LONDON CONGESTION TRENDS

MARCH 2016

INRIX

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Project Summary

The annual INRIX Scorecard shows that London continues to be one of the most congested cities in the world. Congestion has a significant impact on cities—both on businesses that drive economic growth and on individuals' quality of life. While increased congestion is generally a result of a growing and vibrant economy, it may ultimately stall economic growth if not addressed.

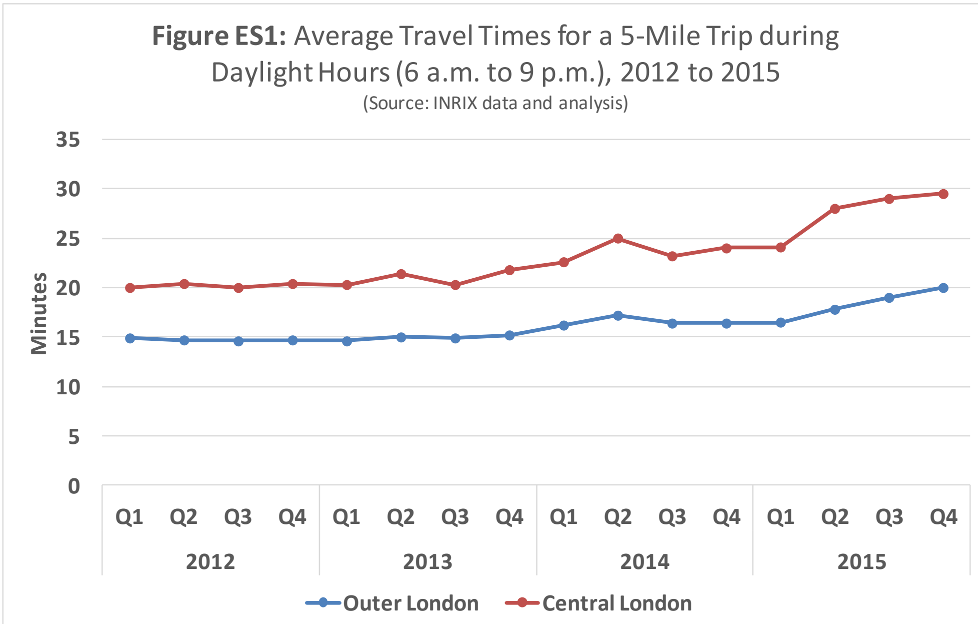
Traffic congestion is caused when the demand for space on the road network exceeds the supply. In order to understand the changes in the supply and demand elements, data was analysed from a range of high quality sources including the Department for Transport, Transport for London and the Office for National Statistics, along with INRIX's own traffic data. This study utilises information from 2012–2015 from these data sources to consider each of the factors that could impact congestion and to build up a multi-faceted picture of the causes of congestion.

Key Conclusions

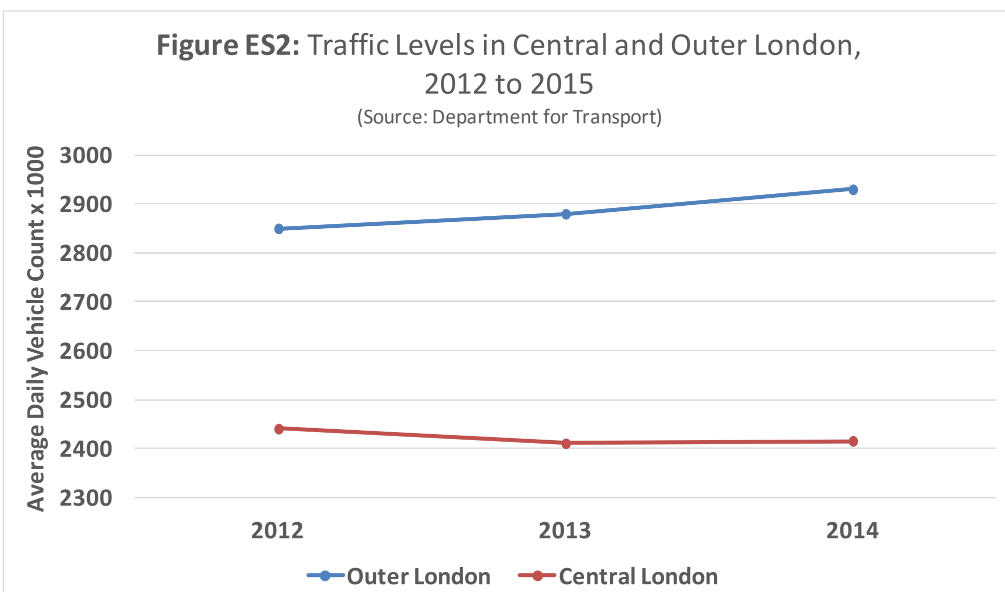
- Congestion in London has risen noticeably between the years of 2012 and 2015 with journey times in Central London increasing by 12% annually.
- Car traffic, including taxis and private hire vehicles (PHVs), is decreasing in Central London and the Congestion Charge Zone (CCZ); thus, as a category, cars are not causing an increase in congestion in these area
- Roadway travel demand, as seen in vehicle counts, is flat or decreasing in Central London and increasing only slightly in Outer London; increased use of alternate modes of transit may explain why roadway traffic volumes remain flat.
- Light goods vehicle (LGV) traffic is increasing in Central London, possibly related to the rise in ecommerce. This is the only vehicle type to show more roadway volume in all three zones of London.
- One of the most significant drivers of increased congestion in London is roadworks, increasing 362% during the study period.

Findings

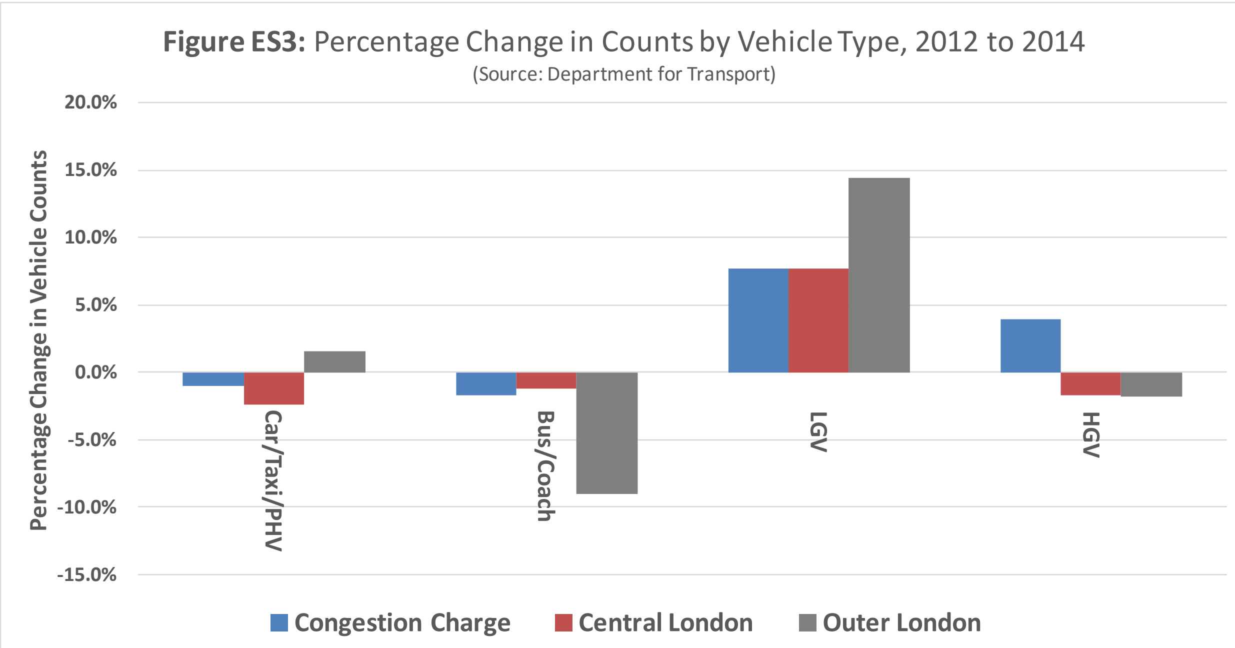
Congestion in London has increased each year during the study period, especially in Central London.



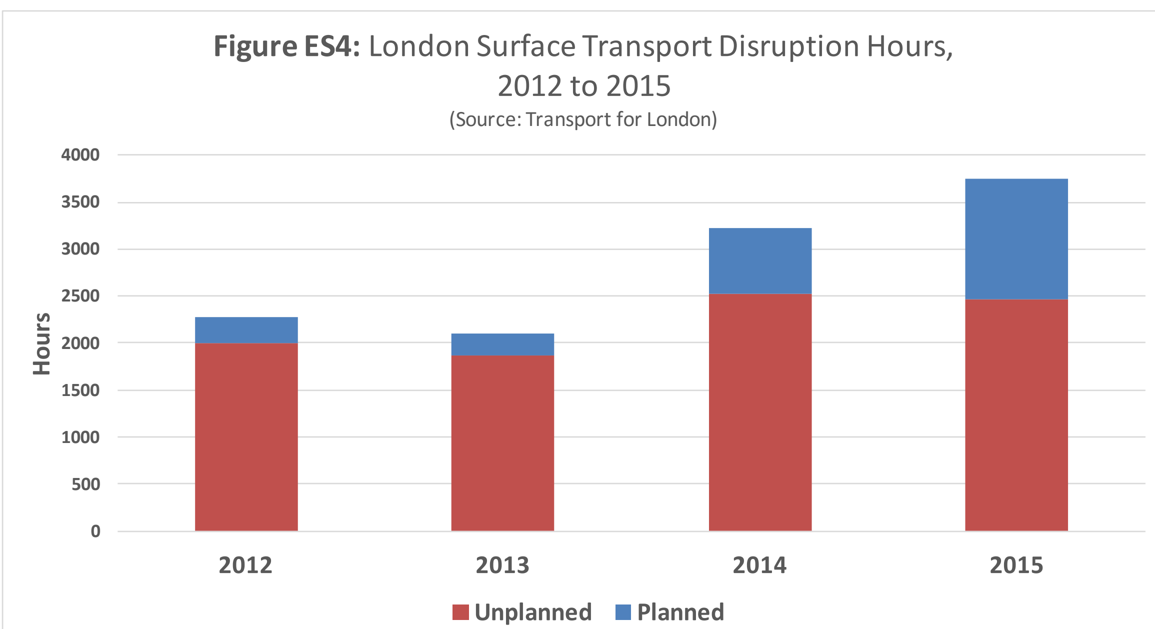
Economic data indicate that the London economy and population are both growing which would normally be associated with an increase in travel demand. Further, both unemployment and petrol prices are down, both of which are also generally associated with increased road traffic. However, overall traffic volumes in Central London have remained flat or decreased during the study period.



Travel by car, including taxis and private hire vehicles, has decreased during the study period in the Congestion Charge Zone and Central London, while increasing only slightly in Outer London. The significant increase in light goods vehicles (LGVs) is likely the result of increased deliveries due to the rise in ecommerce.



