in terms of support for the scheme and whether or not it has been beneficial, did not seem to make any difference to whether or not the driver had considered an alternative. However, those who stated that they would not use public transport even if services were improved were more likely to say that there were no convenient alternatives (67 percent compared to 58 percent). Similarly, those who considered driving in London to be a necessity were also more likely to say that they had not considered any alternatives (64 percent compared to 51 percent). Interestingly, the vast majority of respondents to this survey stated that driving in London is a necessity (78 percent).

When asked what they would have done if a car or van was not available to them for this trip, around half said that they would have travelled by a different mode. A third stated that they would not have made the trip at all, demonstrating that either they genuinely consider there to be no other option or perhaps that, for this group, only a trip that can be made by car is worth considering.

Twenty six percent of those travelling on business would consider using another mode of transport if their car was not available. One in seven opted for a hire or replacement car, and half said that they would not make the journey at all. This seems a surprising result for journeys normally considered 'essential'.

Overall travel behaviour change

Eight percent of those who choose to 'stay and pay' say that they now travel in the western extension zone less often than prior to the introduction of charging, while 20 percent say that they travel more often. Most were not anticipating any changes in the frequency of travel in the longer term. This reflects the fact that those who continue to drive in the zone after the introduction of charging are relatively price-insensitive and committed to travel by car.

Attitudes towards affordability and the benefits of the scheme

On average, respondents had spent £78 on the congestion charge in the month prior to the survey; this sample excludes those eligible for exemptions. Those who travelled for commuting purposes had spent the most on average, with leisure travellers having spent the least.

Just under 40 percent of respondents said that they found the charge difficult to afford. Those who reported finding the charge difficult to afford had typically paid more in the previous month than those who reported finding it easy.

Few respondents considered that they were experiencing any benefits as a result of the introduction of charging in the western extension zone; only 20 percent agreed that the introduction of the charge had been beneficial and that it is easier to drive in the western extension area, with more than half disagreeing with both statements.

6.9 Summary

Surveys of travel behaviour change accompanying the introduction of the western extension scheme provide new insights into the disaggregate changes to the travel underlying the observations, or aggregate traffic change, as described in Sections 2 and 3. It is nevertheless clear that different groups of drivers have reacted in quite different ways to the introduction of the extension scheme, according to their discount eligibility, trip purpose and wider socio-economic characteristics. It is also apparent, as alluded to in previous annual monitoring reports, that aggregate volumetric statistics that show overall change (eg successive counts of traffic crossing into the extended congestion charging zone) conceal considerable turnover, or 'churn', at the level of the individual.

TfL estimates that around seven in ten of those driving a car or a van in the western extension zone prior to the introduction of charging chose to continue to make their trip by car and pay the charge. Those who had made a change were most likely to have changed mode, although there was some evidence of a variety of other responses.

The travel behaviour of residents was largely unaffected by the introduction of charging, although travel into the original charging zone, particularly for shopping and leisure purposes, increased with the introduction of the residents' discount for this group. Those who continued to drive in the western extension zone after the introduction of charging were more likely to have considered another option if they were making 'discretionary' shopping, leisure and social trips; those travelling on employer's business were very unlikely to have considered another option.

7. Social Impacts

7.1 Introduction

The social impacts of congestion charging can be defined as the effects on how people and communities live, work, travel and relate to one another. The social impacts monitoring programme aims to identify the more significant of these effects and to assess the balance between those who may have 'benefited' or 'lost out' as a result of the scheme. In particular, the programme has explored the impact of charging on access to services; on social behaviour and available time; and on the cost of living and financial hardship.

This section describes the social impacts monitoring work that has been developed for the western extension. This builds on a wide-ranging survey programme that was put in place in 2002, prior to the introduction of the original central London charging zone. This has been described in detail in previous annual impacts monitoring reports.

The objectives of the programme of social impacts monitoring were:

- to understand how people have changed their travel behaviour as a result of the introduction of congestion charging and to explore the impact that these changes have had on their quality of life;
- to understand the impacts of congestion charging on the amenity of the charging zone itself and the surrounding area, as perceived by residents and visitors;
- to understand the wider impacts of congestion charging on the quality of life of London residents, in the context of other changes and developments.

The social impacts of the western extension have been monitored primarily by two main surveys, carried out at regular intervals before and after the implementation of the scheme, and three supplementary surveys, carried out once each before and after implementation. These surveys are described in Section 7.3. Results from each of the surveys are presented throughout the section, drawn together into topics of interest.

Note that the social impacts surveys have dealt with perceptions and experiences described by survey participants. As such, they may be subject to bias and not reflect the experiences of the population as a whole. In part, they may contradict the more aggregate evidence found elsewhere in this report.

The surveys should therefore be understood as a depiction of how a representative group of respondents chose to describe their experiences of the scheme to TfL. As such, they can provide us with insights into people's daily lives that cannot be strictly measured but which are nevertheless real to those affected by the scheme.

7.2 Key findings

Although the analysis of the survey programme for the western extension has not yet been completed in full, some clear indications have emerged. These are summarised below.

- Three in ten 'users' of the western extension, including residents, workers and visitors captured in on-street surveys within the area prior to the introduction of charging, had reduced the frequency of their trips by car into the area; the proportion travelling into the area by car at least once a week dropped by more than a quarter. Respondents were most likely to have either reduced their car travel for social and leisure trips or to have changed to a different mode of transport for these trips.
- The proportion of London residents who reported 'ever' travelling into the western extension by car during charging hours dropped by from 26 percent to 17 percent after the introduction of charging. Shopping and entertainment trips and trips made by infrequent travellers were particularly affected.
- There was little evidence of any impact on access to shops and services; where respondents had been deterred from travelling by car they had generally switched to a different mode.
- About 40 percent of western extension users said it was easy to afford to pay the charge; around one in three western extension users said that they found it difficult to afford to pay the charge, particularly those who paid the charge from lower income or economically inactive households, disabled people and those with young children. This did not have any effect on overall affordability of travel in London; between 40 and 50 percent of London residents reported that travel was difficult to afford both before and after charging.
- About 16 percent of London residents said that they had benefited from the introduction of charging in the western extension; a similar proportion said that they had lost out. Western extension 'users' were more likely to say that they had lost out as a result of the introduction of charging (41 percent). Western extension residents (43 percent) and those who drove in the area (59 percent) were also more likely to say that they had lost out.
- On balance, both western extension 'users' and London residents considered that air quality and the environment, bus service supply and journey times, and traffic congestion and car journey times had improved since the introduction of charging in the western extension.
- Half of the western extension 'users' surveyed visited friends and family in the extended zone during charging hours at least once a week; there was no evidence of any congestion charging impact on these trips. By contrast, there was evidence that London residents had switched mode from car to public transport for trips to friends and family in the western extension zone, although 6 percent had reduced the frequency of such trips.
- Parents were apparently less likely to drive their children to school or to childcare after the introduction of charging, at between 25 and 30 percent depending on the age of the child, from more than one third in 2006.
- The was a drop of 40 percent in the proportion of key workers who usually drove to work in 2007, and the vast majority stated that the introduction of congestion charging was a factor in this decision. Those who did continue to drive to work tended to say that their costs had increased and that they found this difficult to afford.

- Very few shift workers chose to drive to work in the western extension before the introduction of congestion charging and therefore there was little impact on this group. However, there was some evidence of a differential impact on key workers.
- In general, those disabled people surveyed were largely unaffected by the introduction of charging and TfL found no evidence of any impact on the provision of services to disabled people. However, carers and visitors appear to have reduced the frequency of visits made during charging hours. Even where these were replaced by visits at other times, some disabled people said that they experienced periods of loneliness and isolation during the day and the working week.

7.3 Survey programme

The western extension zone 'users' survey

This is a longitudinal panel survey of individuals who travel into and within the western extension zone. It seeks to observe change over time in a consistent group of individuals likely to be directly affected by the extension scheme, exploring themes such as travel behaviour change, access to shops and services, social interaction, and affordability.

Five waves of this survey have been carried out, two gathering data on patterns of behaviour and anticipated change before the introduction of charging in the western extension, followed by three further waves investigating actual experiences of the scheme (analysis of results for wave five is currently being undertaken).

The sample for this survey is considered to be representative of those who had visited the western extension before the introduction of charging. Around half the respondents were resident in the zone, two fifths of whom also worked in the area. A further 30 percent worked in the area and around 20 percent were visiting. The sample was selected via on-street surveys at eighteen sites spread across the future charging zone, followed by a more detailed telephone survey to recruit respondents into the main panel. Table 7.1 shows the response rates for each wave of the survey.

Table 7.1 Western extension 'users' survey response rates.

	Sample size	Response rate
Wave one telephone survey	3966	-
Wave one recruited to panel	3606	91%
Wave two	2437	61%
Wave three	1755	44%
Wave four	1312	33%

An additional sample of 'hard to reach' respondents was included in the survey. This sample included groups considered unlikely to be included through conventional sampling methods; in this case people who were mobility impaired, carers, the 'vulnerable elderly', and people who attend a place of worship on a weekday.

The sample of 'hard to reach' groups was recruited via trusted organisations and individuals using a 'snowball' sampling approach. Some 84 respondents were recruited via this method. Attrition rates across the waves were similar to the main sample, with 34 respondents (40 percent) remaining by wave four.

The 'Londoners' survey

This survey aimed to understand how London residents in general are affected by the western extension, in order to place the experiences of those most directly affected in a wider context. As such, it employed a representative cross-sectional sample of 2,400 people living across Greater London, including additional 'booster' samples of 200 residents each from the original central London congestion charging zone and the western extension zone.

Six waves of the survey have been carried out to date; one further wave is planned in autumn 2008. Three waves of the survey were conducted during 2006, before implementation of the extension scheme, gathering data on anticipated impacts and adaptations, and three further waves have been carried out in 2007 and early 2008 following implementation, gathering data on actual impacts.

The survey provided a set of indicators that could be tracked over time; identified basic indications of travel behaviour change in terms of frequency, mode and purpose at the aggregate level; and provided an understanding of the impact of these changes and of the scheme as a whole on the quality of life of London residents. The surveys were designed to be able to identify impacts to a range of socio-economic and geographical groups of interest and to incorporate emerging topic areas of interest.

Supplementary surveys: key workers

According to the Department for Communities and Local Government, key workers comprise:

- all clinical NHS staff,
- teachers in schools, further education and sixth form colleges,
- police officers and community support officers,
- uniformed staff in fire and rescue services,
- prison and probation service staff,
- social workers, occupational therapists, educational psychologists, speech and language therapists and qualified nursery nurses,
- local authority employed clinical staff, and
- local authority town planners.

Recruitment and retention rates of key workers are low in central London, so the key worker survey sought to investigate the possibility that congestion charging may influence them to cease working within the new charging zone, thus potentially affecting provision of public services. Although some questions were asked of key workers within the Londoners survey, a separate survey was designed to provide a

sufficient sample and to target specific topics of interest. It is worth noting that around a third of key workers also work shifts, and that the shift worker survey specifically excluded health and education sector employees.

Surveys of around 500 key workers employed in each of the western extension zone and original central London charging zone were carried out during autumn 2006 and again in autumn 2007, before and after the introduction of the western extension. Respondents, mostly working in clinical NHS roles, policing, and education and childcare roles, completed paper or online questionnaires. The key worker survey topics included changes in travel, activity and career patterns; and the impact of these changes and of the scheme as a whole on key workers' quality of life.

Supplementary surveys: shift workers

According to the Labour Force Survey, shift work is defined as a regular work pattern during which a firm or organisation is open and working or providing services beyond the normal working hours from 08:00 to 18:00 on weekdays. In 2006, the Incomes Data Service reported that more than 15 percent of UK employees regularly worked shifts, equating to perhaps 30,000 workers in the western extension and 175,000 workers in the original central zone.

Shift workers are typically lower wage earners and may be more likely to drive to work, as their working patterns may limit their ability to travel by other modes. The impacts of congestion charging upon this group were therefore of particular interest.

To provide a sufficient sample and explore topics of interest, a small scale survey was carried out with shift workers in the western extension area, before and after the introduction of charging; with a parallel group surveyed in the original charging zone.

Around 120 people who worked shifts within the western extension were interviewed at their workplaces or by telephone during autumn 2006 and autumn 2007, before and after the introduction of the western extension. The survey explored any changes in travel patterns and activities among shift workers following the introduction of the western extension. To avoid overlap with the key workers survey, health and education sector employees were excluded. As the shift worker survey sample was relatively small, results should be considered as indicative only.

Supplementary surveys: disabled people and carers

Disabled people are included in the main surveys as a matter of course, but tend to be under-represented and the most vulnerable tend to be excluded. Disabled people and carers may have specific issues and experiences which cannot be adequately captured in a survey intended for the wider population. These impacts may be particularly complex and personal and it was considered that they can be more appropriately captured in a qualitative research context.

Face to face in-depth interviews were carried out with 60 disabled people and carers resident in the original congestion charging zone and the western extension in 2006 and 2007, before and after the introduction of charging in the western extension. A sampling strategy was employed, so that quotas were set by socio-demographic

criteria to have similar numbers of respondents in each 'group'. This helped ensure that the sample reflected the breadth of experiences in the survey population and enabled comparisons to be made between groups, although as this is a qualitative study, the sample is not seeking to be 'representative' as such.

The sample was drawn from a range of sources and also used a 'snowball' approach whereby disabled people, carers and support workers were asked to recommend others to take part in the research.

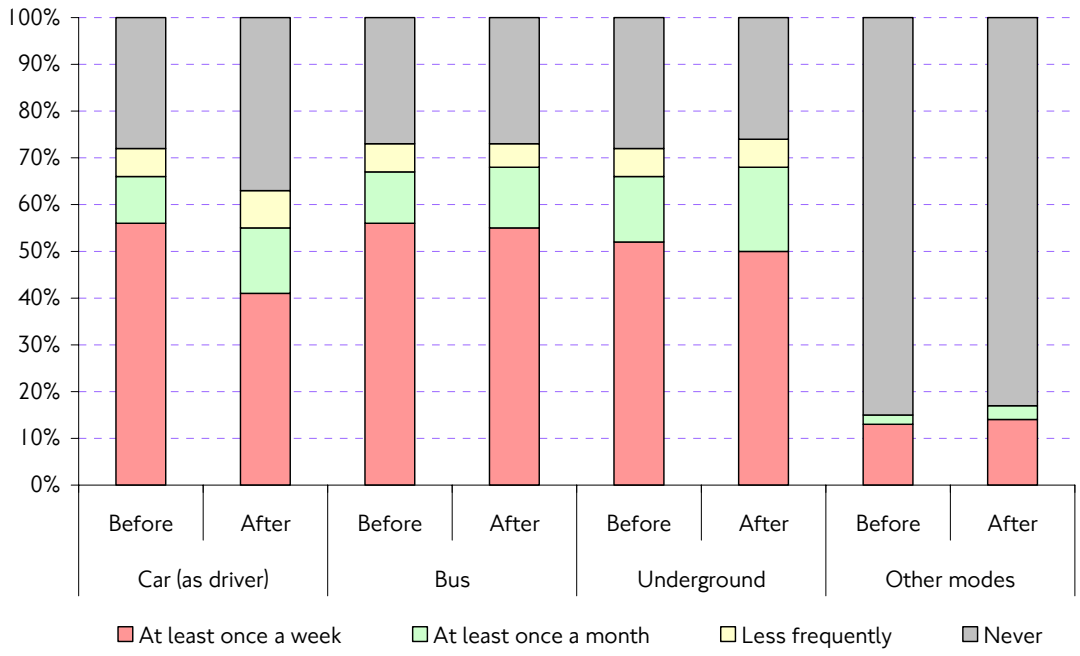
7.4 Travel behaviour change

Travel behaviour of western extension 'users'

Nearly 50 percent of the respondents to the western extension 'users' survey lived in the western extension zone, including 20 percent who also work in the area. A further 30 percent worked locally; 20 percent were visitors to the area. In 2006, of those visiting the area, two thirds did so at least once a week. Thus, respondents to this survey tended to have a strong relationship with the western extension zone and were therefore potentially likely to be affected by the introduction of charging there.

Figure 7.1 shows that after the introduction of charging in February 2007, the proportion of respondents to the western extension 'users' survey travelling into or within the western extension zone once a week or more by car or van dropped by more than a quarter, from 56 percent to 41 percent. The level of travel by public transport and other modes such as cycling stayed fairly constant over this period. The proportion of visitors stating that they came into the area by any mode at least once a week dropped from 66 percent in 2006 to 59 percent in 2007.

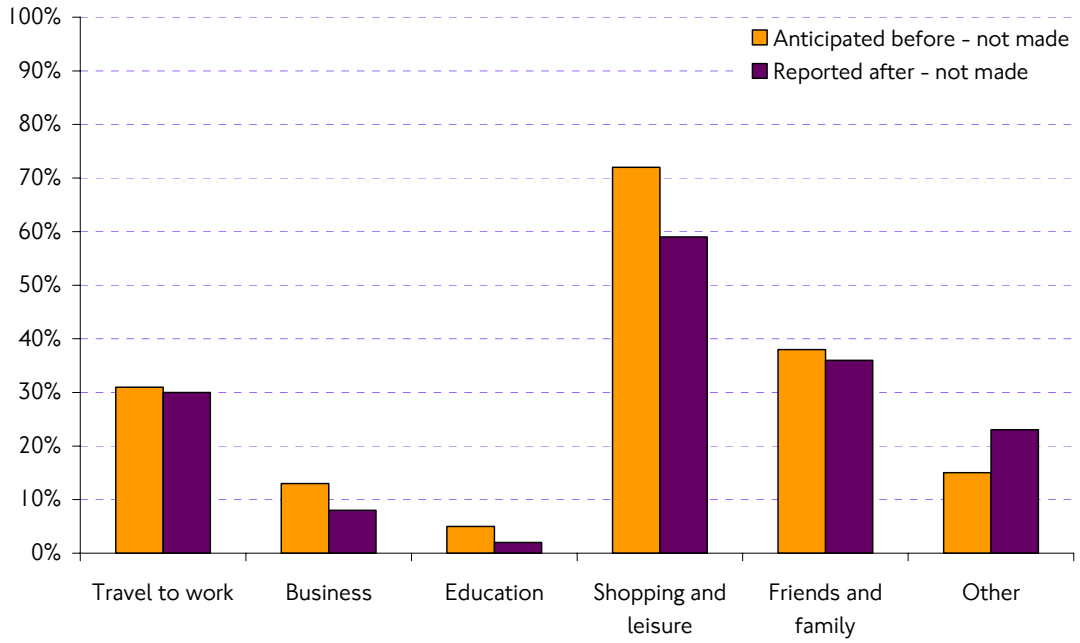
Figure 7.1 Frequency of travel in the western extension zone during charging hours by mode, western extension 'users', 2006 and 2007.



Overall, three in ten western extension 'users' with access to a car, including residents, workers and visitors, said that they had reduced the frequency of their car trips into the western extension.

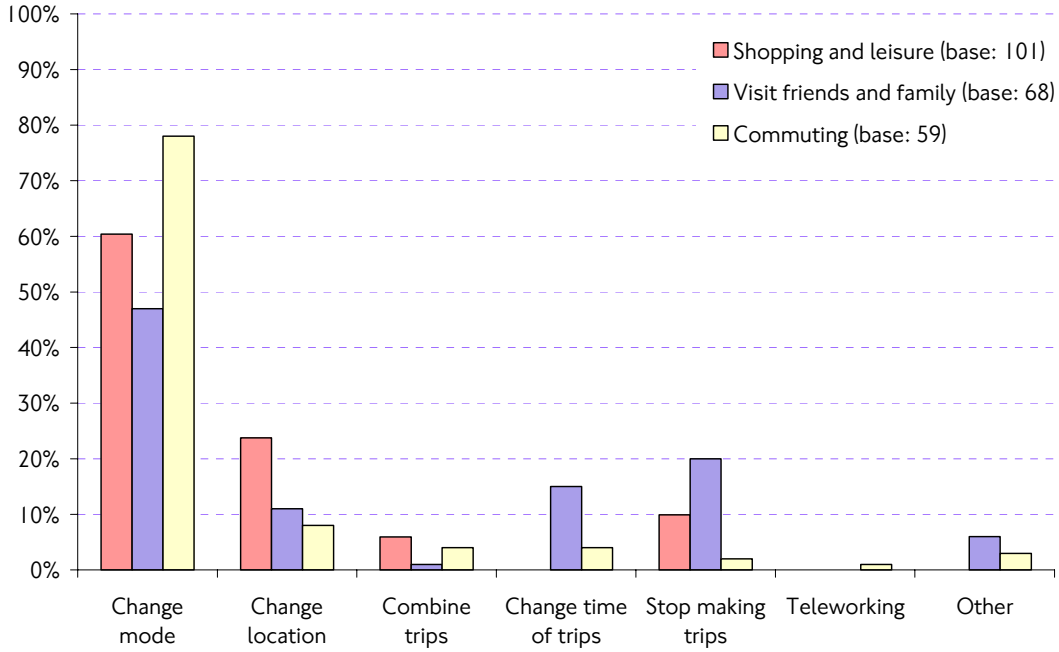
Respondents were asked which trips they no longer made by car, and what they did instead. Figure 7.2 shows that, in general, respondents were more likely to have reduced car use for 'discretionary' trips such as those for shopping and leisure purposes (59 percent of those who had reduced the frequency of their car trips) and to visit friends and family (36 percent) than 'essential' trips such as those for business or education purposes.

Figure 7.2 Proportion of respondents anticipating and reporting a reduction in car-as-driver journeys by purpose. Western extension 'users' who anticipated or reported a reduction in car-as-driver trips, 2006 and 2007.



When asked what they had done instead, Figure 7.3 shows that the most common response was to have changed mode of transport. Those travelling for shopping and leisure purposes and to visit friends and family were also likely to change the location of their trip or simply not travel for that purpose; those visiting friends and family were also likely to change the time of their trip to avoid charging hours.

Figure 7.3 Alternative to journeys no longer made by car into or within the western extension zone, by purpose. Western extension 'users' who anticipated or reported a reduction in car-as-driver trips, 2006 and 2007.



After the introduction of the extension scheme, car trips were proportionally more likely to be for purposes of business and visiting friends and family than prior to the introduction of charging, and less likely to be for the purpose of work commuting, shopping or leisure. Note that these changes are to journeys made – by journey purpose – regardless of frequency. The overall patterns of change needs to take account of the relative frequency of journeys, and to new journeys made following the introduction of charging. Aggregate travel behaviour change is explored in greater depth in Section 6 of this report.

Around two-thirds of drivers in the western extension 'users' survey said that they had not made any changes to their car trips as a result of the introduction of congestion charging and continued to drive in the zone during charging hours. Among this group, attitudes towards the effectiveness of the scheme were mixed, with just under half considering that the congestion charge had saved them time and around a third stating that driving conditions are faster or less congested as a result. Few believed that conditions had worsened in the past year, but many had seen no material change.

Travel behaviour of Londoners

Overall, London residents were less likely to travel into the western extension than into the original charging zone during charging hours before and after the introduction of the scheme (76 percent and 93 percent respectively 'ever did so' in 2007).

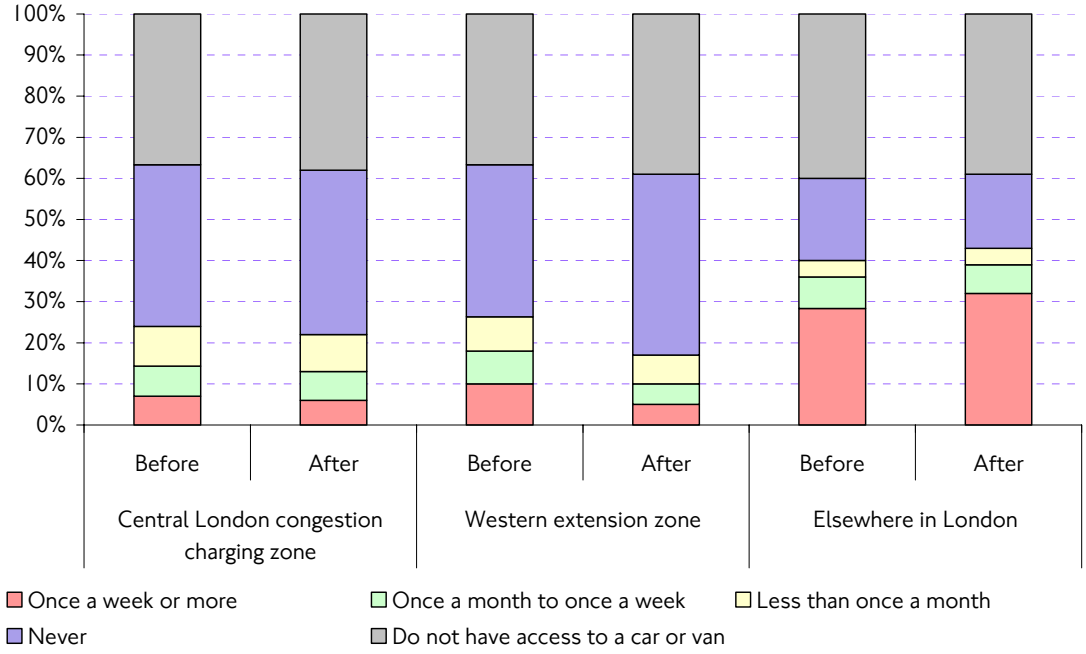
However, before the introduction of charging in the western extension, London residents were as likely to travel by car into the western extension as they were into the original central zone. Furthermore, they did so more frequently; 10 percent of

London residents said that they travelled into the uncharged western extension zone once a week or more by car during charging hours, compared to only 7 percent who said that they travelled into the original zone.

Figure 7.4 shows a clear congestion charging effect, as the proportion of London residents who said in 2007 that they ever travelled by car in the western extension during charging hours dropped from 26 percent to 17 percent. In comparison, the proportion of London residents who said that they ever travelled by car in the original central zone or elsewhere in London remained fairly stable during this period.

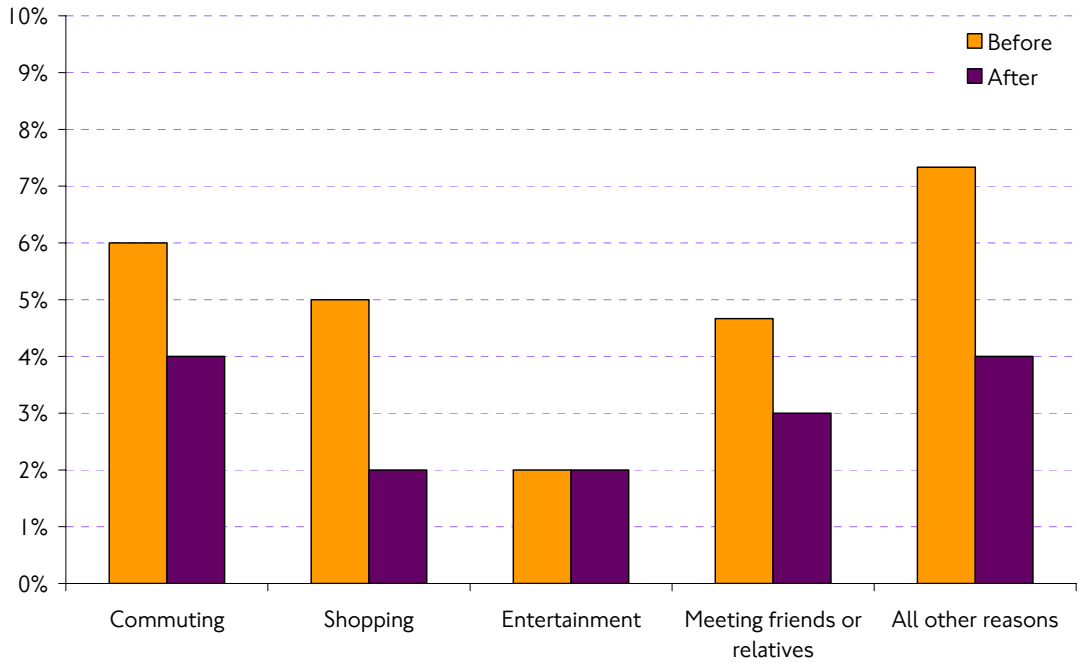
The proportion of London residents who said that they 'ever' travelled by bus in the western extension zone stayed the same at 29 percent. The proportion who said that they ever travelled by Underground also increased marginally, from 43 percent to 45 percent. The reported frequency of travel by these modes increased after the introduction of charging.

Figure 7.4 Frequency of travel by car in the original central London congestion charging zone, the western extension and elsewhere in London, London residents, 2006 and 2007/08.



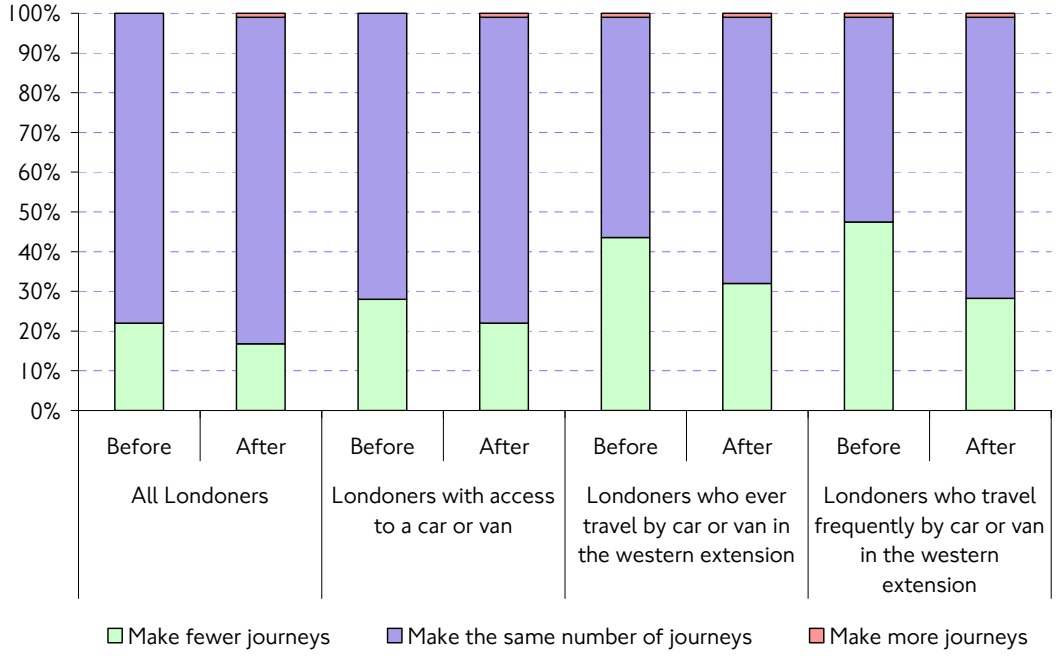
There have been significant decreases in travel by car during charging hours in the western extension for all purposes since the introduction of charging. Figure 7.5 shows the change in the main purpose of travel by car in the western extension zone before and after the introduction of charging. In particular, the proportion of respondents who say they ever travel by car for shopping and entertainment purposes has reduced from 7 percent in 2006 to 4 percent in 2007/08.

