

London Crossrail - mega-infrastructure as keyhole surgery

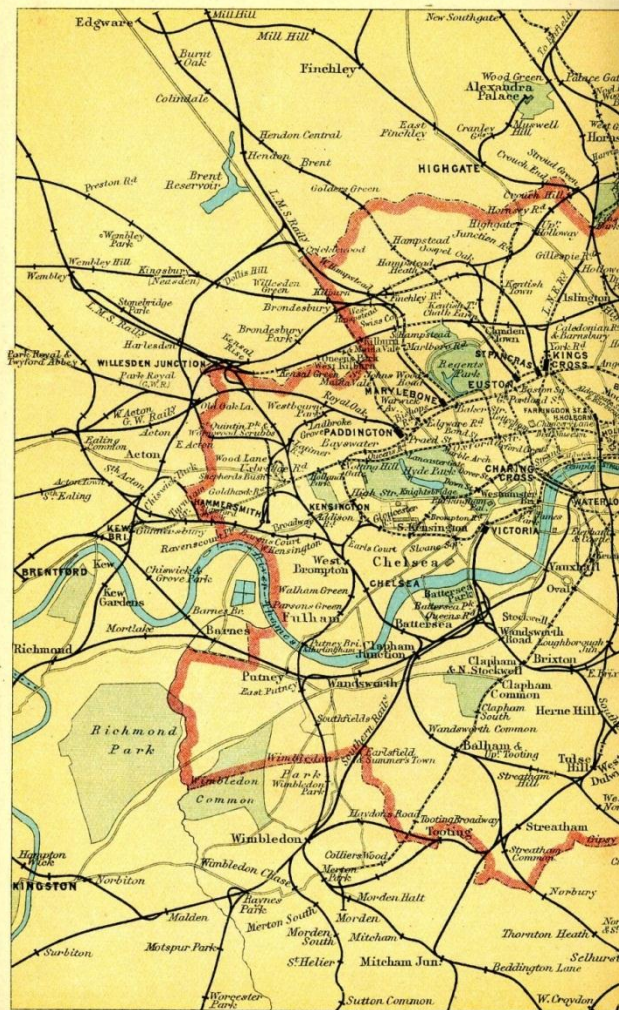
Michael Hebbert, Bartlett School of Planning, UCL



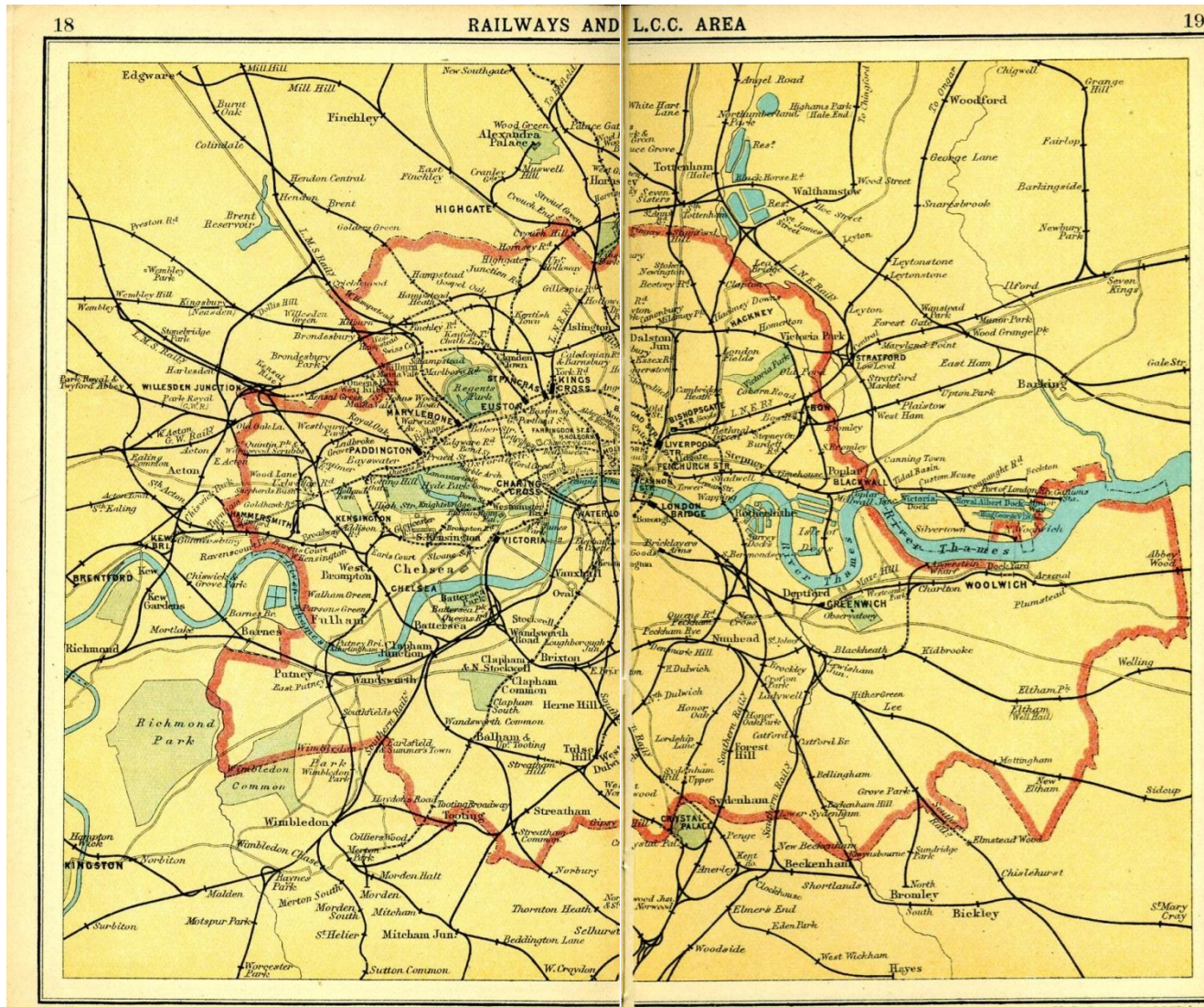
The OMEGA Seminar

The Bartlett UCL

January 30th 2013

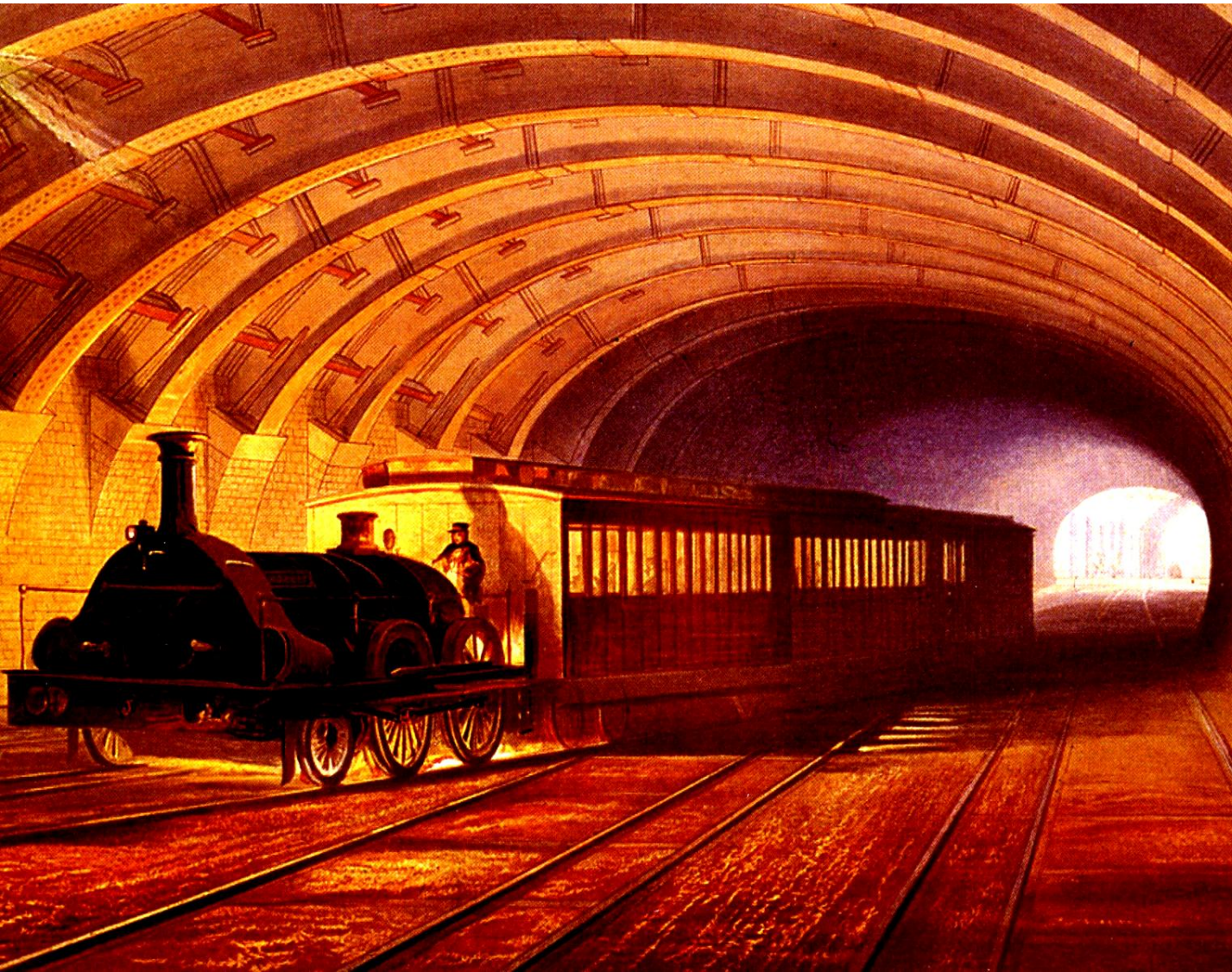


Joining up the dots, a 150-year-old puzzle



Paddington
Marylebone
Euston
St Pancras
King's Cross
Broad Street
Liverpool Street
Fenchurch Street
London Bridge
Cannon Street
Blackfriars
Embankment
Waterloo
Victoria

Joining up the dots, a 150-year-old puzzle



first solution (1862)
Metropolitan
Railway connects
Paddington via
Euston and King's
Cross to
Farringdon

Joining up the dots, a 150-year-old puzzle



Circle Line completed 1884 and fully electrified by 1905.

1896 LCC recommends future links be built with 16' bore for heavy rail

Continuing debate about London's need for a Grand Union Station. . .

Joining up the dots, a 150-year-old puzzle



1943 *County of London Plan* proposal for consideration to be given to new cross-London rail infrastructure

1944 appointment of the Railway (London Plan) Committee, reports 1948

Joining up the dots, a 150-year-old puzzle



1948 formation of British Transport Commission, integrating all the main line railway companies with the London Passenger Transport Board

1949 British Transport Commission report - origins of modern Crossrail

London Railways Plan (1949)

London Railways Plan (1949)

Proposal

34 miles of large-bore tunnel under central London

designed for main line, heavy-rail services
not Tube trains

10-carriage trains, ample seats, sliding doors

through-London routes

London Railways Plan (1949)