Further, road supply is restricted by an increase in planned and unplanned incidents, with a significant increase in disruption hours due to planned construction during the study period. This contraction in supply is one of the primary causes of congestion.



Congestion is increasing, while roadway travel demand remains flat. Data suggest that the increased demand is largely met by public transport and cycling. With a decrease in car travel, including taxis and private hire vehicles, in Central London, any change in the balance of vehicles between private cars, taxis and private hire vehicles is not contributing a net increase to road congestion. Reduction in roadway capacity due to planned roadworks is a primary cause of increased travel times.

Data Summary

Summarising key data elements since 2012 highlights the major contributors to congestion in London.

Table ES1: Data Summary
(Source: Multiple from this report)

Travel Time (Minutes) for 5 Mile Trip, Daytime Average — Congestion Charge Zone						
	2012	**2013**	**2014**	**2015**	**% change**	
	20.3	21.8	23.3	24.8	+22%	↑

Total of Average Daily Vehicle Counts ('000s) by Type — Congestion Charge Zone						
	2012	**2013**	**2014**		**% change**	
All Vehicles	436.9	431.6	439.2		+0.5%	↔
Car/Taxi/PHV	313.6	302.9	310.2		-1.1%	↓
Bus/Coach	33.0	33.4	32.4		-1.7%	↓
LGV	70.5	74.5	76.0		+7.7%	↑
HGV	19.8	20.8	20.6		+3.9%	↑

Disruption Hours (Planned and Unplanned) — London						
	2012	**2013**	**2014**	**2015**	**% change**	
Planned	227	239	690	1281	+362%	↑
Unplanned	1998	1863	2530	2461	+23%	↑

SECTION 1: INTRODUCTION

INRIX, a global leader for transportation analytics, released its latest *2015 Traffic Scorecard* report in March 2016. Each year, the *Scorecard* analyses and compares the state of traffic congestion in countries and major metropolitan areas worldwide. One key finding of this latest report is that, for the second year running, the most congested city in Europe is London.

Traffic congestion is caused when the demand for space on the road network exceeds the supply. There are many factors that can cause an increase in travel demand but they generally are related to an improving economy or increased population. Supply can be permanently increased by adding roadway capacity or permanently decreased by converting road space for other uses. Supply can also be temporarily decreased by roadworks and by unplanned incidents, such as accidents. It is important to note that the relationship between added trips and additional congestion is not linear as corridors reach ultimate capacity. Small increases in demand or decreases in supply can result in significant increases in delay as routes are at or over capacity. As road networks are more heavily utilised, they can reach a "tipping point" where a small increase in demand can have a disproportionately large impact on overall congestion.

While congestion may be seen as an indicator of a thriving economy, its presence compromises the ability of a city to function efficiently. For its citizens, rising traffic levels impede movement, reduce the time available to spend on other activities, and increase frustration levels. For its businesses, more congestion translates into greater difficulty in transporting goods around the city. In short, increased congestion leads to reductions in the quality of life and economic competitiveness of a city.

While it is easy to speculate on causes of the recent growth in London's congestion, solving any problem requires an awareness and understanding of its true cause. With this in mind, INRIX has conducted a deeper analysis to investigate why the city is experiencing higher levels of congestion with the intention of providing a valuable resource for informed discussions on the issue.

Following this introductory section, the paper is outlined as follows:

- Section 2 specifies the approach to the study and the data sources utilised;
- Section 3 characterises the condition of congestion in London;
- Section 4 discusses the principal economic drivers of travel demand;
- Section 5 quantifies actual roadway travel demand;
- Section 6 explores demand by mode of transit and vehicle types;
- Section 7 examines private hire vehicle traffic and its impact on congestion during peak hours;
- Section 8 presents findings on the impact of roadworks and incidents on road capacity; and
- Section 9 summarises the work and details the key findings.

SECTION 2: STUDY DESIGN

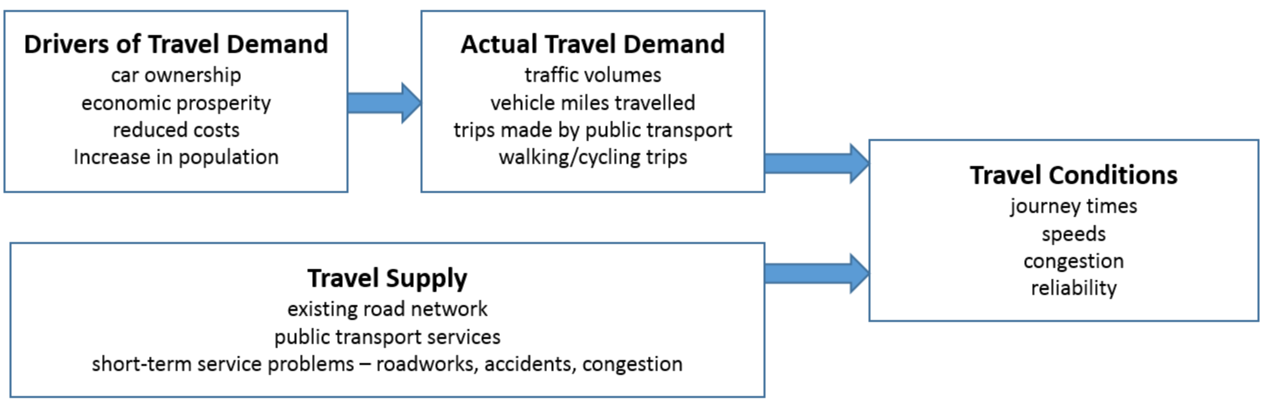
Approach

Congestion is a complex issue that manifests itself in a number of ways, some related to traffic phenomena and others (arguably more important) associated with business productivity and support for economic development. In simple terms, congestion problems involve extra travel time and/or unpredictable arrival times and are caused by an imbalance between travel demand and transportation capacity.

In reality, there are many interactions that can change this demand-and-supply dynamic on a daily—or even hourly—basis, such as planned events (roadworks), unplanned events (car crashes or other incidents), inclement weather, and other traffic disruptions. These interactions become even more complicated when also considering different modes of travel, like single-occupancy driving, bus, underground, taxis, private hire cars, cycling, and walking.

Figure 1 outlines the model used in this study to examine this complex issue. Specifically, travel conditions arise as the result of the interaction between travel demand and travel supply, and demand for travel is influenced by certain drivers such as changes in population.

Figure 1: Structure of Congestion Model



Utilizing this congestion model, the approach of this study is to investigate changes in the attributes of each of the four areas (drivers of travel demand, actual travel demand, travel supply, and travel conditions) and to attempt to understand the most likely driver(s) of congestion in London.

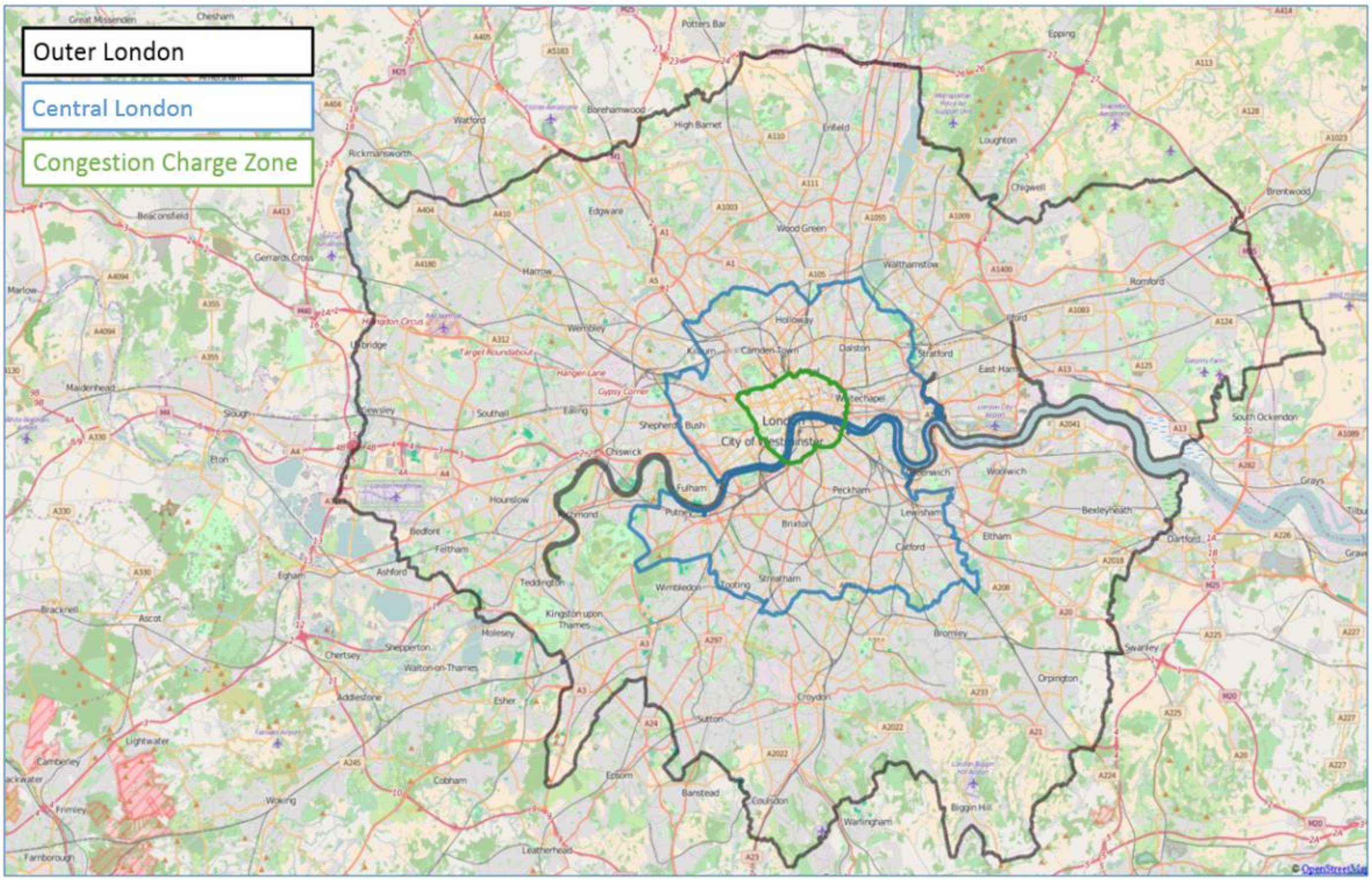
The study spans the years 2012 to 2015.

ZONE SYSTEM

London is a large city, with over 8 million inhabitants[1]. Attempting to identify causes of congestion while studying the city as a whole would fail to consider the varied nature within the city and the differing congestion patterns, particularly between Central London and outer areas. Therefore, for the purposes of the study, London is separated into zones as depicted in Figure 2.

A special focus was made on the Congestion Charge Zone. This district is considered separately as it is the most congested part of the city and the presence of the road user charge may lead to different congestion patterns emerging.

