Transport for London Lane Rental Scheme

Monitoring Report – July 2014 to March 2015

Status: Final
Version: 1.0
Date: 28/10/15

MAYOR OF LONDON

TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

Contents

1. Document Control

1.1 Author

Jennifer MacInnis – Traffic Analyst, Outcomes Insight and Analysis

1.2 Document Summary

This document provides updated information on the impacts of the Transport for London Lane Rental Scheme for the period 1 July 2014 to 31 March 2015.

1.3 Reference Documents

Transport for London Lane Rental Scheme fv Submission
TLRS Cost Benefit Analysis v2.1, January 2012
TLRS First Annual Monitoring Report v0.5, February 2014
TLRS Interim Monitoring Report Oct 2013 to Jun 2014, March 2015
London's Road Modernisation Plan, October 2014

1.4 Reference Resources

Transport Research Laboratory Reducing Congestion from Highway Works
TfL's Our Plan for London's Roads – What we've done

1.5 Distribution

Garrett Emmerson – Chief Operating Officer, Surface Transport
Alan Bristow – Director of Road Space Management
Dana Skelley – Director of Asset Management
Mark Whitaker – Head of RSM Operations
Helena Kakouratos – Works Coordination and Permitting Manager, RSM Operations
Gerard O'Toole – Operational Analysis Manager, RSM Operations
Karl Kulasingam – Roadworks Intelligence and Enforcement Manager, RSM Operations
Glynn Barton – Head of Outcomes Delivery
Andy Emmonds – Chief Traffic Analyst, Outcomes Insight and Analysis
Jonathan Turner – Corridor Performance Team Leader, Outcomes Insight and Analysis
James Cockerton – Principal Analyst, Outcomes Insight and Analysis

1.6 Document Quality Assurance

Step	Step Description	Undertaken by	Date	Remarks
1	First draft 0.1	JM	09/07/2015	
2	Second draft 0.2	JM	20/07/2015	Refinements
3	Third draft 0.3	JM, JT	10/08/2015	Refinements
4	Fourth draft 0.4	HK, KK, GOT, JM	08/10/2015	Refinements Following LRMT Review
5	Report Finalised	JM	23/10/2015	Refinements following Senior Management Review

2. Executive Summary

The Transport for London Lane Rental Scheme (TLRS) was introduced on 11 June 2012. It was designed to incentivise all activity promoters to minimise disruption due to roadworks and streetworks by applying a daily charge for occupation of the most traffic sensitive streets at traffic-sensitive times.

On 1 July 2014, following thorough analysis and stakeholder consultation, the areas covered by the TLRS were changed to ensure the scheme continued to cover the areas where it will bring about the most benefit. As a result of these changes, from 1 July 2014 onwards the TLRS applies to 56 per cent of the Transport for London Road Network (TLRN), down from 57 per cent.

Following on from the TLRS First Annual Monitoring Report, which covered the period between October 2012 to September 2013, it was decided that future TLRS reporting should be aligned to Transport for London's (TfL's) financial year (April to March). In order to achieve this it was necessary to split the subsequent 18 month period (from 1 October 2013 to 31 March 2015) into two nine month reporting instalments. This became a prerequisite as the geographical extent of the TLRS segments changed on 1 July 2014, thus preventing analysis of a consistent set of source data.

An interim report was published in March 2015, which covered a monitoring period from 1 October 2013 to 30 June 2014 – the final day before the extents of the TLRS segments were changed. This report is the second part, covering the 9 month period from 1 July 2014 to 31 March 2015 – the final day of TfL's financial year end.

This reporting period has seen pressure on the TLRN increase due to a huge amount of construction work taking place to accommodate London's phenomenal economic and population growth - with developers, boroughs and utility providers building additional homes, shops, public places and infrastructure. This growth is changing the way our roads operate, and in response to this TfL is overseeing the largest ever investment in London's roads and streets through its £4bn Road Modernisation Plan, which comprises numerous projects and programmes that have started to transform some of the busiest roads and junctions to make them safer and more attractive for all road users. The overall performance of the network has, unsurprisingly, become increasingly affected by this rising construction activity, leading to a deterioration in journey times and journey time reliability (JTR) across the network; although the TLRS has had a positive effect in mitigating this impact.

Analysis has shown that for the period 1 July 2014 to 31 March 2015:

- 99 per cent of TfL works and 87 per cent of utility works taking place in TLRS segments avoided incurring a TLRS charge

- Collaborative working opportunities have increased by 159 per cent when compared with the baseline data
- There was a 2 per cent increase in the monthly average of disruption days saved
- There was a 41 per cent increase in the number of agreed ‘Lane Rental days’ saved since the previous 9 month reporting period, equating to 1317 days saved, despite the total pot of requested days reducing by 30 per cent. This shows that TfL is taking an active role in ensuring that works promoters’ exposure to TLRS charges is minimised, while ensuring the number of days of works during traffic-sensitive times is kept to a minimum
- There has been a 14 per cent increase in planned utility works taking place overnight on TLRS segments since the scheme was implemented, which has been achieved without an increase in noise complaints
- Average 24 hour vehicle flows on TLRS segments increased by 2 per cent
- Average vehicle flows per lane in the TLRS are 29 per cent higher than in non-TLRS segments
- Serious and severe disruption increased by 26 per cent in TLRS segments, although this was less than the same disruption on non-TLRS segments despite the former being more sensitive and covering a larger extent of the TLRN
- Journey times on TLRS segments within this reporting period decreased by 1.3 per cent in the inter peak, but increased marginally in the AM and PM peaks (0.2 and 0.5 per cent respectively) when compared to the non-TLRS segments. However this increase is small when compared to the baseline, which varies between 4 to 10 per cent.
- JTR on the TLRS dropped across the AM, inter and PM peaks in relation to non-TLRS segments (1.0, 0.2 and 2.3 percentage points respectively). Further analysis has revealed that much of this deterioration is attributable to two areas on or approaching the A406, which have both seen substantial major works; in addition to the increase in vehicle flows mentioned above.
- The greatest improvements in customer satisfaction since 2011 was a 15 per cent reduction in frustration from ‘major delays to a journey by bus, cycle, driving and walking as a result of roadworks’ and ‘unreliable journeys’
- Customer satisfaction that roadworks are taking place outside of busy times has improved by 9 per cent since the TLRS began
- Analysis of two sets of roadworks on the Hammersmith Flyover and Marylebone Road showed that the TLRS has prevented over £8 million worth of delay was saved at these two particularly sensitive parts of the network

This report demonstrates that the TLRS has continued to deliver substantial savings in delay to road users through reducing the amount of roadworks taking place during traffic sensitive times, combined with the use of extraordinary traffic management and innovative working techniques. The TLRS is becoming an essential component to managing an unprecedented programme of road improvements that are being delivered as an integrated response to cope with a growing population and the way London is changing.

3 Introduction

3.1 Scheme Scope

The Transport for London Lane Rental Scheme (TLRS) was introduced on 11 June 2012, applying to 57 per cent of the Transport for London Road Network (TLRN). It was designed to minimise disruption due to roadworks and streetworks in specified traffic-sensitive locations by applying a daily charge for each day that the street is occupied by an activity promoter's works. The daily charge is not applied if the works take place outside traffic-sensitive times providing all activity promoters with an incentive to change behaviour and adopt less disruptive practises.

An example of typical charge bands is shown below:

Table 1: Lane Rental Charges

Charge Band	Type	Charge	Typical Charging Times
Charge Band 1	Segment	£800 a day	Monday to Friday 06:30-10:00 and 15:30-20:00 Saturdays and Sundays 12:00-18:00
Charge Band 2	Segment	£2,500 a day	Monday to Friday 06:30-22:00 Saturdays and Sundays 12:00-18:00
Charge Band 3	Pinch point	£2,500 a day	Monday to Friday 07:00-20:00 Saturdays and Sundays 12:00-18:00

Following analysis and stakeholder consultation the roads covered by the TLRS were changed to ensure the scheme continues to cover the areas where it will bring about most benefit[1]. The new areas took force on 1 July 2014 and as a result the TLRS currently covers 56 per cent of the TLRN, down from 57 per cent originally. The original TLRS segments which were valid prior to 1 July 2014 are shown in Figure 1. The current LR scheme extents which were adopted in July 2014 are shown in Figure 2.

[1] Results from the consultation on proposed changes to the TLRS - https://consultations.tfl.gov.uk/streets/lanerental/results/lane-rental-changes-consultation-report-final.pdf

The change was driven by the need to ensure the scheme still covers the most traffic sensitive parts of the network and where it can bring about the most benefit, as changes to certain parts of the network meant they were no longer appropriate to be TLRS. The previous algorithm used to determine those areas on the TLRN that are most susceptible to disruption from roadworks has also been refined to focus on the movement of people rather than vehicles.

The same permitting regime is applied to all works on TLRS and non-TLRS segments. TfL liaise with work promoters to reduce the length of time that the carriageway is occupied, especially in traffic-sensitive times and could typically include changing works timings to overnight, off-peak or weekend working – actions that TfL takes on proposed works across the TLRN, in both TLRS and non-TLRS segments.

As part of the preparation for the launch of the TLRS, TfL and the Department for Transport (DfT) jointly funded a research project into innovative methods of reducing the disruption from roadworks. The outputs of this project are published on the Transport Research Laboratory website and were shared with works promoters to assist in minimising the disruption on the network and reducing or avoiding TLRS charge[2]. Areas researched include plating and bridging, rapid cure materials and temporary backfill materials.

[2] Transport Research Laboratory - http://www.trl.co.uk/solutions/asset-management/asset-condition-monitoring/pavement-investigation/reducing-congestion-from-highway-works/