Figure 7.5 Main purpose of travel by car in the western extension zone, London residents, 2006 and 2007/08.



Through trips were significantly affected; the proportion of London residents who say that they ever make journeys by car during charging hours travelling through the western extension without stopping declined from 26 percent before the introduction of charging, to 17 percent afterwards.

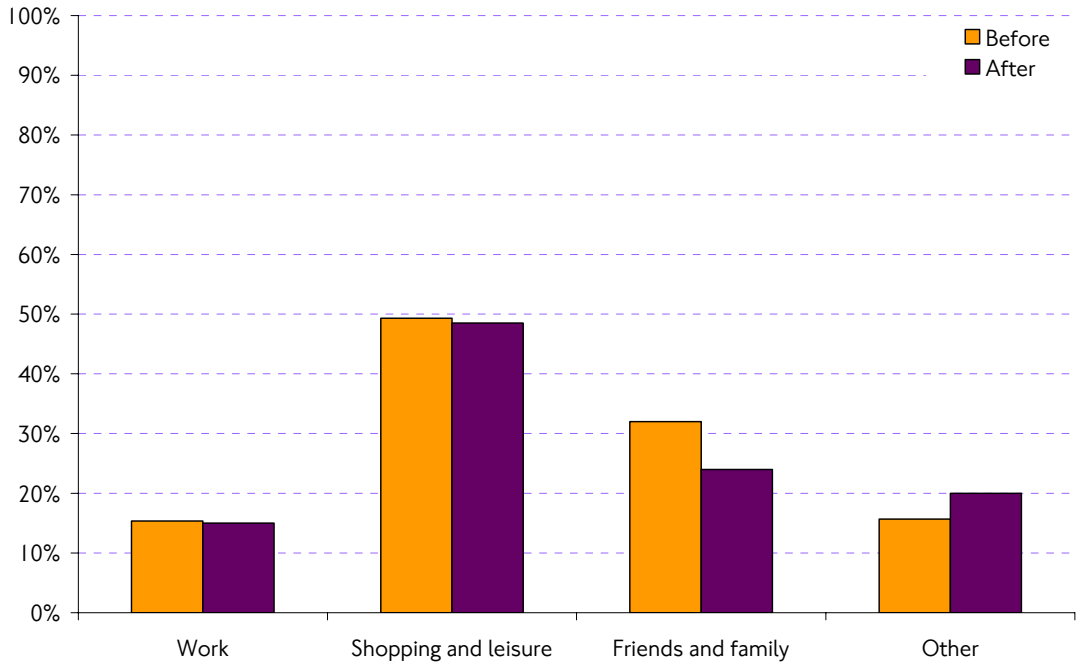
Figure 7.6 Anticipated and actual impact of charging in the western extension zone on the number of car trips made, London residents, 2006 and 2007/08.



It can be seen in Figure 7.6 that the deterrent effect of congestion charging in the western extension was substantial, with one in eight London residents reporting a reduction in car trips.

Those who anticipated or experienced a reduction in the number of trips made by car were asked the purposes of these trips. Figure 7.7 shows that the biggest impact was on trips made for shopping and leisure purposes.

Figure 7.7 Anticipated and reported purpose of journeys no longer made by car into or within the western extension zone. London residents who anticipated or reported a reduction in car-as-driver trips, 2006 and 2007.



7.5 Access to services

Grocery shopping

The vast majority of respondents to the western extension 'users' survey carry out their main grocery shop at a supermarket once a week (86 percent) and half do so inside the western extension. Around half shop in charging hours, and the car is the preferred mode for four in ten. Two thirds of the trips made for grocery shopping take less than 10 minutes and nine in ten less than 20 minutes.

Most respondents did not anticipate any change to the frequency of these visits as a result of the introduction of charging during the western extension zone (92 percent) and in the event only 5 percent of respondents said that they had reduced the frequency of these visits. There was no significant evidence of a modal shift.

Although three-quarters of respondents also shop for groceries at a local shop once a week, many of these inside the western extension zone, charging had little impact as only 8 percent initially said they travelled to their local shop by car and only 2 percent of respondents said that they had made any changes to their routine.

Local services and leisure facilities

Figure 7.8 shows the frequency of using local services in the western extension during charging hours for western extension 'users'. Figure 7.9 shows that travel by car to local services and leisure facilities dropped in 2007, and travel by other modes rose.

Figure 7.8 Frequency of using local services in the western extension zone during charging hours, western extension 'users', 2006 and 2007.

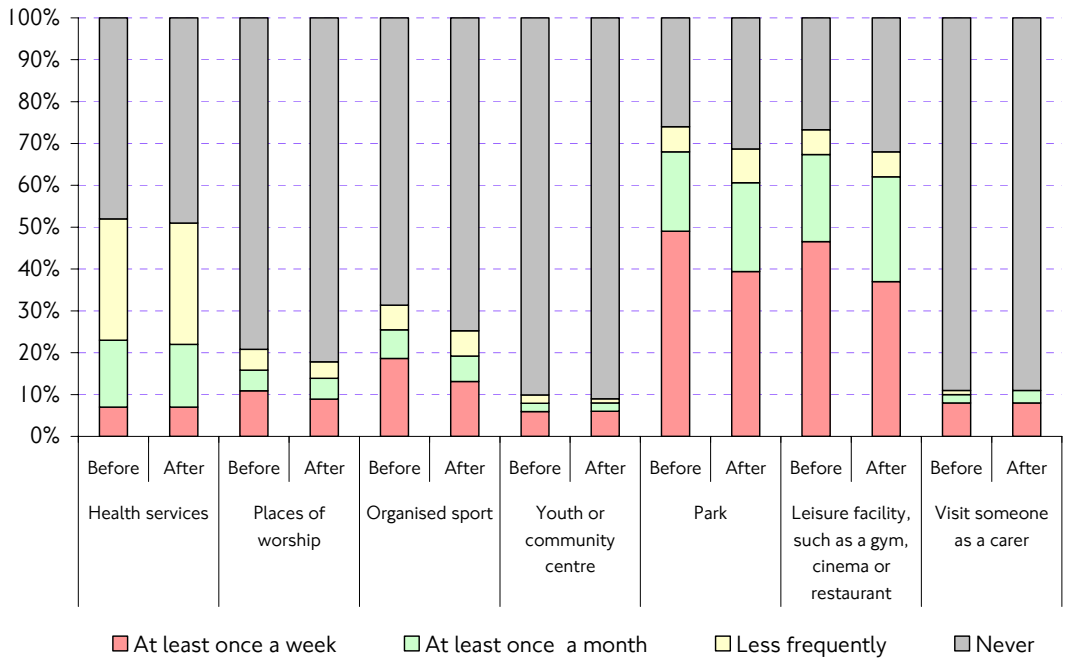
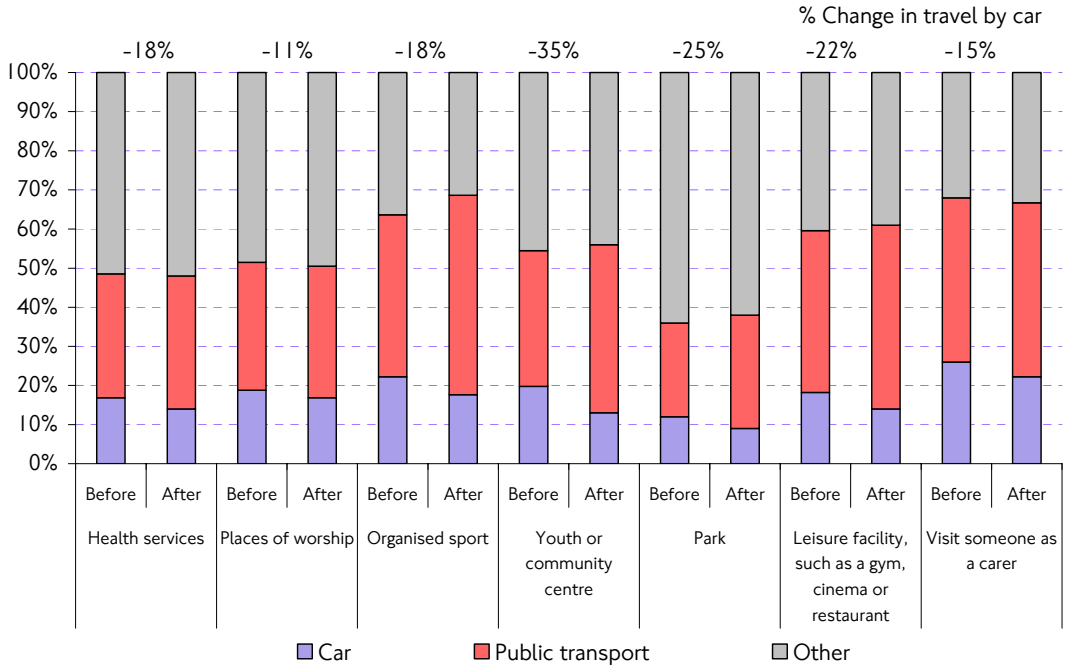


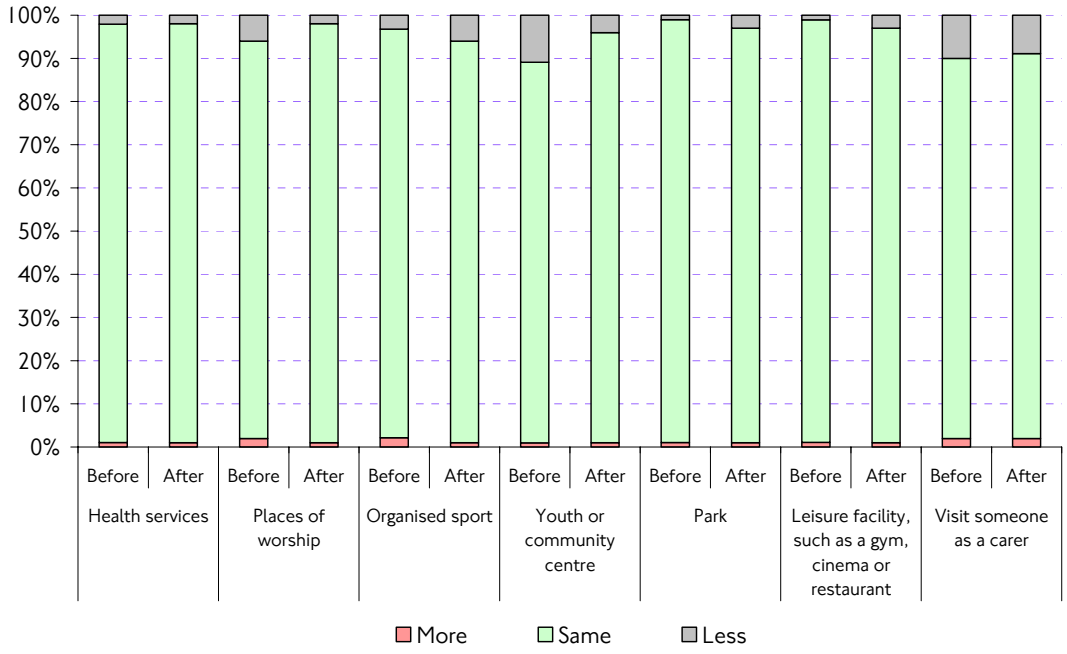
Figure 7.9 Mode of travel to services in the western extension during charging hours, western extension 'users' accessing services, 2006 and 2007.



As seen in Figure 7.10, in most cases respondents preferred to change their mode of travel rather than reduce the number of trips made, and there was little evidence of a decline in frequency of trips to local services and leisure facilities.

However, those visiting someone as a carer reported a drop of nearly 10 percent in the frequency of visits made during charging hours. This reflects the finding of the Disabled Persons and Carers Survey that some disabled people feel lonely and isolated during the daytime as friends and family avoid visiting during charging hours, instead visiting during evenings and weekends.

Figure 7.10 Anticipated and reported change in frequency of travel to local services in the western extension zone during charging hours, excluding those who never access the service. Western extension 'users', 2006 and 2007.



After-work leisure facilities

More than eight in ten of those who worked in the western extension area but were not local residents said that they sometimes visited leisure facilities after work. Seven percent said that they had reduced the frequency of their visits after the introduction of charging and in general they have reduced the frequency from at least once a week to at least once a month.

Although the number of respondents is too small for detailed analysis, TfL concludes that this may reflect changes in the mode of travel to work, from car to other modes.

7.6 Affordability of travel and overall impact of the scheme

Affordability of travel and impact of cost on travel choices

Overall, around two thirds of respondents to both of the core surveys said that they try to find the cheapest option when they travel. Users of the western extension zone

were less likely than London residents as a whole to say that they have difficulty affording to pay for travel, at just under 40 percent compared to between 40 and 50 percent of London residents. There was no significant increase after the introduction of charging. Around one third of western extension 'users' liable for the charge found it difficult to afford to pay it in 2007. Figure 7.11 shows those groups who reported particular difficulty in affording to pay.

Figure 7.11 Ease of affording the congestion charge, western extension 'users' liable to pay the charge, 2007.

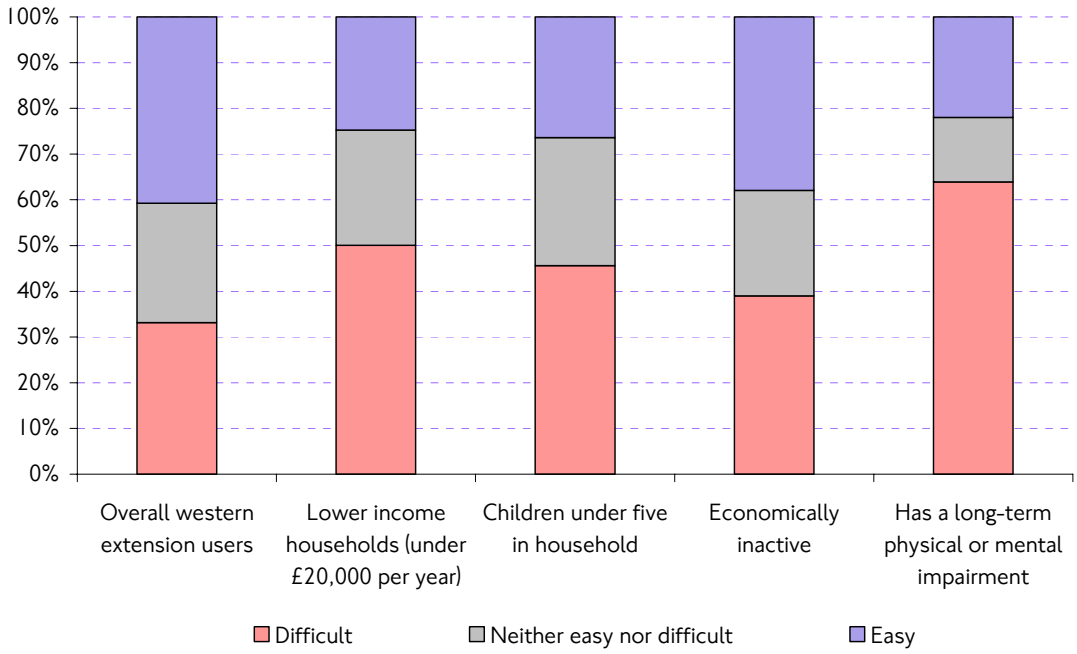
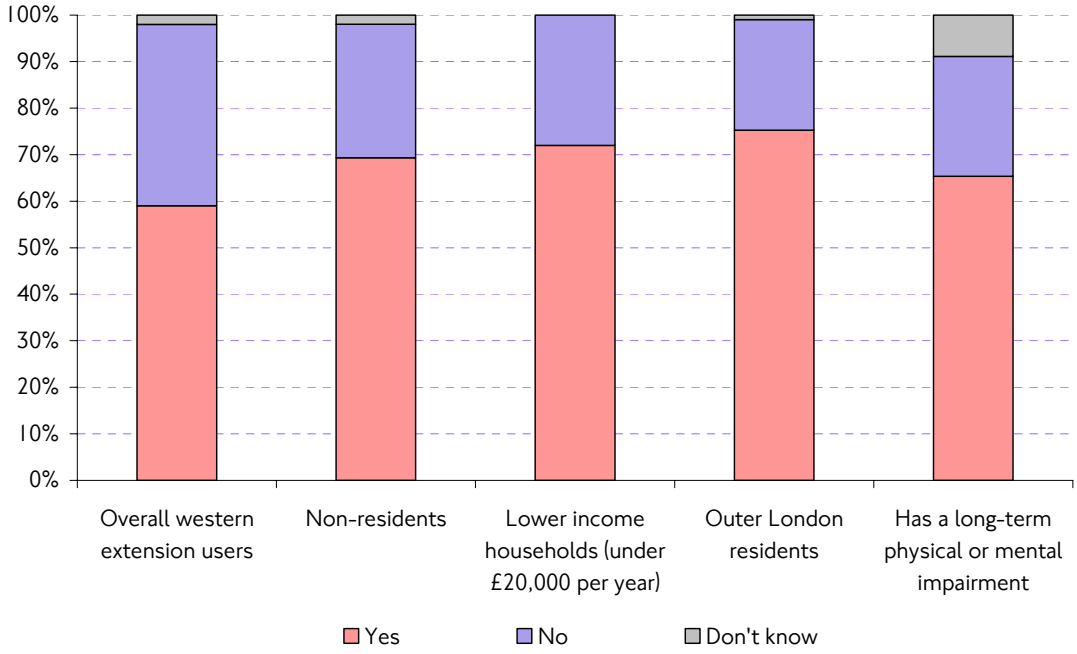


Figure 7.12 Proportion of respondents who reported limiting the number of journeys made because of the cost, western extension 'users' liable to pay the charge, 2007.



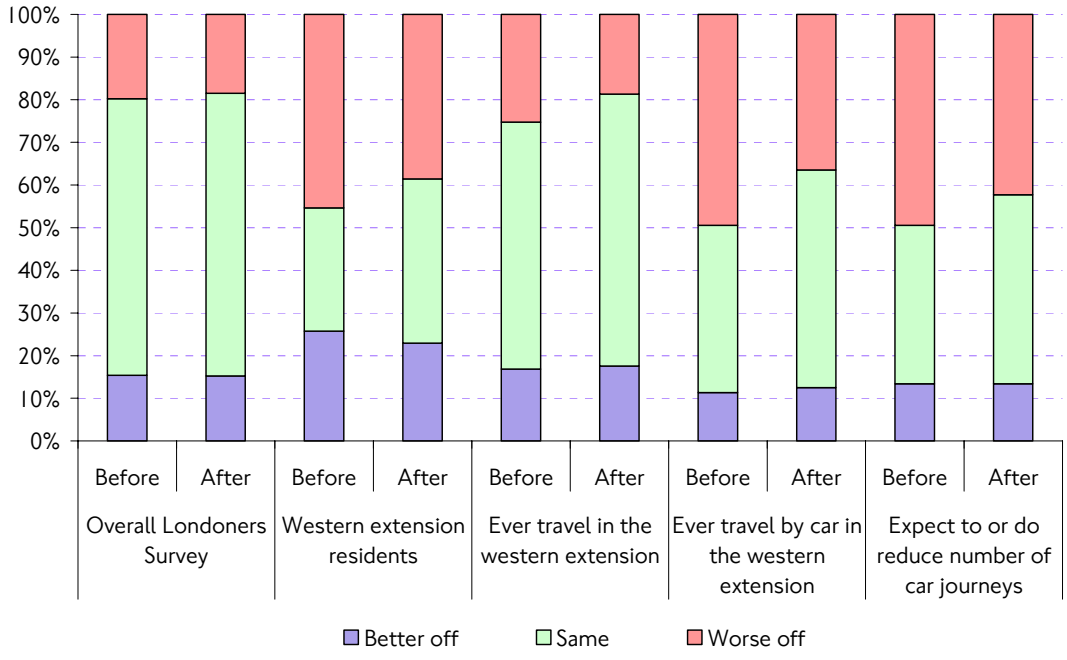
Around one third of London residents reporting having reduced the number of car or van journeys that they make because of the increasing cost, whereas 60 percent of western extension 'users' liable to pay the congestion charge said in autumn 2007 that they had done so. Figure 7.12 shows those groups who were most likely to have reduced the number of trips they made as a result of the cost. Although the costs referred to were not limited to the congestion charge, it is noticeable that residents, eligible for a 90 percent discount to the charge, were less likely than non-residents to say that they had reduced the number of trips made. Older people were less likely to have reduced their trips, probably because of the Freedom Pass, allowing older people free travel on public transport in off-peak hours.

London residents who said that they found travel more difficult to afford were more likely to say that the overall impact of congestion charging on them had been negative than the population as a whole, although a significant majority (70 percent) said that the impact had been neutral or positive. Western extension 'users' who said that the cost of travel had increased as a result of the congestion charge and that they found this difficult to afford (26 percent of the total sample) were much more likely to say that the western extension had a negative impact on them (68 percent, compared to 41 percent of all respondents).

Overall impact of the western extension scheme

The reported impact of the western extension zone on London residents as a whole was largely as they had anticipated, with just under one in six respondents stating they were better off and just over one in six stating they were worse off as a result of charging. The majority of London residents, around six in ten, felt that the scheme had made no difference to them.

Figure 7.13 Overall impact on self of the introduction of congestion charging in the western extension, Londoners, 2006 and 2007/08.

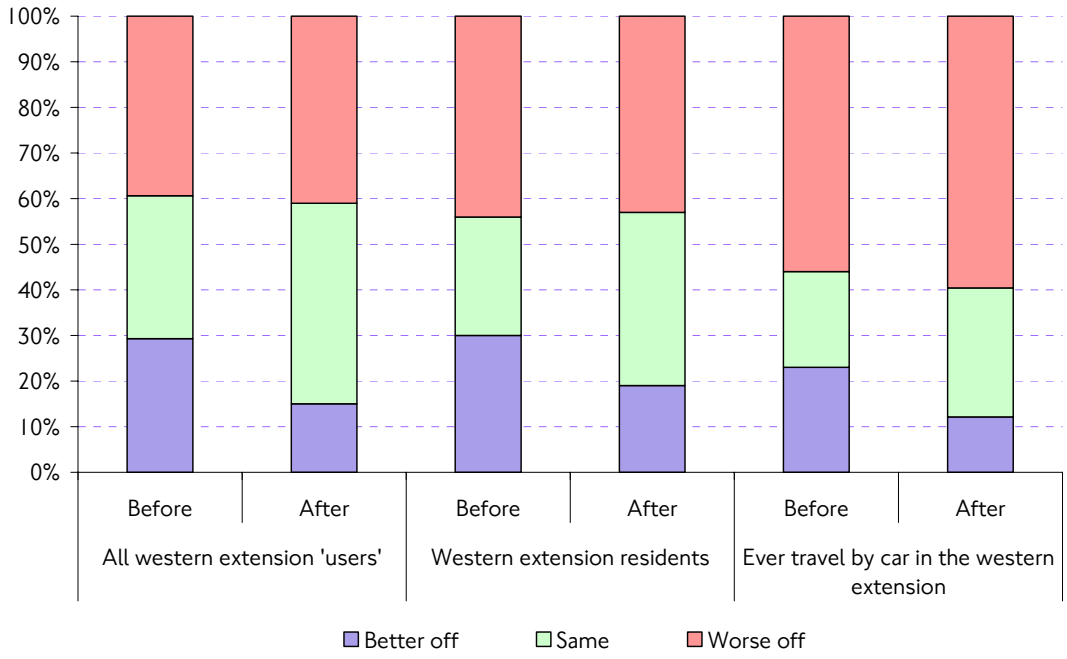


Western extension zone residents and those who 'ever' travelled by car into the zone were more than twice as likely as the population as a whole to say that the impact on them had been negative, although residents of the zone were also the most likely to say that the impact on them had been positive. Among those who had reduced their car travel as a result of the scheme, more than half stated that the impact on them personally had been positive or neutral.

Figure 7.13 shows that, in all cases, the actual impact of the western extension tended to be less negative than had been anticipated.

Prior to the introduction of charging, respondents to the western extension 'users' survey were fairly evenly split as to the likely impact on them, with around a third each saying that they would be better off, the same, or worse off. Figure 7.14 shows that, afterwards, the proportion who felt they had lost out remained fairly stable, but respondents were less likely to feel that they had benefited and more likely to think that the charge had not had any impact on them.

Figure 7.14 Overall impact on self of the introduction of congestion charging in the western extension zone, western extension 'users' survey, 2006 and 2007/08.



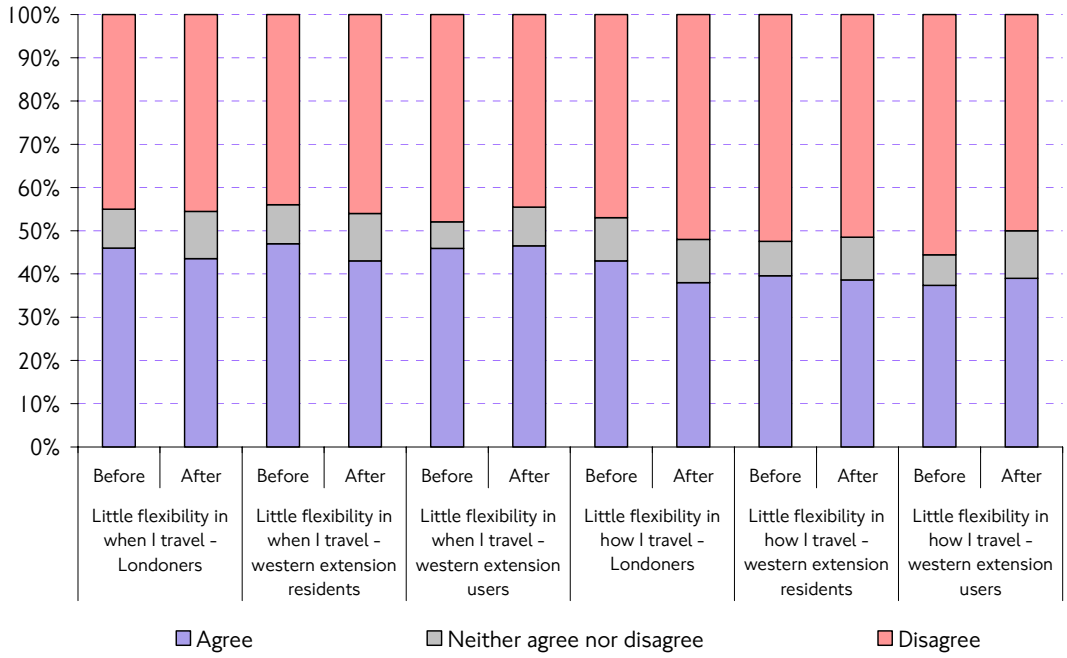
As found in the Londoners survey, residents were more likely to think that they had lost out as a result of charging (43 percent) but also more likely than the 'user' population as a whole to say that they had gained (19 percent). Those who ever drive into the extension zone were also more likely to say that they had lost out as a result of charging (59 percent).

Flexibility in choosing when and how to travel

Figure 7.15 shows that the introduction of charging in the extension has not reduced the flexibility of respondents to choose how and when they travel. Those with little

flexibility were marginally more likely to say that the introduction of charging has had a negative impact on them.

Figure 7.15 Whether or not London residents have flexibility in how and when they travel, 2006 and 2007/08.



7.7 Perceptions of transport provision and the environment

Prior to the introduction of the extension scheme, respondents believed that many aspects of transport provision and the local environment would improve as a result. These included air quality and the environment; bus service supply and journey times; and car journey times and reliability. After the introduction of charging in the western extension, a comparable proportion believed that such improvements had occurred.

Table 7.2 Attitudes to transport and the local environment, 2007/08.

		Worse	Better	Net positive
Air quality/the environment	Western extension users	10%	17%	7%
	London residents	4%	31%	27%
Personal safety on public transport	Western extension users	12%	11%	-1%
	London residents	-	-	-
Parking provision	Western extension users	14%	9%	-5%
	London residents	-	-	-
Bus service supply	Western extension users	8%	28%	20%
	London residents	3%	33%	30%
Bus journey times	Western extension users	10%	27%	17%
	London residents	4%	34%	30%
Underground provision	Western extension users	11%	9%	-2%
	London residents	-	-	-
Traffic congestion/ journey times	Western extension users	14%	32%	18%
	London residents	6%	26%	20%

7.8 Impact on social interaction with friends and family

Western extension 'users' visits to friends and family

Three-quarters of western extension 'users' have friends or family in the western extension zone and many visit them regularly.

Figure 7.16 Frequency of visiting friends and family in the western extension during charging hours, western extension 'users', 2006 and 2007.

