

# Journey time and connectivity measures for London

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RGS/IBG

Journey times for policy-making, delivery and evaluation

28<sup>th</sup> January 2020



# Overview

- TfL
- TfL journey time datasets
- Travel time analysis
- WebCAT
- Future developments



# Transport for London – what we do

- One of the GLA's 'Functional Bodies' and directly accountable to the elected Mayor
- Responsible for strategic planning for transport in London (Mayor's Transport Strategy), and significant implementation and operation - London Underground, Buses, DLR, Tram, Overground
- City Planning is responsible for delivering an integrated, effective and efficient Strategy and Planning function across TfL

‘Keep London working and growing and make life better

Meet the rising expectations of our customers and users

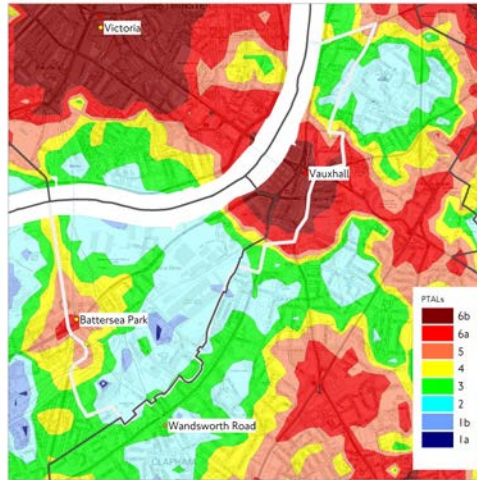
Plan ahead to meet the challenges of a growing population

Unlock economic development and growth



# Journey time/connectivity analysis is central to TfL City Planning's work

- Mayor's Transport Strategy
- London Plan
- Build the case for new transport schemes
- Regeneration schemes
- Encouraging modal shift



## DRAFT FURTHER ALTERATIONS TO THE LONDON PLAN

THE SPATIAL DEVELOPMENT STRATEGY FOR GREATER LONDON  
DRAFT FURTHER ALTERATIONS TO THE LONDON PLAN JULY 2015  
CONSOLIDATED WITH REVISED EARLY MINOR ALTERATIONS OCTOBER 2015

JANUARY 2016

MAYOR OF LONDON



Mayor's Transport Strategy  
Draft for public consultation  
Executive summary

JUNE 2017



# Journey time data is derived from our strategic transportation model outputs

- Journey time matrices available for all modes:
  - Public transport (Railplan) Rail, Tube, Bus, DLR, Tram
  - Cycling (Cynemon)
  - Highway LOHAM
- Current and Future networks – Crossrail - new schemes and projects
- Time periods – Peak, Inter-peak, Evening
- Congestion and crowding
- Population and employment forecasts for catchment analysis
- Zoning systems



