

Brent Inclusive Growth Strategy (IGS): Infrastructure

2019-2040

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Executive Summary

The next twenty years will bring significant changes to Brent in response to population growth and climate change pressures. In order to accommodate growth, meet environmental requirements, and align with national and local policies in London, Brent must consider the current capacity of existing infrastructure, projected future demands and future policy changes.

The infrastructure chapter of the Inclusive Growth Strategy (IGS) analyses four main sub-themes that will shape future considerations in the borough. Current areas of stress and deficiencies are considered together with the provision of infrastructure capacity related to transport, digital, water, energy and land available to increase future housing and employment density. These sub-themes are analysed in the ongoing report, considering the current situation in Brent and London; its economic and population growth projections; technological changes; environmental requirements and future policy directions at national and local level. Consideration includes Brent's minimum target to deliver 1,525 new homes a year, which has now almost doubled in the Draft New London Plan to 2,915 new homes a year.

Baseline

Headline findings from base analysis of infrastructure provision in Brent include:

- Brent is an Outer London Borough which is well-connected to Central London, but is poorly connected to other Outer London Boroughs, and to London Heathrow Airport, despite relatively close geographic proximity.
- Public Transport Accessibility Levels (PTAL) are higher in identified growth areas, although Church End and Alperton have some lower PTAL areas. The northern part of the borough has an overall lower PTAL.
- Proposed transport projects such as a Crossrail spur from Old Oak Common to stop at Wembley Central station and the West Coast Mainline, and the West London Orbital Line, with stops at Staples Corner, Neasden and Harlesden, would improve business and labour links, accessibility and demand for housing and commercial uses, and improve PTAL and reduce reliance in motorised vehicles.
- There are 92,100 cars registered in Brent with an average 0.7 cars per household.
- 7% of Brent's principle road network length was in poor condition in 2018.
- Compared with Outer London, Brent has the largest percentage of daily trips by public transport, and one of the lowest for motorised vehicles. However, 45% of daily trips in the borough are by car or motorcycle, increasing management pressure of parking spaces, congestion and pollution.
- Only 1% of Brent's commuters preferred transport mode is by bicycle. 12,600 trips are realised in Brent by cycling. Although TfL identified currently Brent's residents could realise more than 300,000 trips by cycling.
- There are 688 plug-in electric vehicles registered in Brent, 0.6% of the total cars, vans and motorbikes licensed in the borough.
- Around 13% of the Electric Vehicle Charging Points (EVCP) in London are provided in Brent, however almost 17% of EVCP have technical problems.
- Brent has the third highest broadband accessibility amongst the West London Partnership boroughs and one of the best in London, though there are some "not-spots" where connectivity is still poor, including Church End and Park Royal. Ultrafast broadband connections are limited or null in most of the borough
- Since 2013 water usage in London is classified with a demand "seriously stressed" designation and Thames Water indicate demand is reaching current available supply.

- Thames Water Corporation data indicates current domestic water consumption is above target levels for new properties, and Brent is also identified as one of the boroughs in London with serious problems of sewer flooding and pollution.
- Over half of energy consumption is in the domestic sector. Brent Council is committed to promote sustainable energy and increased energy efficiencies in the borough, although there is not enough information about current sustainable energy supplied.

Trends

Assessing and planning to meet future infrastructure demands requires analysis of key trends that will shape the future of the UK and London, and resultantly impact Brent's citizens. These trends inform the Responses section of the infrastructure chapter, outlining policy options that can accommodate the infrastructure needs of the growing population and ensure that necessary infrastructure will be provided in Brent to 2040. In the context of the demographic, economic and environmental changes, the IGS identifies the key infrastructure aspects that will affect urban growth in Brent as:

1. Increased demand for public transport
2. Increased cycle and walking transport modes
3. Transportation technology for motorised vehicles
4. Increased technological requirements
5. SMART Infrastructure
6. Growing water demand
7. Increased demand for sustainable energy sources

Responses

This report concludes with proposals that Brent Council could take forward to address the challenges and seize the opportunities in order to provide infrastructure according to the environmental, economic and health requirements of Brent's growing population, aligned with national and local policies in London.

Modal shift away from motorised vehicle use is fundamental. Brent should continue to lobby for better links into HS2, Crossrail and Thameslink networks, and the West London Orbital Railway. In parallel, infrastructure is needed to support and encourage active transport modes – including untapped potential for cycling in the borough – and dialogue increased with TfL and the Mayor through Healthy Streets for London, to improve cycling, walking and bus infrastructure, attract local investment into Brent, and develop already-identified potential new routes and pathways.

Brent has a digital strategy to make Brent a digital place and promote digital inclusion amongst its population. Digital requirements should be embedded within planning policy and regeneration strategies, and private partnerships agreed to rollout of 4G, 5G and superfast/ultrafast broadband. Brent should build on its current pilot of SMART infrastructure to monitor air quality and parking, and embrace the role big data can play in understanding population needs and asset management in an urban environment.

Brent supports Thames Water's plans to provide major new water infrastructure, rollout metering and water efficiency measures, and reduce leaks. Locally, Brent should raise awareness of the need for water efficiency, including options to retrofit existing buildings, use planning policy to secure blue infrastructure and mitigate flood risk, enforce planning and building control regulations for new development, including use of Sustainable Urban Drainage Systems (SuDS) and green roofs, and require water management plans for larger strategic regeneration schemes.

Introduction

Physical and digital infrastructure in Brent is required to underpin minimum projected population and business growth in the area, maintain the wellbeing of the population, and enhance the competitiveness and attractiveness of the borough as a place for its residents, business and entrepreneurs. Infrastructure provision will strengthen Brent's relations with Outer London and the West London partnership.

Special focus is required on current areas of stress and deficiencies in infrastructure capacity related to transport, digital, water, energy and land available to accommodate future housing and employment densities. These sub-themes are analysed within the context of the economic and population growth projections, environmental impacts, technological changes and future policy directions and national and local level in Brent and London. This includes Brent's target to deliver a minimum 1,525 new homes a year, which has almost doubled in the Draft London Plan to 2,915 new homes a year, and the target to convert London to a Zero Carbon city by 2050.

Infrastructure in Brent is analysed with focus on areas that are seeing an increase in residential, commercial and mixed use development, and that have potential to accommodate future growth. Identified growth areas in Brent include Wembley, Alperton, Church End, Burnt Oak/Colindale and South Kilburn, as well as Old Oak and Park Royal. Emerging growth areas identified in the Local Plan preferred options include Northwick Park, Neasden Station and Staples Corner.

The Old Oak Park Royal Development Corporation (OPDC) was founded on 1st April 2015. The OPDC acts as the planning authority for Old Oak and Park Royal, located within Brent, Hammersmith & Fulham and Ealing. The Old Oak and Park Royal opportunity area will have a significant impact on infrastructure demands for Brent, as a result of plans for around 14,000 new homes and 37,000 new jobs for the area. Large scale infrastructure projects such as Crossrail and the new High Speed 2 station in Old Oak Common will help shape London's future. Although this regeneration project is managed by the OPDC, the IGS analyses probable constraints on Brent's boundaries due to expected increase demand for transport, water, energy and digital infrastructure. The investment opportunity that OPDC could bring to Brent is also great, including the potential link to the West Coast Mainline (WCML) at Wembley Central station, and the more general political and developer attention that OPDC is attracting to the area.

The expansion plan for Heathrow is analysed due to the positive economic benefits that could flow to Park Royal, increasing business links and improving international access. This project will require significant new infrastructure to relieve pressure on the public transport network, with an expected increase in public transport demand of more than 250%.

The Wembley area is one of the Mayor's Opportunity Areas for growth with a target for 11,500 new homes and 11,000 jobs to be delivered over the next 15 years, and is analysed due to transformational changes in density that will increase the demand for infrastructure capacity in terms of water, energy, digital connectivity and public transport. Particularly for transport, this report includes the potential development for Crossrail WCML Link station at Wembley Central.

This report is divided into three sections, analysing the main infrastructure capacity and demand pressures currently in Brent, with particular attention to the “growth” areas previously mentioned.

- The first section describes the current baseline information, considering the most up to date information and data available for infrastructure in London and Brent. This section also includes an analysis of Brent compared with Outer London.
- The second section includes trends that may affect the specific sub-themes according to planning policy changes, technological improvements, environmental targets and population and economic growth.
- The third section briefly suggests some policy responses to the challenges and opportunities presented in this report, for measures that could meet future infrastructure requirements and reduce capacity deficiencies.

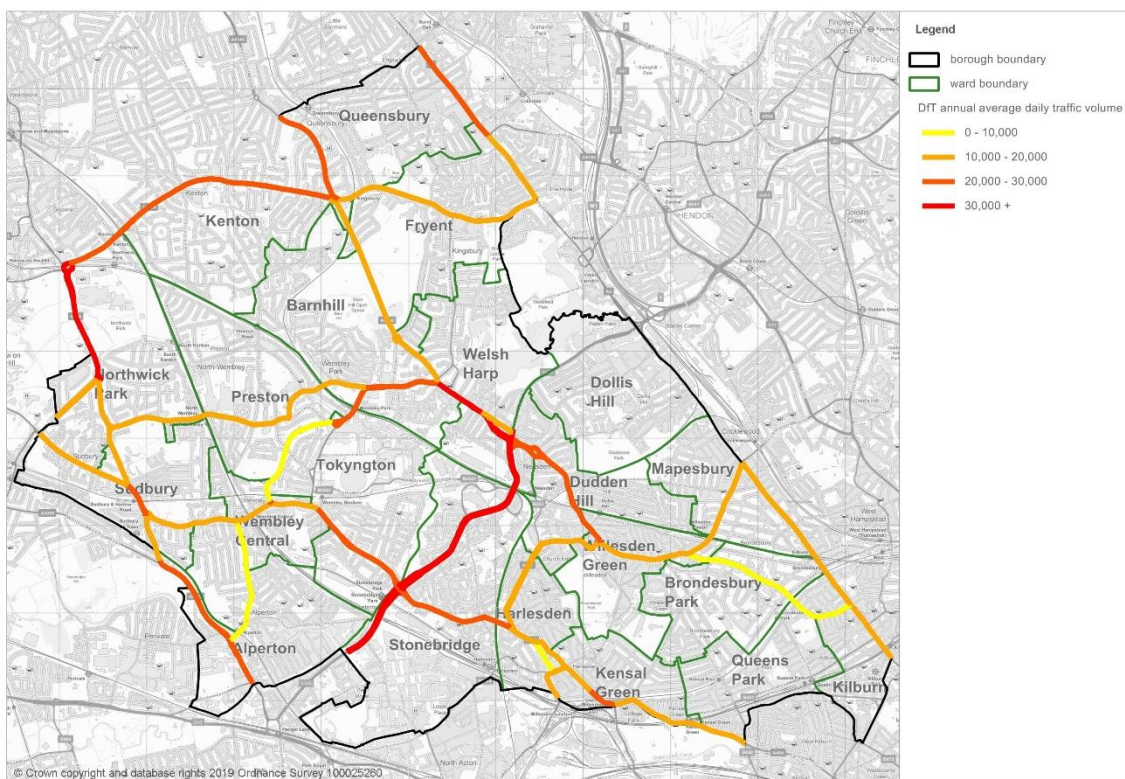
Baseline Transport

Provision of adequate transport infrastructure that considers anticipated levels of population and employment growth is essential in order to reduce environmental impacts, delays to private, business and public transport, and resultant decreases in wellbeing and productivity levels. In London and Brent the main aims for transport infrastructure are to reduce congestion and encourage the use of sustainable modes of transport.

Road Network

Brent is well-connected by road to central and other parts of West London. Average vehicle delays are lower in Outer London than Inner or Central London, although heavy road transport and pockets of localised congestion continue to put pressure upon parts of the borough and network. Traffic congestion is especially concentrated in central wards and along the North Circular Road. High levels of congestion reduce the quality of life of Brent residents and have a negative effect on economic growth. The map below shows daily traffic flow, where red indicates the most congested roads (Figure 132).

Figure 132: Annual Average Daily Traffic Volume All motor vehicles

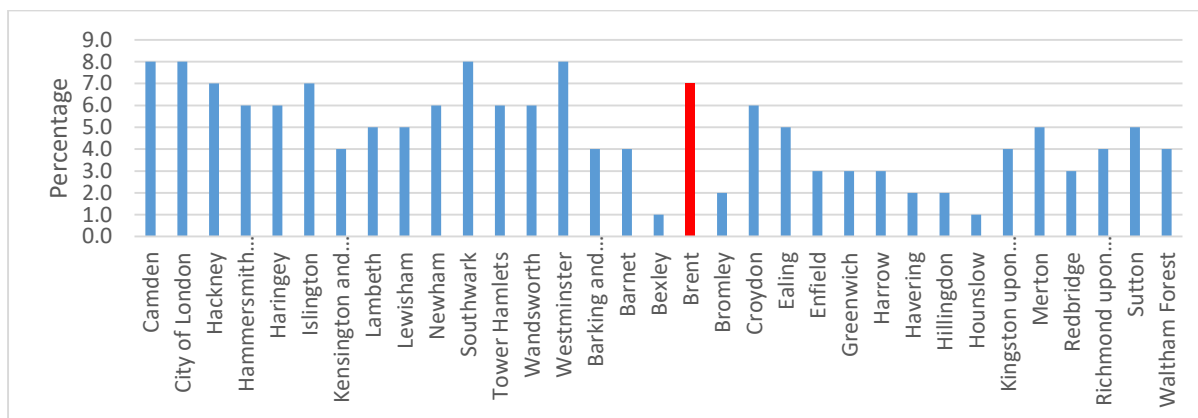


Source: Ordnance Survey

To reduce congestion in Brent it is important to encourage alternative sources of transport, and provide adequate road network maintenance. Brent has recently improved the condition of its highway assets, which is important for freight services that rely on this network and serve a number of industrial estates located in Brent. In 2013 around 40% of main roads were in poor condition, but this dropped to 21.6% in 2016, and only 7% in 2018. Brent still

however has a higher percentage of road network in poor condition compared with some London boroughs. (Figure 133).³⁰⁴

Figure 133: Highway Asset Condition – % of principal road network which requires maintenance 2017/18.



Source: Department for Transport statistics (2019)

Cars

In London, the increasing use of private cars and reduction of road space are the main causes of congestion, a problem that costs £4 billion a year to the UK economy. In 2012 air pollution had a total cost of up to £2.7 billion, impacting UK productivity³⁰⁵. Strategic solutions are needed to reduce traffic and congestion, improve sustainable modes of transport, and provide alternatives to motorised vehicles, in order to reduce these significant costs to the economy.

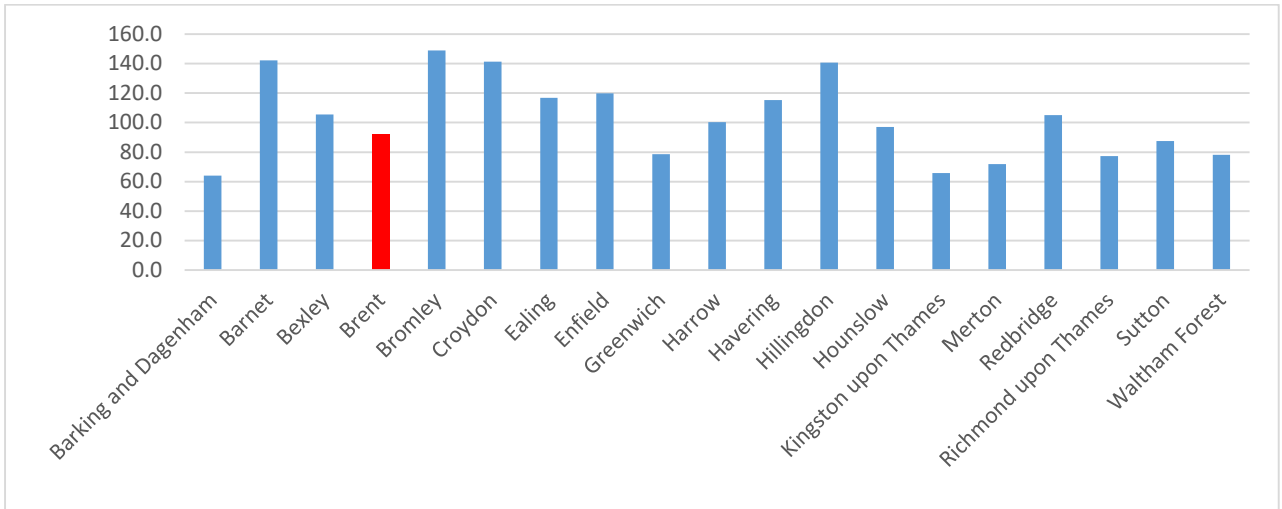
In 2017, there were 2.6m cars registered in London, 73% of which were registered in Outer London and 3.4% registered in Brent. Brent has the 12th highest cars registered out of the Outer London boroughs (Figure 134)³⁰⁶ however this number has increased considerably between 2012 and 2016 and fallen slightly since then (Figure 135).

³⁰⁴ TfL (2017) Travel in London 9 & TfL (2017) Borough Local Implementation Plan (LIP) performance indicators. *Department for Transport statistics (2019)*

³⁰⁵ DEFRA & DT (2017) UK plan for tackling roadside nitrogen dioxide.

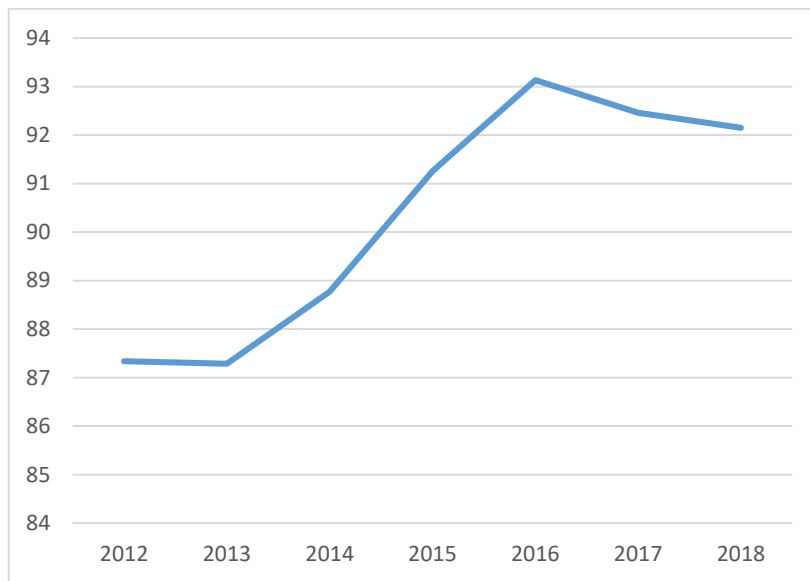
³⁰⁶ DfT (2018) Number of Licensed Vehicles 2017.

Figure 134: Cars registered 2018 Outer London (000s)



Source: Department for Transport Statistics Vehicle Licensing Statistics 2019.

Figure 135: Number of Licensed Cars Registered in Brent



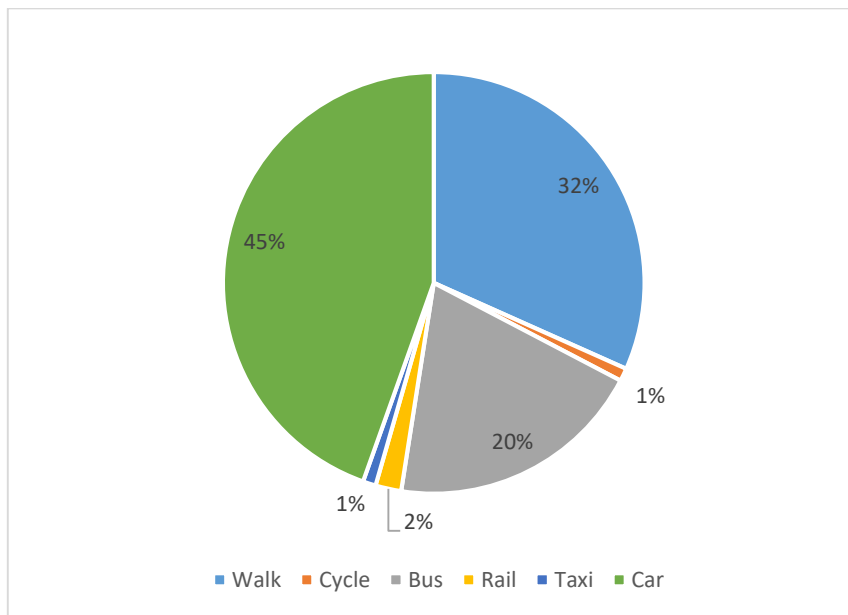
Source: Department for Transport Statistics Vehicle Licensing Statistics 2019.

Compared with Outer London, Brent has the largest percentage of daily trips by public transport (Rail, Underground, Bus), and one of the lowest for motorised vehicles. From 565 daily trips realized in the borough, 45% are made by private motorised vehicles, 20% by bus, 32% walking and only 1% cycling (Figure 136).³⁰⁷ In comparison to London as a whole, a lower proportion of trips are by car (35%) and by walking (25%).³⁰⁸

³⁰⁷ TfL (2017) Travel in London 9 supplementary information & TfL (2017) Borough Local Implementation Plan (LIP) performance indicators.

³⁰⁸ TfL (2018) Travel in London Report 11

Figure 136: Modal Split 2017

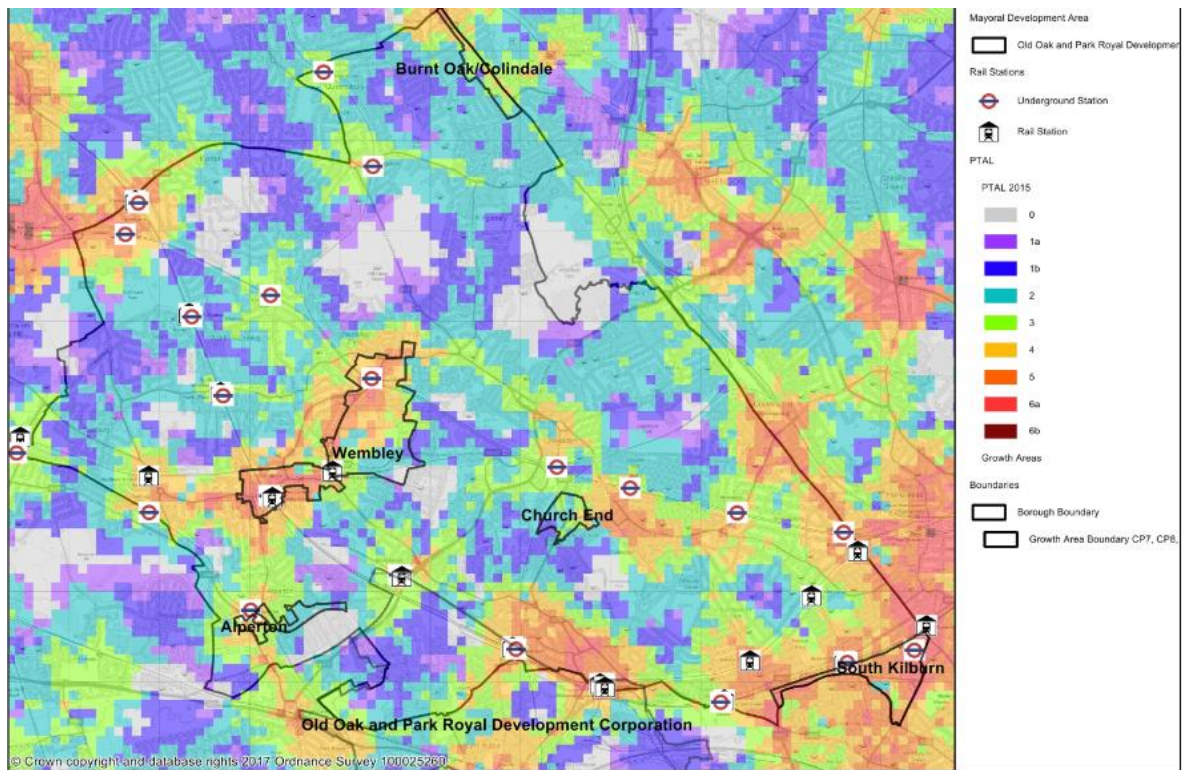


Source: Brent Local Implementation plan 2018

Public Transport

Car dependency can be reduced when people are offered efficient public transport alternatives. Although London's transport network is controlled and financed by Transport for London (TfL), the Council can seek to manage the location of new developments. In Brent, identified growth tend to have the highest Public Transport Accessibility Level (PTAL) levels, particularly around Wembley and in the southern part of the borough. Burnt Oak/Colindale also has good PTAL around 3, as does Church End and Alperton, although these latter two areas have some areas with lower PTAL around 2 and 1 (Figure 137).