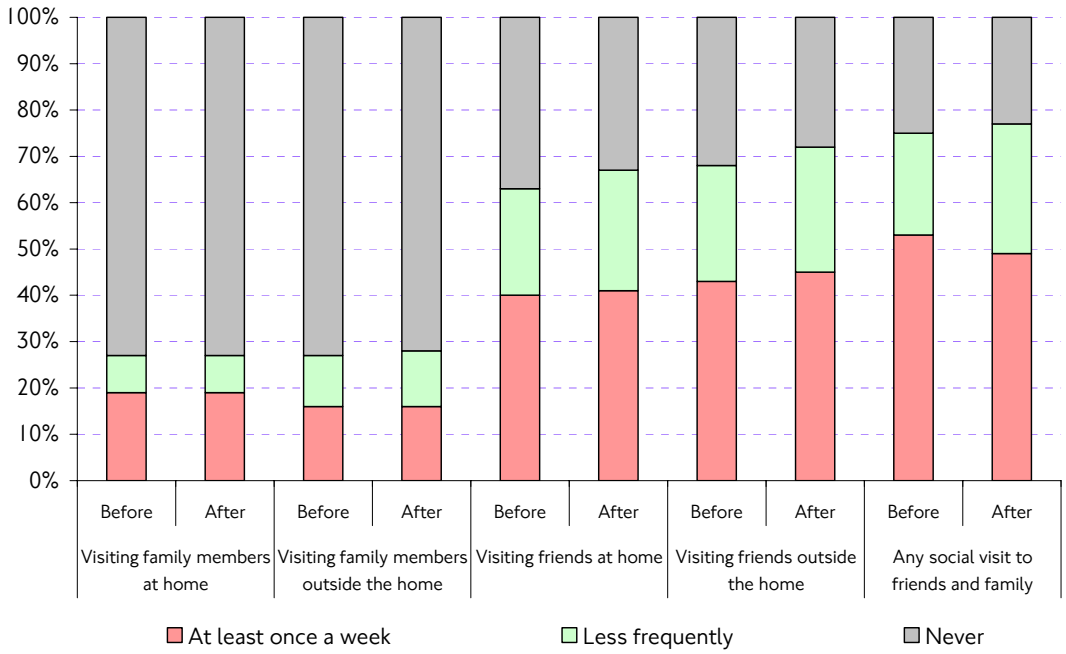
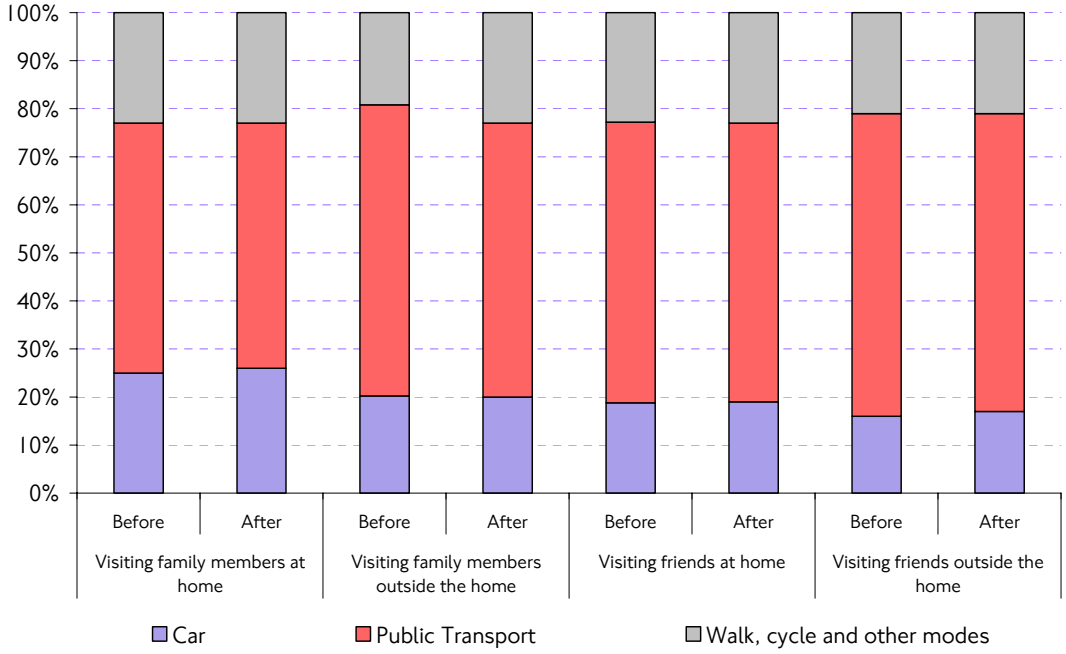


Figure 7.17 Mode for visits to friends and family in the western extension zone by mode during charging hours. Western extension 'users' who visit friends and family in the zone, 2006 and 2007.



Some 49 percent visit friends or family in the western extension during charging hours at least once a week; 23 percent never do so during charging hours. Figure 7.16 shows that the frequency of visits to friends and family by western extension 'users' has remained the same since the introduction of charging in the western extension. Figure 7.17 suggests that there has been no change in the mode used by western extension 'users' to travel to visit friends and family in the zone during charging hours.

London residents' visits to friends and family in the western extension zone

Around a third of London residents reported having friends and family living in the western extension. Those with friends and family in the zone were more likely to travel there regularly by all modes.

In 2006, four in ten London residents said that they sometimes met up with friends and family in the western extension, including 13 percent who were doing so at least once a week. After the introduction of charging in 2007, around a third of respondents said that they sometimes met up with friends and family in the western extension, including 9 percent who were doing so at least once a week. This represented a 24 percent decrease in the reported proportion ever meeting up with friends and family in the western extension zone during charging hours, and a 31 percent decrease in the reported proportion doing so once a week or more.

The reported proportion of London residents with friends and family in the western extension zone travelling to the area once a week or more by car during charging hours dropped by about a quarter from 23 percent to 17 percent, whereas travel by all other modes increased.

When asked whether or not they had changed the number of times they meet up with friends and family in the western extension, 6 percent of respondents said that they had. This was lower than the survey carried out in 2006, where 11 percent of respondents anticipated a reduction in visits. The impact of this may be felt particularly by those who live within the western extension, or who find it hard to travel elsewhere to meet their friends and family.

Those who reported a reduction in meetings with their friends and family were three times more likely than London residents in general to say that they were worse off as a result of the introduction of charging in the western extension (54 percent compared to 17 percent).

7.9 Impact on parents and children

Travel to childcare for under fives

Just over one in ten respondents to the western extension 'users' survey had a child or children under five living in their household. Of these, around half had childcare arrangements in place, three-quarters of which involved travelling to a childminder, nursery, crèche or relative's house. Around half of those with childcare provided outside the home said that this was within the western extension zone.

Prior to the introduction of charging in the western extension, a third of those taking their young children to childcare travelled by car. After the introduction of charging in 2007, this dropped by 24 percent to a quarter of all trips. There was a corresponding increase in the proportion travelling by public transport.

Travel to school for five to twelve year olds

One in eight respondents to the western extension 'users' survey had a child or children aged between five and twelve living in their household. Of these, just under half attended a school in the western extension zone. As with the younger children, prior to the introduction of congestion charging, around one third of children aged between five and twelve travelled to school by car. After the introduction of charging, this dropped by 17 percent to 29 percent.

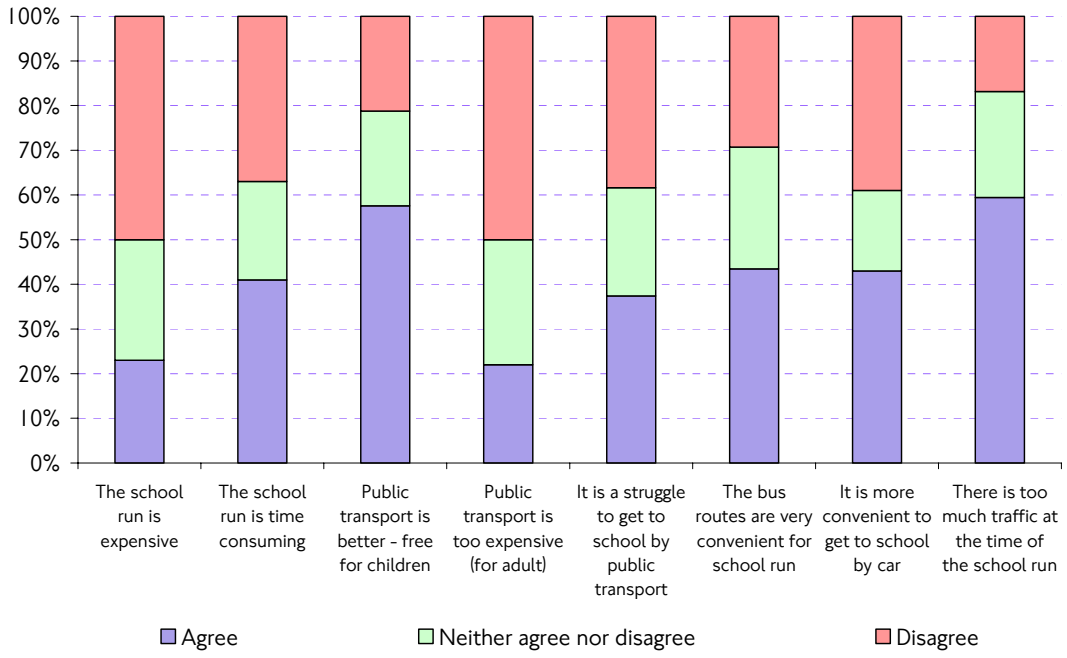
Travel to school for thirteen to seventeen year olds

Just under one in ten respondents to the western extension 'users' survey had teenagers aged between thirteen and seventeen living in their household. Of these, around a third attended school in the western extension zone. Older children were much more likely to travel to school by public transport, and only 18 percent travelled to school by car prior to the introduction of charging. This reduced to 16 percent after the introduction of charging in 2007.

Attitudes towards travelling with children

Parents of school-aged children were asked about their attitudes towards travelling with their children, shown in Figure 7.18. Respondents were evenly split between those who found travelling by public transport or car the most convenient.

Figure 7.18 Attitudes towards travelling with children in London, western extension 'users' with school-aged children, 2007/08.



7.10 Impact on key workers

Key workers enable public services (schools, hospitals and health services, the emergency services, local government) to function. This survey explored the possibility that the western extension might affect the recruitment and retention of key workers.

Some differences appeared in the responses of key workers in the western extension surveyed after the introduction of charging when compared with the 2006 sample. There was an apparent 7 percentage point increase in the casualisation of the workforce, with 13 percent of key workers in temporary roles in 2007.

In 2007, 17 percent of staff had 11 years or more service with the same employer, a decline from 24 percent, and 10 percent more staff had less than two years service. This may suggest that after charging some of the more experienced staff had moved on from their roles. Although this is perhaps unrelated to charging, it is relevant that, in 2007, almost half of workers with more than ten years service sometimes drove to work, compared with around one third of those with shorter lengths of service. Such workers are more likely to be senior staff, in respect of whom attraction and retention of staff is a widespread problem.

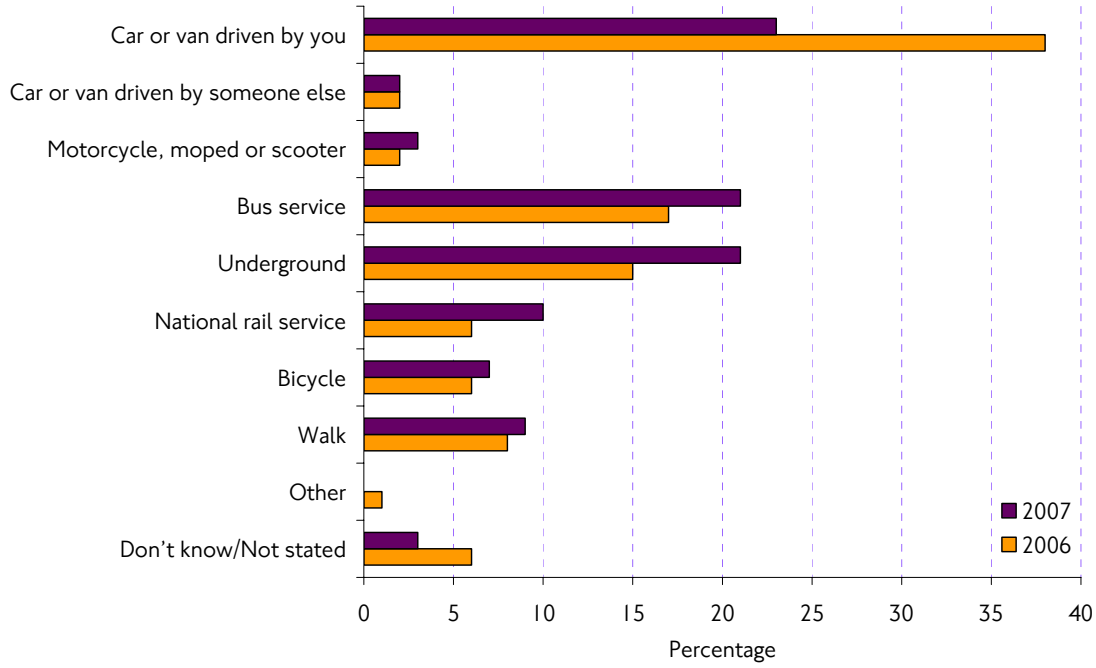
Key workers' travel patterns

The introduction of charging in the western extension had a noticeable impact upon car ownership and use among key workers. Household car ownership was 8 percentage points lower in 2007, at 75 percent. Whereas, before charging, 59 percent of key workers drove a car or van monthly for any purpose, after charging, under half did so. This is likely to reflect a change in the profile of key workers rather than any household change, but could suggest that car drivers have been deterred from employment within the zone.

Key workers were less likely to drive to work as their main mode of travel after the introduction of charging; almost half of key workers ever drove to work before the extension, whereas just over a third did so a year later. Likewise, 38 percent usually drove themselves to work in 2006, but under a quarter did so in 2007. Figure 7.19 illustrates the trends in 'usual work travel' methods, clearly showing that driving had undergone the greatest change.

Key workers in the original charging zone, who had not experienced a change in charging conditions, displayed no similar reductions in car travel in 2007.

Figure 7.19 Main mode of travel to work for western extension key workers, 2006 and 2007.



Over 60 percent of school workers surveyed in both the original and the western extension zones always drove to work in 2007, but only 40 percent of hospital workers did so. This may be linked with the fact that 82 percent of school workers who drove had access to free staff car parking, compared with only 8 percent of hospital workers, suggesting hospital workers may have already been discouraged from driving to work by the lack of free workplace parking.

Around three quarters of those who changed mode had previously travelled by car; smaller proportions of workers also moved away from commuting by the tube, bus and National Rail.

Almost nine in ten workers reported that the introduction of charging in the western extension was a factor in their choice to change their travel method. There was quite marked variation between occupations – for hospital workers 9 percent changed their mode of travel, compared with 19 percent of school workers and one third of police workers.

Around 15 percent of those who had worked in the area pre charging changed the time of day they travelled to work after the introduction of the western extension. Almost three quarters of these workers reported that the extension was a factor in their decision, although only four in ten normally travelled by car or van.

Affordability of travel for key workers

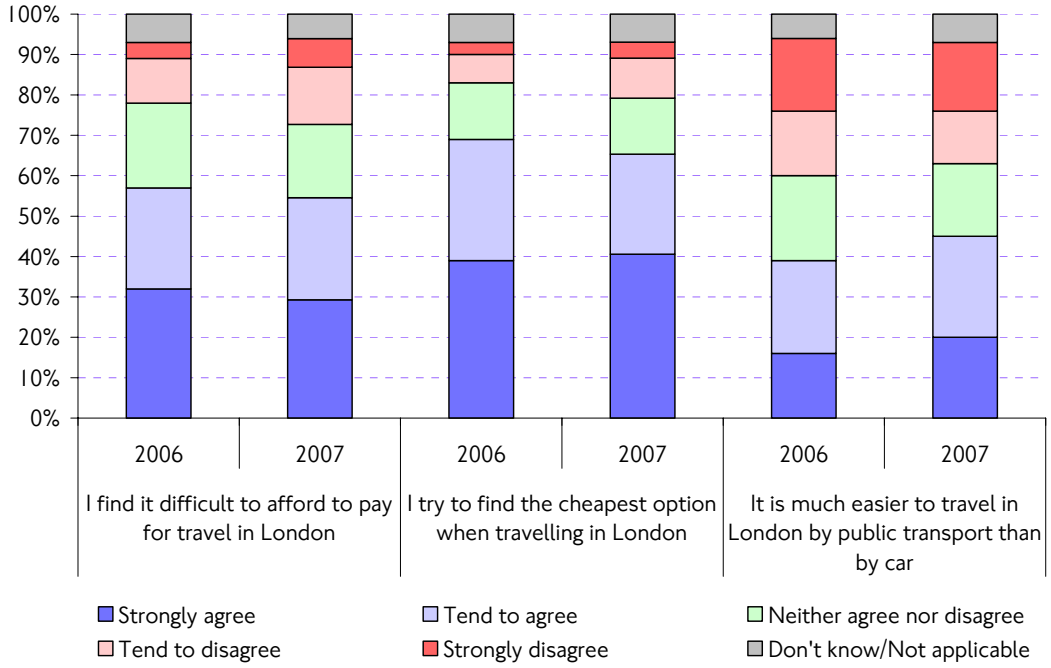
Some 43 percent of key workers reported spending more on work-related travel since the introduction of charging; and just 6 percent spent less, partly reflecting the normal expectation of general increases in the cost of living over time. However, of those who usually drove to work as their main mode, 78 percent said their work

travel expenses had risen, compared with no more than 35 percent of workers travelling by other means, suggesting that congestion charging was an important factor for drivers.

Around three quarters of workers with increased travel expenses found the additional cost difficult to meet. There was no difference in this regard between those who drove to work versus those travelling by other methods.

As shown by Figure 7.20 over half of the key workers surveyed in 2007 reported finding travel in London difficult to afford – a slightly lower proportion than the previous year, but higher than the result for all Londoners (41 percent).

Figure 7.20 Affordability of travel for key workers, 2006 and 2007.



Key worker employment within the western extension

One issue here was the concern that the introduction of charging might deter some key workers from employment in the western extension. An indication of this might be a higher proportion of new starters following the introduction of the scheme. The key worker survey results showed that nine in ten people surveyed in 2007 had been working in the same workplace since before the extension was introduced. The proportions of key workers at different lengths of service in the original charging zone (who had not experienced a change in circumstances) was comparable to those in the western extension zone before and after charging.

Of those who had worked in the western extension both before and after charging, half believed that their work commute was 'fairly similar', 37 percent said that it was 'more difficult', and 6 percent said that it was 'easier'. By comparison, only 11 percent of key workers felt that their work journeys were 'more difficult' than before the introduction of the original charging scheme in 2003. A quarter reported that their

work-related journeys in the western extension took longer after the introduction of charging, and six in ten believed that they took the same amount of time.

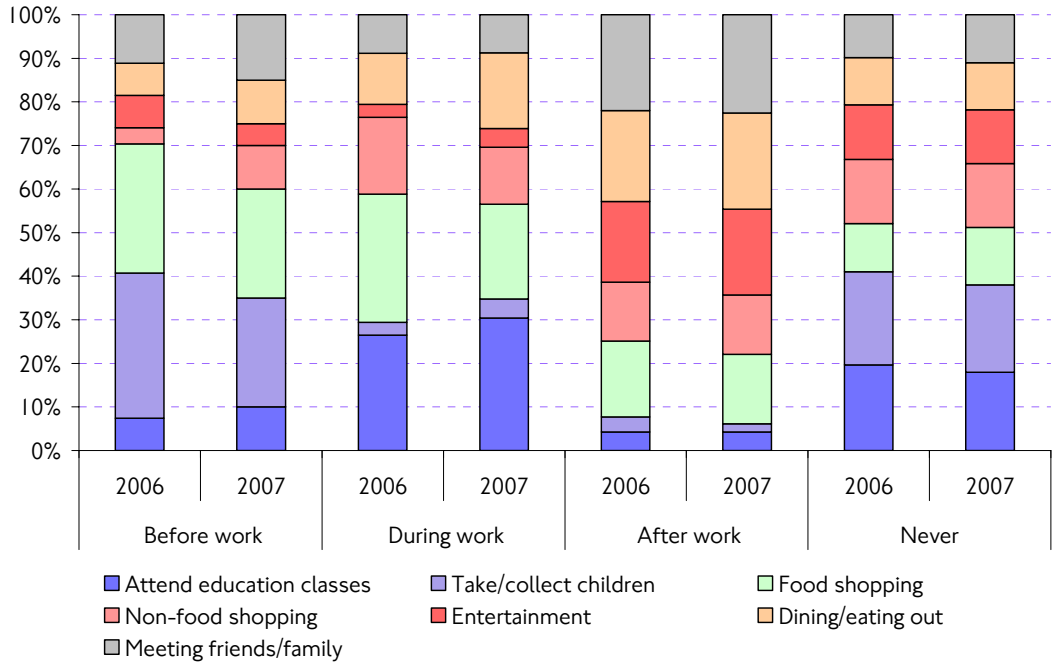
Interestingly, key workers travelling by Underground and National Rail were just as likely as car users to feel that travel was more difficult (around four in ten), suggesting that factors other than congestion charging may be important.

Twelve percent of key workers surveyed had turned down a job in the previous twelve months due to difficulty with transport – comparable to the position before implementation of the extension. The most common transport problems given were inadequate public transport (42 percent), distance (41 percent) and the cost of public transport (37 percent). The congestion charge was also cited by one third of people as a problem. This is particularly high given that those most deterred from working within the zone would not be present in the survey population of the latest surveys.

Activities undertaken by key workers

Figure 7.21 shows reported activities undertaken by key workers in the western extension. There was little change between 2006 and 2007 in the proportion undertaking most activities, although four in ten respondents reported going to activities such as the cinema or theatre less often since charging.

Figure 7.21 Activities undertaken by key workers in the western extension area. 2006 and 2007.



Benefits for key workers

One year into operation, 6 percent of western extension key workers felt they had benefited from the extension scheme; almost half believed they were worse off. Over one third of respondents considered there had been no change to their circumstances as a result of the introduction of charging. In comparison, 14 percent of workers in the western extension 'users' survey believed that they had gained, versus 44 percent who believed they lost out after charging.

Three quarters of those who usually travelled to work by car as their main mode felt disadvantaged by the scheme; however, 30 to 40 percent of those travelling by public transport, bicycle or on foot, also stated that they were worse off.

7.11 Impact on shift workers

Shift worker travel behaviour change

Shift workers, who make up perhaps about 15 percent of the national workforce, may be more likely to be disadvantaged by the introduction of congestion charging, as they may need to travel to work when public transport services are limited and personal safety is of greater concern. They are also more likely to be lower wage earners and to be in temporary employment. As noted earlier, due to the relatively small sample of shift workers (around 120 per wave), interpretation of the findings in this section requires particular caution.

Unlike key workers, shift workers surveyed in the western extension did not make any significant changes to their travel behaviour after the introduction of charging. This might suggest that alternatives to car travel were more limited for these workers. In 2007, one in seven shift workers 'ever' drove to work and one in ten 'usually' did so, showing non-significant decreases from 2006. Bus and the Underground remained the most common methods of travel to work, together accounting for over a half of work travel after charging.

Over 70 percent of shift workers who 'never' drove to work would never consider doing so, an increase of around 10 percent after the introduction of the western extension. For both those who would and would not consider driving to work, not having a driving licence or car, congestion charging and cost in general, and the availability of workplace parking, were important considerations.

Activities undertaken by shift workers in the western extension

There was no significant change in the activities of shift workers within the western extension zone after the introduction of charging. Figure 7.22 summarises the results of the surveys in this regard.

Figure 7.22 Activities undertaken by shift workers in the western extension, 2006 and 2007.

Impact of the extension scheme on shift workers

Shift workers were somewhat more likely than other workers in the western extension zone to say that they found it difficult to afford travel in London (51 percent compared to 43 percent).

The majority of those who had worked in the area before charging took the same time, money and effort to travel to work post charging. Of those who reported a change, fewer reported that the change was positive than negative. Of the few people who reported increased costs, these generally said the additional expense was difficult to afford.

Shift workers mostly felt they had neither benefited nor lost out from the introduction of charging, in keeping with the fairly low proportion of drivers in the survey. Just under a fifth felt they were worse off after charging, and around one in ten felt they were better off.

Around three in five shift workers interviewed in 2007 had worked in the area before the introduction of charging, over 90 percent at their current workplace. None of the few who changed workplace believed that the western extension affected their decision. However the few people who changed time of work or main travel method generally gave it as one of the reasons.

7.12 Impact on disabled people and carers

In the 2001 census, disabled people made up 16 percent of the London resident population and 14 percent of the extended congestion charging zone population. Additionally, 9 percent of people in London and 7 percent of extended congestion charging zone residents provide some form of regular, unpaid care for someone who is disabled or unwell.

Although many disabled people qualify for a Blue Badge, and therefore a 100 percent discount from the congestion charge, there was some concern that they may disproportionately lose out from congestion charging. In particular, TfL was concerned that carers and visitors might find it more expensive to visit, so disabled people may lose out in terms of help and social contact, and that services such as meals on wheels provided by voluntary sector organisations may have difficulties.

Furthermore, those who find it difficult to use public transport, but do not qualify for a Blue Badge, may find their ability to travel is significantly reduced. In general, disabled people and carers were a lower income group disproportionately reliant on cars and less able to benefit from the increased investment in public transport brought about by congestion charging.

A majority of disabled people surveyed in the western extension 'users' survey (as described in Section 7.3) were largely unaffected by the introduction of charging in 2007 and nearly eight in ten said that travel is easier or the same. However, those disabled people who had been affected by the introduction of charging were more concerned about the impact on them. For example, disabled people were no more likely than the population as a whole to say that travel had become more expensive as a result of the introduction of congestion charging (31 percent). However, those who did experience an increase in cost were significantly more likely to say that they found this increase difficult to afford than the population as a whole (82 percent compared to 56 percent, although there was a small sample size of 30 disabled respondents in this group).

Disabled people were a little more likely than other western extension users to say that they had lost out as a result of the introduction of congestion charging (45 percent compared to 41 percent).

The 'face to face' in-depth interviews carried out for the disabled persons and carers survey found that attitudes towards congestion charging in principle, and towards the scheme in practice, were broadly similar to those of the wider population. For many, the scheme has had little impact on their daily lives and respondents did not report significant impacts on their ability to travel, possibly because even those not eligible for a Blue Badge were eligible for the residents' discount. Notably, respondents did not report a decline in support or services provided by voluntary sector organisations. However, several respondents did report a decline in visits by family and friends, especially during the week, and some reported feeling quite isolated as a result.

Travel patterns of disabled people and carers – travel by car

Many of those included in the survey said that they prefer to travel by car as it provides a convenient and efficient way to travel and gives them a sense of independence. One respondent said:

> "For us, car is the best. We can travel without any tensions and we don't have to worry about my sister's behaviour. It is more easy to manage her in the car."
> **Carer for a disabled person who has a learning disability 2007**

Around two thirds of disabled people in London hold a Blue Badge, which entitles them to free parking and a 100 percent discount on the congestion charge. On the whole, respondents who had applied for the Blue Badge congestion charge discount had found the process relatively simple and hassle-free, although some had found it to be a burden. Overall, most were grateful for the independence and flexibility the discount provided.

> "It would have been very difficult – it really is a blessing for us not to pay."
> **Parent of a wheelchair user 2007**

In general, Blue Badge holders felt well-informed about the Blue Badge scheme (those without a Blue Badge had only a basic knowledge of the scheme) and among both groups there was some confusion regarding the scheme. Several respondents were not claiming the benefits they were entitled to, especially with regards to travel by family and friends.

The introduction of congestion charging had not had a significant impact on the travel patterns of respondents. Many qualified for a 100 percent discount on the charge or did not drive a car, and for those who did drive and pay the charge, other factors, such as the availability of disabled parking bays, were significant in determining whether or not to make a trip by car.

Travel patterns of disabled people and carers – travel by public transport

Many disabled people do use public transport, particularly buses. Although respondents reported encountering a range of accessibility barriers, the improvements that have been made to the services, such as the introduction of ramps, were appreciated by some. Respondents reported some increases in over-crowding, which they attributed to the introduction of charging.

Travelling by Underground was not particularly popular and many were not able to use it at all. Various accessibility problems were raised, including the lack of step-free access, big gaps between the train and the platform, a lack of announcements, and inconsiderate fellow passengers. Despite this, London Underground staff were praised for being knowledgeable and helpful and journeys were quick and efficient.

Taxis were used on occasion by these respondents and were generally well regarded, although the Taxi Card scheme, which gives a certain number of free or reduced price journeys per month, was considered to be unreliable.

Disturbingly, several respondents reported that minicab fares had risen 'as a result of the charge'. It was unclear whether this was simply a misunderstanding or whether they had been told this by minicab drivers. Licensed minicabs are exempt from the congestion charge, so increases in fares should not have arisen from the introduction of charging.

Social contact with friends and family

Several felt that the number of visits they received from friends and family had reduced as a result of the scheme.

> "I feel more cut off now. The days are longer and that is when friends cheer you up. They can't drive in the evenings because it gets dark."
> **Carer for a person who is visually impaired**

Others had found that visitors were avoiding charging hours. In both cases, respondents reported feeling lonely and isolated.

> "I have friends from Bristol who come and visit me, but it has to be at the weekend now… I don't see them as much as I used to."
> **Visually impaired person**

Respondents were also more reluctant to ask for help if it meant their friends and family would have to pay the charge

> "People wouldn't take me to places that they used to … you don't ask people to do things because you know it costs money."
> **Visually impaired person**

7.13 Summary

Overall, there was evidence that those living and travelling in the western extension zone had reduced the frequency of trips made by car after the introduction of charging, but that this had not had a significant impact on the overall frequency of trips made by any mode, or on access to shops and services.

The financial cost of the congestion charge was difficult for a significant minority, but the introduction of charging had not had an impact on the general affordability of travel in London. The majority of London residents were unaffected by the introduction of charging, with around the same number stating that they had benefited as those stating they had lost out, although those most directly affected were more likely to say that they had lost out than benefited.