# Data issues:

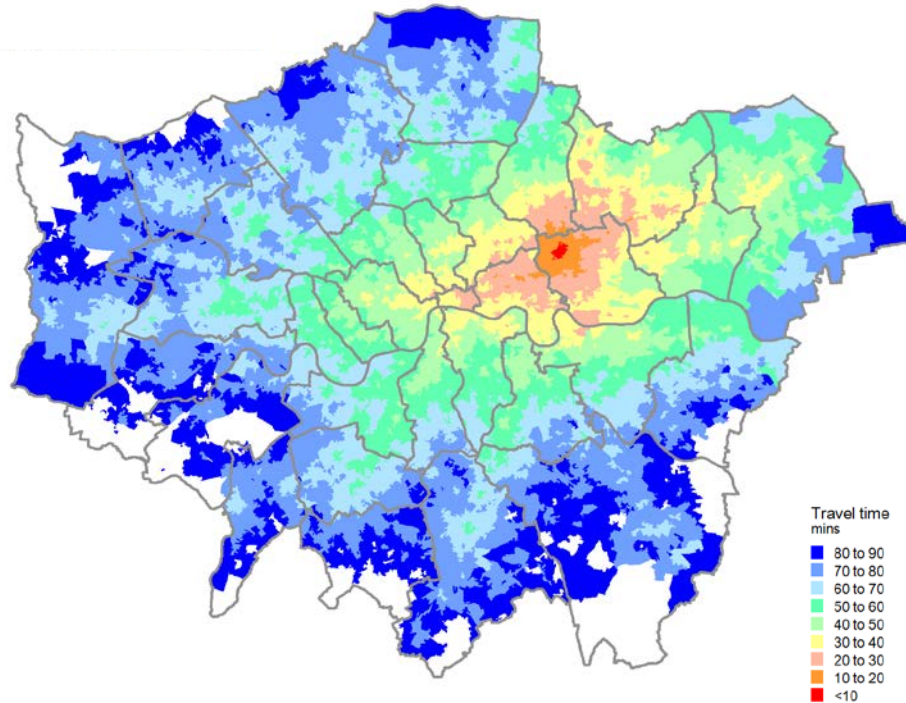
- Our strategic transport networks represent a snap shot of the network at a particular date, Temporary diversions and other incidents are not usually taken into account
- Future year networks include new schemes and projects such as Cross rail 1 and 2, Bakerloo Line extension, line upgrades etc.
- Current and future networks can be compared on a consistent basis: highlighting the differences a new scheme will have on journey times.
- Providing consistent historic/time series datasets though can be more problematic
- The emphasis has been on the Morning Peak and the Journey to Work – but other time periods are significant – Weekends, Night time etc.
- Journey time data usually represents the shortest time between Origin & Destination. We assume customers use “perfect routing knowledge”. But this may involve additional interchange that the customer may not want to use.
- Zoning systems – 3,300 zones in London – strategic vs local level



# Journey time measures in TfL



# Journey time mapping measures connectivity in terms of how far you can get through the network for any combination of locations



## Travel times to Stratford

### Network:

- **Year:** Current/Base
- **Mode:** All PT modes
- **Time period:** AM Peak
- **Direction:** to the location
- **Zones:** COAs

### Journey time:

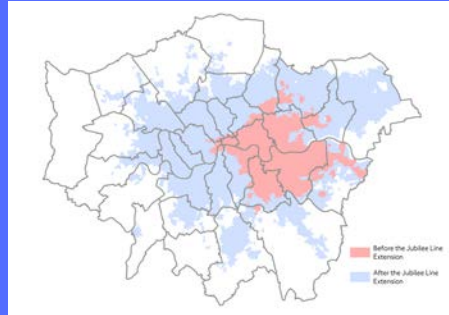
- Walk time
- Wait time
- In-vehicle time
- Interchange time



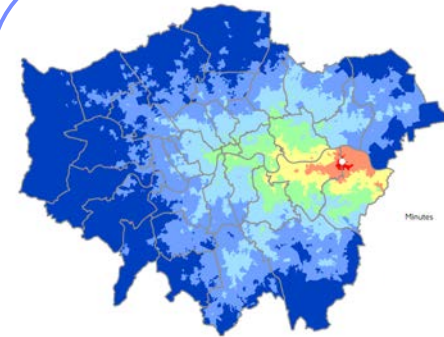


# Journey time mapping – some more examples

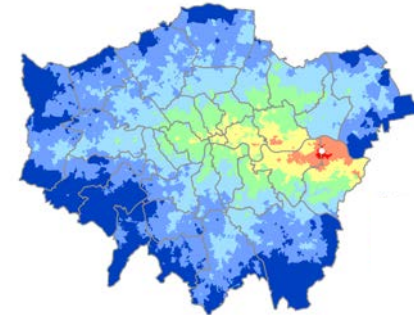
Comparing travel times (60 minute catchments) to North Greenwich with/without the Jubilee Line