Figure 2: Study Zones



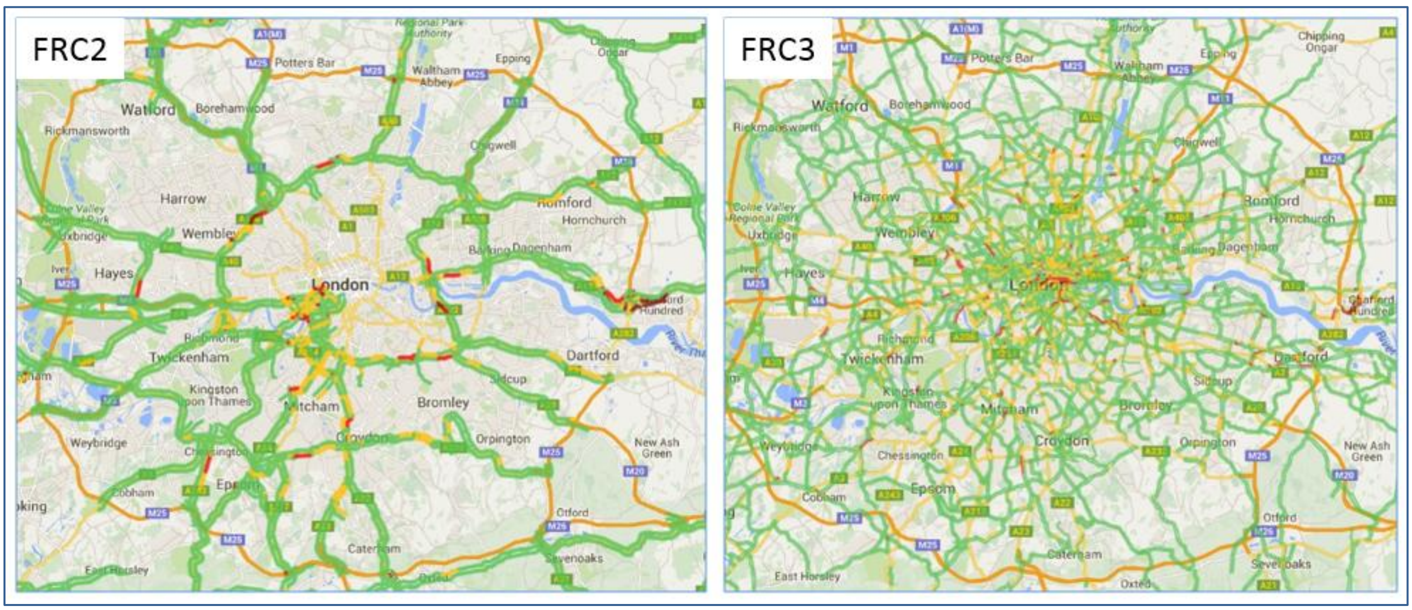
[1] Mid-Year Population Estimates 2014, Office for National Statistics

FUNCTIONAL ROAD CLASSES

In order to identify if the changes in conditions differ according to road type, London's road network is categorised into groups known as Functional Road Classes and analysed in this study for each road type.

The Functional Road Class (FRC) system is a hierarchal definition used by traffic specialists to describe a road's strategic national importance on a consistent basis across the world. The FRC system contains six separate classes named FRC1 to FRC6 in decreasing level of strategic importance. Within the London study area, the only FRC1 road is the M25. As this only crosses the periphery of the area of interest, it is not considered as part of this work. The two classes that are included, FRC2 and FRC3, are illustrated in Figure 3. For this study, they represent the major A-roads and all smaller streets, respectively.

Figure 3: Study Road Types



Data Sources

Several data sources were used to support the various aspects of this analysis. One of the main sources is data from INRIX's own network, which includes 275 million vehicles, smart phones, cameras, incidents and other sensors with the ability to cover nearly 5 million miles of roads, ramps and interchanges in over 45 countries. To complement the INRIX data, information is included from a variety of recognised authorities on UK transport, including the Department for Transport (DfT) and Transport for London (TfL). In addition, in an effort to understand the potential impact on congestion of the increase in private hire vehicle registrations, INRIX acquired data from Uber to specifically address this issue.

Table 1 specifies the data sources used during this study.

Table 1: Study Data Sources

Description	Source
Traffic Conditions	
Average Road Speeds	INRIX
Drivers of Travel Demand	
Economic Indicators	
Employment Figures	Greater London Authority
Gross Value Added	Office for National Statistics
Petrol Prices	Automobile Association
Population Data	Office for National Statistics
Vehicle Registrations	Department for Transport
Taxi and Private-Hire Vehicles	www.gov.uk
Actual Travel Demand	
Total London Vehicle Miles Travelled	INRIX
Travel in London Reports	Transport for London
London Traffic Count Data	Department for Transport
Vehicles Entering Congestion Charge Zone	Transport for London
Private Hire Vehicle Miles Travelled	Uber
Travel Supply	
Surface Transport Disruption Hours	Transport for London
Traffic Incidents by Severity	INRIX

SECTION 3: TRAFFIC CONDITIONS — CONGESTION IN LONDON

Weekday journey times have been calculated using INRIX's historical archive of information derived from floating vehicle car data (FCD). The information used was originally transmitted by GPS devices in vehicles making journeys throughout London. The FCD input data contain a high level of spatial and temporal precision, meaning it is possible to accurately derive the speeds of vehicles and clearly attribute these speeds to the specific sections of roads on which the vehicles are travelling.

For this study, the FCD archive for Greater London was analysed between 2012 and 2015. The analysis is broken out by geographic areas and road type delineated by FRC, as described in Section 2.

INRIX Journey Time Analysis

INRIX computes speed every minute on each segment of roadway in its coverage area and stores this information. This data can then be converted into various forms to conduct longitudinal studies of congestion, looking at speed, journey time, congestion levels, or various indices related to these elements. While all of these methodologies show the same relative trends, for this report, the basic data has been analysed and presented by considering what the average travel time would be for a hypothetical five-mile journey at different times during a typical weekday.

From Figure 4, which presents the trends for FRC2 roads, it is clear that journey times have increased over the study period and that conditions in Central London have deteriorated much more than in Outer London.

Figure 4: Average Weekday Journey Times for a 5 Mile Trip on FRC2 Roads, 2012 to 2015
(Source: INRIX data and analysis)

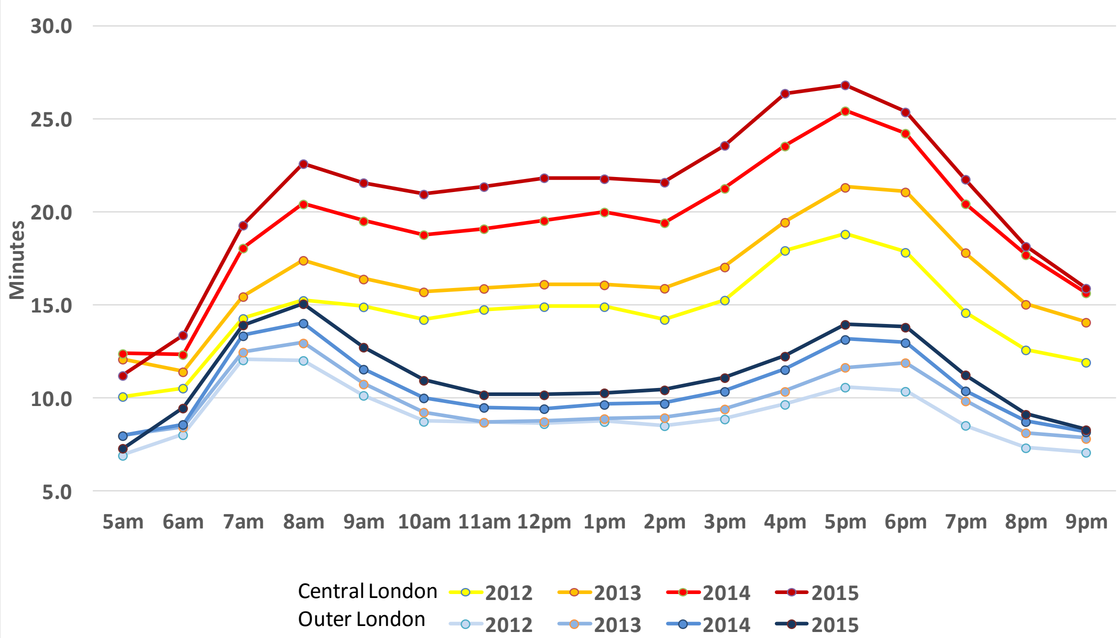


Figure 4 shows that congestion has increased across all daylight hours (not just during peak hours) in Central and Outer London. There has been 3- to 4-minute growth in travel time (30+ percent increase) from 2012 to 2015 in Outer London. In Central London, evening peak travel times have increased from 19 to 27 minutes (40+ percent), morning peak travel times have increased from 16 to 23 minutes (40+ percent), and inter-peak period travel times have increase from 23 to 35 minutes (50+ percent).

A similar situation is seen on FRC3 roads, as shown in Figure 5. As was the case for FRC2 roads, Central London has experienced a larger increase in journey times and a worsening of conditions for all hours of the day.

Figure 5: Average Weekday Journey Times for a 5 Mile Trip on FRC3 Roads, 2012 to 2015

(Source: INRIX data and analysis)