Overall, the evidence suggests that most London residents have been able to adapt to the introduction of charging without any detriment to their quality of life, although some concerns remain about the impact of charging on the social interaction of vulnerable groups.

8. Western extension zone: business and economic impacts

8.1 Introduction

This section describes the business and economic impacts monitoring programme for the western extension congestion charging zone. The objectives for monitoring business and economic trends within the western extension zone are similar to those established in 2002 for the central zone, namely:

- To assess the aggregate impact of the western extension on business and economic activity, both within the extension zone and more widely, taking into account wider economic trends.
- To understand how the business community perceives, responds to and is affected by the western extension.
- To measure the range and intensity of impacts upon business and other organisations at the general level.
- To monitor the effects of the scheme on those activities that are of specific stakeholder or technical interest.

The business and economic monitoring programme for the western extension has incorporated the following elements:

- A review of available economic datasets.
- The development of new economic indicators for business activity within the western extension zone and 'control' locations.
- Surveys of business attitudes towards changes in turnover and profitability.
- Quantitative surveys of visitors to retail establishments within the western extension zone to establish more localised changes to consumer trends.
- Analysis of wider economic factors affecting business performance in London and within the western extension zone, such as tourism trends.

A full and comprehensive business and economics assessment of the effects of charging in the western extension zone is limited by the availability of reliable, independent data. For instance, official data from the Office of National Statistics on employment and the number of business units is published with a lag of approximately twelve months in the Annual Business Inquiry; the latest data are for 2006. These pre-date the introduction of charging in the western extension zone and were released in December 2007.

However, a range of TfL survey data is now available for 2007. For example, quantitative data on retail footfall traffic measuring the number of potential customers going into a representative sample of shops. TfL's survey of business attitudes is also available; however it is a less objective measure of impacts as it is based on opinions.

8.2 Emerging findings for 2007

The key findings from the main indicators where data is now available for a significant period post-dating the introduction of western extension scheme are as follows:

- The four quarters of weekday retail footfall traffic, since the start of charging in February 2007, show a continuation of the downward trend which pre-dates charging. Weekend retail footfall data show comparable declining trends.
- In the six months after the introduction of charging, rental value growth of office properties in the western extension zone was stronger than in the rest of inner London. Retail rental growth in the western extension zone rose ahead of comparable locations such as Bromley, Kingston and Richmond.
- It is important to note the financial and business difficulties associated with the 'credit crunch' did not materially impact the property markets until around the fourth quarter 2007.
- Business owners and employers in the western extension zone reported weaker sales and profitability in 2007 compared to 2006 in the TfL telephone survey of local businesses.
- TfL on-street surveys found that over 90 percent of shoppers and diners in the western extension said that they had not changed their trip patterns since the introduction of charging. Of the approximately 10 percent of visitors who said they had changed, the most common responses were to use public transport instead of the car or to make fewer journeys to the area.

However it is important to note that it is too early to fully evaluate the business and economic impact of the western extension zone because some of the most robust and comprehensive datasets for 2007 have yet to be released due to publication lags. Data is not yet available from the period following the introduction of western extension zone charging on employment growth, numbers of business units and new VAT registrations.

8.3 General economic trends in London

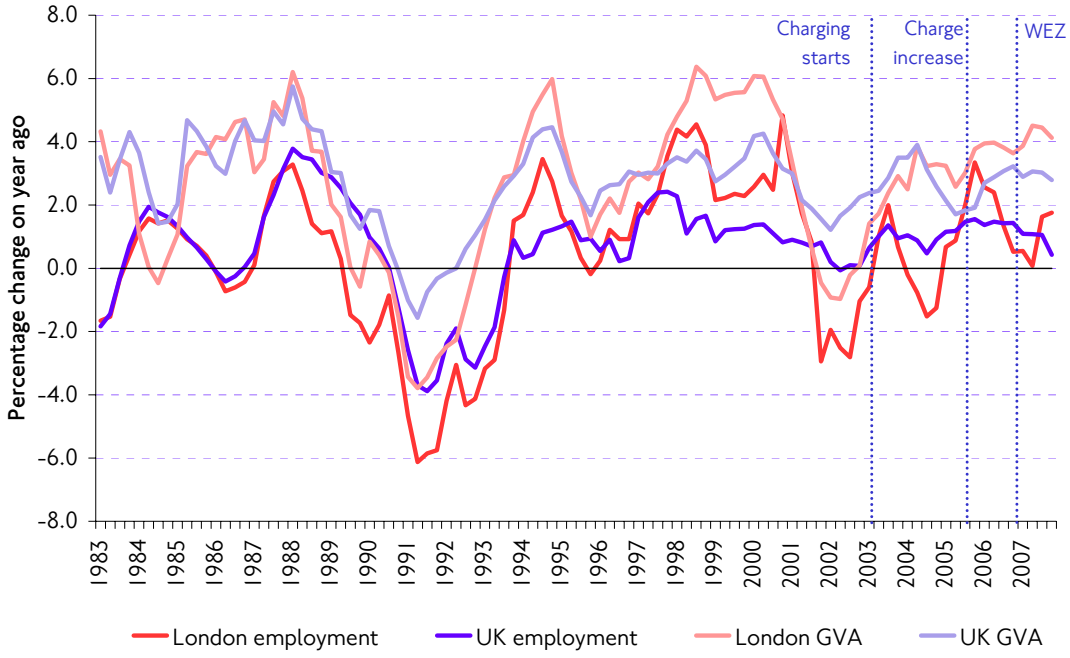
During 2007 London's economic output (Gross Value Added) continued its strong growth. According to preliminary estimates, annual output in London grew at 4.3 percent in 2007, compared to 2.9 percent in the UK. Key features of recent growth and future forecasts are as follows:

- Over the long-term, London's economy tends to grow at the same rate as the economy of the UK as a whole. However, London tends to be a more volatile economy – shown by the peaks and troughs of the London data in Figure 8.1.
- London's output growth has recovered from a shallow recession at the beginning of 2002. In 2007 overall output grew at around 4 percent, well above trend, and above the growth rate of the UK as a whole. London's employment growth also picked up during 2005-2007.
- Recently published economic data reveals signs of the onset of an economic slowdown. Annual house price inflation in London fell at the end of 2007 and this has continued in 2008. Similarly London's commercial property market slowed in

the final quarter of 2007 with take-up 26 percent below the ten-year average quarterly totals.

- The retail sector began to show signs of slowing sales growth in the final quarters of 2007 and early 2008 with the slowdown in central London more marked than the rest of the UK, although sales growth in central London had historically outperformed the UK.
- Regional consumer confidence indices show that consumer confidence remains higher in London than in the UK as a whole; however there has been a significant downturn in confidence in both London and the UK since summer 2007 that coincided with the onset of the credit crunch.
- Business survey results indicate that the rate of London's expansion has slowed since the summer of 2007, but that growth is still positive. The Purchasing Manager's Index of seasonally adjusted business activity, new orders and employment all remain above 50, which indicates growth.
- The outlook over the medium term is for a significant slowdown in growth in 2008 and 2009.
- The total number of workforce jobs in London was over 4.7 million in quarter 4 2007. London is likely to see small contractions in employment in 2008 and 2009. London household spending is expected to grow more slowly than GVA in 2008 and 2009.

Figure 8.1 Change in GVA and employment in London and the UK, 1993-2007.



8.4 Characteristics of the western extension zone

The western extension zone differs in a number of respects to the original central London charging zone. These features may condition the impacts of charging in the extension zone, and so have influenced the design of the monitoring work. Key features emerging from the analysis of conditions and trends before implementation of the extension scheme were:

- Compared to the central charging zone, the western extension zone has relatively less representation in the financial and business services sector in terms of employee jobs and business units.
- The western extension zone is relatively well represented in sectors such as retail, education and health, and hotels and restaurants in comparison to the central charging zone.
- The long-run trend in weekday retail footfall in the western extension zone has been downward since the beginning of 2005 – comparable to the central London charging zone.
- In the western extension zone, VAT registrations have outnumbered deregistration in all years since the mid-1990s, comparable with central London charging zone.
- Local residents represent the largest proportion of shoppers and visitors in the western extension zone.
- As in the central London charging zone tourism is a major factor within the western extension zone. Kensington and Chelsea along with Westminster are among London's most visited boroughs.
- The western extension zone is relatively more residential than the central charging zone and has some of the most expensive properties in the capital.

8.5 Assessing business and economic impacts of charging in the western extension

Quantitative assessments of business impacts are critically limited by the quality and quantity of the available input data. In general, transport costs are a relatively minor aspect of much business activity and the broad effects of congestion charging on the cost of business operations and on customer disposable income are marginal. However, it is possible that some businesses will be more than marginally affected – either positively or negatively – though attributing this specifically to congestion charging can be difficult.

In simple terms, the economic impact of road user charging can be divided into 'supply side' and 'demand side' effects, alongside some redistribution of economic activity. The scale of these effects will be determined by the actual costs imposed by the charge and the impacts on journey times and journey costs brought about by the change to traffic and congestion conditions from the charging scheme.

Table 8.1 summarises the business and economic impact monitoring programme which aims to gauge the impact of charging on businesses and the economy in the western extension zone.

Table 8.1 Western extension zone business and economic impacts monitoring programme.

Issue	Survey/dataset	Indicators	Western extension data available
Business and employees	The Beta Model analysis	Number of enterprises, survival rates, formations and deformations	December 08[i]
	Dun & Bradstreet business database analysis	Turnover and profits	December 07
	Annual Business Inquiry	Employee numbers and business units	December 08[i]
	VAT Registrations data	Number of business registrations and deregistrations	December 08[i]
	TfL London Congestion Charging Business Survey	Business reactions and attitudes to the scheme	December 07
Retail	SPSL	Changes in retail traffic in the zone	March 08
	London Retail Sales Monitor (central London)	Changes in retail traffic in the zone	March 08
	TfL Western extension zone 'visitor' survey	Shoppers/diners/boundary business users' behaviour in the zone	December 07
	TfL Western extension zone shoppers exit survey	Exit survey and shopper counts at retail stores on Kings Road	December 07
Tourism	GLA tourism analysis	Visitor trends	March 08
Property	Investment Property Databank	Commercial property prices and rental yields	September 07
	Land Registry analysis of residential property prices	Residential property prices and sales volumes	September 07

[i] Post-western extension data will be available from December 2008.

The common approach of all these studies is to compare business performance inside the western extension zone with business performance outside the zone, both before and after the introduction of the extension scheme. This is measured by such variables as number of businesses or sites, numbers of employees, sales and profits.

8.6 Western extension zone business and economic structure

The Annual Business Inquiry is compiled by the Office for National Statistics. It is among the most comprehensive sources of employee jobs and numbers of business units with data available at a relatively fine level of geographic and industrial disaggregation. However, publication lags delay the release of data by up to twelve

months and as a consequence the latest available data, released in December 2007, relates only to 2006, prior to the western extension being introduced.

The 2006 Annual Business Inquiry data was subject to several sources of discontinuity, most significantly a change in the reference survey date from December to September. By no longer capturing seasonal employment gains between September and December 2006, the 2006 Annual Business Inquiry understates employment growth in London for 2006 if compared with 2005 estimates. This affects some sector more than others, for example retail, and hotel and restaurant sectors which are greatly influenced by seasonal business activity.

While discontinuity in the Annual Business Inquiry time series precludes direct comparisons between 2005 and 2006, the 2006 Annual Business Inquiry is still a worthwhile snapshot in comparing and contrasting the western extension zone with the central London charging zone and Greater London in its industrial and employment mix. The western extension is relatively less represented in the financial and business services sector in terms of employee jobs and business units compared to the original central London zone, as Table 8.2 shows. By contrast, the western extension zone is relatively more represented in sectors such as retail, education and health, and hotels and restaurants.

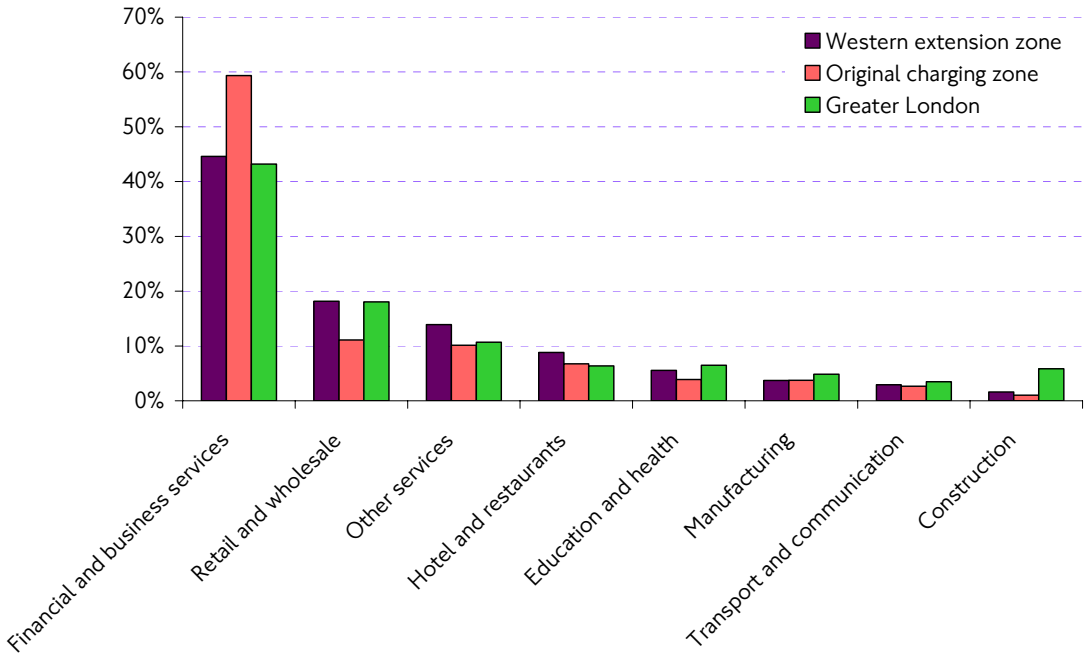
Table 8.2 Employee jobs, by business sector in the western extension, 2006 dataset.

	Western extension zone		Central London zone		Greater London	
	Employee jobs	Percent of zone	Employee jobs	Percent of zone	Employee jobs	Percent of Greater London
Financial and business services	55,000	27	624,000	52	1,341,000	31
Education and health	34,000	17	102,000	9	676,000	16
Retail and wholesale	33,000	16	65,000	6	568,000	13
Hotel and restaurants	31,000	15	94,000	8	285,000	7
Other services	16,000	8	86,000	7	277,000	6
Public administration	12,000	6	80,000	7	233,600	5
Transport and communication	10,000	5	75,000	6	297,000	7
Manufacturing	6,000	3	36,000	3	191,00	4
Construction	2,000	1	11,000	1	117,000	3
Total	200,000	100	1,200,000	100	4,365,000	100

Source: Annual Business Inquiry, Office for National Statistics, December 2007.
Note: Percentages do not sum to 100 percent due to the omission of utilities, fishing and agriculture sectors.

In its industrial and business break-down, the western extension zone is a mixture of both Greater London and the central charging zone. The proportion of businesses in the 'hotels and restaurants' sector in the western extension zone closely resembles the central charging zone, as shown in Figure 8.2. However, the percentage of businesses in the 'financial and business services' and 'education and health' sectors more closely reflects the picture in Greater London. The western extension zone is more residential than the central charging zone but at the same time has disproportionately large commercial and retail sectors, in part due to the importance of tourism to the area.

Figure 8.2 Business units by business sector in the western extension compared to the central London charging zone and Greater London, 2006 dataset.



Source: Annual Business Inquiry, Office for National Statistics, December 2007.

Data for 2007 is expected to be released towards the end of 2008 at which time it will be possible to assess how, in terms of employment and business units, the area of the western extension has performed in relation to others parts of London.

8.7 Western extension zone business survey

During October and November 2007, six months after the introduction of the western extension scheme, TfL conducted the fourth wave of its annual business survey. A total of 1,200 telephone interviews were conducted with business owners and employers: 620 within the western extension charging zone; and 580 in 'control' areas, including Camden, Hammersmith, Docklands and in the western extension boundary area.

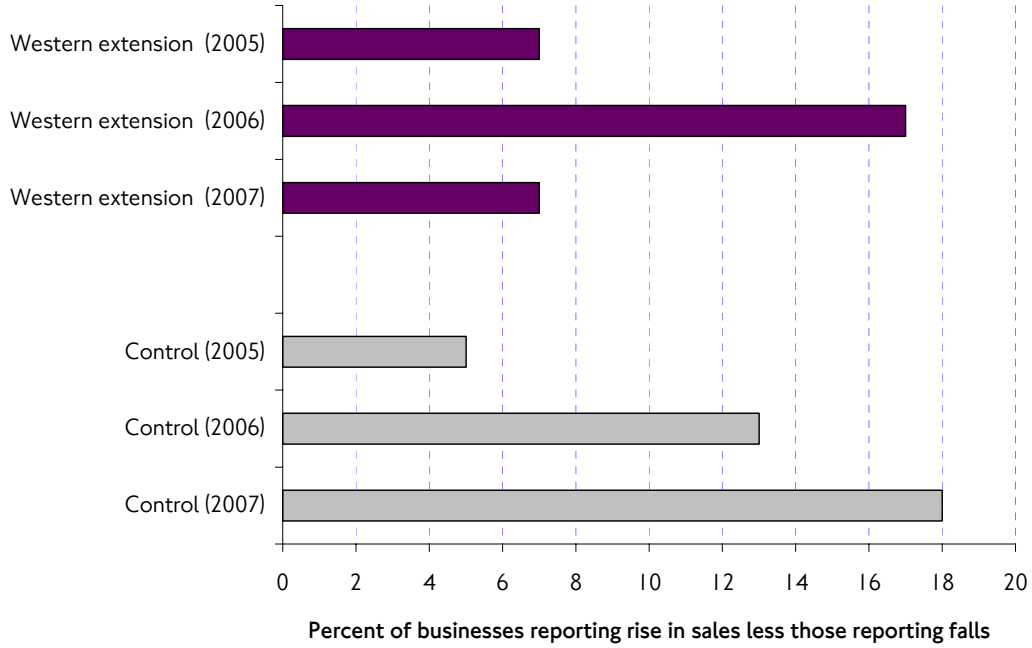
The sample included a cross-section of all types of business and focussed on those more likely to be affected by congestion charging: shops, restaurants, leisure businesses, and wholesalers and distributors. To obtain representative overall results the sample was re-weighted to reflect the population of all businesses.

While the survey explores business performance, it should be noted that the results reflect the opinions of the respondents and have a degree of subjectivity within them. The potential for policy response bias should also be borne in mind: this is where, for example, someone who is strongly opposed to, or supportive of, congestion charging on principle allows these views to consciously influence their answers to the survey. The majority of businesses in the western extension zone sample are small, based at one site, and have been in the area for over five years. The TfL Business Survey asked business owners and employers a wide ranging set of questions from sales and profitability performance to recent cost pressures facing businesses.

Sales performance

In terms of sales, businesses in the western extension zone reported deteriorating performance. In 2006, 24 percent of businesses reported an increase in sales compared to 2005 while 7 percent reported a decrease. This net positive balance of 17 percent declined to 7 percent of businesses, with 20 percent reporting an increase and 13 percent reporting a decrease, in 2007, as shown in Figure 8.3. In contrast, in the control sites the net positive balance of business reporting an increase in sales over those reporting a decrease rose from 13 percent of businesses (26 percent reporting a rise and 13 percent reporting a decline) in 2006 to 18 percent (31 percent reported an increase while 13 percent reported a fall) in 2007.

Figure 8.3 Proportion of businesses reporting an increase in sales less those reporting a decrease.



Source: TfL Business Survey, 2007.

The 2007 improvement in sales performance in the control sites appears to be a continuation of past trends, as can be seen in Figure 8.3, from the incremental increase in the net positive balance since 2005. By comparison, the 2007 lower positive balance of western extension zone businesses reporting higher sales mirrors that of 2005, prior to the introduction of charging in the western extension. In a

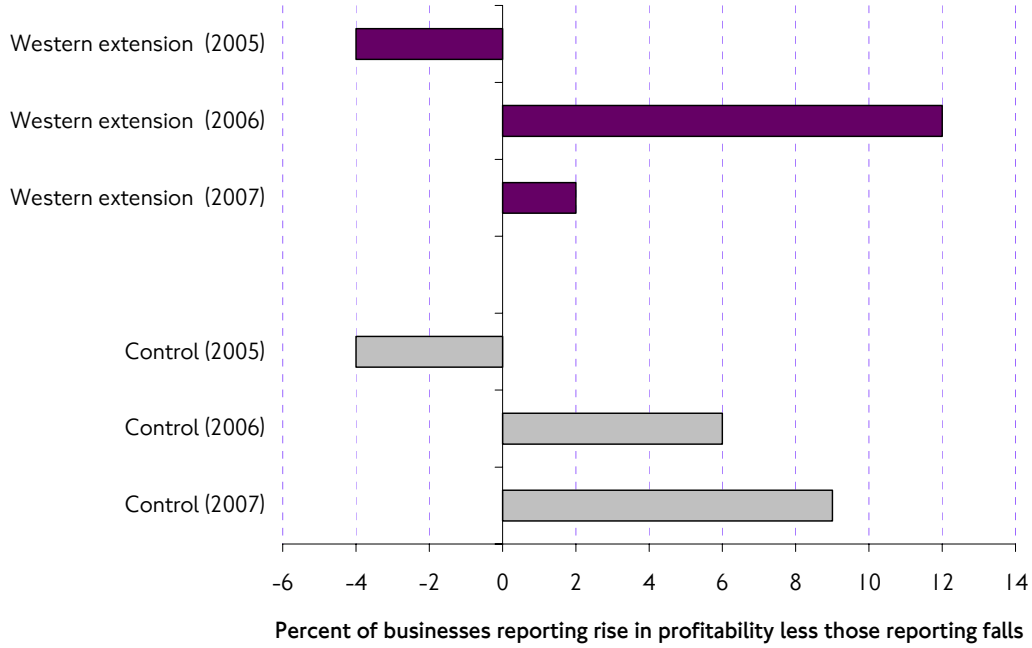
three-year context, the 2006 western extension zone results appear to be the anomaly therefore.

A significant and growing proportion of businesses in the western extension zone did not report sales performance. Four in ten businesses declined to answer or the respondent 'did not know' whether sales had changed. Businesses in the control areas were somewhat clearer in their financial assessment with only three in ten failing to respond.

Profitability

In terms of profitability, businesses in the western extension zone reported a deteriorating performance. For 2006, 20 percent of businesses had reported an increase in profitability compared with 2005 while 8 percent reported a decrease. This net positive balance of 12 percent declined to 2 percent of businesses, with 17 percent reporting an increase and 15 percent reporting a decrease, in 2007, as shown in Figure 8.4. In contrast, in the control sites the net positive balance of business reporting an increase in profitability over those reporting a decrease rose to 9 percent of businesses (24 percent reporting a rise and 15 percent reporting a decline) in 2007 from 6 percent (24 percent reported an increase and 18 percent reported a fall) in 2006.

Figure 8.4 Proportion of businesses reporting an increase in profitability less those reporting a falls.



Source: TfL Business Survey, 2007.

As with sales, an exceptionally high net proportion of businesses in the western extension zone reported increasing profitability for 2006. In terms of profitability, 2005 was a poor year more generally, though an increasing proportion of businesses in the control sites have shown a gradual improvement since. The notable decline in the proportion of western extension zone businesses reporting improved profitability

was mainly from businesses reporting a decrease in profitability in 2007 compared to 2006 as opposed to lower numbers reporting an increase in profitability.

According to the TfL Business Survey therefore, businesses in the western extension zone report more difficult trading conditions in 2007. This is not reflected elsewhere in the control sites, although 2006 appears to have been an exceptionally good year in the western extension zone.

8.8 Western extension zone retail sector analysis

Financial and business services is the largest employment sector in the western extension zone. Retail has a relatively high representation in comparison to the central London charging zone. According to the Annual Business Inquiry, in 2006 there were over 3,500 business units and 33,000 jobs in the retail and wholesale sectors, accounting for 18 percent and 16 percent of all business units and jobs in the western extension respectively. Although disaggregated data for retail alone is not yet available for 2006, it is estimated that over eight in ten of the 33,000 'retail and wholesale' jobs are retail specific.

Retail is also among the sectors where businesses in the western extension have expressed the greatest concerns about the impact of charging. Retailers have argued that lower car borne traffic levels following the introduction of charging has reduced shoppers and visitors, which in turn has adversely impacted their sales and profitability.

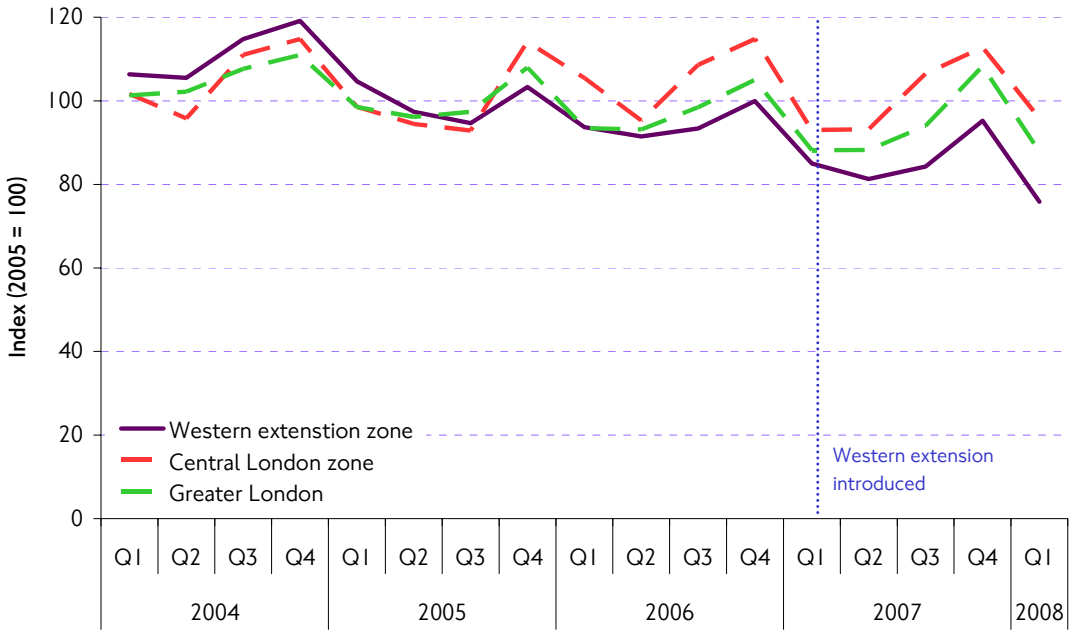
Retail 'footfall' data

TfL have a longstanding programme of monitoring retail traffic indicators which measure the number of people going into a representative sample of shops. This is known as 'footfall' and is supplied by SPSL, an independent commercial provider, on a weekly basis.

In contrast to previous annual reports, quarterly averages have been calculated to make it easier to identify trends, due to a high degree of variability in weekly data. Figure 8.5 shows quarterly averages of retail traffic, based on weekly data, indexed to 2005, for the western extension zone, the central London charging zone and Greater London between 2005 and early 2008.

The shopper footfall data, as expected, reveals a degree of seasonality with peaks during Christmas (quarter 4), and troughs during spring and summer months (quarter 2 and quarter 3). Importantly, immediately following the introduction of charging in the western extension zone, in approximately quarter 1 2007, there was no marked decline in the level of weekly shopper footfall. However, there appears to be a falling long term background trend in weekly footfall in both charged and non-charged areas, and while this appears more pronounced in the western extension zone, it pre-dates the introduction of charging.

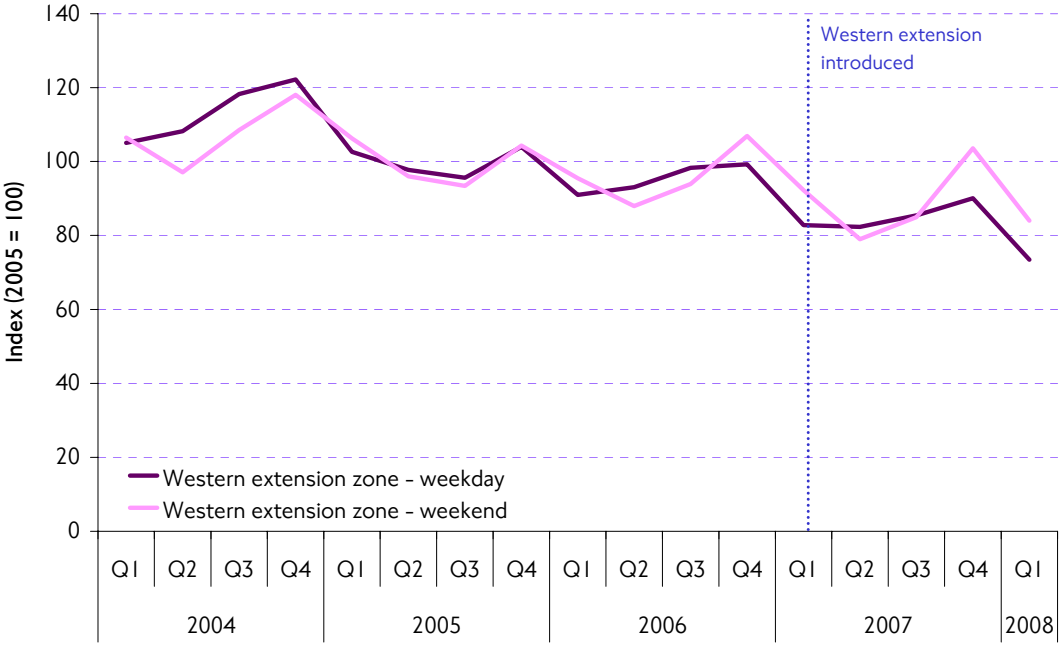
Figure 8.5 Retail traffic (footfall) indicator, western extension zone, central London charging zone and Greater London. Weekly data. 2005 to 2007.