Figure 1: Lane Rental Segments by Charge Band - June 2012 to June 2014

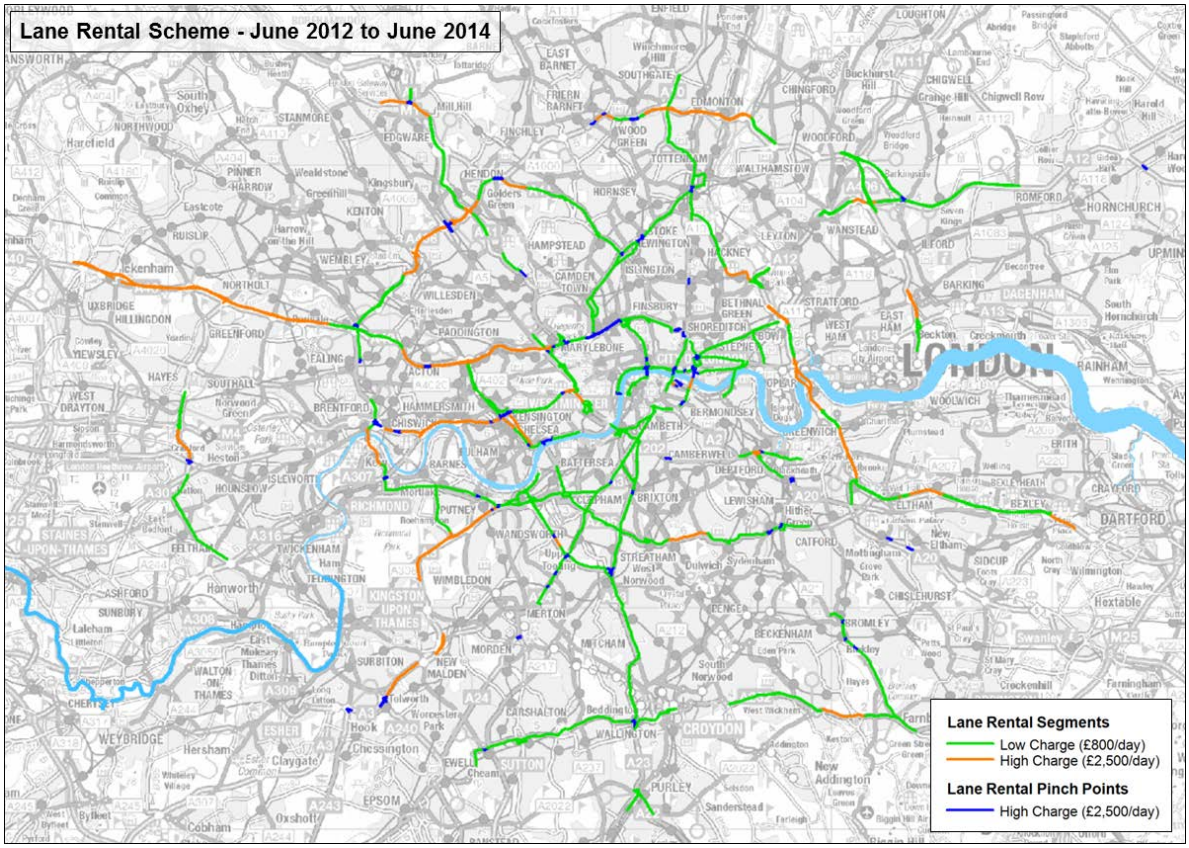
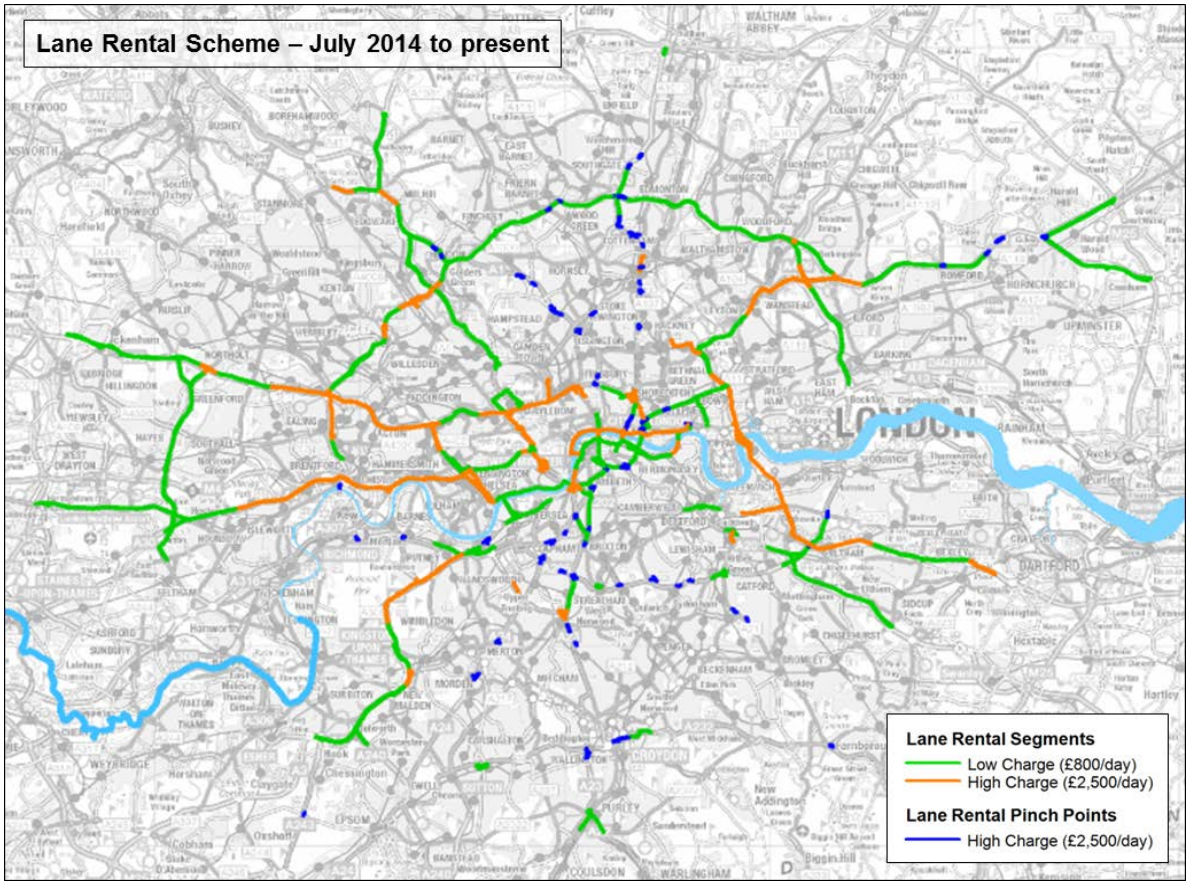


Figure 2: Lane Rental Segments by Charge Bands - July 2014 to present



3.2 Reporting Periods

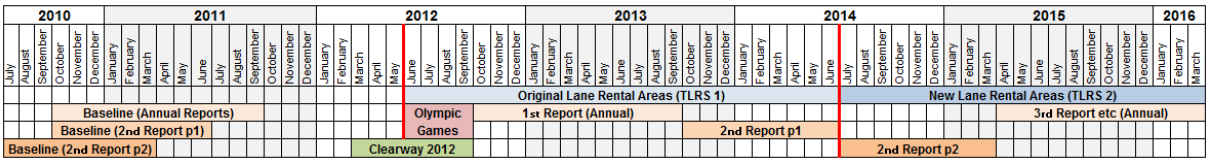
The TLRS First Annual Monitoring Report was released in February 2014 and showed that the scheme had been successful in its primary objectives. The report covered the period from 1 October 2012 to 30 September 2013 and provided a comparison with data from 1 October 2010 to 30 September 2011. This was in order to avoid conflict with the Clearway 2012 works embargo which was implemented to restrict works taking place on the Olympic and Paralympic Route Networks (which consequently reduced the number of works taking place inside TLRS segments during that period). This ensured the Olympic period was excluded from any analysis and provided an unbiased comparison of the impact of the scheme.

Following on from the TLRS First Annual Monitoring Report it was decided that future TLRS reporting should be aligned to TfL's financial year (April to March). In order to achieve this it was necessary to split the 18 month period (from 1 October 2013 to 31 March 2015) into two nine month reports. This became necessary as the geographical extent of the TLRS segments changed on 1 July 2014, thus preventing analysis of a consistent set of source data.

An interim report was published in March 2015[3] and covers the nine month period 1 October 2013 to 30 June 2014, up until the date when the coverage of the TLRS segments changed. This report is the second part covering the 9 month period 1 July 2014 to 31 March 2015, the final day of TfL's financial year end, and assesses the impact that changing the TLRS segments has had. All future reporting will be yearly (from 1 April to 31 March).

Figure 3 offers an illustrative explanation of the changes to the monitoring periods outlined above, whereby this report is referred to as '2nd Report Part 2'.

Figure 3: Changes to Reporting Periods since the TLRS began



There is an assumption that all things apart from the implementation of the TLRS are equal across the TLRN in terms of network outcomes.

3.3 Scope of Analysis

The change in TLRS segments means that the TLRN can be split into four categories as listed in Table 2. For the purposes of this report, and to align with previous TLRS reports, analysis has been restricted to non-TLRS and Updated TLRS (henceforth

[3] Interim Monitoring Report Oct 2013 to Jun 2014 - https://tfl.gov.uk/cdn/static/cms/documents/lane-rental-scheme-interm-report-2013-14.pdf

referred to as TLRS). TLRS is a combination of category 'C' and 'D' which reflect the current TLRS extents adopted 1 July 2014.

Table 2: Areas Defined by LR Category

	TLRS Category	Description	Included within Report
A	**Non-TLRS**	Areas of the TLRN that were neither part of the original TLRS nor the updated TLRS	Yes as 'non-TLRS'
B	**In Original TLRS not Updated TLRS**	The original LR scheme extents which were valid between July 2012 and June 2014 and not included within the updated TLRS	Excluded
C	**In Updated TLRS not Original TLRS**	Areas of the updated scheme extents which were not part of the original TLRS	Yes as 'TLRS'
D	**In Original TLRS and Updated TLRS**	Areas which are within the original TLRS and updated TLRS	Yes as 'TLRS'

4. Objective of the TLRS

The TLRS seeks to encourage the undertaking of works at the least traffic-sensitive times, and an early completion of works. It also applies the following guiding principles:

- Safety must be ensured
- Inconvenience to people using a street, including in particular people with a disability, must be minimised.

Other objectives of the TLRS are to:

- Treat all activity promoters on an equal basis
- Promote behaviour change to minimise the duration of occupation of the street at the busiest locations at traffic-sensitive times on the network
- Minimise the number of works taking place during traffic-sensitive times, and contribute to JTR as required under the Mayor's Transport Strategy.

TfL will measure these objectives so as to evaluate whether they are being met[4]. Following on from the 2nd TLRS Part 1 Monitoring Report, this report forms Part 2, analysing the impact that the updated TLRS segments have had since implementation on 1 July 2014.

[4] TfL Lane Rental Scheme fv Submission - https://consultations.tfl.gov.uk/streets/lane-rental/results/tfl-lane-rental-scheme-submission.pdf

5. Road Network Context

By 2031 London's population is expected to grow by almost two million – it has been growing at a rate of over 100,000 people per year, whilst the number of international visitors increased by more than half a million in 2014. This combined with strong economic growth and the consequent increase in building and construction is leading to more traffic, and therefore congestion.

As part of TfL's efforts to tackle this challenge the Roads Modernisation Plan was launched – a £4 billion investment programme[5]. This is currently underway to transform junctions, bridges, tunnels, cycling lanes and pedestrian areas; all of which are expected to put even more pressure on the network in the short term.

The increased traffic flows and commencement of the roads modernisation programme has led to deterioration in journey times and journey time reliability across the network, making effective traffic management, including operating the TLRS, more vital than ever.

6. Impact on the Road Network

6.1 Road Network Analysis

To assess the TLRS impact on the road network this report will analyse the recorded journey times, journey time reliability, vehicle flows, disruption and the number of works on the TLRN during the nine month monitoring period (1 July 2014 to 31 March 2015) and compare it to the nine month baseline period (1 July 2010 to 31 March 2011) prior to the TLRS implementation.

Analysis where possible will be broken down into peak periods. This will help assess the influence the TLRS has had on peak period roadworks. The peak period definitions used throughout this report are shown in Table 3.

Table 3: Peak Period Times

AM Peak	Inter Peak	PM Peak	Overnight
07:00 to 10:00	10:00 to 16:00	16:00 to 19:00	19:00 to 07:00

6.2 Background to Journey Time and Journey Time Reliability

An objective of the TLRS is to contribute to Journey Time Reliability (JTR) as part of the Mayor's traffic smoothing initiative by improving travel conditions on the road network.

[5] Road Modernisation Plan - https://tfl.gov.uk/cdn/static/cms/documents/londons-road-modernisation-plan.pdf

JTR is measured as the percentage of nominal 30 minute journeys completed within 35 minutes. For example, if a corridor can be managed such that 9 out of 10 journeys can be completed within the expected journey time then the corridor would be considered 90 per cent reliable.

JTR is calculated using journey time data from the London Congestion Analysis Project (LCAP), which in turn is based on Automatic Number Plate Recognition (ANPR) camera data.

6.3 TLRN Journey Time Reliability

A comparison of JTR for the TLRS and non-TLRS segments on the TLRN has been performed. The results are summarised in Table 4.

Table 4: Change in JTR on the TLRN between 2010-11 and 2014-15

Journey Time Reliability												
	July 10 - March 11				July 14 - March 15				% Point Difference 10/11 to 13/14			
	AM Peak	Inter Peak	PM Peak	Over night	AM Peak	Inter Peak	PM Peak	Over night	AM Peak	Inter Peak	PM Peak	Over night
TLRS Segments	88.3%	90.9%	85.9%	95.9%	87.3%	90.2%	84.1%	96.6%	-1.0%	-0.7%	-1.8%	0.7%
Non-TLRS Segments	90.9%	92.4%	88.4%	95.8%	90.9%	91.9%	88.9%	96.2%	0.0%	-0.5%	0.5%	0.4%
TLRS Impact									**-1.0%**	**-0.2%**	**-2.3%**	**0.3%**

As highlighted in Section 5, general deterioration of the TLRN has been seen recently, largely brought about by an increase in traffic flows (discussed further and shown in Table 6).

The decline in JTR has been more marked on TLRS segments, with negative impacts in the AM, Inter and PM peak ranging from 2.3 and 0.2 per cent.

The previous Part 1 report displays a marginally negative impact in TLRS areas during the PM peak of 0.3 percentage points and in this part the theme continues with an average reduction of 2.3 percentage points, indicating that TLRS segments may have been more adversely affected during the PM peak by the combination of network-wide JTR deterioration and flow increases.

6.4 TLRN Journey Times

Journey time data has also been analysed for each time period throughout the day and has been separated into TLRS and non-TLRS segments.