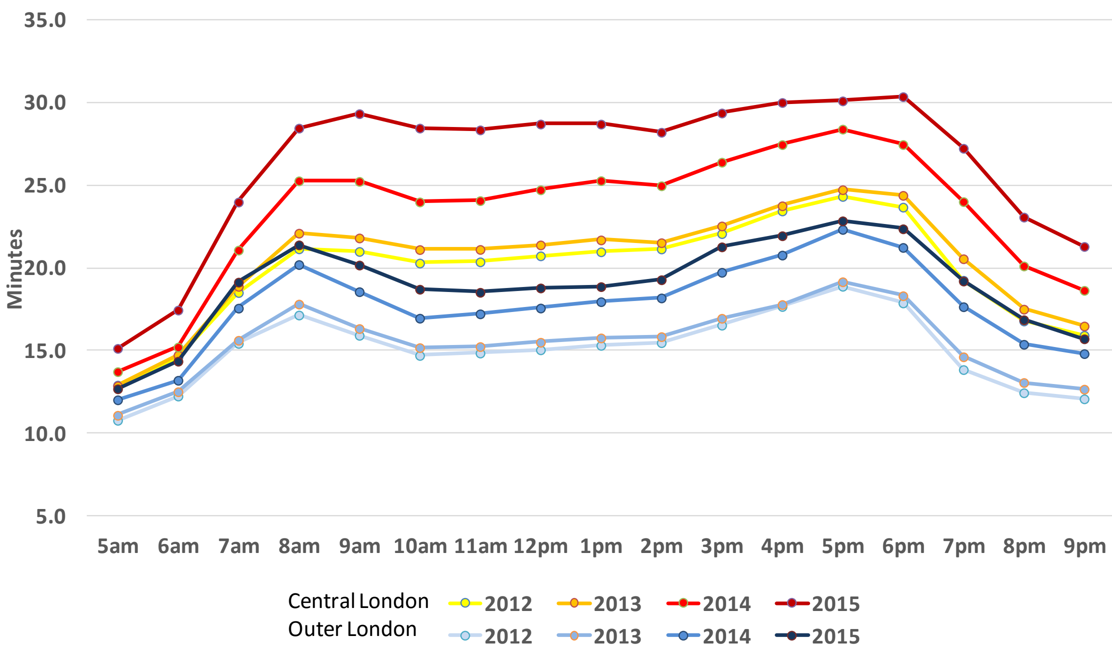
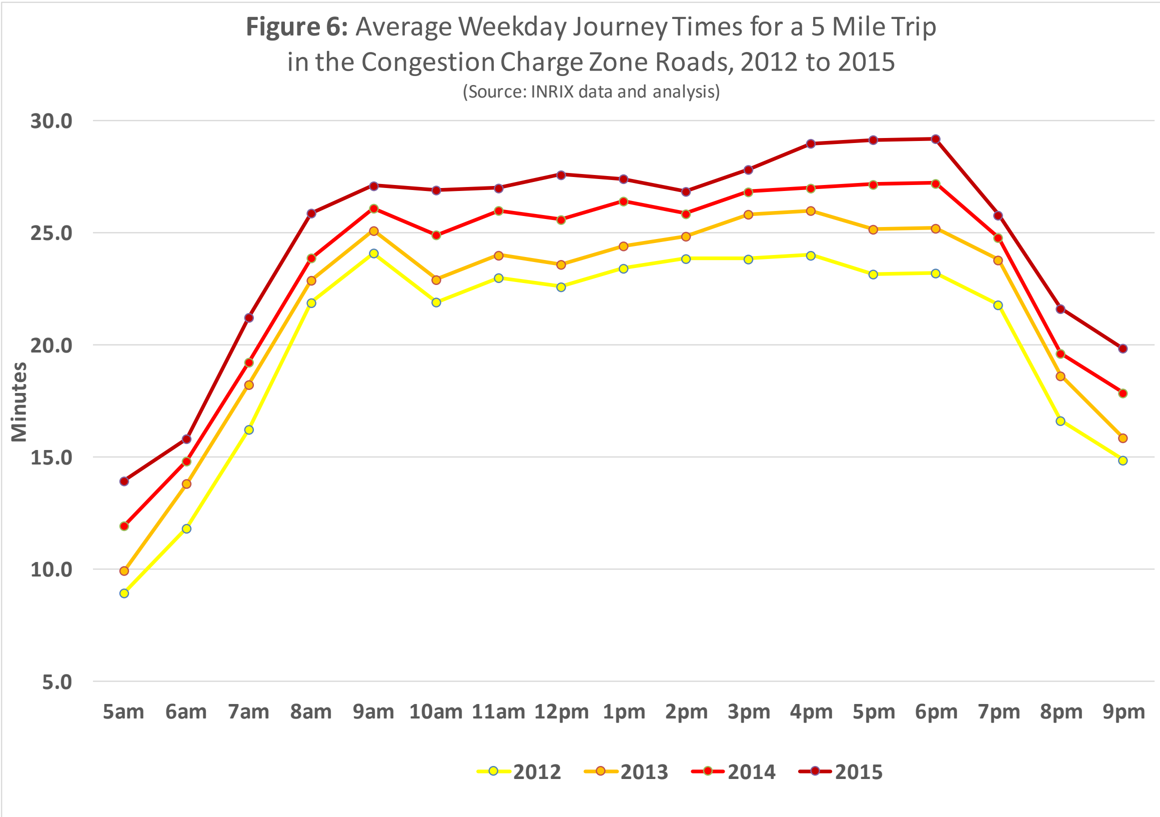


Figure 5 shows that congestion has increased across all daylight hours in Central and Outer London and that journey times have become similar across all hours in Central London. There has been a 4-minute growth in travel time (30+ percent increase) from 2012 to 2015 in Outer London. In Central London, evening peak travel times have increased from 24 to 30 minutes (almost 30 percent), morning peak travel times have increased from 21 to 29 minutes (almost 40 percent), and midday period travel times have increased from 21 to 29 minutes (almost 40 percent).

Looking specifically at the Congestion Charge Zone, in Figure 6 the same trend emerges with congestion increasing each year. However, the increases are somewhat smaller, perhaps indicating that the congestion charging programme is slowing congestion growth in this zone.



While there is some variation in specific percentage increases, travel times have lengthened in all three zones in the study during the four-year study period. In general, the increases are greater and the travel times are longer toward the centre of London. However, slightly less growth in congestion is noted in the Congestion Charge Zone.

SECTION 4: DRIVERS OF TRAVEL DEMAND — KEY INDICATORS

In economic terms, transport is a derived demand. Few journeys are made through a desire to travel per se but are, rather, a means to some other end. People travel to work or for other business reasons, to attend leisure activities, for educational or health related activities, or to acquire goods and services required for day-to-day life. Travel demand generally rises as the population increases or if an existing population has more time or money to pursue activities that require travel. Economic improvements also give individuals more choice in transportation and may allow them to afford travel by different modes of transport or to acquire and utilise private vehicles. Increased use of ecommerce increases the trips made by delivery vehicles. This section describes the changes in primary travel demand drivers: economic indicators and population changes.

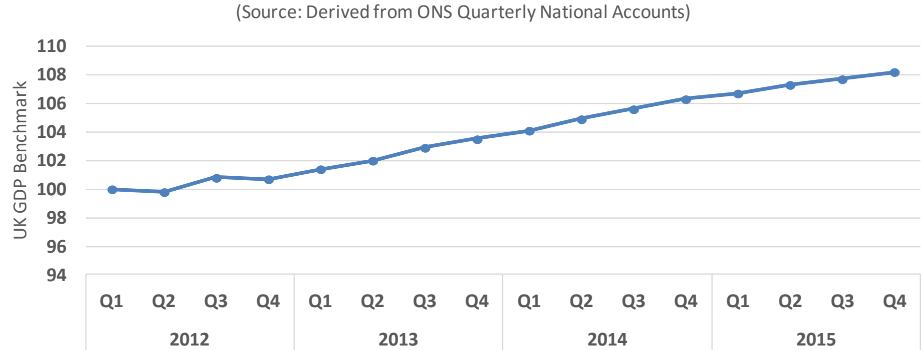
Economic Indicators

With the United Kingdom and London economy recovering from the recession over the last several years, and with higher employment levels and lower petrol prices, it should be expected that more people and goods are being moved in London. London's economy has grown faster than the United Kingdom's—more than 3 percent annually since 2008, compared to the United Kingdom rate of about 2 percent[2]. London employment exceeded 5.5 million jobs in 2014, 5 percent higher than in 2013 and 12 percent higher than the pre-recession peak in 2008. This growth means more buildings are being constructed with more work-related trips, more goods and services are being delivered, and more people are visiting shops and other retail outlets. The result is more individuals making more trips, and in the past, this activity would have resulted in more cars, taxis and freight vehicles on the roads.

INCREASING GDP — ECONOMIC GROWTH

The UK has seen an increase of over 8% in GDP over the four years of this study period. This uptick in activity would be expected to increase travel demand by introducing additional trips into the system.

Figure 7: Seasonally Adjusted UK GDP Index, 2012 to 2015
Benchmark 2012 Q1 = 100
(Source: Derived from ONS Quarterly National Accounts)

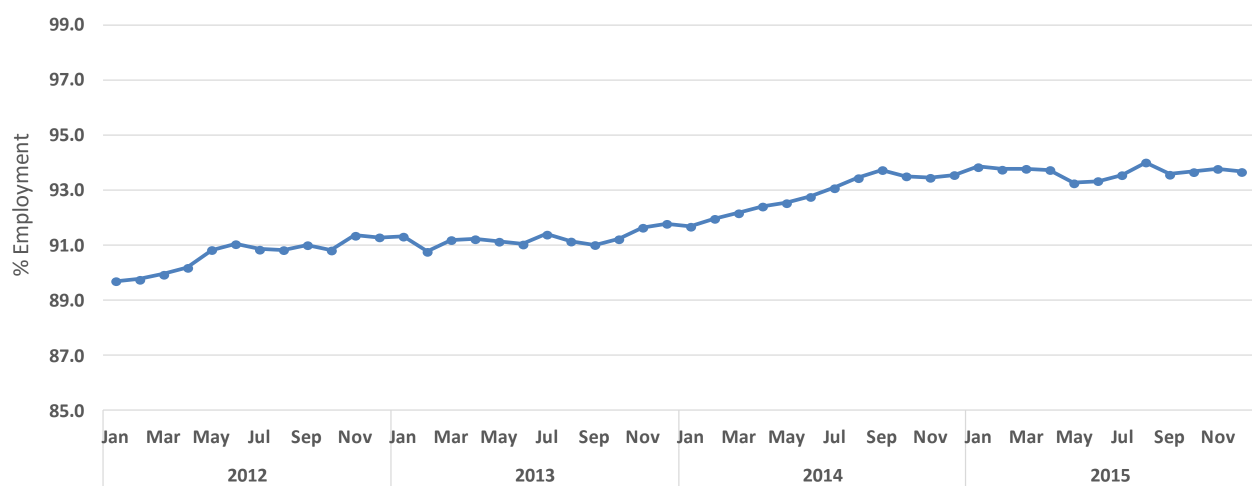


[2] London's changing economy since 2008, Greater London Authority (2015)

INCREASING EMPLOYMENT

During the study period, unemployment dropped from more than 10 percent to approximately 6 percent. Increase in employment generally produces additional trips across the network as more people are moving to and from work and increases in disposable income lead to more discretionary travel.

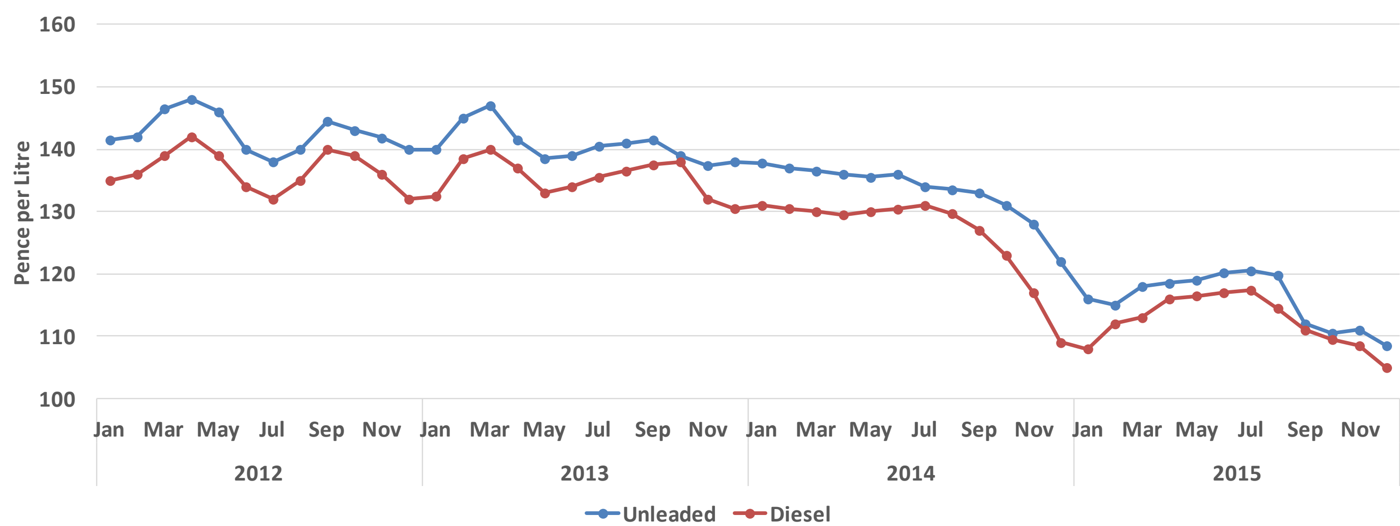
Figure 8: London Employment Rate, 2012 to 2015
(Source: Greater London Authority)



DECREASING PETROL PRICES

Petrol prices have declined by more than 25 percent during the study period. Decreasing petrol prices make vehicle travel a more affordable option and may increase the demands on the road network.

