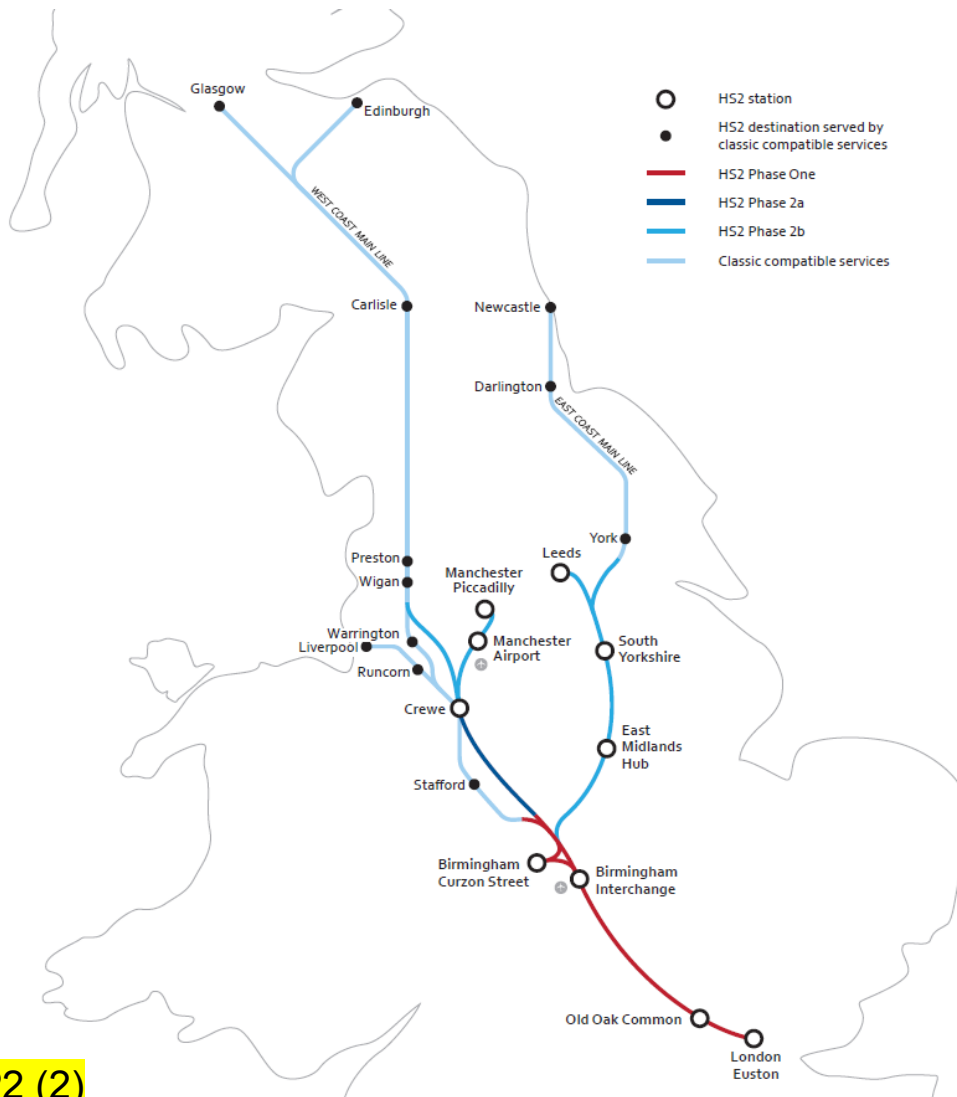


# HS2 Phase One Overview

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Prof Andrew McNaughton

# Contents



- Purpose and Strategy
- International experience
- Stations
- Route
- Next steps

# Purpose of HS2

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**'The new north-south railway is a long term solution to a long term problem'**

Secretary of State for Transport, Foreword, Strategic Case for HS2, November 2013

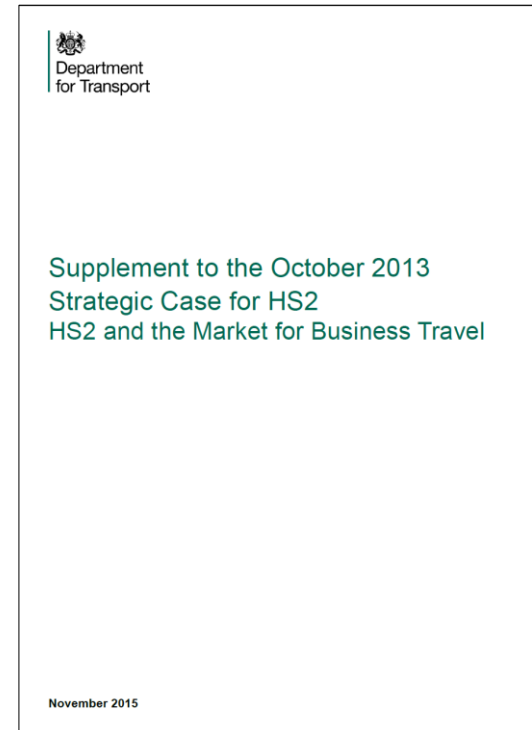
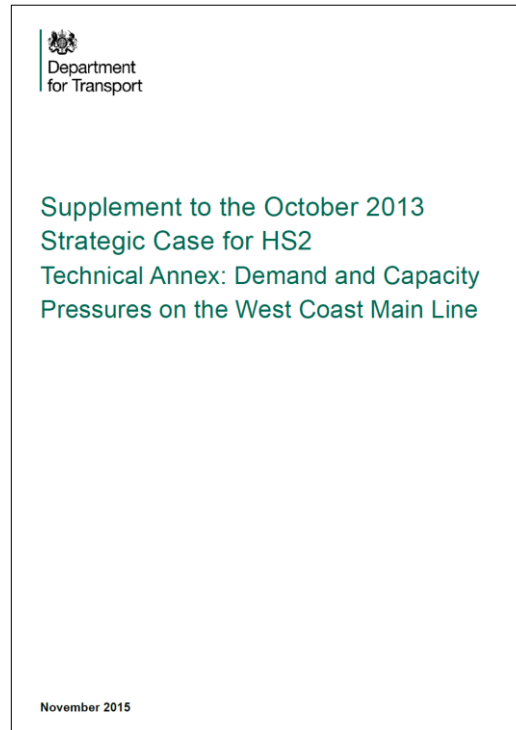
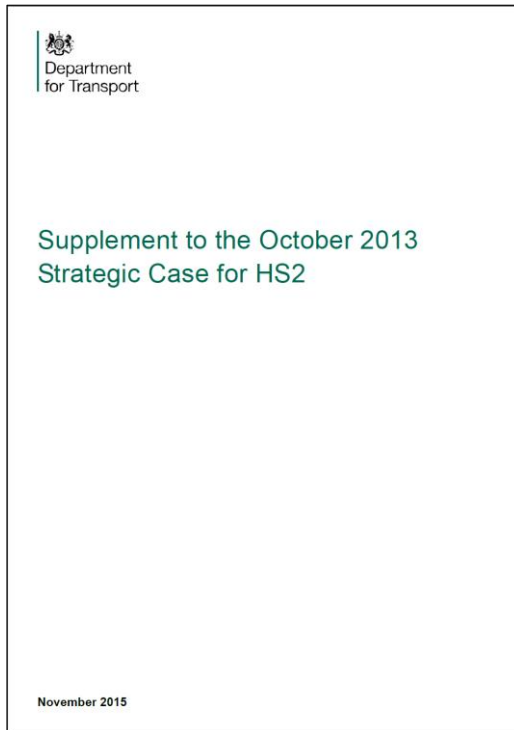
**'The aim of the HS2 project is to deliver hugely enhanced capacity and connectivity between our major conurbations'**

**'... capacity will be freed up on the existing network, especially on the congested lines to the north of London, creating sufficient capacity for extra commuter and freight services'**

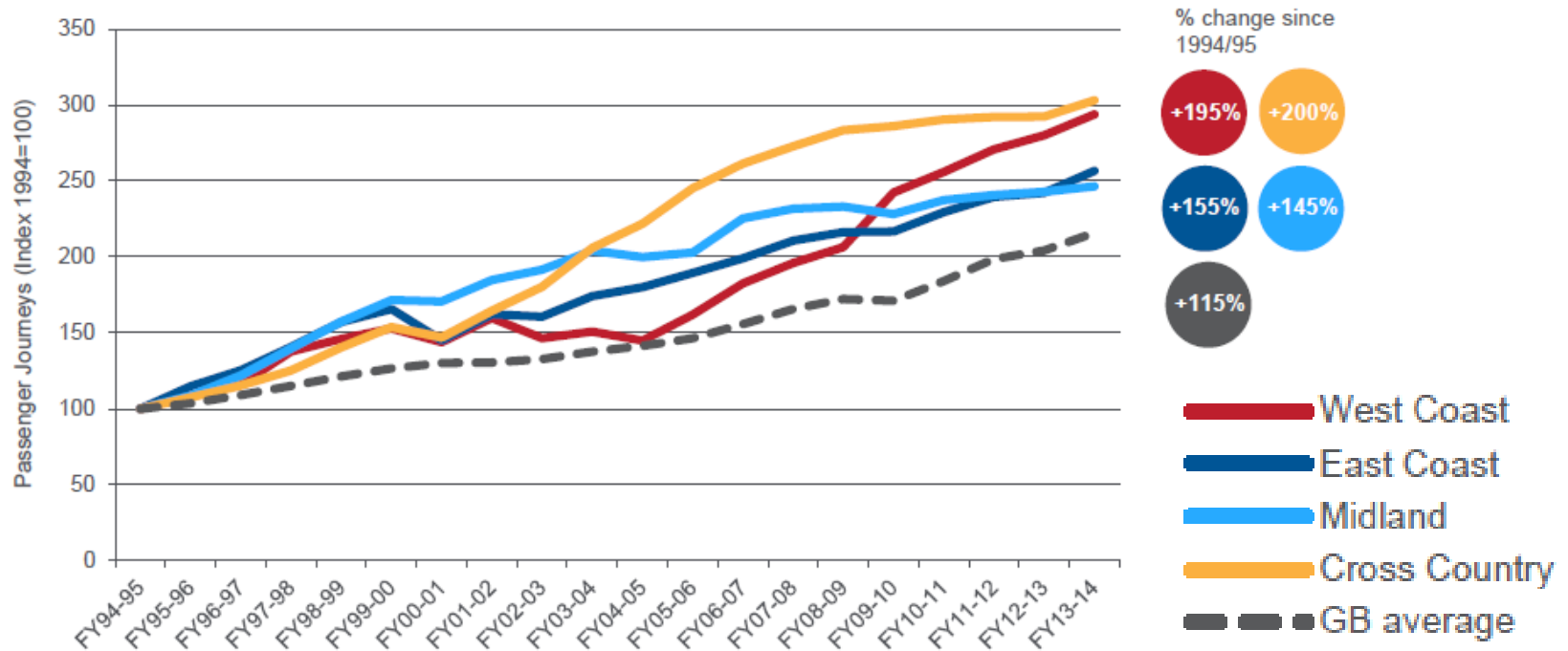
High Speed Rail Investing in Britain's Future – Decisions and Next Steps, January 2012, p.11

# Strategic and transport case November 2015 update

---



# Long distance passenger demand



WCML average annual growth 1996/7 – 2014/15

- Virgin West Coast (long distance) **5.5%**
- London Midland (commuter) **4.0%**

# UK transport capacity filling up fast

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“...even at even only half the recent rate of growth capacity will be a severe problem by the mid 2020s. Crowding levels will be untenable. A step change is needed.”

Strategic case for HS2. October 2013, para.2.10.2

- Demand for freight train paths forecast to double by 2033
- Reliability and resilience affected by heavy utilisation of train paths
- Traffic on strategic roads also predicted to grow – by 29-60% 2010-2040 (depending on growth assumptions)

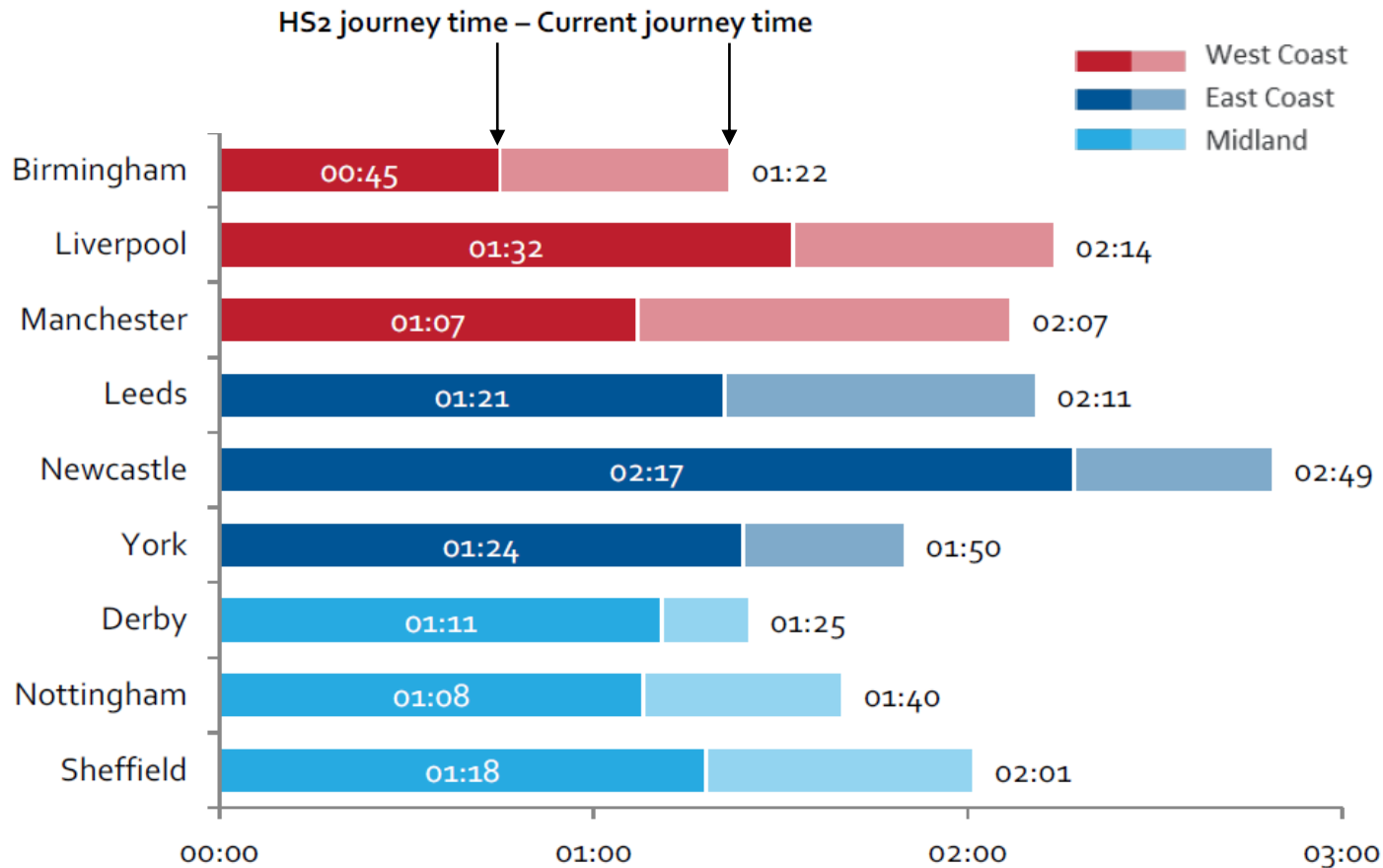
Road Traffic Forecasts 2015, DfT, Table 3.3

# HS1 Two Track Railway

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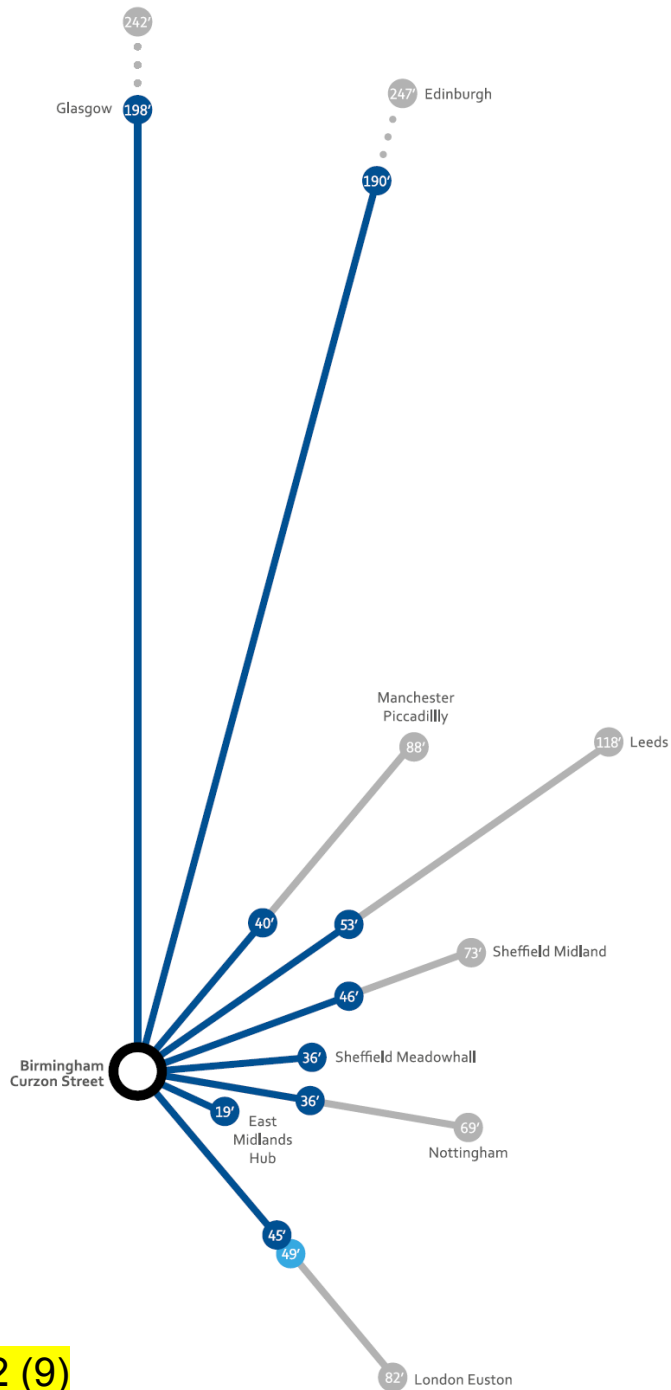
# Bringing cities closer together



Selected journey times from London (HS2 Phase 2)



# Connectivity from Birmingham



- Current journey time (mins)
- HS2 Phase One journey time 2015 (mins)
- HS2 Phase 2a journey time 2015 (mins)
- HS2 full Phase Two journey time 2015 (mins)

# HS2 will attract passengers from the West Coast, Midland and East Coast Main Lines

---

- In 2026 **half** the passengers who would otherwise travel on WCML inter city trains will transfer to **HS2 Phase One** services.
- By 2036, **HS2 Phase Two** would attract:
  - **Two thirds** passengers who would otherwise travel on WCML inter city trains
  - **One third** of passengers who would otherwise travel on MML inter city trains
  - **Half** the passengers who would otherwise travel on ECML inter city trains
  - On the trunk section of the HS2 network south of the West Midlands) circa 250,000 passengers will use HS2 each day
- **Releasing capacity for more commuter and freight services**

# What HS2 releases from WCML

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- The HS2 Phase 1 services replace most long distance non-stop services to or from areas served by HS2
- At least 10 new services can operate into Euston
- Each new commuter train is c700 seats
- Each new long distance train is c500-600 seats