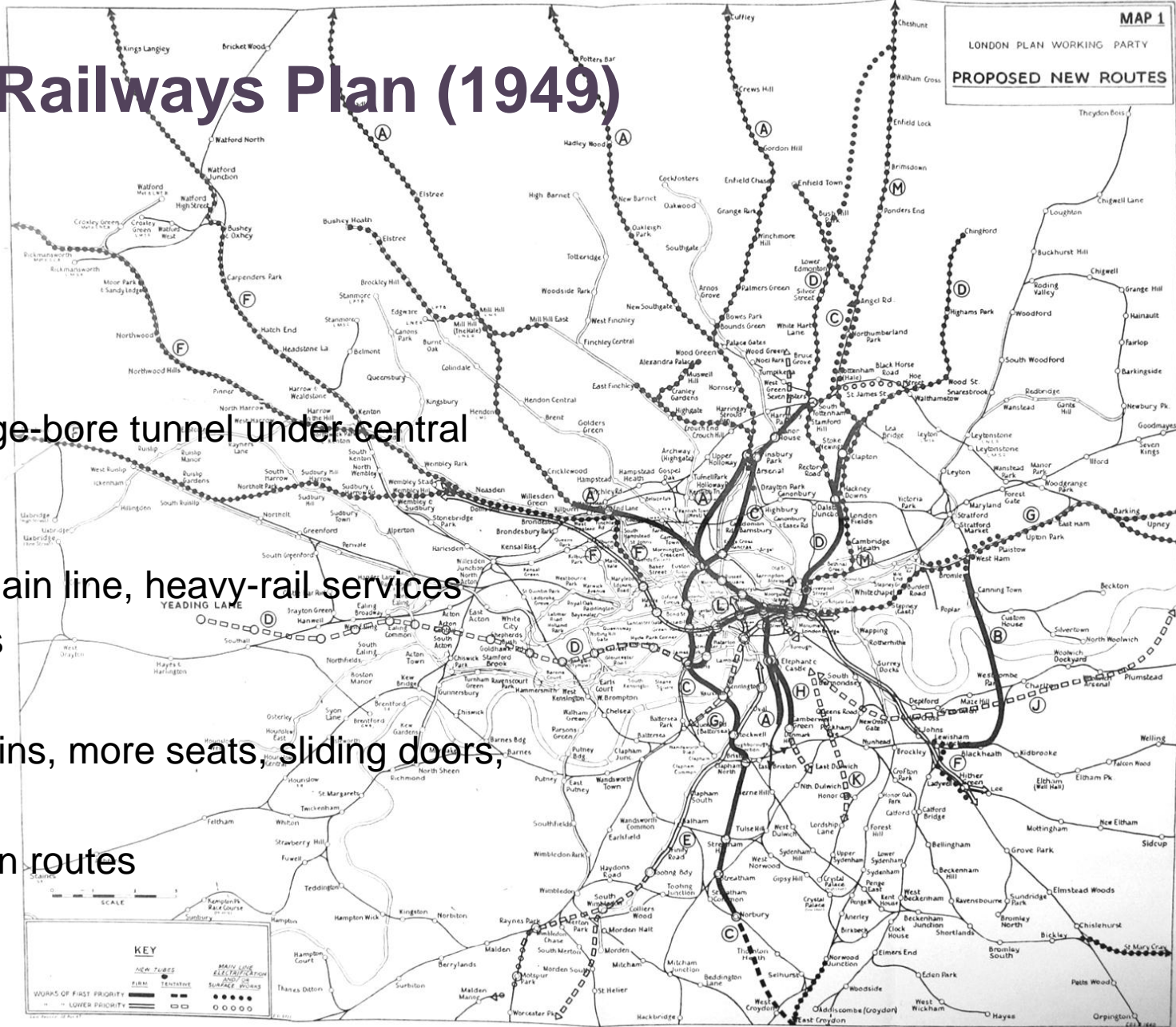
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London Railways Plan (1949)

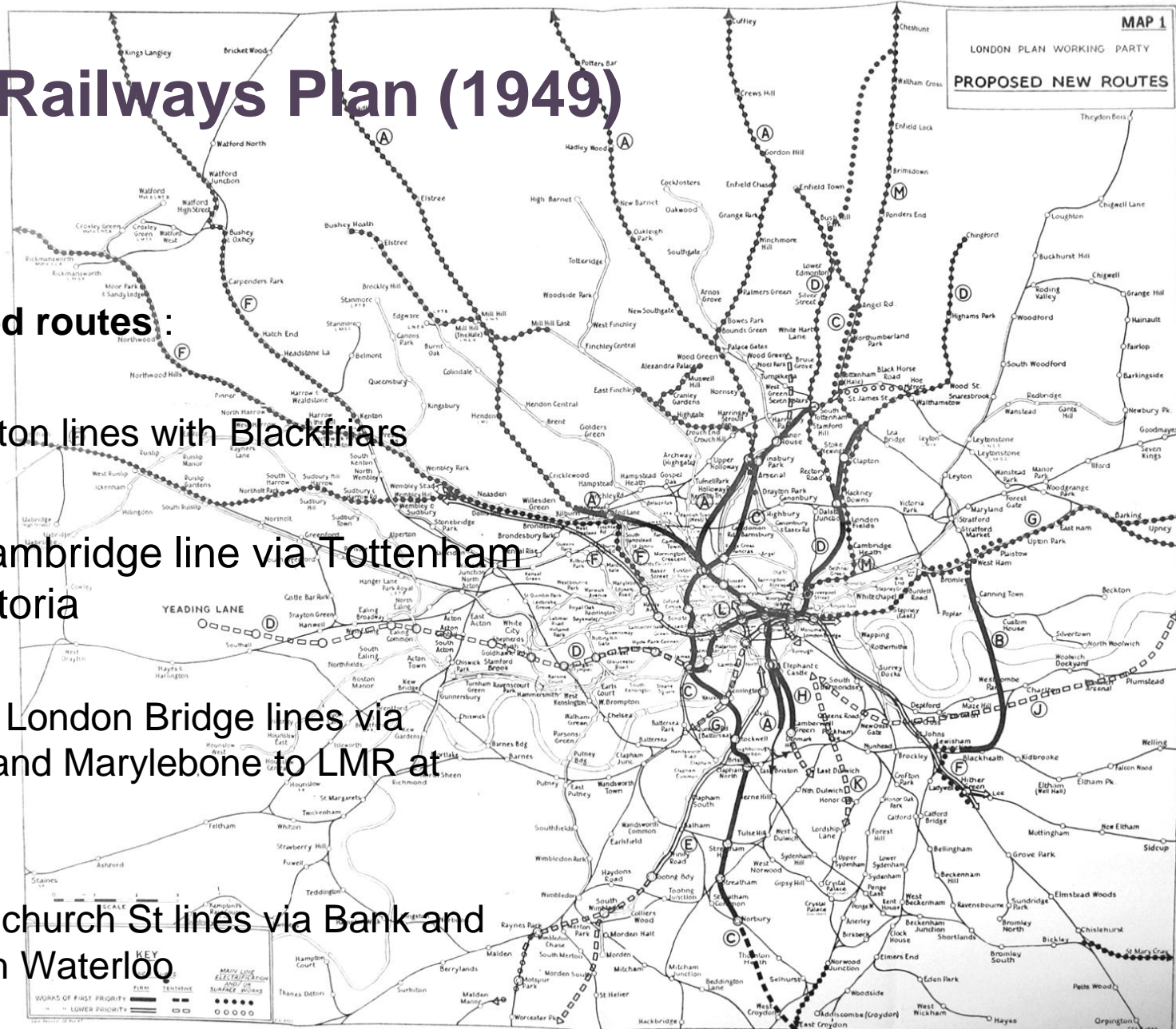
Recommended routes :

(A) linking Euston lines with Blackfriars

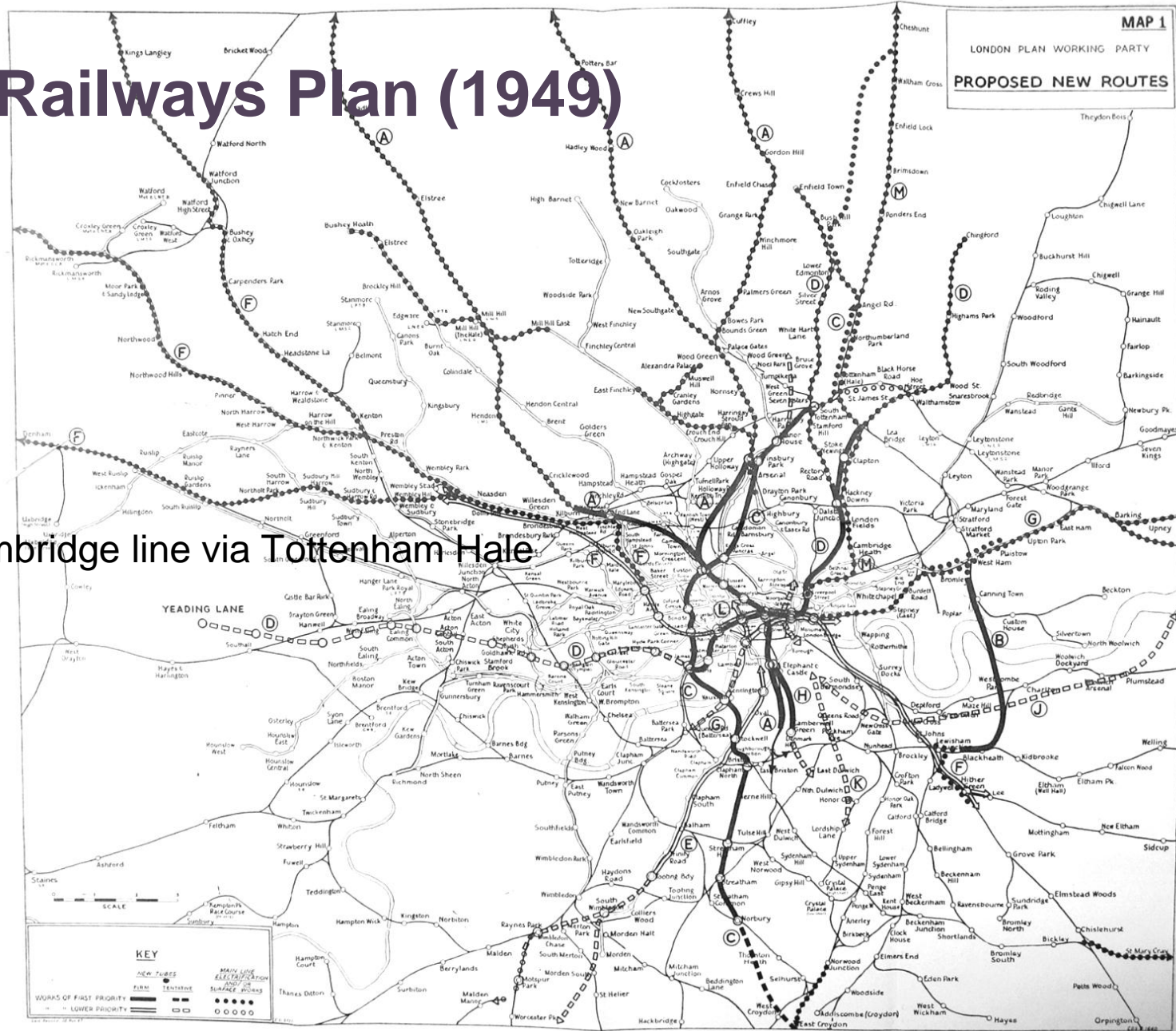
(D) linking Cambridge line via Tottenham Hale with Victoria

(F) connecting London Bridge lines via Fenchurch St and Marylebone to LMR at Neasden

(G) linking Fenchurch St lines via Bank and Southwark with Waterloo

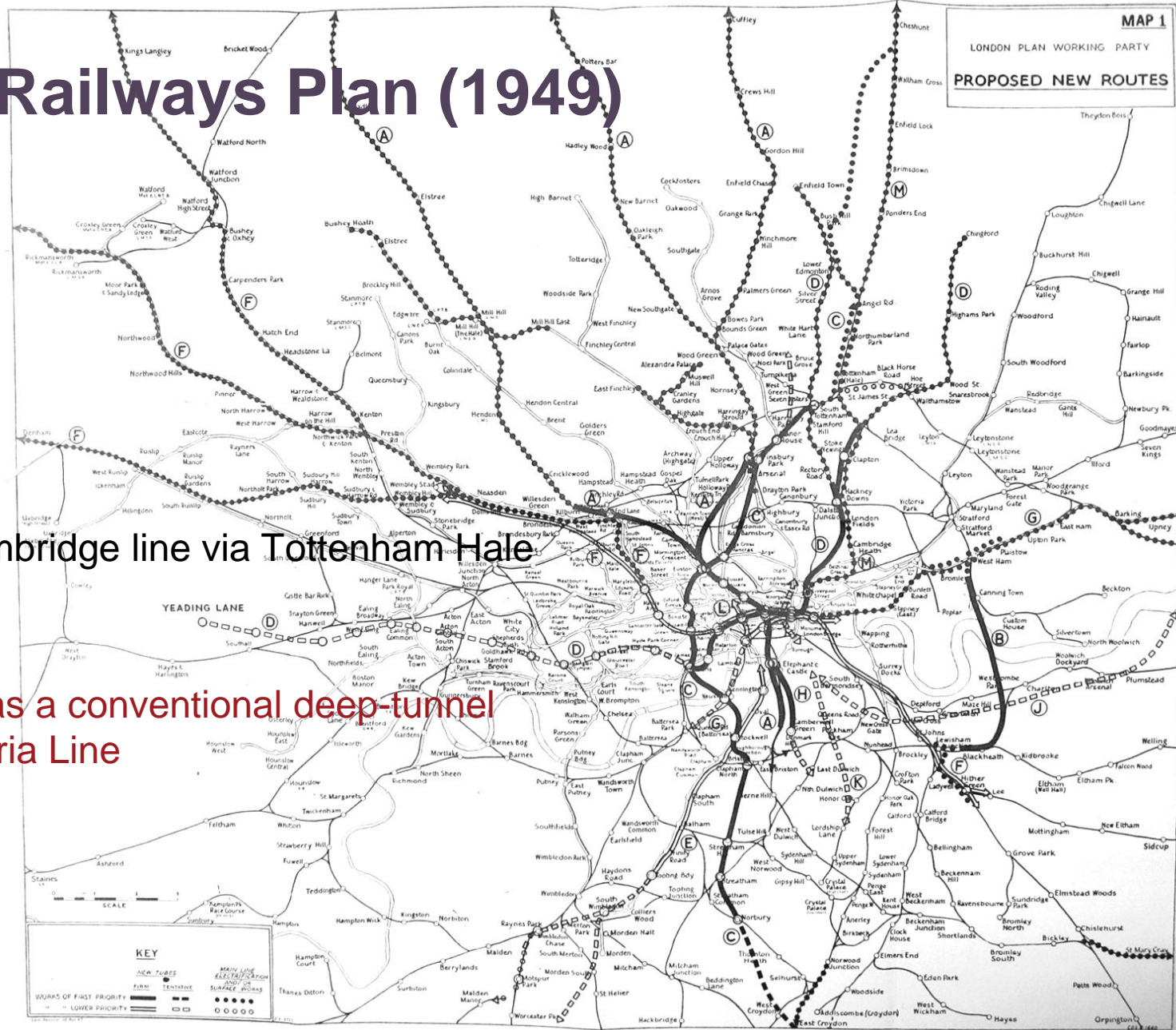


London Railways Plan (1949)