Table 5: Change in Journey Times on the TLRN between 2010-11 and 2014-15

Average Journey Times (mins/km)												
	July 10 - March 11				July 14 - March 15				% Difference 10/11 to 14/15			
	AM Peak	Inter Peak	PM Peak	Over night	AM Peak	Inter Peak	PM Peak	Over night	AM Peak	Inter Peak	PM Peak	Over night
TLRS Segments	1.9	1.7	2.1	1.1	2.1	1.7	2.3	1.1	7.7%	4.4%	9.5%	0.2%
Non-TLRS Segments	1.8	1.7	2.1	1.2	2.0	1.8	2.3	1.1	7.5%	5.7%	9.0%	-2.2%
TLRS Impact									**0.2%**	**-1.3%**	**0.5%**	**2.4%**

As with JTR, journey times have deteriorated across the TLRN. The changes are very similar between TLRS and non-TLRS segments, giving a comparatively small impact in TLRS areas. The largest negative impact in TLRS areas is seen in the overnight period where journey times increased on average by 2.4 per cent. This could be a cumulative effect of more overnight roadworks taking place since the implementation of the TLRS, whereby working outside of traffic sensitive times, such as overnight, is incentivised as no charges are applied during this period.

6.5 Vehicle Flows

Table 6 shows the average 24 hour vehicle flows over the monitoring period and compared to the baseline (July 10 to March 11) as measured from Automatic Traffic Counters (ATCs) located in TLRS and non-TLRS segments. Vehicle flow averages were calculated using weekday flow data only (i.e. excluding weekends and bank holidays), where there is data available for both the monitoring period and equivalent dates in the baseline period.

Table 6: Average 24 Hour Vehicle Flows per Lane

Average 24 Hour Vehicle Flow per Lane				
	July 10 to Mar 11	July 14 to Mar 15	Change	% Change
TLRS segments	13,070	13,327	256	2%
Non-TLRS segments	10,201	10,316	115	1%

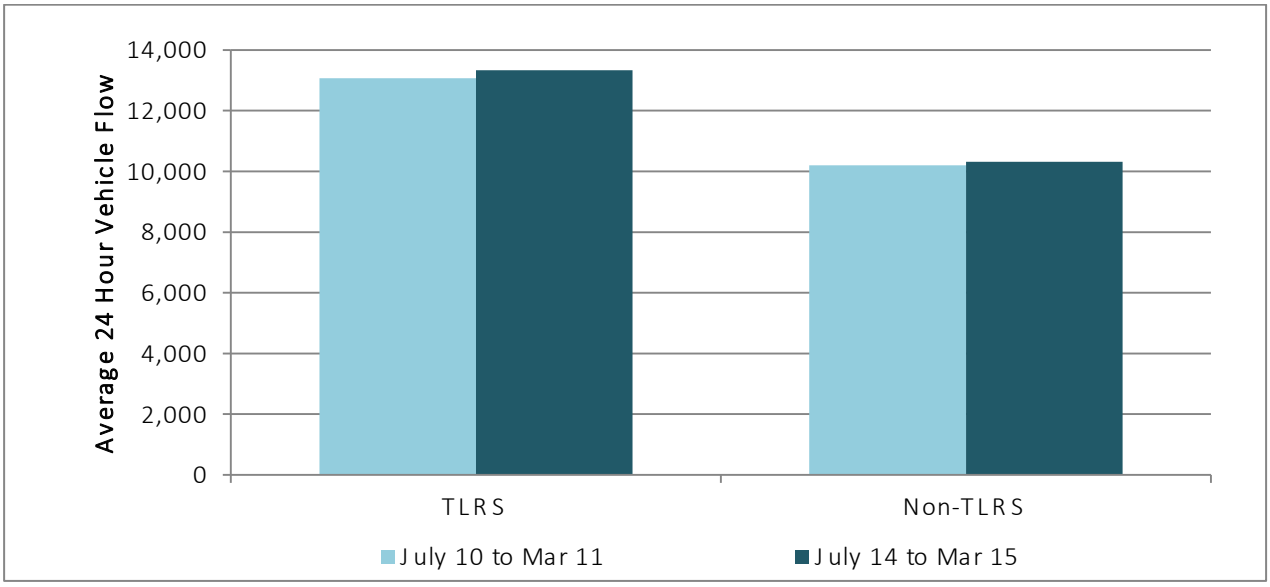
Average 24 hour vehicle flows increased within TLRS segments by 2 per cent whilst the areas of the road network which were within the original TLRS but not included within the updated TLRS showed a reduction of 1 per cent.

Vehicle flows within TLRS segments have much higher flows per lane than non-TLRS segments, approximately 29 per cent higher (as shown in Table 6). This is logical, as vehicle flows were one component used to determine the TLRS segments,

as they are expected to be more susceptible to congestion and disruption as a result of incidents such as roadworks.

The combination of both increasing vehicle flows over time and much higher average 24 hour flows has led to increasing pressure on TLRS segments. This has been a major contributing factor to the deterioration in JTR and JT in TLRS areas.

Figure 4: Average 24 Hour Vehicle Flow per Lane



6.6 Background to Disruption

Disruption data is taken from both the London Traffic Information System (LTIS) and its successor the Traffic Information Management System (TIMS). Data is aligned to TfL financial accounting periods whereby Period 1 always starts on 1 April and each period is 28 days. Therefore the analysis for this report has been run from Periods 4 to 13, corresponding to July to March. The most disruptive events are labelled 'serious' and 'severe' as defined in Table 7.

Table 7: Serious and Severe Disruption Definition

Type	Description
Serious	0.Traffic Congestion unusual for that time of day 1.Traffic which has been stopped for less than five minutes but in excess of the red signal time for traffic signals operating on the road 2.The traffic queuing is longer than normal for the time of day 3.The incident causes inconvenience to road users within a short space of time
Severe	Similar to above however: 0.The traffic has been stopped for more than five minutes 1.The incident can quickly cause significant inconvenience of at least an additional 20 minutes to the road users' journeys

A reduction in the duration of works taking place in traffic-sensitive times should lead to a reduction in the amount of disruption taking place on the road network. The analysis has been separated into works undertaken by the highway authority (TfL) and those by utility companies, within TLRS and non-TLRS areas. Serious and severe disruption is calculated as a total amount regardless of the time of day it occurred. Other causes of disruption such as accidents and congestion have been excluded from this analysis as the TLRS targets roadworks only.

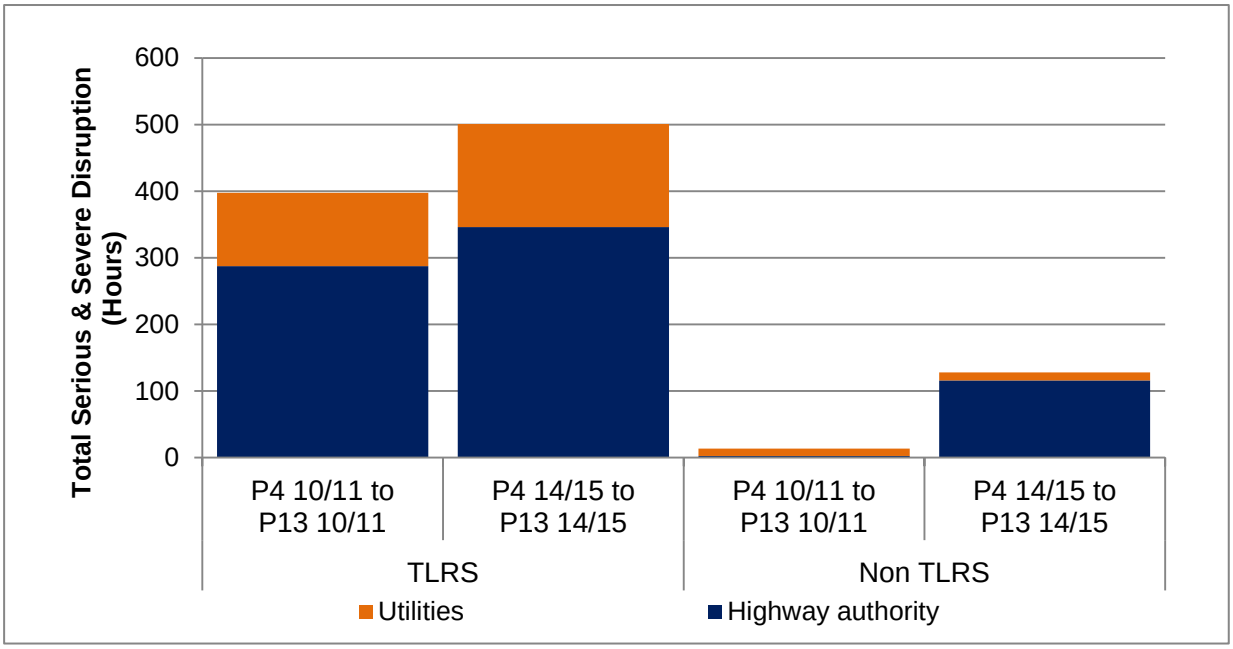
6.7 Serious and Severe Disruption

Serious and severe disruption hours have increased across the TLRN due to the aforementioned conditions on the road network. Table 8 and Figure 5 show the contribution of highway authority (TfL) and utility planned works by TLRS and non-TLRS areas.

Table 8: Hours of Serious and Severe Disruption due to Planned Works

Total Serious & Severe Disruption Associated with Planned Works (Hours)			
	P4 10/11 to P13 10/11	**P4 14/15 to P13 14/15**	**Change**
TLRS Segments	**398**	**501**	**103**
Highway authority (TfL)	288	346	58
Utilities	110	155	45
Non-TLRS Segments	**14**	**128**	**114**
Highway authority (TfL)	3	116	113
Utilities	11	12	1

Figure 5: Total Serious and Severe Disruption from Planned Works



Serious and severe disruption hours increased by a significantly greater percentage in non-TLRS areas than in TLRS areas. TLRS areas experienced an increase of 103 hours (26 per cent) and in non-TLRS areas it increased by 114 hours (814 per cent). This is despite TLRS segments representing a larger part of the network and being more sensitive. This provides evidence that the TLRS is successfully limiting the deterioration by encouraging more non-peak working.

Further analysis found that a third of the total amount of serious and severe disruption within TLRS segments was caused by two sets of roadworks. This included the upgrade of the Fore Street Tunnel and the resurfacing of the A406 Southend Road (North Circular Road). The A406 works were the greatest combined total area of resurfacing of a single works site in TfL history[6] which helps to explain the reason behind the amount of disruption caused. The majority of the works and road closures took place overnight and on the weekends demonstrating that if the TLRS had not been in place to discourage peak period working then the impact would likely have been much greater.

It was found that 65 per cent of serious and severe disruption caused by highway authority planned works within non-TLRS segments, was caused by the junction improvement works on Ripple Road (A13), accounting for the large increase in serious and severe disruption.

Table 9 shows the changes to the numbers of works associated with serious and severe disruption (representing less than half a percent of all works, as given in Table 11).

Table 9: Number of Works Resulting in Serious and Severe Disruption

Total Number of Planned Works Resulting in Serious & Severe Disruption			
	P4 10/11 to P13 10/11	**P4 14/15 to P13 14/15**	**% Change**
TLRS Segments	**37**	**47**	**27%**
Highway authority (TfL)	24	28	17%
Utilities	13	19	46%
Non-TLRS Segments	**5**	**14**	**180%**
Highway authority (TfL)	2	11	450%
Utilities	3	3	0%

The number of works causing serious and severe disruption has increased by 10 works (27 per cent) across TLRS segments compared to 9 works (nearly three-fold) on non-TLRS segments- a similar pattern to hours of serious and severe disruption. The number of works resulting in serious and severe disruption has risen from Part 1 of the report. Part 1 saw a decline in the number and amount of hours of disruption,

[6] What we've done - https://tfl.gov.uk/campaign/what-weve-done

whereas Part 2 has reported an increase. This is attributed to a number of factors including the increase in vehicle flows on the network and the £4 billion road network improvement programme going on across the TLRN leading to less resilience on the TLRN. It is worth noting that as more of the road network improvement programme begins running concurrently, the TLRS will be instrumental in minimising peak period capacity reductions and thus minimising the disruption of such major works.

7. Customer Satisfaction

TfL began measuring customer satisfaction with TLRN users in 2010 with an online survey. Table 10 shows the key findings in relation to roadworks.