# WCML weekday peak service from London

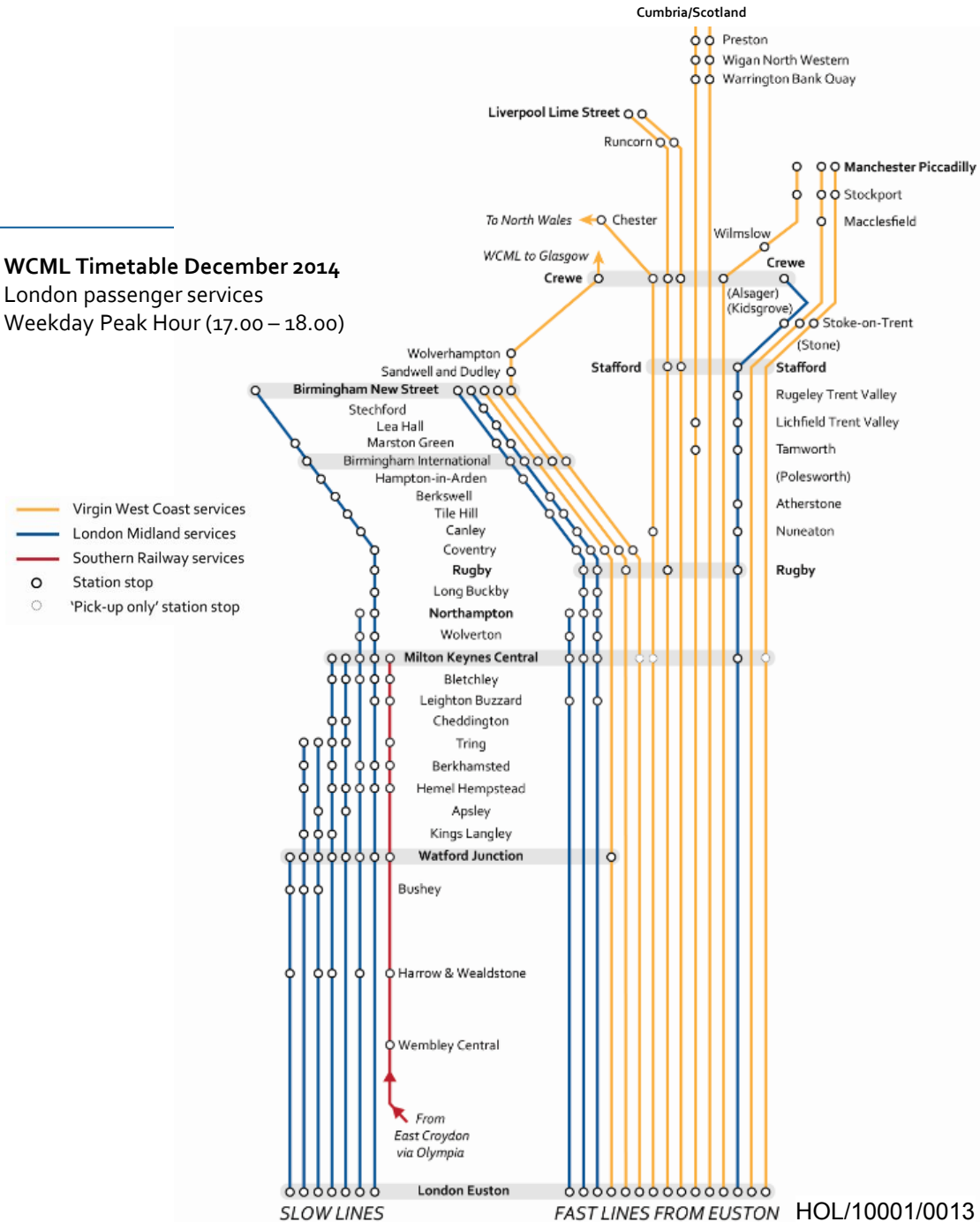
## Passenger (peak)

	Current WCML	2026 HS2 & WCML
Long Distance	14tph	19tph
Commuter distance	9tph	14tph

## Freight (off peak)

	Current WCML	2026 WCML
Paths south of Rugby	3tph	4tph

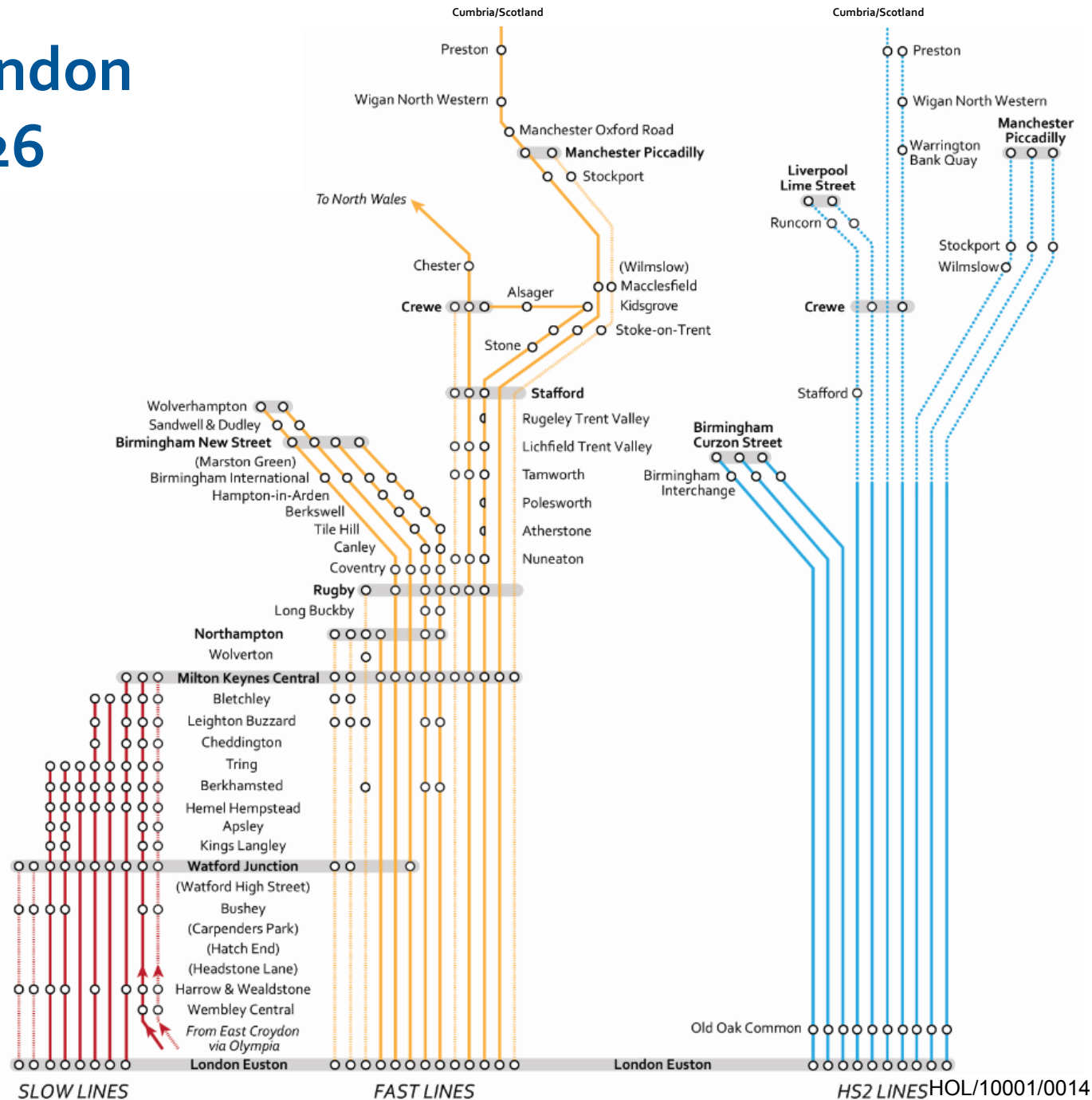
**WCML Timetable December 2014**  
London passenger services  
Weekday Peak Hour (17.00 – 18.00)



# Indicative London services – 2026

- Slow line services
- - - - Slow line services (peak)
- Fast line services
- - - - Fast line services (peak)
- HS2 services
- - - - HS2 services on West Coast Main Line
- Station stop
- Station stop (less than one per hour)

- Service specification is for modelling purposes only.
- Diagram is a simplification of actual modelled services for presentation.



# International experience and design principles

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The first high speed rail (HSR) line was opened in 1964

## The Tokaido Shinkansen

- (lit. “new transport system”)
- Tokyo to Shin-Osaka (515km – 320 miles)

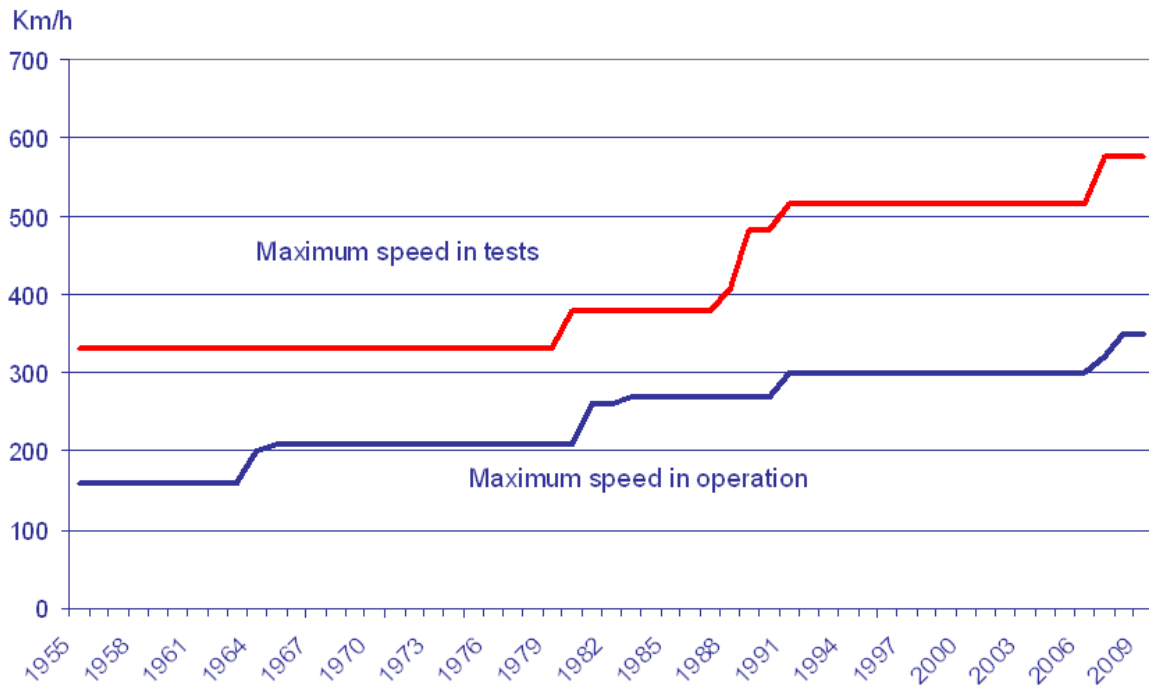
## It established some key HSR characteristics

- New line not constrained by historic limitations
- Dedicated to inter-city passenger traffic – not mixed traffic railway
- Very high capacity
- Very high reliability
- Bringing cities “closer together” through much reduced journey times

- Note: HSR is now defined as lines operating at 250km/h (155mph) or higher



# HSR has developed over half a century

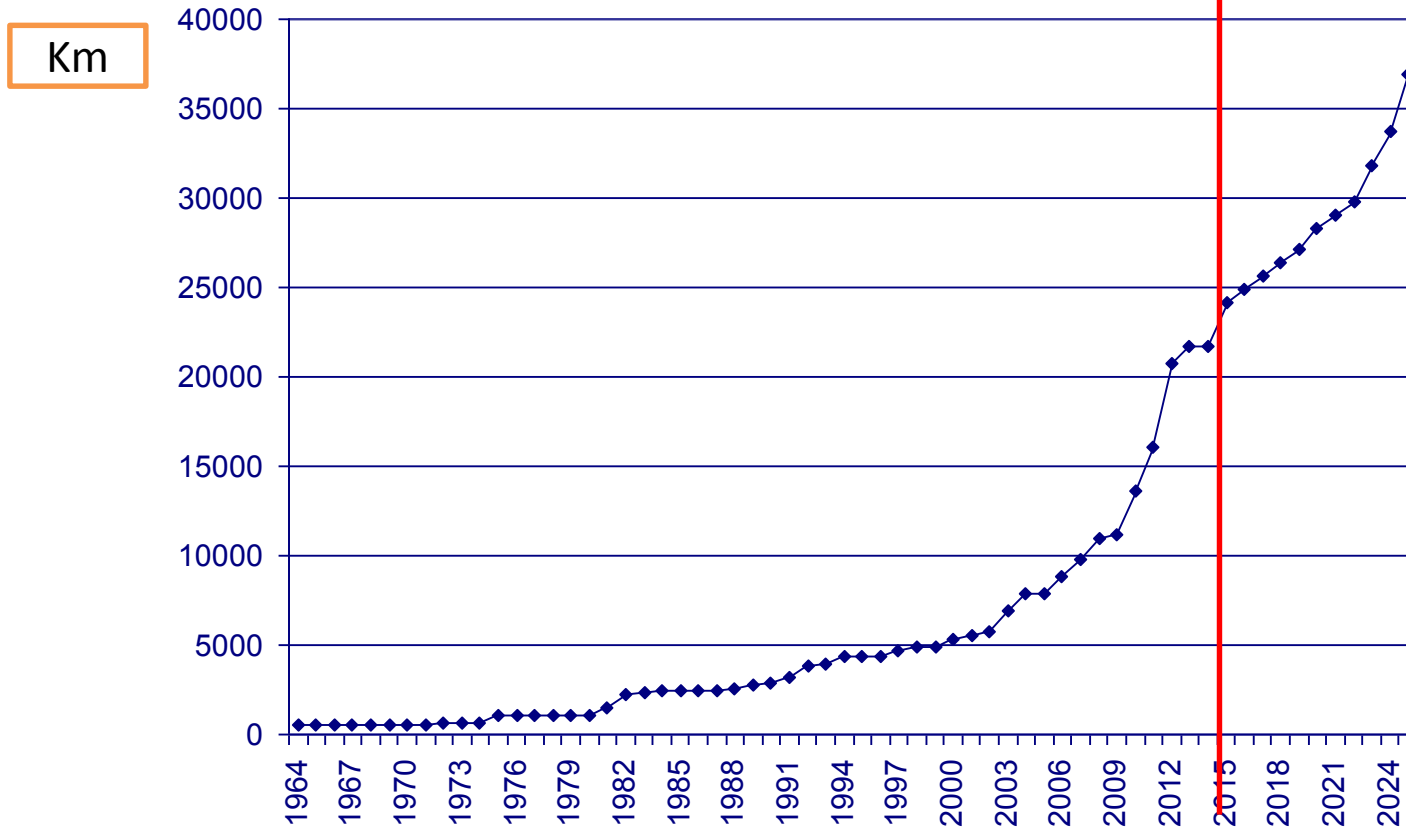


Proven systems and technologies

Continuing improvements

HS2 will use latest technologies to internationally accepted standards

# HSR is being adopted across much of the world





# Shorter distance services have been most successful

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## Example of Paris – Brussels Thalys service

- similar distance as London – Leeds or Manchester
- Journey time reduced from 2 ½ hours to 1 ½ hours
- Rail share of market doubled
- Car share reduced by 1/3
- Air marginalised



# Station and route selection

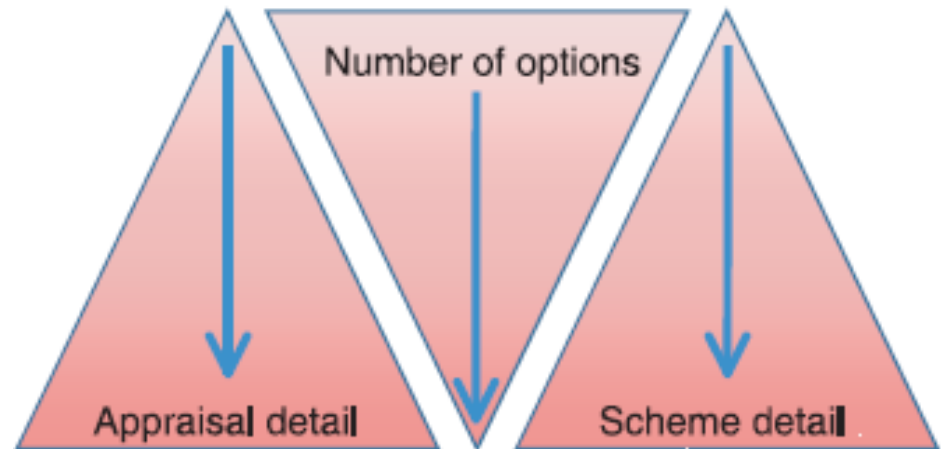
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# Station and route selection

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Selection criteria included:

- Strategic fit
- Demand
- Operational feasibility
- Environment
- Cost
- Regeneration
- Other relevant factors



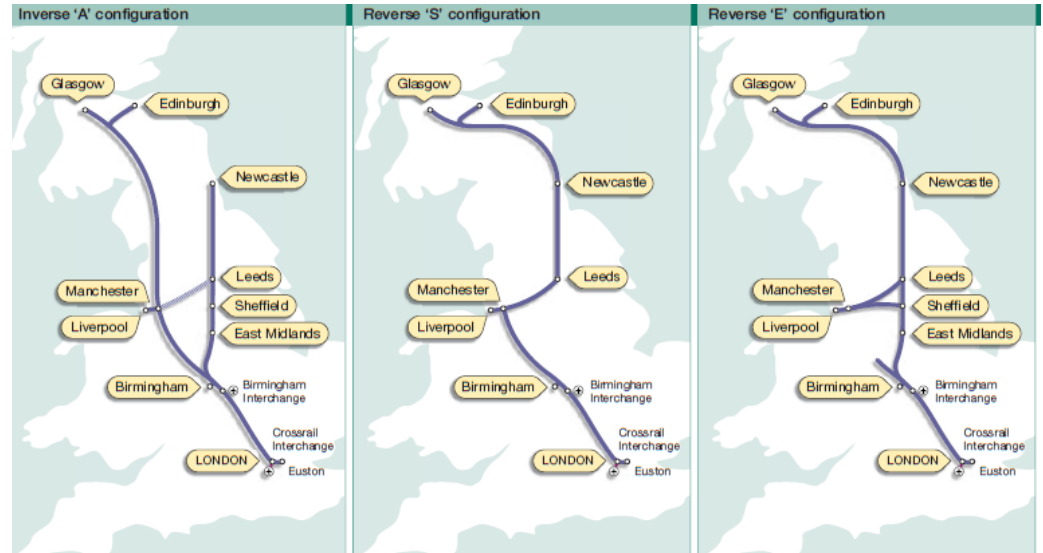
As options were narrowed down, the level of design and appraisal detail increased

# Evolution of the proposals

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<b>December 2009</b>	HS2 Ltd reported initial proposals to Government
<b>March 2010</b>	Government announced initial preferred route subject to further work
<b>February-July 2011</b>	National public consultation
<b>January 2012</b>	Government announced post consultation route
<b>May-July 2013</b>	National public consultation on Draft Environmental Statement and Route refinements
<b>November 2013</b>	High Speed Rail Phase One Bill deposited
<b>June 2014 – Feb 2016</b>	House of Commons Select Committee hearings