Combined 45 minute travel time catchments to the nearest large town centre



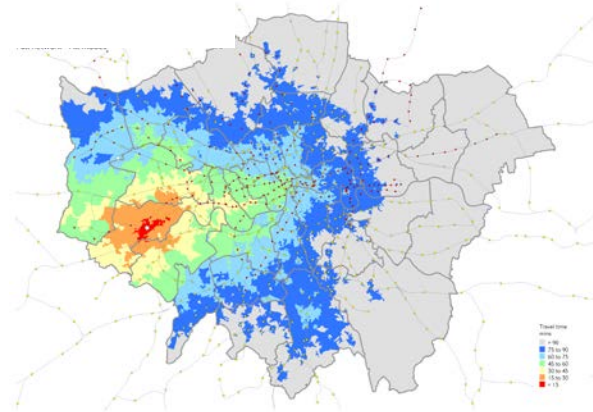
Travel times from Abbey Wood – with and without Crossrail



## Travel time mapping - step-free analysis

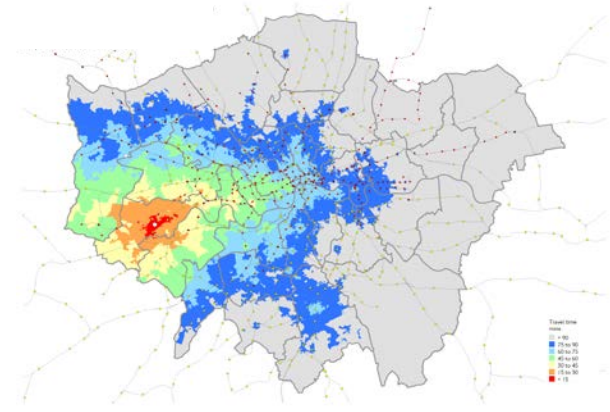
For many public transport users the network is not fully accessible: steps and other barriers exist.

We have developed a series of transport networks that take step-free access into account, removing those station walk links that are not considered accessible/step-free.