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A Railway Plan for London (1965)

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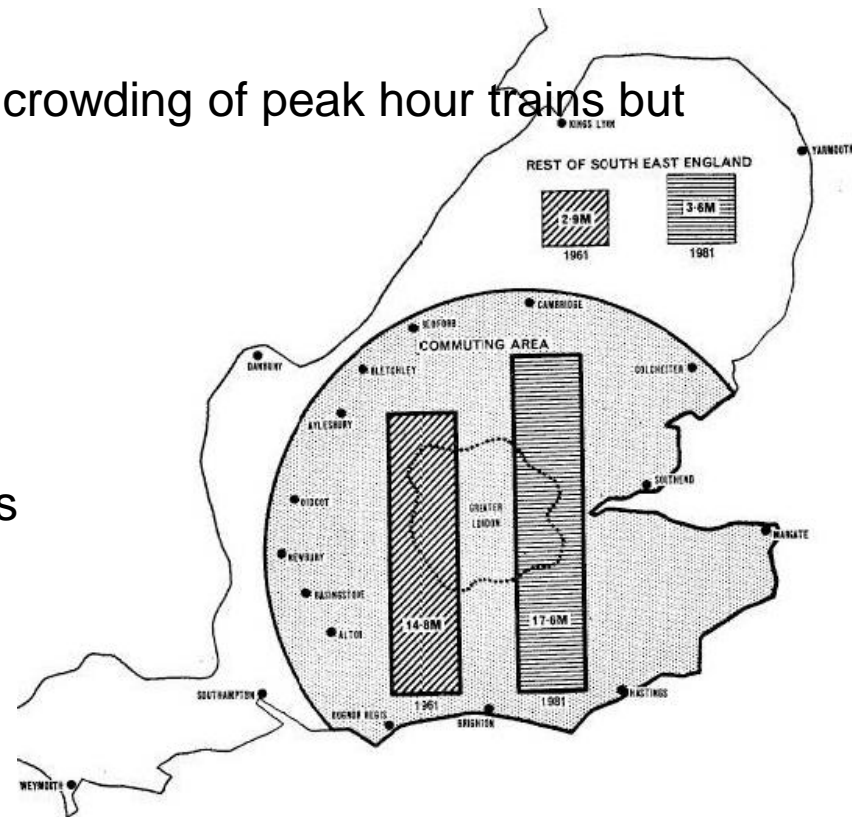
report of the Working Party of the Passenger Transport Planning Committee for London

assumes outward spread of commuting, with crowding of peak hour trains but surplus capacity on inner-suburban lines

recommends new Fleet Line Underground, Baker Street to New Cross

Victoria, Piccadilly & Northern Line extensions

some rationalisation of existing BR lines, but no new tunnels



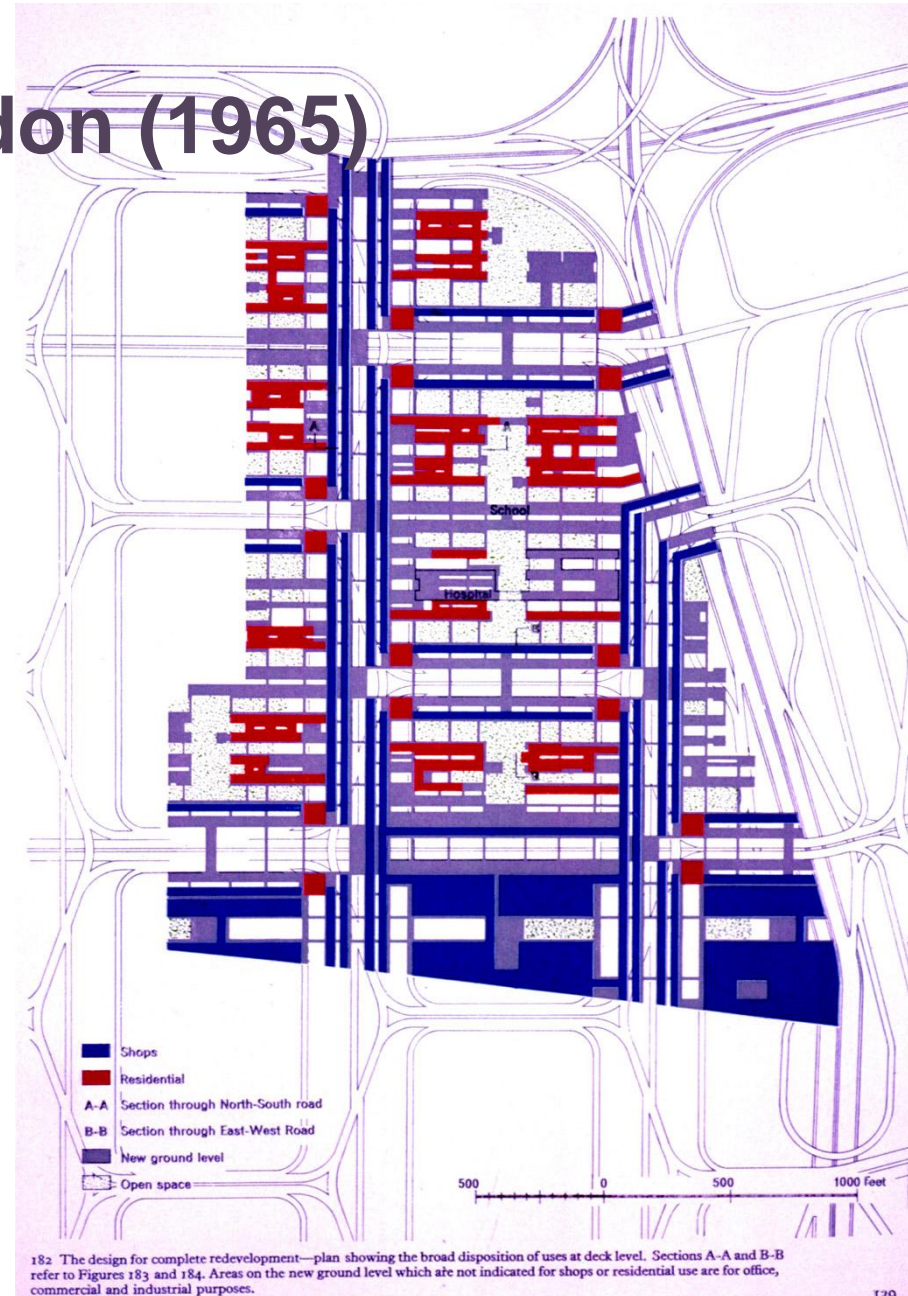
A Railway Plan for London (1965)

context of Buchanan Report *Traffic in Towns* (1965) and GLC Primary Road Network (1969)

trend forecasts of employment and demographic decline, rising motorisation, surplus rail capacity

8% decline in rail commuting to Central London 1966-73

transport investment channelled into the Motorway Box, Ringways and Radial Motorways



London Transportation Study (1968)

London Transportation Study (1968)

First large scale application of American land use/transportation methodology to a British city

Phase 3 (published 1968) includes Plan G: two 'main line tube' links through central London with a major interchange under Covent Garden

Paddington to Liverpool St

24 tph between Reading/High Wycombe lines and Southend/Chelmsford lines

London Bridge to Victoria

28 tph connecting two branches of Southern Region

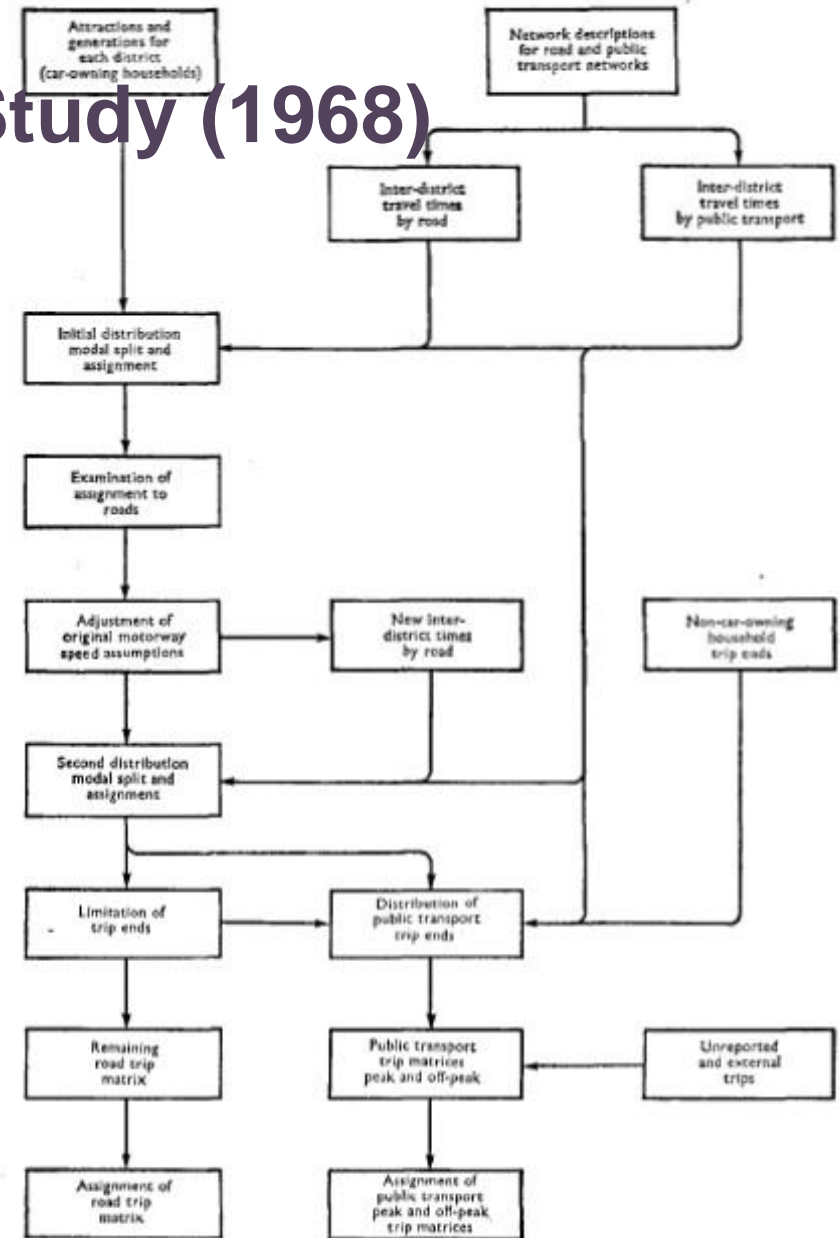


Fig. 1. Transportation model flow diagram

London Transportation Study (1968)

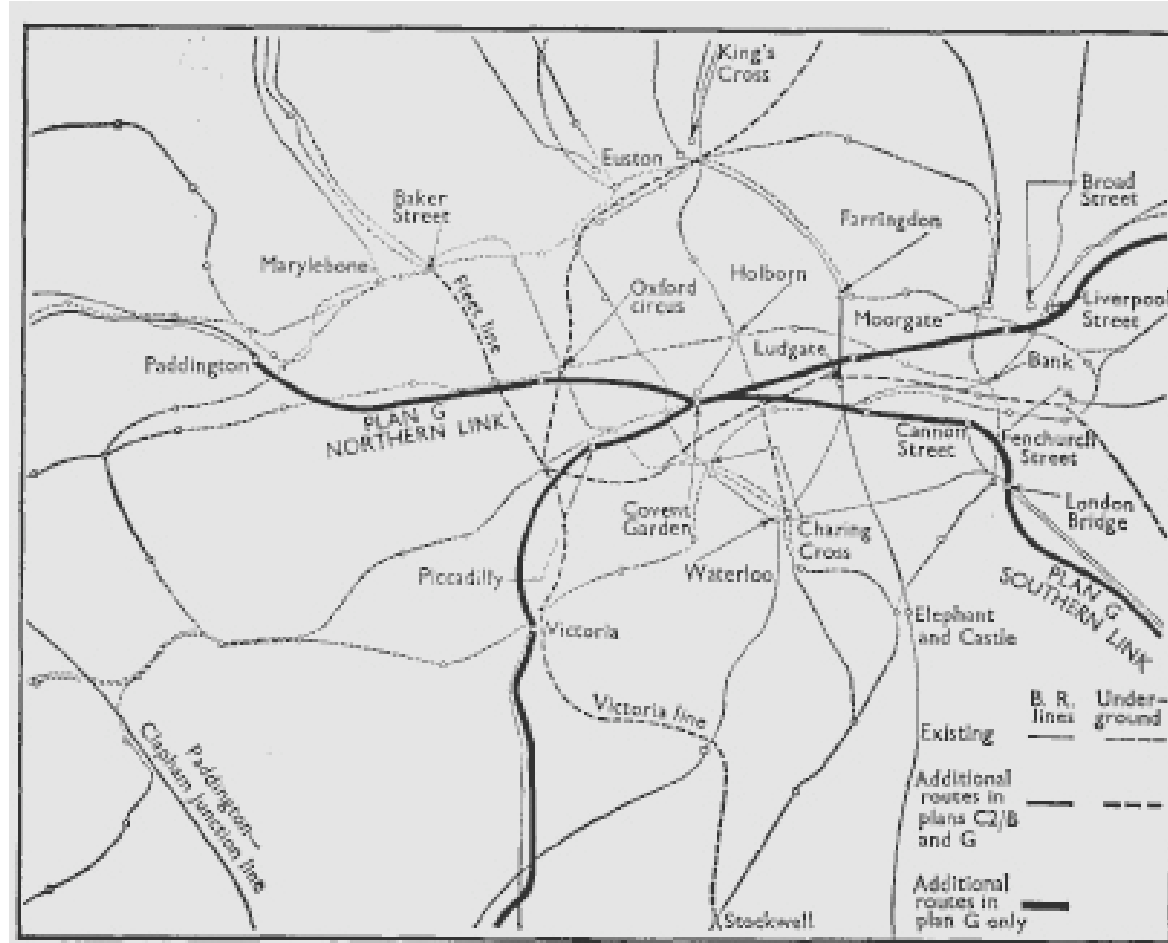
Analysis predicts minimal benefits from Plan G - net increase of **1%** in peak-hour public transport trips