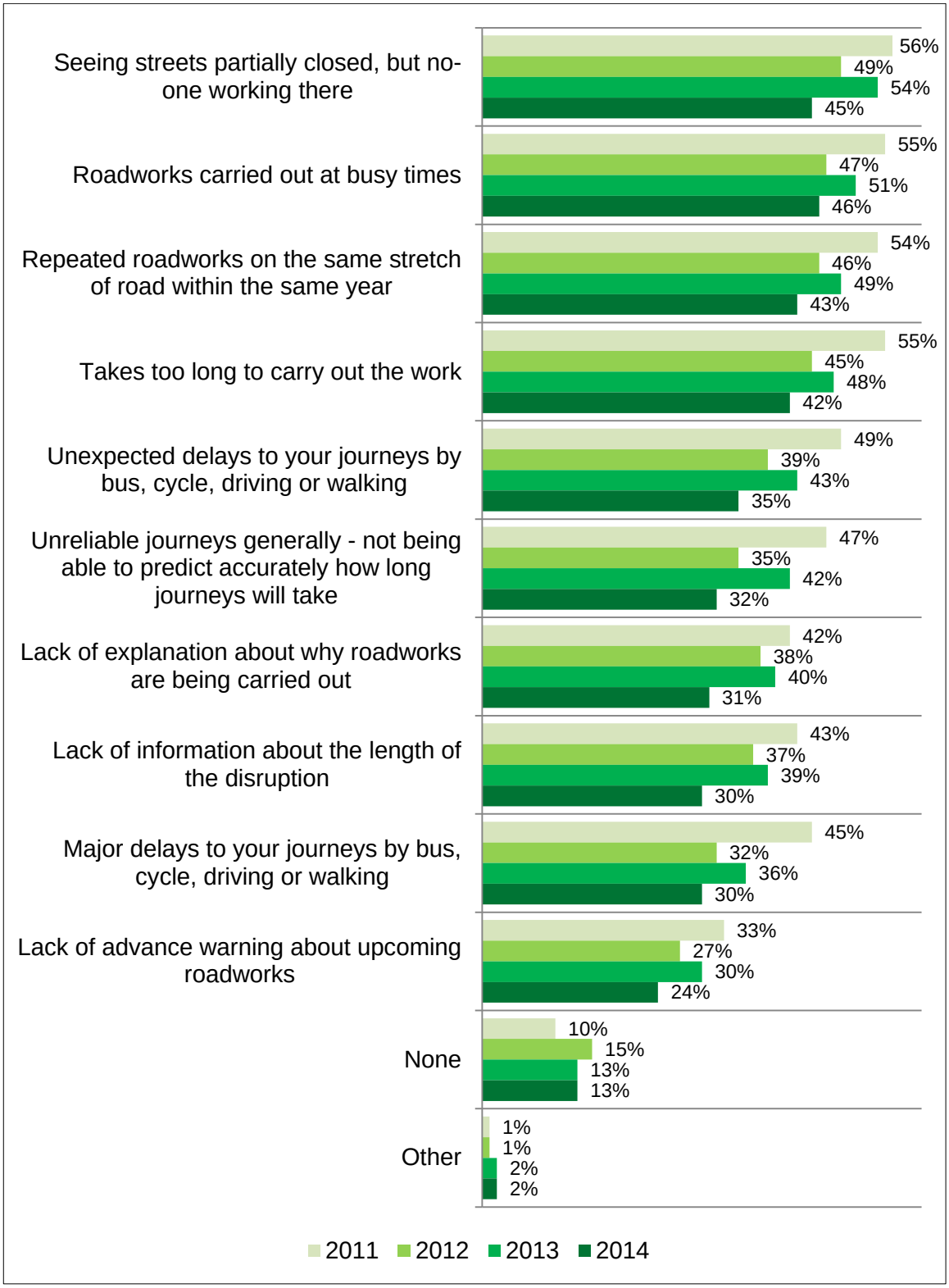
Table 10: Percentage of Customer Satisfaction with the Management of Roadworks

Customer Satisfaction Survey (Q3)						
	2010	**2011**	**2012**	**2013**	**2014**	**% Points Change**
Customer satisfaction with the management of roadworks	-	70%	73%	71%	72%	+2
Customers disrupted due to roadworks	69%	57%	46%	51%	45%	-24

Since 2011, when customers were first asked, overall satisfaction with the management of roadworks has risen 2 percentage points (from a score of 70 to 72), whilst since 2010 the percentage of customers who felt that their journeys were disrupted as a result of roadworks fell by 24 percentage points (from a score of 69 to 45).

In 2011 the user satisfaction survey started recording the most frustrating aspects of roadworks for TLRN users and all results are shown in Figure 6.

Figure 6: Roadworks Related Frustrations for TLRN Users



Customer satisfaction has improved in all areas since the survey began. There was a small deterioration in results between 2012 and 2013, likely to be a result of the survey taking place during the Olympic and Paralympic periods. The greatest improvements in customer satisfaction were 15 per cent reductions in frustration

associated with ‘major delays to a journey by bus, cycle, driving and walking’ and ‘unreliable journeys - not being able to predict accurately how long journeys will take’.

It should be noted that less than half of people surveyed reported dissatisfaction that roadworks were ’carried out at busy times’ and ‘take too long to carry out’– a reduction from 2011 of 9 and 13 percentage points respectively. It is reasonable to assume that the implementation of TLRS has had a positive influence on these results.

8. Behaviour Change

8.1 Number of Works Taking Place

Using data obtained from the Local Streetworks Register (LSWR), Table 11 shows the number of works that took place within TLRS and non-TLRS segments, separated into highway authority (TfL) and utility works, regardless of time of day and whether traffic sensitive or not.

Table 11: Number of Works on TLRS and Non-TLRS segments

Number of Works Completed on TLRS and Non-TLRS Segments			
	July 10 to March 11	**July 14 to March 15**	**% Change**
Highway authority (TfL) total	**15,027**	**16,188**	**8%**
TLRS segments	10,978	11,852	8%
Non-TLRS segments	4,049	4,336	7%
Utility companies total	**5,733**	**5,019**	**-12%**
TLRS segments	3,873	3,517	-9%
Non-TLRS segments	1,860	1,502	-19%
Grand total	**20,760**	**21,207**	**2%**
TLRS segments	14,851	15,369	3%
Non-TLRS segments	5,909	5,838	-1%

The total number of works undertaken on TLRS and non-TLRS segments combined has increased by 2 per cent with a 12 per cent reduction by utility companies offset by an 8 per cent increase by the highway authority. One reason behind the relatively high number of highway authority works taking place is likely to be a result of the increased investment programme that is underway and has been scheduled for the next five years. This includes but is not limited to TfL’s £4 billion Surface Transport Investment programme.

It is worth noting that, while there was an 8 per cent increase in highway authority works in TLRS segments, 99 per cent of these works did not attract a Lane Rental

charge (as shown in section 8). This indicates that while a relatively large number of highway authority works took place, they are generally restricted to overnight or 'off-peak' hours (i.e. less traffic-sensitive times of day).

8.2 Changes to Planned Carriageway Works

Lane Rental days are those where works took place during chargeable hours. Table 12 shows the total number of Lane Rental days for carriageway works (only) that utility companies applied for and were approved in the monitoring period. As such it relates to just a subset of all works reported in Table 11.

Table 12: Planned Carriageway Utility Works on TLRS Segments (LR Days)

Planned carriageway utility works on TLRS segments (Lane Rental days)				
	Part 1 Oct 13 to Jun 14		Part 2 Jul 14 to Mar 15	
	Total	Proportion	Total	Proportion
Total requested Lane Rental days	3,900		2,736	-
Agreed Lane Rental days	1,003	26%	1,419	52%
Lane Rental days saved	2,987	74%	1,317	48%

Comparing Part 1 and Part 2 it was found that the overall proportion of Lane Rental days saved is lower in Part 2 (74 per cent in Part 1 and 48 per cent in Part 2). However, there was a 30 per cent reduction for the total amount of requested Lane Rental days between Part 1 and Part 2. This suggests that works promoters are reducing the amount of lane rental days they are requesting when first applying for the permit or agreeing to work within non-chargeable hours, indicating that they are being more conscious of peak period working.

As it can be seen from Table 12 above a total of 1,317 Lane Rental days were saved between July 2014 and March 2015 due to TfL liaising with promoters to reduce the length of time that the carriageway is occupied. The charges recovered between July 2014 and March 2015 were on average made up of 30 per cent low charge band and 70 per cent high charge band (See Table 16 below). Assuming the ratio between low and high charge bands on the network is 30:70 then there would be an average daily charge of £1,800, resulting in £2,370,000 worth of charges avoided.

8.3 Changes to Works in Traffic Sensitive Times

TfL has been proactive in approaching borough Environmental Health teams to allow extended working hours during night time periods and has already reached an agreement with a number of boroughs. The proportion of works taking place during the day or overnight is shown in Table 13. Note that the baseline dates run from October 2010 to June 2011. Data is not available prior to this and a 2011 to 2012 baseline could not be used as it would include the 2012 Clearway Scheme.

Table 13: Proportion of Day Time or Night Time Planned Utility Works

Proportion of Planned Utility Works Taking Place During the Day or at Night					
	Oct 10 to Jun 11*		Jul 14 to Mar 15		Percentage point increase in night time works
	Daytime	Night time	Daytime	Night time	
TLRS segments	89%	11%	75%	25%	14%
Non-TLRS segments	86%	14%	77%	23%	9%

*Data not available for first part of baseline period Jul 10 to Mar 11

Table 13 shows that the proportion of utility works taking place at night has more than doubled from 11 to 25 per cent in TLRS segments. Night time works also increased in non-TLRS segments, albeit to a lesser extent. The increase was 5 percentage points higher in TLRS segments than non-TLRS segments, showing that the TLRS is having a direct impact on the time of day that works take place in the TLRS; whilst the TLRN-wide increase hints at a wider indirect impact. Despite the increase in the number of night time works, there have been no reported increases in noise complaints from the borough Environmental Health teams.

9. Other Benefits of the Scheme

9.1 Collaborative Working

As discussed earlier, the TLRS encourages works promoters to minimise their duration of occupation of the street. One of the ways this can be achieved is through collaborative working, where promoters work within the same traffic management footprint or share trenches in order to avoid having to dig up the road a number of times.

Collaborative works that have taken place across the whole of the TLRN have been examined and are shown in Table 14. While it is not possible to separate out the numbers for the TLRS, these figures give a good indication of changes which have occurred in these segments.

Table 14: Collaborative Working Figures across the TLRN

Collaborative Working			
	Period 4 to Period 13 2010-2011	Period 4 to Period 13 2014-2015	% Change
Average monthly number of collaborative work sites	17	44	**159%**
Average monthly number of days of disruption avoided	123	125	**2%**

Table 14 shows works promoters are undertaking (159 per cent) more collaborative works, over a slightly longer average duration, meaning the number of days of disruption avoided has risen (2 per cent). Compared to the monitoring period for Part 1 the number has risen but the duration has dropped (35 to 44 and 173 to 125). One of the reasons behind the drop in duration is that the Part 1 monitoring period saw the completion of a few very large scale, long term projects, which incorporated a lot of collaborative works. For example the Bow Roundabout development which included improved cycling infrastructure and introduction of early-start cycle traffic signals.

9.2 Cost of Delay Savings

Within Appendix 1 two case studies have been analysed to assess the benefit of the TLRS. Costs of delay have been calculated which assess the impact of the roadworks and then compare them to the estimated impacts if the TLRS had not been in place.

The case studies below show that within the most sensitive areas of the network, the TLRS can prevent as much as £42,000 worth of delay per day. With over £8 million worth of delay saved in these two case studies alone (Table 17 and Table 20).

The two case studies below only represent 10 per cent of the total agreed Lane Rental Days. Therefore, whilst it is hard to monetise precisely the benefits the TLRS generates, it would be reasonable to assume that the true overall benefits are in the tens of millions of pounds.

9.3 Use of New Technology

The Lane Rental Governance Committee (LRGC) is formed of senior managers from TfL and utility companies who have responsibility for ensuring that the expenditure of surplus income generated from the TLRS in in accordance with DfT regulations.

The LRGC meet quarterly to review requests for funding from the net proceeds, which must be applied for purposes intended to reduce the disruption and other adverse effects caused by street works.

Applications must also directly or indirectly benefit London. This is not to say that items outside of London would not be considered, but they must have the potential to be used within London, for example the use of innovative technology.