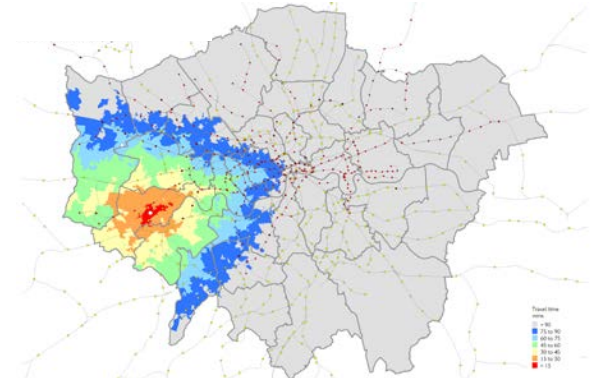


**Full network** – standard base network using all modes (Rail, LU, DLR, Tram, Bus).

**Bus only network** – times derived from the full network but using bus mode only

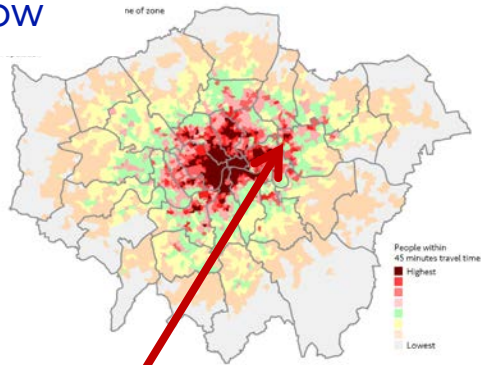


**Step-free network** – walk links removed that are not considered step-free .

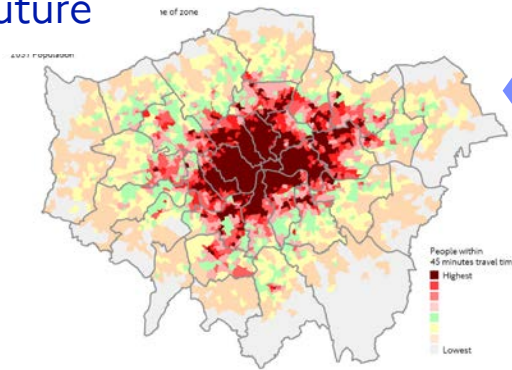


# London-wide catchment analysis – aggregates the catchment attribute for each zone in London and maps the results

Now



Future

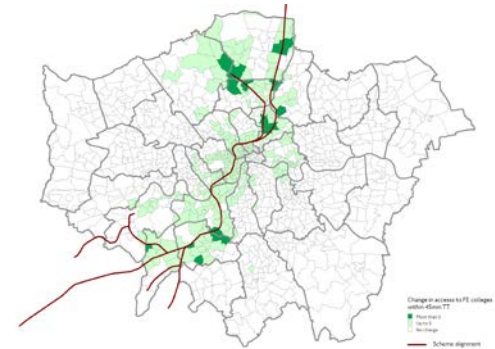


These examples show the number of people within 45 minutes travel time of each zone in 2011 (left) and 2031 (right)

Changes are due to population growth and/or improvements in connectivity by 2031

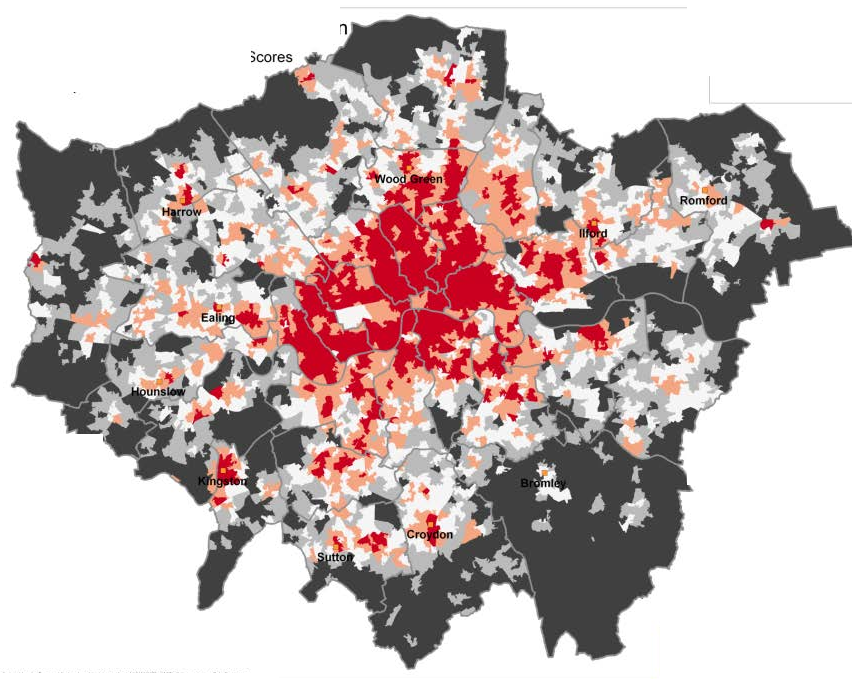


This example compares travel times from all zones to FE colleges within 45 minutes travel time using the current network and a future network including Crossrail 2



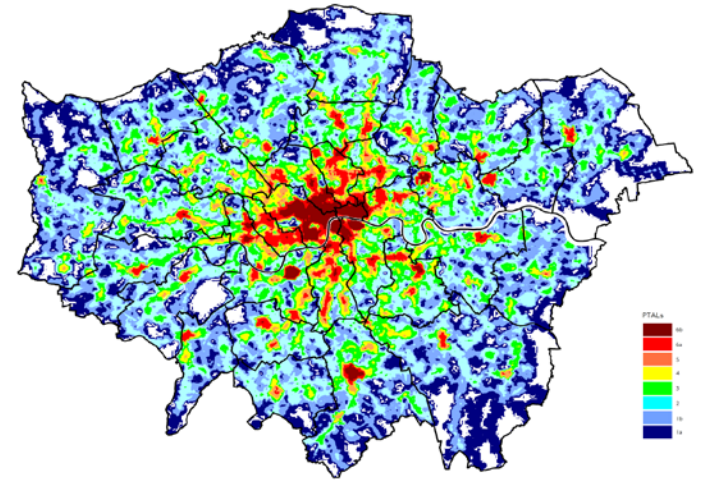
# ATOS – measuring access to opportunities and services