Estimated annual rates of return:

Plan G Crossrail	2%
Motorway Box	8.8%

1973 Labour wins control of GLC:

'the world was stood on its head'



London Rail Study (1974)

London Rail Study (1974)

Joint committee of Department of Transport, British Rail, Greater London Council and London Transport Executive, chaired by Sir David Barran

technical team led by David Bayliss, using innovative computer forecasting and cost-benefit analysis

acknowledged the **decline** scenario but also tested **growth** scenarios based on rail investment, congestion charging and revival of the London economy

PROPOSALS

BR non-radial schemes
Ring Rail and N.London Line

BR through running via Blackfriars
(Thameslink)

Bakerloo & Victoria line extensions

Chelsea-Hackney Line

Fleet Line

River Line to Thamesmead
via Surrey Docks & Isle of Dogs

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PROPOSALS

two BR Crossrail lines

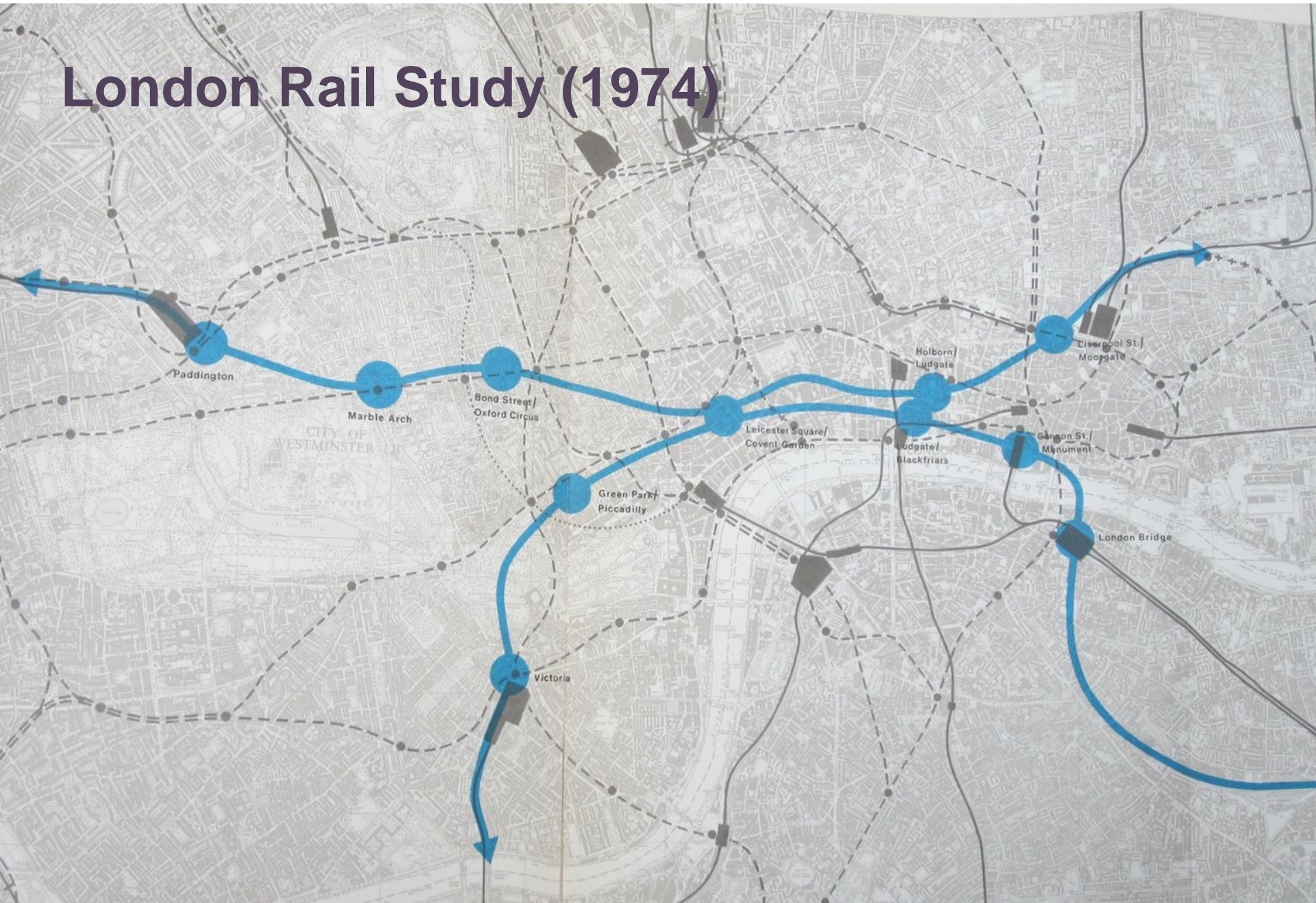
Paddington - Liverpool Street

Victoria - London Bridge

interchanges at Blackfriars
and Leicester Square

*'an imaginative and exciting solution
to the problems of overcrowded
public transport in Central London'*

London Rail Study (1974)

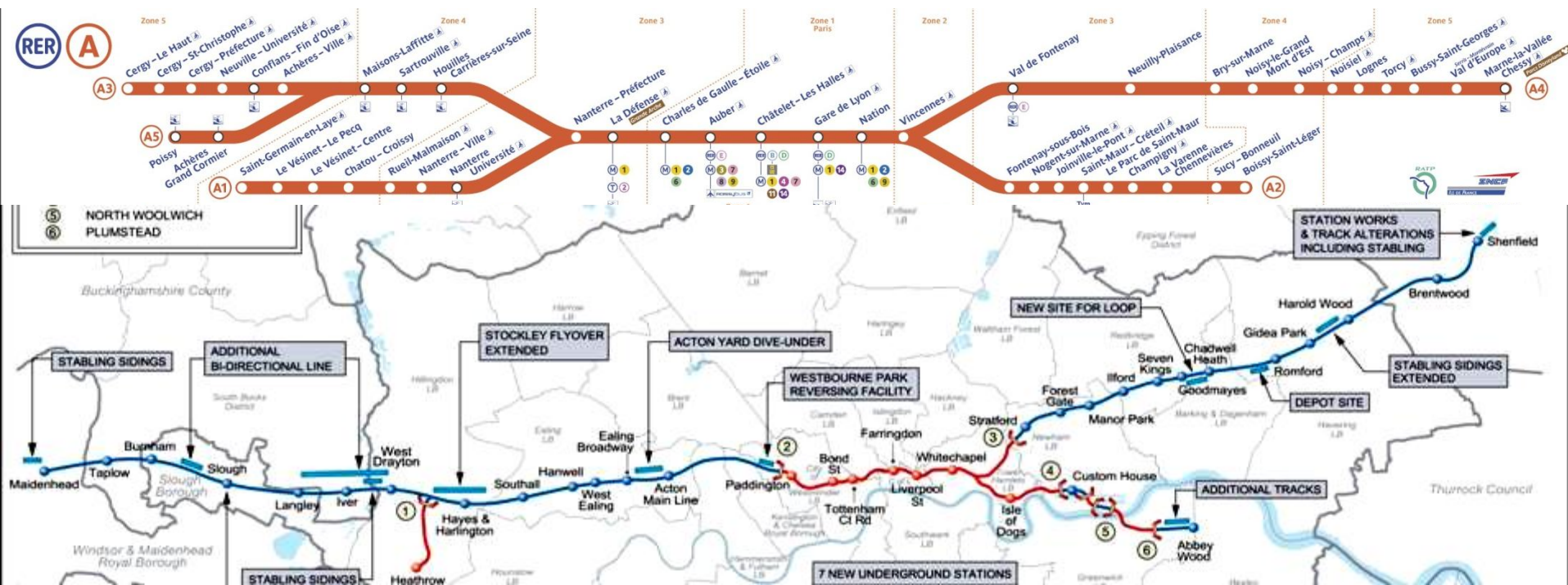


London Rail Study (1974)

Precedents

Hamburg and Munich S-Bahn

Paris RER Ligne A - under construction and due to open in 1976



NB a remarkable symmetry . . . in all respects but timing

A Cross London Rail Link (1980)

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1977-1980 study of Crossrail options by BR Strategic Planning Office

released November 1980
with foreword by BR
Chairman Sir Peter Parker:

'The Link Scheme demonstrates that BR is capable of innovatory thinking and can reason expansively, constructively and at a high technical level in bad times as well as good'

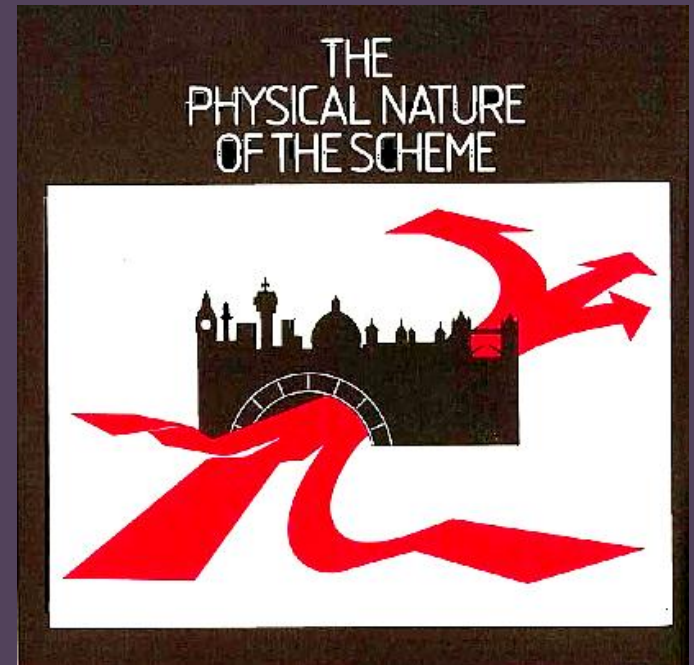


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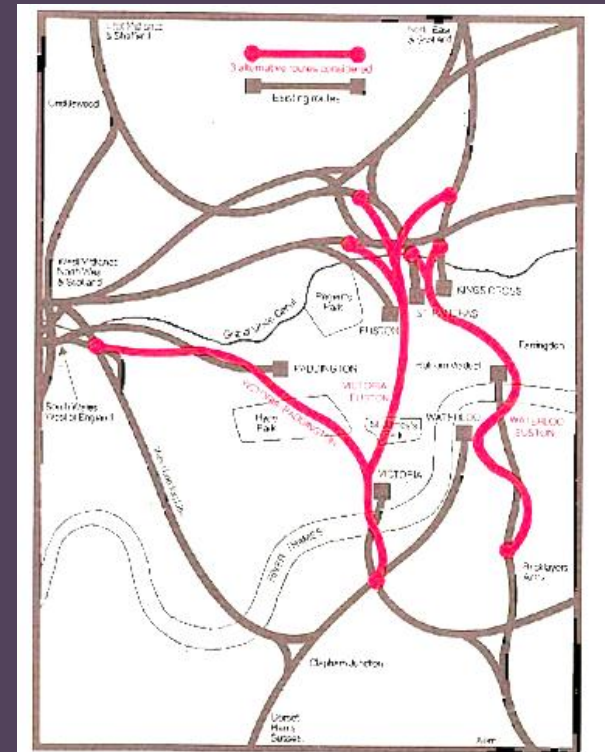


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LPAC London Rail Study (1988)