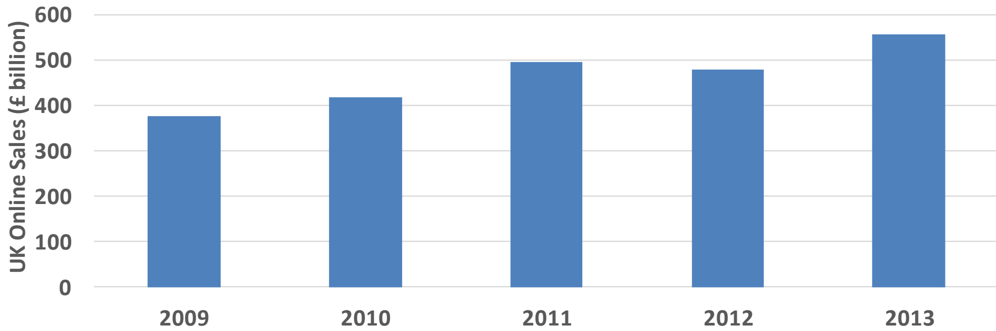
Figure 9: UK Petrol Prices, 2012 to 2015
(Source: Automobile Association)



INCREASING ECOMMERCE

According to the UK Office for National Statistics, ecommerce in the UK has grown 48.3% from 2009 to 2013[3]. Increased Internet purchases require more deliveries and likely lead to additional delivery vehicle traffic. While ONS data on ecommerce are not available for 2014 and 2015, media reports[4] indicate that online sales have continued to grow.

Figure 10: Ecommerce in the UK, 2009 to 2013
(Source: Office for National Statistics)



The issue of whether internet shopping increases or decreases travel demand is complex. There is an obvious increase in trips related to delivery of goods to individuals. However, some of these trips are replacing trips that individuals would have made to acquire goods in brick and mortar stores. Both individuals and freight delivery companies group trips together increasing the complexity of the model.

Population Changes

The population of London has increased slightly, in relative terms, during the study period; however, this small percentage change represents a large absolute change. For example, assuming 65 percent of the total population is in the workforce, the 250,000 new people would add 300,000 trips into the network even if they only make one trip a day—going out and back to work or another location.

Table 2: London Population
(Source: ONS Mid-Year Population Estimates)

Year	Source	Change	% Change
2012	8,303,369	—	—
2013	8,416,525	113,156	1.4%
2014	8,539,689	123,164	1.5%

[3] The impact of e-commerce on the UK economy: Office for National Statistics, 2015

[4] http://www.telegraph.co.uk/finance/newsbysector/retailandconsumer/12089765/Retail-spending-up-in-December-but-high-street-loses-out-to-online.html

SECTION 5: ACTUAL TRAVEL DEMAND — VOLUME OBSERVATIONS

Section 4 considered various indicators of traffic demand and observed that they are all up; therefore, one would expect traffic and congestion to also be on the rise in London. However, in order to complete the picture, it is also important to analyse whether the increase in demand indicators actually led to increased traffic demand.

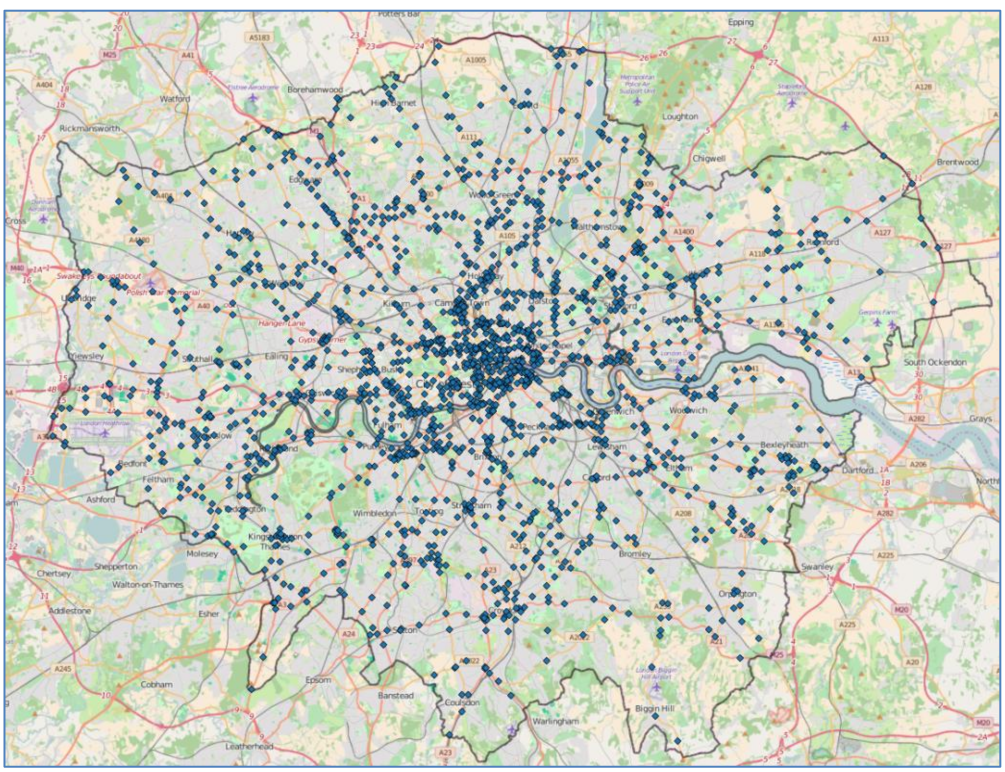
The best way to capture actual driving levels is with traffic counts and an assessment of vehicle miles travelled. This section addresses these directly by analysing DfT and TfL traffic counts from 2012 to 2015.

London Traffic Count Data

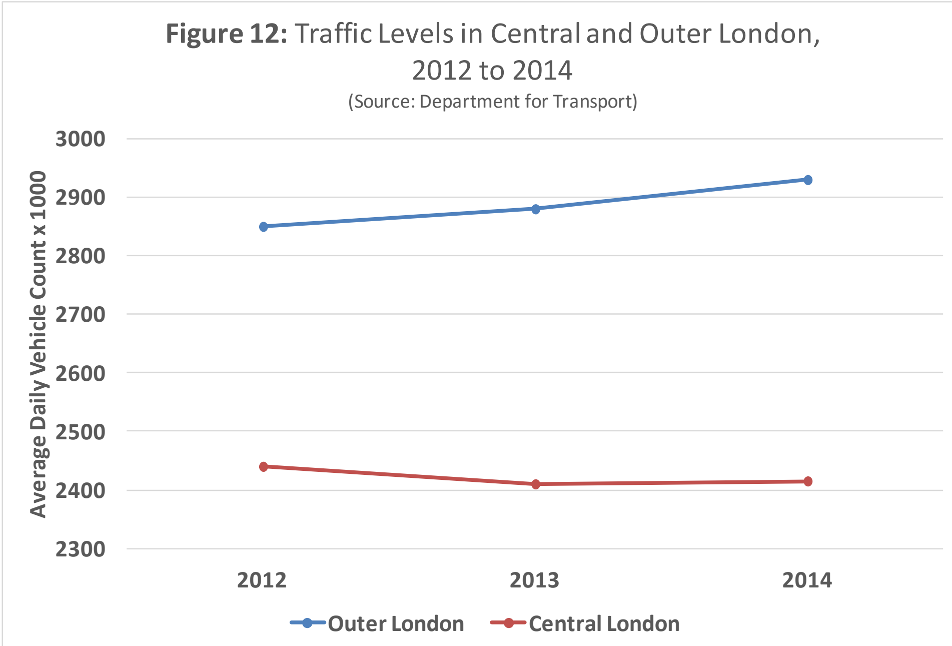
In contrast to what might be expected, based on several different sources of vehicle traffic data, the overall level of traffic volume in Central London is slightly declining, whereas traffic volume in Outer London is slightly increasing during the period of 2012 to 2015.

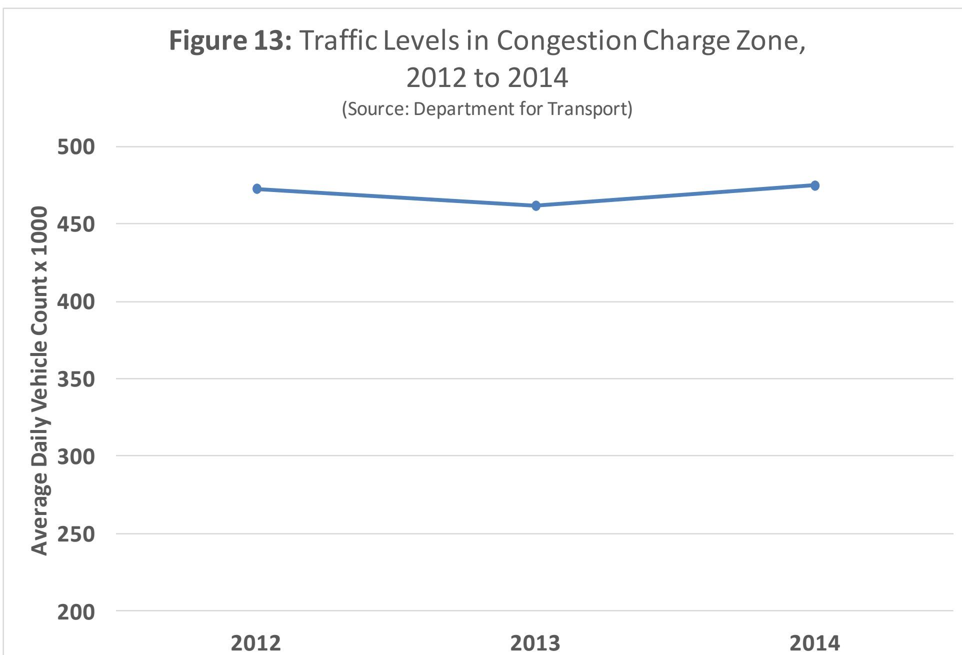
DfT maintains an extensive sensor network throughout London which provides volume counts of vehicles transiting roadways at 1,872 locations. The extent of these data collection locations is shown in Figure 11. INRIX obtained traffic counts from these sites, which are collected and published by DfT, and aggregated them to match the spatial and temporal analysis areas for this study.