- A response to the DfT's work: ATOS was developed as a measure to quantify access to a basket of essential services including – schools, GP surgeries, food shopping etc. by public transport and/or walking.
- The map above shows ATOS composite scores – combining data for all service types
- Issues associated with defining essential services: capacity, quality, service provision, public/private, personal choice
- High service provision in London means that many locations can be reached by walking, cycling or local bus services alone
- This method is more useful for assessing access by walking and cycling where proximity to services is more significant



# Public Transport Accessibility Levels (PTALs)

- PTALs do not consider travel time through the network but proximity (walk distance/walk time) to the public transport network.
- They are relevant to London where (in most cases) a dense and integrated transport network means that a range of opportunities can be reached within a reasonable amount of time
- Access to essential service research showed that there is a strong correlation between PTALs and the time taken to reach key services – i.e high PTAL areas generally have good access to services and low PTAL areas have poor access to services



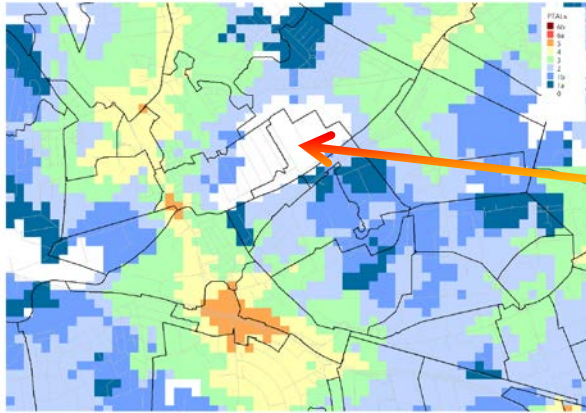
For any location in London PTALs combine walk times (to stations/bus stops) and service wait times (at those stops) to give a measure of connectivity to the Public Transport network

They are relatively easy to use and calculate for single locations or an area

Mapped output provides a clear and intuitive representation of public transport provision across London – understandable to both transport planners and the general public



# PTALs at the local - site specific level



A new housing development may be planned here but it is beyond the maximum walk time to the transport network – PTAL 0

The simplicity of PTAL means we can calculate them using a grid of points at 100m intervals - 150,000+ across London

Highlights variation in access to the transport network within a development site or at a sub-zonal level

We provide PTAL calculation results for individual locations on our website WebCAT

## PTALs and the London Plan

- a key factor to determine housing densities across London
- helps defines parking provision in residential developments
- used to monitor the provision of business and commercial activities in areas of good connectivity – PTAL 5 and above

Table 3.2 Sustainable residential quality (SRQ) density matrix (habitable rooms and dwellings per hectare)

Setting	Public Transport Accessibility Level (PTAL)		
	0 to 1	2 to 3	4 to 6
Suburban	150–200 hr/ha	150–250 hr/ha	200–350 hr/ha
3.8–4.6 hr/unit	35–55 u/ha	35–65 u/ha	45–90 u/ha
3.1–3.7 hr/unit	40–65 u/ha	40–80 u/ha	55–115 u/ha
2.7–3.0 hr/unit	50–75 u/ha	50–95 u/ha	70–130 u/ha
Urban	150–250 hr/ha	200–450 hr/ha	200–700 hr/ha
3.8–4.6 hr/unit	35–65 u/ha	45–120 u/ha	45–185 u/ha
3.1–3.7 hr/unit	40–80 u/ha	55–145 u/ha	55–225 u/ha
2.7–3.0 hr/unit	50–95 u/ha	70–170 u/ha	70–260 u/ha
Central	150–300 hr/ha	300–650 hr/ha	650–1100 hr/ha
3.8–4.6 hr/unit	35–80 u/ha	65–170 u/ha	140–290 u/ha
3.1–3.7 hr/unit	40–100 u/ha	80–210 u/ha	175–355 u/ha
2.7–3.0 hr/unit	50–110 u/hr	100–240 u/ha	215–405 u/ha