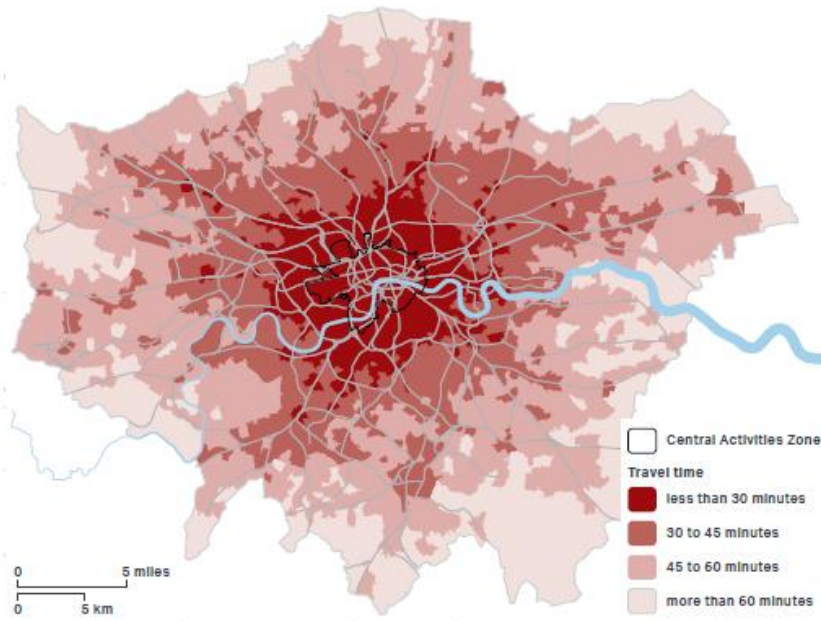
Figure 137: Brent's PTAL 2015



Source: Ordnance Survey

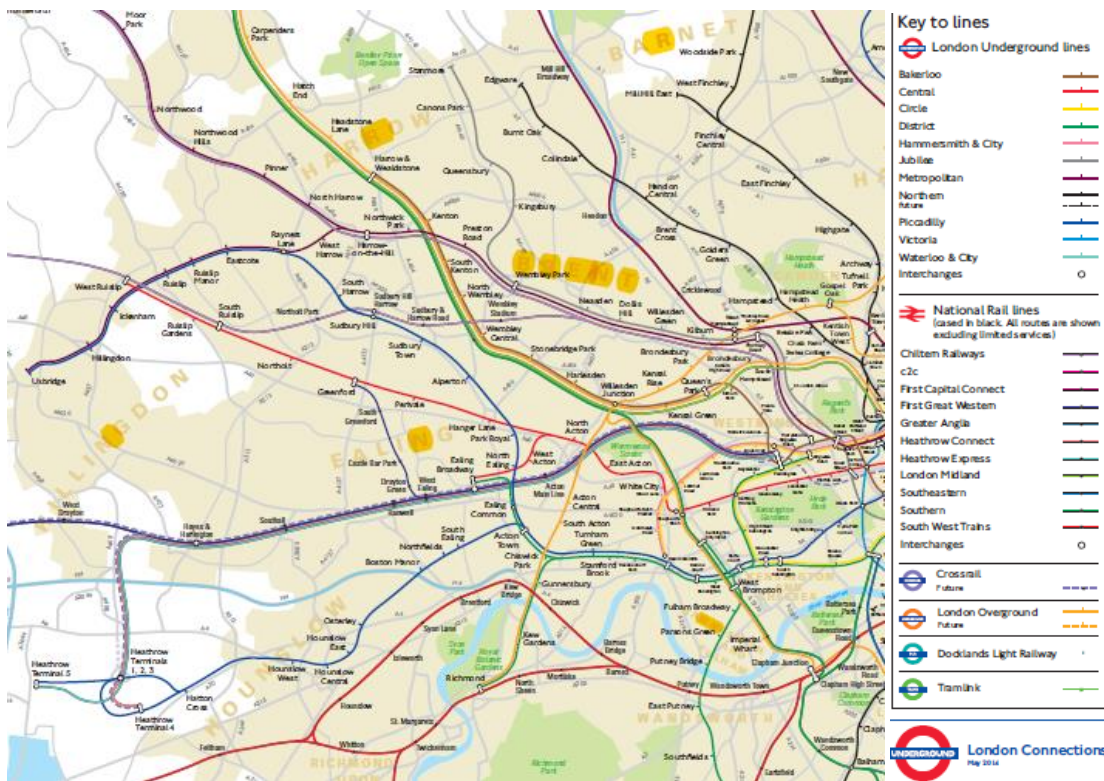
Brent is one of the Outer London Boroughs with higher accessibility by public transport (Figure 138). Brent is well connected to Central London, however is poorly connected to Outer London Boroughs, and to London Heathrow Airport, despite relatively close geographic proximity. Brent is therefore seen to have strong radial public transport links to Central London, but much weaker local orbital ones to the other West London boroughs. The proposed West London Orbital line therefore offers great potential to address these weaker orbital links. Brent is currently connected with the West and Outer London only through orbital road routes such as the A406 (North Circular Road), A4006 (Kingsbury Road) and A417 (Sudbury Court Drive), and improved bus routes and frequency would also help strengthen orbital transport links (Figure 139).

Figure 138: Public Transport Travel Time to the Central Activities Zone, 2015



Source: GLA (2018) Mayor's Transport Strategy

Figure 139: Central and West London underground and line connections map



Source: TfL (2014) London connections map

Public transport in Brent includes:

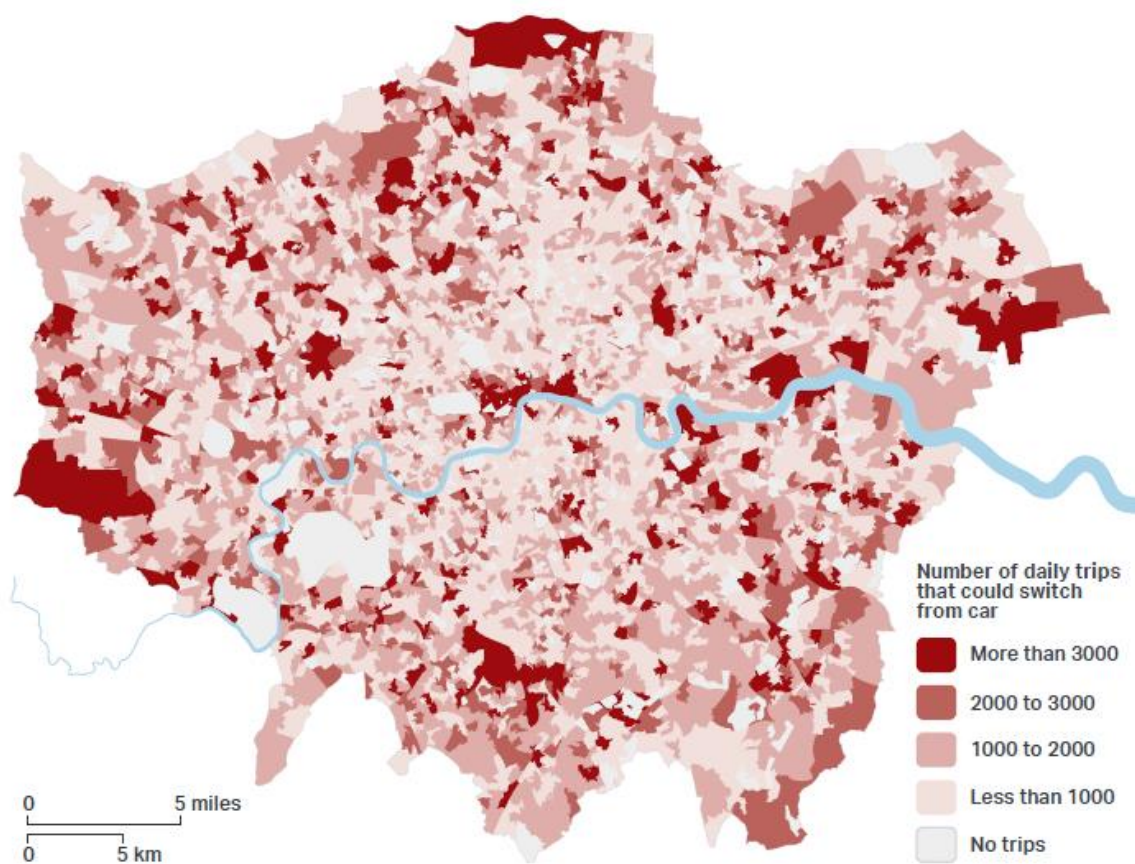
- 58 bus routes, 7 of which are night buses.
- 25 Underground stations, with currently only 3 stations with step free access at Wembley Park, Kingsbury, and Kilburn (and step free access now planned for Park Royal). Brent

has direct access to Jubilee, Piccadilly, Metropolitan and Bakerloo Underground lines. Jubilee line with night service during weekends.

- 3 Overground stations with access to Euston-Watford Junction and Richmond/Clapham Junction Overground routes.
- 4 National Rail stations offering direct links to Marylebone and out-lying destinations such as Birmingham/High Wycombe.

According to recent TfL analysis, an important proportion of residents in Brent could switch journeys currently made by car to journeys by foot, bicycle or by public transport, particularly for short trips (Figure 140)³⁰⁹.

Figure 140: Volume of car trips that could be made by walking, cycling and public transport



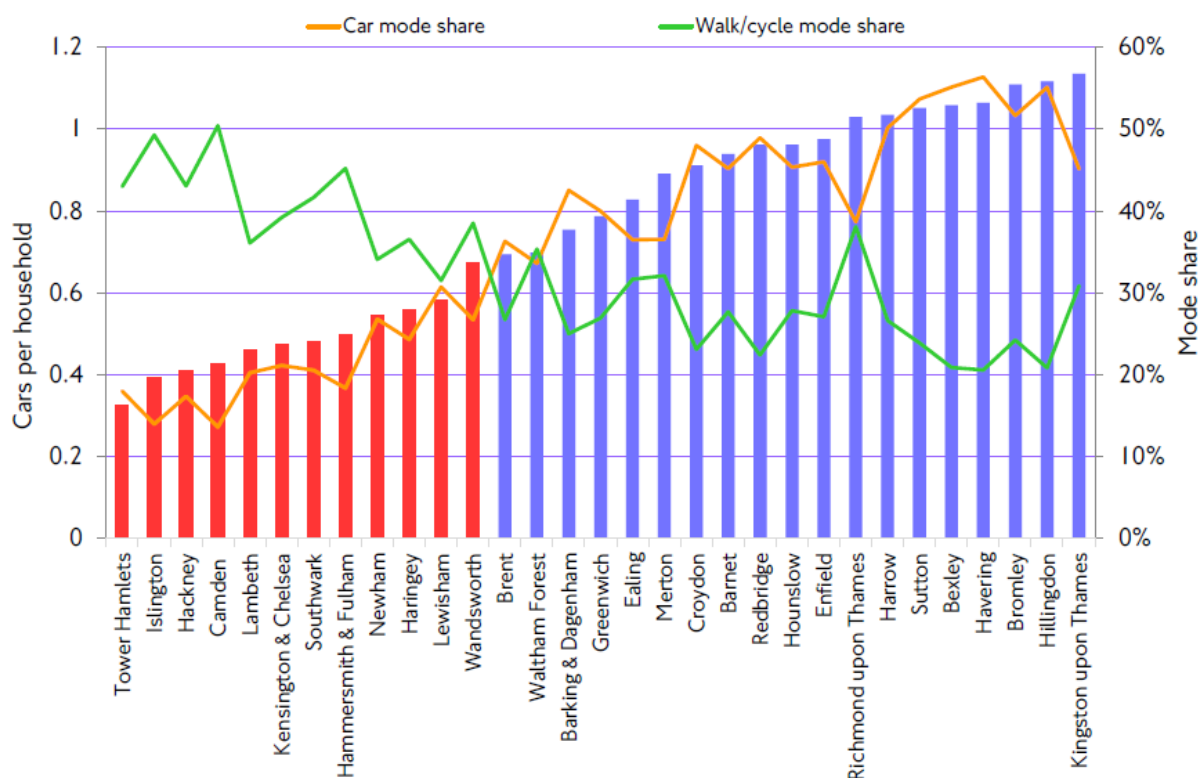
Source: GLA (2018) Mayor's Transport Strategy.

³⁰⁹ TfL (2017) Transport Classification of Londoners and GLA (2017) Mayor's Transport Strategy.

Cycling

Cycling in London has grown significantly over the past 15 years. There are now more than 670,000 cycle trips a day in London, an increase of over 130% since 2000. However, car dependency is higher in Outer London when compared with Inner London, and the numbers of trips by bike are lower (Figure 141)³¹⁰. Although, there are some boroughs such as Richmond upon Thames with cycle levels above 7%, in Brent only 1% of trips are realised by this mode.³¹¹

Figure 141: Car ownership rates by borough of residence. Average number of cars per household, car mode shares and active travel mode share compared, 2013/14-2015/16.



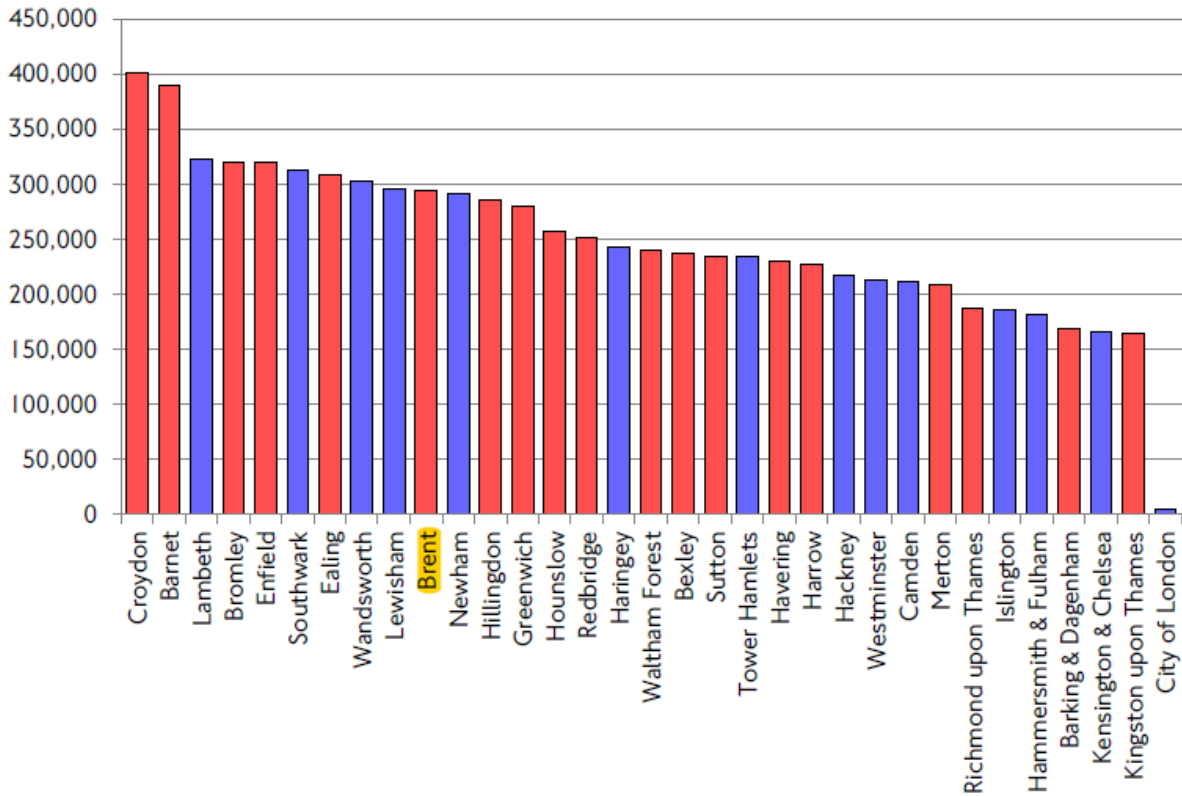
Source: TfL (2017) *Travel in London 9 supplementary information*.

Londoners make 8.17 million daily trips by motorised modes that could instead be made by bike. Current National and Local policies encourage cycle trips, rather than use of motorised vehicles. TfL recently evaluated cycle behaviour in the city to identify opportunities to increase the rates of cycling. TfL indicate that in Brent only 12,600 trips were realised by cycle, though cycling has potential to realise almost 300,000 trips by bike. Compared with Outer London, Brent is the borough with the 6th highest potential to increase its daily cycle-able trips (Figure 142).

³¹⁰TfL (2017) *Travel in London 9 supplementary information* & TfL (2017) *Borough Local Implementation Plan (LIP) performance indicators*.

³¹¹TfL (2017) *Borough Local Implementation Plan (LIP) performance indicators* & London Datastore (2014) *Travel to Work by Bicycle*. Brent Local Implementation plan 2018

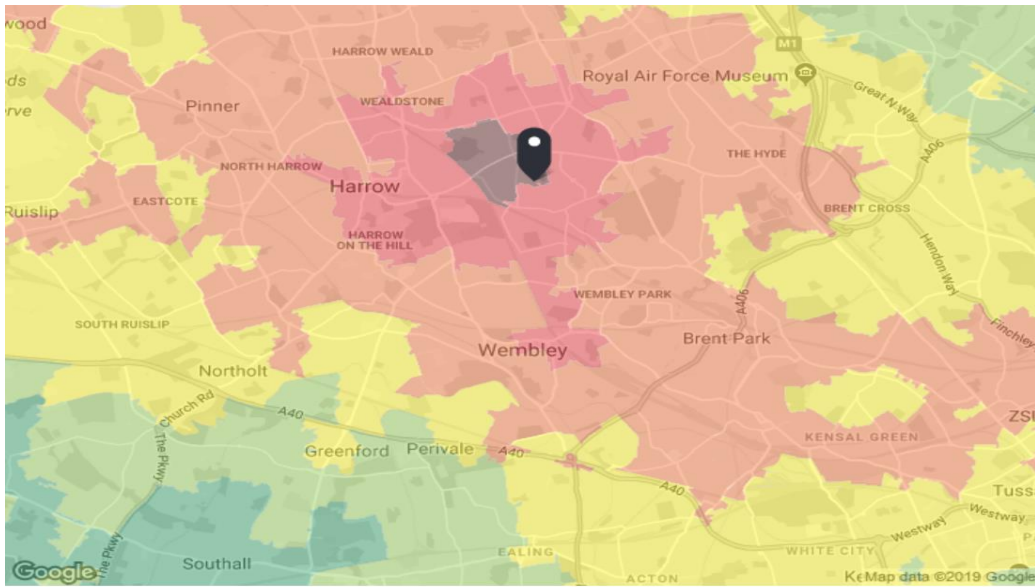
Figure 142: Potentially cyclable trips by borough of residence



Source: TfL (2017) Analysis of cycling potential 2016

Public transport is a preferred alternative to discourage the use of private cars, however as TfL control investment, Local Authorities have little control over improving infrastructure. Instead Local Authorities can focus on improving and promoting green transport models in areas with lower PTAL levels and for short trip distances. The case map below analyses areas with PTAL between 0 and 2 within Kenton with the potential to develop walking and bicycle trips (Figure 143).

Figure 143: Kenton TIM 2019

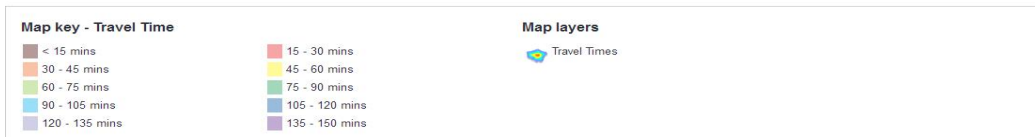


TIM output for Base Year

Scenario: Base Year Mode: All public transport modes, Time of day: AM peak, Direction: From location

HA3 0LT
 Ebrington Rd, Harrow HA3 0LT, UK
 Easting: 517747, Northing: 188253

Code: NT086A05A

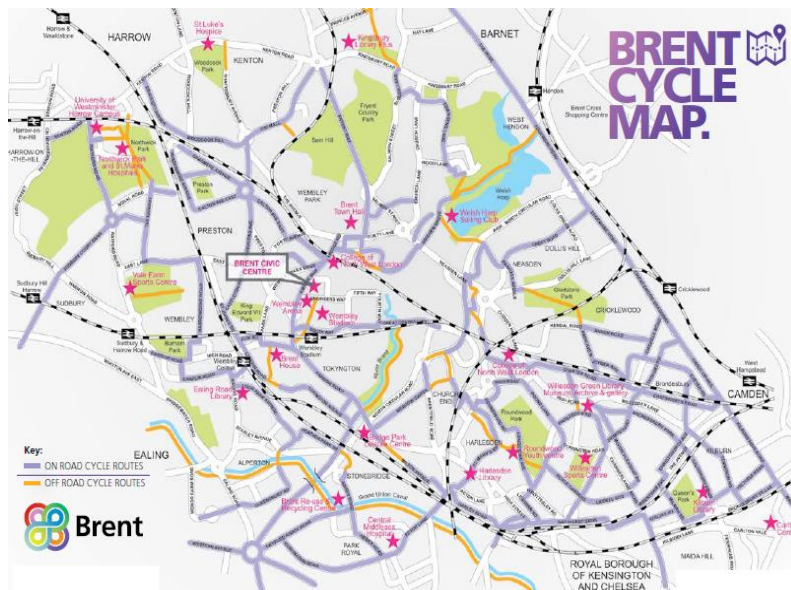


Source: TfL (2019) WebCAT

Brent provides some cycle parking facilities located close to public transport and cycle pathways, as well as some cycle pathways (Figure 144)³¹²

³¹² Brent (2017) Brent your guide to Cycling in Brent.

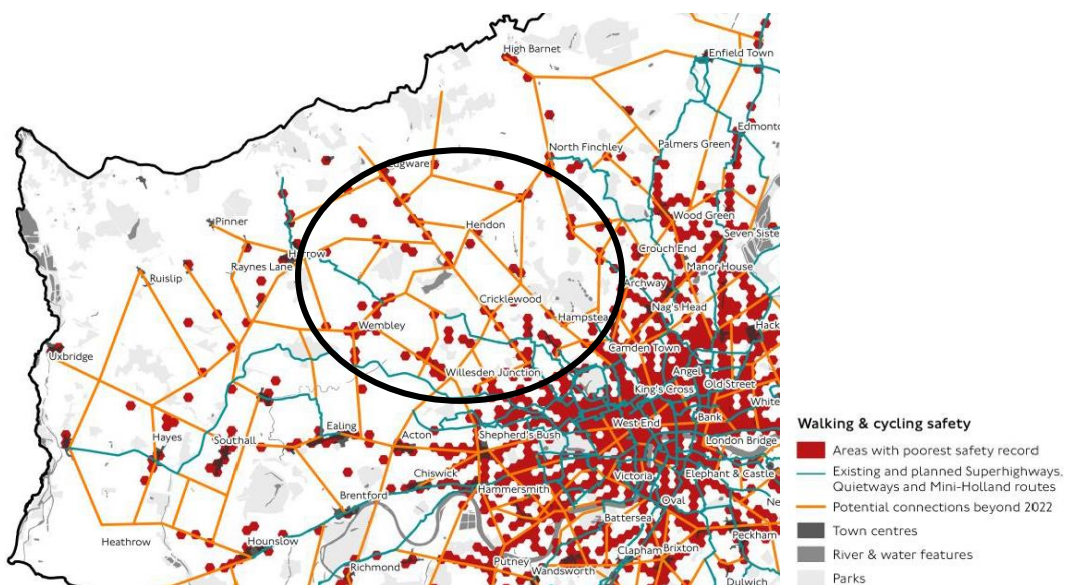
Figure 144: Brent Cycle Map



Source: Brent (2017) *Brent your guide to Cycling in Brent*.

Survey data indicates the most frequent reason that discourages people from cycling in London is concern about road safety and the probability of having a collision³¹³. Recent TfL analysis of walking and cycling infrastructure, shows Wembley, Cricklewood and Willesden Junction are located within areas with the 20% poorest safety records in London, based on the total number of collisions involving people walking or cycling (Figure 145). Similarly, on this analysis, TfL identified Wembley and Cricklewood in the top percentage of areas with higher growing population and employment in London, highlighting the importance to increase current levels of safety to encourage the use of green modes of transport.³¹⁴

Figure 145: Walking and cycling safety in London



Source: TfL (2017) *Strategic Cycling Analysis*.