Figure 11: London Traffic Count Locations
(Source: DfT Annual Road Traffic Estimates, 2014)



The resulting vehicle volumes by study zones are depicted in Figures 12 and 13. This is a total count across all sensors within the respective zones.





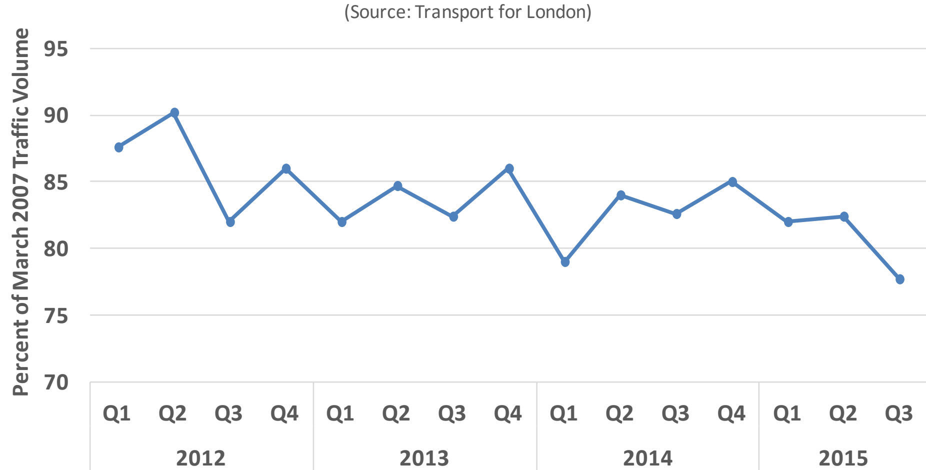
Based on the aggregated DfT data, within Central London, the traffic counts show a slight decline in overall traffic count levels of 1 percent. For Outer London, the traffic counts show an increase of 3 percent. For the Congestion Charge Zone, there is no noticeable change.

Transport for London Traffic Volumes

Figure 14 shows a TfL summary of traffic volumes entering Central London Major Roads (indexed to March 2007 traffic levels). The TfL data support the same conclusion as the INRIX analysis of the DfT traffic data, namely that traffic in Central London has slightly declined since 2012. (Note: Q4 2015 data was not yet available.)

Figure 14: Traffic Levels Entering Central London Roads, 2012 to 2015

(Source: Transport for London)

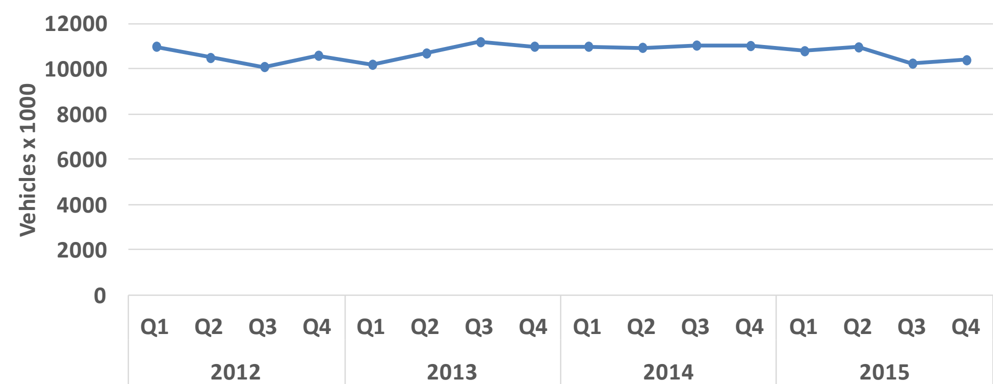


Vehicles Entering Congestion Charge Zone

While the congestion charge was raised from £10.00 to £11.50 in June 2014, Figure 15 shows that the number of unique vehicles entering the Congestion Charge Zone daily during the charging hours remained similar from 2012 to 2015, further demonstrating relatively unchanged traffic volumes.

Figure 15: Unique Vehicles Entering the Congestion Charge Zone, 2012 to 2015 (daily during charging hours)

(Source: Transport for London)



SECTION 6: INFLUENCE OF MODE AND VEHICLE TYPE ON TRAVEL DEMAND

With the uptick in indicators that usually increase travel demand, and the flat to declining traffic volumes in Central London, consideration of other modes of travel is relevant to understanding the overall congestion picture. The mixture of vehicle types on the roadway is also evaluated for potential impact on travel demand.

Travel by Other Modes

Data from TfL indicate that use of non-auto modes of transit has increased during the study period.

While buses also occupy road space, they are much more spatially efficient than single occupancy vehicles. Bus use as seen both in journey count and passenger kilometres travelled are both up slightly during the study period, as Figure 16 shows.

Figure 16: London Passenger Kilometres and Journey Stages Travelled by Bus, 2012 to 2015
(Source: Travel in London, Report 8, Figure 3.1)

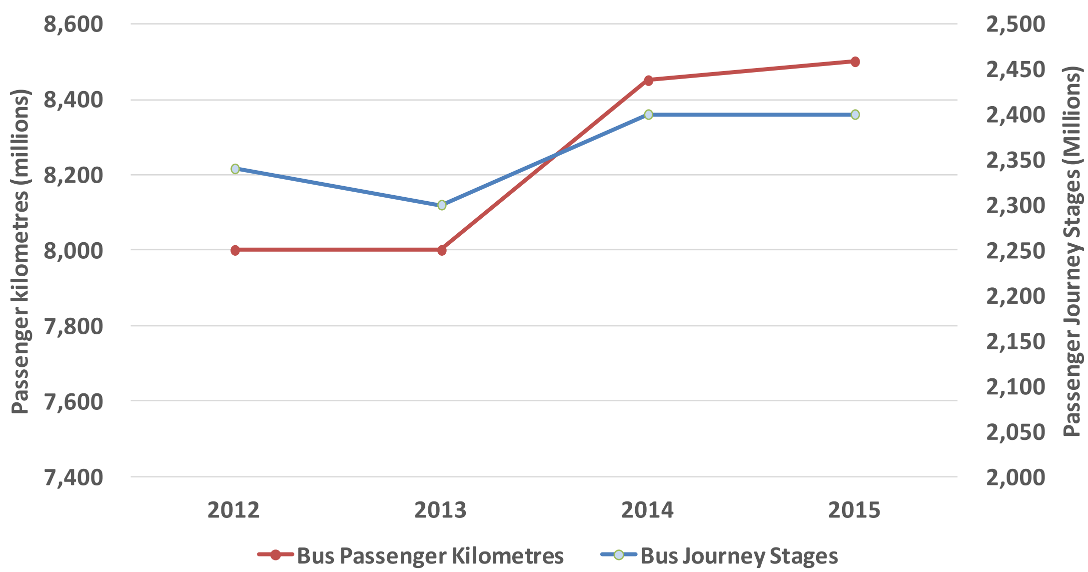
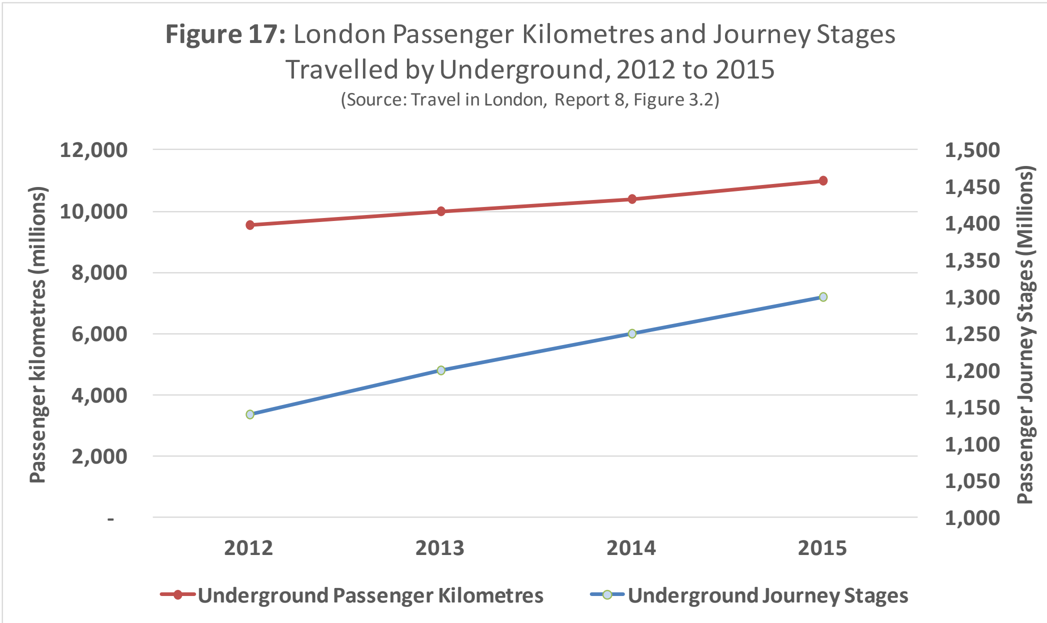
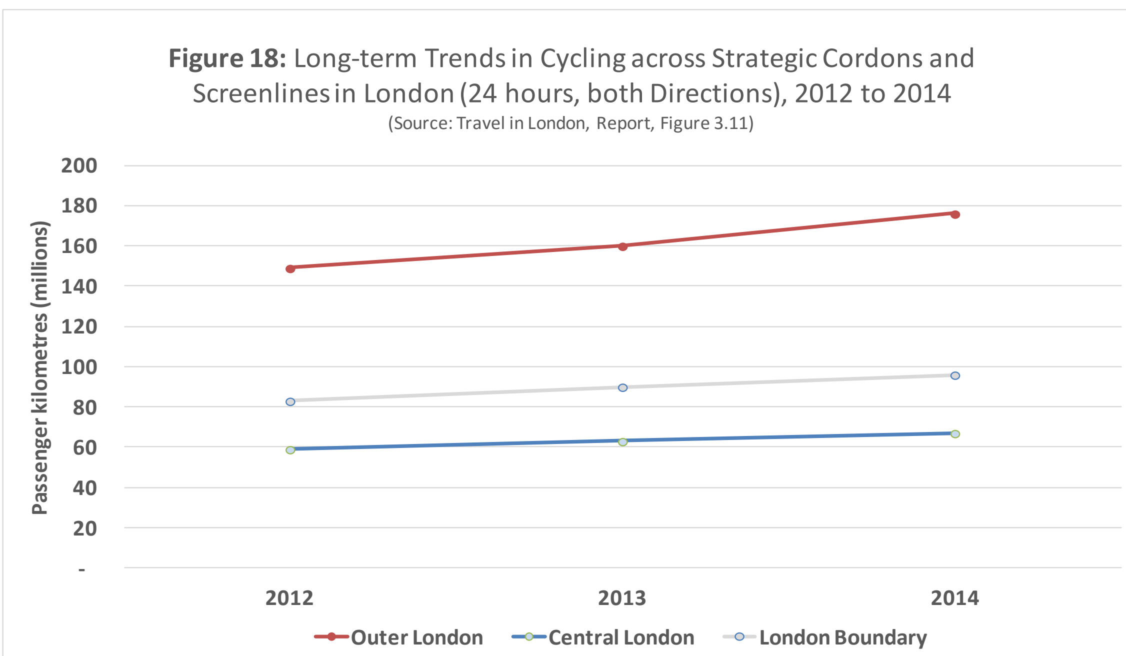


Figure 17 shows that use of the Underground has increased significantly during the study period. Data indicate that Underground use is up 3.2 percent in the past year, surpassing the usage levels seen during the 2012 Olympic Games[5].