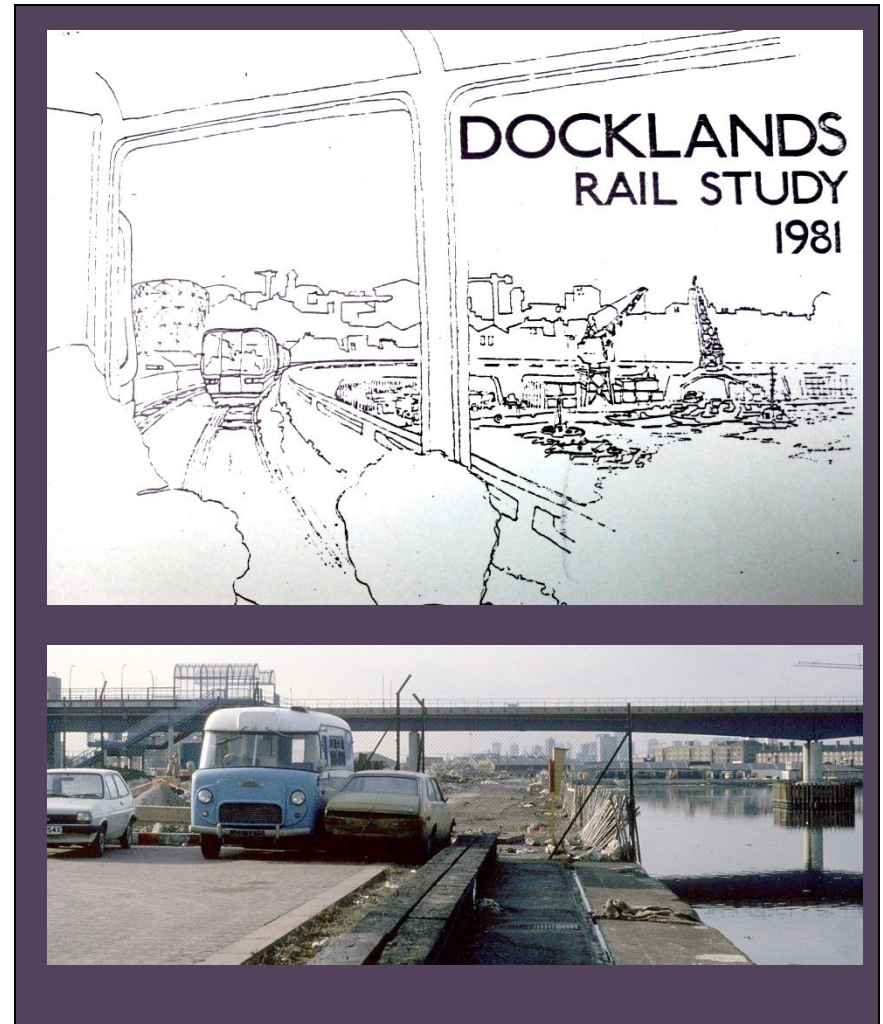
LPAC London Rail Study (1988)

Globalisation and Big Bang - the upturn in Central London labour market, and the beginning of Docklands development

1982-1990 70% increase in passenger miles on London Underground

post GLC abolition, the 33 Boroughs commission a study from Colin Buchanan & Partners

the consultants contrast the timid abandonment of the Fleet Line with the 'brilliant opportunism' of the DLR



LPAC London Rail Study (1988)

‘The DLR has been a dramatic demonstration not only of the way in which a rail investment can trigger major development in the right sort of area but also of the fact that this is something which developers are prepared to pay for.’

Trends of ridership and congestion indicate need for major expansion of rail capacity in Central London

Five Crossrail options reviewed:

CROSSRAIL OPTIONS

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Liverpool St - Waterloo

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Liverpool St - Paddington

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KING VIC LINE

King's Cross - Victoria

&

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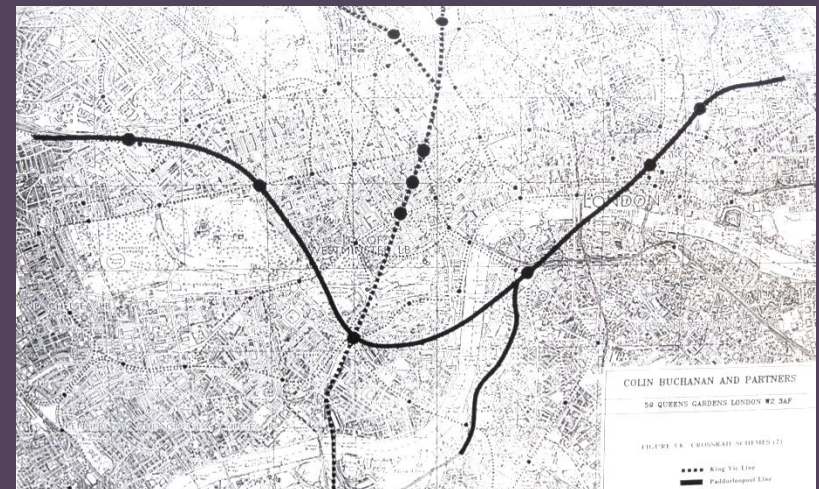
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PADDERLOOPOOL LINE the ‘catch-all solution’

Liverpool St-Waterloo-Victoria-
Paddington



LPAC London Rail Study (1988)

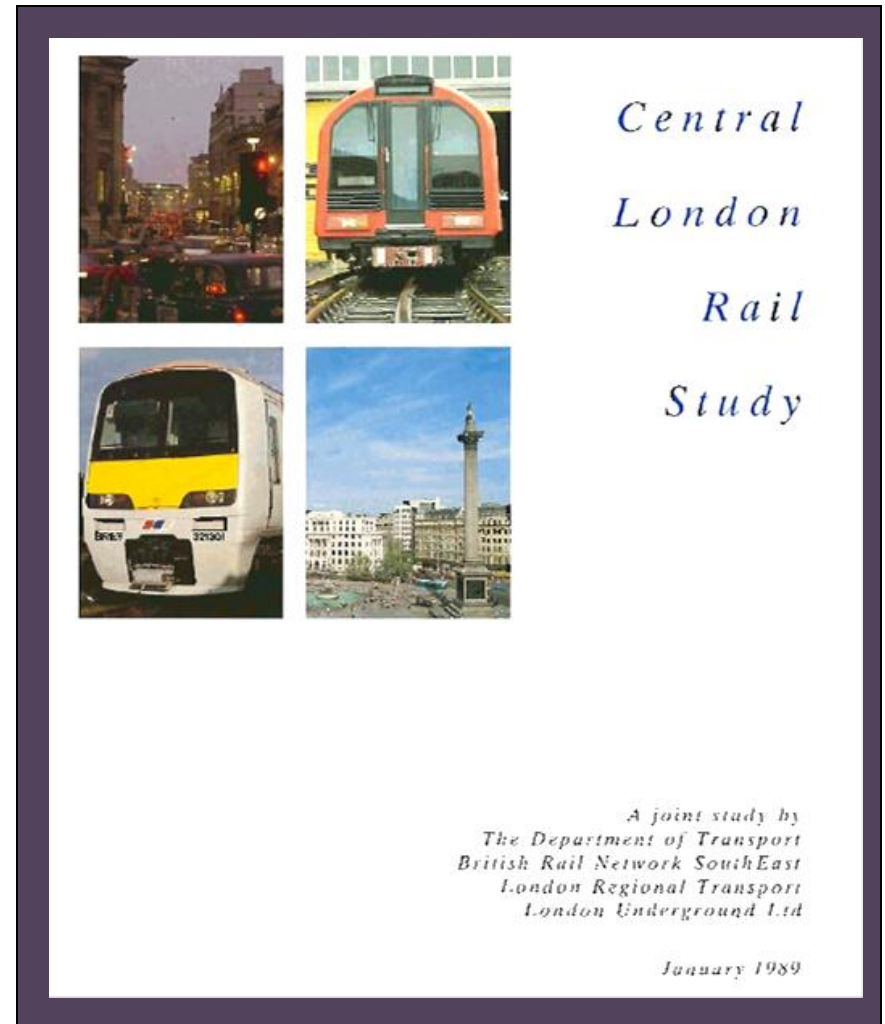


Central London Rail Study (1989)

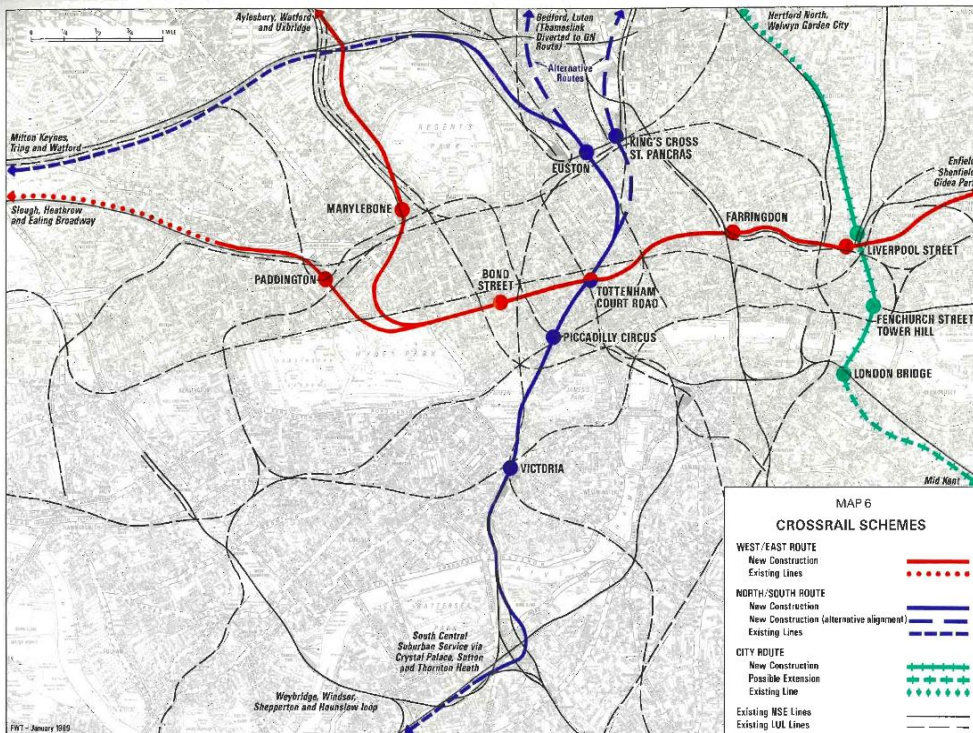
Central London Rail Study (1989)

Secretary of State acknowledges to Parliament that further network capacity will be needed - even after completion of Jubilee Line Extension

Joint study group of Department of Transport, London Underground, British Rail examines the options



Central London Rail Study (1989)



East-West Crossrail
Paddington - Liverpool Street

Chelsea-Hackney Line
Fulham Broadway - Leytonstone

North-South Crossrail
Victoria - Kings Cross

East-South Crossrail
Liverpool St - Victoria
via Tottenham Ct Rd & Green Pk

Central London Rail Study (1989)

narrowed down to two options with Treasury assistance

East-West Crossrail

cost £1.4 bn

CBR 1.32

Chelsea-Hackney Line

cost £1.8 bn

CBR 1.29

➤ recommended option: Crossrail

East-West Crossrail

Paddington - Liverpool Street

Chelsea-Hackney Line

Fulham Broadway - Leytonstone

North-South Crossrail

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East-South Crossrail

Liverpool St - Victoria
via Tottenham Ct Rd & Green Pk

Central London Rail Study (1989)

Crossrail Bill presented to Parliament
1993

Widespread concern over project's
environmental impact, construction
disruption, damage to historic fabric

Treasury unpersuaded, Prime Minister
John Major lukewarm

Crossrail Bill voted out by Parliament at
Committee Stage, 1994

CROSSRAIL

EXPLANATORY MEMORANDUM

This Bill is promoted by London Underground Limited ("the Company") and the British Railways Board ("the Board").