³¹³ Brent (2016) *Brent Cycle Strategy 2016-2021*

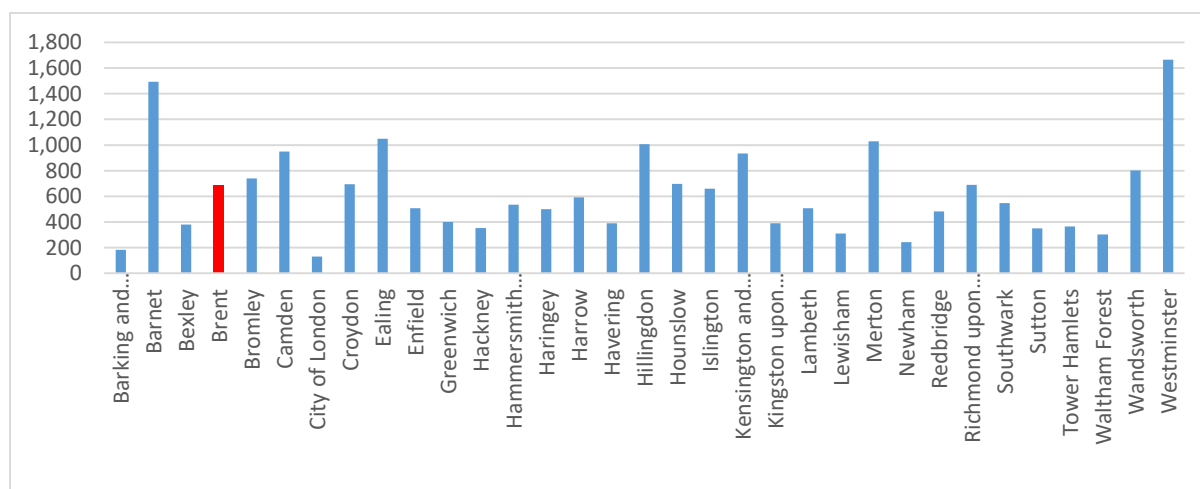
³¹⁴ TfL (2017) *Strategic Cycling Analysis: identifying future cycling demand in London*.

Electric Vehicles

Since 2011, the UK government has implemented a programme to improve air quality generated by motorised vehicles, promoting the use of clean technologies such as charging stations for Ultra Low Emissions Vehicles (ULEV). This program includes infrastructure for buses, vans and cars that are electric or hybrid.

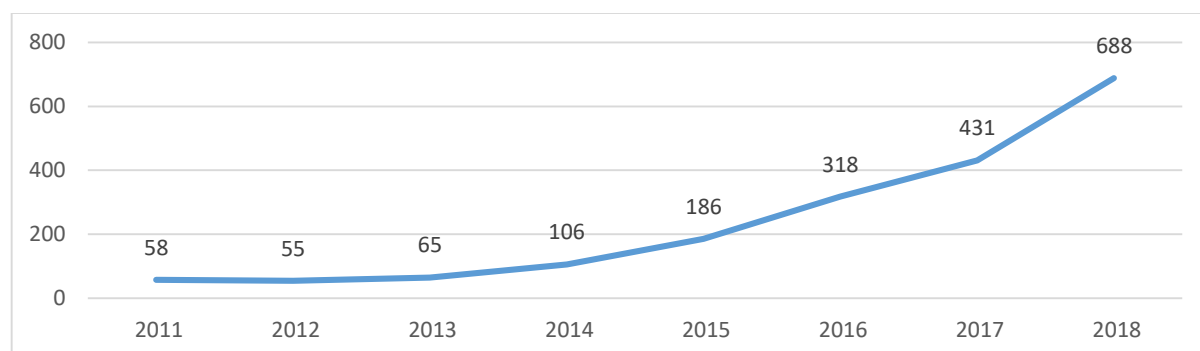
Brent has the 10th highest number of plug-in vehicles in London with 688 registered at the end of 2018 (Figure 146) which has increased by 679% since 2011 and makes up 0.6% of the total number of vehicles registered in Brent (Figure 147).

Figure 146: Plug-in vehicles registered in London 2018



Source: DfT (2019) Vehicle licensing statistics

Figure 147: Plug-in vehicles licensed registered in Brent

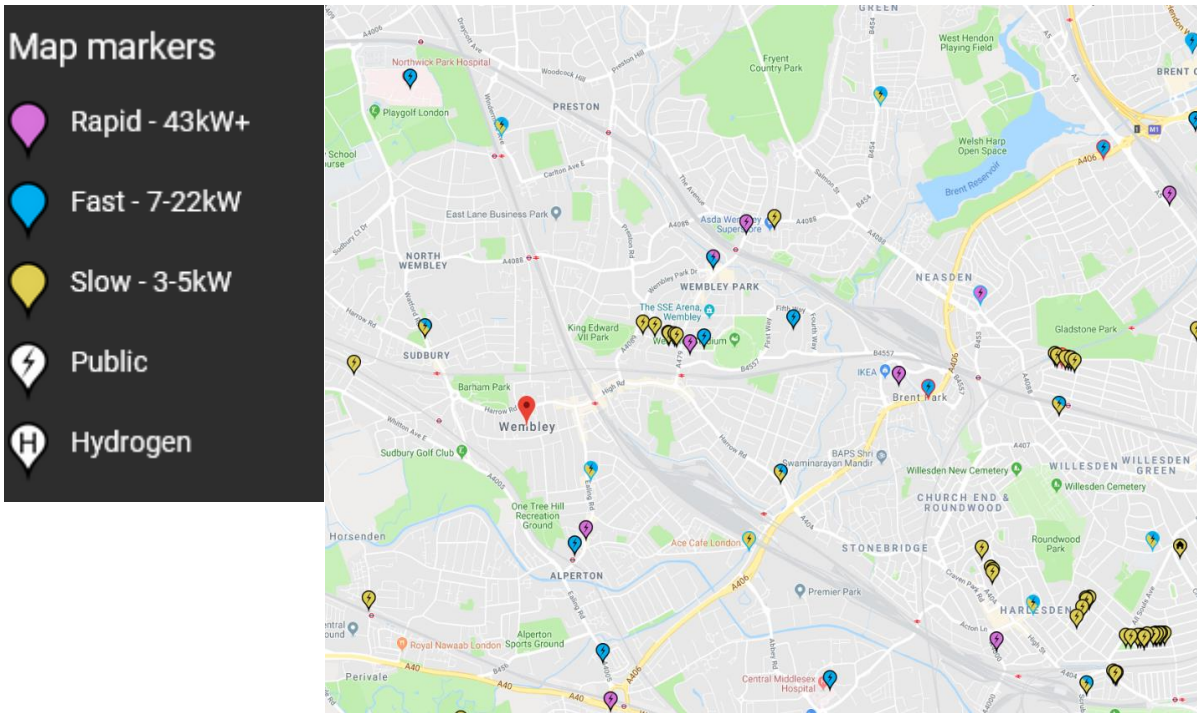


Source: DfT (2019) Vehicle licensing statistics

In 2017, Brent Council installed 33 charging points for electric cars in 24 locations. According to the online platform EVCPs zap-map, Brent has 13% of the connectors available in Greater London. 74 charging points in 13 locations mainly in supermarket areas, such as Morrisons and Costco circled in purple in the map below (Figure 148). Of the current EVCPs, 19% are out of service or have performance issues reported, including the five stations located at Wembley Stadium.³¹⁵

³¹⁵ Zap-Map (2018) Consulted 8 January 2018

Figure 148: Electric Vehicle Charging Point (EVCP) Locations



Source: Zap-Map (2019)

	SLOW 3kW	FAST 7 kW	RAPID 50kw	SUPER 120kw	HYDROGEN	TOTAL
Available to use	8	52				60
Reported issue		1				1
Out of service	4	7	2			13
TOTAL	12	60	2			74

Source: Zap-Map (2018) Consulted January 2018

Charging points at Brent can provide full daily charge for 265 to 469 EV users³¹⁶. This capacity and charging time associated with EVCP depends on the power level associated in Brent as is shown in Figure 149:

- 3kW provide a full charge between 7 and 8 hours and is most suited for overnight charging at or near home or work. With capacity for 1 or 2 users in a 24 hour.
- 7kW typical full charge electric vehicles in 3-4 hours, meaning that 3 or 4 users a day could fully charge.
- 50kW a higher power rapid charging option ideal to charge EV quickly, provide full charge between 30 and 40 minutes, allowing between 36 and 48 users per day³¹⁷.

Figure 149: Power Level EVCP in Brent

	3kW	7kW	50kW
Subtotal	12	60	2
% Total EVCP	16%	81%	3%

Source: Zap-Map (2018) Consulted 8 January 2018

³¹⁶ Scenario considering all the 74 EVCP at Brent available to use.

³¹⁷ TfL (2017) Electric vehicle charging infrastructure: Location guidance for London.

In addition to the charging stations, there are 6 off-street parking spaces provided exclusively for electric vehicles. There are also 47 off-street parking spaces provided for electric vehicles in Brent Civic Centre, available as general parking when not in use for vehicle charging. Electric vehicle parking is very limited in comparison with the infrastructure and off-street parking spaces for standard motorised vehicles (Figure 150).³¹⁸

Figure 150: Brent’s off-street parking spaces

Normal Car	650
Electric Vehicles	53

Source: Brent (2018) Parking Annual Report 2017-2018

Funding and securing electrical connections is one of the biggest barriers to maintaining and installing new EVCPs.³¹⁹ Investment requirements depend on the type of charging point and location³²⁰:

- Public on-street EVCPs cost in the region around £6k - £10k for installation and equipment.
- Private off-street EVCPs, costs are generally between £0 – £2.5k for installation and equipment.
- Cost of electricity averages £1.80 per charge (60 miles) for a standard domestic rate.

Parking

Demand for parking is high in Brent. Although the Council has introduced a number of parking control measures, due to current levels of car traffic and with limited space available, the pressure to manage kerb space is noticeable.

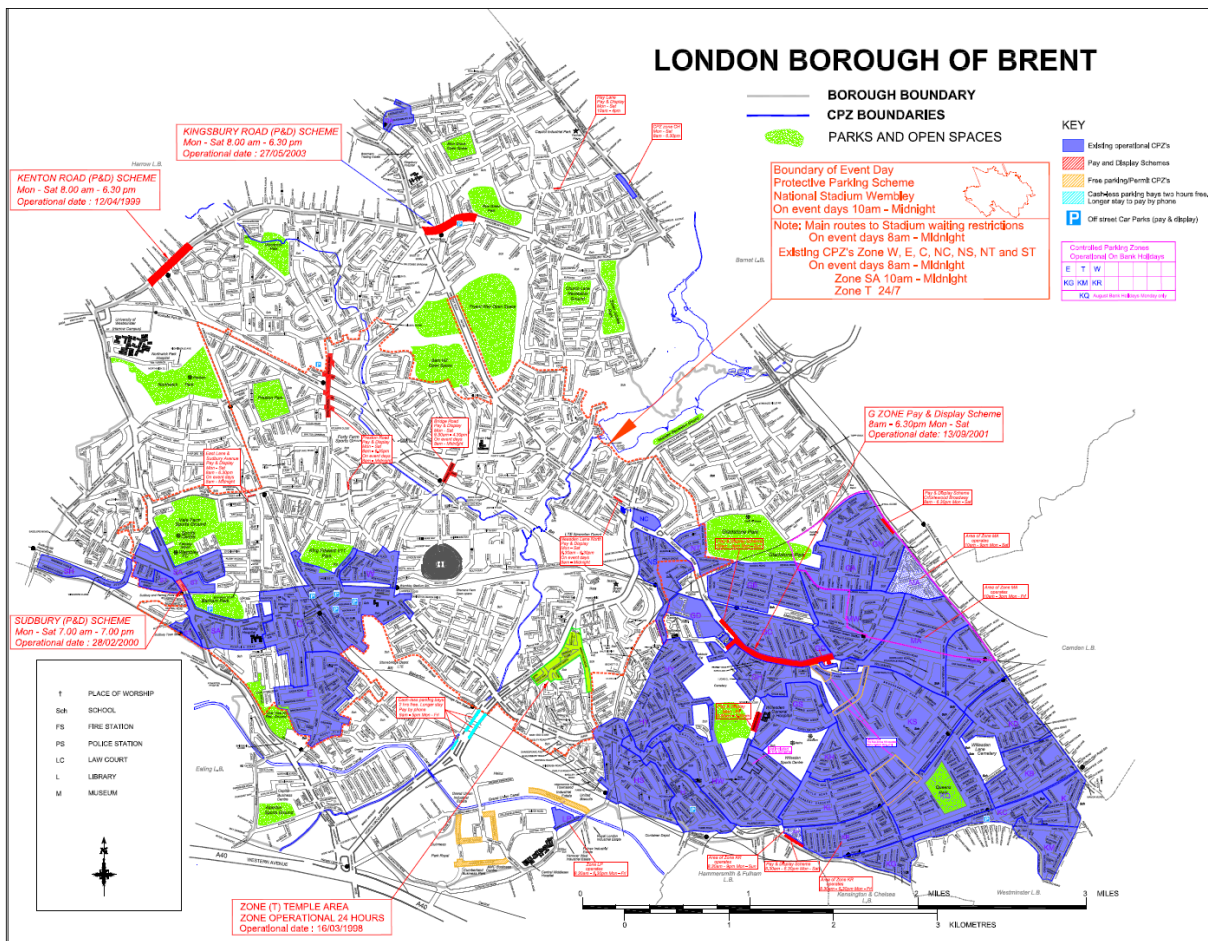
Parking management is delivered in partnership with Serco, a private company that provides services such as off-street parking enforcement; CCTV for public space and traffic enforcement; vehicle removal; pay and display machine maintenance and cash collection; and provision of parking IT and back office services. On-street parking spaces are managed through 40 Controlled Parking Zones (CPZs) across Brent (Figure 151). With operation times specific to location, 33,000 parking spaces are provided serving 56,000 households.

³¹⁸ Brent (2016) Parking Strategy 2015.

³¹⁹ Brent (2016) Cabinet Report from the Strategic Director Regeneration and Environment.

³²⁰ RGP (2017) Electric Vehicle Charging Points.

Figure 151: Controlled Parking Zones



Source: Brent (2018) *Parking Annual Report 2017-2018*

Overall, CPZs are designed to prevent commuters from parking in residential streets, and to encourage them to instead use pay and display facilities or use alternative means of transport. A recent parking consultation expressed views to extend current CPZs and loading restrictions, interventions that are currently considered by the Council for implementation mainly in areas with high level of public transport accessibility.³²¹

Parking permits are issued in CPZs according to the type of user. Permit price goes up with 1) higher emissions, 2) additional permits per household. Priced parking, particularly in CPZs and areas with good public transport, is designed to discourage car use and remove disincentives to use public transport. The 35% drop in visitor parking permits between 2016 and 2018 (Figure 152) is considered a result of the parking service introducing new visitor parking charges in all Controlled Parking Zone (CPZ) areas 29th November 2016 in an effort to reduce excess demand for parking spaces.³²²

³²¹ Brent (2017) *Parking Annual Report 2016-2017*.

³²² Brent (2018) *Parking Annual Report 2017-2018*

Figure 152: Brent Parking permits in CPZ

Permits Issued	2014/15	2015/16	2016/17	2017/18
Resident Permit	34,427	31,132	31,098	33,450
Visitor Parking	411,000	451,000	420,000	272,000
Business Permits	627	589	691	788
All Other Permits	5,164	5,140	5,095	-

Source: Brent (2018) Parking Annual Report 2017-2018

Digital

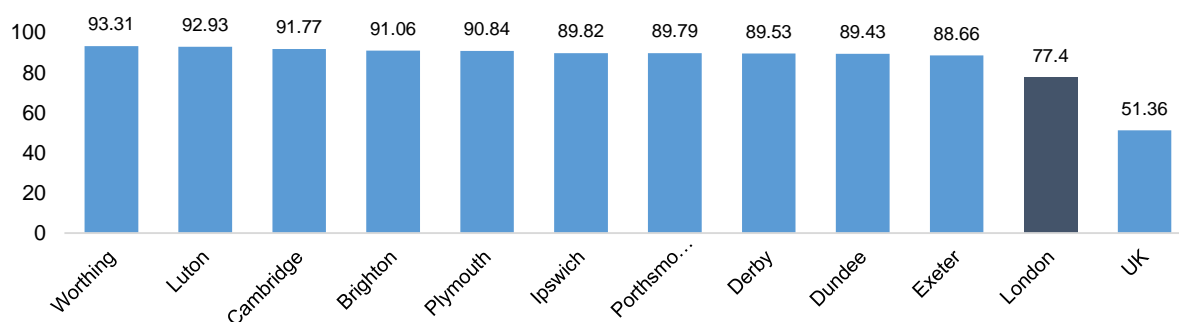
Accessibility to technology is a crucial influence in people's lives; connectivity drives productivity and innovation. In order to realise the benefits of technology in Brent, it is important to ensure access to digital infrastructure that meets the requirements of residents and businesses located in the borough. Digital capacity includes broadband connections, speeds, Wi-Fi public hotspots, and self-service terminals.

The Universal Service Obligation (USO) introduced in 1984 has as its aim to ensure that basic fixed line telecom services be made available at an affordable price to all UK customers. This basic line considers broadband technology below 10Mbps: technology that is still limited, to cover the basic needs of business and entrepreneurs working in a global environment.

In London, the development of optical fibre has considerably increased broadband speeds above the USO minimum, allowing more places to be connected with access to superfast (above 30Mbps) and ultrafast (above 100Mbps) broadband. However, there are places in London that still have poor digital connectivity, a situation that limits city economic productivity, international competitiveness and new investment.

London ranked 30 amongst 63 surveyed cities in 2016, with 77.4% of properties in general covered by ultrafast broadband, above the national average of 51.4%, but below cities with a lesser number of residents and business (Figure 153)³²³.

Figure 153: Percentage of premises covered by ultrafast broadband (>100 Mbps) at the end of 2016.



Source: Thinkbroadband.com and Centre for Cities in London Assembly (2017) Regeneration Committee: Digital Connectivity Report.

In July 2018, Central Government set a goal of delivering full-fibre to 15 million premises by 2025 with delivery to all premises by 2033³²⁴. Full-fibre broadband coverage in the UK has risen since to around 7% of premises in Spring 2019, an increase of over 300,000 premises, an increase of 4% since 2017. This increase mainly reflects the commercial roll-out of Fibre to the Property (FTTP) by BT Plc, Virgin Media and KCOM and a range of other providers including Hyperoptic, CityFibre and Gigaclear³²⁵.

³²³ London Assembly (2017) Regeneration Committee: Digital Connectivity Report.

³²⁴ Ofcom (2018) Connected Nations

³²⁵ Ofcom (2019) Connected Nations Update

IT operators in UK have completed implementing a major 4G rollout programme and the coverage of these higher-speed data services has increased significantly, with geographic coverage from all operators. The launch of 4G voice call services by EE and Three has had a beneficial effect on their voice network coverage, in particular by improving indoor coverage.

In 2018, the Government had achieved its goal of 95% superfast broadband coverage for homes and businesses in the UK with the support of BT Plc. In Brent, broadband capacity significantly improved over 2016 and 2017 as a result of £50m BT Plc investment to deploy fibre broadband in the borough³²⁶. BT Plc investment increased connection speeds, widening accessibility to broadband over 30Mbps from 92.8% to 99% of hotspots. After this investment, Brent reached the third highest broadband accessibility amongst the West London Partnership (Figure 154) and one of the best in London (Figure 155).

Figure 154: BT Superfast Broadband access (>30Mbps) 2015/2017 across West London Partnership

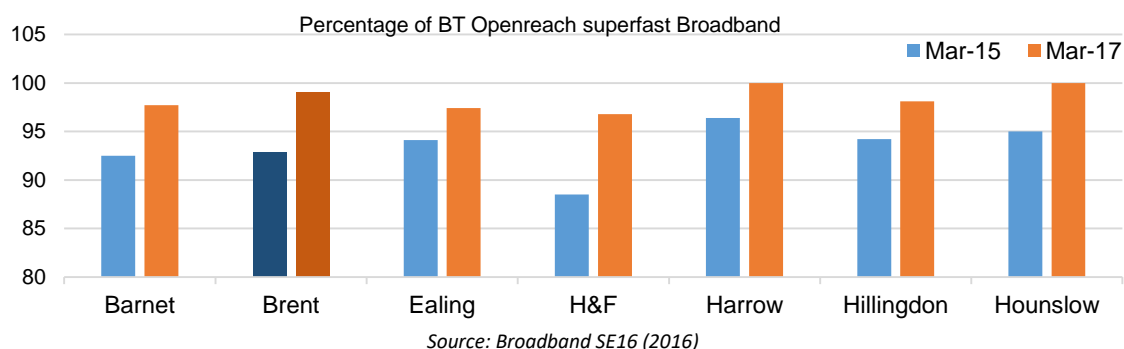
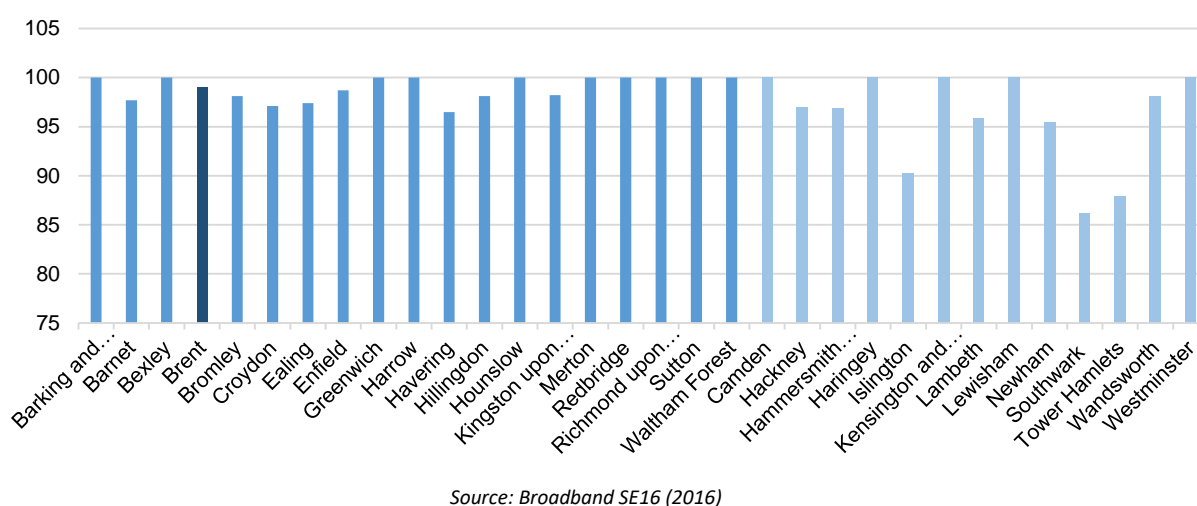


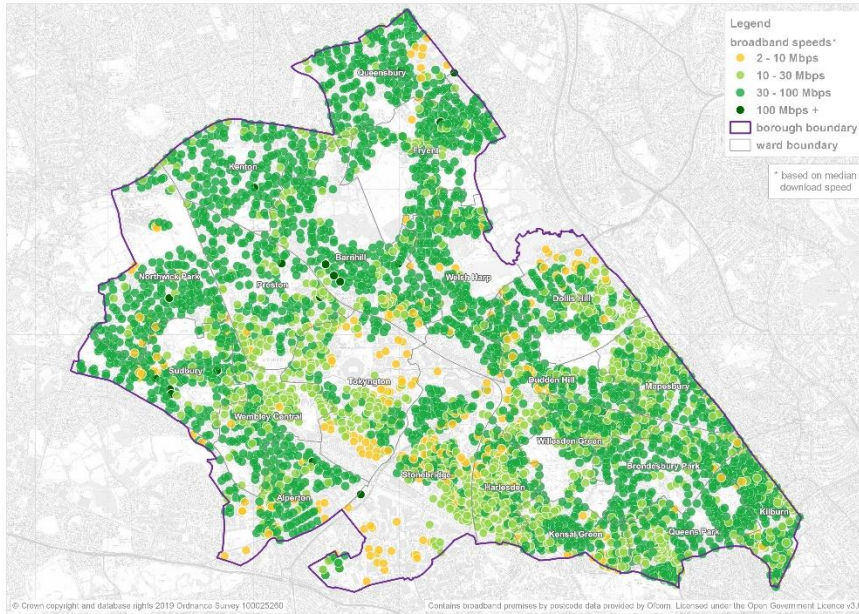
Figure 155: Percentage of BT Superfast Broadband in London (March 2017)



Although this investment increased the competitiveness of Brent among other boroughs, there are ‘not-spots’ where connectivity is still poor, shown as red dots on the map below. Areas with low connectivity include “growth” areas expected to accommodate new housing and employment such as Wembley, Burnt Oak/Colindale and OPDC, where requirements for faster broadband could be higher than in other parts of the borough (Figure 156).