Cycling levels are up as well throughout the study period, increasing 12 percent in the past year alone[6]. Bicycle use in Central London is increasing more rapidly than in other areas.



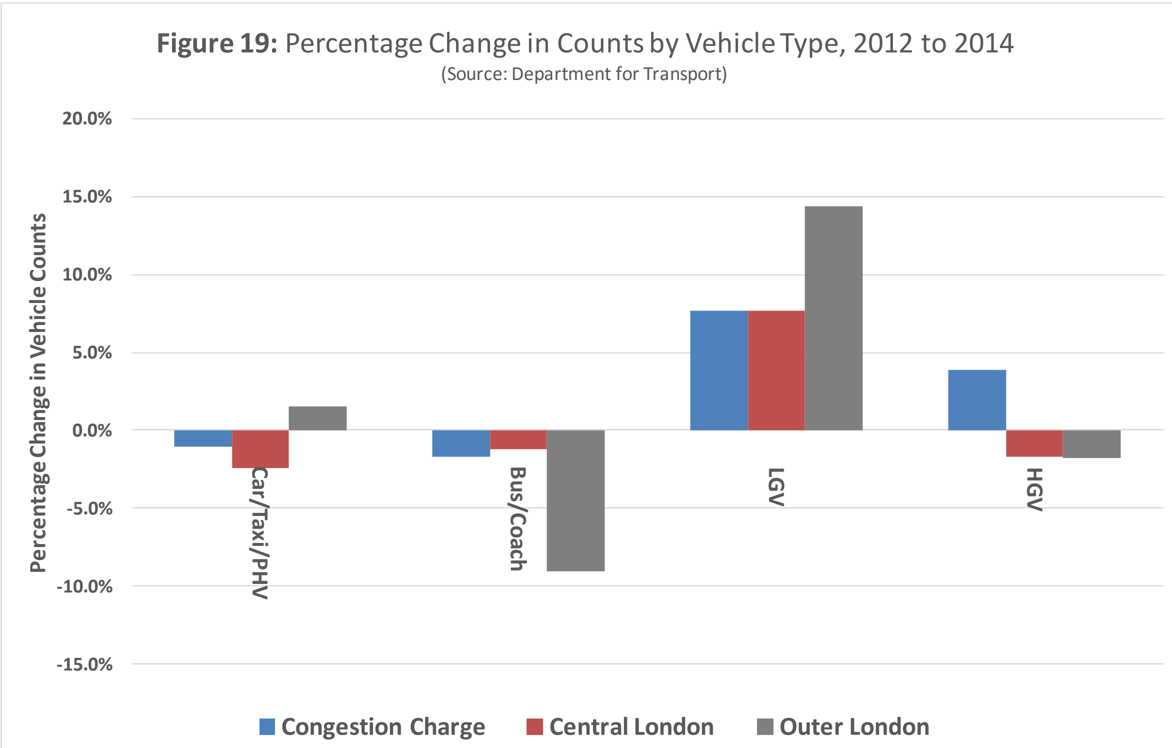
[5] Transport for London, (2015). Travel in London Report 8 (p. 52).

[6] Transport for London, (2015). Travel in London Report 8 (p. 63).

Vehicle Type Trends

Changes in the mix of vehicle types on the roadways could impact congestion as cars, delivery vans and freight vehicles utilise roadways differently.

Figure 19 shows the how the traffic changed over the study period by different vehicle types. Here, the term *light goods vehicle (LGV)* refers to goods vehicles of no more than 3,500kg in weight, and *heavy goods vehicle (HGV)* refers to goods vehicles of more than 3500kg in weight.



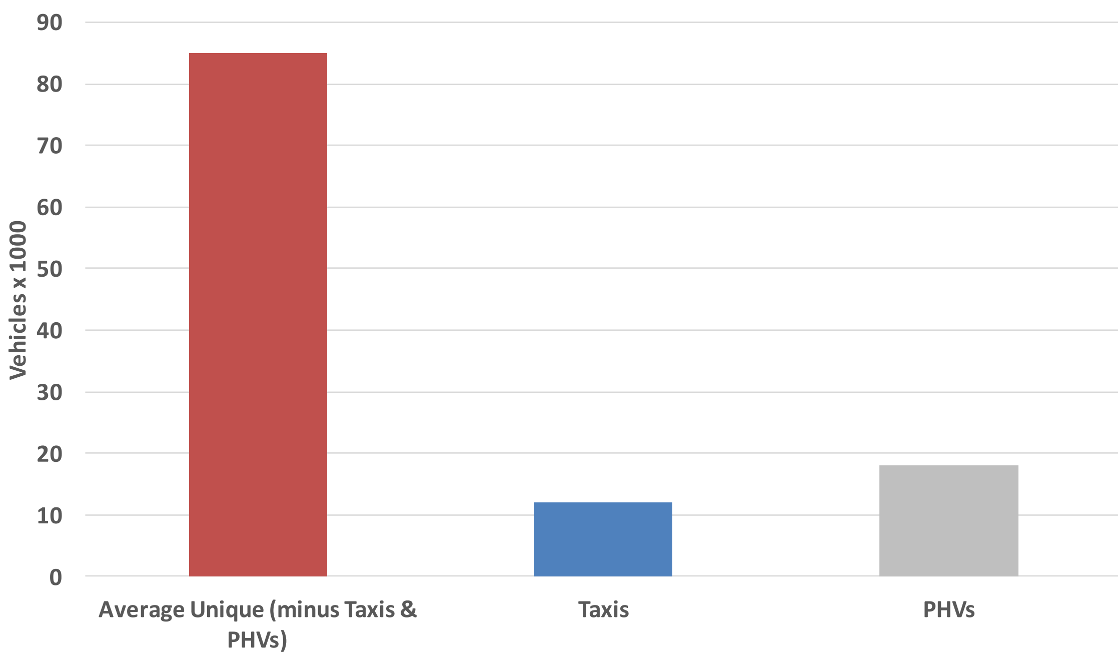
The figure shows that there has been a significant increase in LGV traffic in Central London during the study period and a less sizeable decrease in car traffic. HGVs have also increased in the Congestion Charge Zone. Since LGVs are used primarily for deliveries, the upswing in ecommerce noted in section 4 is likely contributing to this increase.

Private Hire Vehicles Entering Congestion Charge Zone

Data from TfL supports the finding that taxis and private hire vehicles represent only a small portion of traffic in London. Figure 20 shows that taxis and private hire vehicles together account for only about one out of every four vehicles in the traffic stream crossing the Congestion Charge Zone boundary.

Figure 20: Daily Average Vehicles Entering the Congestion Charge Zone, 2015

(Source: Transport for London)



Looking at this data in conjunction with Figure 19 above, which shows that volume counts are down in the Congestion Charge Zone for the category of cars/taxis/private hire vehicles, and Figure 13, which shows total vehicle volumes are flat in this zone, it would appear that while the overall registration of private hire vehicles is increasing in London, these vehicles are replacing other vehicle trips and are thus not causing an increase in congestion.

SECTION 7: PRIVATE HIRE VEHICLES — IMPACT ON CONGESTION

There has been a significant increase in private hire vehicle registrations during the study period, which has led to speculation that this is the cause of increased congestion. However, analysis of the quantity and timing of private hire vehicle use shows that the data does not support this conclusion.

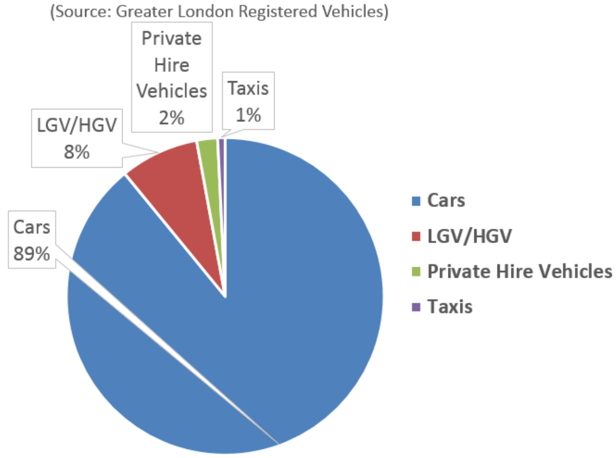
Vehicle Registrations

As this study is primarily focused on road congestion, the number of registered vehicles in different classes provides additional insight into the issues being analysed. It is recognised that not all vehicle types are utilised at the same rate; for example, taxis spend many more hours on the road each day than most privately owned vehicles. However, the overall proportions amongst vehicle types, along with the general increase in vehicle registrations, is another indicator of the potential for increased congestion.

The number of registered vehicles has increased since 2012 in all vehicle classes, with privately-owned cars having the highest increase with 93,000 more registrations. Light/heavy goods vehicles have the next highest increase, at just over 14,000 more registrations. Private hire vehicles increased by 12,500 but had the highest relative growth rate among all vehicle types, at 7.68% compound annual growth rate from 2012 to 2015[7]. While this is a significant increase in this category, trip data from Uber indicate that only 5.9% of all Uber trips are in the Congestion Charge Zone during charging hours (7 am to 6 pm). So while the number of private hire vehicle registrations is increasing, 94% of the trips taken by Uber do not impact the most congested times in Central London.

Figure 21 illustrates the overwhelming role of private vehicles in the Greater London fleet; the number of all other vehicle types—light/heavy goods vehicles, private hire vehicles and taxis—is very small in comparison to the number of private vehicles.