# The "Y" network



Strategic options were considered before the "Y" network was selected

# Four Phase One stations

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Birmingham

West Midlands

West London/Heathrow

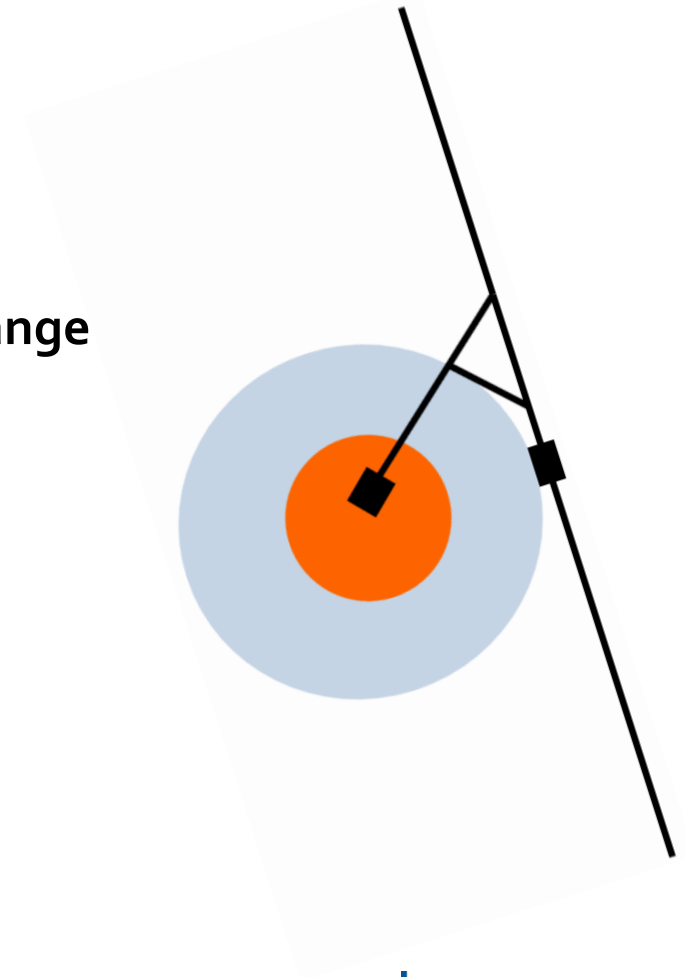
London

**Curzon Street**

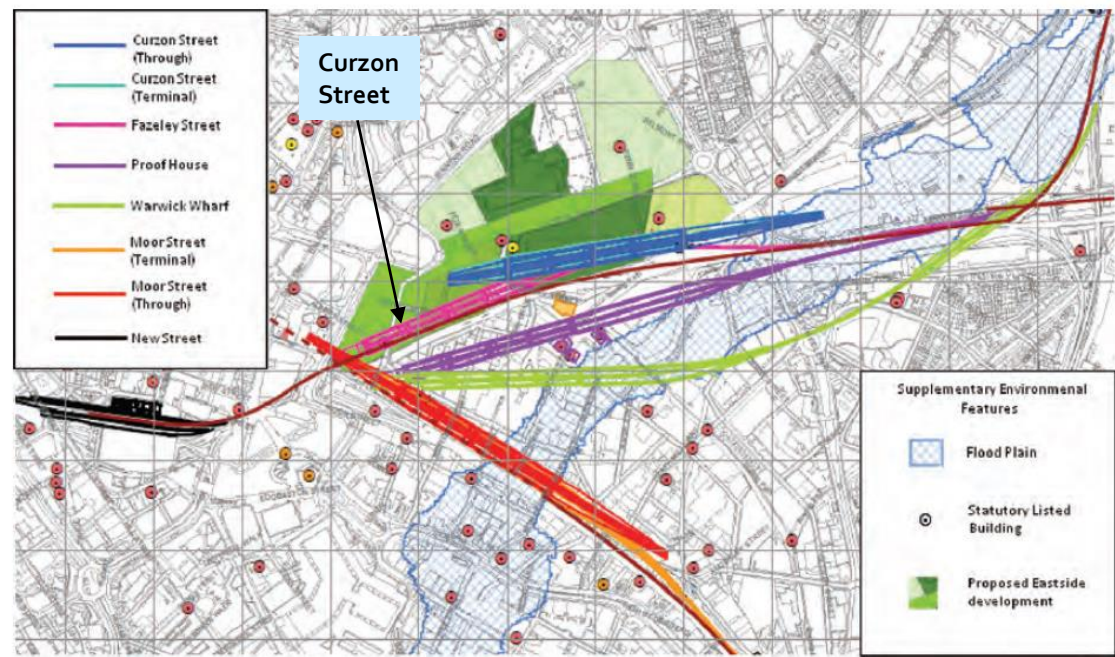
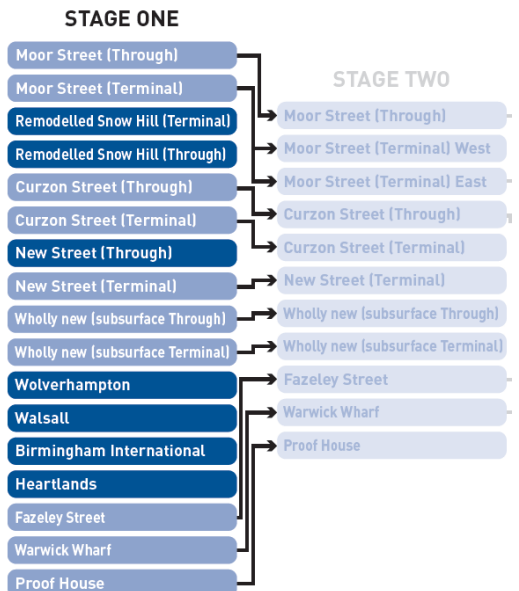
**Birmingham Interchange**

**Old Oak Common**

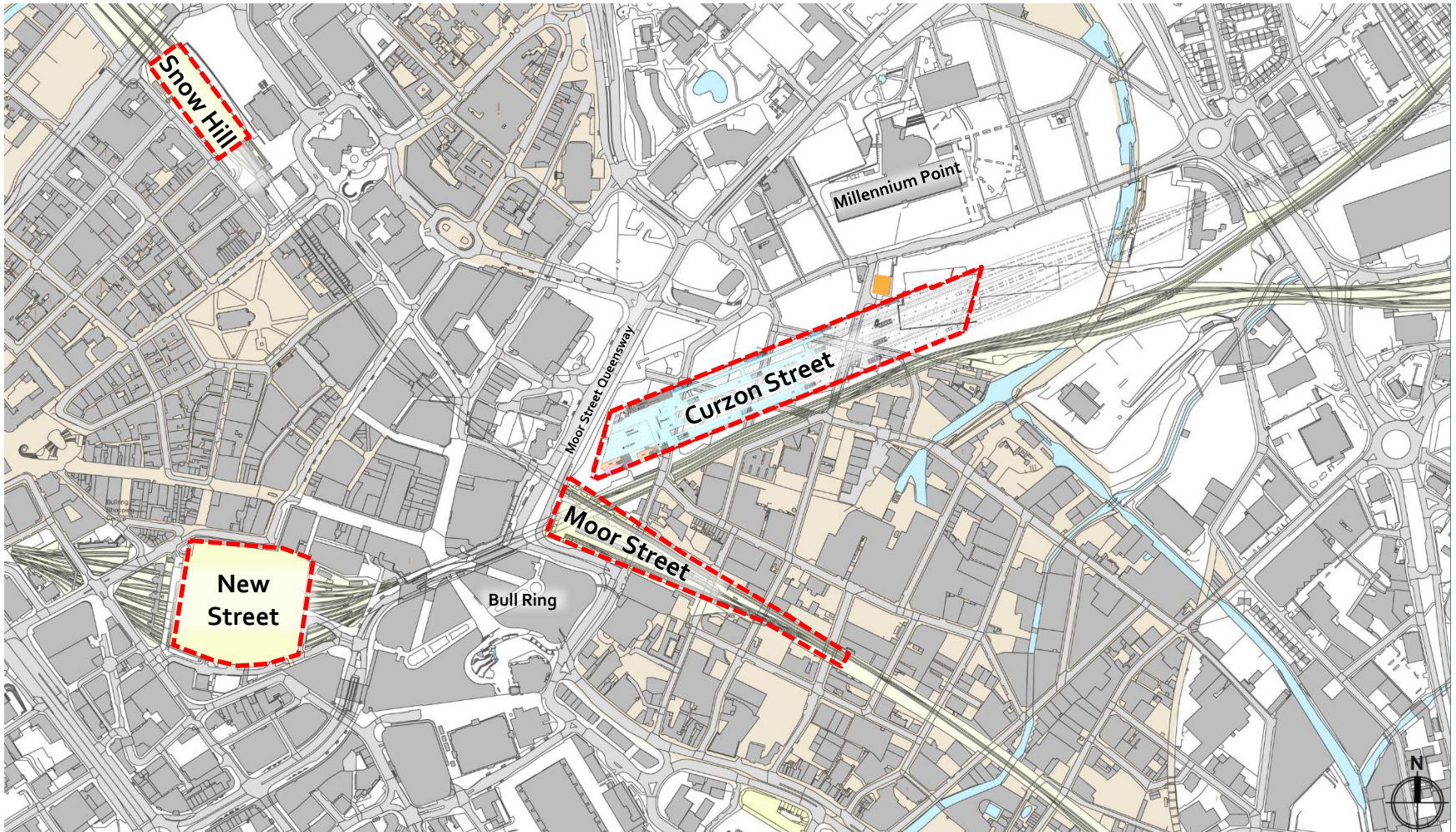
**Euston**



# Birmingham terminus



# Curzon Street Station



Next to Moor Street and 400m east of New Street



# Old Curzon Street Station

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
# Curzon Street station



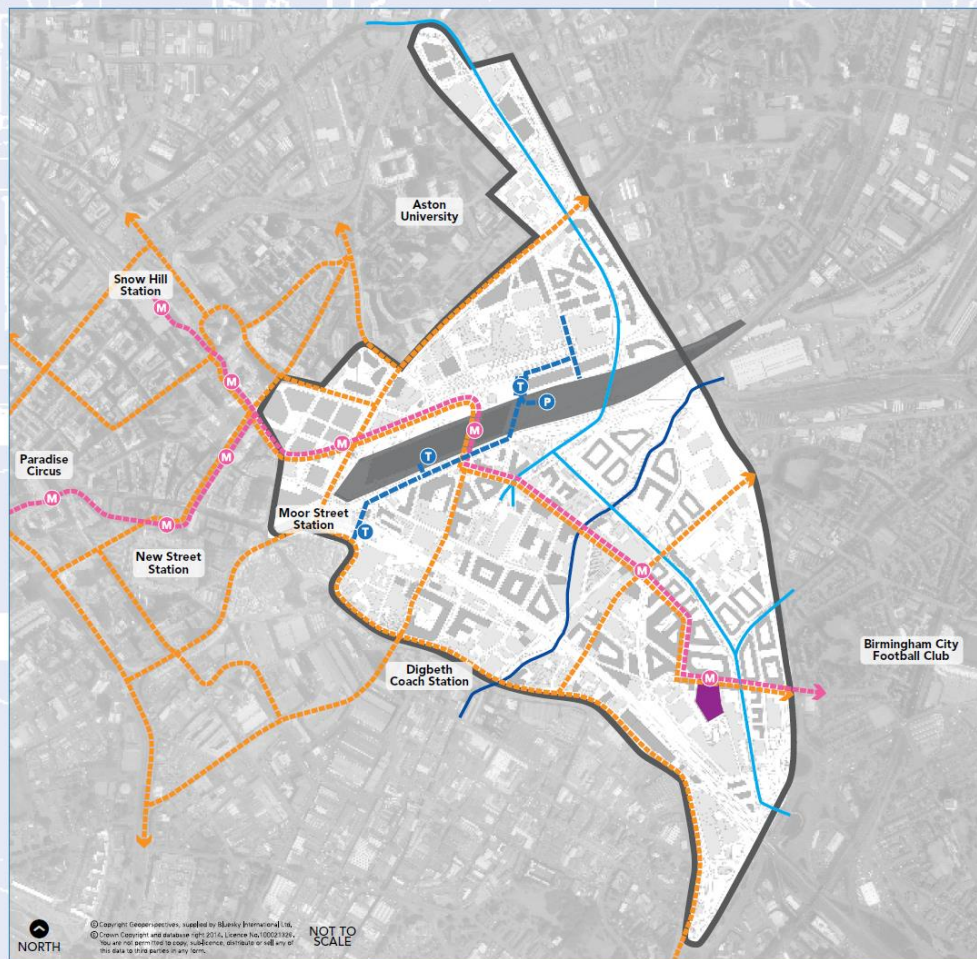
# Birmingham Curzon Masterplan

## Connectivity and regeneration potential

### PLAN 15 Birmingham Curzon Public Transport

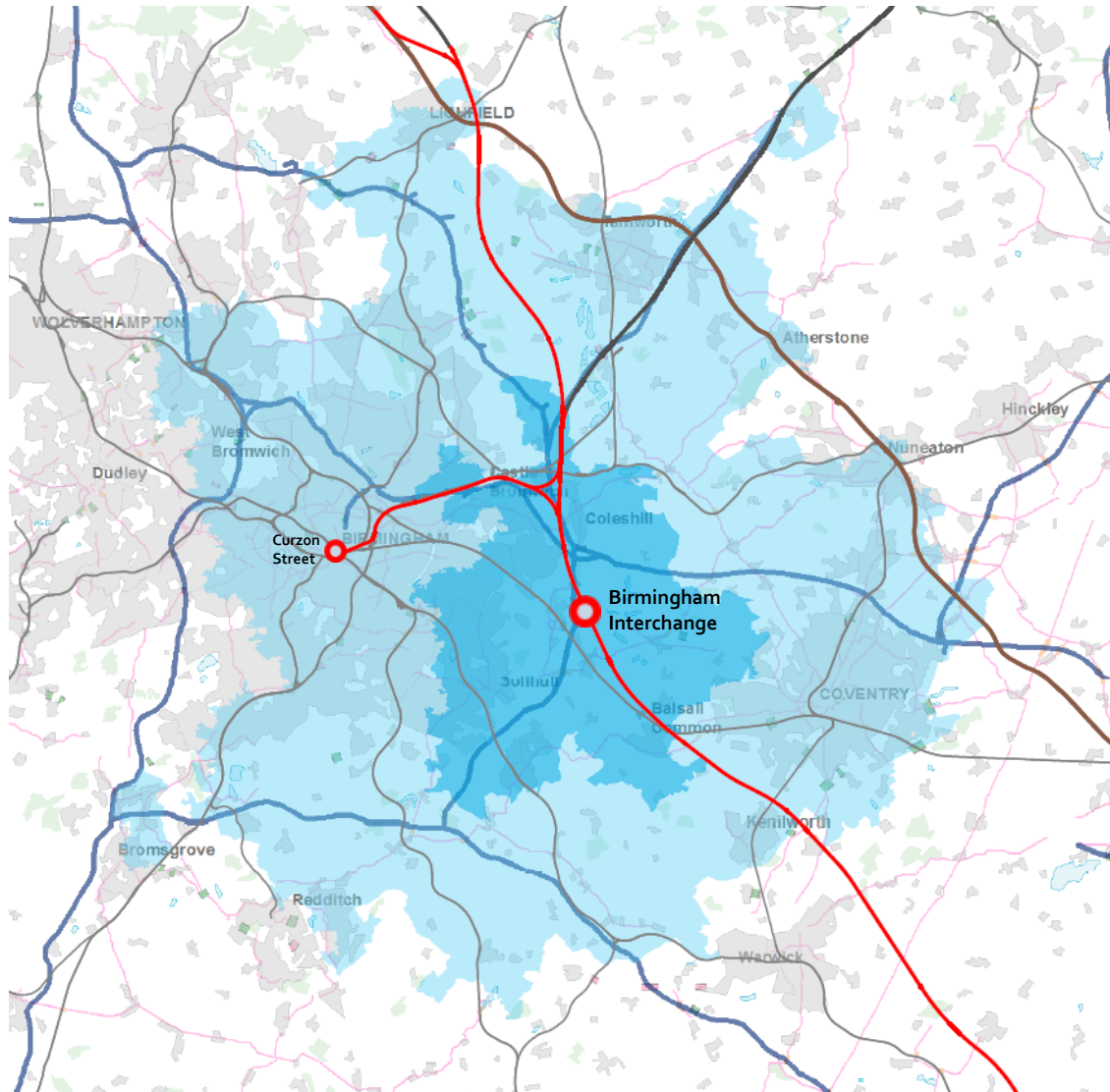
- KEY**
-  Masterplan boundary
  -  HS2 line and station
  -  New development block
  -  Metro extension/stop
  -  'Sprint'/bus route
  -  Taxi/service route
  -  Parking
  -  Taxi pick-up/drop-off
  -  Park and ride
  -  Canal
  -  River Rea