Source: SPSL, 2007.

Separating weekly data between weekdays and weekends, as shown in Figure 8.6, reveals that footfall trends in the western extension zone on weekdays are comparable to those at weekends when the charge in not applied, both before and after the introduction of charging.

Figure 8.6 Retail traffic (footfall) indicator, western extension zone. Weekdays and weekend. 2004 to 2007.



It appears from this data that activity in the main shopping areas of the western extension zone has been in decline, but that this predates the introduction of charging. Furthermore, similar trends have been seen during weekends when charging has never been applied.

TfL visitor surveys

Since 2004, TfL has undertaken a series of annual, on-street surveys with a random sample of retail consumers within the western extension zone. This survey aims to:

- gain a better understanding of the relationship between the mode of travel and wider daily shopping and dining trends in the western extension;
- assess the behaviour of shoppers, diners and visitors to businesses within the western extension zone and at key comparable sites following the introduction of charging.

The TfL Visitor Surveys comprise of two main retail-specific surveys which focus on the trends of shoppers and diners within the western extension zone and at key comparable sites. In 2007, 6,021 people participated in this survey – 4,356 shoppers and 1,665 diners.

Those interviewed for the survey were individuals whose primary or secondary reason for being at the locations was to shop or dine within the western extension during charging hours. Some example findings are reported below, including the results of the most recent survey wave, undertaken between October and December 2007, six to nine months following the start of charging in the western extension.

Survey of shoppers

The 2007 Shopper Survey sample comprised 2,931 respondents in the western extension zone and 1,425 respondents at the following control sites; Camden High Street, Oxford Street, Regent Street, Long Acre and Hammersmith. The results have a degree of uncertainty, depending on the numbers of respondents which varies by question.

Nature of trip

In 2007, 22 percent of respondents in the western extension zone said they were in the area exclusively to shop. This proportion was unchanged from 2006. In 2007, 35 percent, compared with 36 percent in 2006, were shopping in the area during a break from other main activities while 17 percent said they were in the area as they lived locally, down slightly from 18 percent in 2006. It therefore appears that the nature of trips in the western extension has changed little following the introduction of charging.

Shopping behaviour

The proportion that reported shopping in the western extension at least once a week was 54 percent in 2006 and 52 percent in 2007. This fall may be part of a longer term trend since the proportion that reported shopping once a week has fallen from 59 percent in 2005. Weekend shopping (on Saturday, Sunday or both) in the western

extension zone area was reportedly around 48 percent in 2006 and 49 percent in 2007. In 2007 the 'average' daily spend on shopping in the western extension area was £82, and £83 in 2006.

Mode of transport used

A quarter of interviewed shoppers in the western extension area walked all the way to the interview location in 2007 compared to nearly a third in 2006. Public transport (mostly Underground and bus) use in the western extension zone has gone up; 65 percent compared to 57 percent in 2006. For the surveyed shopping trip, the proportion using a car in the western extension area was 5 percent in 2007 compared with 6 percent in 2006, before the introduction of charging. Nearly six in ten shoppers interviewed in the western extension zone said they had no access to a car or van, both in 2006 and 2007.

Shoppers' responses to the western extension zone

Over 90 percent of on-street shoppers in the western extension said that they had not changed their shopping trips since February 2007 when the congestion charge was extended to the area. The 9 percent who said they had changed their shopping trips since charging was introduced were asked how their behaviour had changed. The most common responses were to use public transport instead of car or to make fewer journeys to the area.

Diners' survey

The Diners' Survey sample comprised 960 respondents in the western extension zone and 705 respondents at control sites; Chalk Farm Road, Maiden Lane and Old Compton Street.

Nature of trip

Only 5 percent of diners in the western extension zone said that they came to the area only to eat out, compared to 4 percent in 2006, and suggesting that the large majority of diners combine a restaurant visit with journeys to the zone for other purposes. The three main reasons for being in the area were that the respondents lived locally (28 percent), worked locally (23 percent) or were combining eating with other main activities (26 percent).

Dining behaviour

The proportion that reported dining out at least once during the week was 60 percent in 2007 compared to 64 percent in 2006. The reported level of dining out at the weekend, when the charge is not applied, in the western extension area was 52 percent in 2007, compared with 55 percent in 2006. The apparent decline in dining out in the western extension at weekends suggests the fall in weekday dining may not be related to the introduction of charging in 2007.

In 2007, the average daily spend on dining out in the western extension area was £17.03, a decrease on the average of £19.20 in 2006. The fall is apparently driven by the choice of restaurant, with an increase in the use of fast food outlets. The most frequently visited type of establishment in the western extension area was the lower

priced restaurant although this has dropped since 2006 (30 percent in 2007, 38 percent in 2006). At the same time, there has been an increase in the use of fast food specialists (27 percent in 2007 compared to 15 percent in 2006).

Mode of transport used

In terms of the mode of transport used to get to the western extension zone by those eating out, public transport (mostly Underground and bus) use increased in 2007 to 60 percent from 54 percent in 2006. About one in three walked all the way, unchanged from 2006. The proportion of diners using the car fell from 9 percent in 2006 to 3 percent in 2007, following the introduction of charging. Further probing revealed that the decline in car use was mainly from other residents outside the charging zones, although the small sample sizes for car use mean that the results are subject to a relatively high level of uncertainty.

Diners' responses to the western extension zone

In 2007, 92 percent of diners in the western extension said that they had not changed their shopping trips since the congestion charge was extended to the area. The 8 percent who said they had changed when congestion charging was introduced were asked how their behaviour had changed. The most common responses were to use public transport instead of car or to make fewer journeys to the area. In 2006, when diners were asked how they were likely to change, the most common response was to change destination. It must be noted that any who did change destination in 2006 would not be included in the 2007 survey.

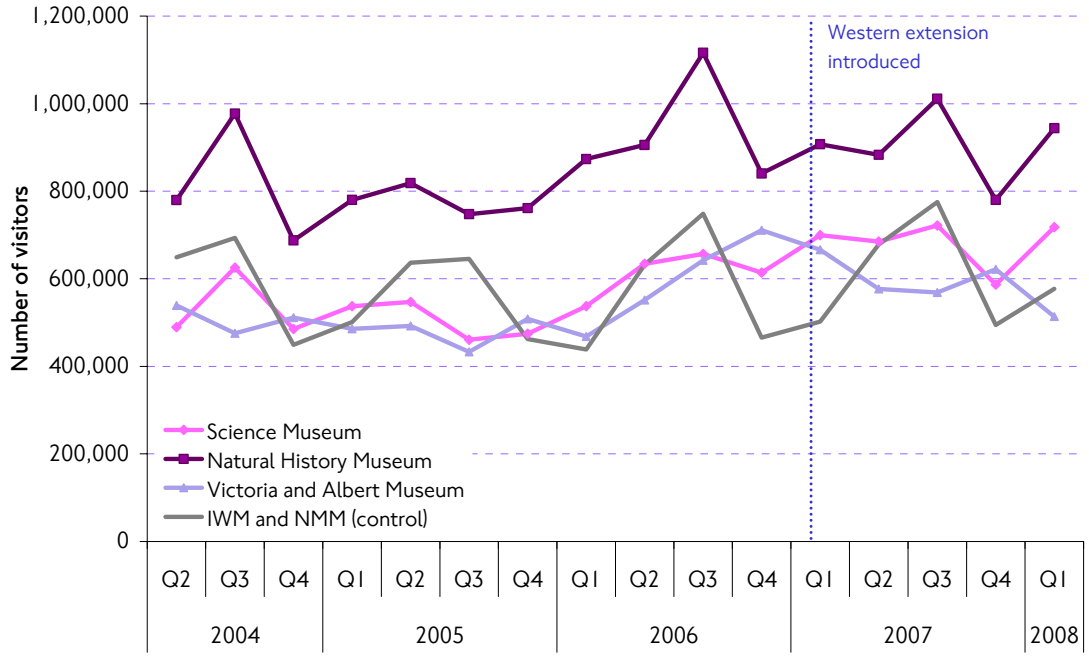
Diners who accessed the western extension area by car were very much more likely than other mode users to say they had changed their eating out trips. Over 20 percent of car users said they had changed their current eating out trips compared to between 6 percent and 8 percent for other modes, although the small sample sizes for car use mean that the results are subject to a relatively high level of uncertainty.

Western extension zone tourism analysis

Tourism is a major factor within the western extension zone. There are many visitor attractions in the western extension zone, with the Natural History Museum, Victoria and Albert Museum and Science Museum attracting millions of visitors each year. Some of London's largest events, retail outlets and park spaces are also located in the western extension zone.

Figure 8.7 compares visitors per quarter at the three museums in the western extension charging zone with a combined total of visitors at two of the most popular museums outside the western extension zone – the National Maritime Museum in Greenwich and the Imperial War Museum in Lambeth. The cluster of museums in close proximity within the western extension zone attracts huge numbers of visitors, and only by combining two of the most popular museums outside the western extension zone, Imperial War Museum and National Maritime Museum, does the total approximate to the level of visitors attracted to any one of the western extern zone museums. The unique nature of this cluster of museums in the western extension zone means that Imperial War Museum and National Maritime Museum will fall short of being truly comparable control sites.

Figure 8.7 Visitor numbers to top museums in the western extension zone and control sites.



Source: Department of Culture, Media and Sport.

Nevertheless, while there is considerable variability and seasonality in visitor numbers to these museums there does not appear to be any discernable impact following the introduction of charging as shown in Figure 8.7. Table 8.3 shows year-on-year change in visitor numbers at the three western extension museums and the 'control' museums both before and after charging. Visitor numbers were generally substantially higher in 2006 compared to 2005, particularly for the museums within the western extension zone.

Since the first quarter of 2007, which approximately coincided with the introduction of charging, growth has slowed in the western extension zone. However, this would in part, be due to the year-on-year comparison from the strong growth, in excess of 20 percent, in visitors to western the extension zone museums in the previous year. This growth was not seen in the two control site museums in the same period.

The analysis of the impact on tourism in the western extension zone warrants further investigation in addition to monitoring visitors to museums. TfL have a wider monitoring programme in this area including an examination of the supply of hotel accommodation. However, due to lags in the availability of reliable data this will be analysed subsequently.

Table 8.3 Year-on-year change in visitor numbers to museums in the western extension zone and control sites.

	Average annual quarterly growth - pre charging		Average annual quarterly growth - post charging
	Q2 to Q4 2005	Q1 to Q4 2006	Q1 2007 to Q1 2008
Western Extension Zone Museums			
- Natural History	-3%	21%	-4%
- Science and Industry	-6%	22%	9%
- Victoria and Albert	-6%	24%	0%
Combined Total	**-5%**	**22%**	**1%**
Greater London Museums			
- National Maritime (Greenwich)	3%	2%	11%
- Imperial War (Lambeth)	-8%	2%	5%
Combined Total	**-2%**	**1%**	**9%**

8.9 Business performance in the western extension zone

Dun & Bradstreet

The Dun & Bradstreet analysis is based on 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 Dun & Bradstreet analysis uses the latest available business turnover and profitability data for the financial year ended 2006/07. This is a period predominantly before the introduction of charging in the western extension zone but does provide background trends for key business indicators in the run up to charging.

Data and analysis

The analysis compares the performance of businesses in the western extension charging zone with the performance of businesses in other parts of London over time. Businesses categorised as 'headquarters' or 'branches' tend to report turnover and profit for the whole business, including any sites that may be located outside the charging zone. Because of this, branches and headquarters are excluded from this analysis. Also excluded are businesses whose financial performances are considered to be outliers – exceptionally high positive or negative growth in sales or profits. The sample thus considers businesses reporting turnover and profit on a site by site basis.

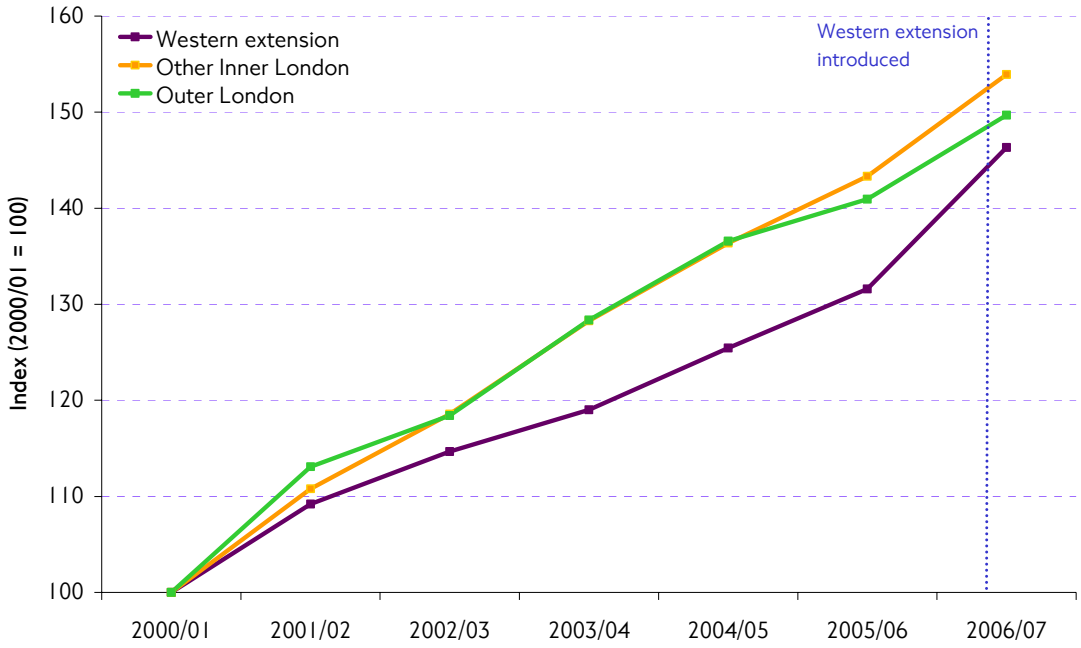
In the western extension zone the records of some 2,300 businesses were analysed, compared to 3,900 for 'other inner London', which excludes the central and the

western charging zones, and 4,900 for 'outer London', which includes all of Greater London outside inner London.

Key findings

Figure 8.8 shows the sales performance for businesses in the western extension zone, other inner London and outer London. Indexed at 100 in 2000/01, the historical growth in turnover of the western extension businesses has been lower than other parts of London, although latest data for 2006/07, in the run up to western extension charging, shows stronger growth in sales than across both other inner and outer London.

Figure 8.8 Western extension zone index of sales 2000/01 to 2006/07.

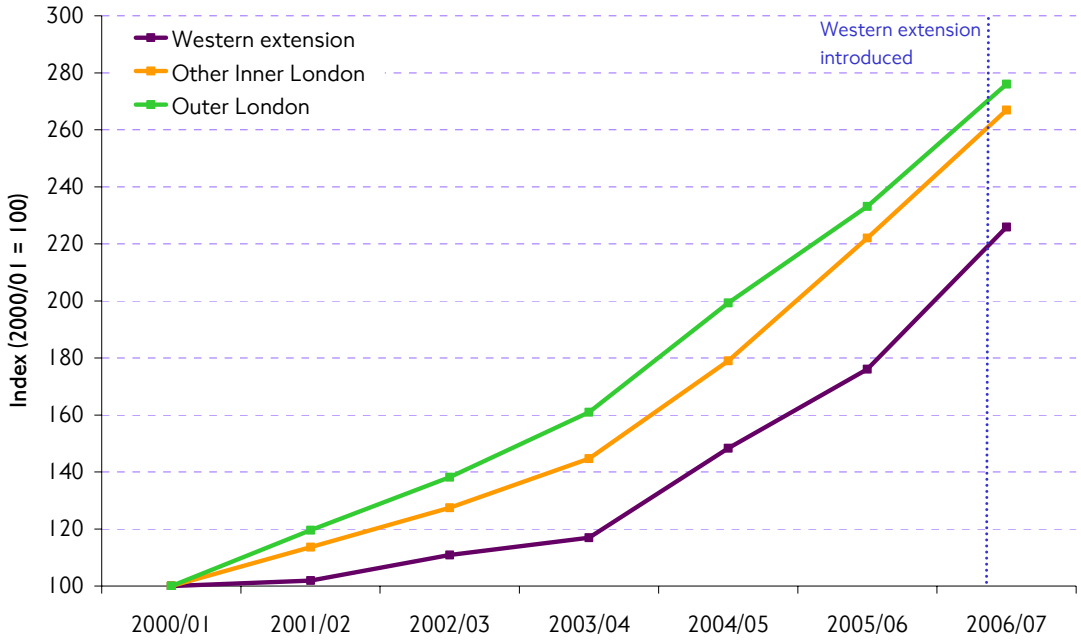


Source: Dun & Bradstreet.

Figure 8.9 shows the profitability growth of businesses in the western extension zone, other inner London and outer London. Profit performance of businesses in the western extension zone was lower than growth in other areas from 2002/03 to 2005/06. However in 2006/07, the most recent year of available data, profit growth in the western extension was the highest of all areas.

This analysis of actual sales and profitability clearly shows strengthening growth in the western extension zone in the months before the introduction of charging. It is important to note that these results are seemingly at variance with the opinions from business owners and employers, who reported weaker sales and profitability performance in 2007 compared to 2006, in the most recent TfL Business Survey. However, the time frame for the Business Survey extends further into 2007, approximately six to nine months after the introduction of charging.

Figure 8.9 Western extension zone index of profitability. 2000/01 to 2006/07.



Source: Dun & Bradstreet.

VAT registrations

The Department for Business Enterprise and Regulatory Reform estimates that there were 4.5 million businesses or enterprises in the UK at the start of 2006. Of these 1.9 million are registered for Value Added Tax (VAT). VAT registrations and de-registrations provide a useful independent, reliable and robust official dataset.

A concern among some businesses – particularly small businesses – is that congestion charging imposes additional regulatory burdens on businesses which may affect business start-ups or contribute to business closures. Analysing time series data on VAT registrations, within and outside the charging zones, both before and after charging, may reveal whether charging has affected business start-up or de-registration (closures, relocations or mergers).

Data and analysis

VAT data is not yet available for 2007 and therefore this analysis looks at pre charging trends in the western extension zone. As VAT data is available at borough level only, and the western extension does not follow borough boundaries, a proportion of VAT registered businesses in 'boundary boroughs' have been reallocated to the western extension zone based on the database of businesses from Dun & Bradstreet, which is available both at borough and post code level.

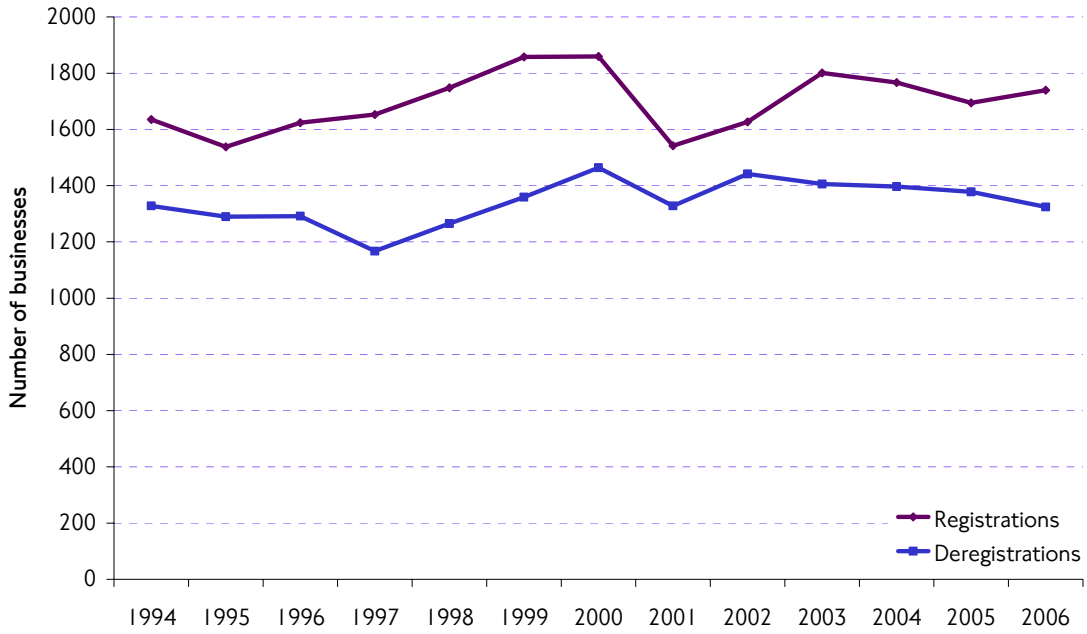
The smallest businesses with an annual turnover below the VAT threshold – £61,000 at April 2006 – are not required to be registered for VAT, and are therefore not included as part of this analysis. Also, the VAT threshold is raised annually and may affect numbers of businesses that qualify for VAT registration, a regulatory adjustment that is unrelated to changes in normal business activity.

Key findings

Figure 8.10 shows the number of businesses registering and de-registering for VAT in the western extension each year. Key trends in VAT registration in the western extension zone were as follows:

- In the last decade registrations have always exceeded de-registrations.
- The gap between the two narrowed during the financial recession in 2001 but has begun to widen most recently with registrations increasing to 1,740 while de-registrations fell to 1,324 in 2006. Thus, there does not appear to be an adverse impact in the year before the introduction of western extension charging.
- Total business stock in the western extension has grown at a steady rate of around 2 percent per annum since 1994.

Figure 8.10 VAT registrations and de-registrations in the western extension zone, 1994-2006.



Source: VAT Registration Data Analysis, Department for Business Enterprise and Regulatory Reform, 1994-2006.

8.10 Property markets in the western extension zone

The analysis of commercial and residential property performance within the western extension zone builds on previous work undertaken within the central charging zone to explore trends in sales volumes, property prices and rental value in western extension zone property before and after the extension of the scheme.

Although comparatively less important than in the central charging zone, the financial and business sector still accounts for the largest proportions of business units within the western extension zone, creating a high demand for office space in both locations. The retail sector in the western extension zone is proportionally larger and more varied than that of the central zone, in terms of the tenant and property mix.

The residential property profiles of both locations also vary distinctly. While the number of residential properties in the western extension zone is larger than that of the central London zone, it should be noted that both zones form a small part of Greater London and collectively account for only about 5 percent of all Greater London residential property sales volumes.

Commercial property

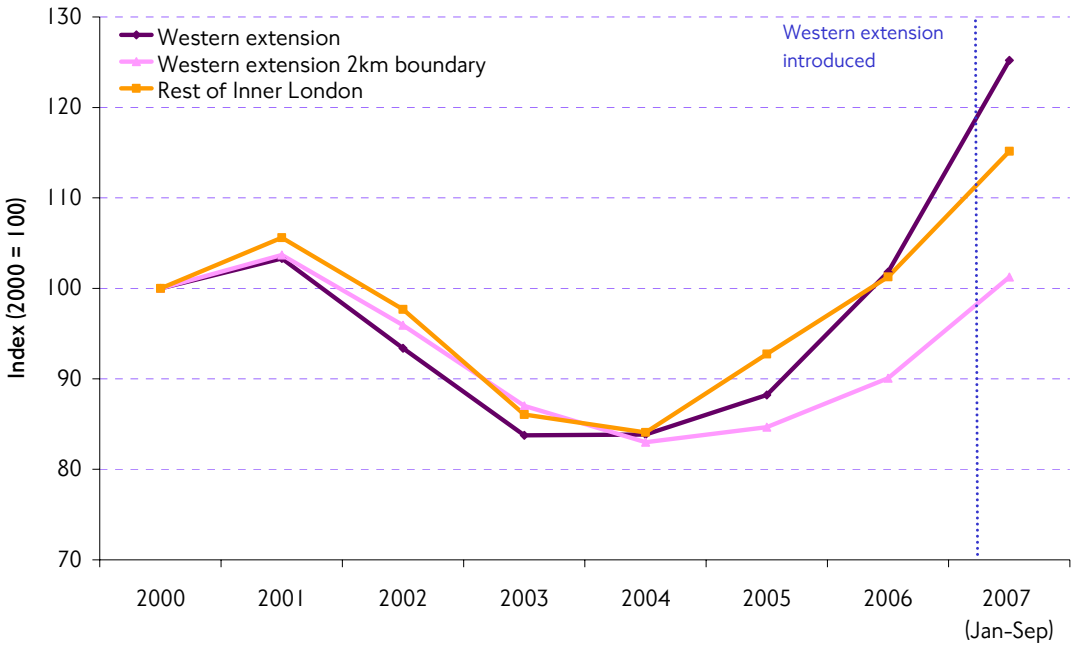
The analysis of commercial property performance is based on the Investment Property Databank. This represents £133 billion of commercial property in the UK as at the end of September 2007. It includes properties that are valued monthly and quarterly and allows an in depth analysis of commercial property rental trends.

The performance of commercial properties within the western extension zone is assessed in terms of rental value of retail and office properties. This is further assessed against the performance of commercial properties in other areas within Greater London.

Office markets

Figure 8.11 shows that according to the Investment Property Databank, growth in office rents have followed a similar cyclical pattern across London. Office rents fell at the turn of the millennium following recession in the financial services sector, bottoming out in 2004.

Figure 8.11 Office rental value growth in the western extension zone, rest of inner London and within 2km boundary of the western extension. Index 2000 = 100.



Source: Investment Property Databank Ltd, 2007.

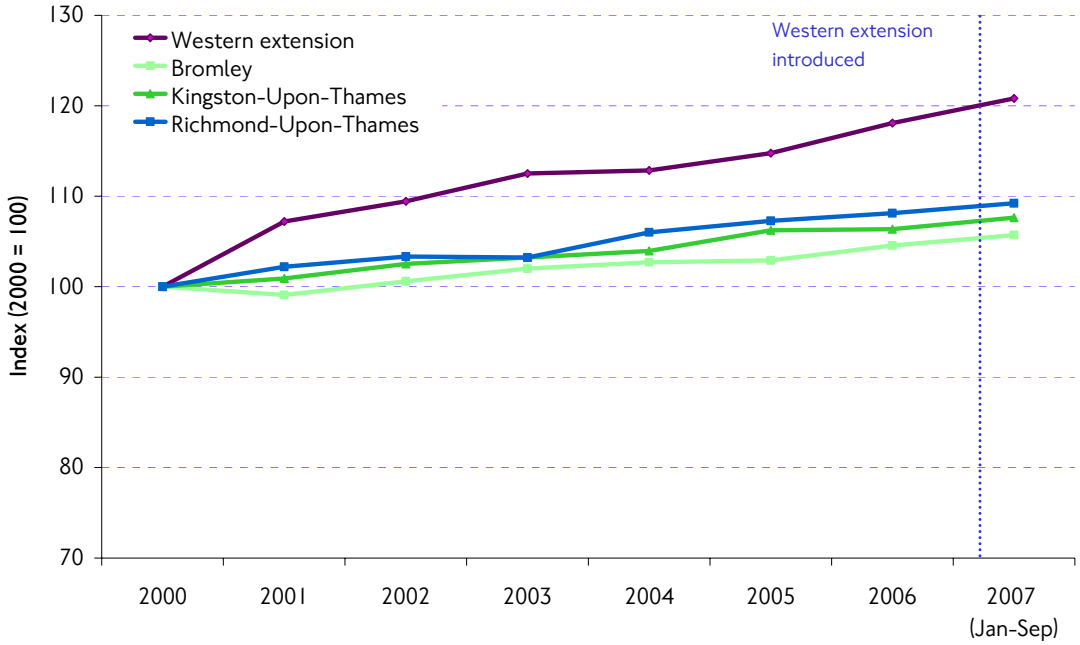
Since then rents have risen, with rental growth of office properties in western extension zone in the nine months to 2007, six months following the introduction of

charging, about 25 percent higher than in 2000; and between 10 percent to 20 percent higher than in surrounding areas. This suggests no adverse impact in the months immediately before, or following, implementation of the extension zone in February 2007.

Retail property

In looking at the retail property rental growth, the western extension zone has been compared with Kingston-upon-Thames, Bromley and Richmond-upon-Thames.

Figure 8.12 Western extension zone retail rental value growth compared to Kingston-upon-Thames, Bromley and Richmond-upon-Thames. Index 2000 = 100.



Source: Investment Property Databank Ltd, 2007.

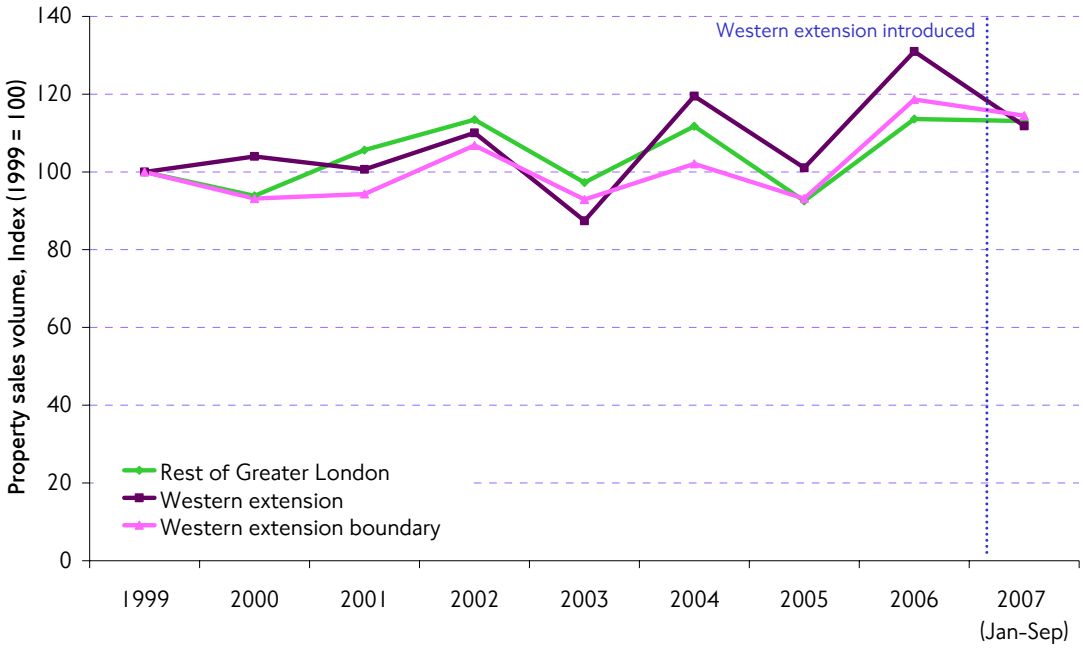
Figure 8.12 shows that according to the Investment Property Databank, growth in retail rents has generally been positive since 2000. Rental growth of retail properties in the western extension zone in the nine months to 2007 was about 20 percent higher than in the year 2000; and between 10 percent to 15 percent higher than comparator retail locations. As with the office rents, there is no visible adverse impact that might be related to the western extension in the run up to, or immediately following, the introduction of the extension scheme.