Bringing TfL's  
connectivity  
work together

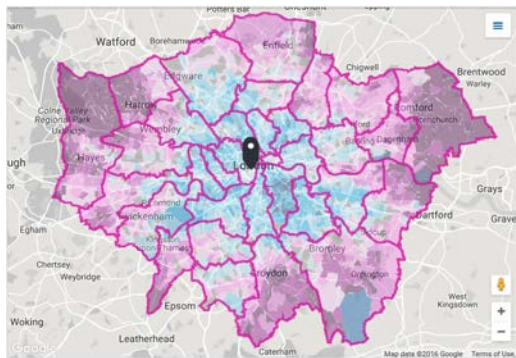
WebCAT



EVERY JOURNEY MATTERS

# WebCAT brings together our connectivity measures into one intuitive web-based application

- Available on TfL's public website - making our travel time/connectivity datasets available to a wider audience
- Select any location in London on the interactive map to view site specific data:
  - Travel time mapping
  - Catchment statistics
  - PTALs
  - Journey time comparison tool



## WebCAT

Address or co-ordinates  
eg: NW1 5BE or 53.0273, 19.983

Access level (PTAL) Time mapping (TTM)

TTM: a new measure, looking at how far you can travel in a given journey time.

Map key - Travel Time

0 - 5 mins	41 - 50 mins
5 - 10 mins	46 - 45 mins
10 - 15 mins	51 - 55 mins
15 - 20 mins	56 - 60 mins
20 - 25 mins	61 - 65 mins
25 - 30 mins	66 - 70 mins
30 - 35 mins	71 - 75 mins
35 - 40 mins	76 - 80 mins
40 - 45 mins	81 - 85 mins
45 - 50 mins	86 - 90 mins
50 - 55 mins	91 - 95 mins
55 - 60 mins	96 - 100 mins

Change travel time bands

Map layers

- Travel Times
- Through Boundaries

You can click anywhere on the map to change the selected location.

**Scenario**

Base Year

Mode

All public transport modes

Time of Day

AM Peak

Direction

From location

Compare travel times

Choose a variable to compare your current travel time selection against.

Update

What is WebCAT

WebCAT updates

Glossary

Reports and map downloads

- Full TTM report PDF
- TTM map PNG

Figures are based on TfL's strategic forecasting tools.

**TTM output for Base Year**

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

8 Chispa St, Whitechapel, London E1 1SE, UK Easting: 534473, Northing: 180926

Population and employment: 2011 forecast 2016

From Census: 2011 2016

Business Register: 2011 2016

Health and Social Care: 2011 2016

Open StreetMap

**Catchment analysis for your selected location**

- Population
- Employment
- Town centres
- Health services
- Educational establishments





# WebCAT and journey time analysis

Users can select different travel time datasets based on the following criterion:

- Year: 2011, 2021, 2031
- Mode: All PT, Bus, Step-free
- Time of Day: AM Peak, Inter-peak, PM Peak
- Direction: To, From, Average

Further analysis:

- Catchment bar charts for each location
- Compare and plot different travel time variables
- Alter the travel time bands to suite your analysis

Change travel time bands —

5 minutes  10 minutes

15 minutes  20 minutes

30 minutes  45 minutes

Scenario

Mode

Time of Day

Direction

Compare travel times  +

## WebCAT

Address or co-ordinates  
eg. NW1 6XE or 53.0273, 1.9613 Go

Access level (PTAL) **Time mapping (TIM)**

TIM: a new measure, looking at how far you can travel in a given journey time.