**Development potential**  
**36,000 jobs**  
**4,000 homes**



Source: Birmingham Curzon Masterplan, Birmingham City Council

# Birmingham Interchange catchment



Over 40% of West Midlands passengers will use Birmingham Interchange

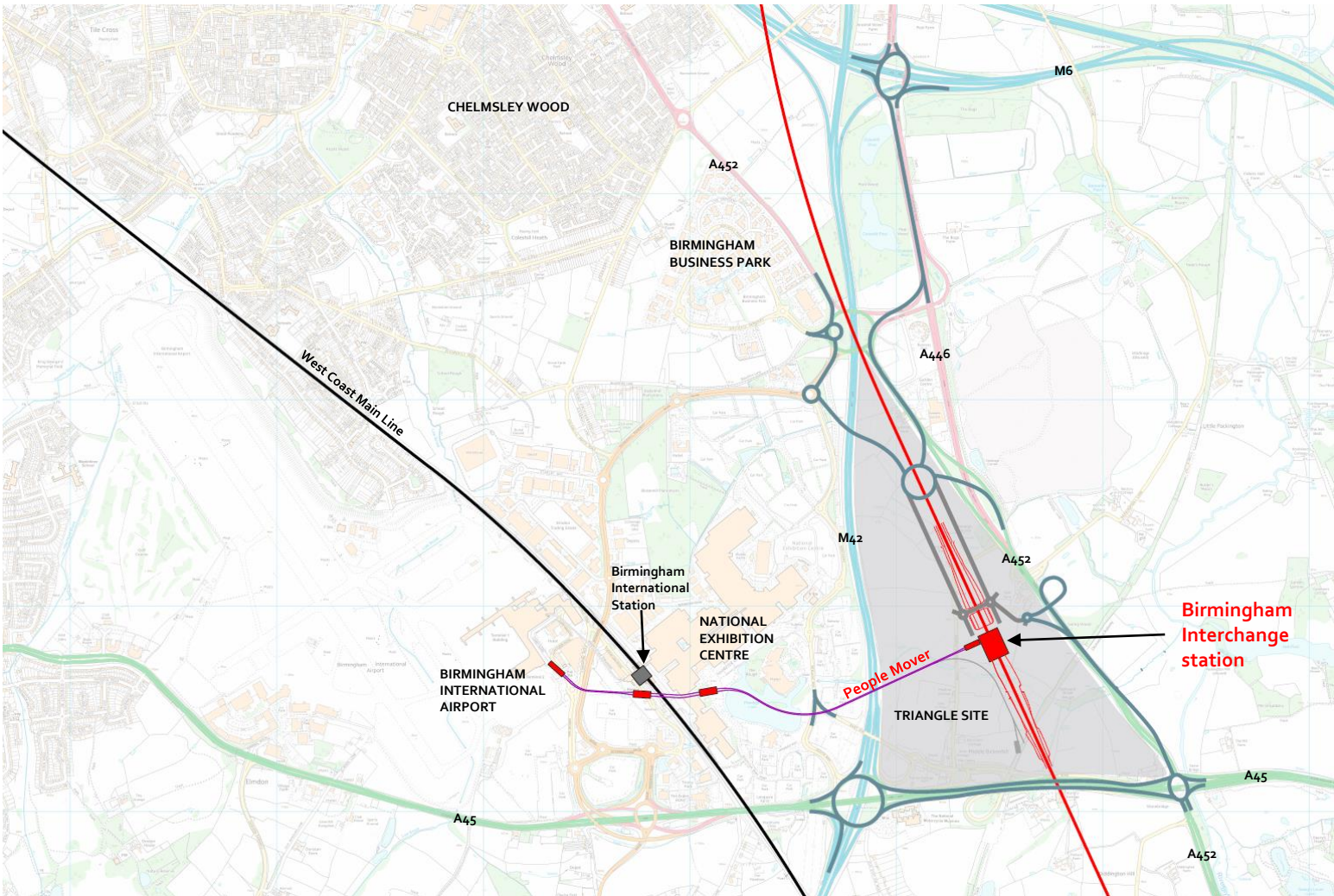
Within 10 mins free flow drive time



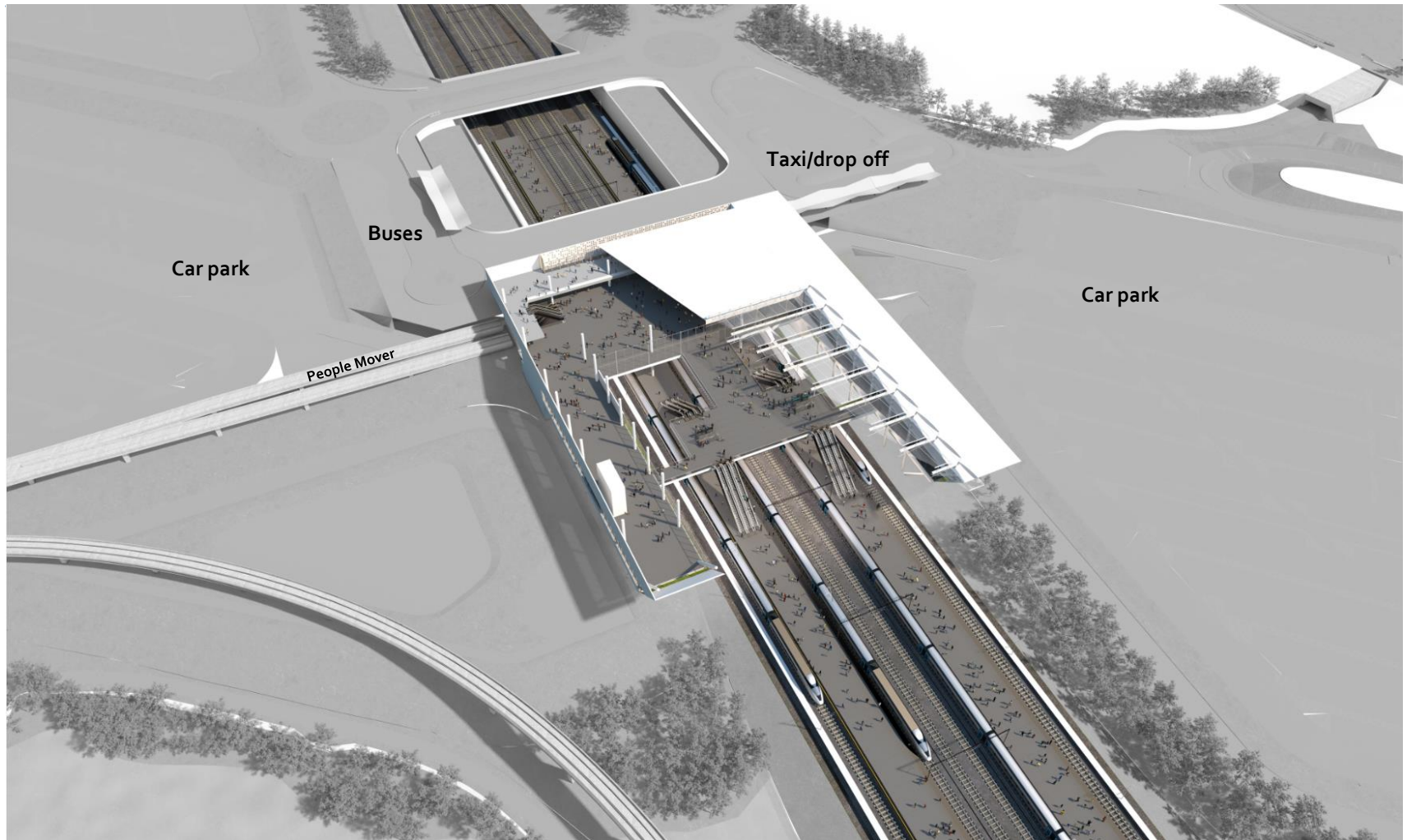
Within 20 mins free flow drive time



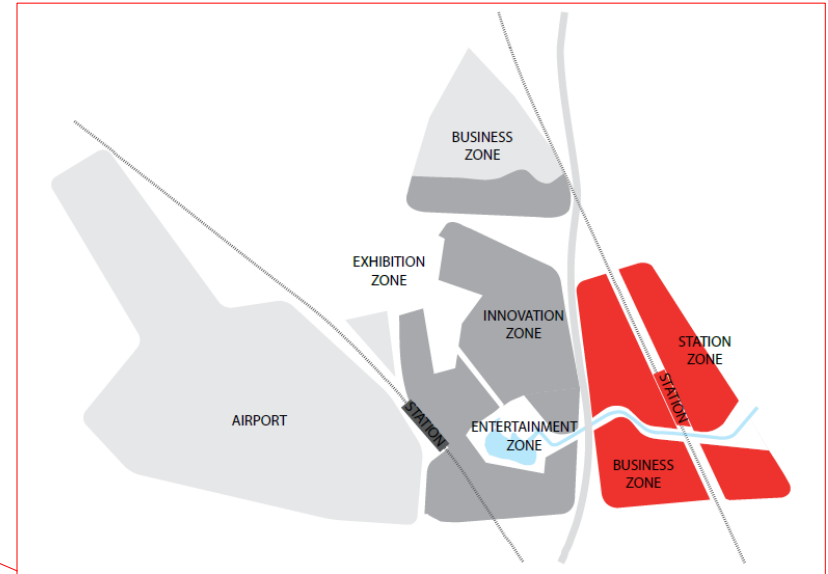
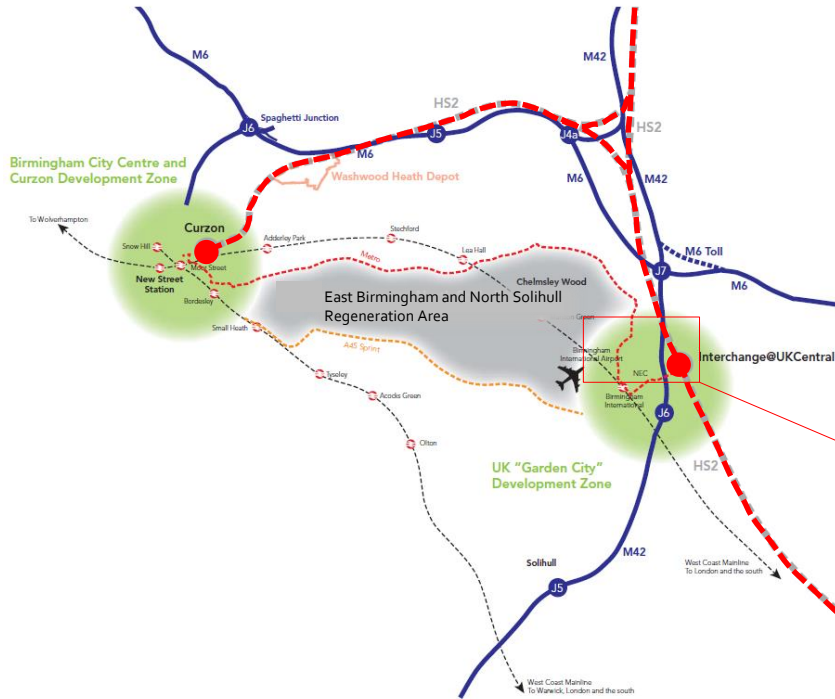
# Birmingham Interchange location



# Birmingham Interchange station



# UK Central regeneration



Midlands HS2 Growth Strategy estimates that the triangle site could provide:

- 16,500 Jobs
- 1,900 homes

Sources: The Midlands HS2 Growth Strategy, Greater Birmingham & Solihull LEP, July 2015  
M42 Economic Gateway Masterplan, Solihull MBC, June 2013

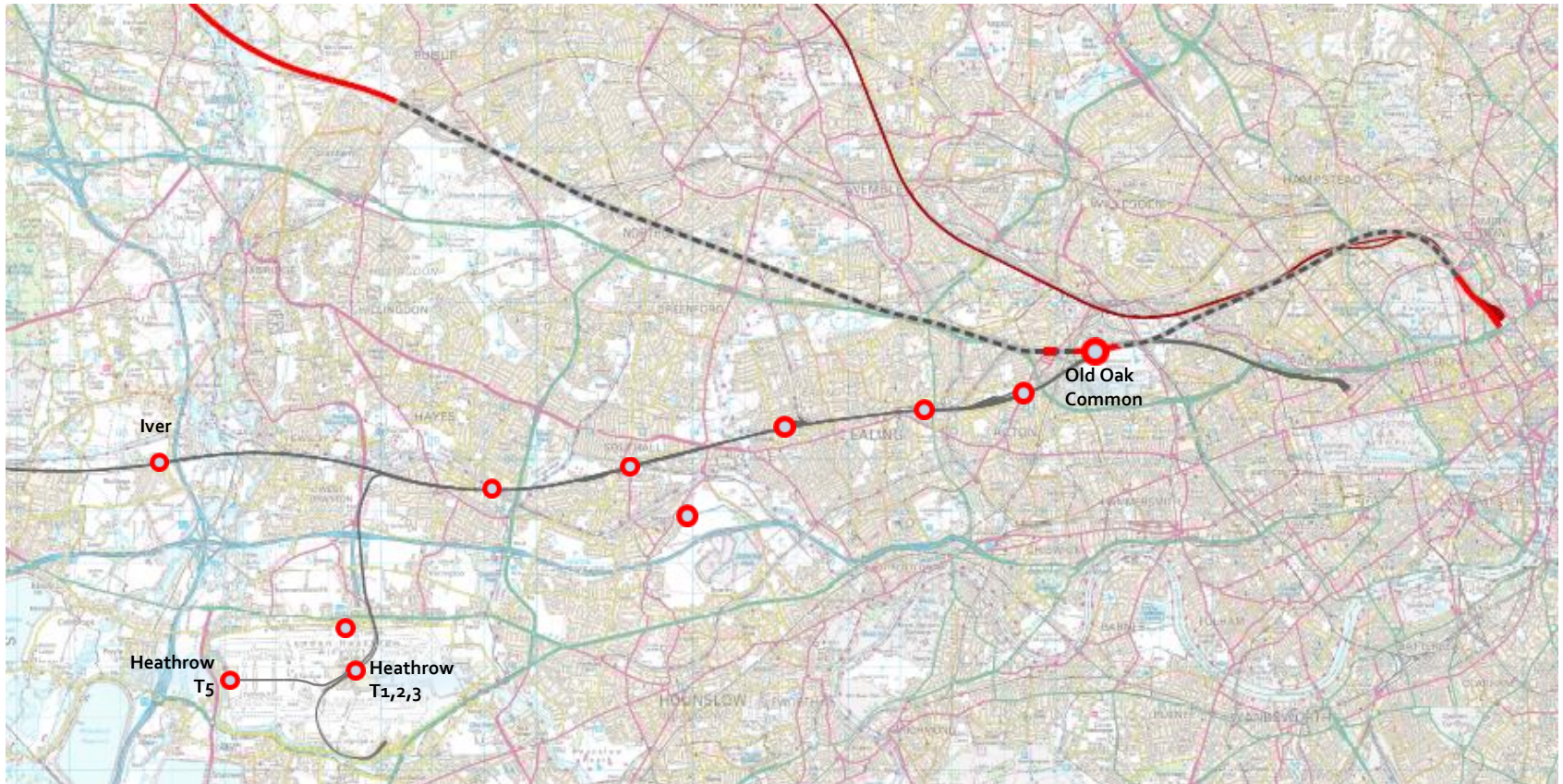
# London station options

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- 90% of HS2 London passengers will be travelling to, from or via central London
- 27 options for the London terminus
- 11 options for an interchange
- Terminus options included Euston and Old Oak Common without a second London station
- Best solution for both passengers and strategic objectives is the terminus at Euston and an interchange at Old Oak Common



# London interchange station options



2009-11 - Options for serving Heathrow and interchange with Crossrail/GWML including on airport locations and Iver

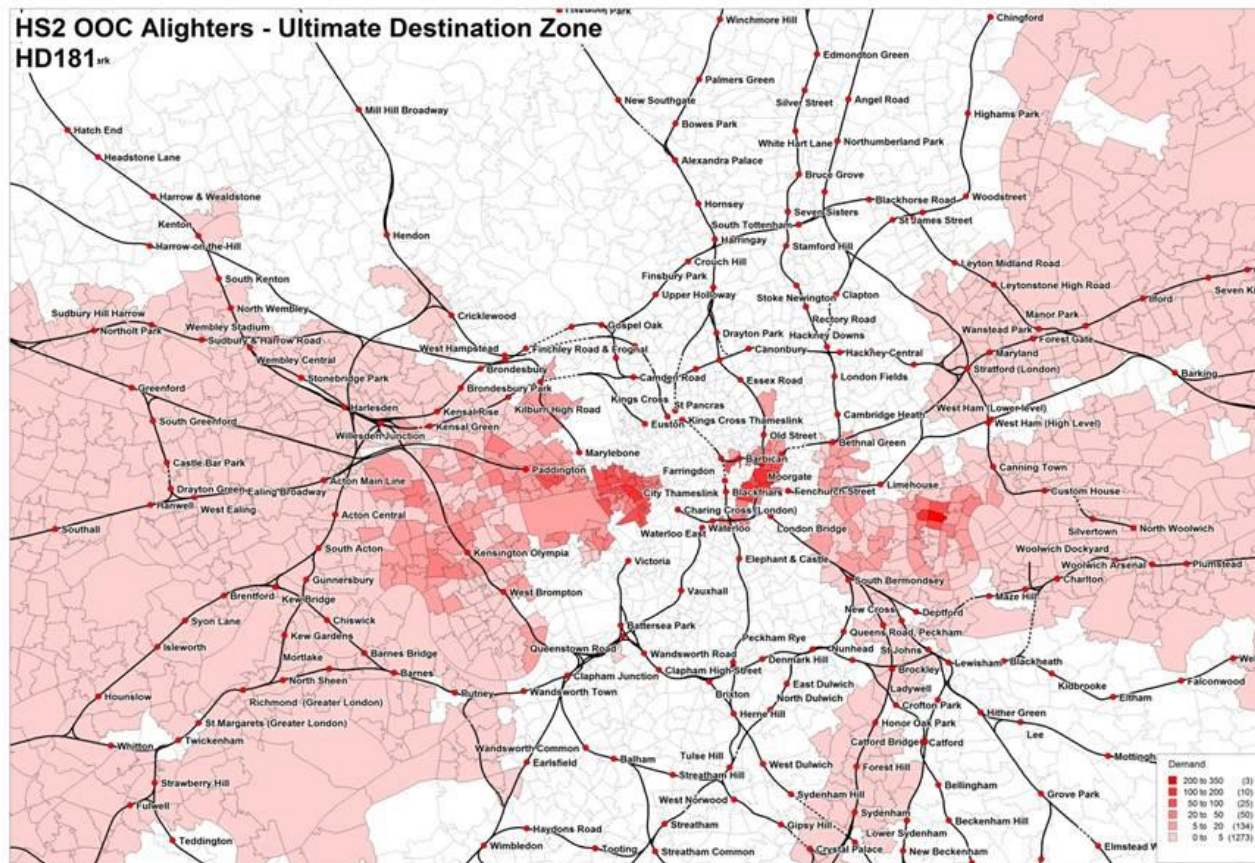
# Old Oak Common Station

---

Old Oak Common selected because it provides:

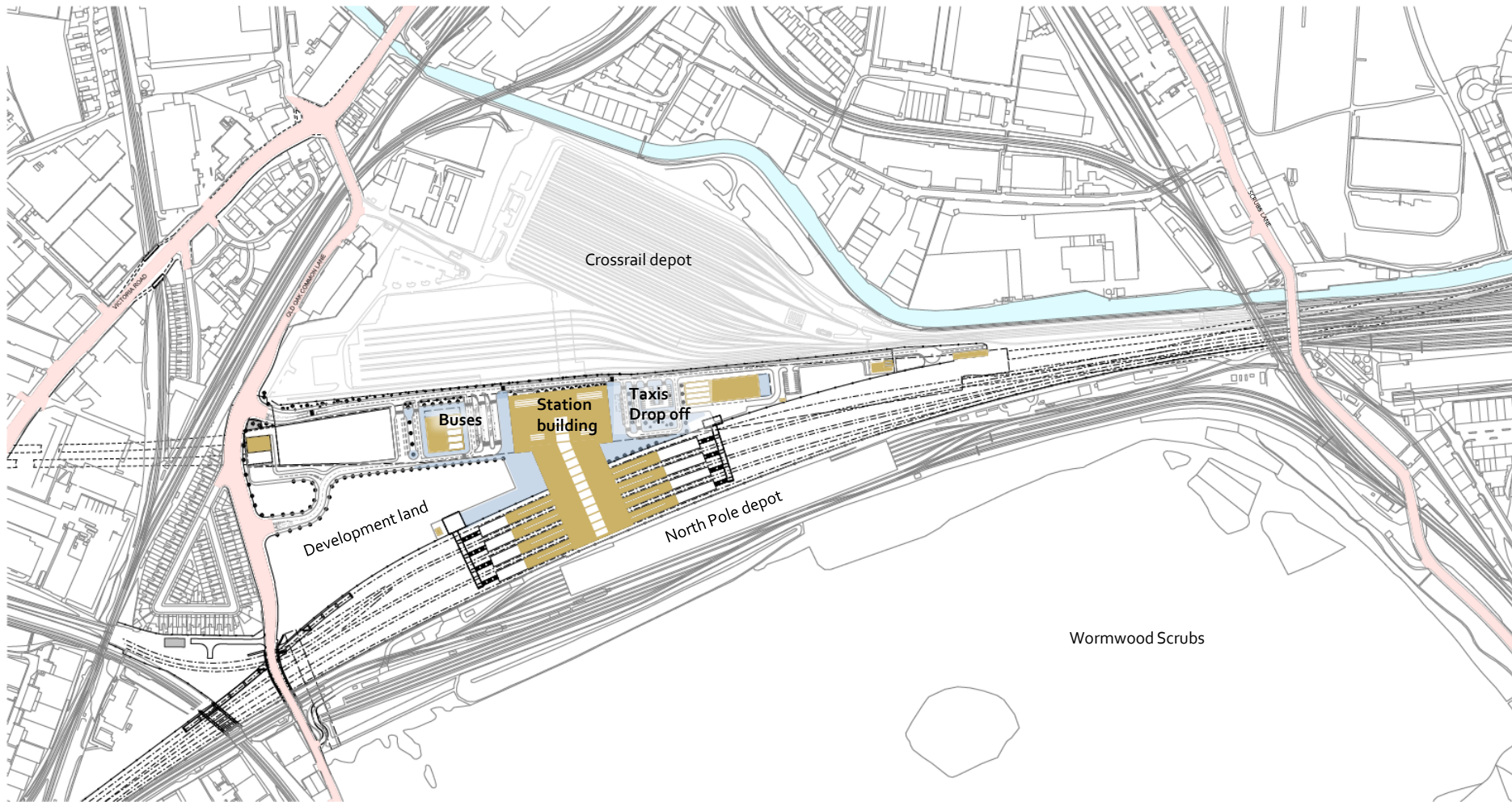
- Convenient access via Crossrail towards central London and Docklands
- Direct links to west London Heathrow terminals and Thames Valley
- Catalyst for regeneration

# Old Oak Common interchange

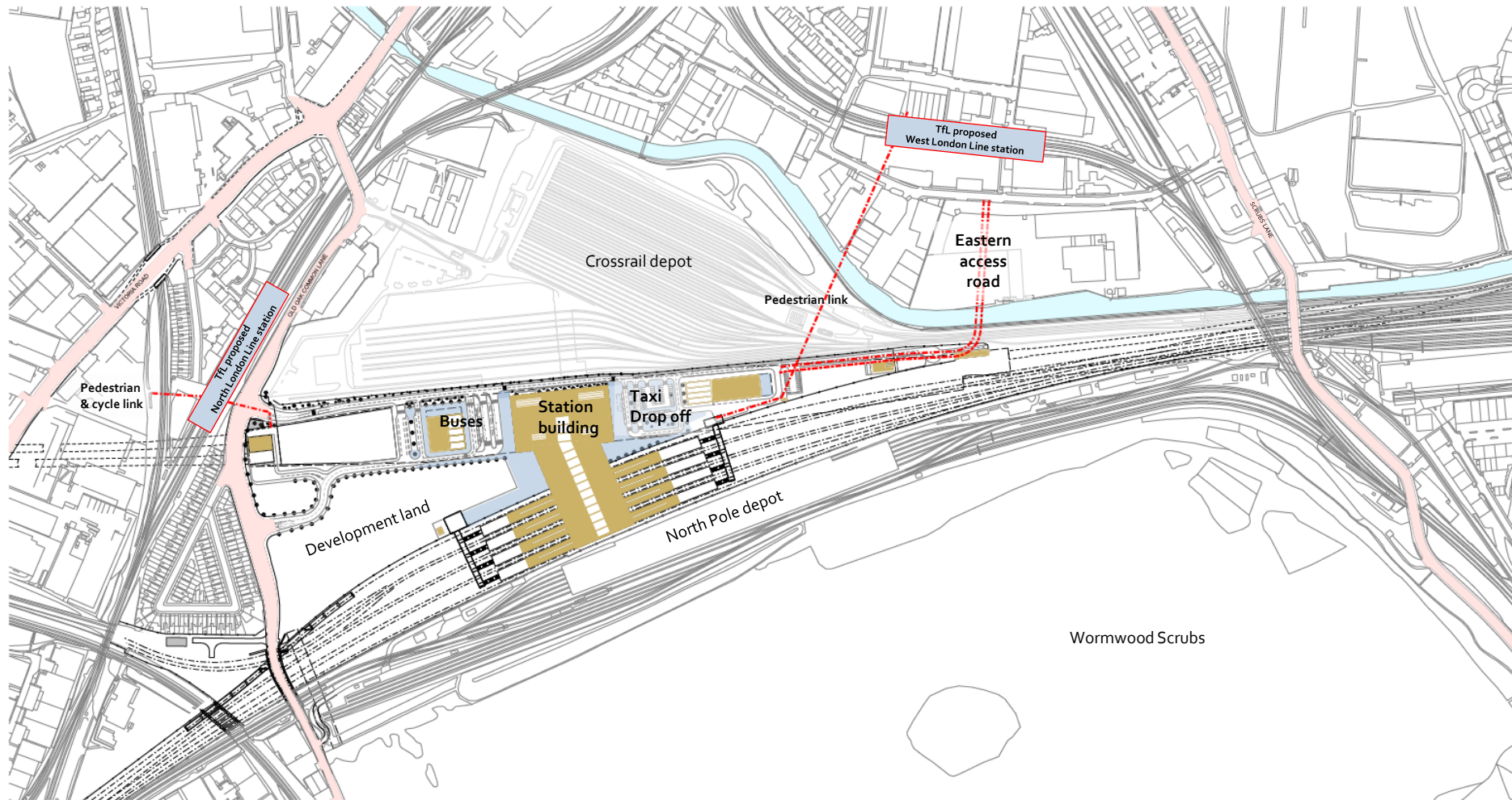


25-35% of HS2 passengers will use Old Oak Common rather than Euston mainly for destinations in east and west London