The Bill provides for—

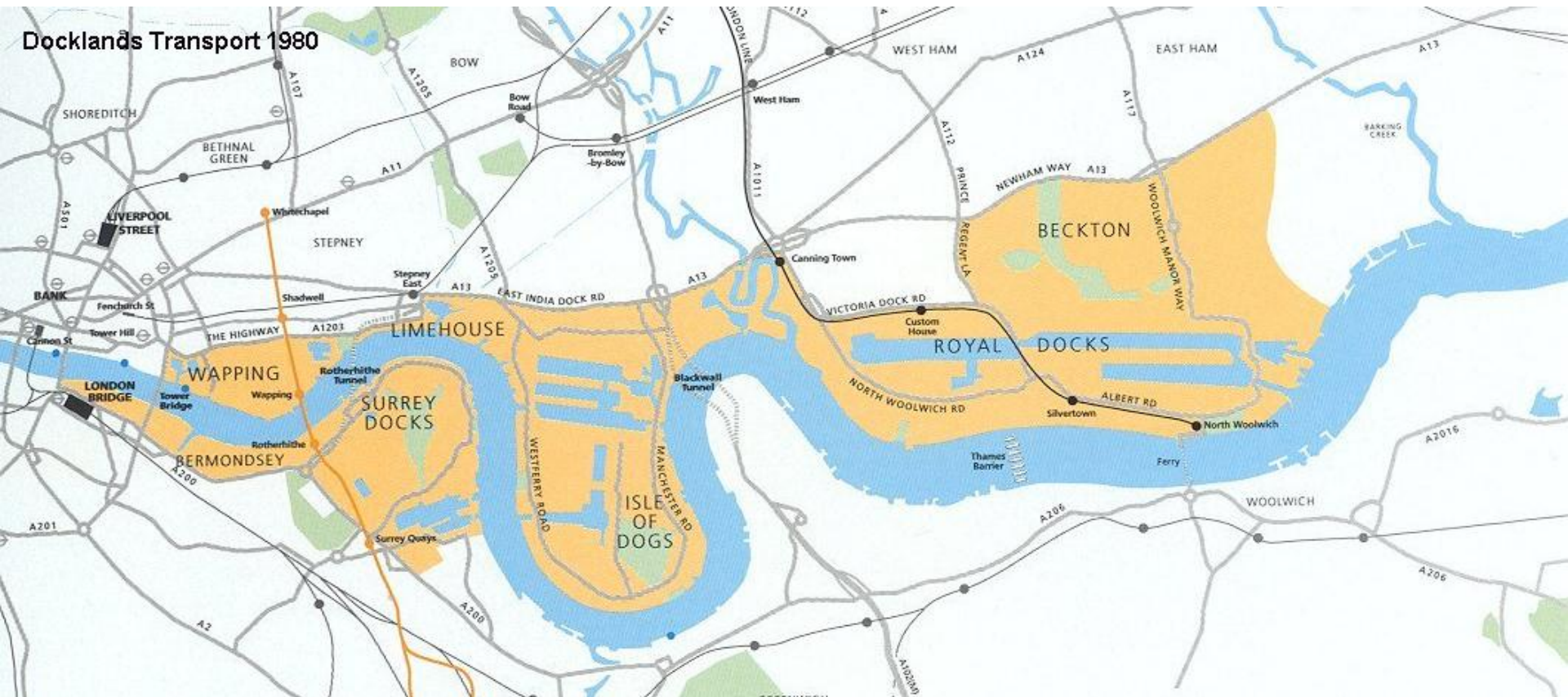
- (a) the construction of a new underground railway commencing west of Paddington Station and terminating east of Liverpool Street Station and connecting, on either side, with existing railways of the Board;
- (b) the construction of a new railway on the Thames Valley railway at Old Oak Common to connect the new underground railway with the Metropolitan and Chiltern lines; and
- (c) the construction of a further connection at Hayes on the Thames Valley railway with the proposed rail link to Heathrow Airport authorised by the Heathrow Express Railway Act 1991 for services using the new underground railway;

and includes additional works in Greater London, Berkshire, Buckinghamshire and Hertfordshire for the provision of direct railway services, across Central London, between those areas and places east of London.

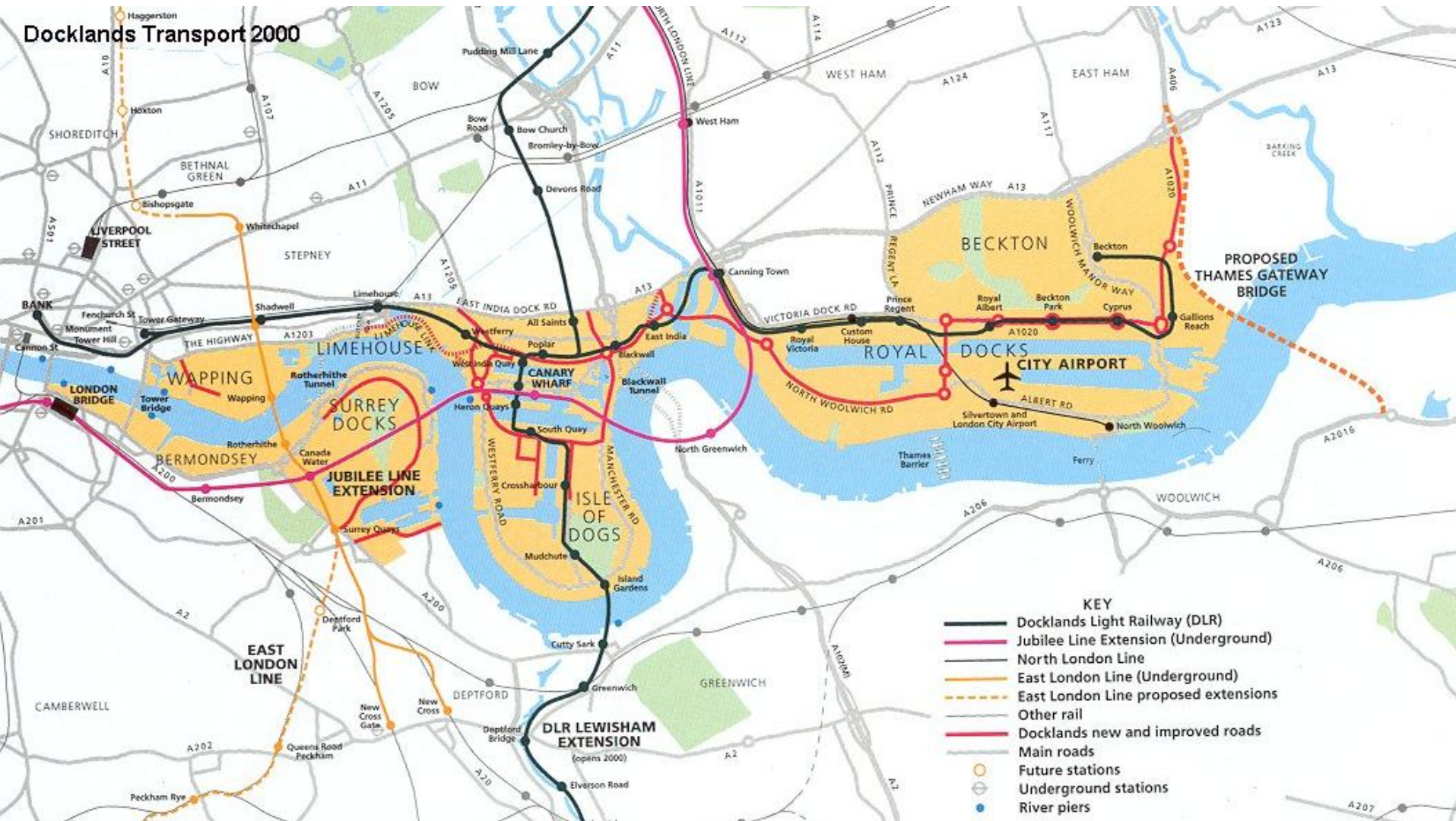


Docklands - the driver of change

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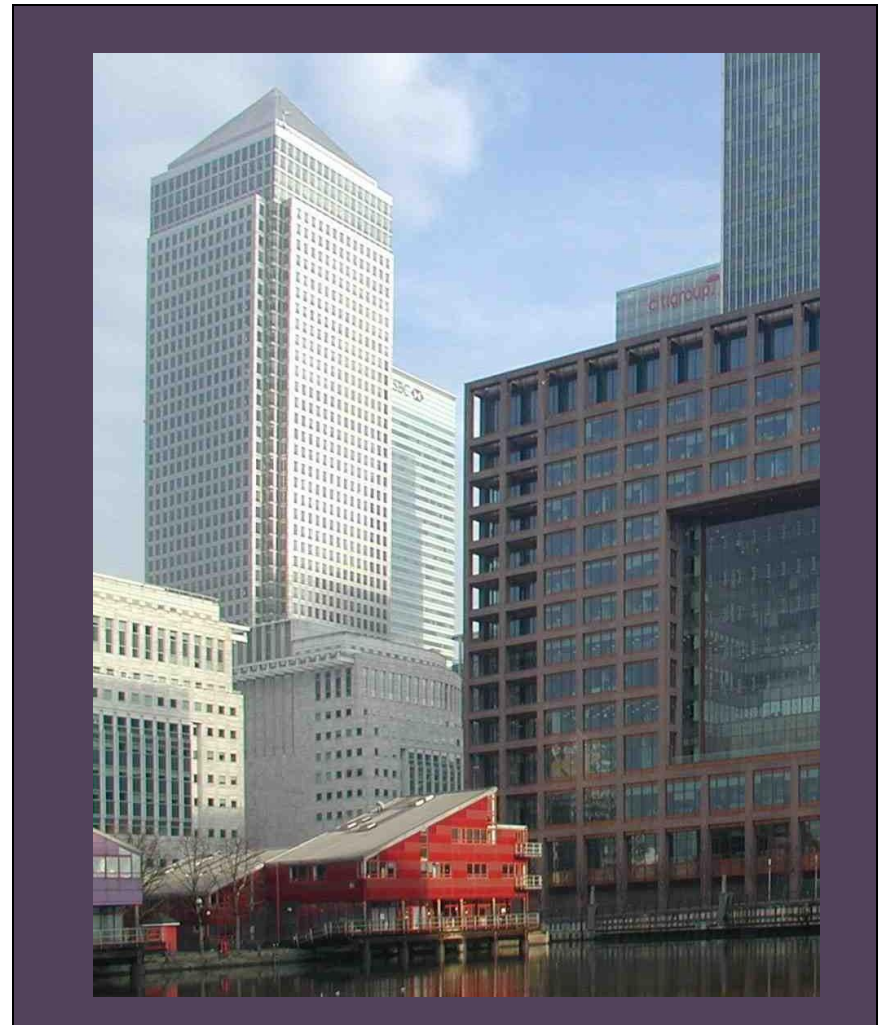


Docklands - the driver of change

sustained growth around the Canary Wharf hub, 02, Stratford, London City Airport - & trajectory predicted to continue

travel demand outstrips new capacity on DLR and Jubilee Line extensions

Mayor Ken Livingstone's *London Plan* (2004) sees West End, City and Docklands joined together by infrastructure into 'a virtual unified economic & business core'



Crossrail - on or off ?

Crossrail - on or off ?

2003 Department of Transport sets up 'Cross London Rail Links' (CLRL) in partnership with TfL and Strategic Rail Authority

Olympia & York successfully lobby for alignment through Isle of Dogs to serve Canary Wharf

2005 London Crossrail Bill submitted to Parliament - three and a half years of petitioning, debate and scrutiny, with Design Review for stakeholders

2008 July Royal Assent



Crossrail - on or off ?

2009 May construction phase launch at
Canary Wharf by Prime Minister
Gordon Cameron and Mayor Boris
Johnson



Crossrail - on or off ?



2009 financial crisis, market crash, demands for the £1bn project to be stopped
 2010 October Comprehensive Spending Review confirms 'value for money'
 2011 May - tunnelling contracts signed, 'momentum unstoppable'

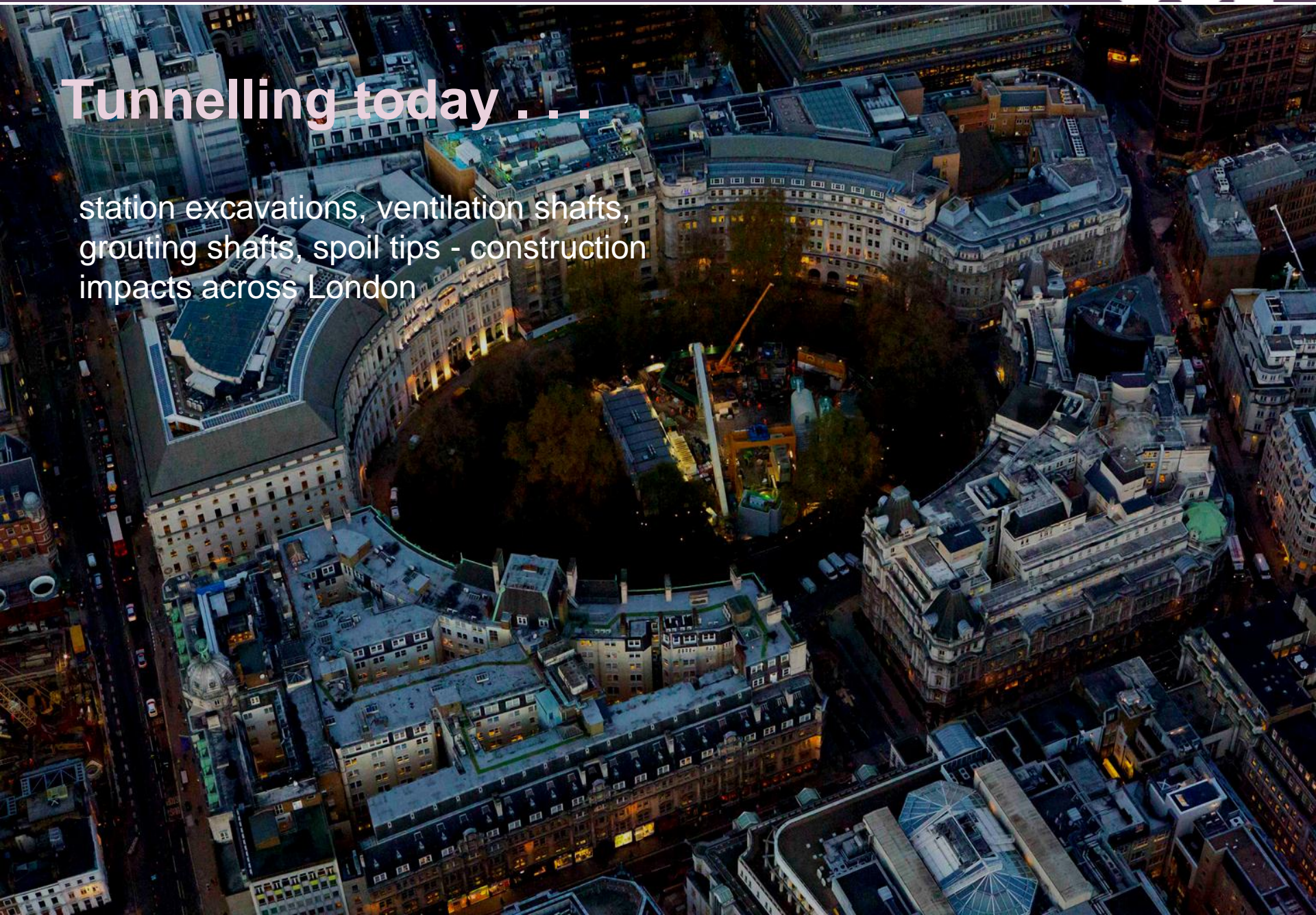
Tunnelling today . . .