Figure 21: Mix of Registered Vehicles in London, 2015
(Source: Greater London Registered Vehicles)

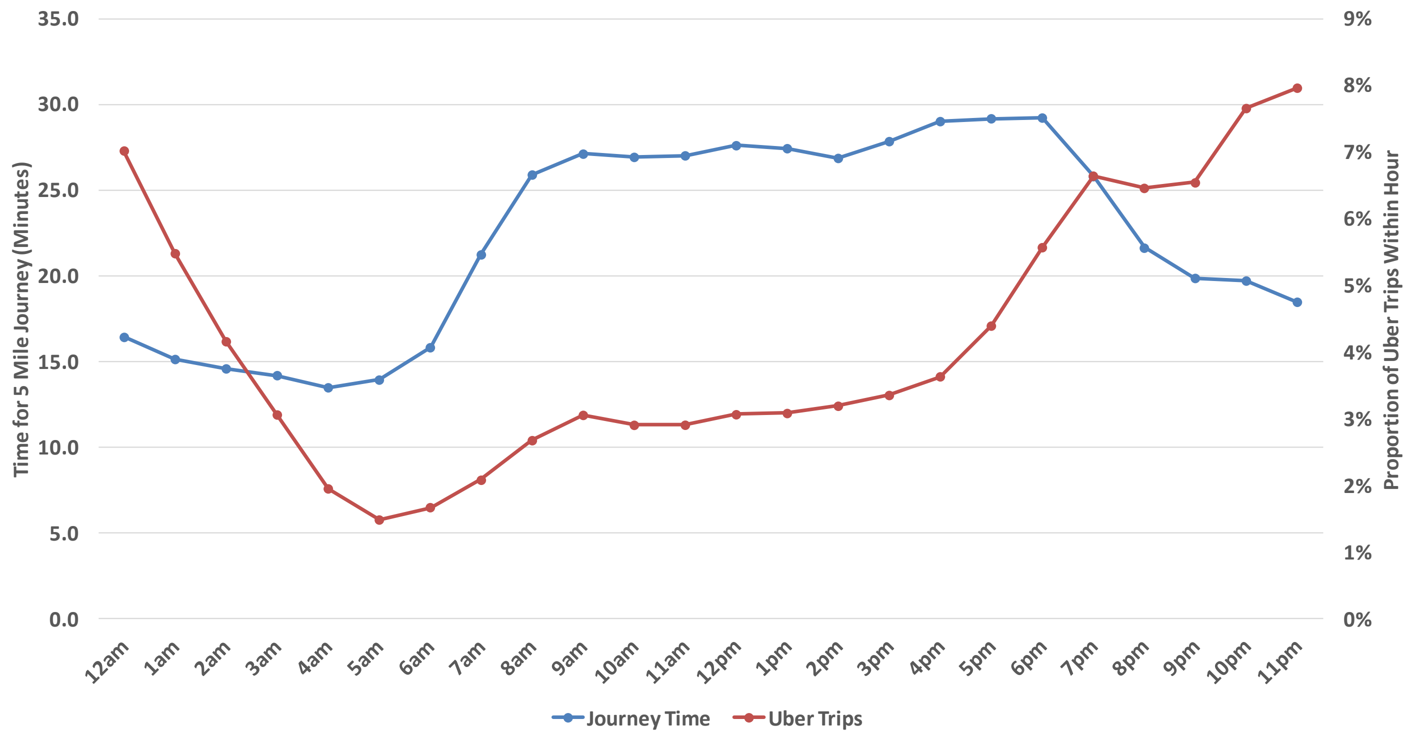


[7] Taxi and Private Hire Vehicle Statistics: England 2015

In order to assess the actual contribution of private hire vehicles to overall London congestion, INRIX obtained data from Uber related to total trips by time of day and location to further analyse possible impact. Since the overall numbers of cars in the Congestion Charge Zone is flat or decreasing, the only way private hire vehicles could be significantly impacting congestion in this area would be if the PHV trips were disproportionately occurring during the most congested periods of the day.

To determine the impact of the Uber traffic on overall traffic levels in the Congestion Charge Zone, data was compared at the hourly level to show how the proportion of Uber trips coincided with the peak congestion periods in this zone. Figure 22 plots the journey time numbers by hour for 2015 to show congestion periods and overlays Uber trip data to show the proportion of their trips that are made in each hour.

Figure 22: Hourly Profile of Journey Time and Uber Trips in the Congestion Charge Zone, 2015
(Source: INRIX analysis and Uber vehicle data)



As Figure 22 shows, there is a generally inverse relationship between primary Uber usage times and congestion peak periods. Only 31.8 % of Uber travel occurs from 7 am to 6 pm, with 23% of all Uber trips occurring between midnight and 5 am, when the underground is generally closed. This indicates that Uber is providing people additional choices for travel during this time of day when other transportation options are not available.

SECTION 8: TRAVEL SUPPLY — PLANNED AND UNPLANNED DISRUPTIONS

While increased reliance on public transport may explain the flat line traffic volume numbers in light of increased economic activity, it does not assist in explaining the increasing congestion in London. The other variable in the congestion equation is the supply of roadway.

Several roadway improvement projects that are components of the £4 billion Road Modernization Plan (2014 to 2022) will transform junctions, bridges, tunnels and public spaces. These infrastructure improvements are expected to deliver significant long-term benefits to the city. However, the Cycle Superhighways as well as the Crossrail project have caused construction on key roads in London.[8] It is typical for a road improvement programme of this magnitude to create short-term disruption of travel during the construction period.

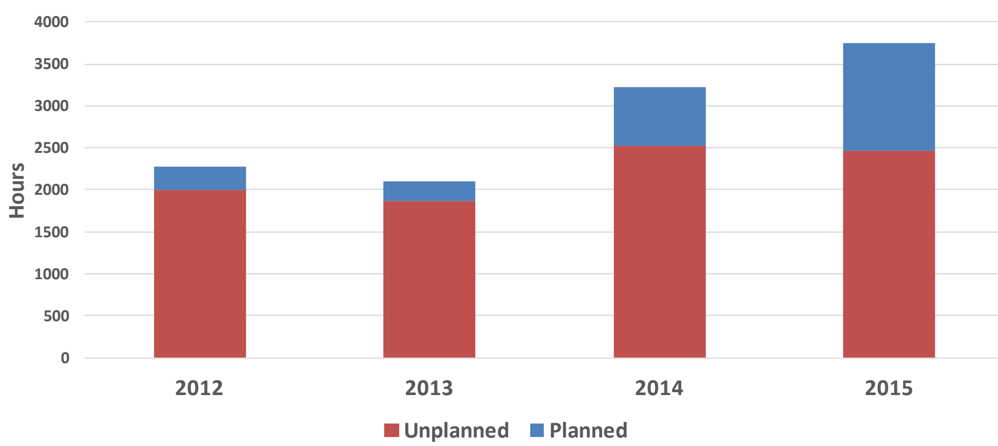
Both TfL and INRIX data clearly point to a sharp increase in traffic disruptions in 2014 and 2015, and in particular, planned traffic disruptions like roadworks. This correlates strongly with increased congestion that is observed during this time period.

Disruptions by Time

Figure 23 shows the growth in traffic disruptions, both planned (such as roadworks) and unplanned (such as traffic incidents).

Figure 23: London Surface Transport Disruption Hours, 2012 to 2015

(Source: Transport for London)



The combined duration of planned roadworks has increased by 362% from 2012 to 2015, with the most dramatic uptick occurring in 2015. Continued improvement in the London economy is increasing both road construction and traffic impacting building construction. The unplanned traffic disruption hours have increased by 23% in the same 4 years.

[8] Pidgeon, Caroline. (2015). The Congestion Question (p. 9). London: London Assembly

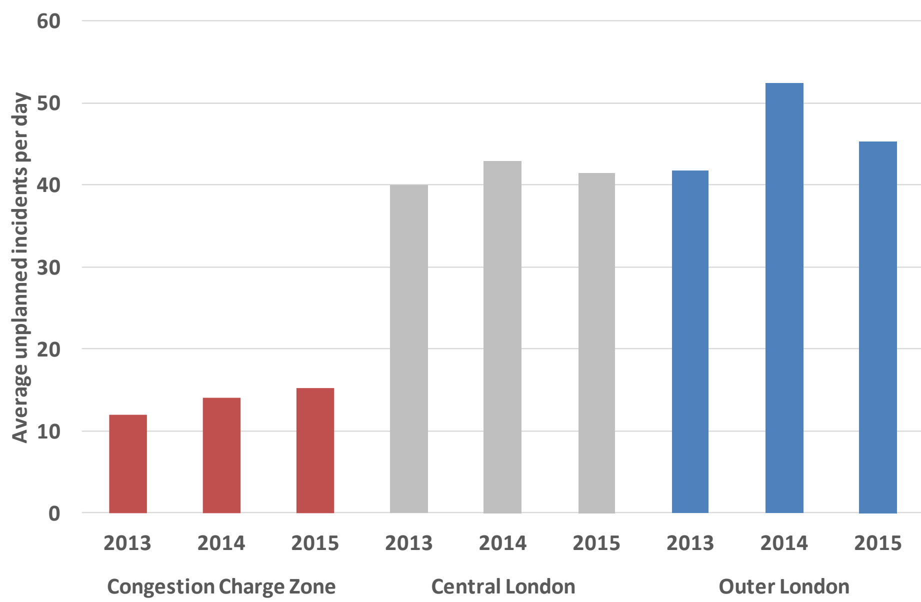
Unplanned Disruptions

In order to evaluate this variable, INRIX analysed its historical archive of incident data (both planned roadworks and unplanned incidents such as accidents). INRIX employs a team of 70 staff dedicated to collating traffic incident data and publishing it to its numerous media partners worldwide. This archive, combined with data from TfL, was investigated to determine if these factors might provide additional insights. Unlike congestion, which can be directly measured, incidents are only recorded if reported. Therefore, for unplanned incidents, changes in rate of reporting may also impact trends.

Data from INRIX's incident database were used to analyse the trend of unplanned traffic disruptions. INRIX used its data to evaluate the trends of significant incidents involving accidents, breakdowns, or the closure of an A road. The average unplanned incidents per day were considered for each year. (Note: 2012 data were omitted from this analysis as the increase in incidents in 2012 related to London's hosting of the Olympic Games made the data non-representative of unplanned incident trends.)

Figure 24: Unplanned Events per Day, 2013 to 2015

(Source: INRIX)



Again, while there is an increase in each area, it is most significant in the Congestion Charge Zone where unplanned incidents rose 35% during the study period. Both the overall number of accidents, as well as the time it takes to clear an accident and return the roadway to normal, impact the supply side of the congestion equation.

SECTION 9: SUMMARY AND CONCLUSION

Multiple data sources confirm what most people intuitively feel: congestion is getting worse every year in London. With a growing economy and increased population, this is expected. While it has been posited that private hire vehicles are a primary cause of increased congestion, the data do not support this conclusion.

Considering each component of travel in turn has enabled a clearer picture of the sources of London's congestion to emerge. The flat line traffic volumes indicate that the cause of increased congestion is not more vehicles on the roadways, and in fact car traffic (including taxis and private hire vehicles) are decreasing in Central London. Exploring other variables reveals that the use of public transport and cycling is up, which may be what is absorbing new travel demand caused by economic prosperity. In the Congestion Charge Zone, car traffic has decreased while light goods vehicles, generally used for deliveries, have increased. This is consistent with the uptick in ecommerce seen in the UK. The remaining factor in the equation is supply, and data indicate that roadworks and incidents related to accidents are the largest factor contributing to increased congestion in London.

Key Conclusions

- Congestion in London has risen noticeably between the years of 2012 and 2015 with journey times in Central London increasing by 12% annually.
- Car traffic, including taxis and private hire vehicles (PHVs), is decreasing in Central London and the Congestion Charge Zone (CCZ); thus, as a category, cars are not causing an increase in congestion in these area
- Roadway travel demand, as seen in vehicle counts, is flat or decreasing in Central London and increasing only slightly in Outer London; increased use of alternate modes of transit may explain why roadway traffic volumes remain flat.
- Light good vehicle traffic is increasing in Central London, possibly related to the rise in ecommerce. This is the only vehicle type to show more roadway volume in all three zones of London.
- One of the most significant drivers of increased congestion in London is roadworks, increasing 362% during the study period.