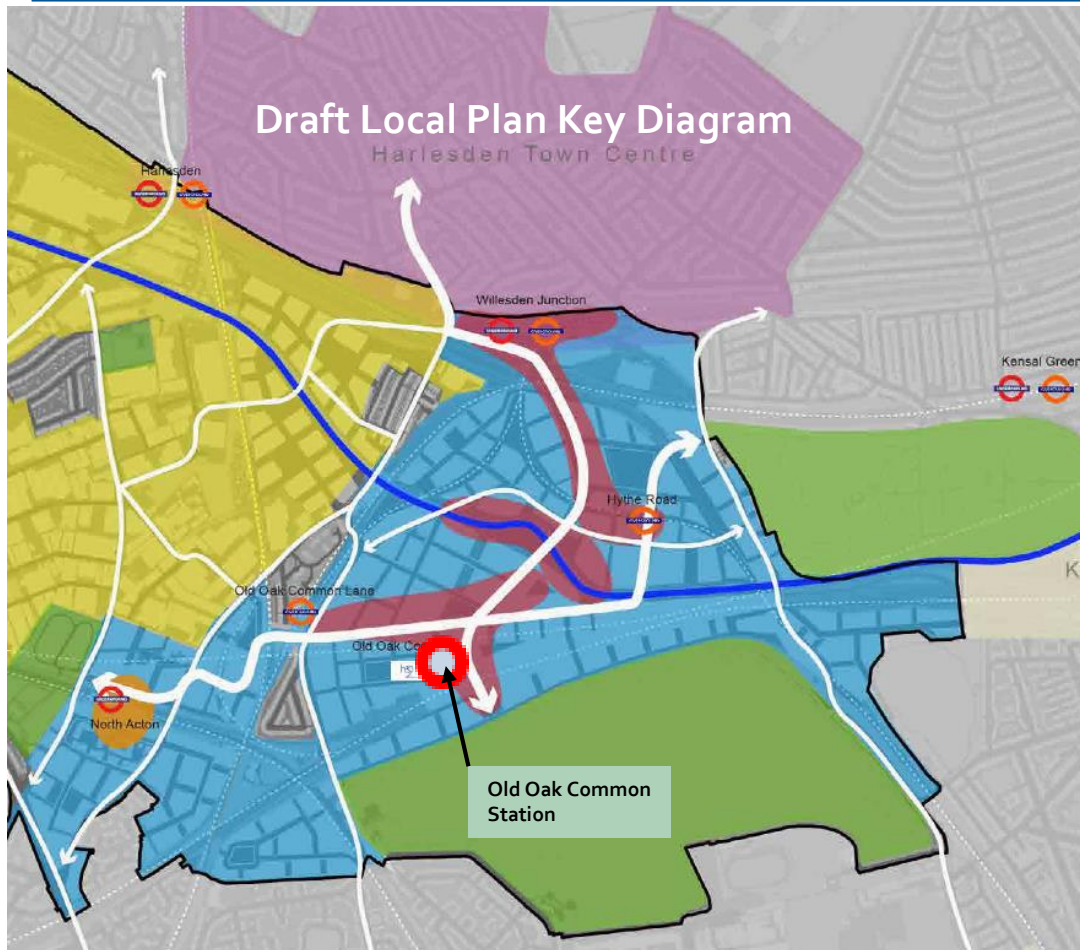
# Old Oak Common Station layout



# Old Oak Common provision for future links



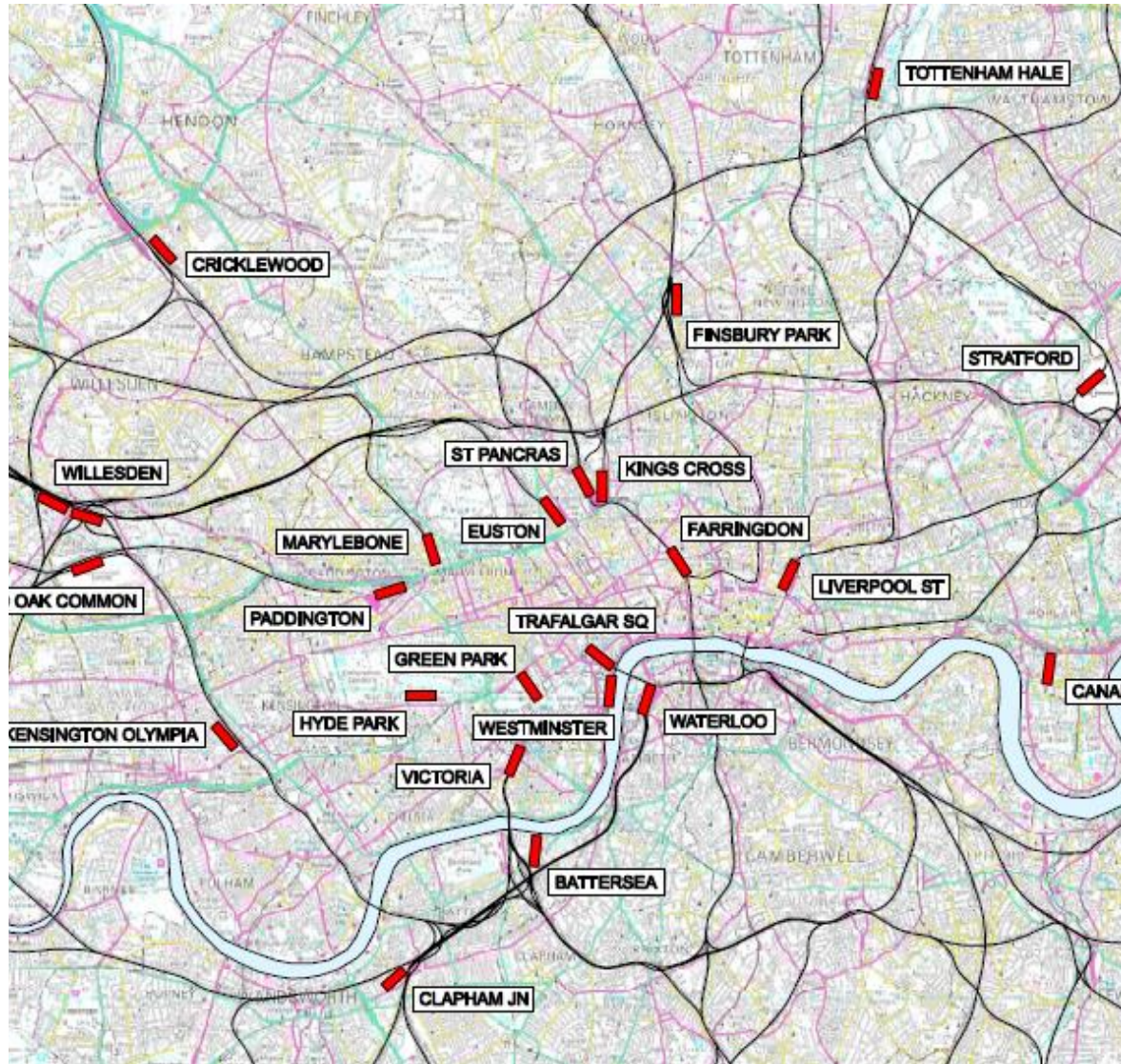
# Old Oak Common development proposals



- Industrial uses
- Mix of uses
- Old Oak High Street major centre
- Park Royal Centre & North Acton neighbourhood centres
- Other town centres outside of Old Oak and Park Royal
- Existing public open space
- Opportunity Areas
- Harlesden Town Centre
- Housing Zones
- Main Routes

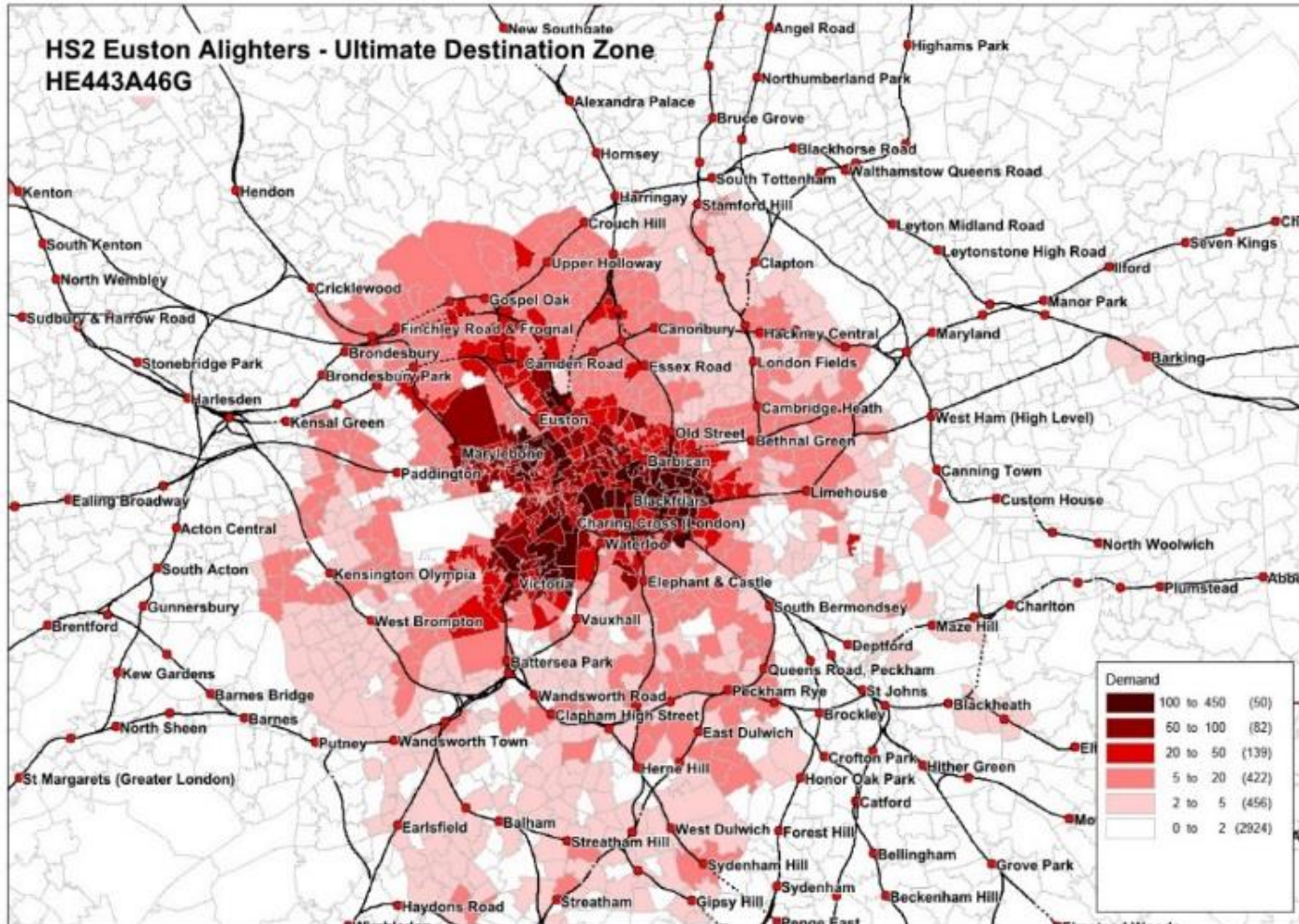
London Plan proposes :  
55,000 jobs  
24,000 homes  
complementary and  
supporting uses

# London terminus options



# Euston passenger destinations

Destinations of HS2 passengers interchanging at Euston





# Euston Station interchange capacity

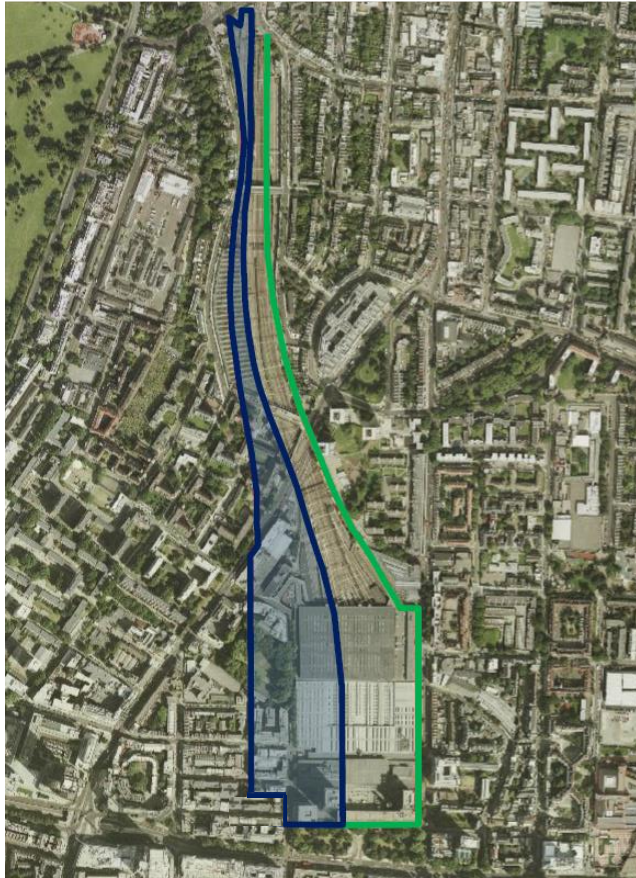
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Passenger demand into Euston in the a.m. peak period is predicted to grow:

2012	25,000
2026	42,000
2041	61,000

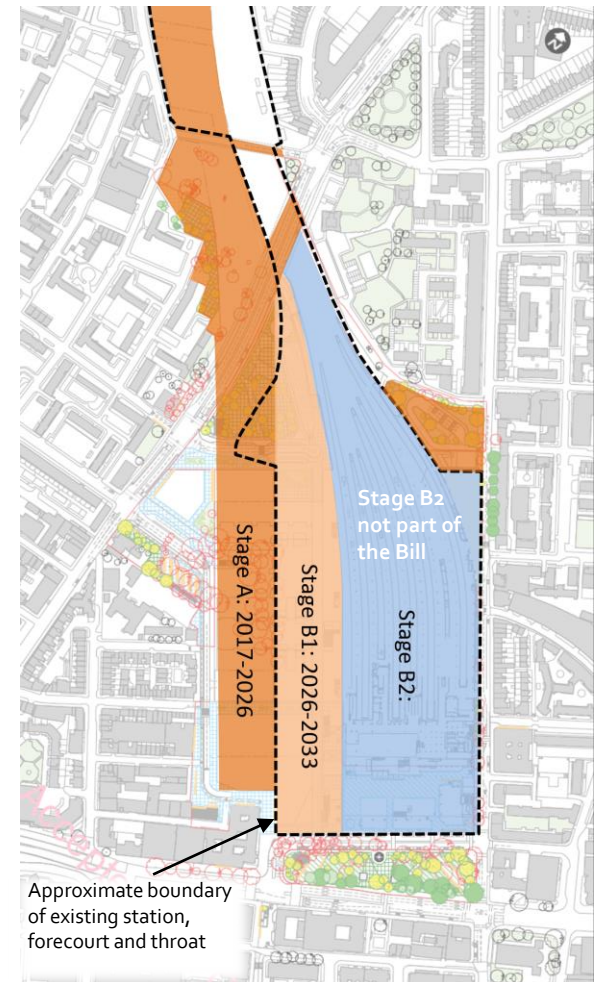
Due to underlying travel growth, increases in London's population and employment, attraction of passengers from MML (St.Pancras) and ECML (Kings Cross).

# Euston Station footprint



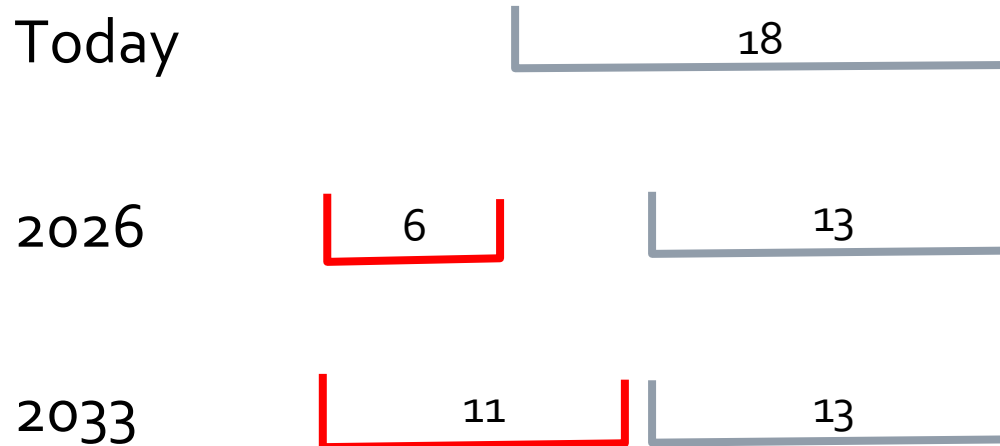
Half the HS2 platforms can be accommodated within the existing footprint

Staged approach to implementation



# Euston station platform requirement

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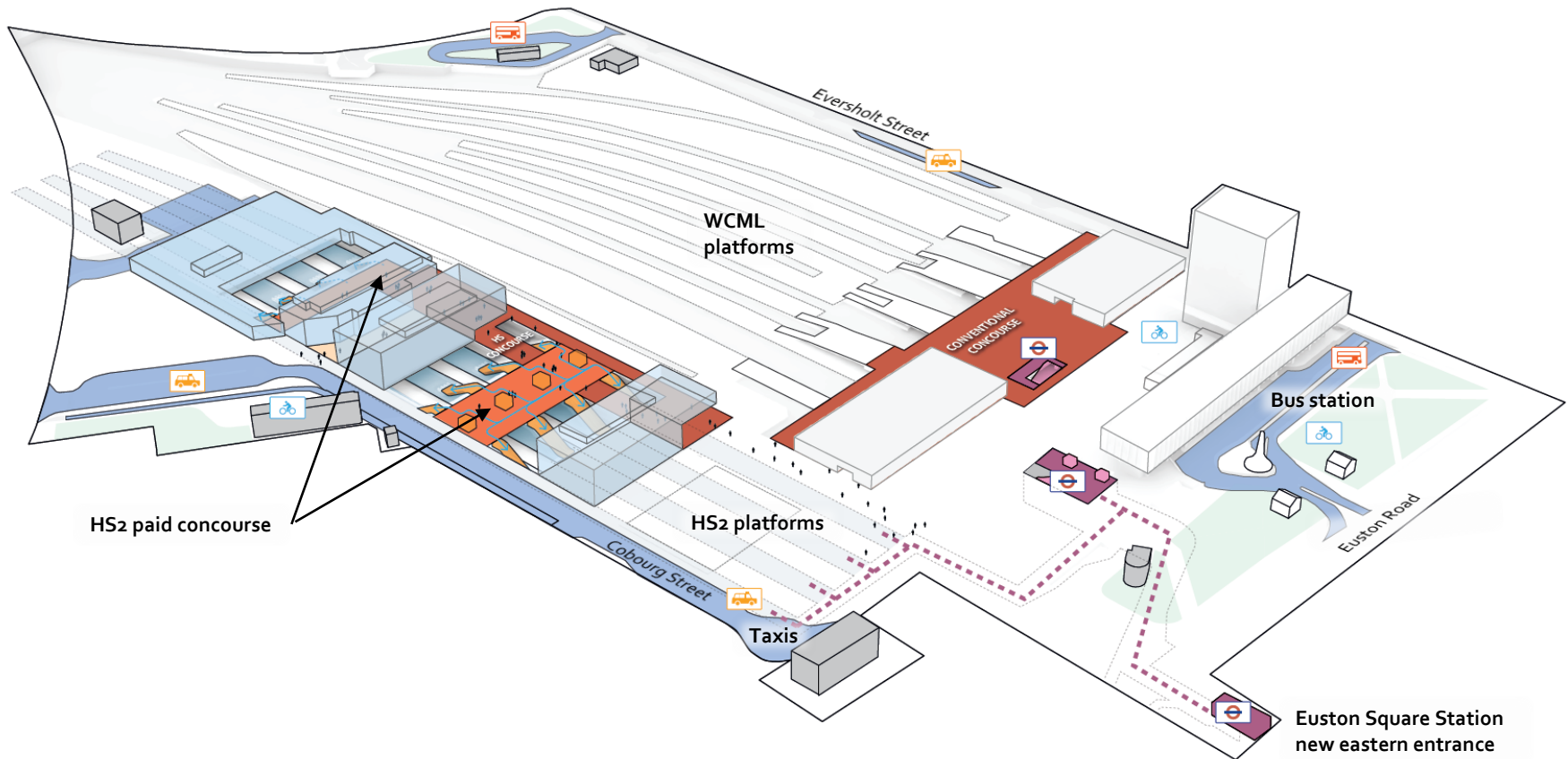