The following is a list of funding requests that have been approved by the LRGC:

<u>Funding of Appendix A9 trial for Keyhole Technology</u>

Keyhole technology is not currently fully recognised in the industry standard specification (Specification for the Reinstatement of Highways (SROH)). In order for

this to happen a formal Appendix A9 trial is required to confirm robustness of the technique and methodology. The A9 trial is the required method in order to secure full recognition within the SROH and enable work promoters to reinstate the public highway to a recognised standard following the use of keyhole technology.

SOLO - Unmanned Sewer Inspection Robot

Current van based CCTV techniques for undertaking condition surveys of apparatus such as sewers and drains are time consuming, resource oriented and create traffic flow issues. Technology available in the USA autonomously inspects assets capturing increased volumes of data at 3 times the rate of existing processes, with an expected 75% reduction in highway occupation and decreased operational costs. Approval is given to fund a trial of the equipment within London.

SGN – Large CISBOT

CISBOT robots repair cast iron pipes by internally injecting all of the joints in a given block or area with an anaerobic sealant. The robotic joint sealing operation is performed live through one small excavation from the rear of a single box truck. The funding will be used to develop the system to operate inside a large 30” cast iron gas main which has never been previously done. Additional benefits include reduced traffic, disruption, noise, pollution and excavation required by other joint repair or pipe replacement methods such as encapsulation, direct burial or lining. This trenchless technology provides a significant reduction in work duration and allows a more accurate project planning process. The result is fewer road closures and delays from multiple excavations, restoration and required permitting.

Remote Access Portable Traffic Signals Control Equipment

This project will develop a portable traffic signal control system which provides safe and reliable traffic and pedestrian-crossing control, and which can be remotely controlled from TfL’s Urban Traffic Control (UTC) system. It will also provide promoters with guidance on remotely changing timings for temporary traffic signals. Benefits include better management of traffic flows and pedestrian-crossings around work promoters' road works, by giving TfL the ability to align portable signal timings with TfL's UTC system; reduced disruption to traffic flows at TfL modernisation sites, by eliminating "poles-in-barrels" installation work; reduced time to implement modernisation schemes by providing an alternative to “poles-in-barrels”; and a reduction in landfill waste.

Hammersmith Flyover - Reducing the Adverse Effects of Roadworks

The combination of implementing narrow lanes by using vario-guard, average speed cameras and provision of a vehicle recovery service enabled full capacity to be maintained throughout the daytime on the A4 Hammersmith Flyover - a busy strategic corridor running from Heathrow International Airport into Central London.

Previous works at this location required a 50% reduction in capacity in order to provide sufficient safety zones for operatives to work safely. The aggregated effect of introducing this package of extraordinary measures reduced the adverse effects that would have normally ensued had this roadworks been executed as before.

Pan-London Ironworks Summit / Workshop

A Pan-London Ironworks summit at the Transport Research Laboratory to establish proposals that minimise the amount of ironwork failures on the road network, and consequently reduce the number of customer complaints relating to these defective apparatus.

North South Cycle Superhighway - Future Proofing Network

Installation of 1770m of additional ducting that will future proof the network and reduce interventions from prospective utility providers. The ducts will be installed as part of the North South Cycle Superhighway Works. Chambers will be installed at specific intervals along the route, across road junctions and at locations of known developments.

Congestion Reduction Coordinator Resource

Funding for dedicated, experienced and technically astute resource to proactively lead on strategically reducing highway congestion as a result of roadworks, including promoting utility infrastructure master plans where localities of development are identified and seek out technological opportunities

10. The Financial Impact of the TLRS

Although TLRS charges do not apply 24 hours of the day, the scheme has increased the cost of carrying out works on the TLRN. This can be in the form of charges for undertaking works during traffic-sensitive times in TLRS segments, or as a result of changing working practices to avoid working during these periods of the day, such as additional overtime for staff working at night.

10.1 Number of Works Avoiding TLRS Charges

Table 15: Proportion of Works Avoiding TLRS Charges

Proportion of works in TLRS areas avoiding TLRS charges	
Promoter	**Jul 14 to Mar 15**
Transport for London	99%
Utility Companies	87%

Table 15 shows that 99 per cent of TfL works and 87 per cent of utilities works in TLRS areas completed within the reporting periods of 1 July 2014 to 31 March 2015 avoided TLRS charges. This is where works took place within TLRS areas but were planned to take place outside the chargeable, traffic-sensitive hours of the day.

10.2 Number of Works Incurring TLRS Charges

Table 16 relates to the value of TLRS charges recovered between July 2014 and 31 March 2015, regardless of whether the work took place in this period or earlier.

Table 16: Charges Recovered (Jul 14 - Mar 15) from Works Incurring a TLRS Charge

Sector	No. of Works for which Charges were Recovered	% Low Charges (£800/day)	% High/PP Charges (£2,500/day)	Total Charges Recovered	% of Total Charges Recovered
TfL	190	27%	73%	£1,705,400	36%
Water	157	26%	74%	£838,700	17%
Electric	155	35%	65%	£714,700	15%
Gas	117	29%	71%	£1,210,000	25%
Telecoms	106	30%	70%	£329,800	7%
Network Rail	0	-	-	-	-
Total	**725**			**£4,798,600**	**100%**

Despite all works sectors (excepting Rail) being charged for similar numbers of works (106 to 190) and attracting similar proportions of higher charges (65 to 73 per cent); TfL and the gas sectors paid considerably more charges in total, primarily due to higher average charges per work (approximately £9-10,000 compared with £3-5,000).

A shift can be seen when comparing this to Part 1 of the report where the majority of works took place within the low TLRS charge (£800/day). As a result the total amount of charges recovered has increased by £1.9 million (66 per cent) despite only a 9 per cent increase in the total amount of works for which charges were recovered.

11. **Summary**

The TLRS provides an incentive for behaviour change among works promoters in order to minimise the occupation of the carriageway at traffic-sensitive times of day in TLRS areas.

It was found that 99 per cent of TfL works and 87 per cent of utility works avoided attracting a TLRS charge over the period monitored in this report. Further analysis has shown that 25 per cent of utility works took place at night in TLRS segments, up 14 per cent from before the scheme was implemented. This demonstrates that promoters have been actively avoiding traffic-sensitive times of day since the TLRS began, and therefore avoiding charges.

Analysis shows that the total number of ‘Lane Rental days’ requested totalled 2,736, over 1,000 days less than in the nine months prior (Part 1). Despite this only 1,419 (52 per cent) were approved. This shows that TfL is taking an active role in ensuring that works promoters’ exposure to TLRS charges is minimised and the number of days of works during traffic-sensitive times is kept to a minimum.

The charges recovered between July 2014 and March 2015 were on average made up of 30 per cent low charge band and 70 per cent high charge band. Assuming the ratio between the low and high charge bands on the network is 30:70 then there would be an average daily charge of £1,800. With 1,317 Lane Rental days saved between July 2014 and March 2015, charges of £2,370,000 were avoided.

There was an increase in average monthly number of collaborative work sites amongst work promoters of 27 between the baseline and monitoring period. This saved 1252 days of roadworks taking place on the network.

Vehicle flow increased on average by 2 per cent within TLRS segments. This highlights the need for the TLRS as these roads have had an increasing demand over time compared to other parts of the network. This increased demand has also had a detrimental effect on JT and JTR in these areas. The segments of the original TLRS which were not included in the current scheme showed a 1 per cent reduction in vehicle flows. This justifies why these segments were taken out as there isn’t as much pressure on these areas of the network.

The total amount of works carried out by utility companies has reduced by 12 per cent, whereas works carried out by the highway authority (TfL) has increased by 8 per cent. As part of TfL’s efforts to tackle London’s rapidly growing population the Roads Modernisation Plan was launched – a £4 billion investment programme. This is currently underway to transform junctions, bridges, tunnels, cycling lanes and pedestrian areas; all of which is expected to put even more pressure on the network in the short term. The impact of this pressure on network performance has been

shown within this report and is expected to be reflected in future Lane Rental Reports.

Overall customer satisfaction continued to rise with only 45 per cent of London residents experiencing disruption due to roadworks in 2014, an improvement of 24 percentage points from 2010, and 6 percentage points from 2013. The greatest improvements in customer satisfaction can be seen by a 15 percentage point reduction in frustration from ‘major delays to a journey by bus, cycle, driving and walking as a result of roadworks’, and ‘unreliable journeys – not being able to predict accurately how long journeys will take’ between 2011 and 2014. Customer satisfaction that roadworks are taking place outside of busy times has also improved by 9 percentage points since the TLRS began.

Journey times and JTR within TLRS segments were not as positive as Part 1, showing deterioration. There are three key reasons for this:

- TLRS segments are more sensitive to network conditions with over 3,000 (29 per cent) more vehicles per lane a day than non-TLRS segments – a significant additional volume
- Demand has increased network wide, but more so in the TLRS
- Two areas on or approaching the A406, which have both seen major works and higher than average flow increases have had a substantial influence on the overall journey times and JTR averages

The positive impact of the TLRs has ensured that the effect of these factors has been mitigated to a large extent as shown by the fact that serious and severe disruption in non-TLRS areas increased by 7 times more than it did in TLRS segments.

Overall the analysis of the TLRS areas adopted in July 2014 has shown benefits ranging from increased works overnight, reduced utility works within TLRS areas and increased collaborative working. Customer satisfaction has increased significantly indicating that TLRS is having a positive impact on London residents.

Two case studies (see Appendix 1) demonstrate that, even though roadworks cause disruption and cost, TfL involvement and influence on work management from the initial stages can result in significantly lower impacts. For example, the Marylebone Road and Euston Road case study showed that by carrying out works during a period which in the past has experienced a significantly lower vehicle flow over the Christmas and New Year period meant that disruption was kept to a minimum. By waiving the TLRS fee to encourage as many works promoters as possible to collaborate during this time, future disruption across 20 weekends was avoided, with an estimated delay savings of £2.9 million.

The Hammersmith Flyover case study compares two sets of roadworks one prior to the implementation of TLRS where one lane was shut (during 2012) and one after

TLRS implementation where both lanes remained open (during 2014). The results found that, although the 2014 works caused additional delay to journeys, this was not as high as the 2012 works whereby the greatest additional journey times were 6.2 minutes in 2012 compared with 1.4 minutes in 2014. It is estimated that the cost of delay was reduced by over £5 million by keeping both lanes open.

The case studies illustrate that on the more sensitive areas of the network, the TLRS can prevent as much as £42,000 worth of delay per day. Over £8 million worth of delay was saved in the two case studies alone. Whilst it is hard to monetise precisely the benefits the TLRS generates, it would be reasonable to assume that the true overall benefits are in the tens of millions of pounds.

This report shows that the TLRS has resulted in numerous benefits including reducing the amount of roadworks taking place during traffic sensitive times and the increased use of innovative traffic management and works techniques, leading to substantial savings in delay to road users. London's growing population and TfL's continuing roll-out of its Road Modernisation Plan means the TLRS will be more critical than ever in minimising the impact this extra utilisation of the road network will bring.

Appendix 1: Case Studies

The following two case studies consider individual areas and works, and the impact that they have had on the road network.

Case Study 1: Hammersmith Flyover Narrow Lanes

The Hammersmith Flyover forms part of the A4 corridor in the London Borough of Hammersmith and Fulham. It is located within the high charge band of the TLRS, applying to works from 06:30-20:00 on weekdays and 12:00-18:00 on weekends.

Prior to the implementation of TLRS in 2012, strengthening works to the Hammersmith Flyover were carried out which resulted in a reduction of carriageway running lanes from two to one in both directions. This caused congestion and delay throughout west London.

In January 2014 works were required to the central reserve. To carry out works, an adequate width of the central reserve was required to allow operatives access and to provide sufficient safety zones. This has previously required a lane two closure for works durations. To mitigate delay to traffic, the width of lanes were reduced to maintain two lanes in both directions.