Residential property

HM Land Registry data has been used to analyse trends in residential property markets in the western extension zone. Land Registry data records all property sales in England and Wales, at post code level, at the point of completion. The data on total sales volumes appears to be more robust than average sales values or prices which may easily be skewed by types of properties sold. This is important as the property mix in the western extension zone, with fewer detached properties and a greater proportion of flats, is different to that for Greater London as a whole.

Nevertheless, the western extension zone is more residential than the original central London congestion charging zone. Residential property sales volumes in the western extension zone account for about 3 percent of all residential sales in Greater London. Residential property sales volumes in the central London charging zone account for 2 percent of all residential sales in Greater London.

Figure 8.13 Change in sales volume index for all residential properties. 1999 to 2007.



Source: HM Land Registry, 2007.

Residential property sales data is very seasonal, with high seasonal peaks in the summer months and lows in the winter. Figure 8.13 shows a yearly index of year-on-year changes in quarterly sales volume to remove seasonality in the data, with 1999 set as the base year for: the western extension zone; a boundary area immediately outside the western extension zone; and Greater London excluding both charging zones. Property sales volumes show a strong annual cyclical pattern across all areas, with an area rarely achieving consecutive years of growth. There is greater volatility in the western extension zone with higher peaks and lower troughs, though for much of the period the underlying trend is sales across all areas has been remarkably stable at around 1999 levels.

In 2006, the upswing in residential property sales was higher in the western extension zone than in the boundary area outside the zone or the rest of Greater London, while the decline in the first three quarters of 2007, which includes a period of about six month post implementation, has been greater in the western extension zone than elsewhere. However, given the variable pattern of past property sales and the high volatility it is too early to conclusively attribute this to the introduction of charging in the western extension zone. Further investigation and a longer time series is required.

It is important to note the financial and business difficulties associated with the 'credit crunch' did not materially begin to impact western extension zone property markets until around the fourth quarter 2007.

8.11 Summary

TfL have a wide ranging monitoring programme, comparable to that of central London charging zone, examining the business and economic impacts of charging in the western extension zone. The programme uses a mix of independent 'official' data sources complemented by TfL surveys to increase the breadth and depth of monitoring and to provide timely coverage where publication lags delay the release of data.

The latest analysis shows positive business and economic performance in the western extension zone in the run up to charging in 2006: rising business turnover and profitability; large increases in tourist visitors; and strengthening property markets. The indicators post-dating the introduction of western extension charging show mixed initial results. Six to nine months into 2007, businesses report weaker sales and profitability, while tourist visitors to museums in the western extension zone are lower. This compares with strong performances in 2006, and may predominantly mirror developing trends in the wider economy. Other indicators post-dating charging including footfall and property markets show a continuation of past trends.

It is too early to fully evaluate the business and economic impact of the western extension zone because some of the most robust and comprehensive datasets have yet to be released for 2007. Data is not yet available from the period following the introduction of western extension zone charging on employment growth, numbers of business units and new VAT registrations.

9. Central zone: business and economic impacts

9.1 Introduction

This section updates TfL's previous assessments of the impact of the original central London congestion charging scheme on business and economic activity.

Previous reports in this series have assessed business performance in aggregate, at the business sector level and in terms of key business indicators such as sales, profitability and business start-ups, supported by a range of more specific studies. This evaluation has shown that there has been no discernable impact – positive or negative – on overall business performance as a result of congestion charging in central London. This does not preclude the possibility that certain businesses in specific sectors may have been affected. However, any aggregate impacts from charging have not been detectable in terms of business and economic output.

This 2008 report selectively updates the picture – now some five years after the introduction of charging. This is important from a monitoring perspective since any impact from a particular change or intervention on contemporary business performance becomes less noticeable over time as the wider economy changes – grows or slows. Any impacts from charging will be overtaken by macroeconomic influences such as interest rates and the wider economic situation.

In 2007 and early 2008 there were several significant 'external' impacts on business and economic activity on the central London economy, most notably the 'credit crunch' and difficulties at financial institutions, all of which were unrelated to the advent of charging itself.

Furthermore, over time the charge is no longer perceived as a 'step' change, but is built in to business planning and decision making in the context of 'business as usual', for both existing businesses and new businesses thinking of locating in the charging zone. These factors mean there are natural limitations to ongoing monitoring and effects attribution of a policy change such as congestion charging, which are especially relevant when looking at the business and economic impacts.

Since 2002 TfL, supported by Greater London Authority Economics, has utilised a wide range of datasets to provide as detailed assessment of the potential macroeconomic and business impacts of congestion charging as possible. This includes the advice, insights and findings of academics, industry specialists and business decision-makers to ensure as robust an evidence base as possible.

These assessments have also taken place in the context of wider events that have affected the central London economy. Key 'external' events since the introduction of charging have included:

- the prolonged closure of the Central line owing to the Chancery Lane derailment, and the beginning of the war in Iraq in 2003;
- the increase in retail rental property value growth in 2004;
- the central London terrorist bombings in 2005;

- the Bank of England interest rate increases in 2006 and 2007;
- the onset of the financial 'credit crunch' in 2007;
- the oil price in excess of $100 a barrel in 2008.

Macroeconomic assessments of scheme impacts are critically limited by the quality and quantity of the available input data that can be used to isolate or separate the effects of charging from all the various other changes that occur and influence business and economic performance. TfL have therefore used the widest possible range of evidence to build as full and comprehensive assessment as is possible. Previous monitoring reports have largely assessed impacts to businesses in the charging zone on a year-on-year basis, contrasting this performance with comparable locations in and around London.

9.2 Key findings from previous reports

Looking across the evidence available in 2007, TfL's *Fifth Annual Impacts Monitoring Report* concluded that there had been no discernible impact on overall business performance or the central London economy from congestion charging. Employment growth in the charging zone has been higher since 2003, than pre 2003. While this has coincided with the introduction of charging, it appears the actual underlying trend reflects wider London macroeconomic performance. Prior to the introduction of charging in 2001-2002 London's economic performance suffered from a recession in financial services following the 'dot.com bubble'. Post dating 2003 and coinciding with central London charging, London experienced strong positive economic growth across many sectors which lifted employment growth more generally, including employment in the charging zone.

The key business sectors – financial and business services, hotel and restaurants, and retail – in the central charging zone showed positive trends in the years following the introduction of congestion charging in comparison to pre 2003. The hotel and restaurants sector and retail sector in the central London congestion charging zone have registered stronger business performance since the introduction of charging, and have outperformed other areas of London.

Analysis of commercial property rental values suggests that the property markets follow a cyclical pattern and are impacted by a combination of both local and London-wide factors. The commercial property market does not appear to have been impacted adversely by the charging scheme even though performance both before and after the introduction of charging has been mixed.

9.3 Key findings for 2007

Specific analysis focused on the retail sector, due to concerns expressed by retailers, has revealed that since 2000, pre-dating the introduction of charging in central London, the sector has faced variable trading conditions. Despite this, the advent of charging does not appear to have adversely affected the retail sector in the central London charging zone since it was introduced. Retail businesses in the central London charging zone have outperformed retail businesses in inner and outer London in terms of sales, profitability and employment growth.

The annual rate of increase in VAT registered businesses, with new registrations outnumbering de-registrations, has been higher in the four years following the introduction of charging in central London than in the four preceding years. This has been in line with London wide trends.

Office and retail commercial property analysis show stronger rental growth performance in the central London charging zone post charging than prior to the introduction of charging. This is in line with trends more generally across London and reflects stronger macroeconomic performance between 2003 and 2007. Most recent data for the final two quarters of 2007 suggests that office rental growth in the central London charging zone may be among the first sectors to be impacted by the current difficulties in the financial sector.

Overall, five years after the event there is no measurable evidence of any differential impact of the central London congestion charging scheme on business and economic activity, at the aggregate level, based on analysis and surveys conducted by TfL.

The 2006 Annual Business Inquiry dataset was subject to several sources of discontinuity. This precludes an assessment of employment trends in the central London charging zone and comparison with 2005.

9.4 General economic trends

- Over the long-term, London's economy tends to grow at the same rate as the economy of the UK as a whole. However, London tends to be a more volatile economy with higher peaks and lower troughs. This is relevant as London and the wider UK economy is expected to experience weaker growth in the near to medium term.
- Greater London's output (Gross Value Added) growth recovered strongly from the shallow recession at the beginning of 2002. Growth appears to have peaked in the final quarters of 2007, well above trend (and above the growth rate of the UK as a whole), at around 4 percent. London's employment growth also picked up during 2005-2007.
- Central London retail sales made a strong recovery from the brief dip that followed the London bombings in July 2005. Indeed, year-on-year retail sales growth in central London has significantly outperformed that of the UK since then. However, following the onset of the credit crunch in summer 2007, retail sales growth slowed down at the end of 2007.
- In 2007, the London economy outperformed the UK as a whole. Nevertheless, preliminary data for final quarters of 2007 and early months of 2008 suggest the outlook for 2008 is for growth to be slower than in 2007 and therefore below trend. This reflects rising inflation, financial market turmoil and the 'credit crunch', which will impact adversely on consumption and investment.

9.5 Assessing the business and economic impacts of charging in central London

The economic impact of road user charging can be divided into 'supply side' and 'demand side' effects, alongside some redistribution of economic activity as previously explained in TfL's *Fifth Annual Impacts Monitoring Report*. The scale of these effects are determined by the actual cost of complying with the charge, the impact on journey times brought about by the aggregate effect on traffic conditions, and the consequent effect on individual travel decisions. As discussed in previous reports, transport costs are typically only a small fraction of total business costs, and congestion charging would typically have only a very limited impact on even these costs. It follows that the impact on most businesses will be small, albeit that some specific businesses may be more significantly affected.

The main data sources used in this report for macroeconomic evaluations are:

- **The Annual Business Inquiry** – Official data from the Office for National Statistics that enables comparison of employment and business units at a relatively fine level of geographic and industrial disaggregation.
- **The Dun & Bradstreet database of businesses** – A commercial database containing individual records for most businesses and workplaces in the UK.
- **SPSL retail traffic indicators** – A private company providing technology and analysis to measure retail traffic (footfall) to UK retail outlets and locations. Retail traffic indicators were established specifically for monitoring footfall within the congestion charging zone.
- **VAT Registrations data analysis** – spatial analysis, by business sector, based on 11 years of data from the VAT (Value Added Tax) registrations database of UK businesses registered, or deregistering for VAT.
- **Investment Property Databank** – An independent global information organisation providing objective measurement and analysis of property markets, through the supply of independent market indices and portfolio benchmarks for the property industry.

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

9.6 Employment trends in the original central London charging zone

The Annual Business Inquiry is compiled by the Office for National Statistics and is among the most comprehensive sources of data on employee jobs. Annual Business Inquiry data has been exhaustively explored in past reports to determine whether the introduction of central London charging led to a deterioration in employment growth and numbers of business units not seen elsewhere in London. Annual Business

Inquiry data was also investigated at business sector level in 2007 for central London to assess whether any impact was discernable at a lower level of aggregation.

The Annual Business Inquiry is published with a lag of twelve months, with the 2006 results released in December 2007. However, the 2006 Annual Business Inquiry dataset was subject to several sources of discontinuity, most significantly a change in the reference survey date from December to September. By no longer capturing seasonal employment gains between September and December 2006, the 2006 Annual Business Inquiry understates employment growth in London for 2006 if compared with 2005 estimates. This affects some sectors more than others, for example retail, and hotel and restaurant sectors, which are greatly influenced by seasonal business activity.

While the 2006 results provide another dataset to analyse post-dating the introduction of charging, the discontinuity in the Annual Business Inquiry time series in 2006 makes direct comparisons with past data impossible this year. The *Fifth Annual Impacts Monitoring Report* provided a comprehensive analysis of employment trends by business sector using a consistent time series pre and post the introduction of central London charging.

This analysis found that employment growth in the charging zone has been higher since 2003 than pre 2003. While this coincided with the introduction of charging it appears the actual underlying trend reflects wider London economic performance. Prior to the introduction of charging, in 2001-2002, London's economic performance suffered from a recession in financial services following the 'dot.com bubble'. Between 2003 and 2005 and coinciding with the introduction of central London charging in February 2003, London experienced strong positive macroeconomic growth across many sectors, which lifted employment growth more generally, including in the charging zone. Growth in business units reflected employment trends.

9.7 Business performance and profitability in the original central London charging zone

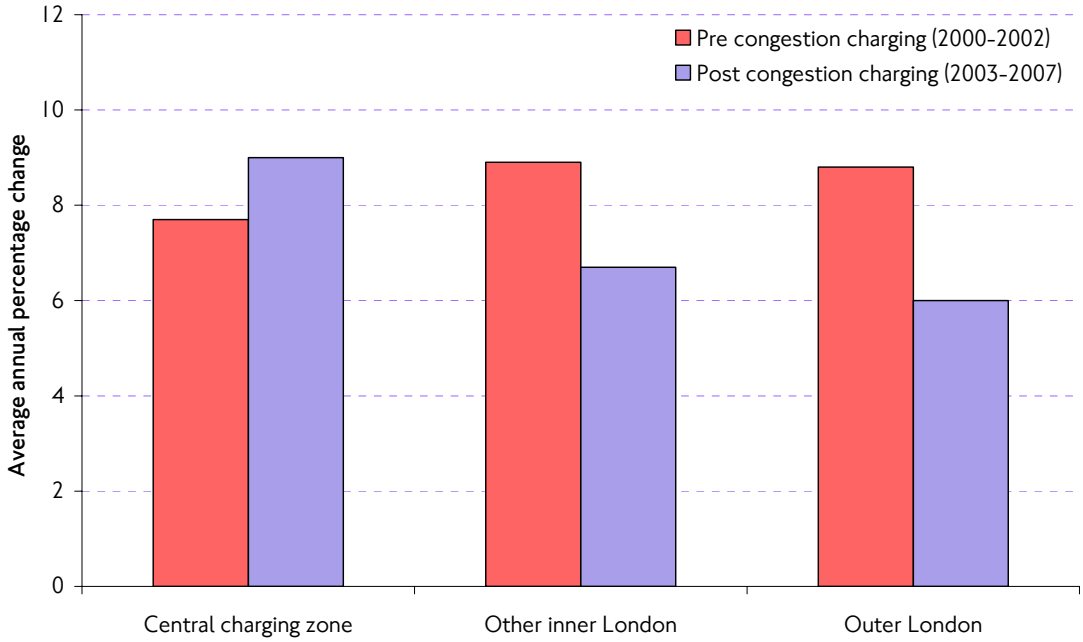
TfL commissioned an updated analysis of the Dun & Bradstreet business dataset – a commercial database containing individual records for most businesses and workplaces in the UK.

The focus of the latest analysis is sales and profitability and how these have changed from 2000 to 2007. The most recent data is for the financial year ending March 2007. The analysis compares the performance of businesses in the central charging zone with the performance of businesses in other parts of London. Businesses categorised as headquarters or branches tend to report turnover and profit for the whole business, including any sites that may be located outside the charging zone. Because of this, branches and headquarters are excluded from this analysis. Also excluded are businesses whose financial performances are considered to be outliers – exceptionally high positive or negative growth in sales or profits. The sample thus considers changes in average business performance – turnover and profit – on a site by site basis.

In the central London charging zone the records of 11,000 businesses were analysed. They are compared to 3,900 for 'Other Inner London', which excludes the central and the western charging zones, and 4,900 for 'Outer London', which includes all of Greater London outside inner London.

In the central London charging zone, sales growth has been stronger after the introduction of charging than in the years before. In comparison, average annual sales growth has deteriorated in other inner London and outer London over the same period, as shown in Figure 9.1.

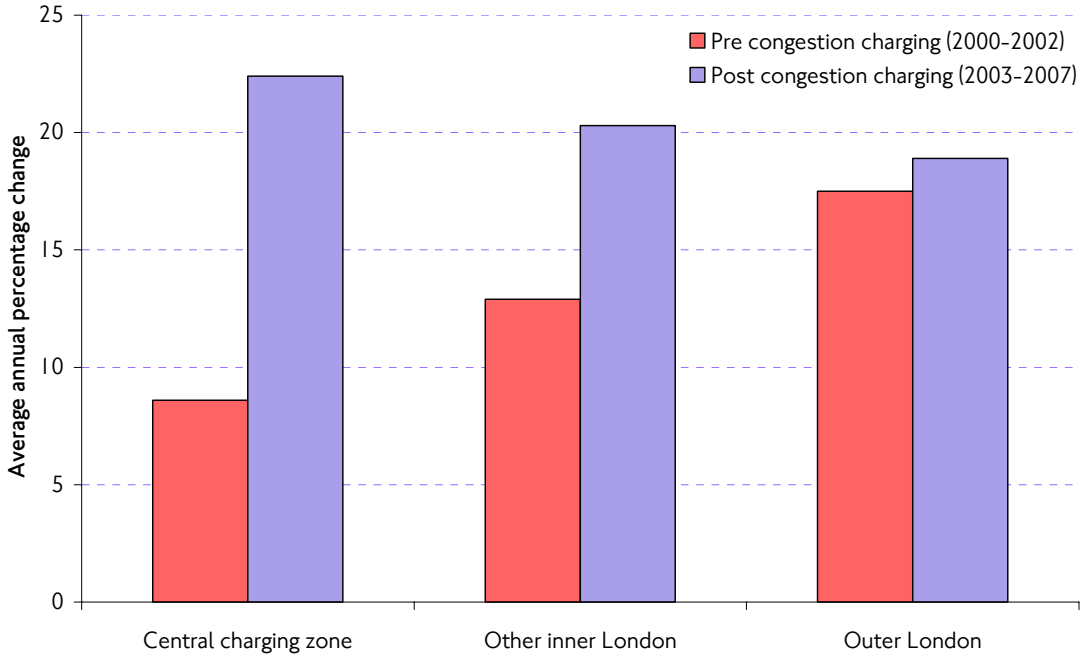
Figure 9.1 Dun & Bradstreet dataset, sales performance of all businesses, pre and post charging.



Source: Dun & Bradstreet 2006/07.

Comparing annual profit performance pre and post the introduction of charging in the original central London zone, all locations performed more strongly post charging, with the central London charging zone significantly outperforming other locations, as shown in Figure 9.2. It is likely that certain underlying factors, not replicated elsewhere in London, have boosted the performance of firms located in the charging zone and this effect has been stronger than any impact of charging.

Figure 9.2 Dun & Bradstreet dataset, profitability of all businesses, pre and post charging.



Source: Dun & Bradstreet 2006/07.

A closer look at performance by business sectors suggests this has been the case. Some of the highest turnover growth since 2000 has been in the financial and business services sector, which accounts for a disproportionately large share of employment (about 50 percent) and business units (60 percent) in the central London charging zone. This trend of strong turnover growth continued in the year ended March 2007, before the onset of the credit crunch and the associated difficulties in the financial markets.

9.8 Value Added Tax registrations

While the Dun & Bradstreet dataset allows an assessment of the impact of charging on existing businesses or 'going concerns', analysis of Value Added Tax (VAT) registrations enables an assessment of trends in business start-ups and closures. A concern among some businesses, particularly small businesses, is that congestion charging imposes additional regulatory burdens on businesses, which may hinder business start-ups or contribute to business closures.

The Department for Business Enterprise and Regulatory Reform compiles data of VAT registered businesses. Analysing time series data on VAT registrations, within and outside the charging zone, both before and after charging, may reveal whether charging has affected business start-up or de-registration (closures, relocations or mergers).

As VAT data is available at borough level only, and the central charging zone does not follow borough boundaries, a proportion of VAT registered businesses in 'boundary boroughs' has been allocated to the central London charging zone based on the

database of businesses from Dun and Bradstreet, which is available both at borough and post code level.

The overall stock of VAT registered businesses in the central charging zone has risen since the mid 1990s. Using four years of post charging data, between 2003-2006, an annual average of 59,100 VAT registered businesses were located in the central London congestion charging zone. This compares to an annual average of 55,800 VAT registered businesses in the four preceding years. There are on average between 5,000-7,000 new registrations and de-registrations per annum, representing between 1 to 2 percent of the total annual stock of VAT registered businesses in the central charging zone. Highlighted below are key trends in VAT registrations:

- Between 1995 and 2000 the number of registered businesses in the central zone increased each year, with the number of new registrations greater than the number of de-registrations.
- From 2000 there was a fall in new registrations in the central zone, until 2002, in which year registrations were at their lowest and de-registrations at their highest, although de-registrations were still less than registrations.
- Since the introduction of congestion charging in 2003 there has continued to be more registrations in the central zone than de-registrations, resulting in a growth in the total business stock. Levels of registrations and de-registrations have remained steady since 2003.
- Total business stock in the central zone has grown by 1,200 per annum since the introduction of congestion charging, compared to a growth of 780 per annum in the three years pre congestion charging.

Figure 9.3 Net annual change in VAT registrations and de-registrations, pre and post charging.

Source: VAT Registrations analysis 2006.

Figure 9.3 compares the net annual change in VAT registration and de-registration pre and post charging in the central London charging zone with comparator locations. The annual rate of increase in VAT registered businesses, with new registration outnumbering de-registrations, has been higher in the four years following the introduction of in central charging zone than in the four preceding years. This has been in line with London wide trends. Thus, with a sufficiently long time series post the introduction of charging, there is little evidence to suggest that charging has unduly hindered business start-ups or accelerated business closures.

9.9 Retail sector performance

Charging those who drive into the zone reduces the disposable income of households where somebody pays the charge and encourages some people to avoid the charging zone. These 'income' and 'substitution' effects are likely to have the most direct effect on the retail sector. Due to these reasons retailers have expressed some of the greatest concerns about the introduction of charging. Thus, the impact on the retail sector is particularly important in assessing the wider impact of congestion charging.

The retail sector itself is subject to some important external trends, such as increased weekend shopping from changes in Sunday trading laws and the increasing use of the internet for shopping, and for browsing comparisons. Furthermore, previous annual monitoring reports have shown that the proportion of shoppers who used cars to access central London has been relatively small, both before and after the introduction of charging. Therefore, the impact of any congestion charging related changes would be correspondingly small.

Retail traffic

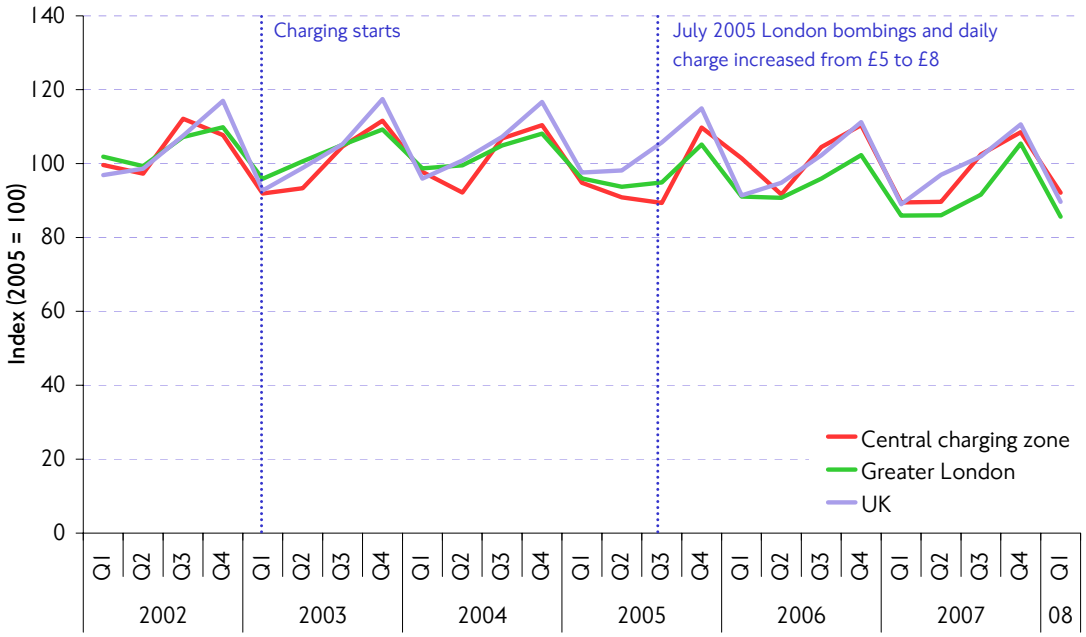
TfL has a longstanding programme of monitoring retail traffic indicators, which measure the number of people observed going into a representative sample of shops. This is known as 'footfall' and is supplied by SPSL, an independent commercial provider on a weekly basis.

In contrast to previous annual reports, quarterly averages have been analysed to make it easier in identify trends, due to a high degree of variability in weekly data. Figure 9.4 shows quarterly averages of retail traffic for the central London charging zone, the central London charging zone and Greater London between quarter 1 2002 to quarter 1 2008.

The shopper footfall data, as expected, reveals a high degree of seasonality with seasonal peaks during Christmas (quarter 4), and troughs during spring and summer months (quarter 2 and quarter 3). Importantly, immediately following the introduction of charging in central London, approximately quarter 1 2003, there was no significant decline in the level of shopper footfall.

Also, retail footfall in the central London charging zone appears to be remarkably stable around the index of 100, notwithstanding seasonal fluctuations. In comparison, there appears to be a falling long term background trend in footfall at a selection of retail sites in Greater London and in the UK as a whole.

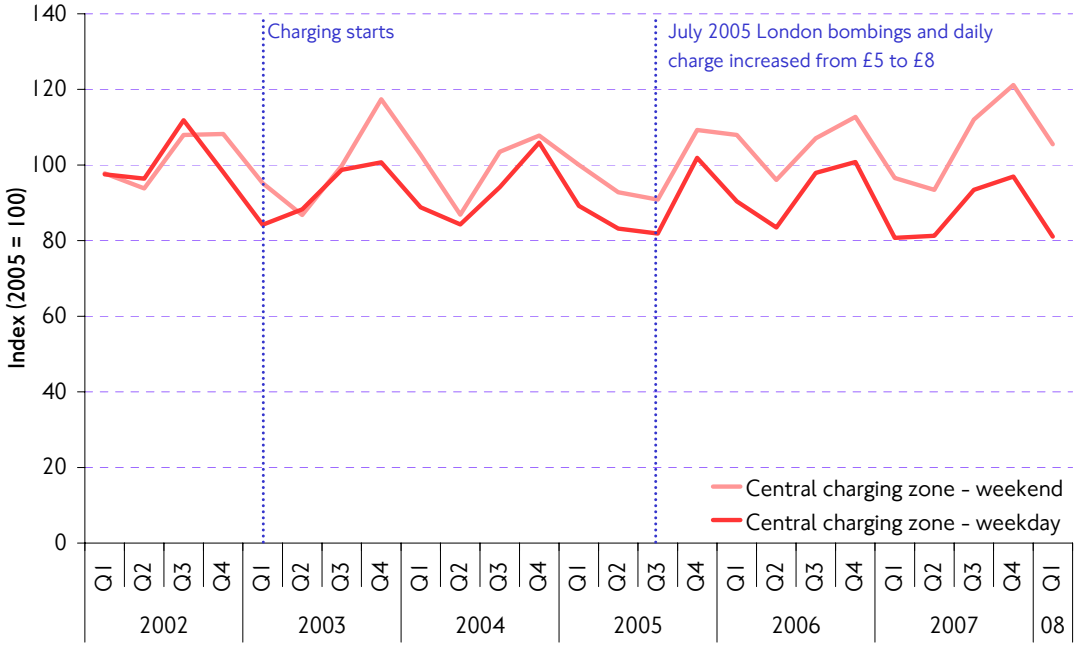
Figure 9.4 Quarterly averages of weekly retail traffic index (footfall), central charging zone, Greater London and the UK, 2002 to quarter 1 2008.



Source: SPSL.

Figure 9.5 shows the central London charging zone weekly footfall data spilt between weekdays and weekends. This reveals an apparent background decline in weekday footfall broadly offset by an apparent upward trend in weekend footfall. The relatively short time series prior to the introduction of central London charging means it is difficult to determine whether these subtle trends predate charging.

Figure 9.5 Quarterly averages of weekday and weekend retail traffic (footfall) in the congestion charging zone, 2002 to quarter 1 2008.