18 WCML platforms will be provided during construction

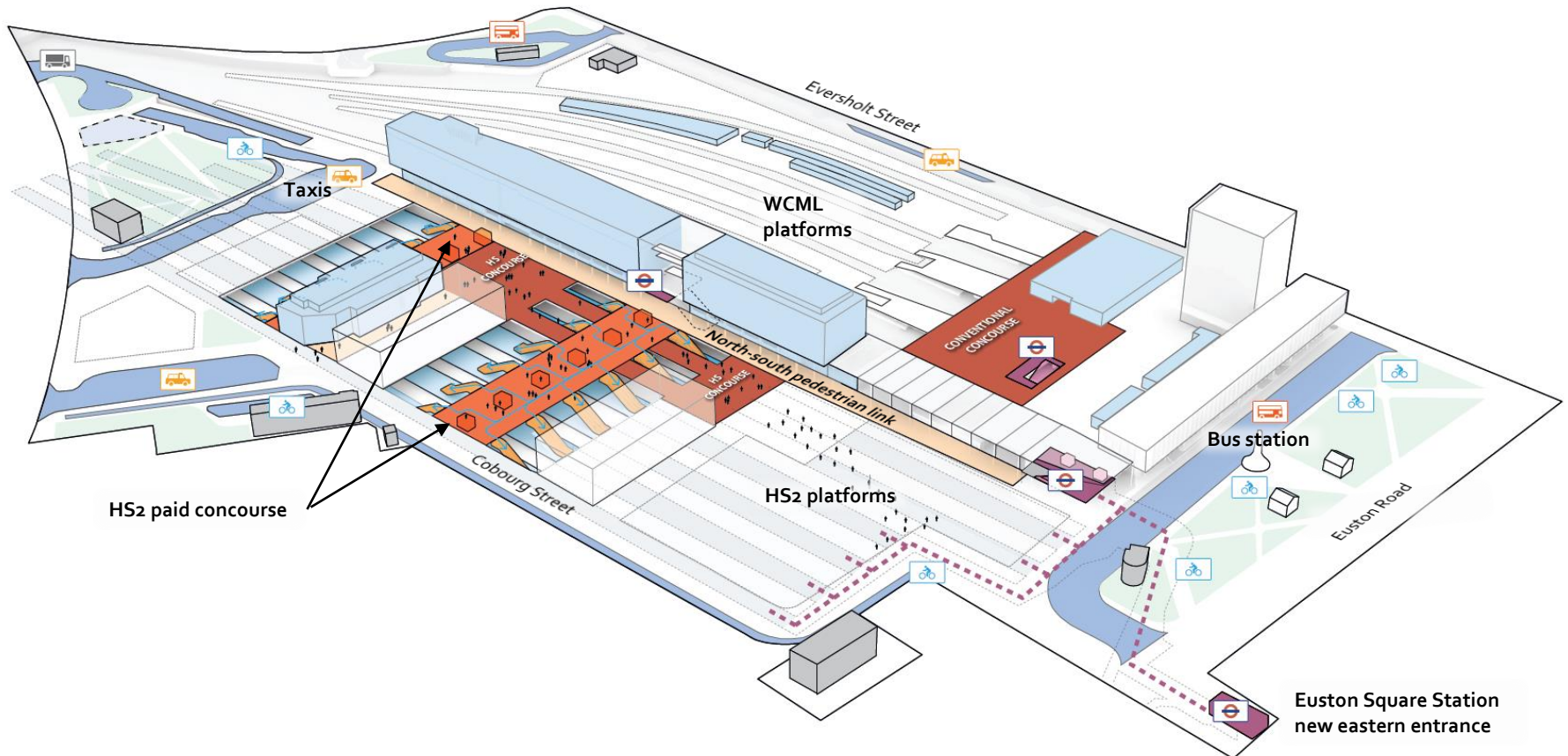
13 WCML platforms needed post 2026

HS2 will require 400m platforms – six for Phase One and eleven for Phase 2

# Euston Stage A layout 2026



# Euston Stage B1 layout 2033



# Euston connections

---

Onward mode share (a.m. peak period %)	2010	2026	2041 (excluding Crossrail 2)
Underground	60	65	67
Bus	20	20	20
Taxi	3	3	2
Cycle	2	3	3
Walk	10	8	7
Local rail	5	2	2

Victoria Line

Two Northern Line branches

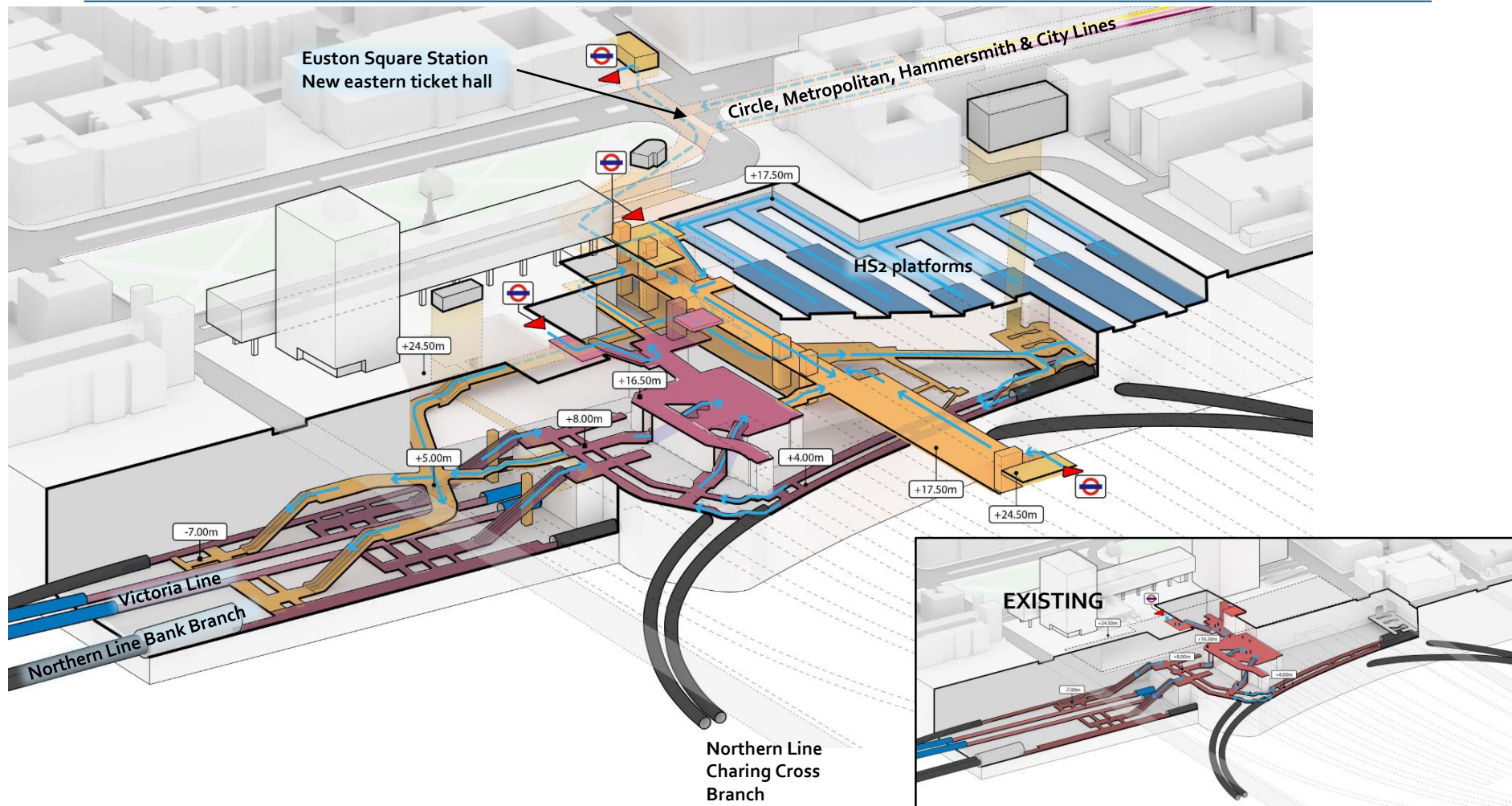
Metropolitan, Hammersmith & City and Circle

Close proximity to St Pancras and Kings Cross

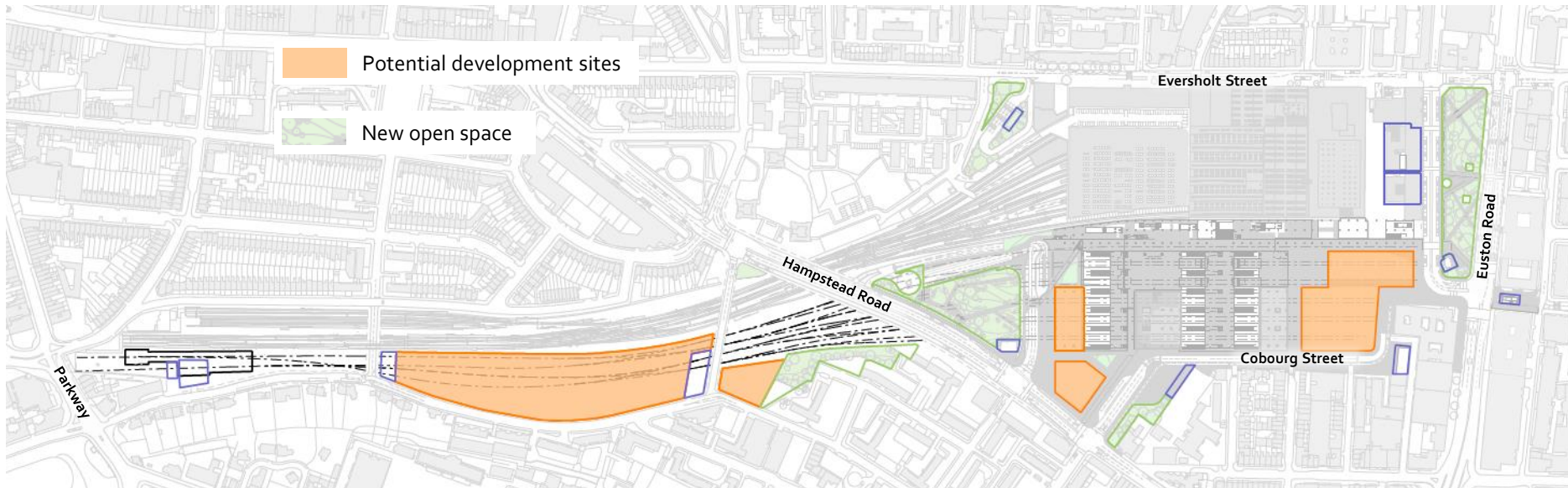
Thirteen bus routes

Central London taxi and rental bikes

# London Underground interchange Stage B1



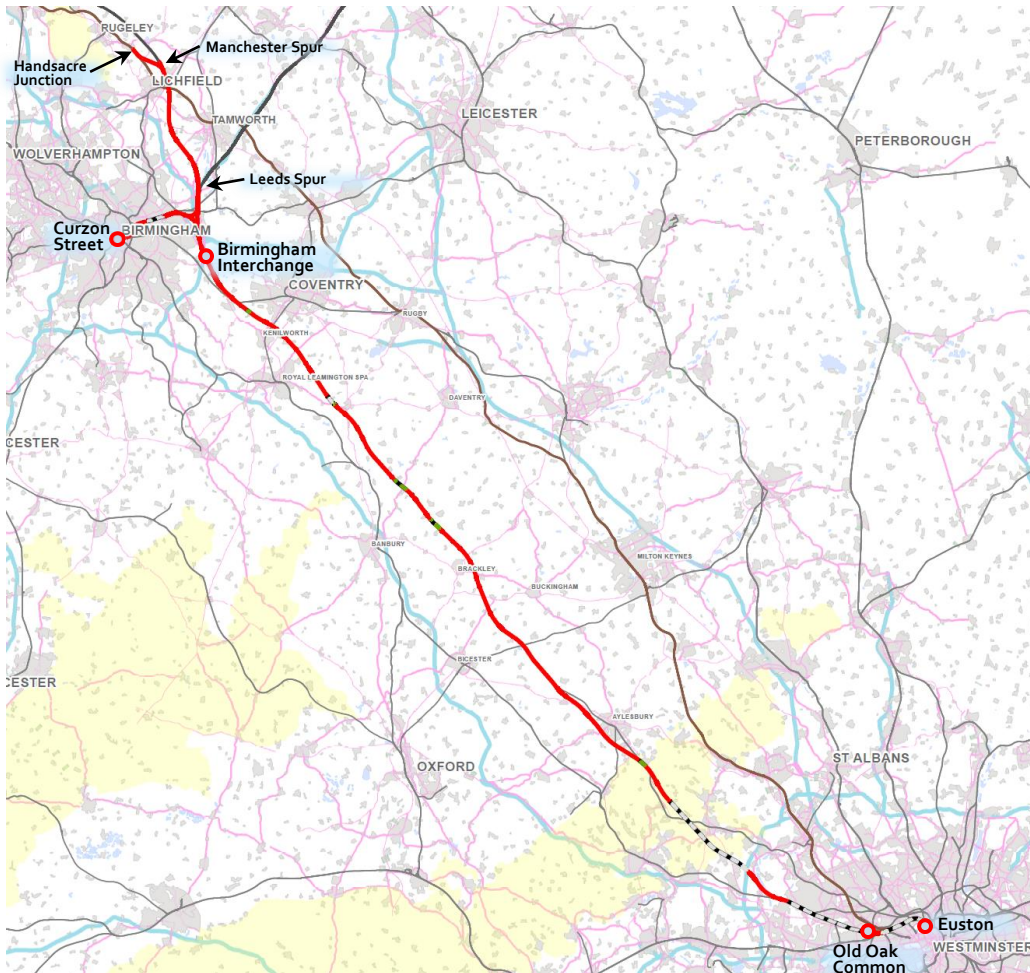
# Potential development sites





# Route sections

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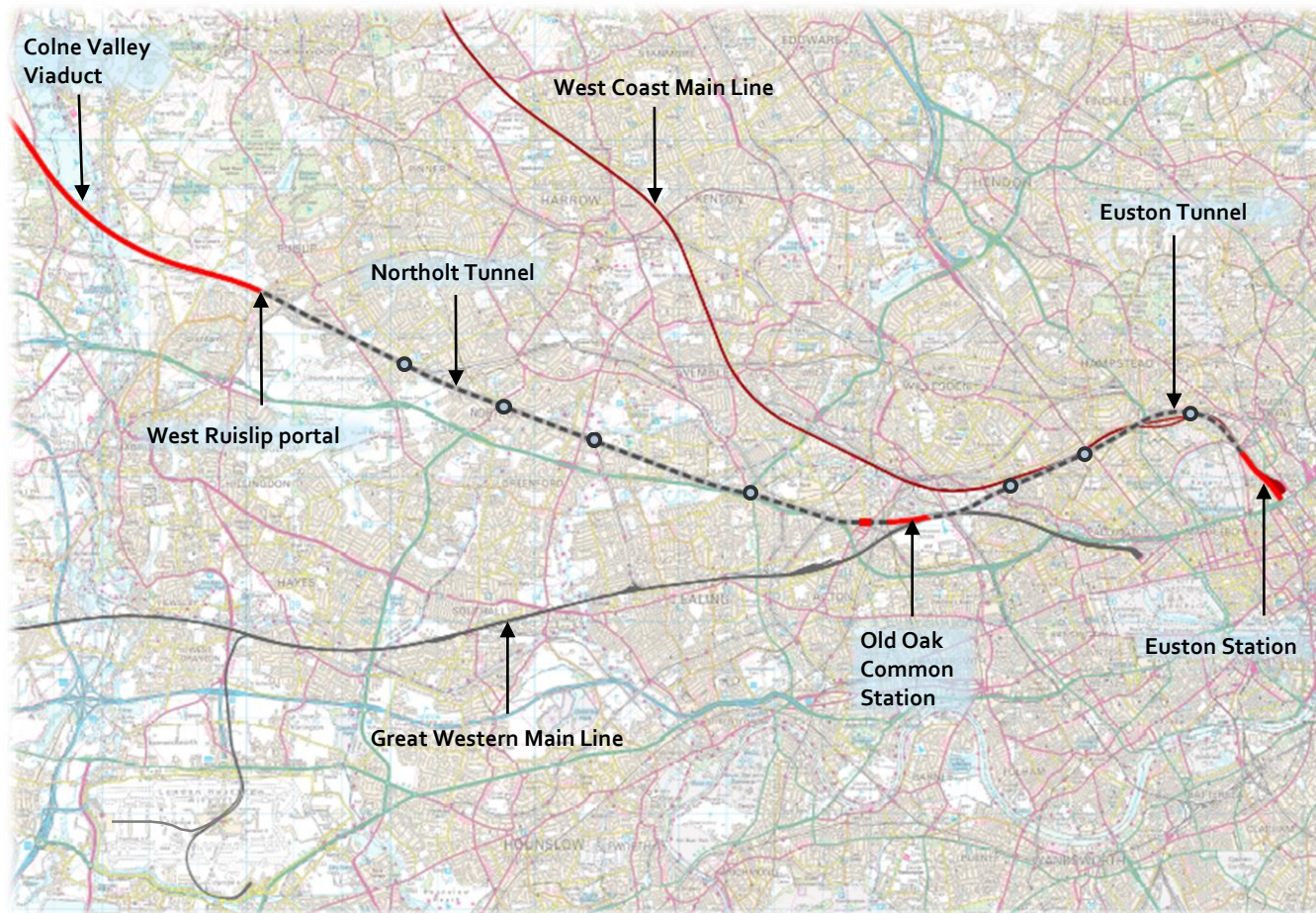
London