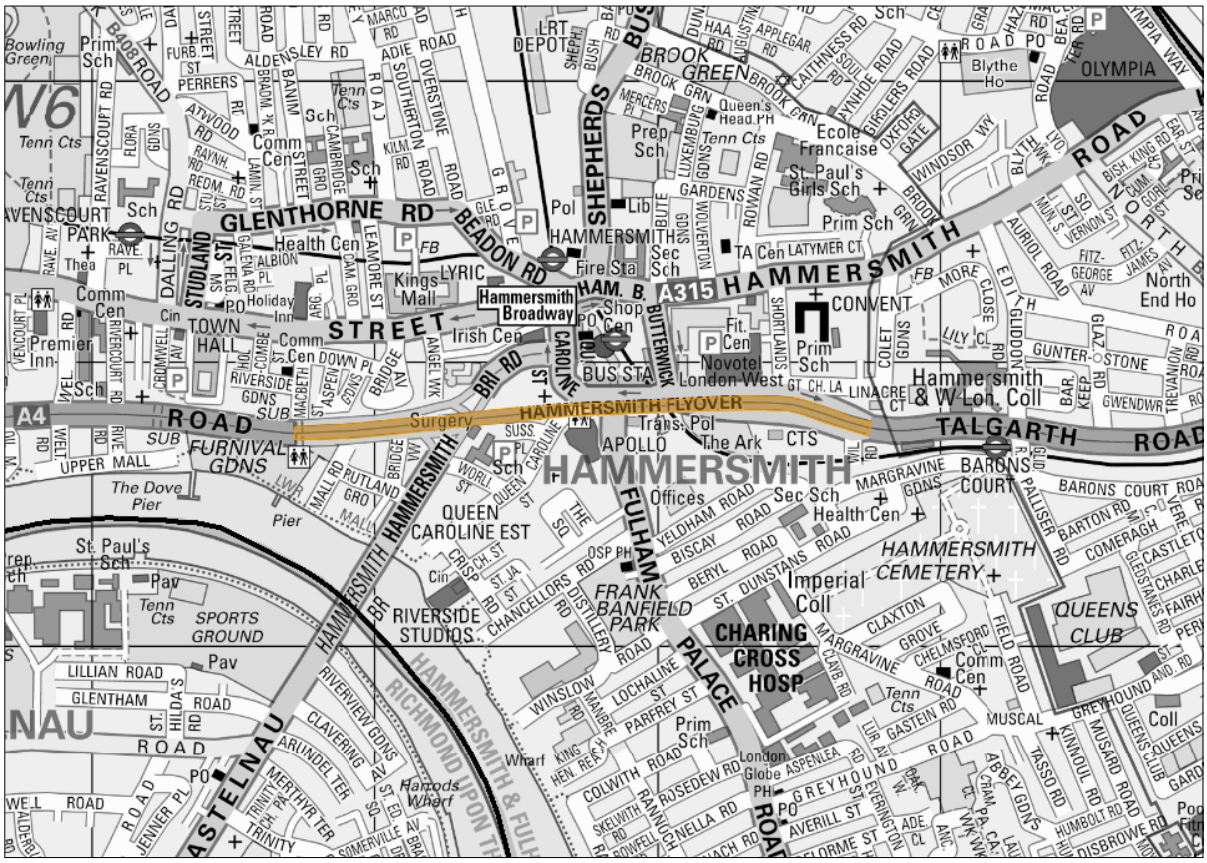
To allow the narrow lanes to operate efficiently and traffic to flow safely, various measures were put in place. These included:

- The use of vario-guard together with average speed cameras which allowed one of the lane widths to be taken down to an absolute minimum while HGV's were restricted to the other lane
- The provision of recovery vehicles to remove broken down vehicles as quickly as possible
- The shift of lanes outwards to utilise the hardstrip.

LRGC decided to fund this scheme as it used innovative traffic management and working practices. It was hoped that more works promoters would also do the same in the future.

Figure 7 shows the location of the Hammersmith Flyover in the context of its surrounding area.

Figure 7: Hammersmith Flyover



i. Analysis Approach

Journey times and JTR has been analysed using LCAP data to compare the effects of the 2012 and 2014 works. The dates of the works and the baseline period are listed below:

- Baseline 2013 – 2 January 2013 to 10 May 2013
- Works 2012 – 16 January 2012 to 2 March 2012
- Works 2014 – 2 January 2014 to 10 May 2014

A longer baseline period has been chosen which correlates with the 2014 works. During the baseline period there were some night closures to the Hammersmith Flyover, these dates have been taken out from the analysis so as not to influence the overall averages.

Vehicle flow has not been analysed in detail within this case study as there is not an Automatic Traffic Counter (ATC) located within a suitable distance to the Hammersmith Flyover.

ii. Average Journey Times

Figure 8 and Figure 9 show the average journey times recorded east and westbound on the Hammersmith Flyover.

Figure 8: Average Journey Times - Eastbound

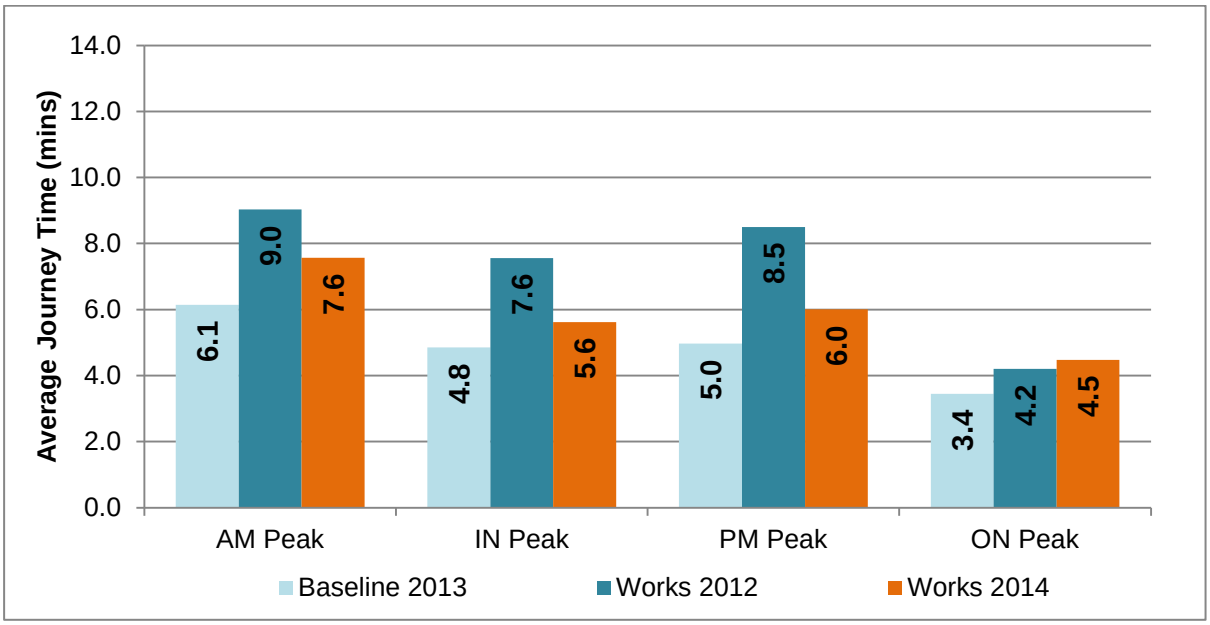


Figure 8 shows journey times eastbound were highest during the 2012 works throughout the AM, Inter and PM peaks by up to an additional 3.5 minutes compared to the baseline period. Whereas the additional journey time during the 2014 works only varied between 0.8 and 1.4 minutes. Comparing the 2012 and 2014 works, journey times were between 1.5 and 2.5 minutes shorter during the AM, Inter and PM peaks during the 2014 works.

Figure 9: Average Journey Times - Westbound

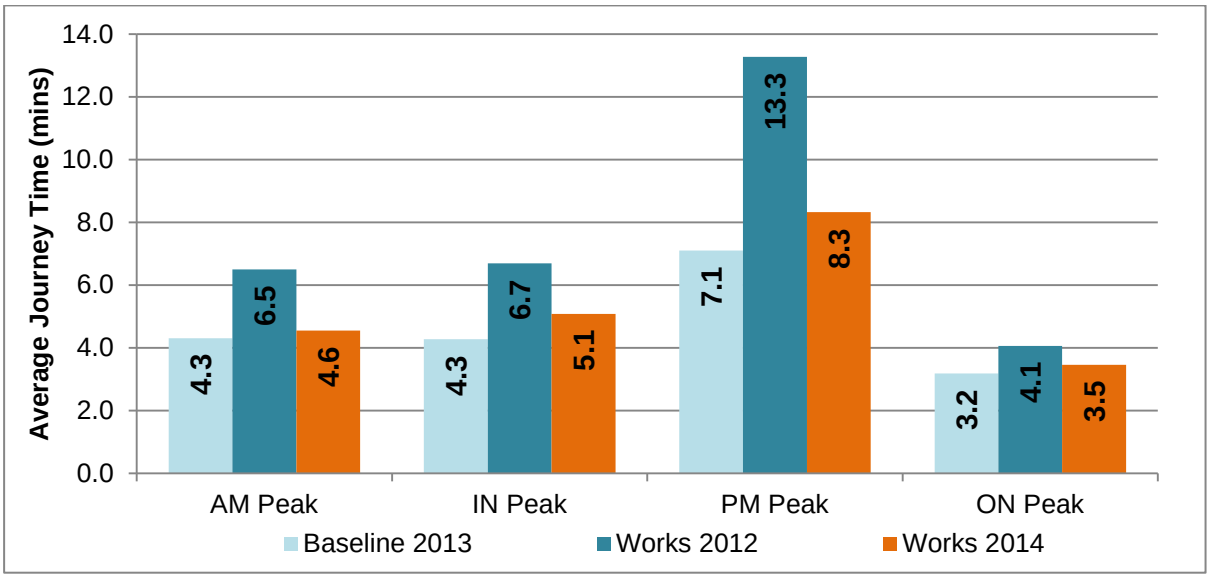


Figure 9 shows that all average journey times westbound were higher during the 2012 works compared to the 2014 works and baseline period. The PM peak was the most affected with journey times increasing on average by 6.2 minutes compared to the baseline. The 2014 works increased average journey times between 0.3 and 1.2 minutes with the PM peak also showing the greatest increase.

iii. Average Journey Time Reliability

Figure 10 and Figure 11 show the JTR on the Hammersmith Flyover by direction.

Figure 10: Average Journey Time Reliability - Eastbound

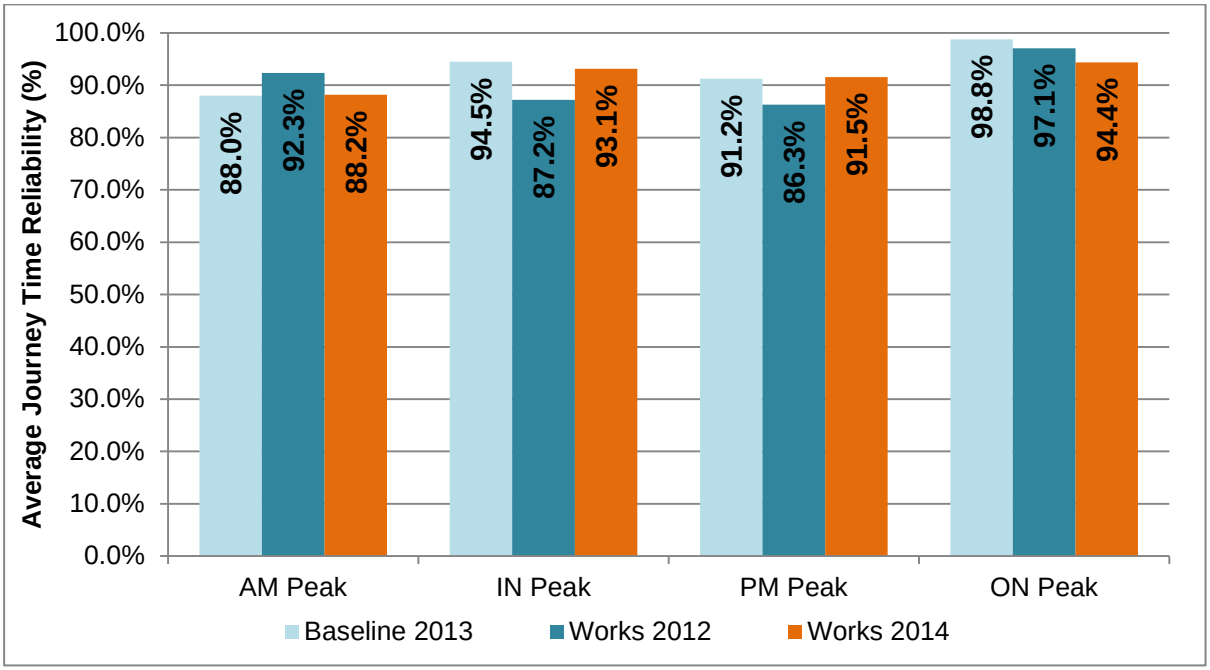


Figure 10 shows that JTR eastbound during the 2014 works was above baseline in the AM peak, and better than the 2012 works in the Inter and PM peaks, with a marginal drop compared to baseline ranging between 0.2 and 1.4 per cent.