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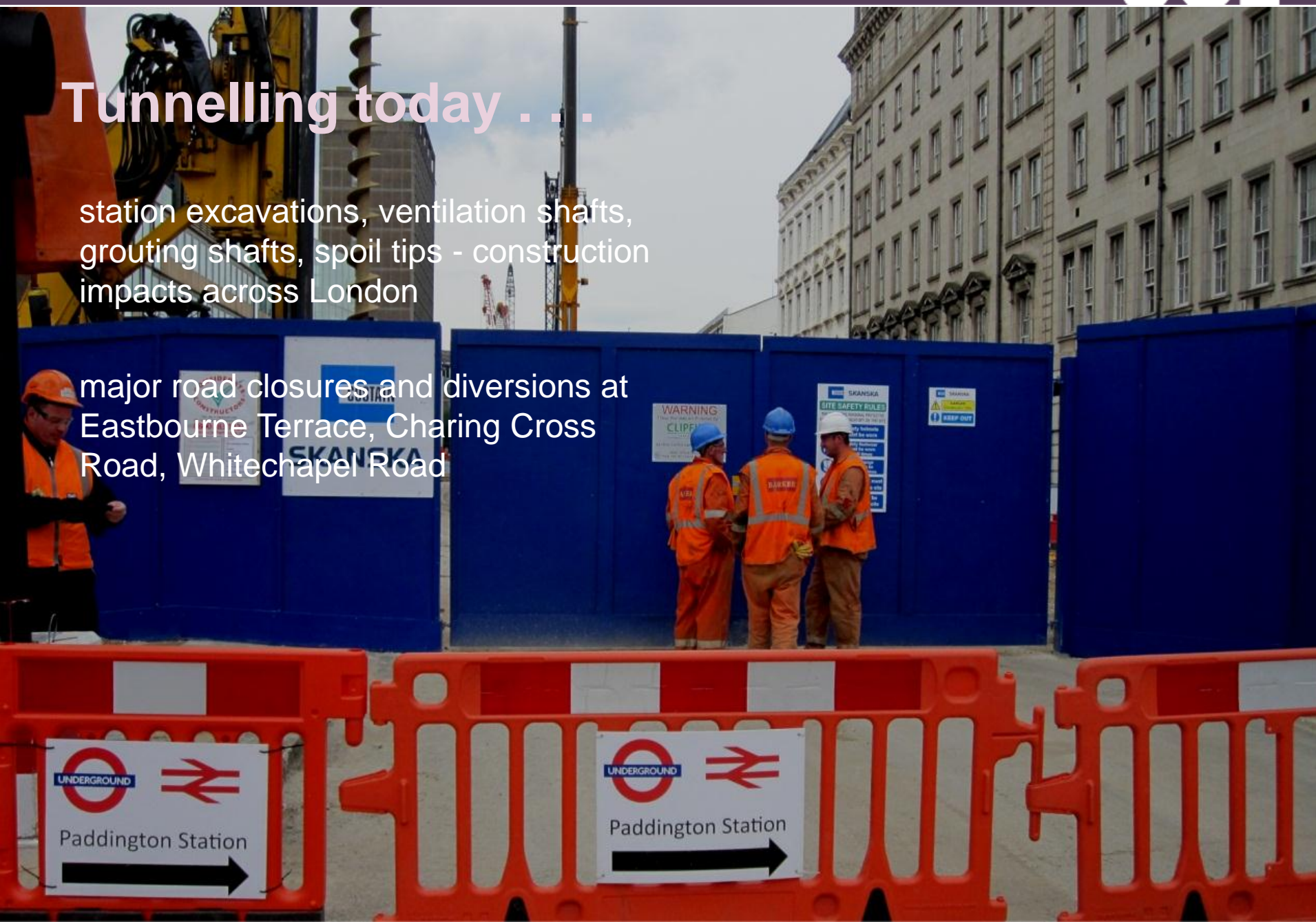
station excavations, ventilation shafts,
grouting shafts, spoil tips - construction
impacts across London



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major road closures and diversions at
Eastbourne Terrace, Charing Cross
Road, Whitechapel Road



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Sept 2012 Tunnelling & Underground
Construction Academy launched in Ilford



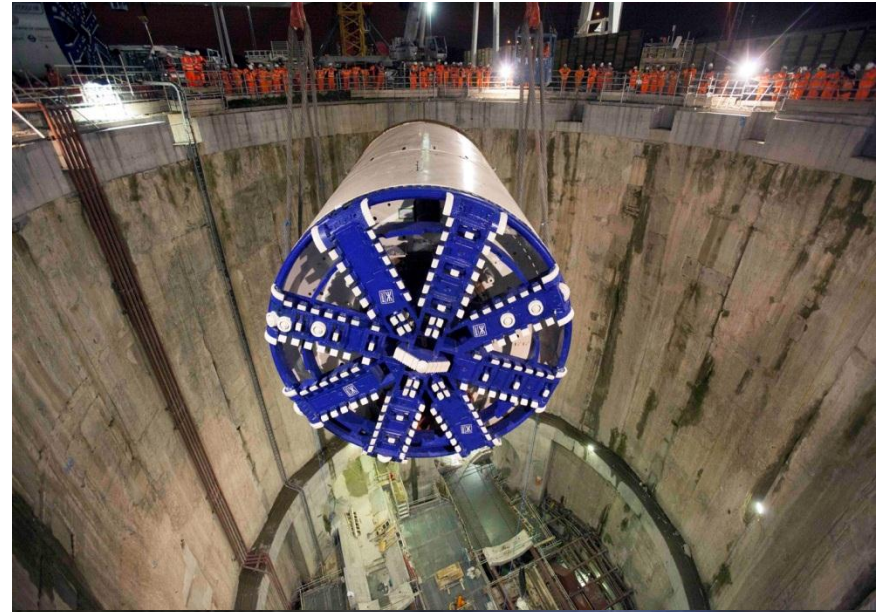
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Sept 2012 Tunnelling & Underground
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January 2013, 5 tunnel boring machines
(TBMs) excavating under London -
Phyllis, Ada, Elizabeth, Victoria and
Sophia



Tunnelling today . . .

intersections of Crossrail tunnels and excavations with earlier infrastructures of underground London

enlargement and integration of ticket halls, eg
Tottenham Court Rd

reutilization of earlier tunnels, eg
Connaught Tunnel under Royal
Victoria Dock and Royal Albert
Dock

Kingsway Tram Tunnel (grout
injection shaft)



Tunnelling today . . .

Civil engineering as media spectacle:
'double-decker bus' statistics

time-lapse web cams, construction
videos, bird's-eye flyovers, picture
galleries, **Near You** mapping tool

Crossrail tomorrow

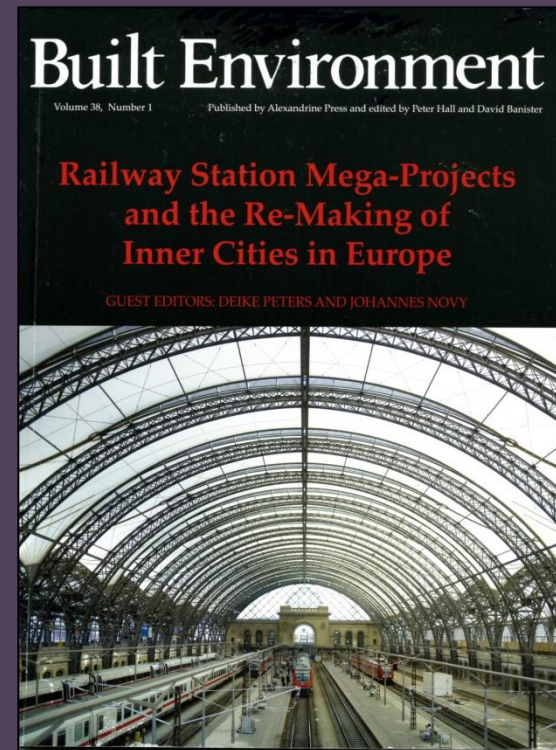
Crossrail tomorrow

a megaproject expected to carry
200,000,000 passengers per year

real estate portfolio of 2.5m sq foot
above stations and other sites worth
estimated £1.6 billion

GVA estimate total property uplift of £5.5
billion

public realm improvements of £90m



Crossrail tomorrow

designed to minimise environmental impact and disruption of urban fabric – ‘megaproject as keyhole surgery’



Crossrail tomorrow



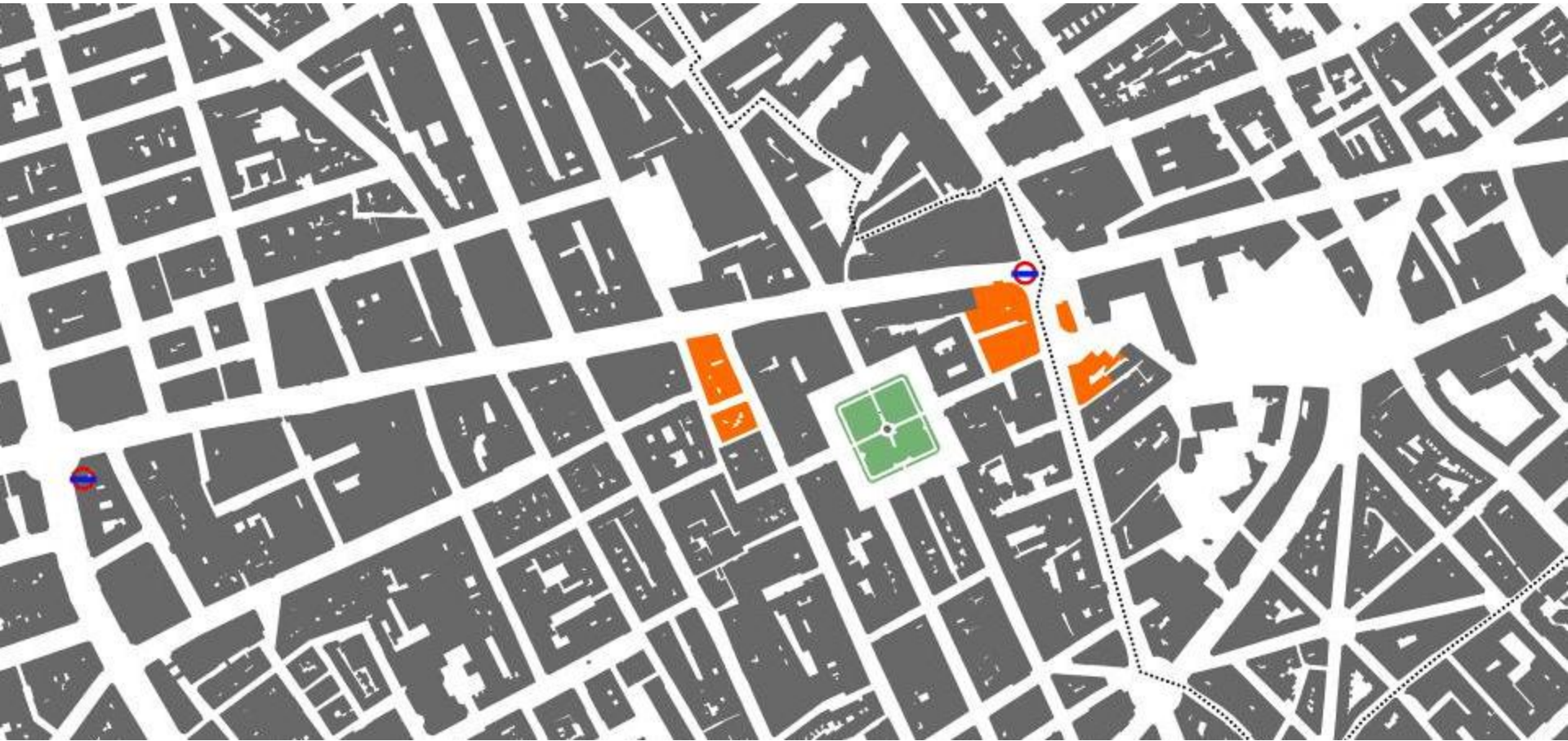
Paddington Station with Crossrail platforms under Eastbourne Terrace