Ruislip to Birmingham Interchange

Interchange to Handsacre

Interchange to Curzon Street

# London



**Euston Tunnel**  
Camden Town to  
Old Oak Common

7.4 km

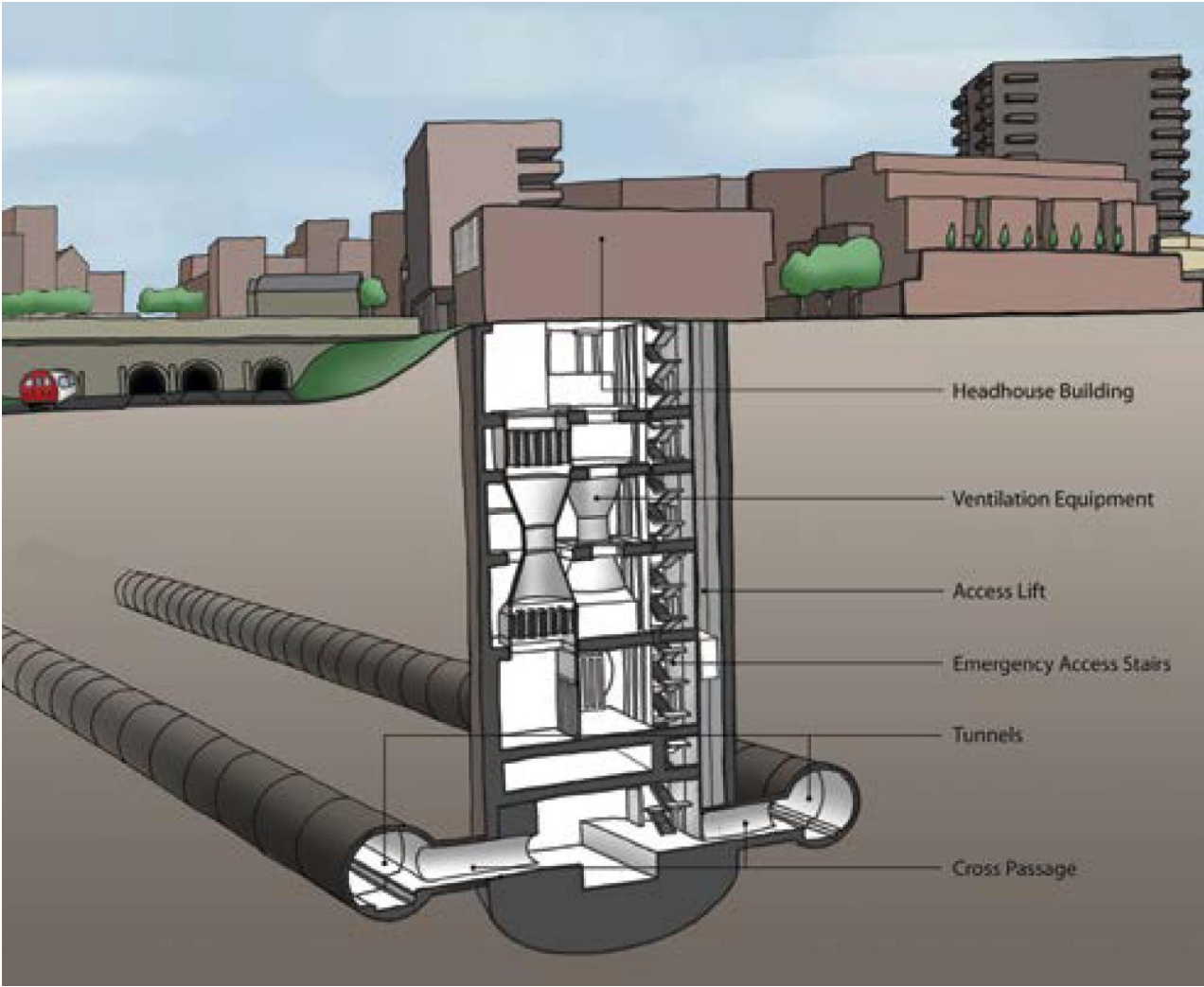
3 vent shafts

**Northolt Tunnel**  
Old Oak Common  
to West Ruislip

13.4 km

4 vent shafts

# Typical urban vent shaft



# Vent shaft – construction

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**HS1**  
Woodgrange Road

Shaft during  
construction

# Vent shaft - completion

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HS1

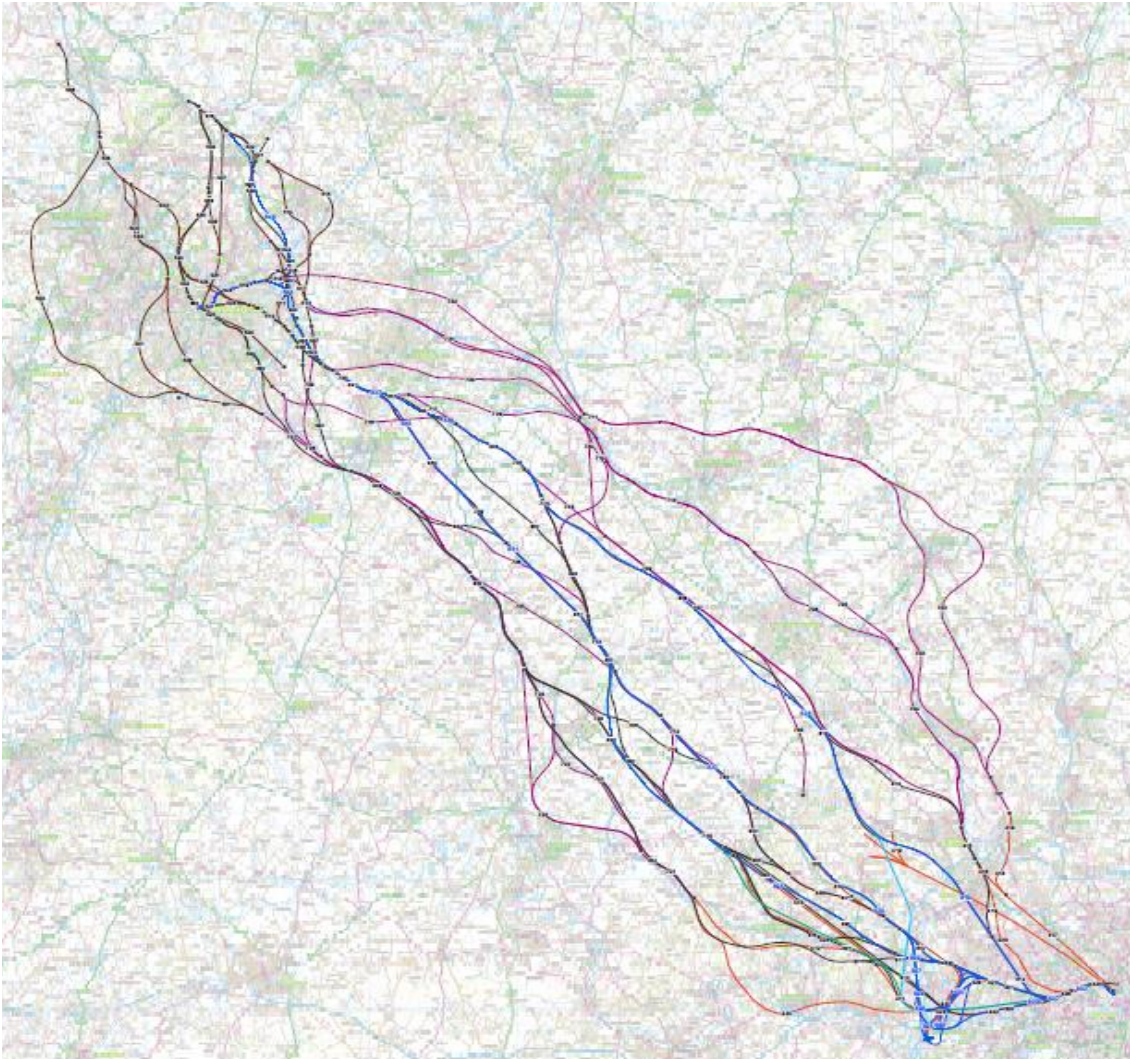
Woodgrange Road

Completed shaft

# Ruislip to Birmingham Interchange

## Route options long list

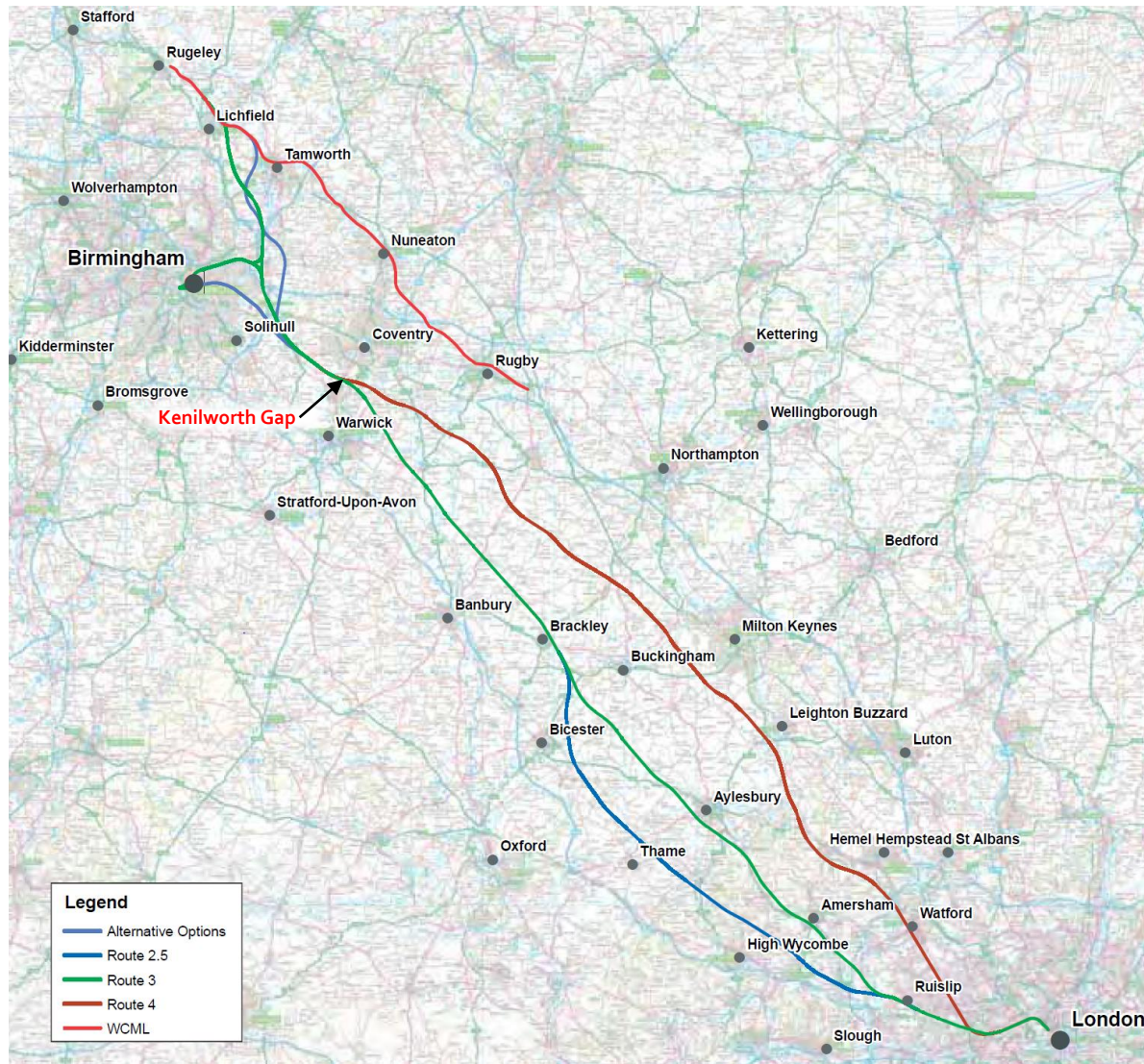
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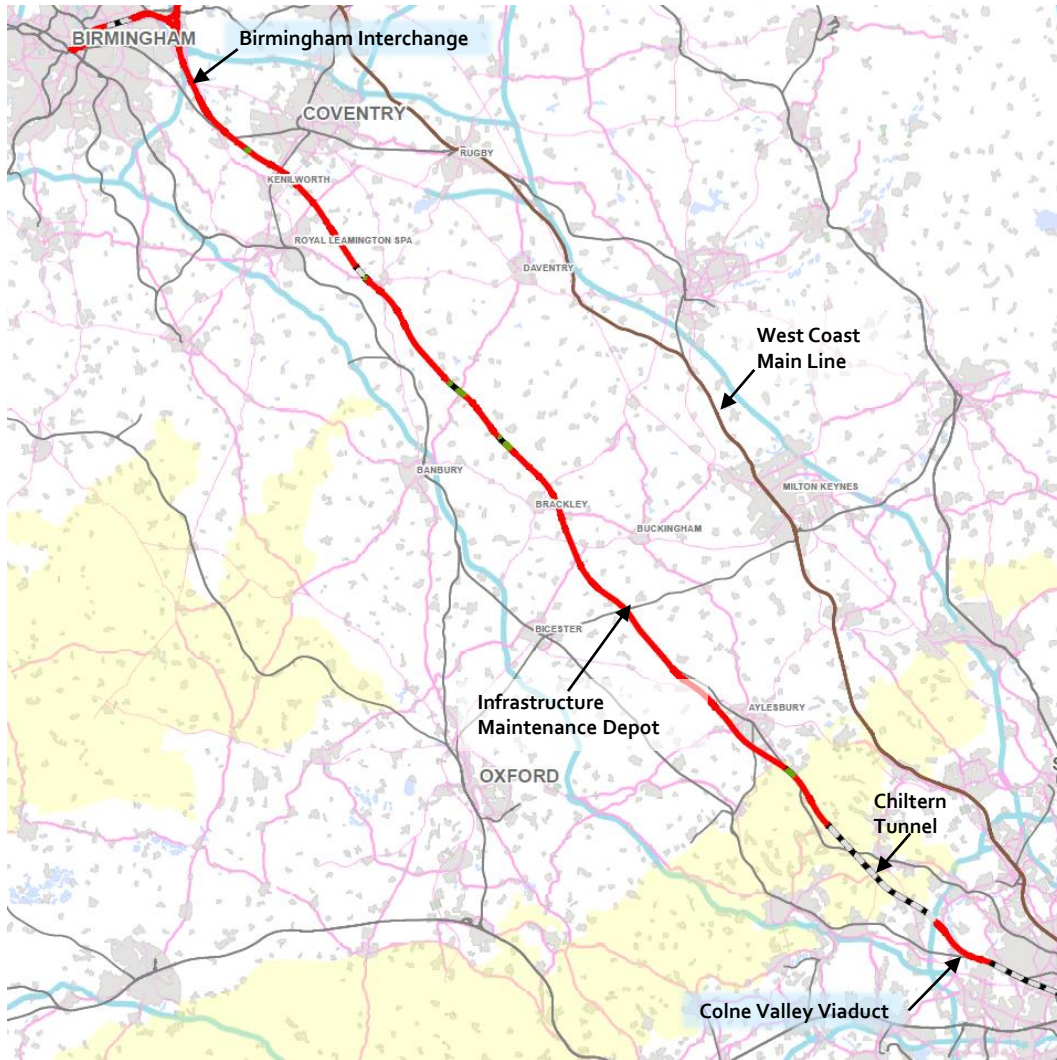
Numerous route options were considered 2009-11

Included routes to serve Heathrow (either through or via a loop or spur)

# Shortlisted route options – 2011 consultation



# Ruislip to Birmingham Interchange



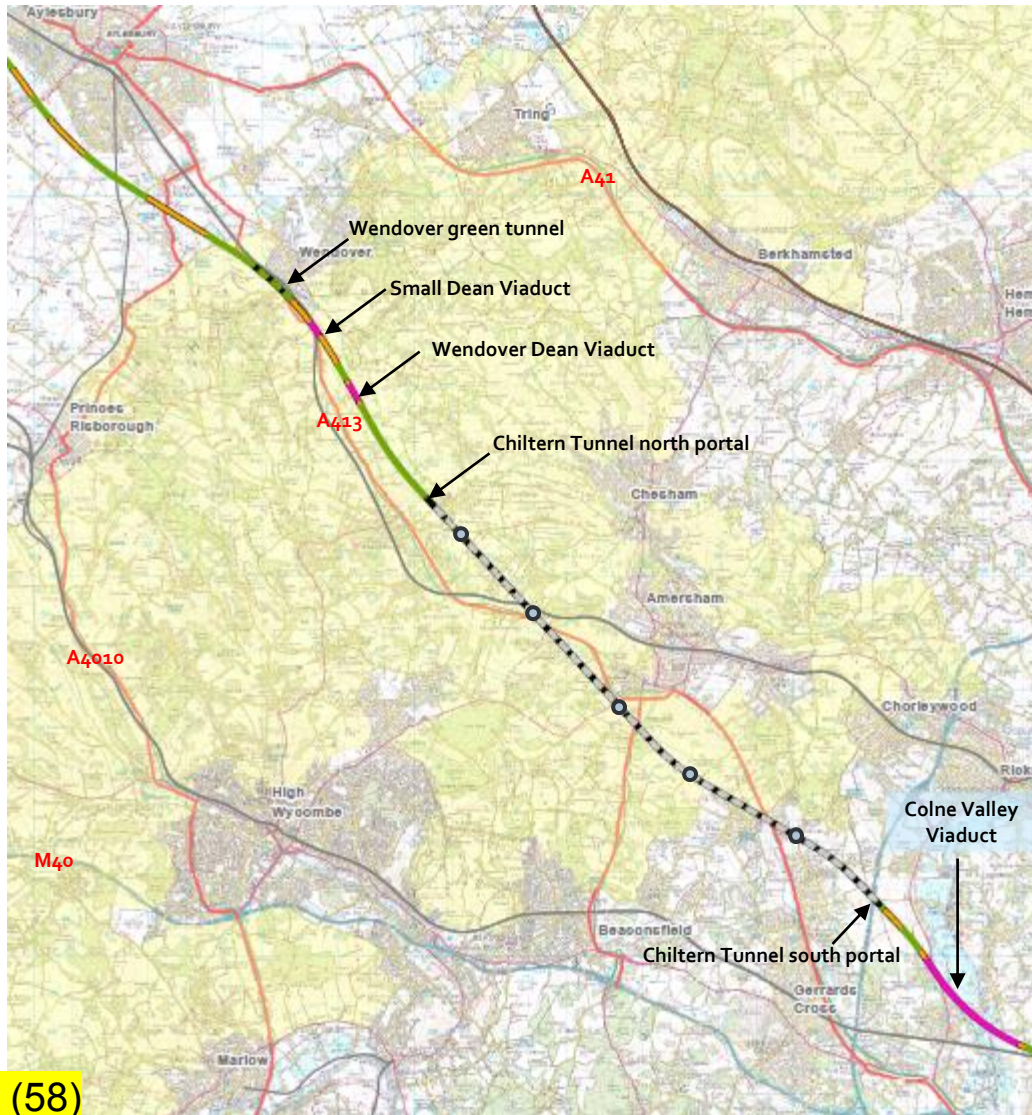


# Colne Valley Viaduct

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# Chilterns AONB



21 km of Hs2 route is through the AONB

63% in tunnel  
four vent shafts in AONB

27% in cutting

5.5% on surface/embankment

4.5% on viaduct

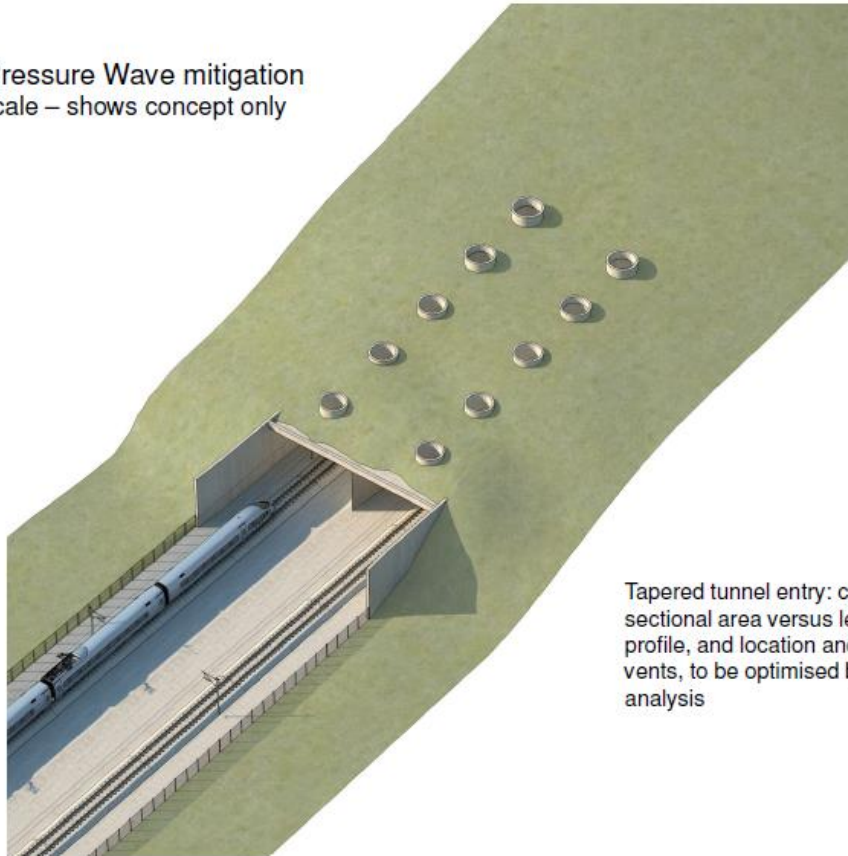
# High Speed Tunnel Portal Example



# Conceptual high speed portal

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Micro Pressure Wave mitigation  
Not to scale – shows concept only



Tapered tunnel entry: cross-sectional area versus length profile, and location and size of vents, to be optimised by analysis