Figure 11: Average Journey Time Reliability - Westbound

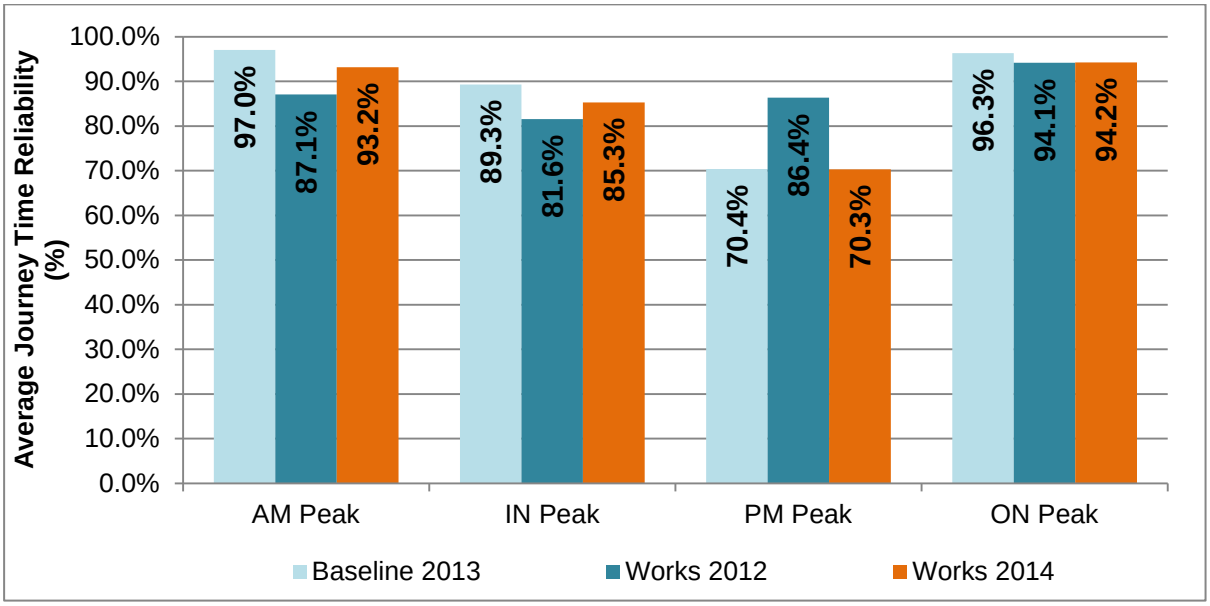


Figure 11 shows that during the AM and inter peak periods JTR westbound dropped by less in 2014 compared to the baseline (3.8 and 4.0 percent) than in 2012 (9.9 and 7.7 per cent). During the PM peak the JTR during the baseline and 2014 works are very similar with only a 0.1 per cent difference, illustrating that the works had a very small impact. The 2012 works however show a large improvement in JTR during the PM peak. Referring back to Figure 9 the average journey times during the PM peak westbound increased by 6.2 minutes. This suggests a rare case of relatively stable longer journey times.

iv. Cost of Disruption

The impact of the delay to vehicles during the 2014 works is estimated to have been £2.5 million, as seen in Table 17. This is using an approximate average cost per vehicle delay, per hour of £19.09, with delay figures coming from LCAP and flows from the Department of Transport Traffic Count database. The works lasted 128 days and data for this period has been compared with the same period in 2013.

The 2012 works took place over considerably fewer days than the 2014 works and yet are estimated to have had a higher cost of delay of nearly £3 million. Scenario C looks at the potential cost of delay should the 2014 works have been reduced to one lane. This is done by assuming the same level of delay seen during the 2012 works but applying 2014 flows, over 128 days. It is estimated that the cost of delay would have been nearly £8 million. Therefore the estimated benefit in reduced delay is £5,360,000; a saving of 68 per cent.

Table 17: Estimated Financial Benefit

Scenario	Description	Days	Average Annual Daily Flow	Average 24 Hour Delay	Impact	Notes
A	Actual impact of 2014 works	128	2014 Daily Average *(74,500)*	Actual *(0.8 mins)*	£2,519,900	The actual cost of delay of the works which took place during 2014, keeping both lanes open
B	Actual impact of 2012 works	46	2012 Daily Average *(78,006)*	Actual *(2.6 mins)*	£2,964,500	The actual cost delay of the works which took place during 2012, reduced to one lane in each direction
C	Estimated impact if 2014 works had been reduced to one lane in each direction similar to the 2012 works	128	2014 Daily Average *(74,500)*	2012 Delay *(2.6 mins)*	£7,878,300	The cost of delay assuming the same amount of delay seen during 2012 but using 2014 flows, over 128 days
	Estimated benefit in reduced delay (scenario C-A)				**£5,358,400**	

v. Summary

Figure 8 to Figure 11 highlight some of the impacts that the Hammersmith Flyover 2014 work had. Overall, journey times and JTR were affected by the works throughout the day in both directions with peak journey times increasing up to 1.4 minutes and JTR reducing as much as 4 per cent. However the 2012 impact was substantially worse with peak journey time increases of up to 6.2 minutes and JTR reducing up to 9.9%, thus it is clear the innovative traffic management funded via the TLRS provided substantial benefits.

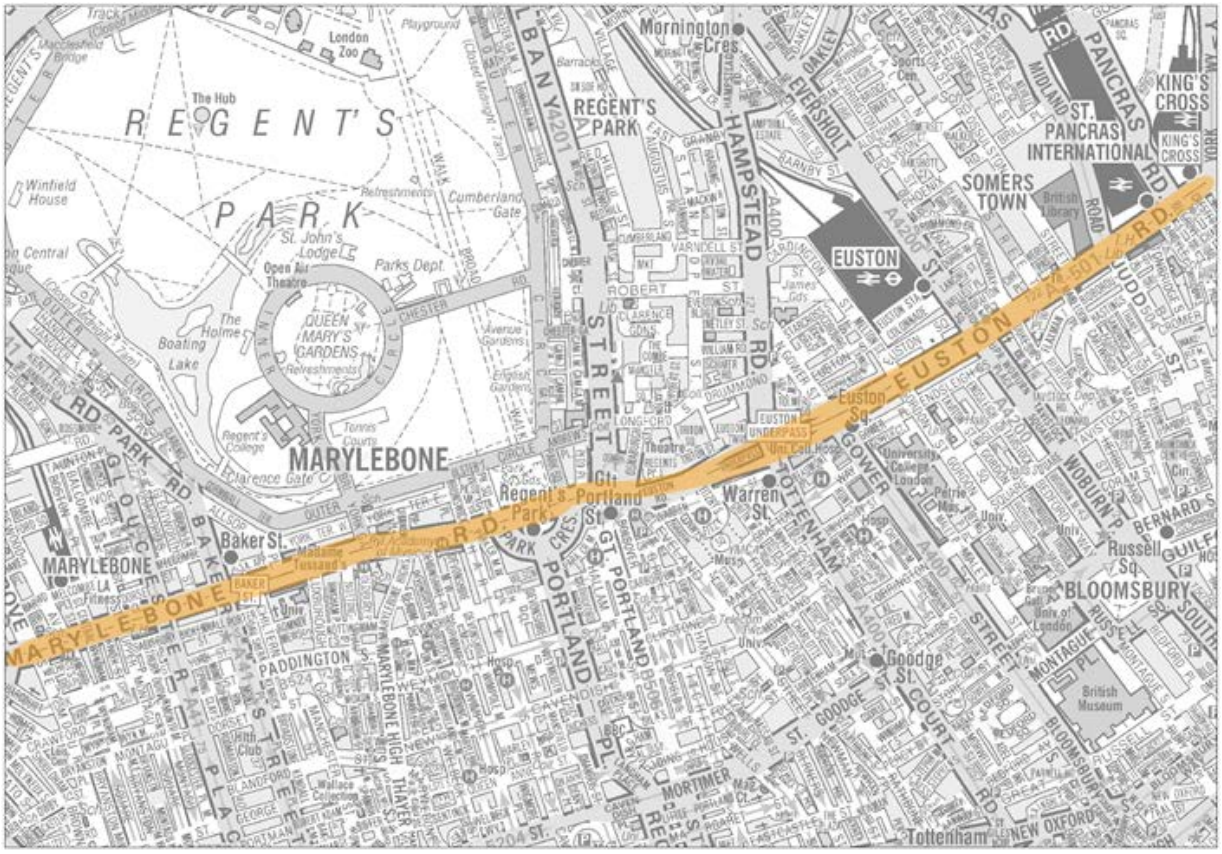
It is estimated that the cost of the impact was over £5 million less than it would have been had the works been reduced to one lane in each direction (Table 17). This highlights the importance of TLRS and that encouraging works promoters to be more innovative in their traffic management can lead to significant savings.

Case Study 2: Marylebone Road and Euston Road Christmas / New Year 2014/2015

Marylebone Road and Euston Road form part of the A501 within the London Boroughs of Camden and Westminster. The A501 corridor is considered to be one of the busiest corridors into London. Marylebone Road and Euston Road are within the higher charge band of the TLRS, applying to works from 06:30-22:00 on weekdays and 12:00-18:00 on weekends. This case study explores the impacts of collaborative works which took place during Christmas and New Year 2014 and 2015.

Figure 12 shows the location of Marylebone Road and Euston Road in the context of its surrounding area.

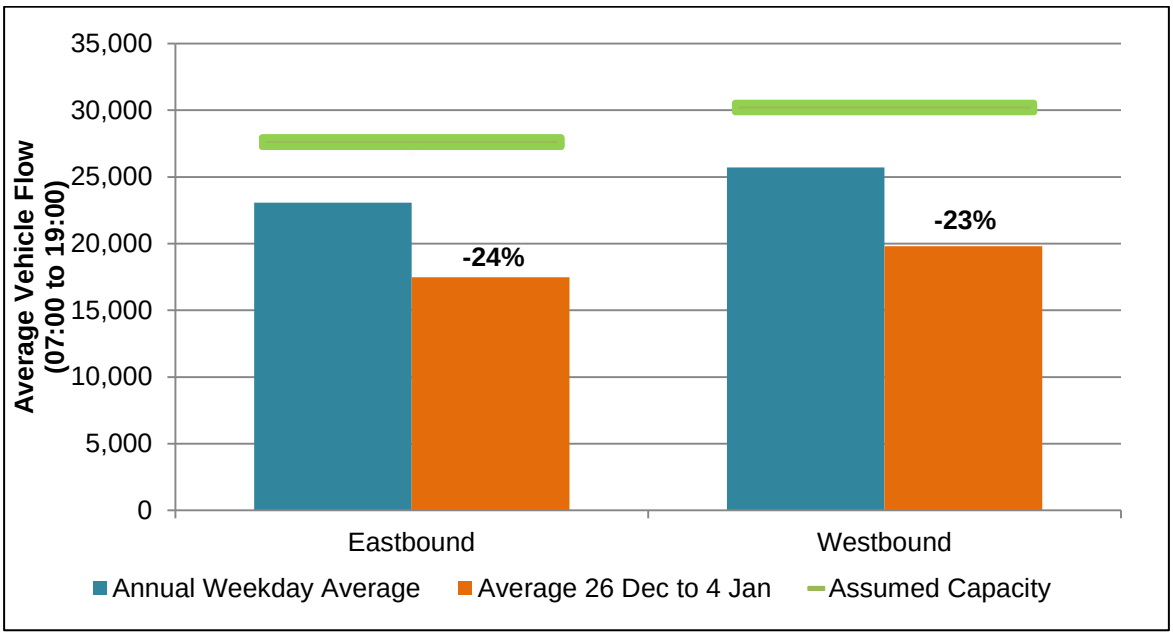
Figure 12: Marylebone Road and Euston Road



There were a number of works which needed to take place on Marylebone Road and Euston Road. A study was carried out on a year's worth of data from an ATC located on Marylebone Road to determine when the flows were lowest and the works would cause least disruption. The aim was to co-ordinate as many works as possible during the same period.