Map key - Travel Time

0 - 15 mins	15 - 30 mins
30 - 45 mins	45 - 60 mins
60 - 75 mins	75 - 90 mins
90 - 105 mins	105 - 120 mins
120 - 135 mins	

Change travel time bands +

Map layers  
 Travel Times  Borough Boundaries

Scenario

Mode

Time of Day

Direction

Compare travel times  
Choose a variable to compare your current travel time selection against.

Update

What is WebCAT? >

WebCAT Updates >

Glossary >

Figures are based on TfL's strategic forecasting tools.

You can click anywhere on the map to change the selected location.

**TIM output for Base Year**

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

8 Christian St, Whitechapel, London E1 1SE, UK  
Easting: 534473, Northing: 180926

Population and employment: GLA forecasts 2016  
Town Centres: GLA 2016  
Education: EduBase 2016  
Health: NHS Direct, CCG 2016  
Code: N702662054

**Catchment analysis for your selected location**

Population	<span>+</span>
Employment	<span>+</span>
Town centres	<span>+</span>
Health services	<span>+</span>
Educational establishments	<span>+</span>

**Reports and map downloads**

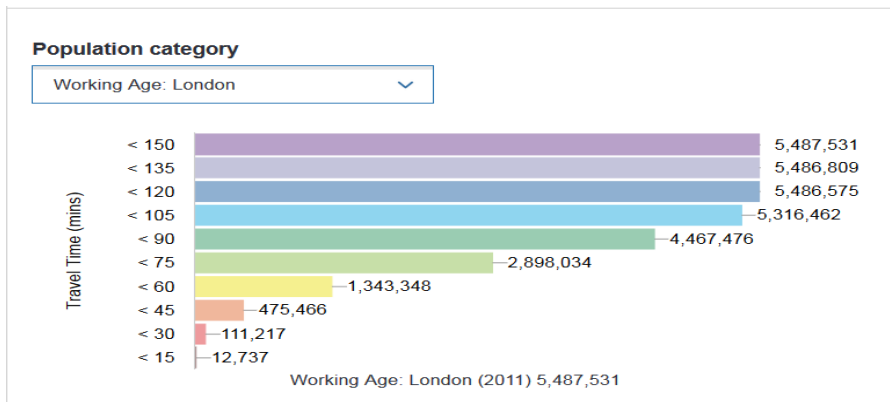
Full TIM report PDF	<span>↓</span>
TIM map PNG	<span>↓</span>



# WebCAT and catchment analysis

## Using cumulative bar charts:

- See how many people or jobs are there within each mapped travel time band
- View the impact of a new scheme
- Population and jobs data based on the GLA forecasts for: 2011, 2021 and 2031
- Data included for locations in and outside London



## Population – London or London & SE:

- Total
- Households
- Working age
- Economically active
- Pensioners
- Jobs – in London or London & SE

## Town Centres:

- Metropolitan
- Metropolitan + Major
- Metropolitan + Major + District

## Health services:

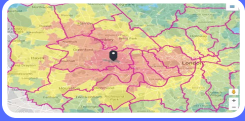
- A&E departments
- GP surgeries
- Pharmacies

## Educational establishments:

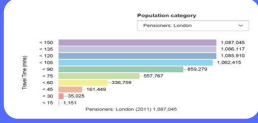
- Primary schools
- Secondary schools
- Further educations



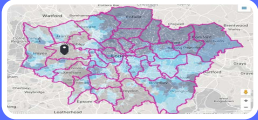
# WebCAT and health service analysis



Travel time plots to health service locations



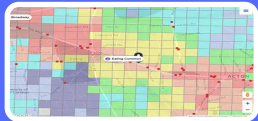
Catchment statistics – total population, age groups etc. within 30, 45, 60 minutes of a site