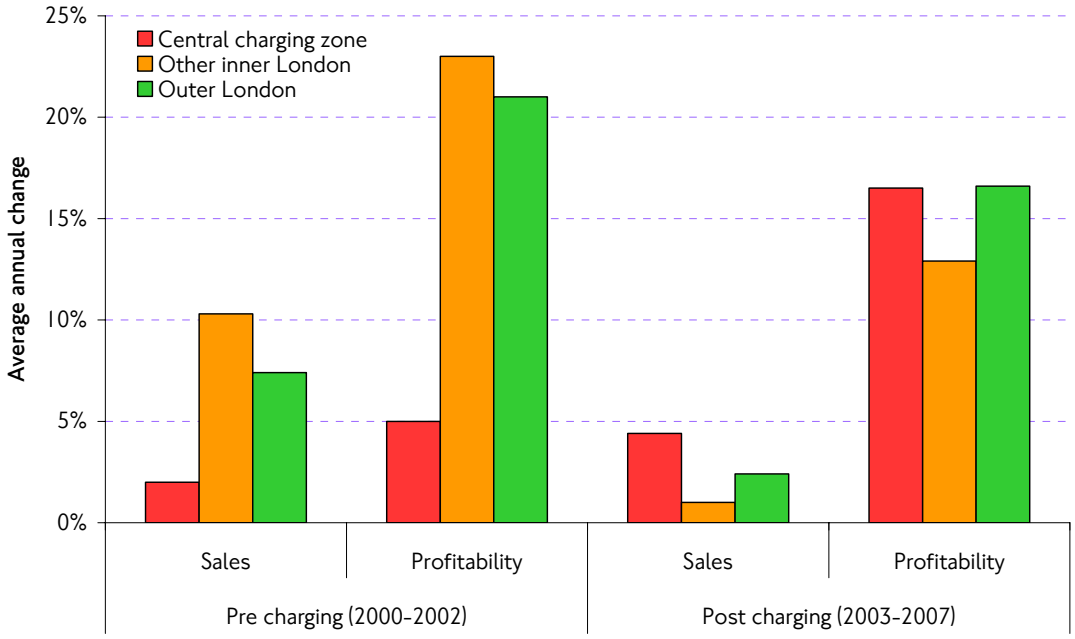


Source: SPSL.

Sales and profitability in the retail sector

Analysis of the Dun & Bradstreet sales and profitability dataset shows that sales growth in the retail sector has been among the lowest of all sectors since 2000.

Figure 9.6 Dun & Bradstreet dataset, retail business sales and profitability, pre and post charging.



Source: Dun & Bradstreet 2006/07.

Figure 9.6 shows however that the central London charging zone was the only location to see stronger sales growth post the introduction of congestion charging at 4.4 percent per annum compared to 2.1 percent per annum in the two previous years. Trends in profitability reflected sales performance, though with higher rates of annual growth, with the central London charging zone outperforming comparator locations.

Summing up, the retail sector across London has faced variable trading conditions since 2000. Despite this, the introduction of charging does not appear to have adversely affected the retail sector as a whole in the central London charging zone. Retail businesses in the central London charging zone have outperformed retail businesses in other inner and outer London post the introduction of charging in terms of sales, profitability as well as employment growth (according to the ABI 2001-2005 datasets, as presented in the *Fifth Annual Impacts Monitoring Report*).

9.10 Property markets

As with other indicators used to determine possible economic impacts of congestion charging, property prices and rental trends result from a complex interaction of supply and demand factors within the context of economic cycles, rather than merely the introduction of the charge. Due to the nature of the central London congestion charging zone, TfL's analysis of trends in property markets is focused on retail and office properties.

Analysis of commercial property rental values suggests that the property markets follow a cyclical pattern and are impacted by a combination of both local and London-wide factors. Past reports have concluded that commercial property, which dominates the property market in the central London charging zone, does not appear to have been impacted significantly compared to inner London by the charging scheme.

It must be noted that the central London property markets have been among the first to be impacted by the 'credit crunch' and associated difficulties in the financial markets, which came to light in the second and third quarters of 2007. This is unsurprising due to the dominance of the financial sector in the central London economy coupled with the importance of property markets in the capital. Key features of the consequential initial impact of the 'credit crunch' on the property markets are presented below:

- Office leasing activity, as measured by the take-up level, fell markedly in the third and fourth quarters of 2007 following a relatively healthy first half. The fall in leasing activity was most apparent in the City with its high concentration of banking and finance companies. This trend has continued into the first two months of 2008, with the decrease in occupational demand spreading to the West End.
- The impact on the property investment market has been more immediate and deeper. The 'credit crunch' has reduced property investment. Investment volumes, which had set consecutive records in the second and third quarters of 2007, fell back sharply in the final quarter of 2007.
- Although less apparent indicators have started to point to some weakening of activity in the UK and London retail markets with a slowdown in growth of West End prime property rents in the final quarter of 2007.

Consequently, it is within this context that the analysis of commercial property markets is presented below for the most recent period of available data, the nine months to 2007.

Investment Property Databank property analysis

The analysis of commercial property performance is based on the Investment Property Databank, an independent commercial provider of property research. The Investment Property Databank investment portfolio represents £133 billion of commercial property in the UK as at the end of September 2007. It includes properties that are valued monthly and quarterly and allows an in-depth analysis of commercial property rental trends.

The performance of commercial properties within central London is assessed in terms of rental value of retail and office properties. This is further assessed against the performance of commercial properties in other areas within Greater London. This analysis builds on previous work in past annual reports.

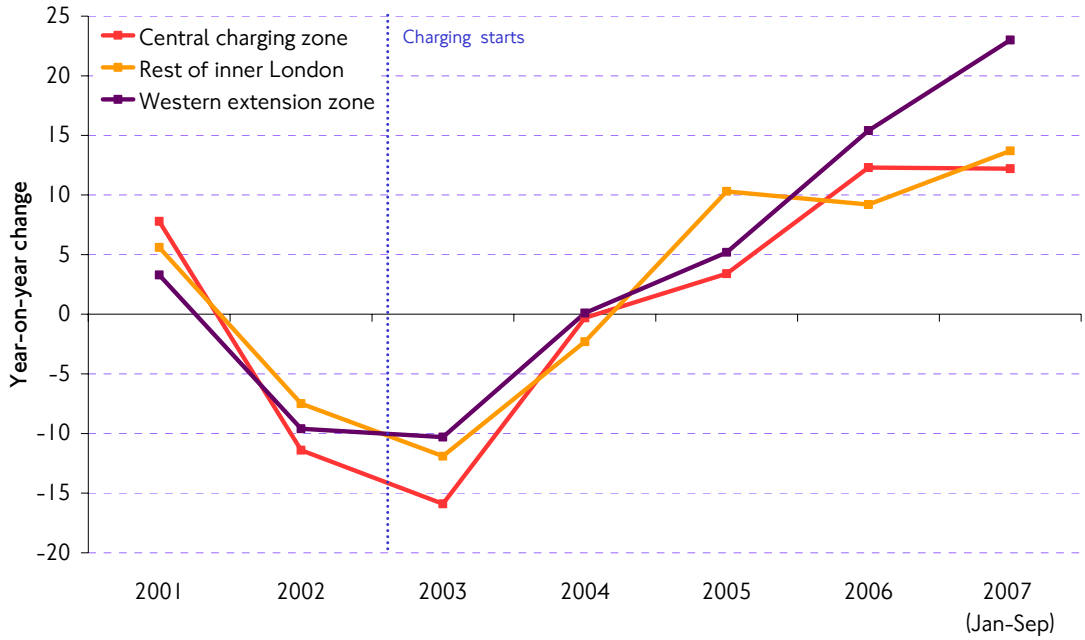
Office property

Figure 9.7 shows that according to the Investment Property Databank, growth in office rents have followed a similar cyclical pattern across London. The office property markets in Kensington and Chelsea are used as comparator locations because they more closely resemble the central London charging zone property market than the Rest of Inner London. Kensington and Chelsea became part of the western extension zone from February 2007.

Office rents fell at the turn of the millennium following recession in the financial services sector, with the central London charging zone recording a comparatively lower trough in 2003, which coincided with the period of introduction of charging. Since then all three locations have seen roughly similar average growth with the exception of the latest data, the nine months of 2007.

In the first nine months of 2007, office rents continued to grow in, what is now, the western extension zone and the rest of Inner London. However, growth was stable in the central London charging zone. Investment Property Databank opinion suggests this reflects the onset of the property crunch, which impacted central London property markets ahead of other locations due to the importance of the financial sector to the central London economy.

Figure 9.7 Office rental value growth in the central London charging zone and rest of inner London.



Source: Investment Property Databank Ltd, 2007.

In summary, annual growth in office rents in the central London charging zone has been higher post the introduction of charging than before charging. This reflects largely macroeconomic factors. Comparative growth post charging has been lower in the central London charging zone than other similar locations though the difference is not significant in relation to the general large variation annual growth rates in the

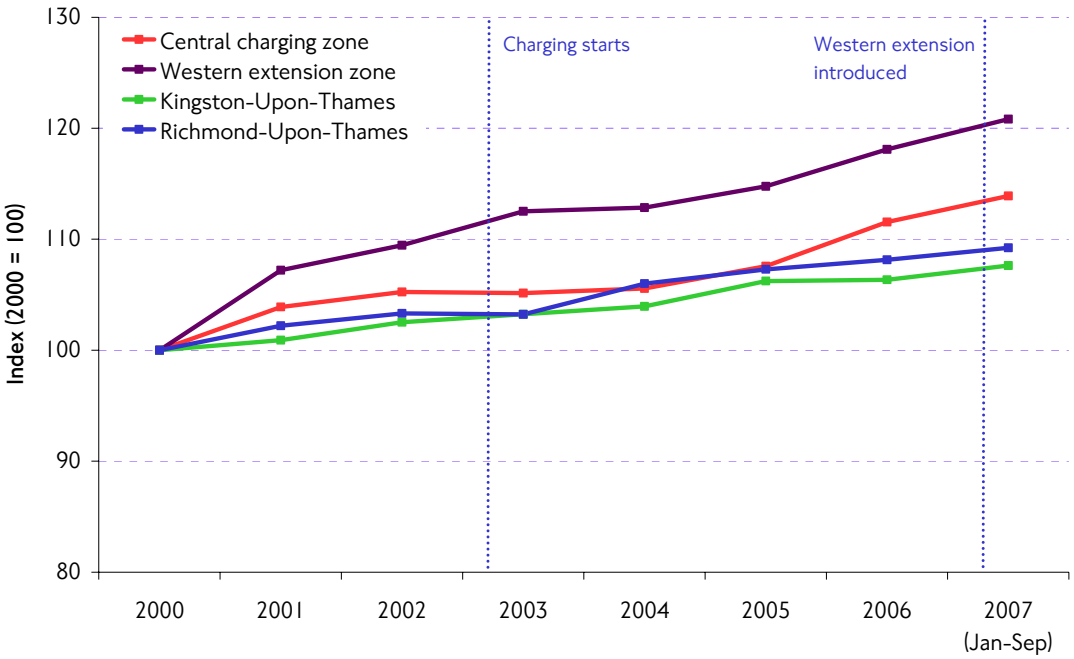
three locations. Thus, from this analysis there does not appear to be any material impact on office rents from the introduction of central London charging.

Retail property

In looking at the comparative performance of retail property rental growth, the central London charging zone has been compared with similar type retail centres in Kensington and Chelsea (now mostly in the western extension zone) Kingston-upon-Thames and Richmond-upon-Thames.

Figure 9.8 shows that according to the Investment Property Databank, growth in retail rents has generally been positive since 2000. Rental growth of retail properties in the central London charging zone in the nine months to 2007 was about 15 percent higher than in 2000 and about 5 percent higher than comparator retail locations in Kingston-upon-Thames and Richmond-upon-Thames. Rental growth in what is now the western extension zone has outperformed all other locations though this predates the start of charging in the central London charging zone. Thus, there appears to be no adverse impact on retail rental rates in the central London charging zone from the introduction of charging in 2003.

Figure 9.8 Retail rental value growth in the central London charging zone and comparator locations. Index = 100 in 2000.



Source: Investment Property Databank Ltd, 2006.

9.11 Summary

There is now a sufficiently large dataset – four to five years – of post charging data for the central London charging zone for the potential economic impacts to be seen in their proper context. Analysis of business performance (sales and profitability) and business start-up (VAT registrations) shows stronger – both absolute and relative – growth in the original central London charging zone post charging than prior to the introduction of charging in 2003. This suggests no material impact, at the aggregate

level, from the introduction of charging – a conclusion reached by TfL in the *Fifth Annual Impacts Monitoring Report*.

Specific analysis focused on the retail sector, due to concerns expressed by retailers, has revealed that since 2000, pre-dating the introduction of charging in central London charging, the sector has faced variable trading conditions. Despite this, the introduction of charging does not appear to have adversely affected the retail sector in the central London charging zone. In total, retail businesses in the central London charging zone have outperformed retail businesses in inner and outer London since the introduction of charging in terms of sales, profitability as well as employment growth.

Office and retail commercial property analysis shows stronger rental growth performance in the central London charging zone post charging than prior to the introduction of charging. This in line with trends more generally across London and reflects stronger macroeconomic performance between 2003 and 2007. The most recent data for the final quarters of 2007 suggests office rental growth in the central London charging zone may be among the first sectors to be impacted by the current difficulties in the financial sector.

Overall, five years after the event there is no general evidence of any measurable differential impact from the central London congestion charging scheme on business and economic activity, at the aggregate level, based on analysis and surveys conducted by TfL.

10. Scheme operation, compliance, enforcement and revenues

10.1 Introduction

This section looks at the operation and enforcement of the central London congestion charging scheme including the western extension zone during 2007.

The operation of the central London congestion charging scheme continued to improve throughout 2007. Further service enhancements have been introduced that have resulted in a better chargepayer experience. These have been reflected in increased chargepayer satisfaction and a continued high level of compliance with the scheme.

10.2 Key developments during 2007

- Overall satisfaction with the quality of service increased to 82 percent in 2007 – the highest level since congestion charging began.
- A number of changes were introduced to the operation of the scheme during 2007, including significant improvements to the processing and maintenance of Blue Badge discounts and quality monitoring.
- 'Warm transfers' were introduced to the call centre, whereby if the initial contact is unable to resolve a query the call is transferred directly through to the customer services team without the need to repeat the query or wait for a call back or written response.
- Total daily charge payments increased following the introduction of the western extension on 19 February 2007, with a 16 percent rise in standard daily charges. Typically, 32,000 western extension resident charges were valid on each charging day.
- Capita Business Services, the main service provider for the scheme, continued to perform well and met all key milestones for the delivery of additional and new services required for chargepayer improvements.
- The web remains the most used channel for charge payments, accounting for some 34 percent of transactions. Including text messaging and interactive voice response, 60 percent of chargepayers use self-service channels to pay the charge.
- Compliance with the scheme continues to improve: on average 96 percent of chargeable vehicles that enter the extended zone are compliant with the scheme.
- Representations and appeals against Penalty Charge Notices remain stable with some 15 percent of the Penalty Charge Notices now being subject to a representation and less than 1 percent subject to appeal.
- Of the cases that reach the Parking and Traffic Adjudication Service, TfL congestion charging has a higher level of success in winning appeals than any other scheme, with 88 percent of appeals heard being found in TfL's favour.
- Penalty payment rates remain consistent, with over 73 percent paid – the vast majority at the discounted amount.

- Further improvements have been made to the congestion charging website in relation to the guidance and advice to vehicle keepers who receive Penalty Charge Notices.

10.3 Service developments and contractor performance

Developments to the operation of the scheme during 2007 have built upon the enhancements to the service delivered from scheme inception to date as described in previous annual monitoring reports. The result has been additional improvements to the 'chargepayer experience' and continuation of established high levels of compliance with the scheme.

Throughout 2007 work has continued on improving the understanding of the operational processes and offering additional services to the public. Key developments for the scheme in 2007 are set out below.

Blue Badge discounts

Blue Badge holders are eligible, on registration, to receive a 100 percent discount from the charge. Key developments during 2007 have included:

- Further improvement of the Blue Badge discount scheme process, reducing rejected applications by 50 percent.
- Updated guidance notes to explain each section on the form, reducing the amount of errors made by the chargepayer.
- A simpler application form, making the process easier to complete which also includes a section to capture third party details. This assists with telephone enquiries from carers.
- Affirmation and renewal forms are now sent to the chargepayer with their details already printed on the forms, making the form easier for the chargepayer to complete and for TfL to process.
- Pre-addressed envelopes which are sent with all forms include reminders to include photocopies of proof of identification.
- A 21-day grace period is built into the affirmation stage for the application. This allows applicants time to obtain a new Blue Badge from the relevant issuing authority.
- The process undertaken to allow borough validation has also been simplified, reducing processing time while ensuring only legitimate claims are validated.

Contact centre

Capita Business Services, the current main service provider to TfL, operates a contact centre for the congestion charging scheme on behalf of TfL.

- The 'warm transfer' team was set up in December 2007 to improve first contact resolution. If the initial phone contact is unable to resolve a query, the caller is transferred to a specialised team without the need to repeat the query or wait for a call back or written response.

- Quality monitoring was increased for written enquiries and complaints.
- An increased rate of first contact resolution has been achieved.

Website changes

TfL's congestion charging website has been updated during 2007.

- The new website has been designed based on feedback from users. The improved clarity and design appeals to existing and new chargepayers, and makes it easier for users to pay the charge and register for an account. The layout has brought the site in line with other TfL sites.
- The foreign language section was improved with the inclusion of five additional languages; Arabic, Gujarati, Vietnamese, French and Spanish. This reflects the diversity of TfL chargepayers, and aims to accommodate their needs.
- The web pages relating to scheme enforcement have been revised with simpler navigation displayed in a friendly manner. A document entitled *Helping you with your Congestion Charging Penalty Charge Notice* has been published. The purpose of this document is to explain what happens if a chargepayer incurs a Penalty Charge and explains how to contest a penalty.
- Further advice is now included on the supporting evidence that may help a chargepayer to contest a penalty; as well as advice on the subsequent stages of the Penalty Charge process and the actions that TfL may take.

Call recording

The introduction of call recording has proved to be a valuable tool and service enhancement, particularly for enforcement. In the vast majority of cases, TfL are now able to confirm whether or not the contact centre operative has processed transactions correctly or responded appropriately to chargepayer's requests and queries.

CD copies of the calls are included within the appeals pack. TfL have received positive feedback from the adjudication service who have highlighted the benefits of being able to play recordings to the appellants. In turn this has led to an increase in the number of cases where the appellant concedes that there was no TfL error despite previously arguing to the contrary. Call recording also provides significant enhancement to training, as well as allowing faster resolution of complaints and enquiries.

Enforcement specific improvements

A number of chargepayer facing documents have been reviewed and, as a result the information leaflet, included with all Penalty Charge Notices, has been reworded with the help of the plain English campaign and achieved Crystal Mark status in May 2007. A new service was launched in August 2007 which offers prospective purchasers of vehicles the opportunity to establish if the vehicle has any outstanding Penalty Charges for the central London congestion charging scheme. Since the service was launched a total of 250 enquiries have been processed.

September 2007 saw the introduction of the Congestion Charging Penalty Charge Notices Enquiry Service. The purpose of this service is to provide more detailed expert and technical advice to chargepayers who have received Penalty Charge Notices, to provide more specific direction on what actions must be taken by the chargepayer, and ultimately improve chargepayer satisfaction. In the first four months of operation, the dedicated Penalty Charge Notices Enquiry Line handled 12,700 calls and this has resulted in the cancellation of 6,300 Penalty Charge Notices which would otherwise have resulted in representations.

During 2007 TfL implemented all of the new contractual changes previously identified in its 2006 review of its bailiff arrangements, contracts and bailiff monitoring programme. This has given rise to a new format for reporting bailiff performance which provides a complete overview of the bailiff operation which is complimented by quarterly on-site case monitoring carried out by dedicated TfL staff.

One of the most notable additions to the bailiff process during 2007 has been the deployment of global positioning satellite tracking devices by all bailiffs and the issuing of a TfL produced bailiff *Know Your Rights* leaflet. This leaflet is issued by bailiffs with each pre-enforcement letter and provides information about a bailiff's powers, what rights a chargepayer has, and how to make a complaint (Figure 10.1).

Figure 10.1 TfL-produced bailiff 'know your rights' leaflet.

Each bailiff company is now required to report the point at which in the enforcement process collection is achieved, and the bailiff fees charged per case paid. This has provided TfL with a good overview of the bailiffs' collection patterns and has allowed inconsistencies and general areas of concern to be addressed more quickly.

Foreign vehicles

Congestion charging continues to use the services of a dedicated European debt recovery agency – Euro Parking Collections. Euro Parking Collections is now in its fourth full year of working on the collection of congestion charging penalties incurred by foreign registered vehicles. Where Euro Parking Collections is able to access the keeper information of foreign registered vehicles it has achieved a 38 percent collection rate in 2007, which remains consistent with the rate in 2006.

10.4 Performance of service provider

Capita Business Services is the main service provider supporting the day to day operations of the scheme on behalf of TfL. Capita has staff in London and Coventry that manage the key functions of the service. These include camera maintenance, image capture, the contact centre, discount registration services and most enforcement services such as the processing of all Penalty Charge Notices, progression, representations and appeals.

TfL has 52 performance indicators within the Capita contract and supplemental agreement. There are seven 'super' key performance indicators, 32 key performance indicators and 13 quality performance indicators. Capita performance against this strict performance regime has remained satisfactory throughout the year. TfL have a team of Policy and Monitoring Advisers based on site in Capita's main contact centre which contributes to the overall acceptable level of performance by Capita.

Planned developments

Additional developments are planned to further improve the quality of service and maintain high levels of chargepayer satisfaction. These include:

- Maintaining a focus on the high standards currently delivered in the operation following the announcement of the changes to the main service provider contract for the Congestion Charging and London Low Emission Zone schemes to IBM United Kingdom Ltd – commencing in November 2009. The focus will be on ensuring the transition and future services are delivered on time and to the required standard.
- In order to allow residents without cars to benefit from car clubs, consideration is being given for the removal of the administration charge associated with a refund. This change would require an amendment to the Scheme Order and would still require the resident to purchase a minimum of a weekly (five day) charge.
- The contract that provides the facility to pay the congestion charge at retail outlets is currently being re-procured to commence in November 2009. This will aim to continue to provide a comprehensive network of payment points and will cover areas within both the charging zone and areas where the chargepayer may live or work.
- Bailiff and European debt recovery agency agreements are currently being re-procured to commence in November 2009 to replace existing agreements which are due to expire at the same time. The new bailiff agreements will bring additional enhancements such as the use of mobile patrol vehicles equipped with

automated number plate recognition and an enhanced performance regime. TfL will continue to work with its European debt recovery agency to extend the scope of access to foreign vehicle licensing authorities.

10.5 Congestion charging payments

Figure 10.2 shows the breakdown of congestion charging payments by type. As with previous years, standard daily charges continued to be the most common payment type throughout 2007.

Figure 10.2 Congestion charging payments by duration. All payment types (charging days), extended central London congestion charging scheme, 2007.

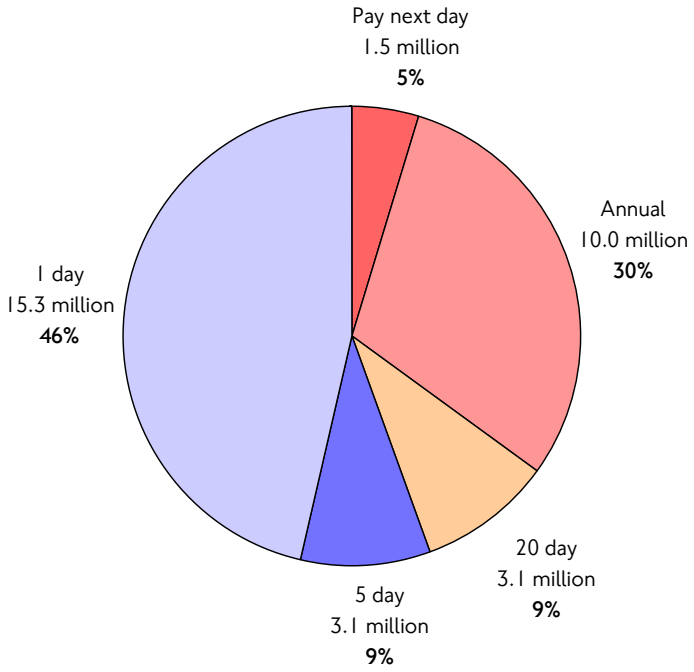


Figure 10.3 shows the monthly average volumes of valid charges paid since the start of 2005. The general downwards trend also included the effect of the increase to the standard daily charge from £5 to £8 in July 2005, as well as the extension of the zone in February 2007.

The upturn in the latter months of 2006 and throughout 2007 primarily reflects an increase in standard charge payments and resident's discount charge payments resulting from the western extension. The extension of the zone also saw an increase in fleet scheme payments; from 15,000 valid charges per day to an average of 20,000.

Figure 10.3 Average number of valid charges on each charging day, showing impact of western extension introduction, January 2005 to December 2007.

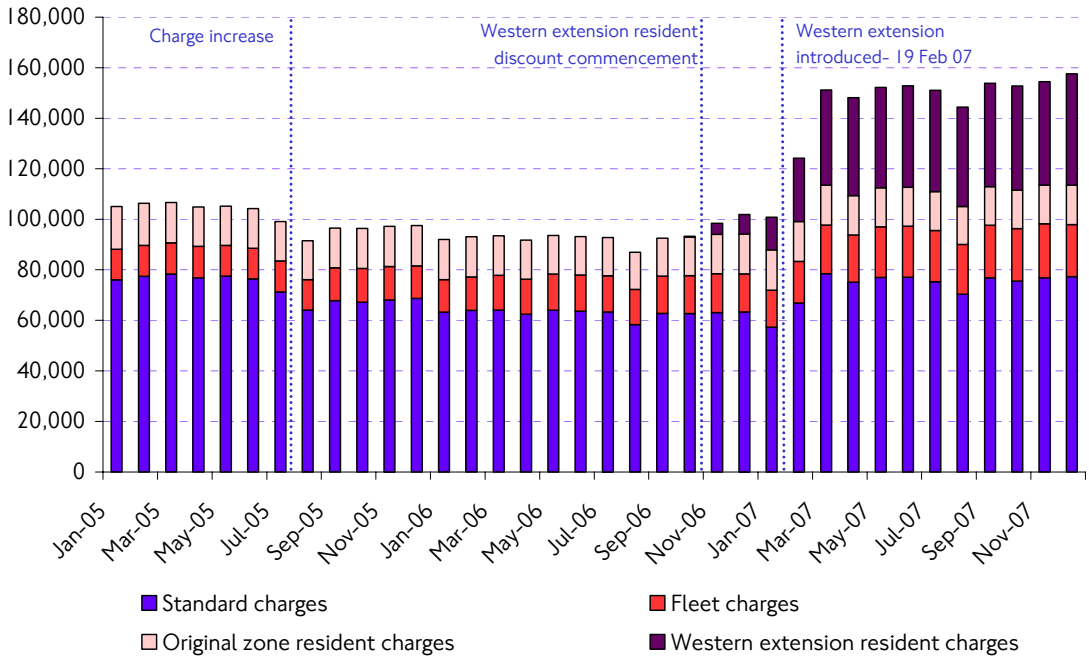


Table 10.1 illustrates the percentages of each type of payment since the start of the scheme in 2003, distinguishing both standard charges and residents' discounted charges. As can be seen, in excess of 70 percent of resident charge payments are annual, whereas over 80 percent of standard charge payments are daily.

Table 10.1 Charges by payment type.

	Standard charges				Residents' charges		
	Daily	Weekly	Monthly	Annual	Weekly	Monthly	Annual
First year of scheme (17/02/03 – 31/12/03)	82%	9%	6%	2%	20%	24%	56%
Second year of scheme (01/01/04 – 31/12/04)	82%	9%	6%	2%	18%	22%	60%
Third year of scheme (01/01/05 – 31/12/05)	81%	9%	7%	3%	17%	18%	65%
Fourth year of scheme (01/01/06 – 31/12/06)	81%	6%	8%	4%	19%	16%	65%
Fifth year of scheme (01/01/07 – 31/12/07)	83%	6%	7%	4%	15%	13%	72%

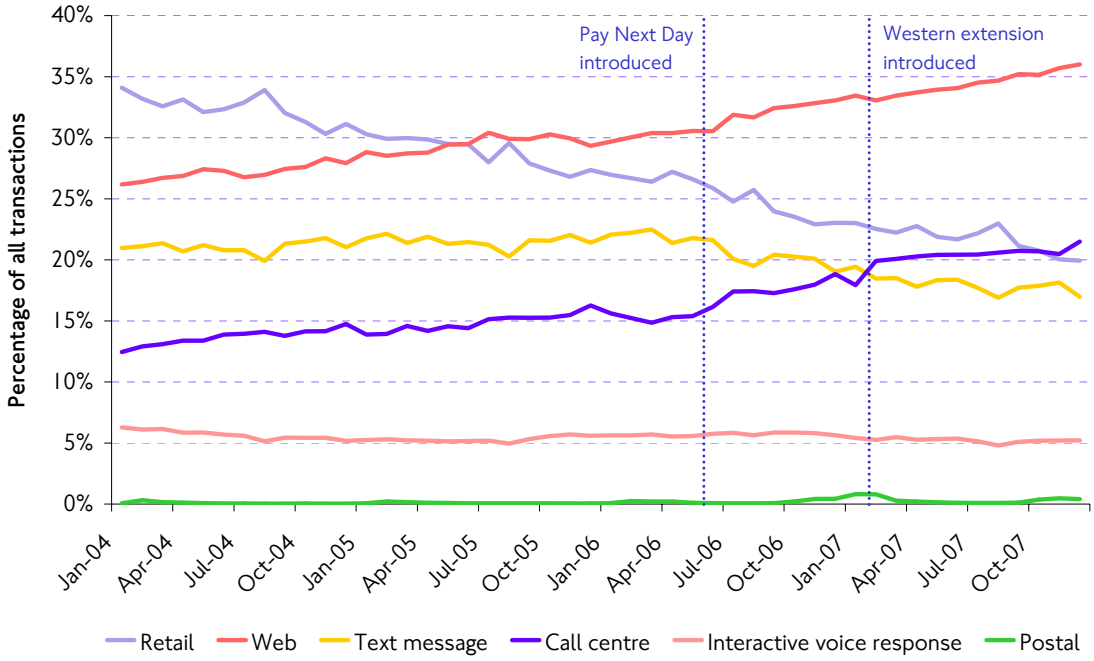
Taking all payment types into account, of the payments made for the twelve months ending December 2007, 41 percent were made in respect of vehicles registered for the 90 percent residents' discount. This was an increase from 20 percent in 2006 and primarily reflects the extension of resident's discount status to residents of the western extension zone. Western extension resident charges accounted for 70 percent of all resident charge payments during 2007.