³²⁶ Brent & Kilburn Times (2015).

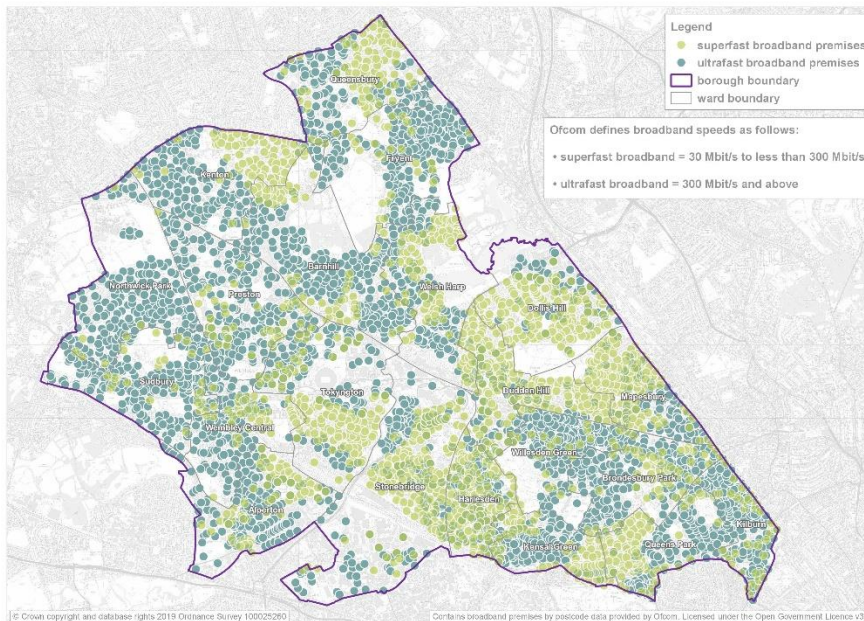
Figure 156: Broadband speeds by postcode in Brent 2016



Source: Ordnance Survey.

Ultrafast broadband connections are limited or null in most of the borough. The map below includes future investments in ultrafast broadband technology (>100 Mbps), and show ultrafast coverage only in the areas of Wembley and Alperton. Important hubs of employment such as Park Royal are not included (Figure 157).

Figure 157: Ultrafast Broadband Premises in Brent 2016.



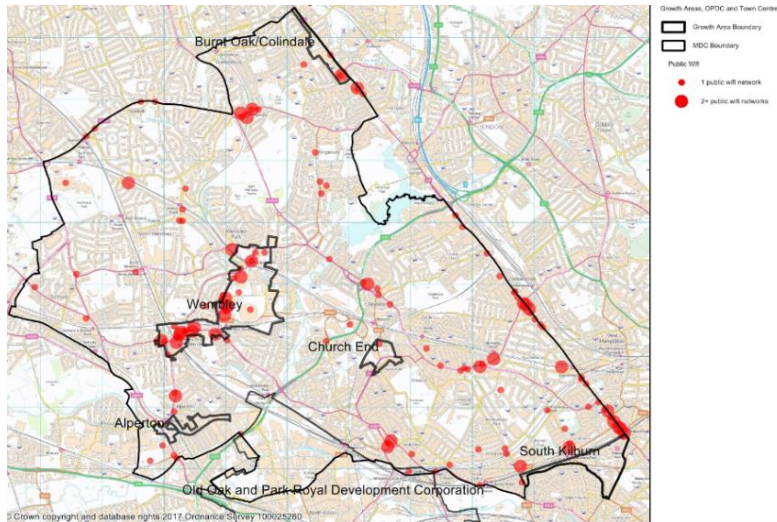
Source: Ordnance Survey.

SMART City strategies integrate big data understanding, physical infrastructure and digital infrastructure. SMART Cities aim to solve cities challenges, create a better environment for the future, and deliver resources efficiencies and better capital asset management. Brent Council's Digital Strategy seeks to align with the London SMART Cities agenda, and plans for

digital infrastructure for the borough from 2017-2022. The strategy aims to improve access to information and services to ensure digital inclusion for all Brent's residents and businesses.

All Council services are currently accessible online, and 61% of Brent households have an account. Digital access in Brent still has deficiencies however, such as: limited free Wi-Fi spots (Figure 158), and broadband speeds that limit business development (Figure 156).³²⁷

Figure 158: Public Wi-Fi in Brent.



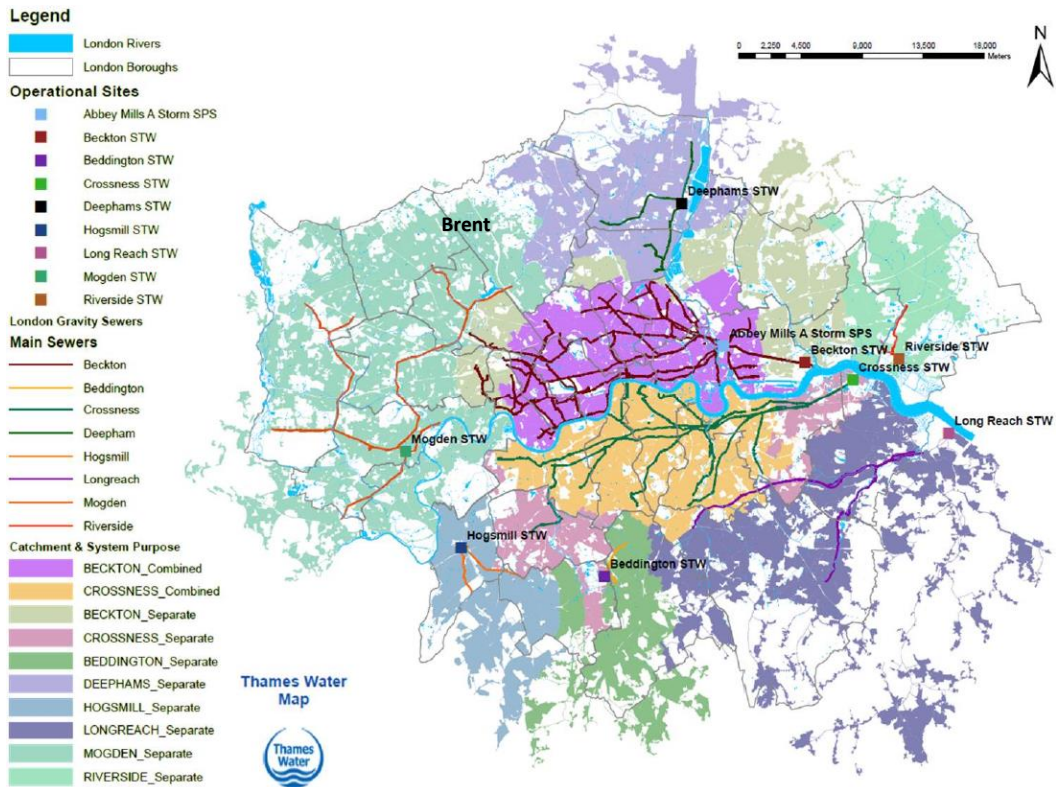
Source: Ordnance Survey.

Water

Thames Water Corporation is the main authority in charge of public water supply and waste water treatment in London. In Outer London, there are mainly separate systems that bring rainwater into local tributary rivers, and foul water to sewage treatment works (Figure 159).

³²⁷ Brent (2017) Digital Strategy 2017-2020.

Figure 159: Combined and separated sewer systems.



Source: GLA (2016) London Sustainable Drainage Action Plan.

Brent’s population is served by three sewage works: Beckton, Mogden and Deephams that treat water from the Thames and River Lee; and this sewage infrastructure also serves other boroughs (Figure 160).

Figure 160: London’s sewage treatment works for selected boroughs including Brent.

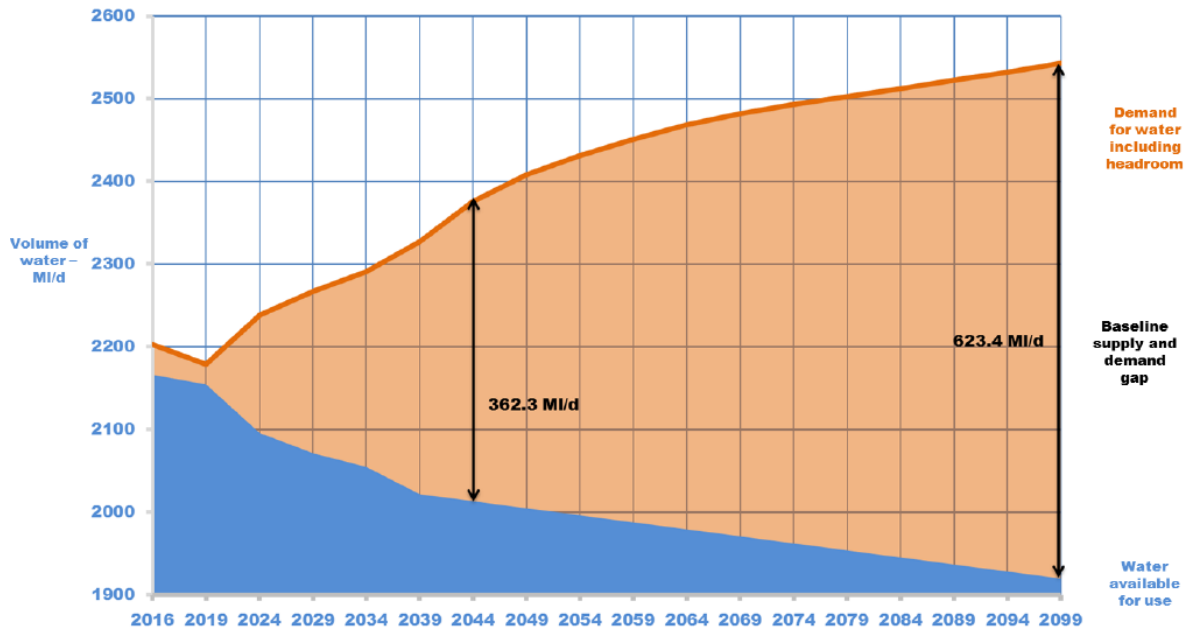
Sewage treatment works	Water course	Catchment	Population served (000s)	Consented flow* (m3/d)
Beckton	Thames Tideway	Barking & Dagenham, Brent, Camden, City of Westminster, City of London, Ealing, Hackney, Hammersmith & Fulham, Haringey, Islington, Kensington and Chelsea, Newham, Redbridge, Tower Hamlets, Waltham Forest	1,420,000	3,300
Mogden	Upper Thames Tideway	Barnet, Brent, Ealing, Harrow, Hillingdon, Hounslow, Richmond Upon Thames, and parts of Berkshire, Buckinghamshire and Hertfordshire	690,000	1,860
Deephams	River Lee via Salmon Brook	Barnet, Brent, Enfield, Haringey, Waltham Forest and parts of Essex and Hertfordshire	443,000	852

Source: GLA (2011) Securing London’s Water Future: The Mayor’s Water Strategy.

London’s water supply is in deficit, with the deficit growing from 7.6M litres per day (l/d) in 2016-17 to 40.1Ml/d in 2017-18. Over 2017-18, London’s annual water consumption per capita

was 120.8 l/d for households in measured (metered) areas, and 159.4 l/d for households in (unmetered) unmeasured areas.³²⁸ Thames Water indicates that London's overall water supply capacity is below consumption patterns. Growth in demand from an increasing population, and falling available supply due to climate changes, changes in bulk supply and increased third party abstraction from the River Thames, means the gap is predicted to widen if no action is taken, with insufficient water to meet London's needs.

Figure 161: Thames Water, Water Deficit Prediction (MI/d) 2016-2100 under dry year average.



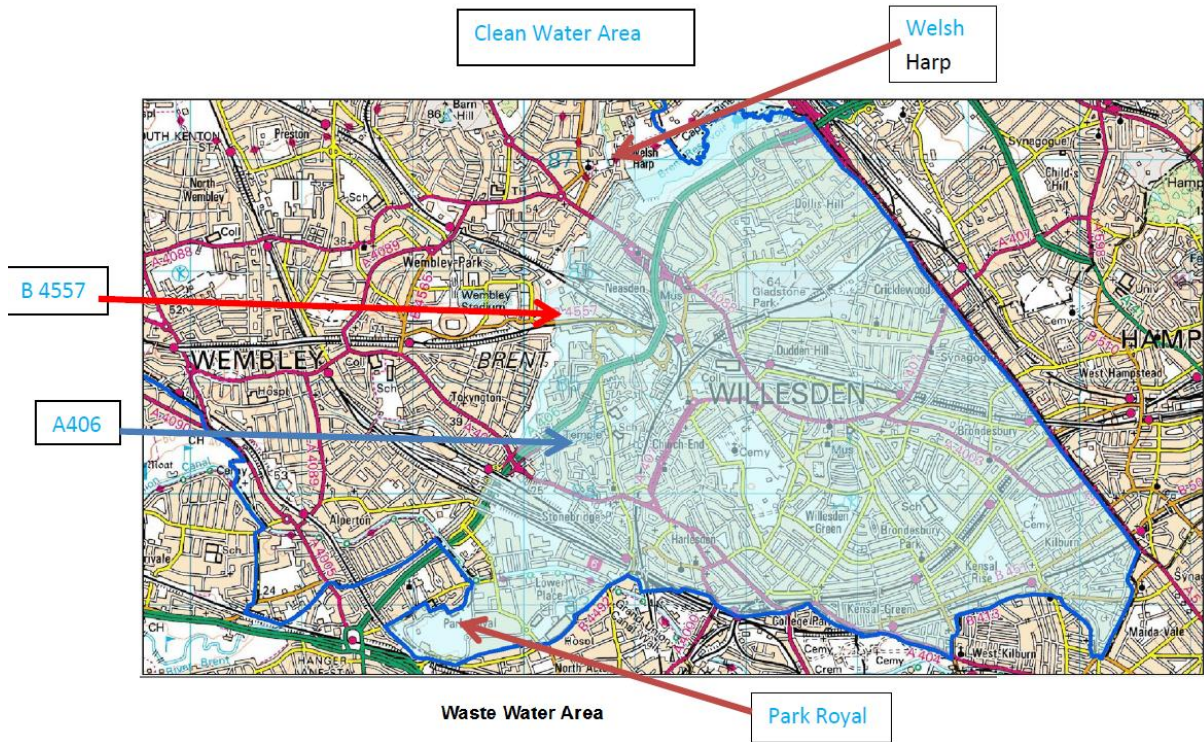
Source: Thames Water Revised Draft Water Resources Management Plan 2019

At a local level, Thames Waters are able to provide some limited detail on water demand and consumption in the District Meter Area which covers half of Brent south and east of the River Brent and Welsh Harp Reservoir.³²⁹

³²⁸ Thames Water (2017 & 2018) Environment Agency Annual Review 2016-17 and 2017-18

³²⁹ Thames Water (2018 & 2019) Environmental Information Request Responses 12/091 and 19/20/014

Figure 162: District Meter Area in LB Brent



Source: Thames Water (2018) Environmental Information Request Response 12/091

Taking latest data for 2016-17 and 2017-18 provided by Thames Water below, household water consumption per capita is noted to be higher than the Thames Water 125 l/d standard³³⁰ or the London Plan³³¹ 105 l/d standard set for new domestic properties. Assuming an LB Brent average household size of 2.8 persons as per Census 2011, latest data indicates daily annual water consumption per capita fell from 152 l/d to 139l/d for households in the LB Brent District Meter Area between 2016-17 and 2017-18. Over the same period 2016-17 and 2017-18 the number of domestic properties metered in the area rose from 28% to 47% and this increase in metering is considered the main driver for the fall in water consumption. Clear variance is observed between daily water consumption per capita at both the London and Brent levels, with water consumption 30% higher at 156 l/d in unmeasured (unmetered), compared to 120 l/d in measured (metered), domestic properties in Brent over 2017-18.³³²

³³⁰ CLG / DEFRA (2007) Water Efficiency in New Buildings

³³¹ Mayor of London (2016) London Plan : Chapter Five : London's Response to Climate Change

³³² Thames Water (2018 & 2019) Environmental Information Request Responses 12/091 and 19/20/014

Figure 163: Household and Commercial Water Consumption 2016-17 & 2017-18

		Property Count ¹	Average Daily consumption m ³	Average per property consumption l/d
Households	Measured	16457	5554.56	337.51
	Unmeasured ²	41451	19165.55	462.36
Commercial	Measured	2708	5426.57	2003.90
	Unmeasured ³	579	183.3	316.58

		Property count	Average Daily Consumption (ADC)	Average consumption per property
Household	Measured	27318	9207.34	337.043
	Unmeasured	30934	13530.88	437.4113
Commercial	Measured	2776	5302.4	1910.086
	Unmeasured	716	188.51	263.2821

Source: Thames Water (2018 & 2019) Environmental Information Request Responses 12/091 and 19/20/014

The Environment Agency classified the water usage in London for 2013 as “seriously stressed” and demand will remain as such into the 2050s. This classification means that more than 20% of the population served by Thames Water is using water from areas classed as under serious stress by limited capacity.³³³

Thames Water have responded by implementing various measures to maintain water resources, including the “Thames Water’s metering” programme of water efficiency and leakage detection. This programme started in 2015, reducing water usage by 2.5 million litres per day, and was rolled out in Brent at the beginning of 2017.

In terms of infrastructure, in 2010 Thames Water opened the UK’s first large desalination plant at Beckton, which serves 150 million litres of drinking water daily to the population in North London, including one small part of Brent. Thames Water highlights the importance of implementing more initiatives to reinforce water supply, particularly in times of drought, and mentioned in its last strategy report that it is evaluating some other technical options for London, but does not specify any future investment in Brent.³³⁴ Current water infrastructure lies under most streets, which are subject to large-scale and widespread excavations.

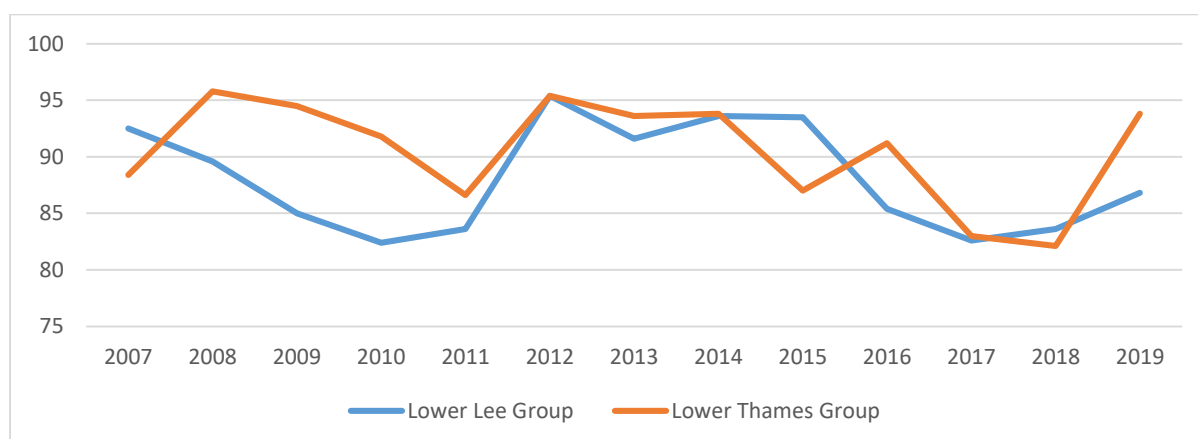
London has two main water reservoirs used to provide potable water to the population. In the last 10 years the capacity of those reservoirs has been above 80%. In the Lower Thames Group that satisfies water demand for Brent, capacity has been above 85% (Figure 164). This is not enough to provide water resources to London’s population, and more efficient use of the resource is required. Thames Water aim to improve the capacity and reliability of major treatment water works and deliver 100% compliance with drinking water quality standards.³³⁵

³³³ Environment Agency (2013) Water stressed areas: 2013 classification.

³³⁴ Thames Water (2017) WRMP19 Resource Options

³³⁵ Corporate Thames Water (2013) Our long-term strategy 2015-2040.

Figure 164: London Water Reservoir capacity level %



Source: Data London, Dataset London Reservoir Levels.

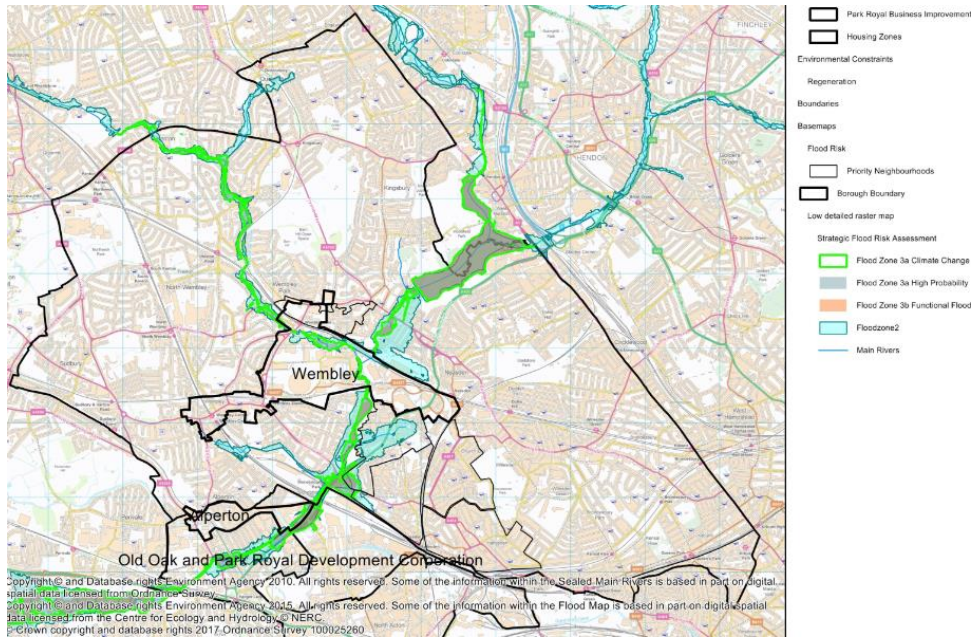
Since 1974, there has been no major increase in London’s strategic reservoir storage facilities. The last project built was the Queen Mother Reservoir in West London. In addition to the constraints on water supply, Thames Water must deal with widespread problems of pollution and flush impacts that severely impact on water quality. One of the main causes is that the drainage system is separate (Figure 160) and as a result, it is more complex and expensive to increase the capacity of London’s stressed drainage systems. Brent falls within an area of serious water stress that could generate future water shortages.

Concurrent to the water shortage issues explained, some areas in Brent have a high risk of surface water and sewer flooding. In 2016, Thames Water Corporation identified serious problems of sewer flooding and pollution in Brent.³³⁶

Particular attention must be paid to the sewage requirements in the Tokyngton and Harlesden wards, due to flood zone classifications, and Housing Zone areas and priority neighbourhood designations. Current sewage infrastructure, including sustainable drainage technologies, must be developed to support proposed growth and new development in these areas.

³³⁶ Corporate Thames Water (2016) Brent and Harrow.