Figure 13 shows that the annual average weekday vehicle flow data along this corridor fell by 24 per cent over Christmas and New Year when compared to other times of year.

Figure 13: Changes in Flow



The study concluded that the collaborative works should take place between 26 December 2014 and 4 January 2015. TfL and LRGC agreed to waive the TLRS fees for the duration of the works, to try and encourage as many collaborative works within the area.

In total 202 works were completed during the 10 day period which included:

- Urgent gas and water works requiring the closure of the two offside lanes, whereby National Grid and Thames Water agreed to work together in this shared road space
- At the same location, TfL needed to construct a kerb build-out to prevent illegal left-turns into Marylebone High Street. It was done by sharing a lane closure with National Grid for further planned gas work
- Numerous other works included tree pruning, yellow box junction marking, carriageway patching, duct clearance work and cabling work.

It was estimated that the works would have alternatively taken place over 20 weekends.

i. Analysis Approach

Journey times and JTR were analysed using LCAP data to compare the effects of the works against a baseline of the same dates a year prior. Vehicle flows and any recorded disruption from the works were also evaluated. The final part of the analysis looks at the cost of disruption from the works and compares it to the predicted cost of disruption if the works were to have taken place over the estimated 20 weekends.

ii. Average Journey Times

The works on the A501 had a negative impact on journey times in the Inter and PM peaks. This was felt most prominently in the PM peaks north-eastbound, with journey times being as much as eight minutes longer than they were over the same period a year beforehand. South-westbound saw little to no impact during the works with journey times slightly improving.

Table 18: Change in Journey Times

Change in Average Journey Times (mins)												
	26 Dec 13 to 4 Jan 14				26 Dec 14 to 4 Jan 15				Change			
	AM Peak	IN Peak	PM Peak	ON Peak	AM Peak	IN Peak	PM Peak	ON Peak	AM Peak	IN Peak	PM Peak	ON Peak
NE Bound	6.8	7.6	9.2	5.2	6.7	10.4	17.2	4.4	-0.1	2.8	8.0	-0.9
SW Bound	9.5	12.7	13.6	6.1	9.3	12.4	12.6	5.0	-0.3	-0.2	-1.0	-1.1
Both	8.2	10.1	11.4	5.7	8.0	11.4	14.9	4.7	**-0.2**	**1.3**	**3.5**	**-1.0**

iii. Average Journey Time Reliability

The JTR has been normalised as some LCAP links used within the analysis will have higher weighting than others due to differences in flows and lengths. Table 19 shows a reduction in JTR overall whilst the works were taking place, especially during the Inter and PM peaks, where it was as much as 24 per cent lower than the baseline period north-eastbound.

Table 19: Change in Journey Time Reliability

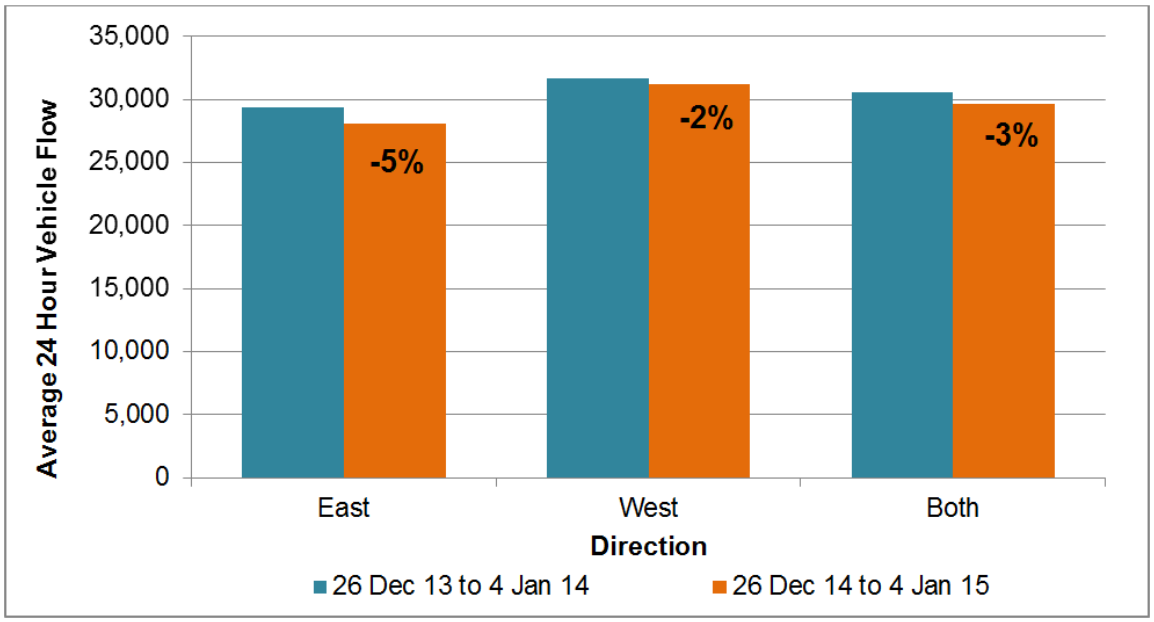
Change in Average Journey Time Reliability												
	26 Dec 13 to 4 Jan 14				26 Dec 14 to 4 Jan 15				% Change			
	AM Peak	IN Peak	PM Peak	ON Peak	AM Peak	IN Peak	PM Peak	ON Peak	AM Peak	IN Peak	PM Peak	ON Peak
NE Bound	93.8%	95.6%	92.6%	93.3%	90.3%	71.7%	73.5%	93.5%	-3.4%	-23.9%	-19.1%	0.2%
SW Bound	93.3%	88.1%	83.9%	93.4%	87.5%	86.1%	89.5%	96.1%	-5.8%	-2.0%	5.5%	2.7%
Both	93.5%	91.7%	88.2%	93.4%	88.9%	79.1%	81.7%	94.9%	**-4.6%**	**-12.7%**	**-6.5%**	**1.5%**

iv. Vehicle Flows

Figure 14 shows the change in average 24 hour vehicle flows. There was an overall 3 per cent reduction in vehicle flows, with the eastbound carriageway experiencing a 5 per cent decrease. The reduction in flow is likely to have had a positive effect on

the journey times as the AM peak in particular did not see an increase in journey times overall.

Figure 14: Change in Average 24 Hour Vehicle Flow



Prior to the works commencing in 2014 many notices were issued informing the public of the works, and asking them to try and avoid the area where possible. The overall lower flows common at this time of year suggests that the impact would have been considerably worse at an alternative time of year when flows would be at a higher level.

v. Disruption due to Marylebone Road Roadworks Christmas / New Year 2014/2015

The works on the Marylebone Road and Euston Road resulted in 2.4 hours of serious and severe disruption and 231 hours of minimal and moderate disruption. These values were obtained from TIMS.

vi. Cost of Disruption due to Marylebone Road and Euston Road Roadworks Christmas / New Year 2014/2015

The impact of the delay to vehicles using this section of the A501 caused by the planned works is estimated to have been £450,000, as seen in Table 20. This is using an approximate average cost per vehicle delay, per hour of £19.09, with delay figures coming from LCAP and flows from the ATCs used above. The works lasted ten days and data for this period has been compared with the same ten day period in 2013.

Table 20 shows three other scenarios which have been created to analyse the impact of the works if they were to take place over either a separate ten day period or the estimated twenty weekends. Scenario ‘B’ looks at the cost of delay assuming that there would be the same delay per vehicle, but using normal flows over a ten day period. It is estimated that this would have a total cost delay of £600,000.

Scenarios ‘C’ and ‘D’ look at the cost of delay if the works were to take place over a twenty weekend period. Scenario ‘C’ looks at the actual delay seen during the Christmas 2014 works, using normal weekend vehicle flows. Normal weekend flows have been calculated by taking an average of weekend flows recorded within October 2014.

Scenario ‘D’ is similar to ‘C’ however the delay has been uplifted to account for the effect of higher flows which would be expected at other times of the year. The estimated cost of delay of the works to be carried out over twenty weekends is over £2.4 million and £3.4 million respectively.

Comparing this last scenario with the actual cost of congestion there was over a £2.9 million cost of delay saving by carrying out the works during Christmas and New Year 2014/2015 compared to carrying out the works over twenty weekends.

It should be noted however that the data available only enables a journey time and a cost analysis on vehicles using this section of the A501. It is likely that the works would have also affected local roads in the area and beyond. Given this, the estimated cost of the closure to the wider network is likely to be higher than the numbers in Table 20.

Table 20: Estimated Financial Benefit of Works Taking Place over the Christmas Period

Scenario	Description	Days	Flow	Delay	Impact	Notes
A	Actual impact over Christmas 2014 (when flows are reduced)	10	Actual	Actual	£454,200	The actual cost delay of the works which took place over Christmas 2014
B	Estimated impact if affecting normal levels of traffic (to the same degree)	10	Normal	Actual	£597,200	The cost of delay, assuming the same delay per vehicle, but normal weekend flows.

C	Estimated impact if affecting traffic over 20 weekends (to the same degree)	40	Normal	Actual	£2,388,600	As above, but assuming works took place over 20 weekends
D	Estimated impact if affecting traffic over 20 weekends, with higher average delay	40	Normal	Uplifted to account for higher flow	£3,378,200	As above, but assumes a proportional increase in delay equivalent to the ratio of normal weekend journey times to (lower) Christmas 2013 journey times. This is still considered conservative and was done at peak period level, giving an overall uplift of 41%
	Estimated benefit in reduced delay (scenario D-A)				**£2,924,000**	

vii. Summary

Table 18 to Table 20 highlight the benefits of carrying the work out over the festive period – the closure still had an effect of up to an additional 8 minutes in average journey times and a reduction of 24 per cent JTR when flows were 24 per cent lower than normal. The flows were also lower than the previous Christmas and New Year period by approximately 3 per cent, showing that the public may have avoided the area due to advance warning signs giving information about the works which were proposed.

The works resulted in 2.4 hours of serious and severe disruption over the 10 day period. If the works had been carried out at any other time of year it is likely that journey times, JTR and hours of disruption would have been much worse than this, and the impacts could have affected tens of thousands of more vehicles each day of the works, being felt over a significantly wider area.

It is estimated that the cost of the impact was around £2.9 million less than it would have been had the works not taken place over the Christmas period. Due to the nature and number of the works taking place, there would never have been a good time for them to be carried out. However, by waiving the TLRS charge and thus encouraging as many works as possible to be carried out over Christmas and New Year, the severe impacts were considerably mitigated.

Case Studies Summary

The Hammersmith Flyover 2014 works saw that by using innovative traffic management both lanes in each direction were able to remain open. In addition, when comparing the 2012 and 2014 works, one before and one after the implementation of the TLRS, it was seen that the works after the implementation had more prior planning and mitigation measures implemented resulting in a much lower negative impact on journey times and JTR. It was estimated to have saved over £5 million in delay costs by keeping both lanes open.

The Marylebone Road and Euston Road works showed that by carrying out works during a period which in the past has experienced a significantly lower vehicle flow, meant that disruption was kept to a minimum. The cost analysis showed that if the works had been carried out over the predicted 20 weekends the additional cost of delay would have been almost £3 million.

The Hammersmith Flyover and Marylebone Road case studies demonstrated that TfL can be extremely flexible with regards to waiving TLRS charges or funding schemes for both TfL and utility companies in order to reduce the negative impact of certain roadworks as much as possible. The case studies showed that, even though the works caused considerable disruption and cost, there would never have been a good time for them to take place. However, by managing them in this way the cost, disruption and effect on journey times was substantially lower than what it would have been at any other time of the year.

Overall, these case studies indicate that the TLRS has had a positive impact on improving journey times and JTR, reducing the number of works taking place in the carriageway and the duration of these works, and minimising the cost of disruption when major works have taken place.

Appendix 2: Financial Summary

Table 21 displays the financial summary of the TLRS by financial year.

Table 21: Financial Summary

£m	01 Apr 12 to 31 Mar 13	01 Apr 13 to 31 Mar 14	01 Apr 14 to 31 Mar 15
Income	1.9	3.6	6.3
Scheme Development & Running Cost	-1.6	-1.4	-1.9
Net Income from Streetworks	0.3	2.2	4.3
Opening Reserve	-	0.3	2.5
Net Income from Streetworks	0.3	2.2	4.3
Closing Reserve	0.3	2.5	6.8