10.6 Payment channel split

Previous annual monitoring reports have described established patterns of payment, and identified a trend towards growing use of automated payment channels.

A further increase in the usage of the web payment channel and a reduction in usage of the retail payment channel has been evident in 2007. Since the introduction of 'Pay Next Day' in June 2006, which is available through the call centre and web channels, the call centre payment channel has remained higher than pre- Pay Next Day averages, while the proportion of text message payments has declined (see Figure 10.4).

Figure 10.4 Charge transactions payment by channel, January 2004 to December 2007.



10.7 Quality of service

Overall satisfaction with the operation of the scheme as measured by surveys of chargepayers is now at 82 percent; an increase of 3 percent compared with 2006 and at its highest level since the start of the scheme. This is well above the benchmarked industry standard level of satisfaction of 76 percent. Satisfaction with the payments process remains consistently high, at a level of 85 percent.

Call centre performance remained high in 2007, with average telephone queuing times of ten seconds. The volume of telephone calls has increased significantly from 2006, which was expected following the introduction of the western extension, averaging some 326,000 calls per month. The percentage of callers abandoning calls or unable to get through to the call centre was 0.7 percent in 2007.

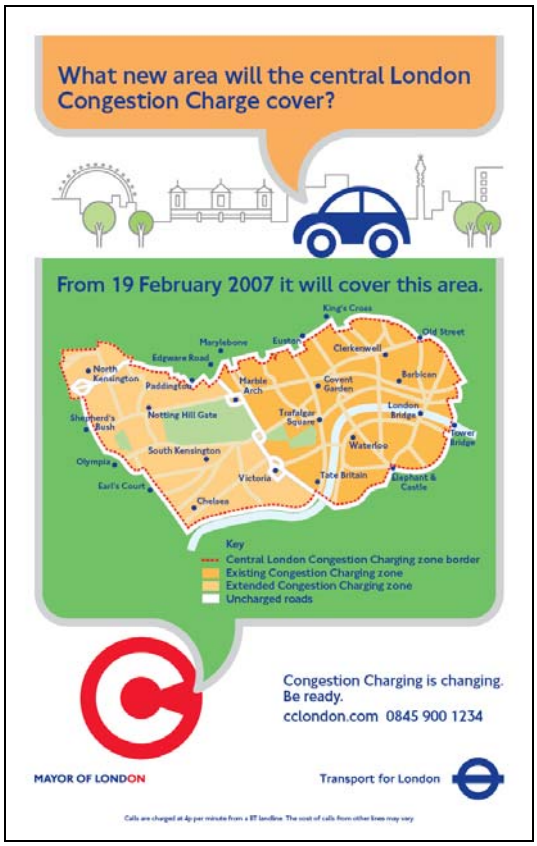
In reviewing the quality of service provided by TfL, the Local Government Ombudsman in the *Local Government Ombudsman Annual Letter 2005/2006* commended congestion charging on the reduction in complaints received, and the

manner in which TfL congestion charging takes a 'positive and proactive approach' when handling and settling complaints.

10.8 Public information

TfL sought to ensure that the launch of the western extension zone ran as smoothly as possible to avoid any kind of operational system overload. To achieve this, TfL needed to communicate what was a potentially very complex message in the most effective way possible. The price of a failed launch would have been high, given the very public nature of the scheme, and so there was very little margin for error.

Figure 10.5 Typical print media and poster advertisement for the introduction of the western extension.



Specifically this meant that before, during and immediately after the introduction of the western extension, there was a need to inform Londoners and those living further afield about the changes to the scheme in order to encourage appropriate and timely action by the key groups who would be affected by the extension. This included residents being eligible for a discount registering early, from October 2006, rather than leaving it until the last minute; drivers using the charging zone knowing where the new boundary would be; providing information on how to pay and informing the public of changes to the charging hours. TfL also needed to ensure that those affected by the extension to the charging zone had time to consider and plan whether or not they were going to continue to drive or switch to public transport.

At the same time there was a need to encourage those who would not be affected by the change from unnecessarily referring to the call centre. A multi-media campaign using TV, national and local press, radio, road shows, and direct marketing ran between October 2006 and March 2007. A range of groups were targeted such as ethnic minorities and businesses within the charging zone.

Information was delivered in 'bite sized' chunks as and when it was required, in a warm, friendly and accessible way in order to not overload people with too much information at one time. The core creative idea used a simple but effective format featuring cars to ask the key questions about the scheme – one question per piece of communication – with answers using the Congestion Charge 'C' sign. Thus creating a dialogue between Londoners and the scheme itself and ensured that all messages had the same look and feel. Each advertisement contained a single piece of information on how the scheme worked while leaflets provided more of the detail.

The public information campaign was very successful. There was a healthy rise in registrations, aided by communication of an early registration incentive for residents – this early registration incentive also helped to prevent system overload by raising awareness early on and encouraging resident registration from October 2006. Residents living within the charging zone registered for their discounts in good time before the extension was implemented. There was also good awareness of the launch, the residents discount and the change to the charging hours. From an operational perspective, the launch ran smoothly – aided by a well informed target audience.

Figure 10.6 Typical print media and poster advertisement for the residents' 90 percent discount.

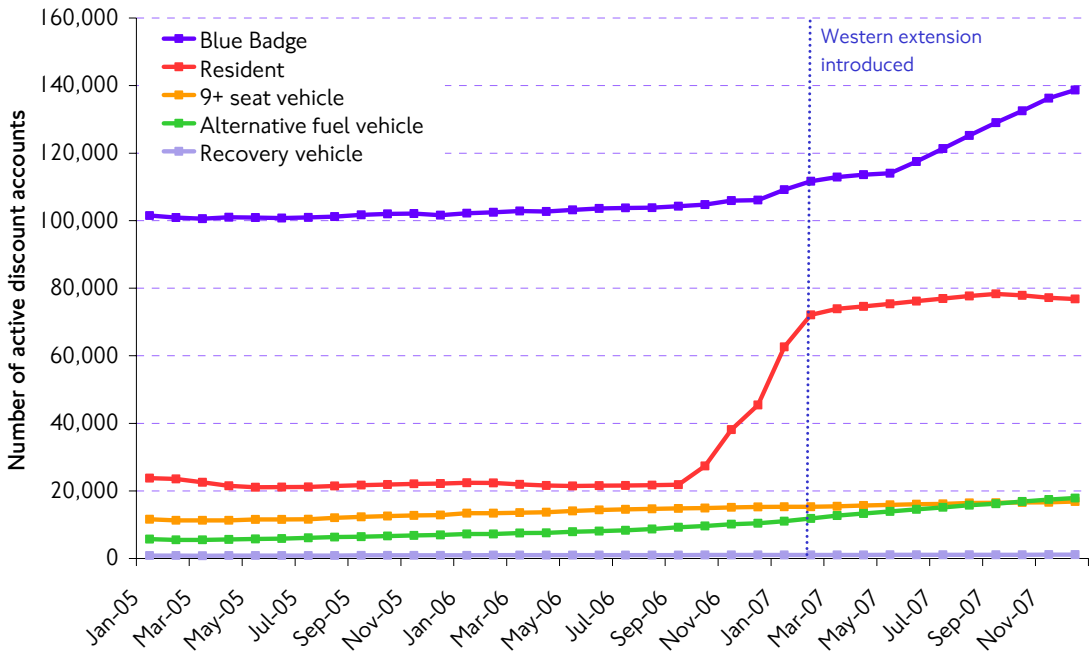
10.9 Registrations and discounts

As expected, many residents for the western extension zone largely took the opportunity to pre-register for the extended scheme and as a result of this, the number of discounted daily charges rose sharply from October 2006. This is discussed in greater detail in relation to Figure 10.8.

The extension of the zone also led to the number of active Blue Badge discounts increasing by 9 percent. Despite this increase, it has been identified that only about a third of Blue Badge holders registered under the central London congestion charging scheme regularly use a car in the zone.

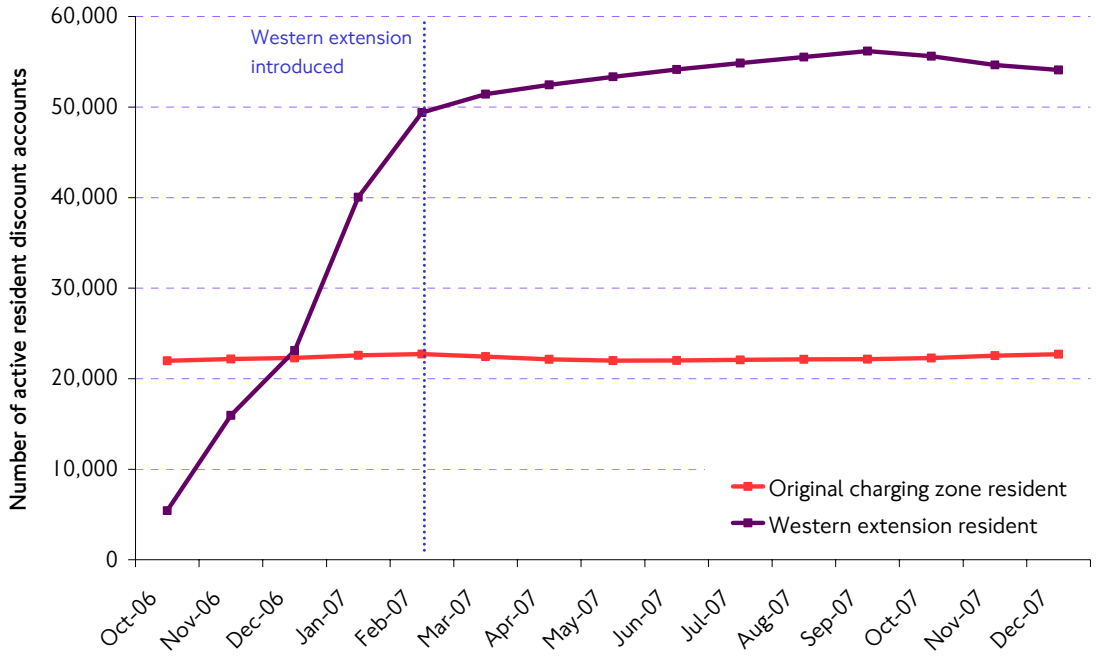
Vehicles registered for the alternative fuel discounts increased significantly, from 11,000 to 18,000 through 2007. This may be due, in part, to an increasing number of models eligible for the discount.

Figure 10.7 Active discount accounts by type, January 2005 to December 2007.



The number of western extension resident discounts have remained consistent since the introduction of the western extension, demonstrating that the successful public information and incentives for early registration prevented a surge of applications closer to implementation of the western extension. Following the implementation of the extension, the number of western extension resident accounts continued to rise slowly, peaking in September 2007 with over 56,000 active western extension accounts.

Figure 10.8 Active resident discounts showing impact of introduction of western extension, October 2006 to December 2007.



10.10 Scheme enforcement

The enforcement processes are described in detail in previous impacts monitoring reports. The key objective of scheme enforcement is to encourage and maintain a high level of chargepayer compliance with the requirements of the scheme.

Since February 2003 TfL have introduced a range of different initiatives and improvements to ensure that genuine, innocent errors made by chargepayers are minimised as much as possible and that any penalties arising from such errors are dealt with consistently and fairly. Key initiatives have included: additional verification and checking of payment details at the call centre and retail outlets; the introduction of the Pay Next Day facility to reduce the level of penalties issued to chargepayers who forget to pay before or on the day of travel; revised business rules used to determine whether a representation against a penalty should be accepted or rejected; enhancements to the discount registration processes including Blue Badge and residents applications to simplify the application process for chargepayers; significant changes to the fleet scheme to allow cars onto the scheme; and a reduction in the fleet scheme threshold.

All these initiatives have contributed to a positive overall impact in reducing the volumes of Penalty Charge Notices issued since scheme inception.

10.11 Penalty Charge Notices issued

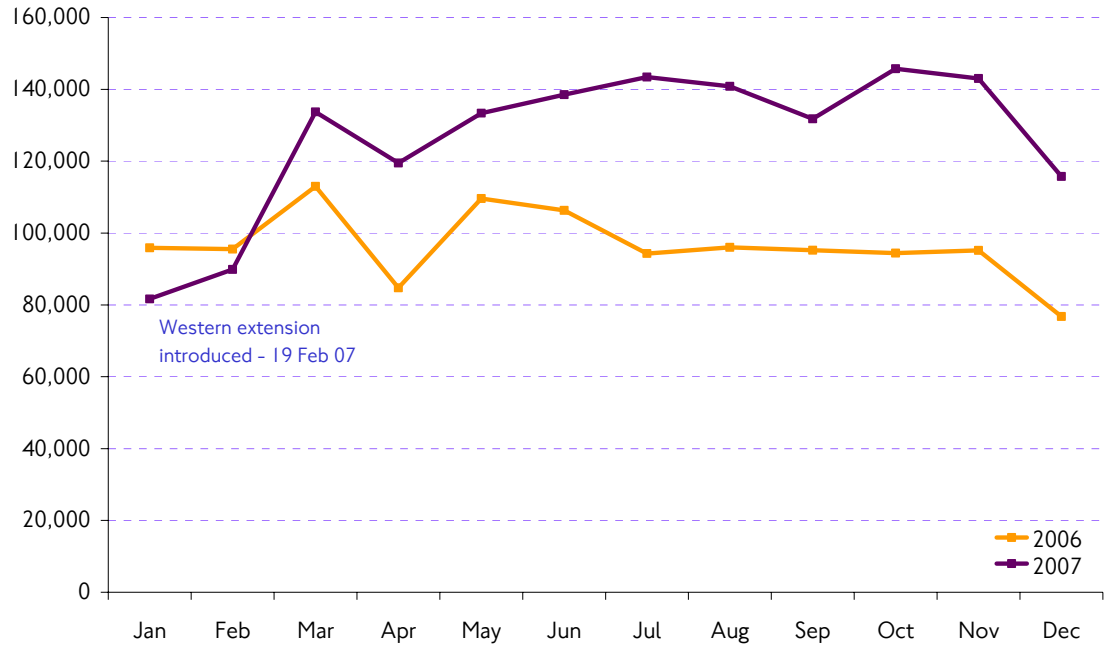
Penalty Charge Notices are issued to the registered 'keeper' of the vehicle; details are provided by the Driver and Vehicle Licensing Agency. The pattern of Penalty Charge Notices issued during 2006 and 2007, as shown in Figure 10.9, was affected by the introduction of the western extension in February 2007. Although the volume of

notices have increased, ongoing public information campaigns and the increases in understanding of the scheme now mean that on average, 96 percent of chargeable vehicles that enter the zone are compliant with the scheme

On 10 December 2007 the value of the congestion charging penalty charge was increased from £100 to £120; £50 to £60 at the discount rate, if paid promptly; and £150 to £180 at the Charge Certificate rate, for delayed payments. This brings the rate into line with the increased level of penalty issued for contraventions of bus lane, traffic and more serious parking offences.

Should a recipient vehicle keeper wish to challenge a Penalty Charge Notice, they are legally entitled to make a representation to TfL. Normally representations must be made in writing although TfL often cancels the notice as a result of telephone calls to the call centre where it can be identified that a simple mistake has been made, such as paying for the wrong vehicle. From the moment that a written representation is received by TfL, all enforcement action is put on hold until the matter is investigated. Should TfL reject the representation, the recipient is then able to make an appeal against TfL to the independent Parking and Traffic Adjudication Service.

Figure 10.9 Penalty Charge Notices issued, 2006 and 2007.

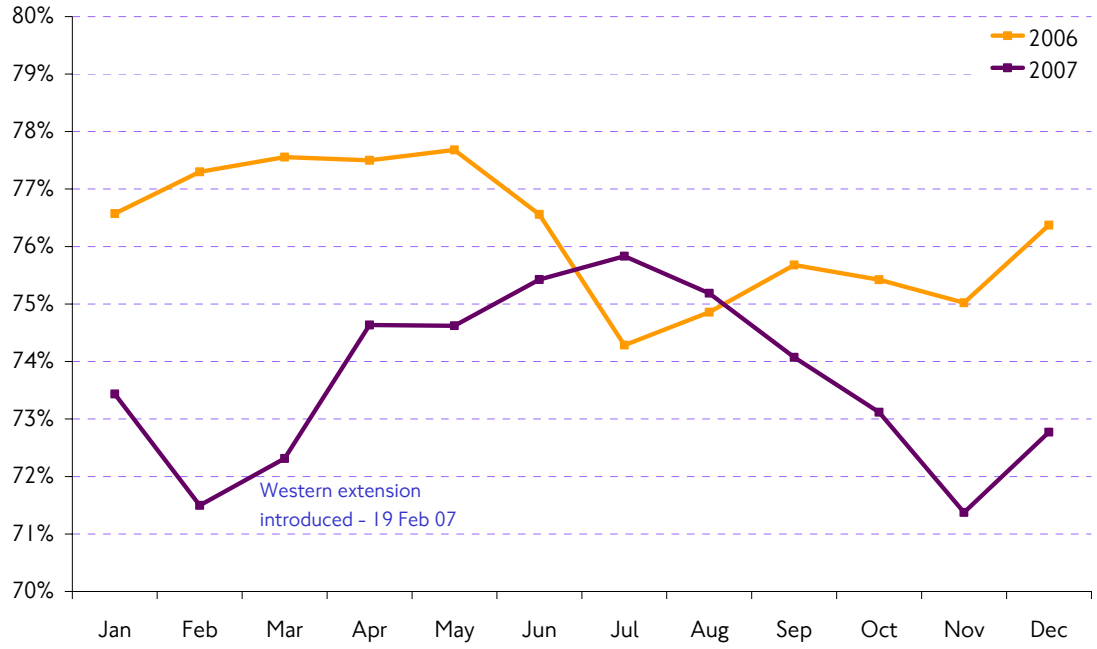


10.12 Penalty Charge Notices paid

The proportion of Penalty Charge Notices paid during 2007 remains steady with 74 percent of all Penalty Charge Notices issued resulting in a penalty payment. A large proportion of these Penalty Charge Notices are paid at the discounted rate of £60 (£50 pre-December 2007). Figure 10.10 is based on the 'contravention date' and therefore some Penalty Charge Notices relating to the last few months of 2007 remain outstanding. The proportion paid will therefore continue to increase slowly over time to an anticipated average across 2007 of 73 percent.

The remaining 27 percent of Penalty Charge Notices are cancelled as a result of an accepted representation, or in the event that the debt can not be recovered, as when the keeper of the vehicle cannot be traced, is bankrupt or is deceased.

Figure 10.10 Proportion of Penalty Charge Notices that were paid, 2006 and 2007.



10.13 Representations made against Penalty Charge Notices

Every representation, challenge and complaint received regarding a penalty is carefully considered on an individual basis as quickly as possible, with a key performance indicator target of processing all representations within 15 days of receipt. Representation categories for both acceptance and rejection of a representation were reviewed in September 2007 to be in line with new business processes. Wherever, possible discretion is applied for acceptance of a representation.

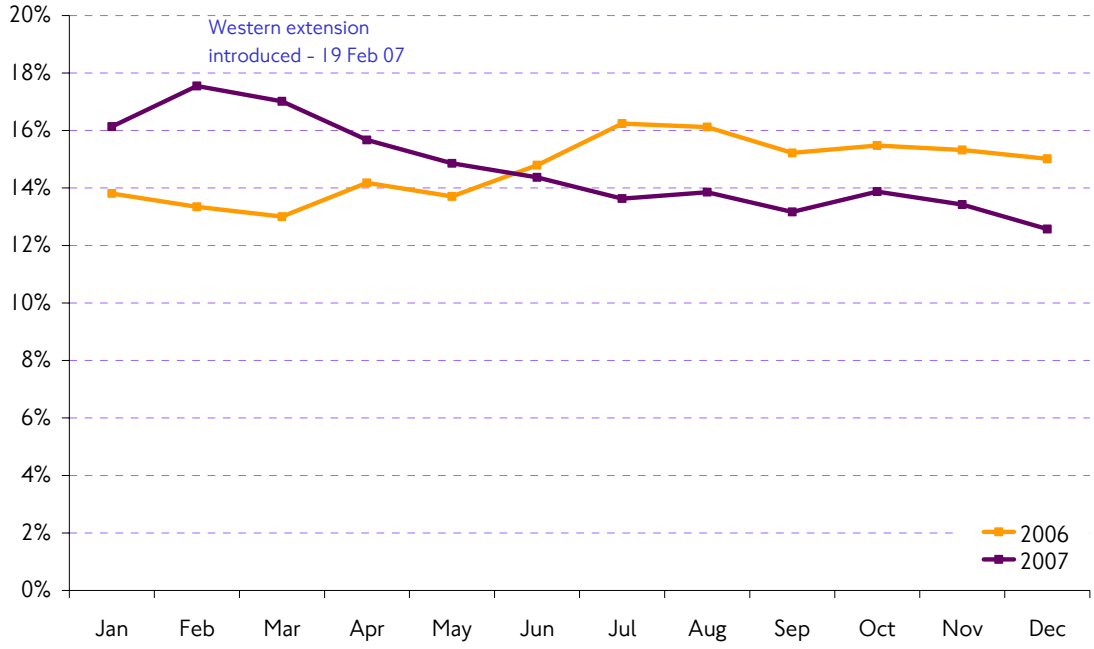
The percentage of representations made against Penalty Charge Notices with a contravention date in 2006 was an average of 15 percent. The figure remains the same for Penalty Charge Notices with a contravention date in 2007.

Figure 10.11 is based on contravention date with almost all representations received within five to seven months of the date of contravention. Data up to September 2007 are considered unlikely to change, with small further increases expected for October through to December 2007.

Immediately following the introduction of the western extension in February 2007, the proportion of representations received against Penalty Charge Notices issued increased slightly, along with a corresponding small reduction in the proportion of notices paid. Figures soon returned to normal and during the latter part of 2007 the proportion is expected to reach 14 percent. This percentage has fallen from a high of 64 percent in 2003 and 21 percent in 2004 and is consistent with an overall figure of

15 percent in 2005 and 2006. This continues to reflect the improvements to, and increased understanding of, the scheme.

Figure 10.11 Representations received as a percentage of Penalty Charge Notices issued, 2006 and 2007.



Representations accepted

The main reasons for representations being accepted in 2007 were:

- **Sold vehicle before the date of offence** – TfL accesses live data on the registered keeper as held by the Driver and Vehicle Licensing Agency and, as a result, Penalty Charge Notices can be issued to the old keeper while the Driver and Vehicle Licensing Agency record is updated.
- **Hire company transfer of liability** – TfL will transfer liability for the penalty if a hire company provides evidence to support claims that the penalty was incurred by a chargepayer while the vehicle was on hire.
- **Vehicle registration number payment error by chargepayer** – TfL applies its discretion and normally accepts representations where chargepayers can prove that they made an innocent mistake in providing their vehicle registration mark when paying for the charge.

Representations rejected

The main reasons for representations being rejected in 2007 were:

- **Unplanned entry in zone** – TfL will not normally accept representations from those who claim they did not intend to travel into the zone, or did not see the numerous signs, road markings etc.

- **No/insufficient payment proof** – TfL will only normally accept a representation if sufficient evidence is provided and will not normally accept a representation for chargepayers who simply forget to pay.
- **Insufficient evidence of hire** – representations are often rejected when the hire company is unable to provide sufficient evidence in the form required by the Regulations that govern the transfer of liability from hire company to hirer.

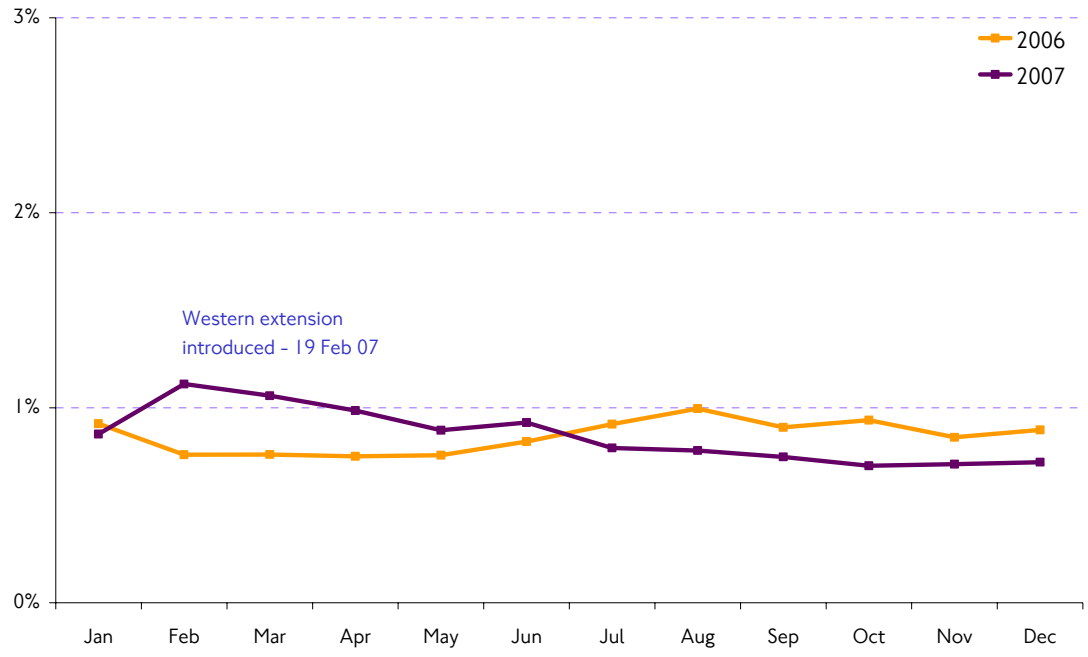
10.14 Appeals

The keeper of any vehicle that was the subject of a representation that TfL has rejected may appeal against this decision to the independent Parking and Traffic Adjudication Service. All appeals are considered by independent legally-qualified adjudicators.

The volume of appeals received consistently reduced throughout 2003, 2004, 2005 and 2006. During 2007, immediately following the introduction of the western extension, the percentage of appeals received as a proportion of Penalty Charge Notices issued peaked at 1.1 percent. Levels soon declined and have remained below 1 percent throughout the remainder of 2007. Overall, less than 1 percent of Penalty Charge Notices issued resulted in an appeal during 2007 and an average of 88 percent of appeals were determined in favour of TfL, 4 percent higher than 2006.

Figure 10.12 is based on contravention date with almost all appeals received within five to eight months of the date of contravention. Figures up to August 2007 are not expected to change. Minor increases are expected for the period September to December.

Figure 10.12 Appeals received as a percent of Penalty Charge Notices issued, 2006 and 2007.



10.15 Debt collection and persistent evasion

Where a Penalty Charge Notice remains unpaid and there is no outstanding representation or appeal, the debt is registered at the 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 credit ratings. The use of such measures to recover unpaid penalties is a last resort that TfL would rather not have to use but which is necessary to ensure that those who fail to pay the initial charge or penalties arising from non-compliance are pursued where possible.

As at December 2007 some 903,896 warrants have been issued to bailiffs since the start of the scheme. In 2007, the number issued was 162,880. TfL have four contracted 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 15 percent of warrants issued have resulted in payment.

10.16 Scheme operating costs and revenues

The western extension was introduced on 19 February 2007; this report provides details for financial year 2007/08, the first full year of revenues from the extended congestion charging scheme. A provisional estimate is also provided for the allocation of the net revenues from the scheme in 2007/08 to transport programmes in support of the Mayor's Transport Strategy.

The original central London zone and the western extension zone are operated as a single scheme and it is not possible to discern the proportion of income and costs which relate to a sub-area of the scheme.

On the same date as the extension was introduced, the operational hours of the scheme were reduced from 07:00-18:30 to 07:00-18:00. As these amendments were coincident it is not possible to define a specific reduction in income arising from the shortening in hours of operation, though this would have been relatively small.

Furthermore, from 10 December 2007 the value of the Penalty Charge Notice was increased from £100 to £120 to bring this into line with other road penalty charges in London.

The costs and revenues associated with the scheme have been provisionally estimated for 2007/08. Overall revenues increased by about £55 million in 2007/08 compared with revenues received in 2006/07.

Table 10.2 provides provisional out-turn figures for financial year 2007/08, comparing scheme revenues with scheme operation costs. Operating and enforcement costs include the payments to all the service providers who support the working of the scheme.

Table 10.2 Scheme revenues and costs, financial year 2007/2008. (£ million provisional).

Costs	
Scheme operational, publicity and enforcement costs	91
Other costs: TfL staff; traffic management; TfL central costs	40
Total costs	**131**
Revenues	
Standard daily vehicle charges (£8)	146
Fleet vehicle daily charges (£7)	37
Resident vehicles (£4 per week)	12
Enforcement income received	73
Total revenues	**268**
Net revenues	**137**

Allocation of net revenues

By law, the net revenues from the scheme must be spent on measures to further the Mayor's Transport Strategy. This is in accordance with an appendix to the Scheme Order approved by the Secretary of State for Transport.

TfL is also required to report every four years to the Secretary of State on the expenditure of scheme revenues; the first such report was delivered in August 2006. Table 10.3 provides a provisional summary of the areas of expenditure of the net revenues in financial year 2007/08.

Table 10.3 Application of congestion charging scheme revenues, financial year 2007/08. (£ million provisional).

Bus network improvements Continued enhancement of London's bus operations and infrastructure. Improvements to bus stations to provide accessibility and space. Replacement of bus shelters; provision of illuminated bus stops. Support to the iBus project to give passengers better information. Transport policing activities to improve safety and security for bus passengers.	**112**
Borough plans Support to London Boroughs for local transport improvements.	**2**
Roads and bridges Support for reconstructing and resurfacing carriageways and footways. Upgrading and strengthening of highway structures.	**13**
Road safety Various measures on TfL roads and on borough roads via LIP funding. Road safety cameras; support to road safety campaigns	**4**
Environment Support for further trials of hydrogen fuel cell buses.	**2**
Walking and cycling Support for new pedestrian crossings and cycling initiatives.	**4**
Total	**137**