Figure 165: Brent Flood Zones



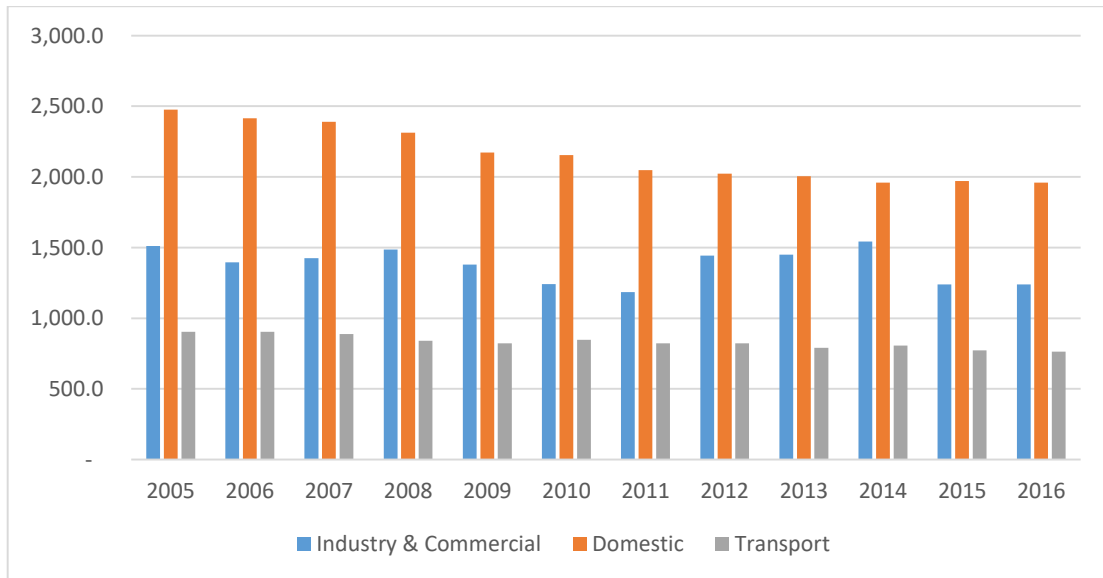
Source: Ordnance Survey.

Energy

Energy capacity in London is reaching the limit to satisfy the minimum requirements to maintain a working city. With 94% of energy supplied from sources outside the city, the GLA are analysing and promoting different measures to provide alternatives, and encourage energy efficiencies, particularly in buildings and transport.³³⁷

In Brent more than half of the energy used is in people’s homes. In spite of a growing population, domestic energy consumption has steadily declined since 2005 (Figure 166).³³⁸

Figure 166: Energy Consumption in Brent



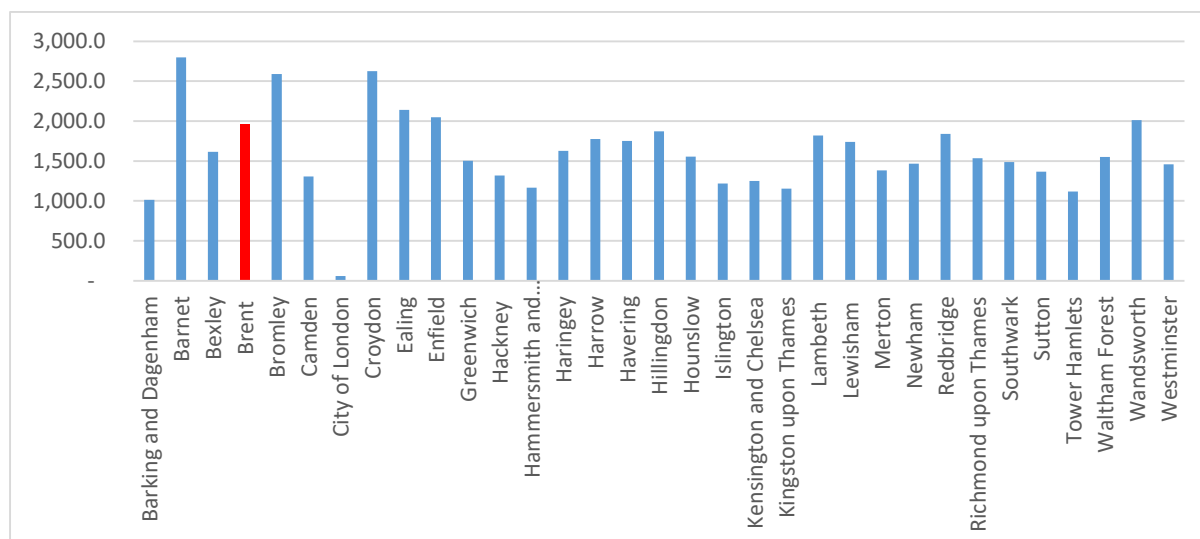
Source: BEIS (2019) Total final energy consumption at regional and local authority level.

³³⁷ GLA (2017) London Environment Strategy. Draft for public consultation.

³³⁸ BEIS (2017) Total final energy consumption at regional and local authority level.

According to the latest data available from the Department for Business, Energy & Industrial Strategy (BEIS), Brent was the 7th largest consumer of domestic energy in London (Figure 167).³³⁹ This underlines the pressure for the borough to develop infrastructure for sustainable energy provision, and align with the Mayor’s zero carbon objective by 2050.

Figure 167: Domestic Energy Consumption by borough in 2016



Source: BEIS (2019) Total final energy consumption at regional and local authority level.

Most of Brent’s energy is consumed from burning fossil fuels. Natural gas accounted for 47.8% of energy use in 2016; while electricity represented 31.3% and petroleum products 20.3%.³⁴⁰ Natural gas is mainly used to heat spaces and water for domestic consumers. Electricity is mainly used for commercial and industrial users, and petroleum used for road transport.

To understand current and future energy infrastructure requirements in Brent, besides analysis of energy consumption patterns, it is important to consider the environmental impact of demand. In London, electricity consumption accounts for almost half of total CO² emissions, while gas use contributes 30% of total emissions. National and local policy is to decarbonise energy, with generation from renewable sources, retrofitting of existing buildings and regulations to ensure new developments satisfy emissions limits.

Since 2007 Brent Council has implemented a Carbon Management Programme (CMP) which aims to reduce Council-generated emissions by 15%, by reducing energy used by Council assets. This programme has included introducing street lamp posts with LED technology and implementing energy efficiency systems on Council buildings. In 2017/2018 the Council had exceeded its 4 year 15% target reductions in CO², achieving 15.6% savings³⁴¹.

Brent has solar photovoltaic technology (PV) on some public buildings and schools, although there is no specific information about how much energy is produced from these assets, nor the amount of PV infrastructure on private buildings.

The Council is currently analysing further implementation of PV Solar panels and mapping potential areas to install sustainable energy plant. The Council is also planning to implement district Energy networks in some growth areas and regeneration schemes which would supply thermal energy to buildings and businesses from central energy centres by moving water

³³⁹ BEIS (2019) Total final energy consumption at regional and local authority level.

³⁴⁰ BEIS (2019) Total final energy consumption at regional and local authority level.

³⁴¹ Carbon Management Programme (CMP) CO₂ Emissions Report 2017/18

through a network of underground pipes. This technology will allow to business and households to use local waste-heat and low carbon fuels rather than generate their own heat or cooling onsite through burning fossil fuels.

Initiatives to bring more efficiency to domestic energy consumption include the “Big London Energy Switch” programme, a collective switching scheme working since 2013 over 20 London Boroughs. The scheme works by bringing together a large group of residential consumers to secure better deals from energy suppliers in an auction process through increased collective bargaining power. Since the scheme began in Brent, over 2,600 households have signed up, with savings on energy bills over £200 a year for those residents that have switched suppliers in the last five auctions.³⁴²

³⁴² Brent (2017) Big London Energy Switch.

Key Trends

The GLA projects London's population and economy will continue growing. Growth will mean changes in economic activities, demographics and lifestyles that will impact future infrastructure requirements. Brent's population is projected to increase 17% between 2019 and 2040 to reach 400,000 people. The Draft London Plan (2017) sets a new target of 29,150 additional homes to be delivered in Brent over the period 2019/20 to 2028/29, an average of 2,915 per annum³⁴³.³⁴⁴ These growth projections should be considered in line with the main trends and changes anticipated in relation to infrastructure across London and in Brent.

Trend 1. Increased Demand for Public Transport

Brent's population growth will increase demand for an efficient transport system that connects housing, jobs and cultural facilities. Achieving an efficient transport network is one of the Mayor's priorities to create the conditions for London's global economy to flourish. Efficient transport aligns with the London Environment Strategy, which encourages the use of public transport and green modes of transportation, with the aim to reduce carbon emissions in the city.

In London, some parts of the city have been predominantly planned around the car, making an inefficient use of road space relative to the number of people that could be moved by sustainable transport modes. Buses can move 70 people in the same amount of space taken up by about three cars. Many trips that people make by car, which they may not want to make by foot or bike, can be switched to the bus. These measures could free up street space and reduce the dominance of motor vehicles that negatively impact the street environment.

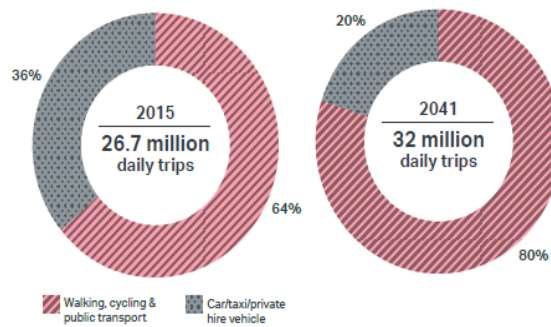
Outer London is more dependent on the car than Inner London. In Brent, 40% of commuters use cars and motor vehicles. Current infrastructure support for car use has contributed to an increase in poor public health as result of pollution, congestion and dangerous places to walk and cycle. Tube, rail and bus services can, however, be overcrowded and sometimes unreliable and indirect, meaning there is no appealing alternative to car use for many people.

In London it is expected population growth will generate more than 5 million additional trips each day by 2041. The GLA expect that without further investments from TfL, 71% of travel on London Underground and 65% of travel on National Rail in the morning peak will be in crowded conditions. In order to reduce these problems, the Major's aim is to improve the transport system as well as improve green infrastructure such that by 2041 80% of Londoners' trips would be on foot, by cycle or by using public transport (Figure 168).

³⁴³ GLA (2017) Draft London Plan

³⁴⁴ GLA (2015) Statistics. Expected employment growth in Brent 2017-2036

Figure 168: Mode share 2015 and 2041 expected.



Source: GLA (2017) Mayor's Transport Strategy.

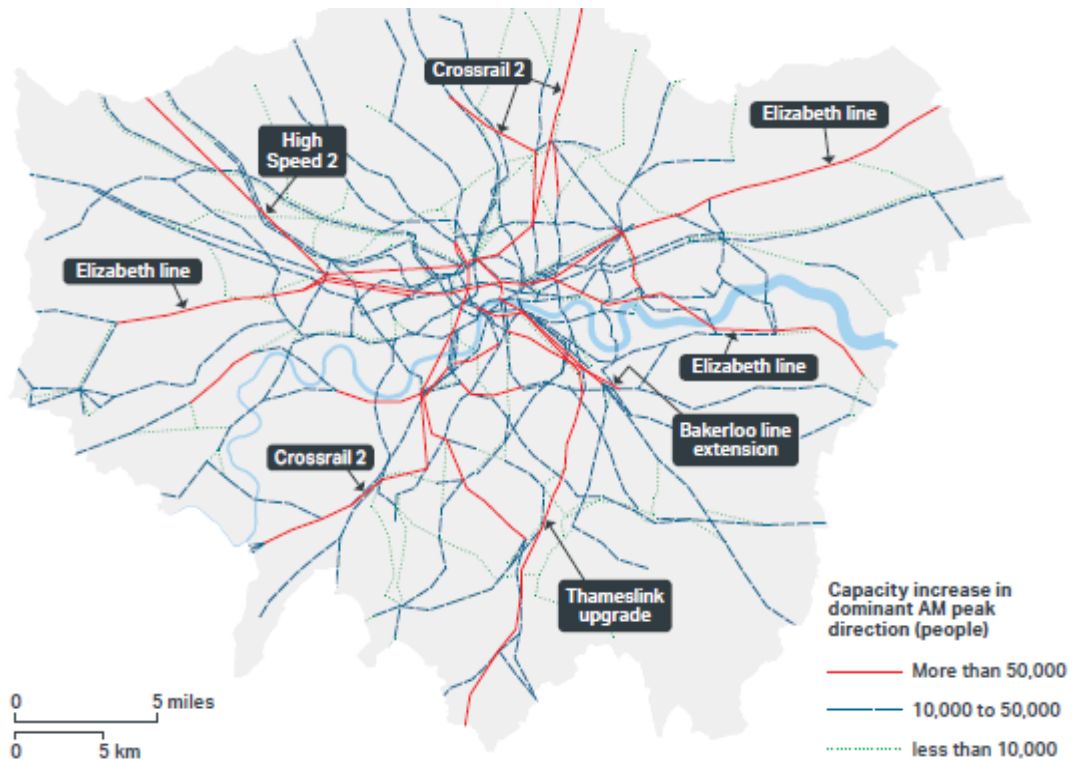
Given projected growth in population and jobs in Brent, it is essential to consider current and future transport infrastructure for rail, bus, cycling and walking, in order to reduce private vehicle dependency, and create places that people of all backgrounds and incomes can enjoy living in. Without new investment, transport routes will become increasingly overcrowded, air quality will worsen and streets and public places will become ever-more dominated by motor traffic.

Consultation undertaken when drawing up Brent's Transport Strategy indicated citizens main concerns surround accessibility within the borough, air quality, congestion and road safety, and proposed increases in walking and cycling and public transport accessibility³⁴⁵.

In London, employment growth will generate an increase in travel by all rail modes of more than 50% by 2041 (Figure 169). As a result of investment in some of the major strategic projects under development by TfL to support this employment growth, transport connections will be improved in specific areas including some within Brent.

³⁴⁵ Brent (2016) Long Term Transport Strategy 2015-2035.

Figure 169: Proposed rail and tube capacity increases, 2015-2041 morning peak hour.



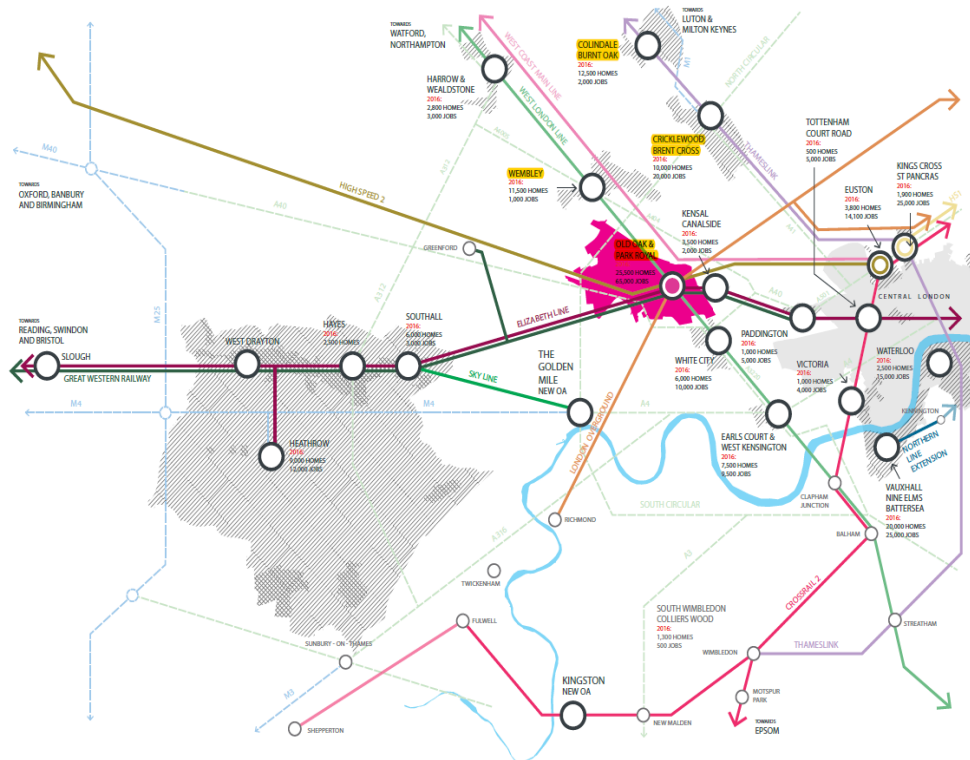
Source: GLA (2018) Mayor's Transport Strategy.

The GLA aim to provide a projected 70% increase in rail and tube capacity serving 1.5 million new homes by 2050. Future improvements for Brent could include:

- Thameslink extension in Colindale and Cricklewood that will connect with Crossrail;
- Crossrail Old Oak Common Station in Hammersmith and Fulham that will increase connectivity in the south of Brent and the area of Park Royal.
- Crossrail spur from Old Oak Common to stop at Wembley Central station and the West Coast Mainline
- West London Orbital Rail that will improved the connection with Outer London with stops considered in Neasden and Harlesden.

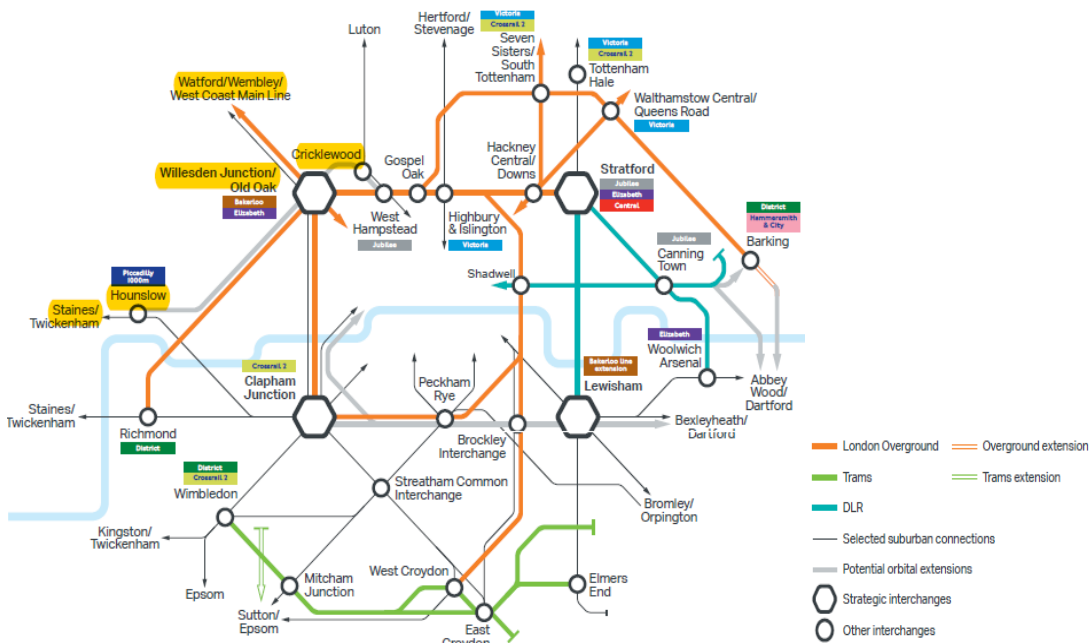
Planned new transport capacity and improvements in West London includes growth areas such as Park Royal and Wembley, which will receive direct benefits, and improve connections with both Outer and Central London (Figure 170 & 171).

Figure 170: Transport connections West London



Source: OPDC (2017) Local Plan Revised Draft

Figure 171: Potential and improved Orbital Rail Links in Inner and Outer London



Source: GLA (2018) Mayor's Transport Strategy

Old Oak and Park Royal

The new Crossrail Elizabeth Line 1 due to open in 2020, will increase network connectivity close to Brent, however at the same time raise congestion challenges. The Elizabeth Line station at Old Oak Common will be the only place where High Speed Two (HS2) connects with Crossrail (Figure 172). The station will have capacity for 250,000 passengers a day and is set to become the most connected place in the UK. It will be 8 minutes from Heathrow, 10 minutes from the West End, and 38 minutes from Birmingham.

Figure 172: Map of Elizabeth Line

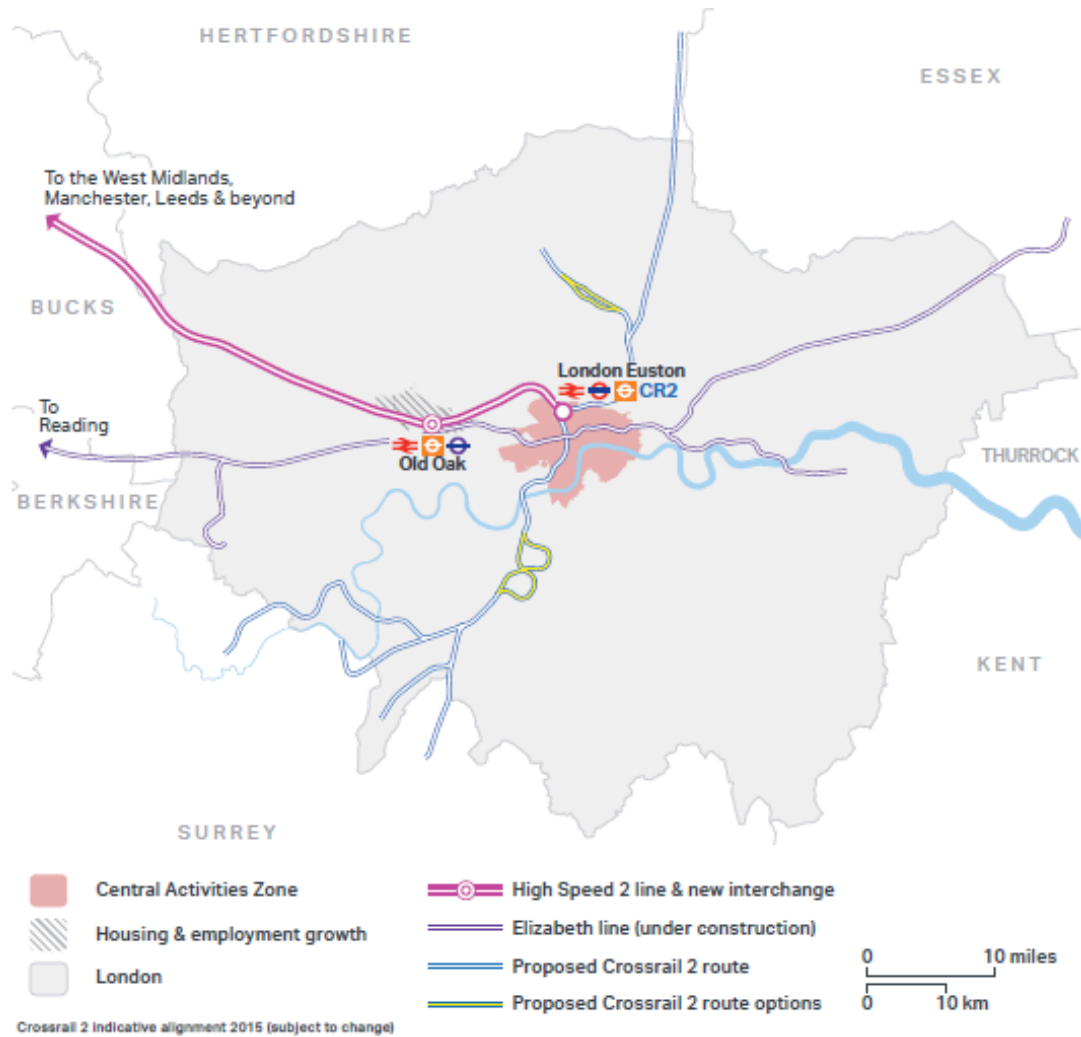


Source: GLA (2018) Mayor's Transport Strategy.

HS2 will increase the connectivity of London and reduce travel times to Birmingham, Manchester and Leeds. The first phase will have two stations in London. Old Oak Common station will be located in Old Oak & Park Royal in the borough of Hammersmith and Fulham, close to the Brent borough boundary. Old Oak Common will be a strategic station that increases connectivity in West London to and from the West End, the City and Canary Wharf, and westwards to Heathrow through Crossrail.³⁴⁶ Strategic rail connectivity will therefore be increased close to Brent, but this will also create challenges to avoid and mitigate increased road congested close to the station (Figure 173).

³⁴⁶High Speed Two (HS2) limited (2017) Interactive map.