Crossrail tomorrow



Bond Street Station with eastern ticket hall on Hanover Square

Crossrail tomorrow



Tottenham Ct Rd Station with new integrated ticket hall under Charing Cross Rd

Crossrail tomorrow



Tottenham Ct Rd Station with new integrated ticket hall under Charing Cross Rd

Crossrail tomorrow



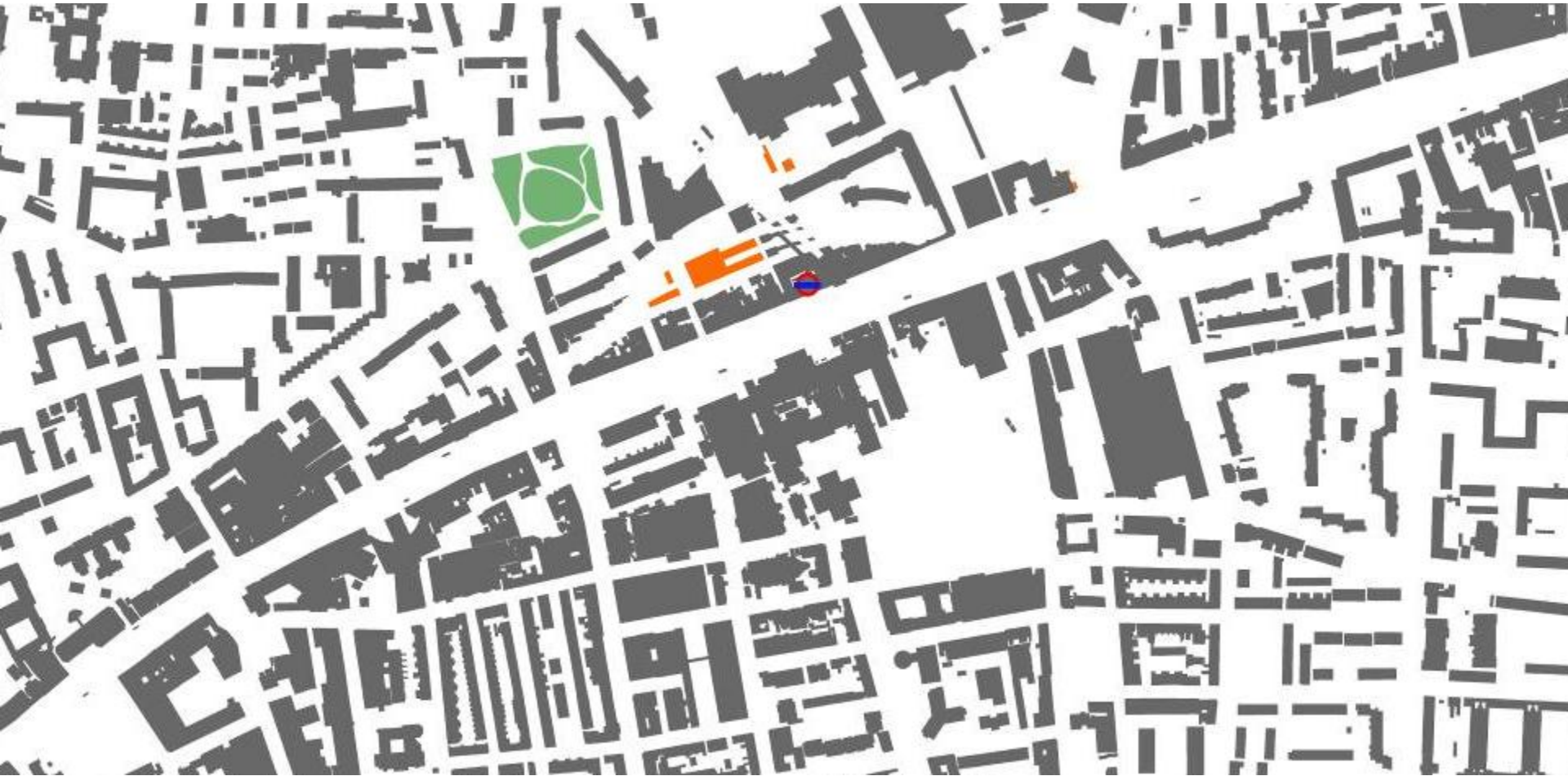
Farringdon – connection to Thameslink - London's Chatelet-Les Halles

Crossrail tomorrow



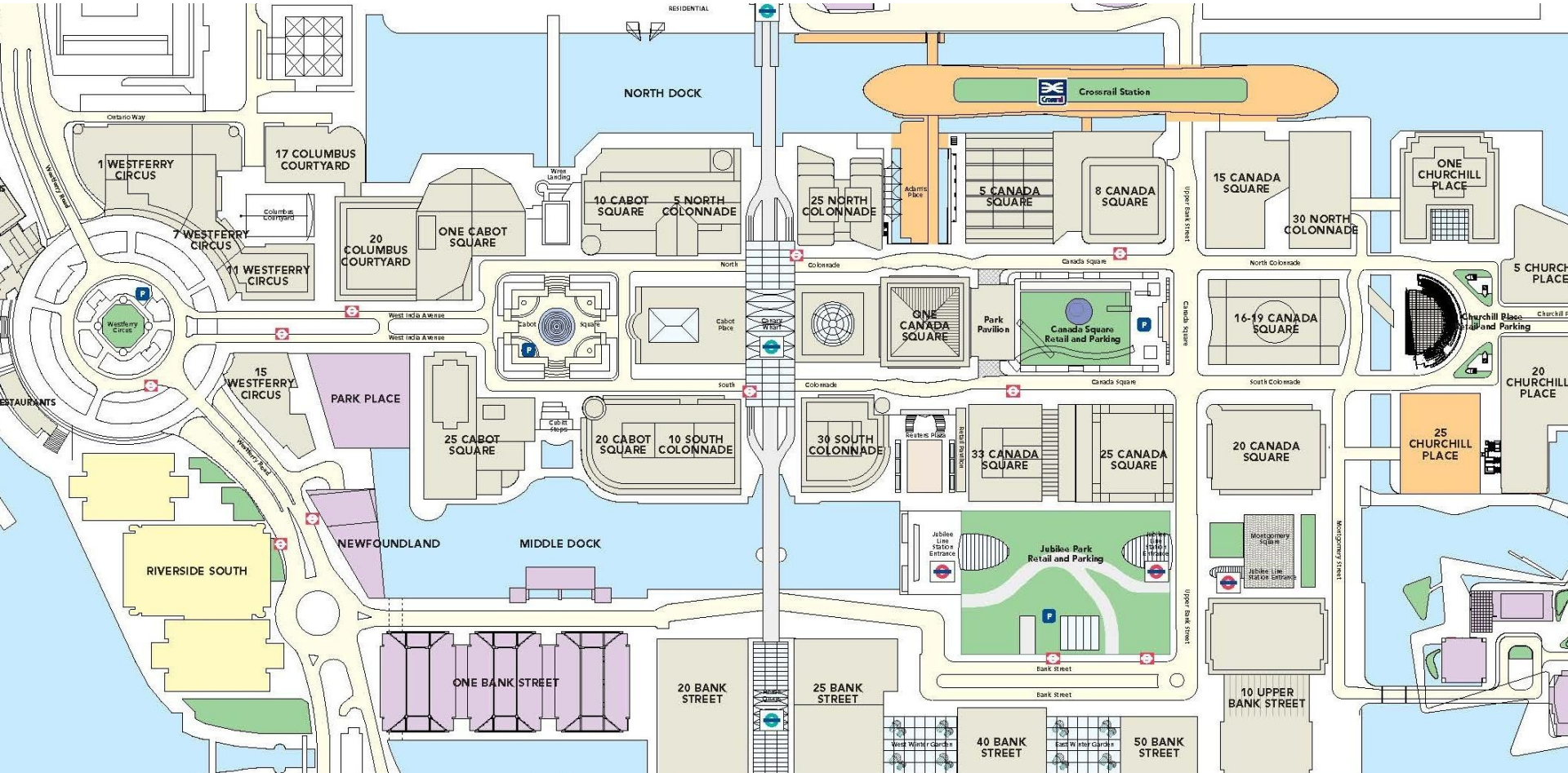
Liverpool St Station with western ticket hall at Moorgate

Crossrail tomorrow



Whitechapel Station inserted behind existing London Underground entrance

Crossrail tomorrow



Canary Wharf - completing its trio of stations with Crossrail located in the Import Dock

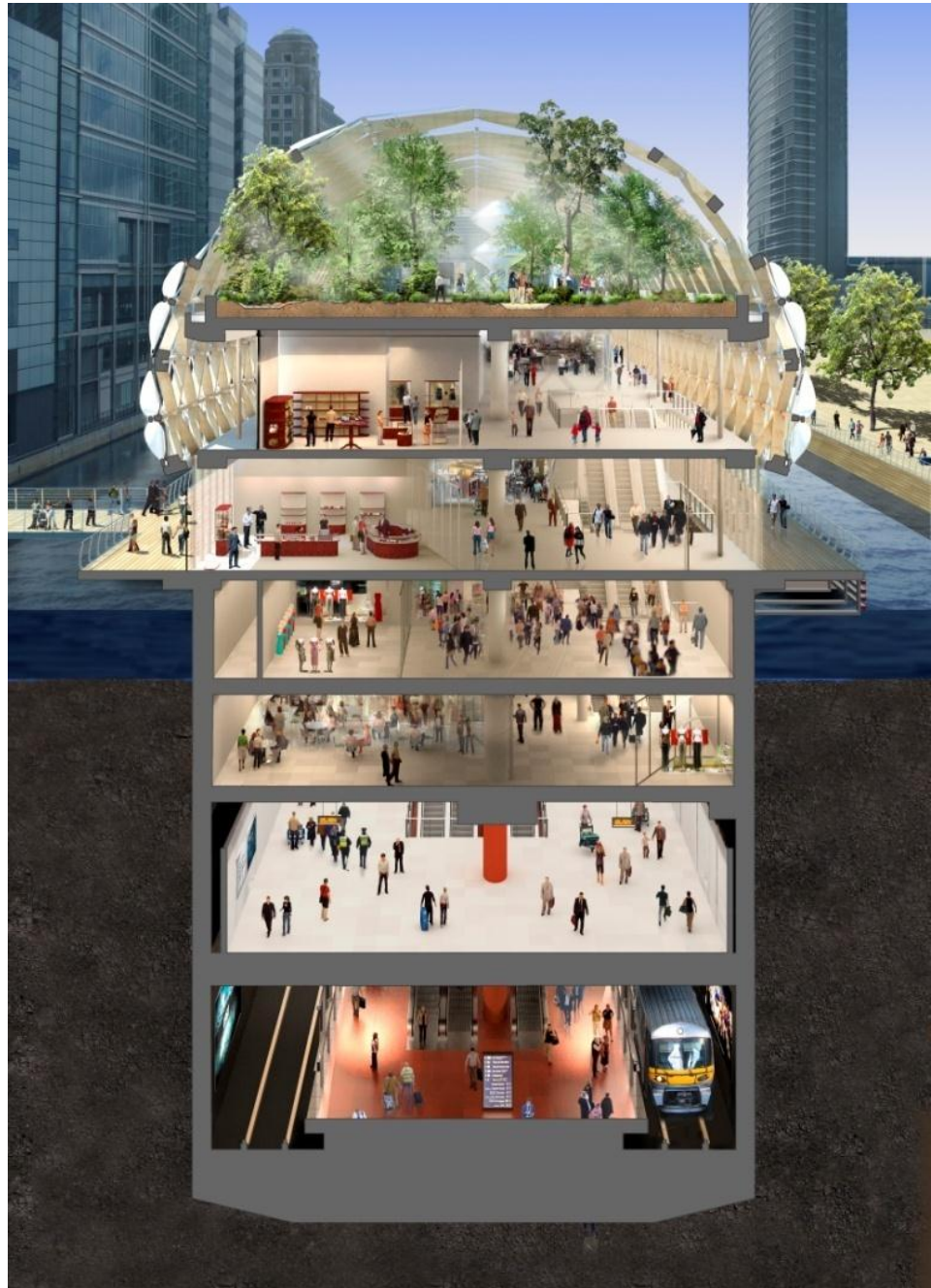
Crossrail tomorrow



Canary Wharf - completing its trio of stations with Crossrail located in the Import Dock

Crossrail tomorrow

and then . . . job done, London's expert tunnellers can turn their hand to upgrading the Northern Line



www.crossrail.co.uk