Compare the full network vs the step-free network



Local connectivity by bus or bicycle – health benefits



PTAL maps – prioritising health service locations with good transport links

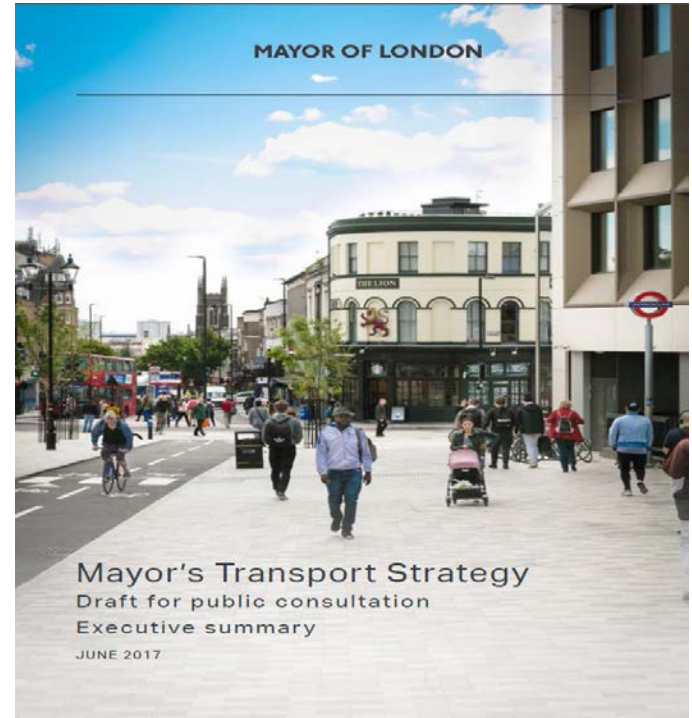


# Current developments – walking as a mode



# Connectivity analysis and the 2017 Mayor's Transport Strategy

- By 2041 London will have a population of 10.5m, accompanied by 6.8 million jobs
- For London to grow and thrive, it is essential “that London’s residents, workers and visitors walk, cycle and use public transport more to improve their health and the environment, to make streets work more efficiently and keep London moving”
- By 2041, 80 per cent of all Londoners’ trips (currently 64%) will be made on foot, by cycle or by public transport
- Our connectivity measures will reflect these aims and include all modes in our analysis





# Further information

**TRANSPORT FOR LONDON** Plan a journey Status updates Maps Fares Help & contacts More - Search

Urban planning and construction > Our role in planning > Planning with WebCAT

## Planning with WebCAT

WebCAT provides information on London's transport system to the professional planning community. This connectivity assessment toolkit allows planners to measure public transport access levels (PTAL) and produce travel time reports and statistics.

**WebCAT**  
Go to the toolkit to check PTAL values and create travel time maps

**WebCAT updates**  
Find out what connectivity data is being added to the toolkit

### What is WebCAT?

WebCAT is our Web-based Connectivity Assessment Toolkit. The toolkit contains two ways of measuring transport connectivity:

- PTAL assesses connectivity (levels of access) to the transport network, combining walk time to the public transport network with service wait times
- Time Mapping analysis (TMA) assesses connectivity through the transport network or, in other words, how far a traveller can go expressed as a series of travel time catchments

PTALs can be viewed for the whole of London or for individual locations, in both the current (base) and future transport networks.

The TMA tool allows you to plot travel times on the map for any location in London with user-selected attributes including:

- Urban planning and construction
- Our role in planning
  - Mayoral Community Infrastructure Levy
  - Policy influencing
  - Design and heritage
  - Growth areas
- Planning with WebCAT
  - Web-CAT
  - Glossary
  - Web-CAT updates
  - Pre-application services
  - Interchange
  - Modelling
- Guidance for planning applicants
  - Our Land and infrastructure
  - Planning and construction contacts
  - Planning and construction resources
  - One Road Network



Visit us at: [www.tfl.gov.uk/WebCAT](http://www.tfl.gov.uk/WebCAT)

Contact us at: [WebCAT@Tfl.gov.uk](mailto:WebCAT@Tfl.gov.uk)

Transport connectivity assessment guide  
PDF 6.19MB