Figure 173: HS2 Connections

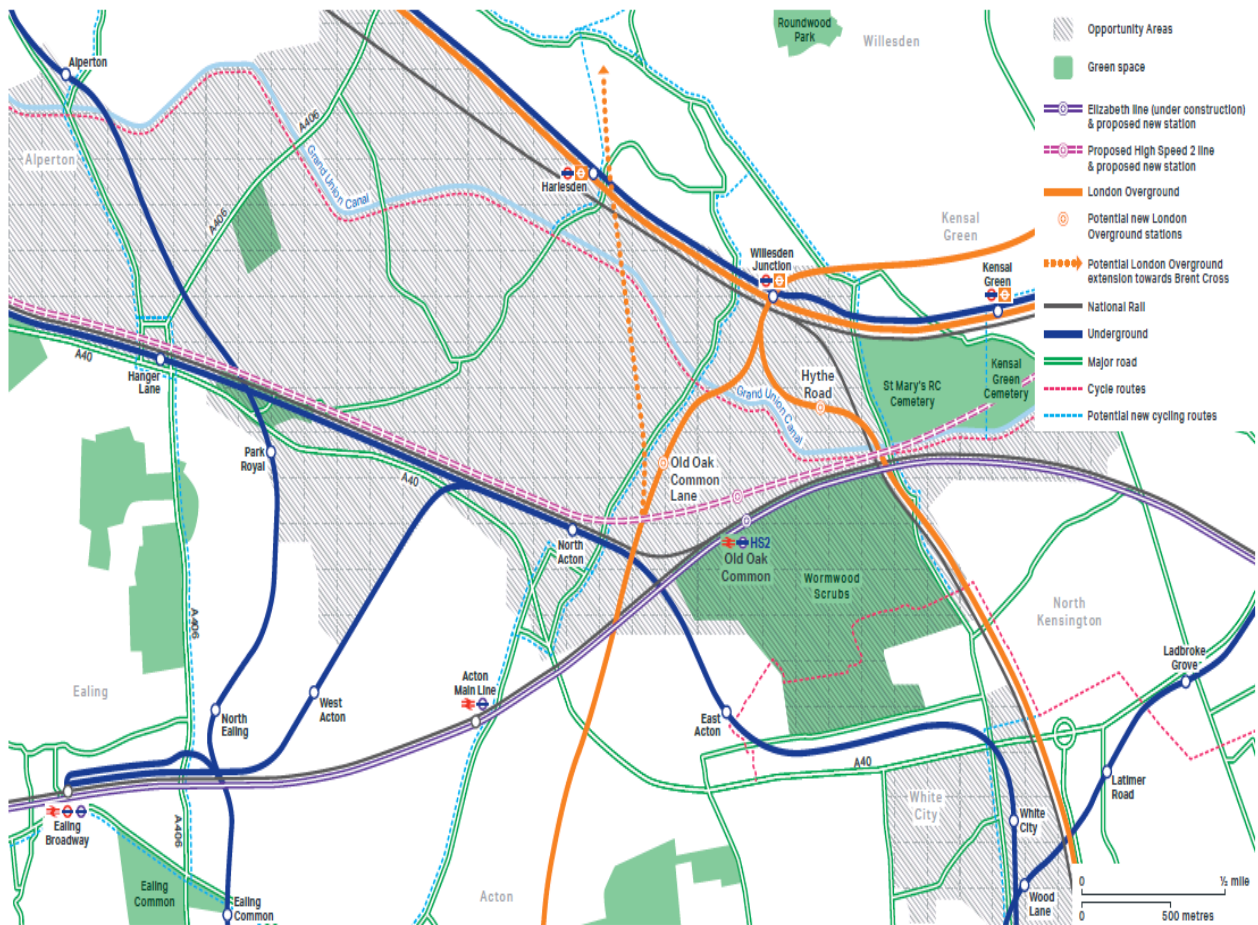


Source: GLA (2018) Mayor's Transport Strategy

GLA expect the regeneration of Old Oak & Park Royal to develop a new mini-city at a scale not seen since Canary Wharf. Around 37,000 jobs and 14,000 new homes are possible at the 650-hectare site in what is the UK's largest regeneration scheme.

The transport improvements in Old Oak Common will increase opportunities for Brent, notably with an extension in the London Overground line, particularly towards Brent Cross. New infrastructure will also include bus route extensions and cycle lanes, some of which will benefit Brent directly (Figure 174).

Figure 174: Transport proposal for homes and jobs at Old Oak and Park Royal



Source: GLA (2018) Mayor's Transport Strategy

Crossrail West Coast Mainline at Wembley Central.

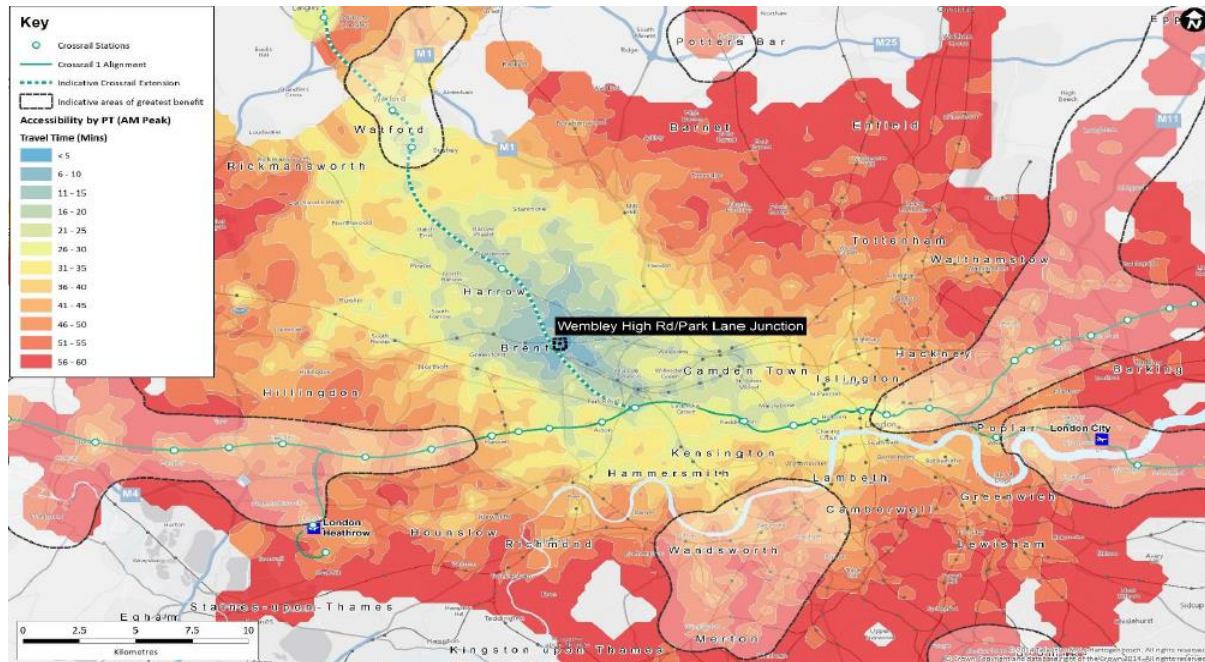
The proposed Crossrail 2 extension could be delivered with the Crossrail West Coast Main Line Link (Crossrail WCML Link), connecting with the main Crossrail Line Elizabeth 1, and including the station at Old Oak Common and a stop at Wembley Central. This delivery option would increase public transport capacity to Brent and improve connections with Heathrow, Central and Outer London³⁴⁷. The extension would reduce journey times, improve Wembley business access to a wider labour pool, and attract more day visitors to Wembley and wider Brent. Crossrail would improve accessibility and demand for housing and commercial uses in Wembley Growth area. The overall catchment area for 60-minute travel time from Wembley Central would be enlarged, and Crossrail would also improve accessibility towards Reading and Heathrow, as well as London City Airport and other destinations along the eastern section of Crossrail 1 (Figure 175).

A Crossrail spur from Old Oak Common to stop at Wembley Central station and the West Coast Mainline would bring economic benefits, including an estimated £50m per year in additional Gross Value Added (GVA) benefits, supporting 750 additional end-use FTE jobs and £118m in additional one-off construction related GVA. The incremental end-use net GVA

³⁴⁷ Brent (2015) Employment skills and enterprise strategy 2015-2020 page 7.

at £50m that could be stimulated with the Crossrail WCML Link Wembley Central station could offset a sizable proportion, if not all, of the development costs involved.³⁴⁸

Figure 175: Areas accessible from Crossrail WCML link extension stopping at Wembley Central.



Wembley Central Crossrail Spur
 Areas Accessible to Analysis Point within 60 Minutes: 2031 Crossrail Case (Rail, Bus, Underground)
 Source: SQW (2015) Assessing the Business Case for a Crossrail West Coast Main Line Link stop at Wembley Central Report to the London Borough of Brent

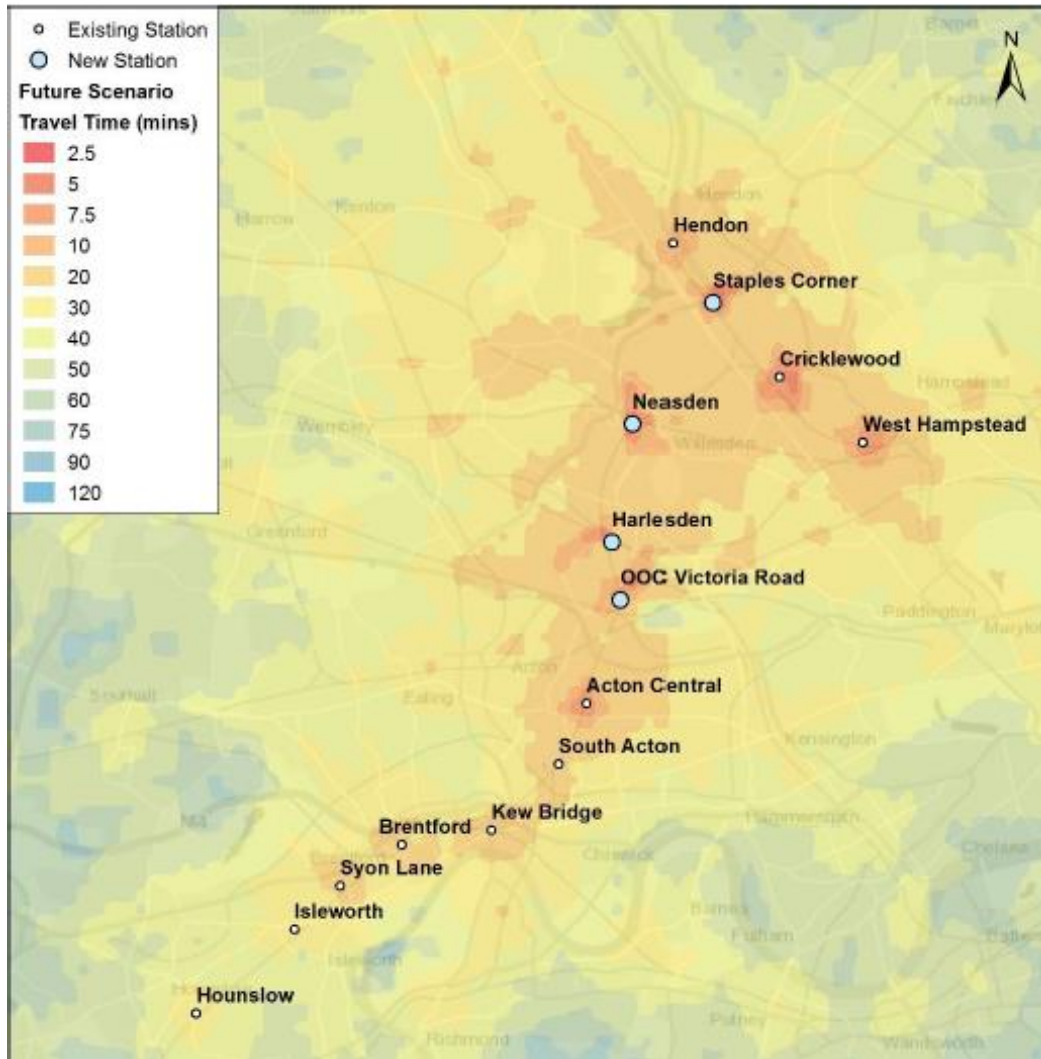
Wembley is identified as an Opportunity Area expected to deliver at least 11,500 new homes and 11,000 new jobs. Wembley Stadium is a centrepiece, with capacity for 90,000 people and hosting around 30/31 events per annum, and the national stadium reinforces London’s world city status. Improving transport infrastructure with the Crossrail WCML Link to Wembley would increase the wellbeing of residents, bring economic benefits, increase attractiveness and demonstrate international connectivity to Heathrow and London City Airports.

West London Orbital (WLO)

The Dudding Hill Line is an existing 4-mile long railway line in north-west London running from Acton to Cricklewood, used mainly by freight, with no electrification and a 30 miles per hour speed limit. The West London Orbital line would extend the London Overground, restoring rail passenger services on the Dudding Hill Line and the Kew – Acton link. The line is identified in the Mayors Transport Strategy (2018) and could include three stations within Brent: Staples Corner, Neasden and Harlesden (Figure 176).

³⁴⁸ SQW (2015) Assessing the Business Case for a Crossrail West Coast Main Line Link stop at Wembley Central Report to the London Borough of Brent.

Figure 176: Accessibility of new West London Orbital line



Source: WSP (2017) West London Orbital Rail. Technical Analysis and conclusions.

Neasden and Harlesden stations are considered integral to the re-opening of the northern stretch of line from Old Oak Common to West Hampstead/Hendon. The cost of these 2 stations has been estimated as £12m. While the station of Staples Corner is optional, depending on the scenario chosen, that station could cost an estimated £5m. The total capital cost of the WLO including new platforms, stations is estimated at £146m, plus a risk/contingency allowance of 80%, which would push total costs towards £300m. Initial analysis from WSP indicates that the Community Infrastructure Levy (CIL) from potentially 15,000 to 20,000 new homes planned in West London could create around £150m to fund the capital cost of the WLO.³⁴⁹

The WLO line would accommodate additional passenger demand resulting from population growth and employment across West London; provide an additional public transport route; contribute to reduced reliance on private car use; and, alleviate congestion on the A406 North Circular Road. The WLO would support an intensification of housing development to be delivered across West London particularly concentrated in Neasden and Church End, as well as address public transport requirements for the corridor between Hounslow and West Hampstead/Hendon (Figure 177).

³⁴⁹ WSP (2017) West London Orbital Rail. Technical Analysis and conclusions.

Figure 177: PTAL scores with and without WLO rail services.



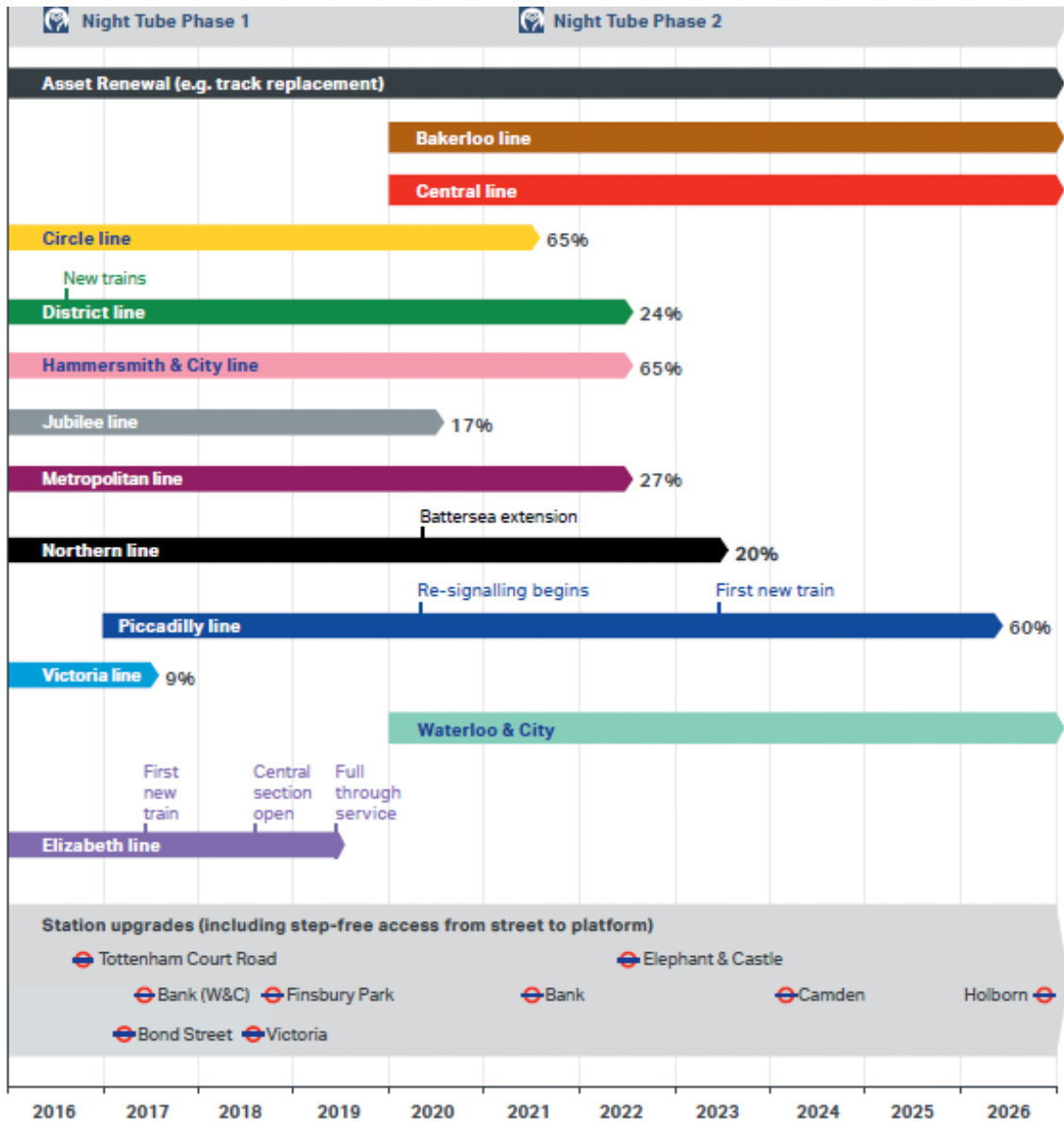
Source: WSP (2017) West London Orbital Rail. Technical Analysis and conclusions.

Underground

The GLA plan increased underground train frequencies from the current maximum of 34 up to 36 trains per hour, across the Jubilee, Piccadilly and Northern Lines by 2035. These changes will increase the peak capacity of these lines by 20-50%, and Brent businesses and residents would expect to benefit from the increase in capacity of the Jubilee Line which runs across the borough. Brand new, air-conditioned, walk-through trains will also add capacity and improve passenger comfort. The planned extension to the Bakerloo Line south, will also improve connectivity from North to South London.

The 24-hour transport system for bus and underground is also planned to be extended, complementing the existing network. This will be accompanied by out-of-hours freight deliveries to ensure London has a transport system that supports a 24/7 city (Figure 178).

Figure 178: Night Tube Improvements 2016-2026



Source: GLA (2017) Mayor's Transport Strategy.

Currently only 3 underground stations in Brent have step free access. TfL is committed to accessibility programmes and to increase the number of Underground stations across the network from the current 27% to 40% by 2022 (with Park Royal station part of the latest £200m programme to introduce step free access at 13 stations by 2022³⁵⁰). The TfL target is that two thirds of public transport journeys will be step free by 2050.

Heathrow expansion

In 2016 Central Government announced its preference for a new northwest runway at Heathrow Airport with the aim to deliver additional airport capacity in the South East of England by 2030. The subsequent approval and formal designation of the Government Airports National Policy Statement in June 2018 paves the way for Heathrow to submit a formal

³⁵⁰ Mayor of London Press Release (2018/01/19)

planning application. This project would increase airport capacity by more than 50% from 480,000 flights to 740,000 flights per year.³⁵¹

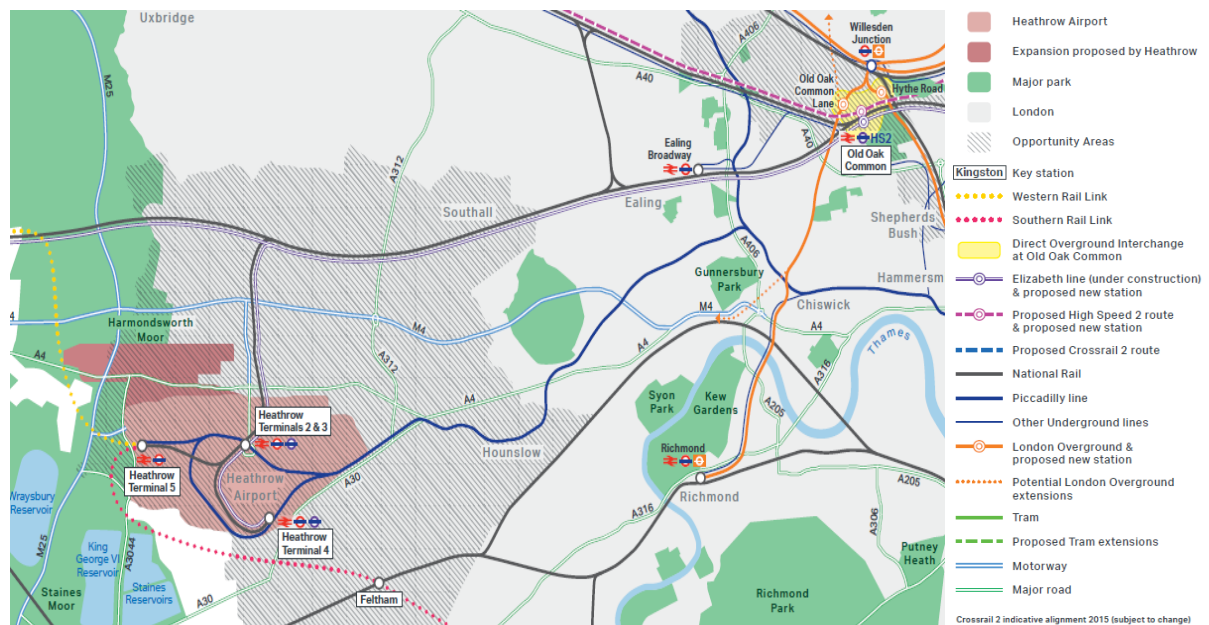
Heathrow expansion is justified as required to maintain the competitiveness of London and the UK. The Government estimates that to not increase airport capacity would cost the UK economy between £30 billion and £45 billion over 60 years.³⁵²

Heathrow expansion will require significant new infrastructure to relieve pressure on air quality, due to the additional highway trips expected, increasing the pressure on congested roads and traffic. Forecasts indicate that with the proposed airport expansion, public transport trips would increase more than 250%, a level of demand not sufficiently accommodated by existing and planned infrastructure improvements such as the Elizabeth Line and Piccadilly line upgrade.

National government aims to ensure highway traffic will not rise, expecting to achieve a public transport mode share of at least 50% by 2030, and at least 55% by 2040, for passengers³⁵³. The Mayor’s Transport Strategy indicates that the transport projects shown in Figure 179 would need to be delivered in order to support increased public transport for the Heathrow expansion:

- Western Rail Link to Heathrow-direct services from the Thames Valley: Slough, Maidenhead and Reading.
- Southern rail link to Heathrow – direct services via a route with sufficient spare capacity from central, south and south west London, as well as Surrey.
- London Overground extension, including a direct Overground interchange at Old Oak common.
- Improvements to bus, cycling and walking infrastructure serving the airport

Figure 179: Additional surface access requirements for expanded Heathrow Airport.



Source: GLA (2017) Mayor’s Transport Strategy.

³⁵¹ GLA (2017) Mayor’s Transport Strategy

³⁵² DfT (2017) Revised Draft Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England.

³⁵³ ⁴² Department for Transport (2017) Revised Draft Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England.

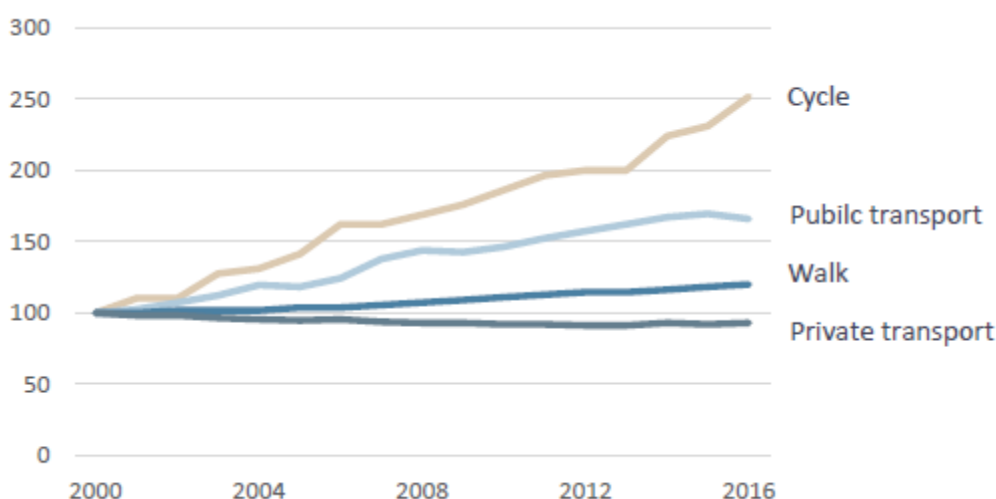
The expansion plan for Heathrow could bring benefits to Brent and Park Royal, with the potential connectivity that will bring to the Old Oak Common Station, and the airport increasing business links and improving international access. Similarly, a Crossrail WCML station at Wembley Central would connect through to an expanded Heathrow, opening a new employment hub for Brent residents. Central government predict that Heathrow expansion will generate up to 21,000 new local jobs by 2030 and 60,000 new local jobs by 2050.³⁵⁴

Trend 2. Increased Cycling and Walking Transport Modes

To reduce the negative effects of motorised cars, it is important to provide greener and more efficient transport alternatives that discourage car dependency across the borough.