# HS1 Boxley green tunnel – under construction

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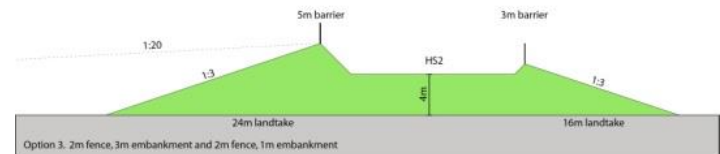
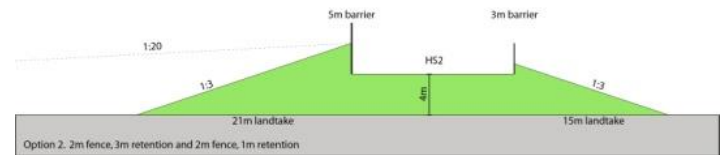
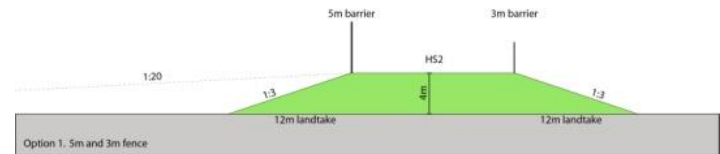
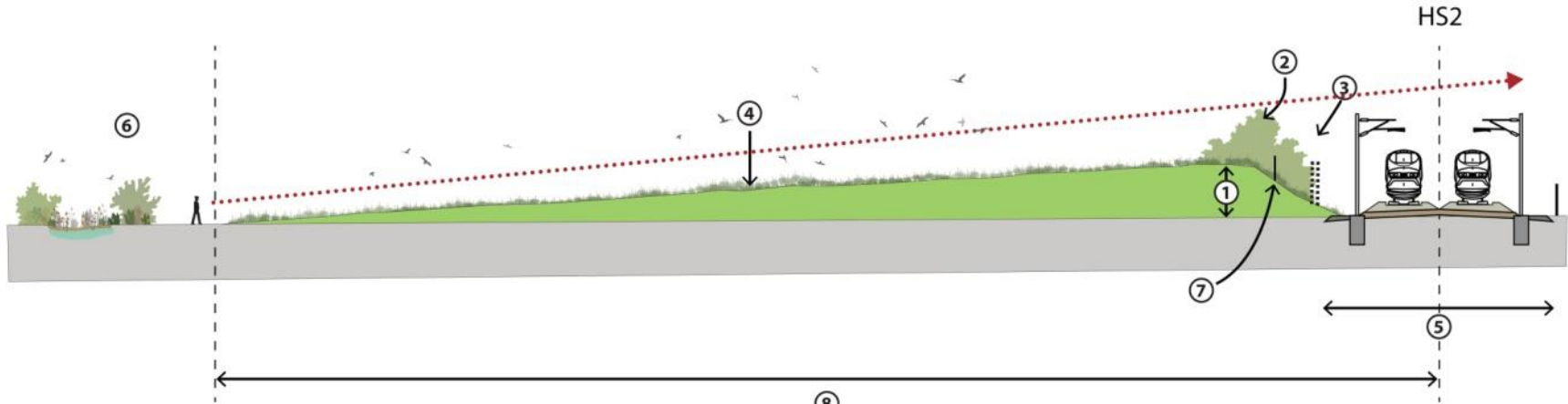


# HS1 Boxley green tunnel - complete

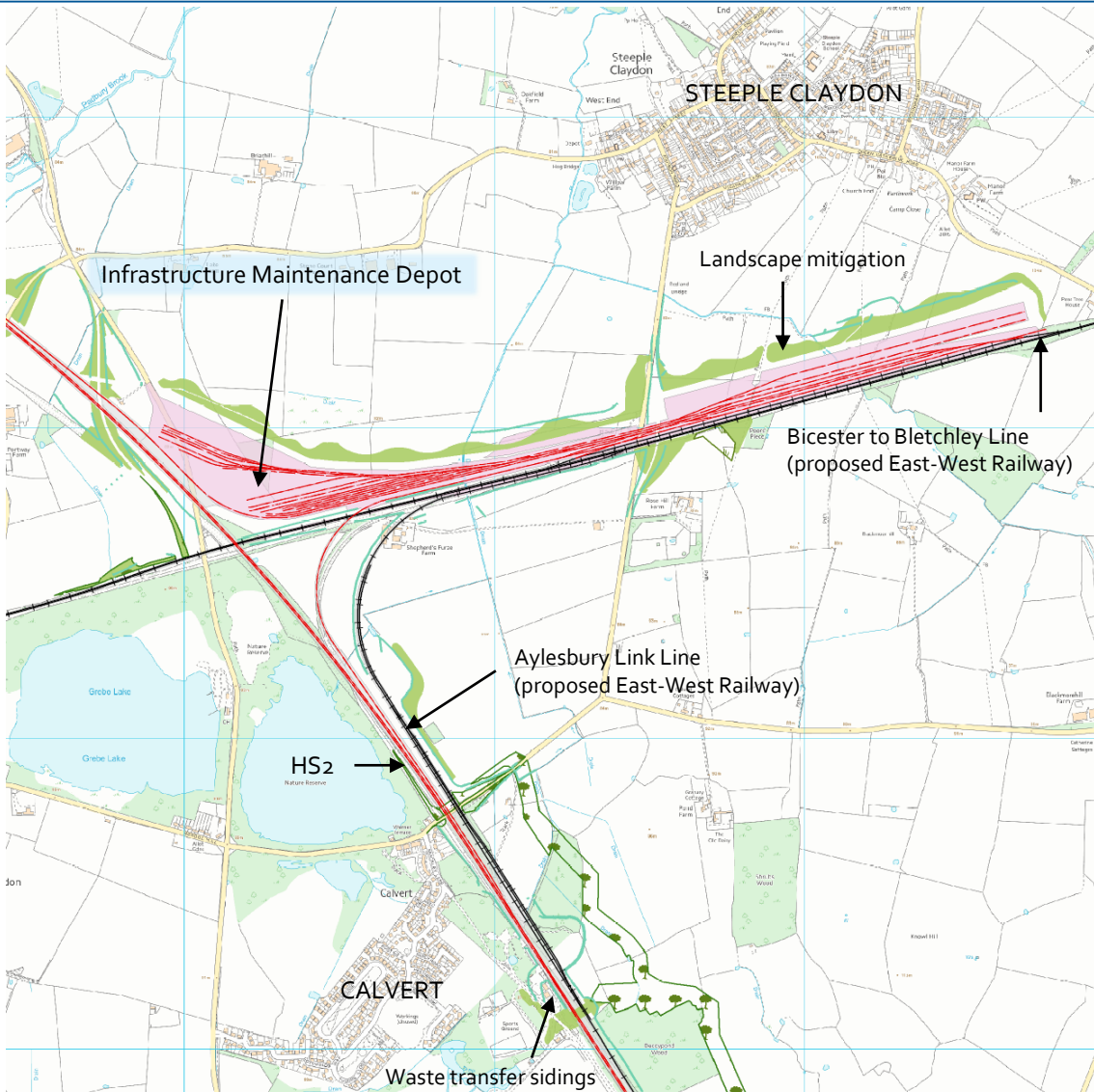
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# Landscape and noise mitigation

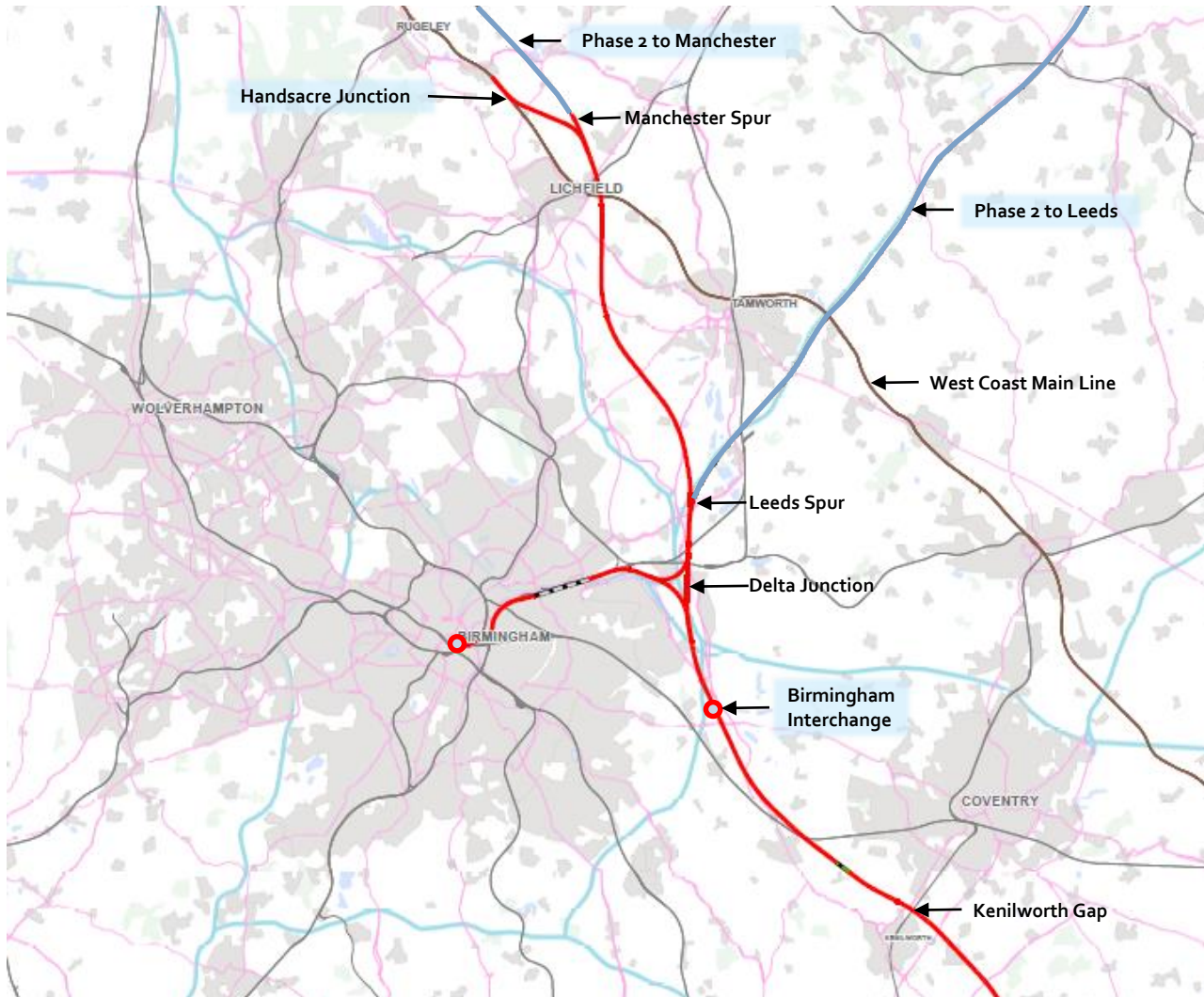


# Infrastructure Maintenance depot





# Birmingham Interchange to Handsacre



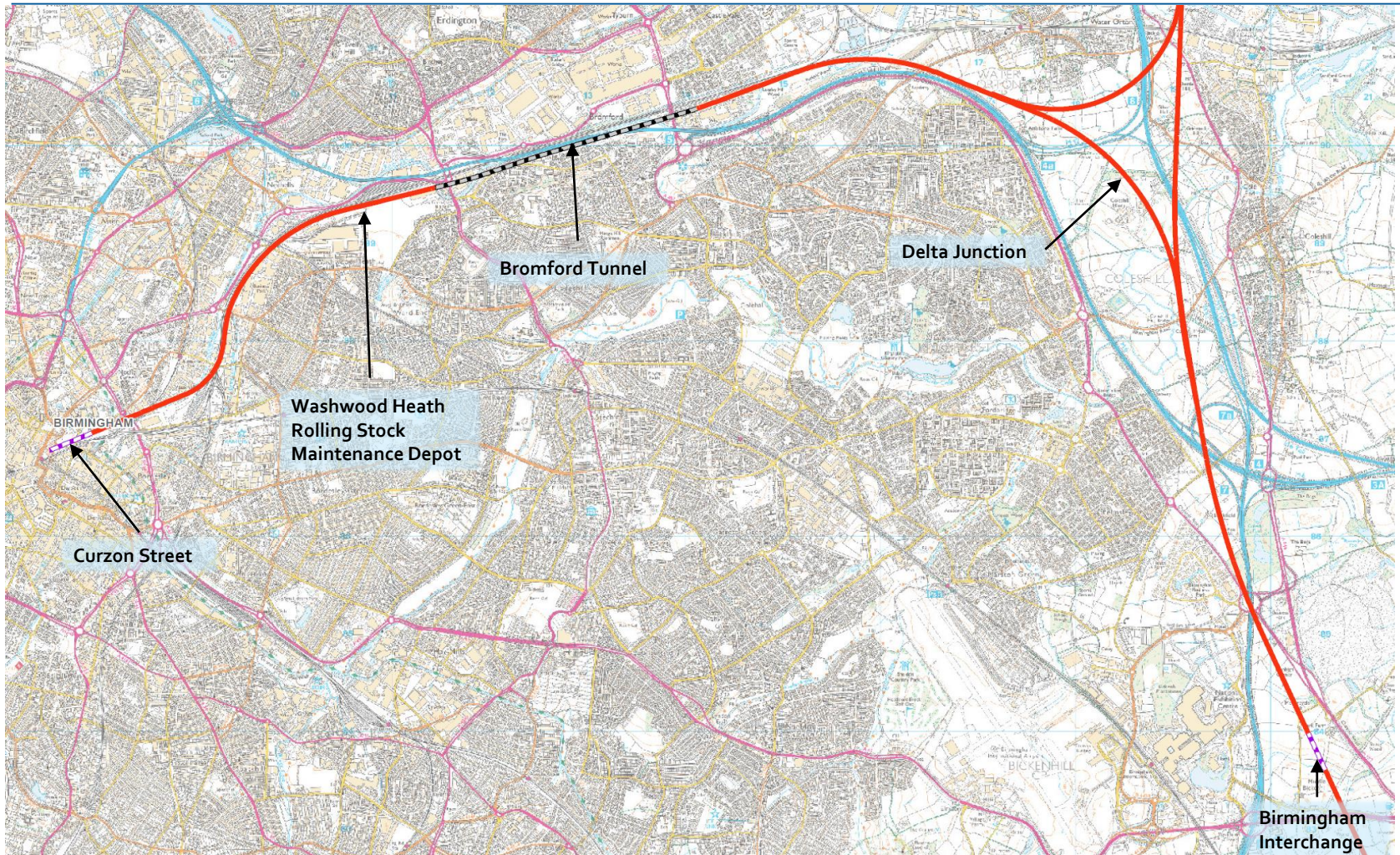
Route north from Birmingham Interchange to connect to the West Coast Main Line and to Phase 2 to Manchester and Leeds

# Delta Junction

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# Birmingham Interchange to Curzon Street

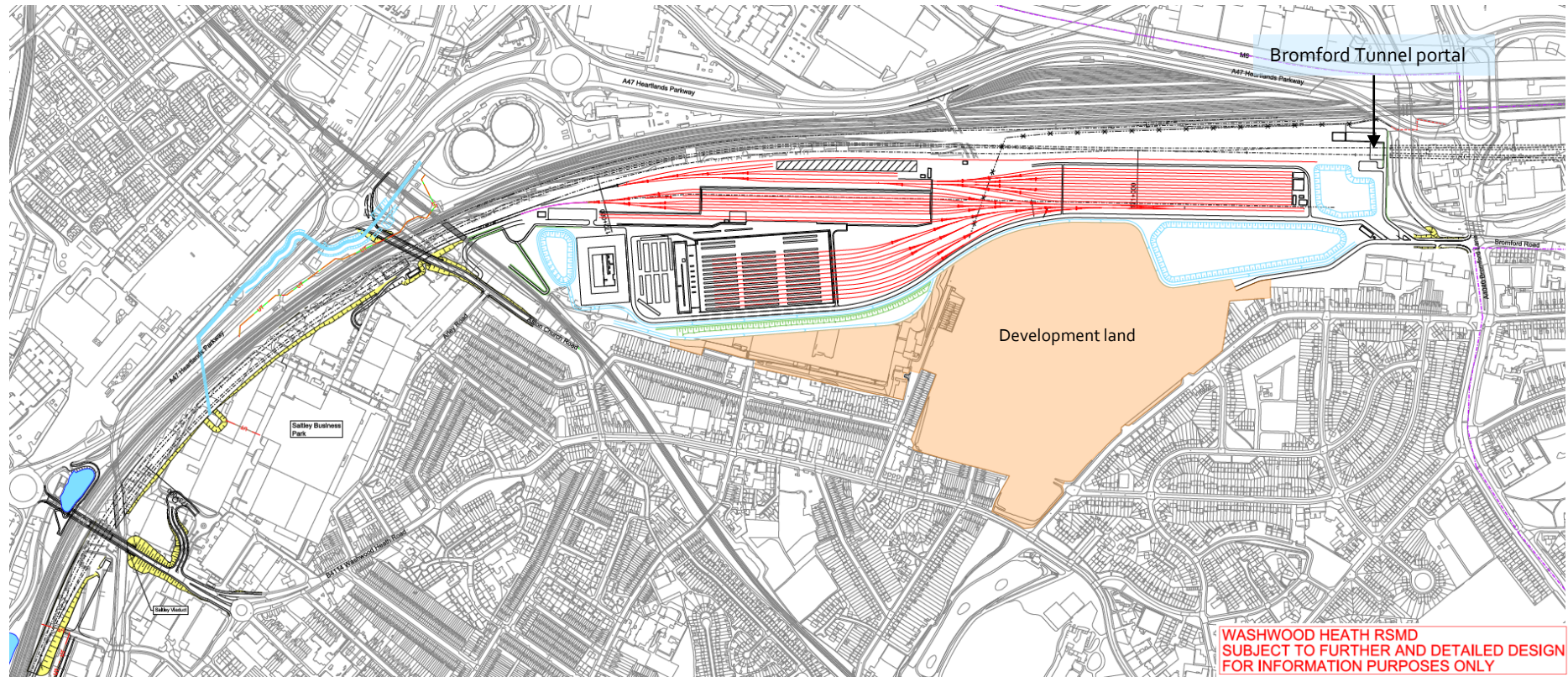


# Rolling Stock Maintenance Depot Washwood Heath



Aerial view of original Bill  
scheme from the west

# Rolling Stock Maintenance Depot Washwood Heath

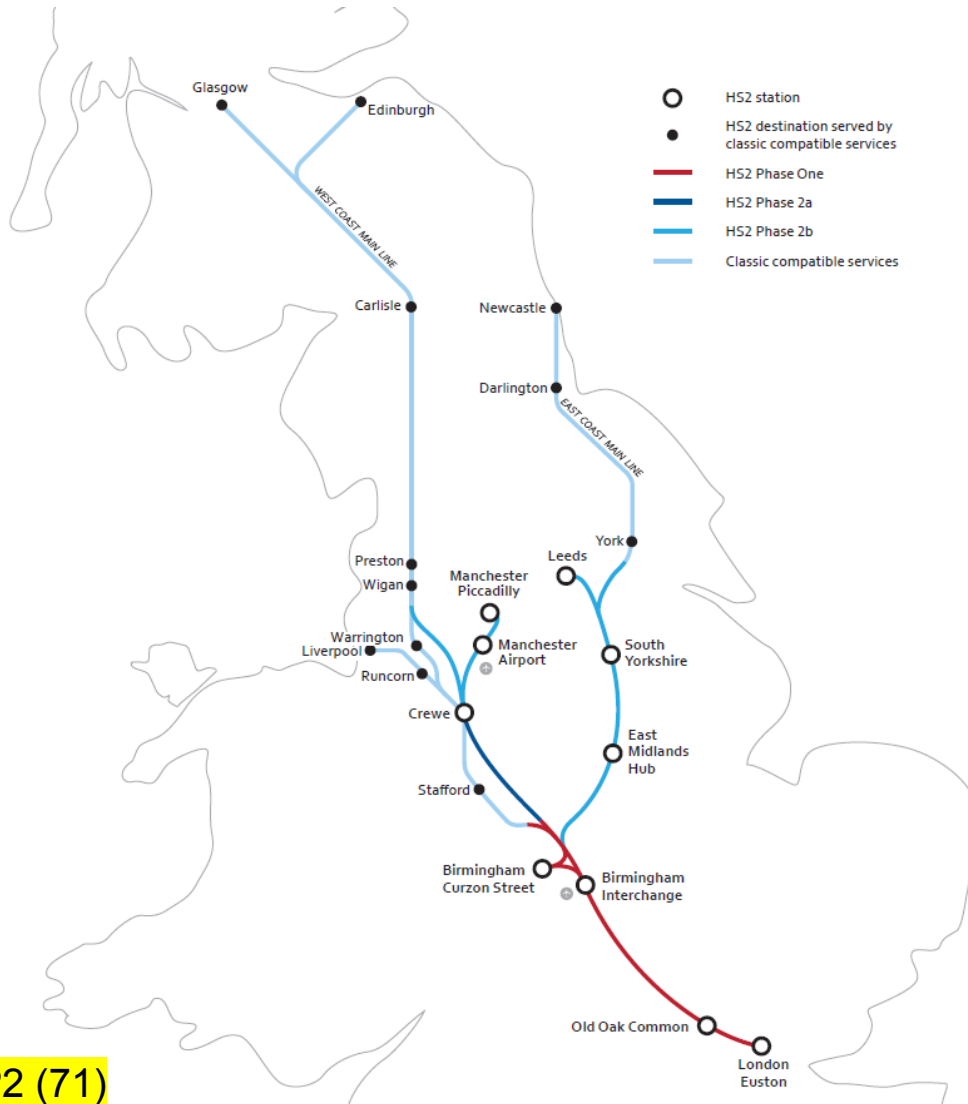


# Implementation – the next steps

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Possession of land	Commences Spring 2017
Site set up and enabling works	Spring 2017 – Spring 2018
Construction works commence	Spring 2018
Operation	2026
Euston platforms 7-11	2033

# Designed to stand the test of time



**'A new passenger transport backbone, not a replica of the existing railway'**

Lord Adonis 2009