One of the most recent and pronounced trends has been the growth in cycling and walking – a return to more ‘human-centred’ modes of travel. Examples of initiatives that encourage cycling and walking include: the provision of secure and dry cycle parking; cycle lanes and pathways separated from cars; loans for bicycle purchase; city bike club schemes; and freedom to carry bicycles on bus and trains services.

Figure 180: Cycling is the fastest-growing mode of transport in London



Source: London Assembly (2018) London's Cycling Infrastructure

The benefits of increasing the uptake of cycling and walking in London are significant in terms of improved air quality, less congestion and a fitter and healthier population. The Mayor set out a long term plan to reduce the number of cars and increase alternative use of walking, cycling and public transport. The Mayor's aim is to achieve a 400% increase in levels of cycling by 2026, resulting in an average 5% mode share for cycling across London³⁵⁵. This plan includes a comprehensive network of cycle routes for all types of journey and cyclists, including 200 kilometres of new Dutch-style cycle highways, at least five new major pedestrian, cycle or green bridges, and inter-regional cycle corridors connecting London to towns outside such as Cambridge. The Mayor has committed to spend £169m per year on cycling as part of the £2.2 billion budget for Healthy Streets over 2018-2023³⁵⁶.

³⁵⁵ Brent (2016) Brent Cycle Strategy 2016-2021

³⁵⁶ London Assembly (2018) London's Cycling Infrastructure

Although Brent has some cycling infrastructure, that remains below London levels, and below other Outer London boroughs that have received direct support from the Mayor. Since 2001, TfL has worked with London boroughs and other partners to improve London's cycling infrastructure, starting with the London Cycle Network (LCN) and London Cycle Network+ (LCN+), then Cycle Hire and the first generation of Cycle Superhighways, and more recently the second generation of Cycle Superhighways and first Quietways and Mini-Hollands.

Strategies to encourage cycling, walking, and the bus as transport modes, such as the Healthy Streets agenda, are planned in London to increase infrastructure provision and improvements for these modes. The target is to triple the proportion of Londoners living within 400m of one or more of these cycle routes to around 35% by 2022.

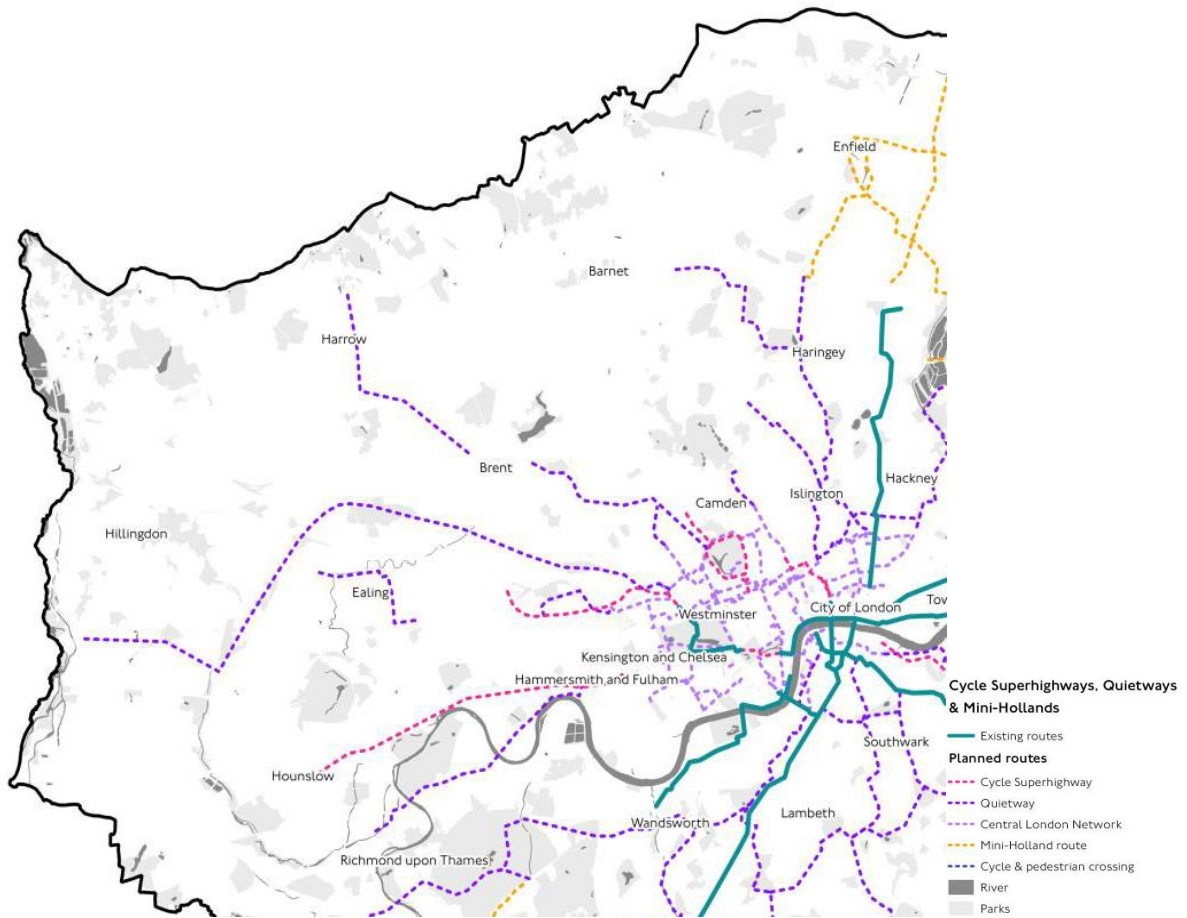
By 2022, TfL is planning to invest in more than 340 km of cycle network focusing on current demand, areas with potential for people to switch from motorised trips to cycling, and areas with the highest growth in population and employment. TfL have identified the overall cycling connections to provide for a larger number of cyclable trip based on potential demand.³⁵⁷

The current TfL investment plan includes a Quietway that could go through Wembley in Brent (Figure 181). Additionally, TfL identifies strategic cycling connections based on their potential to address cycle needs, including Wembley, Cricklewood and Willesden Junction in Brent as top potential connectors (Figure 182). In 2018 the Mayor announced a 5km north-west London's first major cycle route, connecting Wembley, Stonebridge Park and Willesden Junction. Future sections will connect to planned infrastructure in west London such as CS9 and CS10.³⁵⁸

³⁵⁷ TfL (2017) Strategic Cycling Analysis

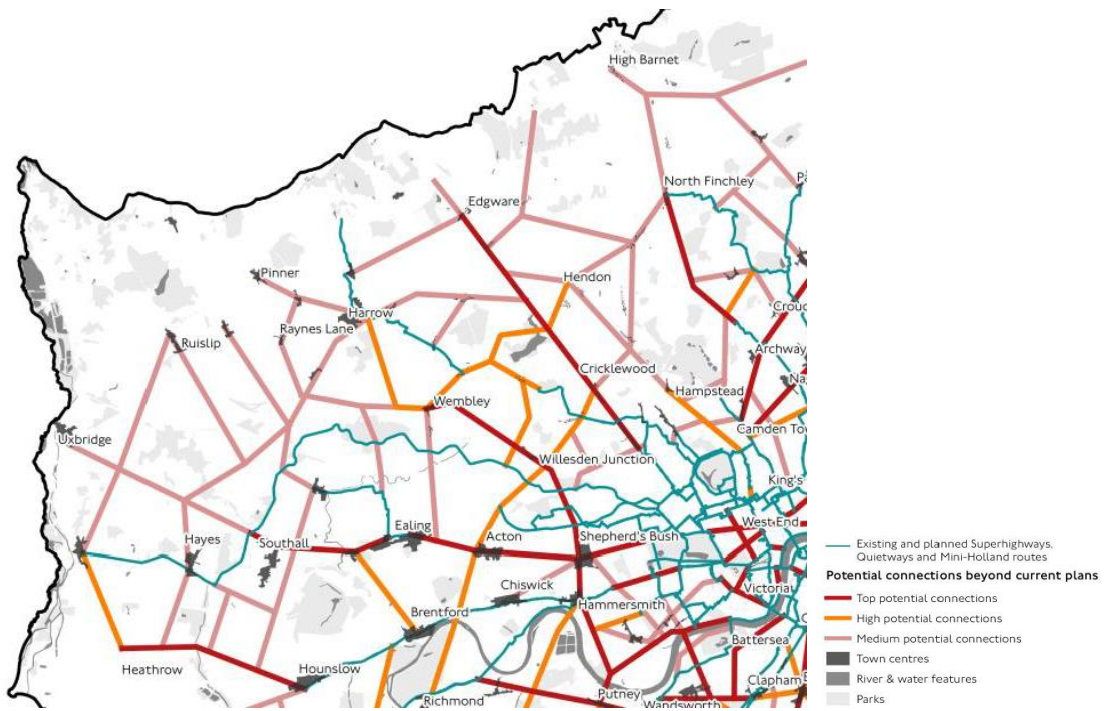
³⁵⁸ Green light for development of six new cycle routes across London

Figure 181: TfL Business Plan for Cycling Routes by 2022



Source: TfL (2017) Strategic Cycling Analysis

Figure 182: Prioritised Strategic Cycling Connections



Source: TfL (2017) Strategic Cycling Analysis

Trend 3. Transportation Technology for Motorised Vehicles

Electric Vehicles

The UK is currently the leader in European manufacture of electric cars. In 2011, the UK was the first country in the world to announce plans to ban the sales of conventional petrol and diesel engine cars and vans by 2040, switching to a zero emission vehicle strategy by 2050. To achieve this target, Government has committed £2.7 billion investment to a plan that includes³⁵⁹:

- £1 billion for UK's charging infrastructure for ultra-low emission vehicles (ULEVs) that includes hybrid and electric car and van;
- £0.29 billion for new buses, bus retrofits, plug in taxi programme that includes £80 million for ULEV charging infrastructure.
- £1.2 billion for cycling and walking infrastructure from 2016-2021
- £0.1 billion for national road networks air quality improvements.
- £89 million for 1,200 new low carbon buses on roads under the Green Bus Fund.
- £27 million to retrofit almost 3,000 of the oldest vehicles (mainly buses).
- £11 million to help Local Authorities improve air quality through the Air Quality Grant scheme.

The Air Quality Grant programme, implemented since 1997 aims to help Local Authorities tackle air pollution and is accessible to Brent. Between 1997 and 2019, over £57m has been awarded through the programme, focused on support schemes to tackle NOx. In 2018-/19 just over £3 million was granted to different initiatives including: £0.24m for retrofits for electric buses in York; £0.42m to reduce emissions from the delivery of goods and services, including trialing EV use, in Inner London boroughs; and, £0.05m for canal electric vehicle charging point (EVCP) infrastructure in Islington.³⁶⁰

In London TfL is making available the "plug-in car grant", a government programme to encourage drivers to switch to electric cars and vans, providing a discount of up to £4,500 for eligible pure electric cars and £2,500 for eligible plug-in hybrids; and up to £8,000 for eligible vans. There are also significant tax incentives for making the switch to electric for business users. Brent also offers free or reduced-charge parking for electric vehicles.³⁶¹

TfL and the GLA were awarded £13m in 2016 and £4.5m in 2017 from the Central Government's Office for Low Emission Vehicles' Go Ultra Low City Scheme (GULCs). Up to 1,500 standard-speed on-street charging points will be installed in the residential areas of 25 London boroughs by the end of 2020. Brent received £0.15m GULCs funding for 50-60 on-street residential charge points in lamp columns which on the basis of usual 3kW to 7kW power levels would charge between 180 and 240 EVs daily in 2018. These installations allow residents to charge their electric vehicles overnight and close to home which is an important factor in encouraging more residents to purchase electric vehicles. In June 2018, 50 requests for on-street charging facilities had been received from residents. The Council's £50,000 match funding for this project was sourced from S106 developer contributions in specific wards, Neighbourhood CIL and TfL Local Implementation Plan Funding³⁶².

³⁵⁹ DEFRA & DT (2017) UK plan for tackling roadside nitrogen dioxide.

³⁶⁰ DEFRA (2019) Air Quality programme 2018 to 2019 <https://www.gov.uk/government/news/3-million-boost-for-innovative-local-air-quality-improvements--4>.

³⁶¹ TfL (2017) Electric vehicles & rapid charging.

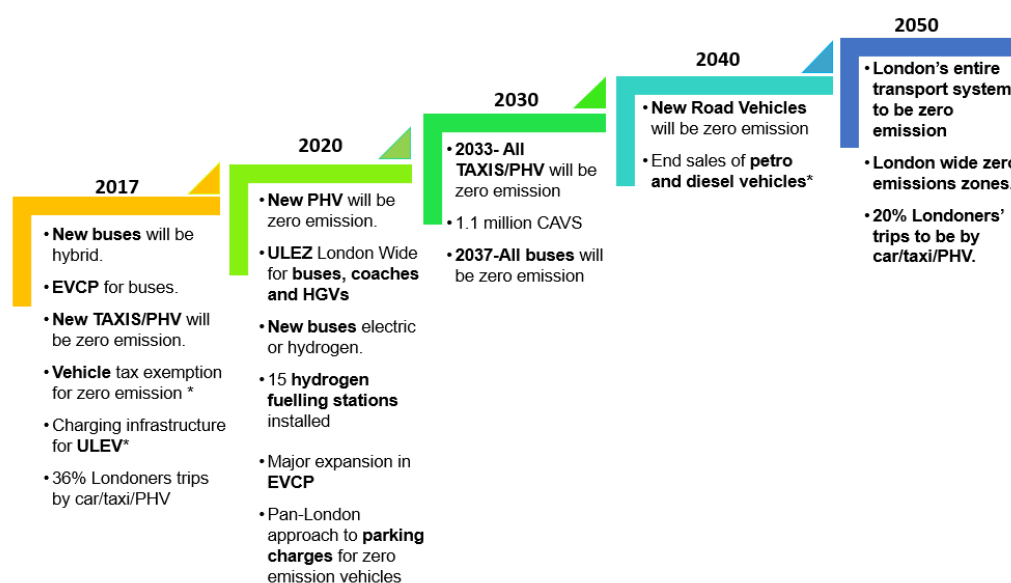
³⁶² Brent (2018) Air quality improvement measures: Electric vehicle charging infrastructure – Cabinet variation report

In 2016 Brent Council also received approval to enter into a contract with Bluepoint London network operator to provide 30 active charge points and associated electric vehicles. In February 2019 the number of Source London members had increased in Brent by 22% and the number of requests from members for charging points has also increased. Phase one of the programme is nearly complete and all of the 25 charging points are now operational³⁶³. Depending on power levels, these future EVCPs will provide capacity to charge between 90 and 1440 EVs daily.³⁶⁴

In December 2018, Lime, the urban mobility company launched their electric bikes at Brent's civic centre 1,000 Lime e-bikes were located in Brent & Ealing initially. The dockless, electric-assist bikes are equipped with a 250-watt motor and have a maximum assisted speed of 14.8 miles per hour. The electric battery reduces the effort required to cycle, making the bikes suitable and accessible for people of any age or fitness level.³⁶⁵

The Mayor of London is committed to implement a zero emission road transport program that will be completed in 2050. The main initiatives of this program and National measures to achieve a zero emission transport that will have an impact on the current infrastructure of the city and Brent are shown in figure 183.³⁶⁶

Figure 183: Mayor's Zero Emission Transport Plan



Note: (*) Measures included in the National Policy for zero emissions. Source: GLA (2017) Mayor's Transport Strategy

In London and Brent, the number of ULEVs has increased despite the limited EVCP infrastructure available. Based on employment levels, historic hybrid sales and income in Brent, the GLA estimates that by 2020 there could be between 1,208 and 2,293 ULEVs, representing 1-2% of the number of vehicles on Brent's roads, if numbers continue increasing at today's rates. By 2025 there could be between 4,786 and 8,551 ULEVs, representing 3.8%-6.8% of the number of vehicles on Brent's roads today.³⁶⁷ Despite current and forecasted

³⁶³ Brent (2019) Parking and Electric Vehicle Charging

³⁶⁴ EVCPs estimations are based on power level capacity for TfL (2017) Electric vehicle charging infrastructure: Location guidance for London and projects planned in Brent (2017) Air Quality improvements measures: electric vehicle charging infrastructure.

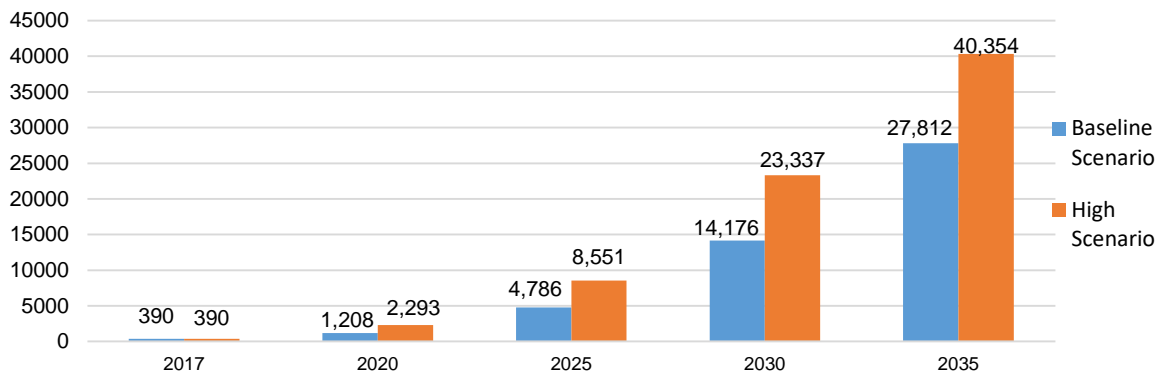
³⁶⁵ Brent (2018) Dockless electric-assist bikes cycle to Brent Press Release

³⁶⁶ GLA (2017) Mayor's Transport Strategy.

³⁶⁷ TfL (2015) An Ultra-Low Emission Vehicle Delivery Plan for London: cleaner vehicles for a cleaner city.

growth in ULEVs in Brent, these numbers are still too low to meet the target that all road transport is ULEV by 2050, as shown in Figures 184 and 185.³⁶⁸

Figure 184: Forecast ULEVs in Brent 2017-2035



Source: DTS (2017) Vehicle licensing statistics VEH0131 & TfL (2015) An Ultra-Low Emission Vehicle Delivery Plan for London: cleaner vehicles for a cleaner city

Figure 185: % Cars, Motorcycles and Vans ULEVs in Brent, forecast for 2017-2035 and target by 2050

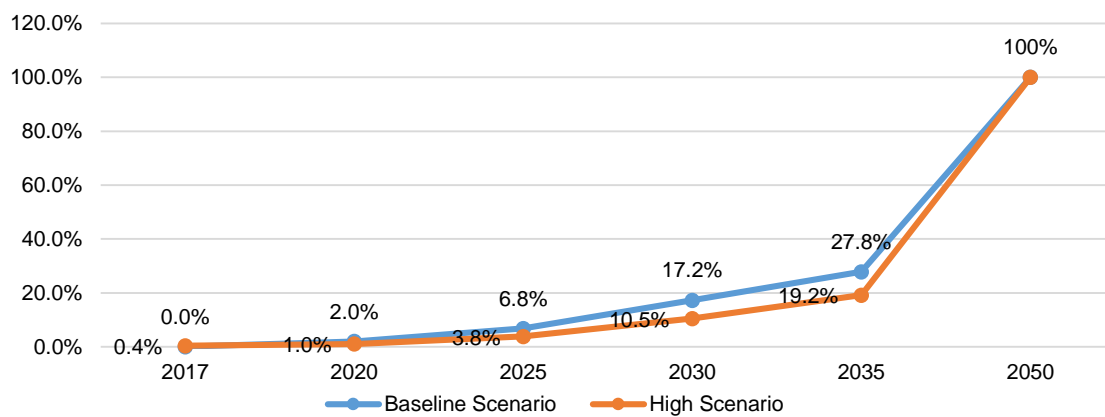


Figure 54. % Cars, Motorcycles and Vans ULEVs in Brent, forecast for 2017-2035 and target by 2050

Source: DTS (2017) Vehicle licensing statistics VEH0131 & TfL (2015) An Ultra-Low Emission Vehicle Delivery Plan for London: cleaner vehicles for a cleaner city

A robust EVCP network could support increased EV ownership in Brent. ECVP infrastructure will be key to unlocking zero emission target by 2050, and intermediate stages such as zero emission capable (ZEC) for taxis and private vehicles (PHV). Given the expected number of EVs in Brent for 2020-2050 (Figure 185), forecast EVCP requirements according to power level, assuming all registered EVs in the borough are charged daily is as below (Figure 186).

³⁶⁸ Forecasts not consider a transport mode shift, only took into account economic variables that impact the consumption patterns and historical growth rates

Figure 186: Forecast EVCP in Brent, according power level, charging time and scenarios

	3kW				7kW				50kW			
	Max charging time		Min charging time		Max charging time		Min charging time		Max charging time		Min charging time	
	Baseline	High	Baseline	High	Baseline	High	Baseline	High	Baseline	High	Baseline	High
2020	403	764	352	669	201	382	151	287	33	63	25	48
2025	1,595	2,850	1,396	2,494	798	1,425	598	1,069	132	235	100	178
2030	4,725	7,779	4,135	6,807	2,363	3,890	1,772	2,917	390	642	295	486
2035	9,271	13,451	8,112	11,770	4,635	6,726	3,476	5,044	765	1,110	579	841
2050	50,324	50,324	44,034	44,034	25,162	25,162	18,872	18,872	4,152	4,152	3,145	3,145

Source: Estimations based on TfL (2017) *Electric vehicle charging infrastructure: Location guidance for London*, TfL (2015) *An Ultra-Low Emission Vehicle Delivery Plan for London: cleaner vehicles for a cleaner city* & DfT (2017) *Vehicle licensing statistics VEH0131*

Forecasts should be considered carefully as charging point usage will vary according to journey purpose and lifestyle. Not all EV owners will need to charge every day. EV ranges currently vary between 120 and 300 miles, depending on the size and battery capacity, some users may only need to charge once or twice a week, while others will need to either fully charge overnight or top up on a more frequent basis, such as taxis and PHV. Therefore, charging infrastructure should best provide a mix of residential, rapid and destination/top-up charging to serve all types of users. Planning for the locations and types of charge point needed, should consider street types, housing types, potential future uptake, likely target markets, and local priorities such as air quality hotspots.³⁶⁹

Connected and Autonomous Vehicles

Another technology promoted by central and local government is connected and autonomous vehicles (CAV), a market that is estimated will be worth £50 billion to the UK economy by 2035, with 1.1 million units sold, including cars, vans, HGVs and buses.³⁷⁰ These self-driving cars could reduce delays by 40% on the national road network, and 30% in urban areas, while making road travel safer. CAVs could also eliminate the number of road incidents caused by human error, which in 2016, was responsible for 85.9% of vehicle collisions.³⁷¹

Driverless cars are capable of sensing their surroundings and navigating without the need for human involvement, offering the potential to make better use of road space, reduce costs and increase the efficiency of goods distribution. Intelligent vehicles could bring economic and social benefits to the UK of £51 billion per year by 2030, save over 2,500 lives and prevent more than 25,000 serious accidents. Consumers will experience the greatest benefit due to the ease of travelling, which will generate wider economic benefits such as fewer accidents, improved productivity and increased trade.³⁷²

National measures to support the development of CAV technology in the UK includes:

- MERIDIAN investment programme funded jointly by Central Government and industry to accelerate the development of CAV, funding a cluster of driverless car testing along the M40 corridor between Coventry and London.

³⁶⁹ TfL (2017) *Electric vehicle charging infrastructure: Location guidance for London*, TfL

³⁷⁰ Centre for Connected and Autonomous Vehicles (2017) *Market Forecast: for connected and autonomous vehicles*.

³⁷¹ DfT (2017) Centre for Connected and Autonomous Vehicles. *Boosts for electric and driverless car industry as government drives forward green transport revolution*.

³⁷² KPMG (2015) *Connected and Autonomous Vehicles-The UK Economic Opportunity*.

- Automated and Electric Vehicles Bill proposal to install charge points across the UK and ensure safe and effective insurance for self-driving cars.³⁷³

Trend 4. Increased Technological Requirements

Central Government intervention under the Broadband Delivery UK (BDUK) initiative aimed to deliver download speeds of 24Mbit/s or more to 95% of the UK by the end of 2017, and to complete the roll-out of 4G and superfast broadband by 2020. Central government consulted on BDUK initiative in 2018 and the duties and primary objectives under the act are as follows³⁷⁴:

- to deliver the USO as quickly as possible, so consumers benefit as soon as possible;
- to ensure any designated provider can deliver services that meet the USO specifications; and
- to ensure the cost of delivery, and therefore impact on industry and consumers, are minimised.

In order to remain competitive and attractive to residents and business, London and Brent must ensure the availability of affordable high-speed internet. Though this relies on private investment, it is anticipated that demand in areas with employment concentrations such as Park Royal will exceed current broadband provision, requiring new superfast broadband networks.³⁷⁵ To deliver new broadband infrastructure it is critical to initiate dialogue with private telecommunications networks including BskyB, BT, Colt, Instalcom, Verizon, Virgin Media, Cable & Wireless and Vodafone. These companies can then deliver adequate public Wi-Fi and mobile access, secure cloud technologies, smart grid linked sensors, 5G networks and fibre connections for ultrafast broadband in Brent.

The GLA is concurrently preparing to upgrade digital infrastructure in the city to globally competitive Gigabit City standards, improving the access to residents and business and making use of ultrafast digital connections. Although, 4G coverage is not complete for the UK, London would potentially become the first capital city in the world to deploy 5G by 2020. This technology is as much as 250 times faster than 4G and can download an 800-megabyte film in one second.

The GLA commitment for 2020 is to rollout the current 4G and 3G network for 5G. To implement this change it will be important to meet the following minimum requirements indicated by the International Telecommunications Unit (ITU)³⁷⁶:

- 20Gbps peak download rate
- 10Gbps peak upload rate
- 30bps/Hz peak spectral efficiency downlink
- 15bps/Hz peak spectral efficiency uplink
- 100Mbps user experienced download rate
- 50Mbps user experienced upload rate

The GLA is similarly committed to build high-quality communication networks to provide high-speed internet access. As part of the GLA plan, partnership opportunities with communication providers, developers and others will be investigated in the early planning and delivery of the Opportunity Areas with currently low levels of connectivity.

³⁷³ Parliament (2017) Automated and Electric Vehicles Bill 2017-19.

³⁷⁴ Ofcom (2018) Consultation on designation regulations

³⁷⁵ OPDC (2016) Development Infrastructure Funding Study (DFIS): Local Plan Supporting Study

³⁷⁶ ITU (2017) ICT facts and figures 2017.

Openreach is partnering with Huawei and Nokia to support its planned rollout of broadband technology to over 10 million homes and businesses across the UK by 2020. 5G has the potential to deliver download speeds up to 330Mbit/s over Openreach's existing copper-based network.

Technology long range very-high-bit-rate digital subscriber line (VDSL) has the potential to deliver superfast speeds over longer distances than can be achieved using current fibre to the cabinet (FTTC) technologies. In theory, download speeds of up to 40Mbit/s and upload speeds of up to 10Mbit/s could be delivered using this technology to premises that currently receive much lower speeds due to the distance to their serving VDSL cabinet.

Virgin Media is in the process of upgrading its network and is beginning to offer services with download speeds of 300Mbit/s. Later versions of the technology used could support, in theory, download speeds of up to 10Gbit/s and upload speeds of up to 1Gbit/s.

Trend 5. SMART Infrastructure

The SMART city model has been conceptualised as an overarching solution to bring sustainability to cities by making them "smarter", using digital and technological infrastructure, and where access and adequate management of big data play a key role to understand population needs. Although there is not a universal definition for "SMART infrastructure" it has been framed as a system that provides evidence for informed decision-making.³⁷⁷ Therefore SMART infrastructure could provide systems that could reduce journey-times through traffic management systems; offer remote monitoring to facilitate asset management with use of specialised software and drone technology; as well as to help to find solutions to climate change mitigation, providing monitoring information about air quality, water and energy grids.

UN-Habitat indicates that in order to ensure future success of "SMART technologies", SMART city approaches should be people-centred rather than technology driven, reflecting the needs and intelligence of communities.³⁷⁸ Similarly, the SMART city strategy in London includes digital engagement with the community to understand population concerns about the city, gathering its feedback to help to improve the services offered.³⁷⁹

For SMART infrastructure, Brent's Digital Strategy aims to increase digital inclusion among its population, and transform Brent into a digital borough. The strategy includes plans to invite bids to work in partnership on radical pilot initiatives that include the use of sensors, monitors and drones in areas such as wellbeing, transport and environment³⁸⁰. Similarly, it is important to increase people and business participation through the use of social media and digital tools such as the Cleaner Brent App using data generated to design and improve future infrastructure.

Trend 6. Growing Water Demand

Water is a vital resource for any city, and frequently one that is taken for granted. Given projected population growth, London is expected to require an extra 200 million litres of potable water per day by 2025. A six-month drought order could cost businesses between £0.75 billion and £1.7 billion³⁸¹. Given the water supply is currently under stress, and the

³⁷⁷ Royal Academy of Engineering (2012) Smart infrastructure: The future

³⁷⁸ World Urban Campaign (2016). The city we need 2.0

³⁷⁹ GLA (2016) The future of Smart: Harnessing digital innovation to make London the best city in the world. Update report of the Smart London Plan.

³⁸⁰ Brent Digital Strategy 2017-2020

³⁸¹ London First (2017) Water scarcity and security in London.

projections of increased pressures on the city's drainage and water supply systems, new creative approaches are required, alongside new infrastructure.

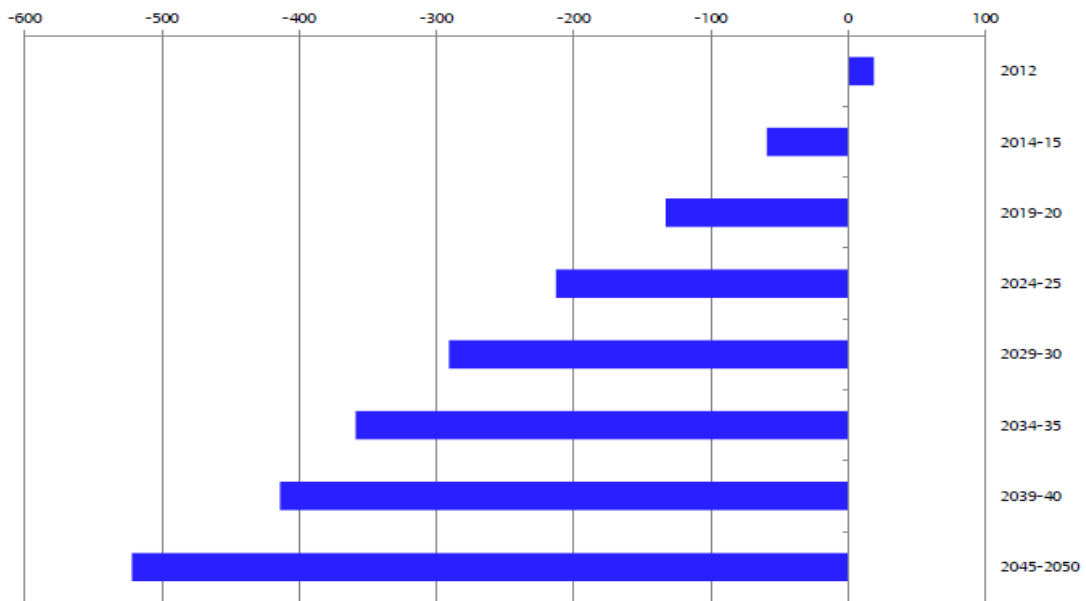
Information about Brent's future water supply and demand at a local level is not readily available, however Thames Water predicts that there will be a water shortfall of 133 million litres daily in London by 2020, equivalent to water provision for 850,000 people.³⁸² This scenario is due to worsen, with water demand predicted to exceed capacity by 10% by 2025, and by 21% by 2040.³⁸³ The GLA similarly predict that given population growth projections, without intervention, London will have a water supply deficit of over 500 million litres daily by 2050 (Figure 187).³⁸⁴

³⁸² Thames Water (2017) Media. Thames Water brings smart water meters to Brent and Hackney.

³⁸³ ICE (2016) Water Infrastructure and London's Successful Growth

³⁸⁴ GLA (2016) Economic Evidence Base.

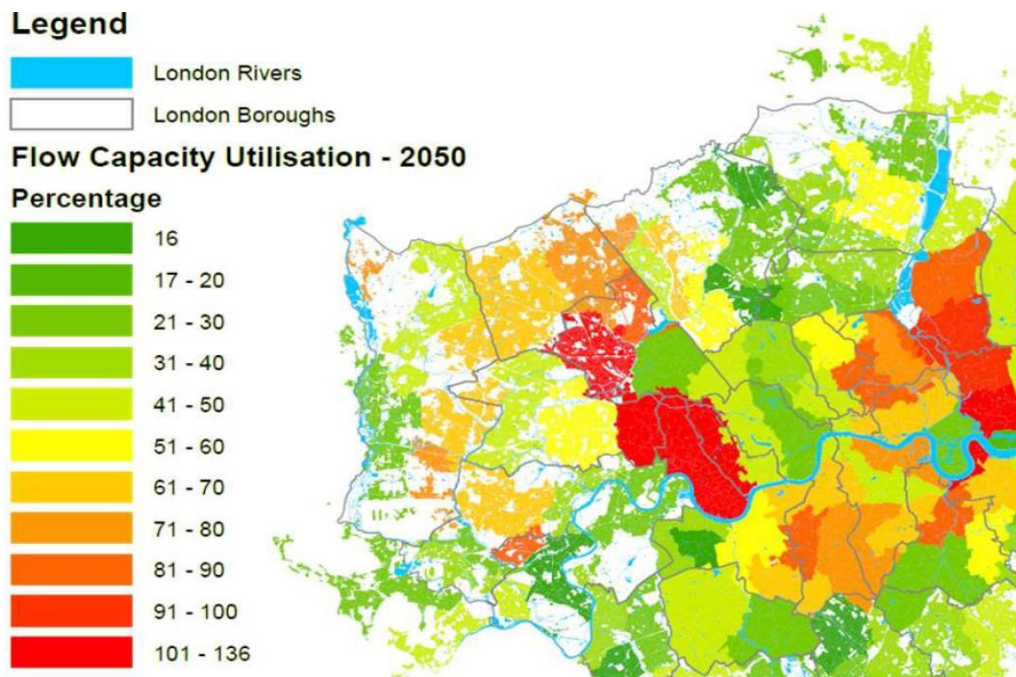
Figure 187: Expected deficit in water supply in London (million litres per day)



Source: GLA (2016) London Sustainable Drainage Action Plan with information from Thames Water

If the foul and sewer capacity of London remains constant, the risk of overflow will be critical in some areas by 2050, including the North and West areas of Brent, which would have insufficient drainage or sewage infrastructure to manage expected flows. As a result, this would lead to an increasing risk of surface water and sewer flooding. Wembley, currently the largest growth area in the borough and expected to support significant housing growth, is notably identified as an area where sewer capacity is modelled at a critical level. Figure 188 below shows flow capacity by 2050 where areas highlighted in red exceed its capacity and some flooding should be expected.

Figure 188: Modelled foul and combined sewer capacity for the 2050s.



Source: GLA (2016) London Sustainable Drainage Action Plan with information from Thames Water

OPDC additionally recognise that the future development of Park Royal will further increase the demand for potable water in the area that includes Brent.³⁸⁵

The SMART water meters implemented in Brent in 2017 will help to increase the efficiency of water use, as well as identify leaks in pipes, and thereby prevent water waste in the borough. It is however also important for Thames Water to improve the efficiency of the strategic water treatment works, water reservoirs and pumping stations.

To bridge the gap between future demand and current supply, the GLA consider that the following will be required:

- Improving water efficiency of existing development by retrofitting water efficient devices
- Incentivising people to become more water efficient by raising awareness
- Developing innovative tariffs and smart tariffs
- Including better water efficiency standards in new developments
- Encouraging innovative leakage detection and fixing.

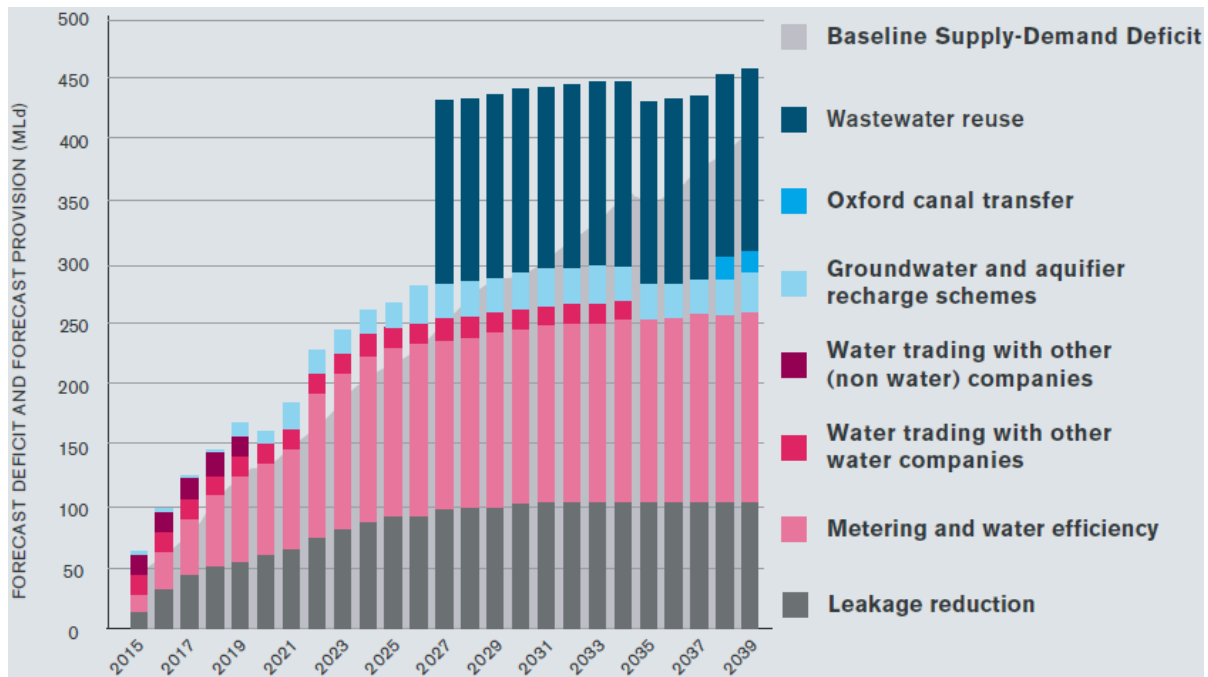
Both Central and Local Government must also encourage Thames Water to develop 25-year plans for wastewater and drainage, which should include how they plan to use sustainable drainage to extend the life of the Thames Tideway Tunnel.

Thames Water propose some measures to balance supply and demand (Figure 189) to 2020, and elaborate on their longer term plans to manage supply from 2020 to 2045. Three main options are identified to provide the major new water resource needed in the late 2020s. This will include among other projects:

- Pipeline or canal from the River Severn to “top up” London’s water supply;
- New reservoir in Abingdon
- Wastewater reuse site at Deephams or Beckton Sewage Treatment works.

³⁸⁵ OPDC (2017) Infrastructure Delivery Plan.

Figure 189: Thames Water’s proposed measures to 2020 (in million litres per day)



Source: GLA (2015) London infrastructure plan 2050

Flood risk is due to increase due to a combination of climate change, ageing flood defences, more impermeable surfaces from new development and more people and assets in areas at risk. The Mayor is set to work with the Environment Agency, London Boroughs and other stakeholders to develop a prioritised 25-year flood risk management and investment plan for each catchment area in London, covering all flood sources.

Thames Tideway is one of the projects that by 2023 will significantly reduce the pollution of the River Thames through a system that will prevent discharges from London’s overloaded sewer system into the Thames.³⁸⁶

The GLA consider green infrastructure is a requirement to mitigate the impacts of surface-water flooding and the urban heat island effect. The GLA plan to model and map the potential for retrofitting sustainable drainage across London, including green roofs, modified green spaces and increased tree canopy cover; as well as to model the likely impact of increased development on the urban heat island effect and identify the green infrastructure interventions required to avoid increased ambient temperatures³⁸⁷.

Trend 7. Increased Demand for Sustainable Energy Sources

The supply of energy to homes and businesses is critical to the functioning of the city, daily activities and the economy. Population and economic growth in London are likely to lead to an increase in energy demand and rising pressure on the energy supply.

London has some of the oldest and most energy inefficient building stock in Europe and it is expected that 80% of these buildings will still be standing in 2050. There is a need to retrofit this building stock through insulation to reduce levels of energy consumption.

³⁸⁶ Corporate Thames Water (2016) Our long-term strategy 2015-2040.

³⁸⁷ GLA (2015) London Infrastructure Plan 2050

Current national and local policy approach is to provide energy with the lowest environmental impact to achieve carbon emissions targets. This approach will increase the demand pressure of particular sources of energy, such as electricity due to future plans for the electrification of heat and transport. Energy provision and capacity from external sources is also expected to be stressed from projected population and economic growth leading to an increase, in the demand for sustainable energy sources.

Many energy storage and production methods have the potential to be used in Brent, including batteries and thermal storage, as well as solar photovoltaic (PV) technology. Council plans include the development of technologies such as a District Energy System in South Kilburn, which is a top priority project and would supply thermal energy to residential and commercial business from central energy centres. The South Kilburn project is planned to set a standard and be replicated in other growth areas after the implementation.

The Council also plans to implement solar technology on Council buildings and its housing stock. Although, solar energy could potentially balance domestic supply, investments on residential buildings are planned to be phased due to technological and investments barriers.

By 2050 London will require a 20% increase in energy supply.³⁸⁸ The GLA strategy for achieving self-sufficient energy and increased climate change resilience, includes some projects that will encourage a change of smart grid technologies towards efficient urban energy system technologies.

London is expecting to produce more than 20MW of electricity and a similar amount of heat through the implementation of heat networks capable of storage, combined heat, power plant, and 82,000 m² of solar photovoltaic panels by 2050.³⁸⁹

³⁸⁸ GLA (2016) The Future of Smart: Harnessing digital innovation to make London the best city in the world. Update report of the Smart London Plan.

³⁸⁹ GLA (2015) London infrastructure plan 2050.

Responses

Considering population growth, economic and environmental changes projected to impact Brent, its residents and businesses to 2040, and the Local Authority strategic role to plan for infrastructure to support sustainable growth; the following responses are aimed to address the main issues with current capacity and expected demand in relation to infrastructure:

- Encourage jobs and housing densification in areas with current good levels of PTAL and social infrastructure, and which will benefit from future transport improvements already planned by TfL. Continue to lobby TfL and national government to target new investment in already densely developed areas and those with potential to accommodate new growth. Brent must promote the Crossrail West Coast Mainline Link and stop at Wembley Central station, due to the significant economic benefits that would accrue from connecting into Old Oak Common, an expanded Heathrow and beyond, and the requirements to accommodate the expected density of growth in the area. In partnership with West London Alliance, Brent has successfully lobbied for the West London Orbital Railway to form part of the Mayor's new Transport Strategy, and must now press for investment and delivery to connect Neasden, Harlesden and Staples Corner, support population and employment growth across a swath of West London, and by strengthening orbital links provide a transport alternative connecting Outer London and reducing reliance on private car use.
- Transform more streets into greener public realms, where active modes of transport, walking and cycling are given greater priority. Cycling has huge untapped potential to replace many of the shorter car trips in Brent. It is important to increase dialogue with TfL and the Mayor through the Healthy Streets program that aims to improve cycling, walking and bus infrastructure, to attract local investment into Brent and develop already identified potential new routes and pathways. The Council should promote and support campaigns for road safety education, cycle loans schemes, education campaigns about personal budget savings, health benefits, and time reductions associated with walking and cycling.
- Changes in car technologies such as electric and automated cars must be planned for and associated benefits identified which include an improvement in air quality. Such technologies do not however themselves reduce the number of cars and remove congestion from the roads, and as a result could reduce productivity in the borough. To more directly address congestion, the promotion of car sharing and renting schemes could be prioritised as strategic model to make more efficient use of vehicles, particularly those with capacity to provide ULEV.
- To reduce air pollution from cars and align with the zero emission policy that aims to increase the number of ULEVs and ban petrol and diesel cars, it is important to increase participation and take up of national and local grants that are awarded directly to Local Authorities to provide appropriate EV infrastructure in Brent. Brent should similarly promote and increase communications about current available EV infrastructure in the borough. TfL future investment in EV infrastructure by borough may well correspond to levels of demand. It is therefore important to encourage the change of vehicle technology to more environmental sustainable, to increase the registration of ULEVs. Future EVCP provision should consider the cost, type and mix of technology required to satisfy the expected up to 40,000 EV users by 2038, where EVCP requirements could be up to 13,000 for slow charging points or up to 840 with rapid charging points. To minimise the investment barrier, cost should be met by operators as far as possible, particularly in more attractive and commercially viable locations, rather than subsidized by the Council³⁹⁰. In the short-term however, financial support could be required to install and operate in other areas. It is

³⁹⁰ Element energy and WSP Parsons Brinckerhoff (2016) Plug-in electric vehicle uptake and infrastructure impacts study.

therefore important to establish and develop partnerships with technology providers, such as Bluepoint London, maximise take up of national and local funding schemes, and access Community Infrastructure Levy resources. TfL funding allocations are based on perceived demand and electric vehicle take up, it is therefore important that Brent encourage EV use beyond ensuring appropriate infrastructure requirements are in place, by promoting government incentives to switch to electric cars and vans and raising awareness of the EV market so people can understand the options and benefits of EV ownership.

- Delivering ultrafast broadband speeds and technology in Brent is important to satisfy business requirements. Although, some investment is planned for denser business centres such as in Wembley and Alperton, further investment is needed in other employment hubs such as Park Royal, to maintain competitiveness and attractiveness among other boroughs. London and Brent needs the right digital infrastructure and access to realise its economic potential and benefits, which are currently failing in some areas as result of the failure of private operators to rollout digital infrastructure, and in particular broadband. It is essential that Brent lobby the GLA, BT and other operators to make this happen, encourage investment in technology and increase broadband capacity, providing evidence of 'not-spots', in order to ensure enough capacity to increase competitiveness in business areas such as Wembley, Park Royal and Kilburn. It is also important to agree new private partnerships and focus Council investment in key areas according to current and future density levels. For example, the London Borough of Camden has implemented some digital programmes in partnership with GLA and private sector that could be replicated in Brent.
- Improve water grid efficiency: Water demand information at a local level is limited and therefore it is important to increase dialogue with Thames Water to better understand the location of main water stress areas and plan to avoid future shortages. Available consumption data shows lower water consumption in metered compared to unmetered properties. With a rising deficit in water supply projected across London, the local authority has a role to play in raising awareness and changing behaviours to help people become more water efficient, as well as to ensure appropriate planning conditions and building regulations are applied and enforced for new developments, and more comprehensive water management plans drawn up for larger strategic regeneration and development.
- Increase Sustainable Urban Drainage Systems (SuDS) in new buildings and green technology. A best practice example with learnings that could be replicated in Brent is the Woodberry Downs regeneration project in Hackney, which will contain green infrastructure features including SuDS and green roofs, together with better links with nearby reservoirs and green spaces. New development however typically affects only 0.5% land each year³⁹¹ and therefore it is critical that the tide of impermeable surfaces is rolled back and SuDS integrated into existing built environments. DRAIN London have supported the design, planning and construction of 5 best practice SuDS retrofit projects across London.³⁹²
- Domestic energy use must be reduced to achieve national and local targets. Many types of energy storage and production have the potential to be used in Brent to achieve this, including solar and thermal. It is understood that technological and investment barriers could block or delay the implementation of these technologies, particularly on existing housing stock and business premises, and the Council is analysing how to overcome them. Therefore, it is important to include in this analysis potential partnerships with private developers, community leaders, charities or private investors in order to accelerate the investment on renewable sources of energy for storage and production.

³⁹¹ Mayor of London (2016) Sustainable Drainage Action Plan

³⁹² DRAIN London (2016)

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