
Beyond the Elephant

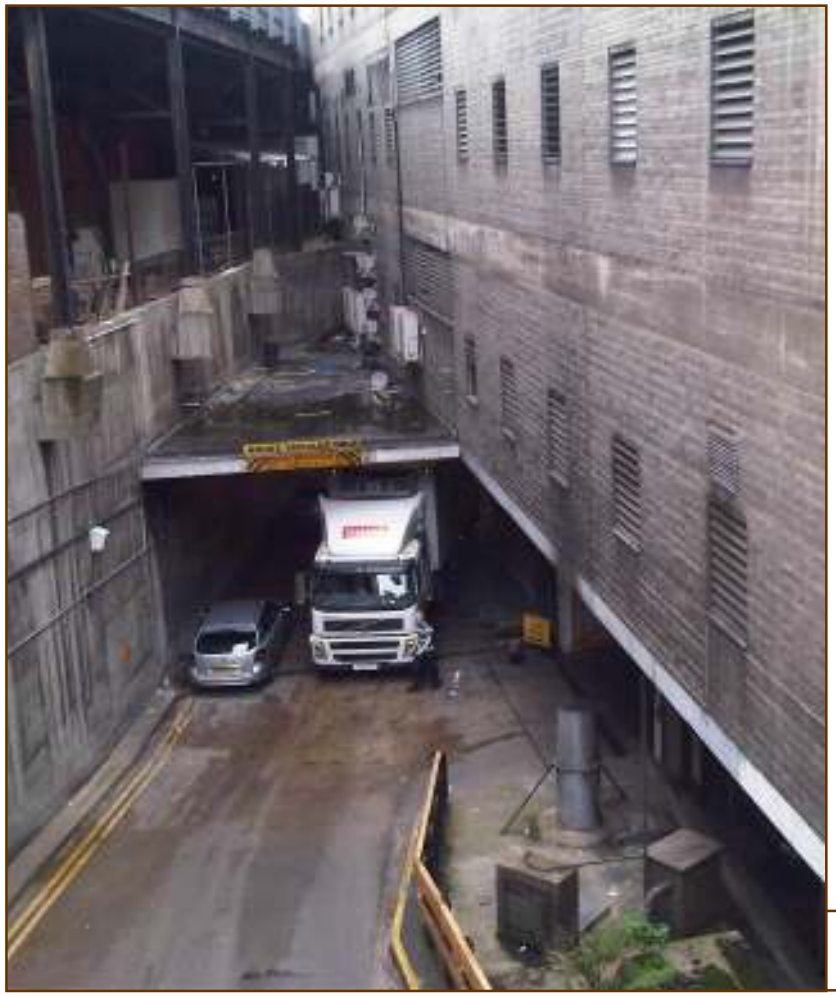
Beyond the Elephant

Extending the Bakerloo

Jonathan Roberts, JRC

at LURS, 13 September 2011

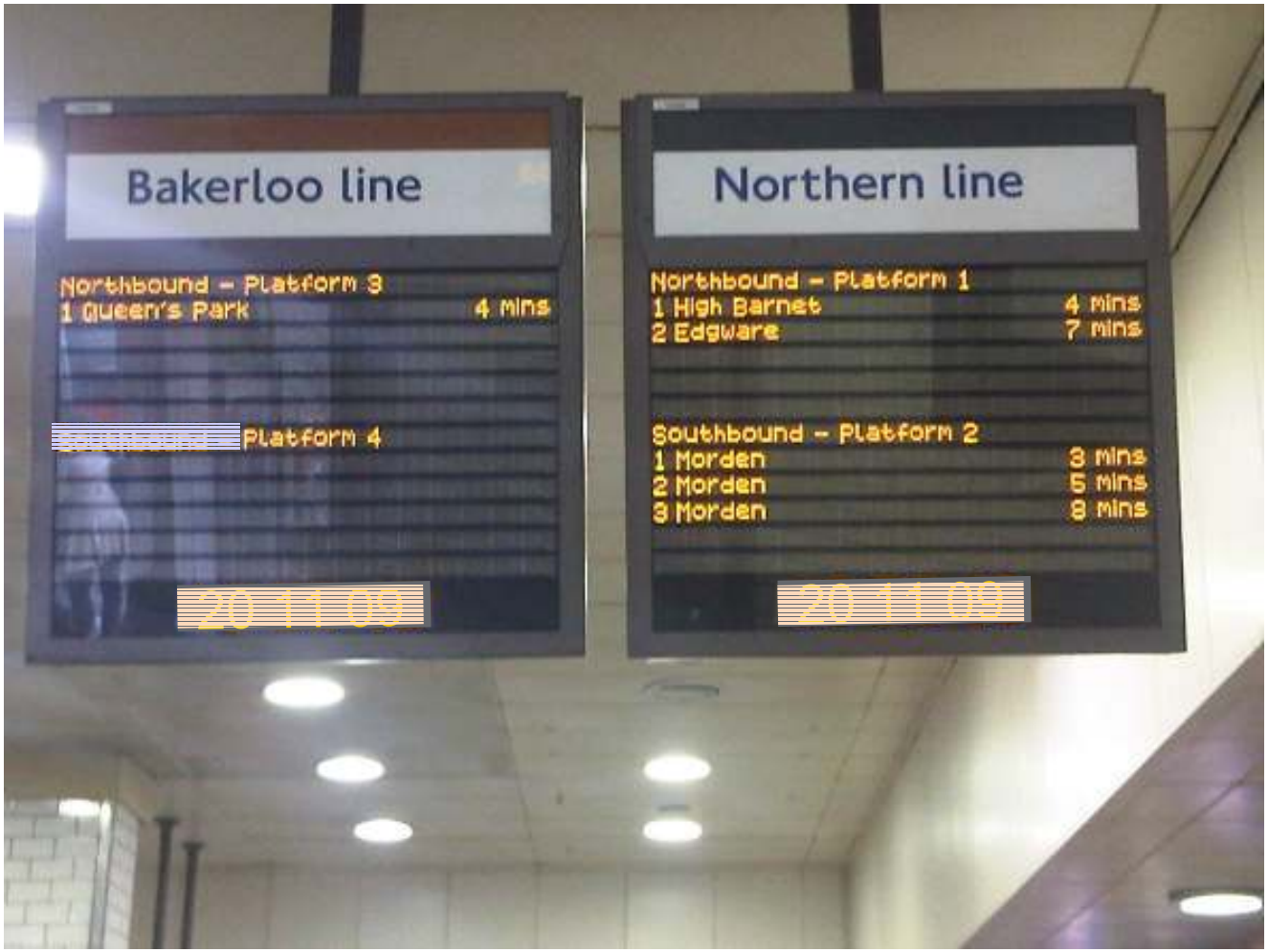
Starting points



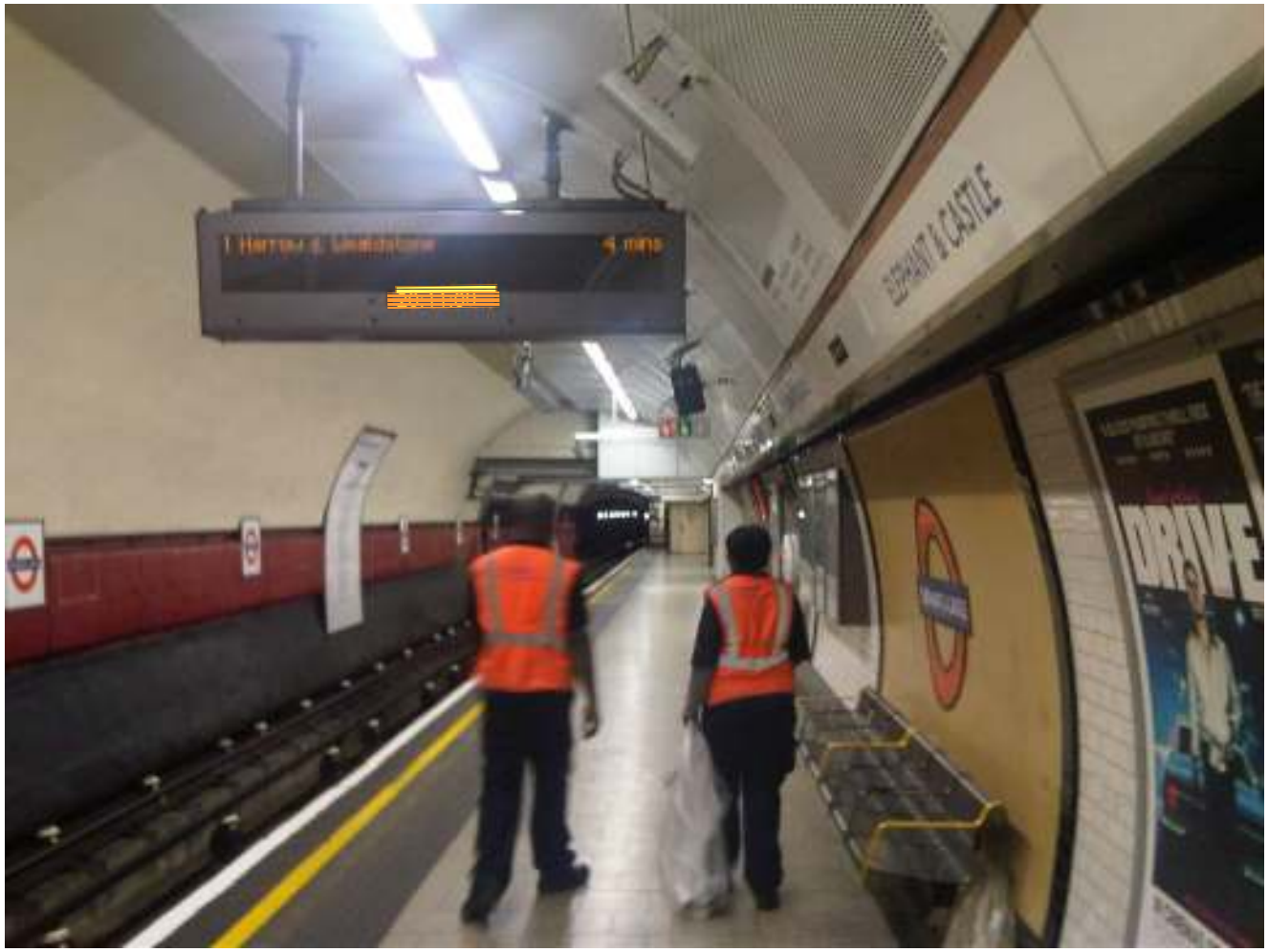
northbound

southbound

Real time information



Looking SE




NT & CASTLE
bound trains: Bakerloo line
ELEPHANT & CASTLE

Background to JRC report

- Request by Lewisham Council's Sustainable Environment Select Committee
- Commentary on the potential for Bakerloo extension
- September 2010 report, committee meeting
- Stimulus for action by Lewisham and other stakeholders

JRC

Projects and their politics

- Lobbying and stakeholder briefing
- Political liaison
- Consultation with stakeholders
- Technical analysis
- Official reports
- Inquiry evidence

Topics in JRC report

- What tube options are ***not*** possible
- Rationale for recent schemes
- Potential purposes of extensions
- Possible routes and specifications
- A feel for costs and other factors
- Timescales and project priorities

Further topics today

- Update on official thinking
- Spending pressures and priorities
- Demand indicators
- Project risks and other ‘lions in the path’
- A wider South and SE London approach
- Stakeholders and politics

Bakerloo - SE history so far

At least 9 chances in 85 years


Ideas and inquiry in 1920s


Case made to Camberwell, 1931 Act


In early 1935-40 New Works


Among ideas for 1940-50 New Works


1949 Camberwell project

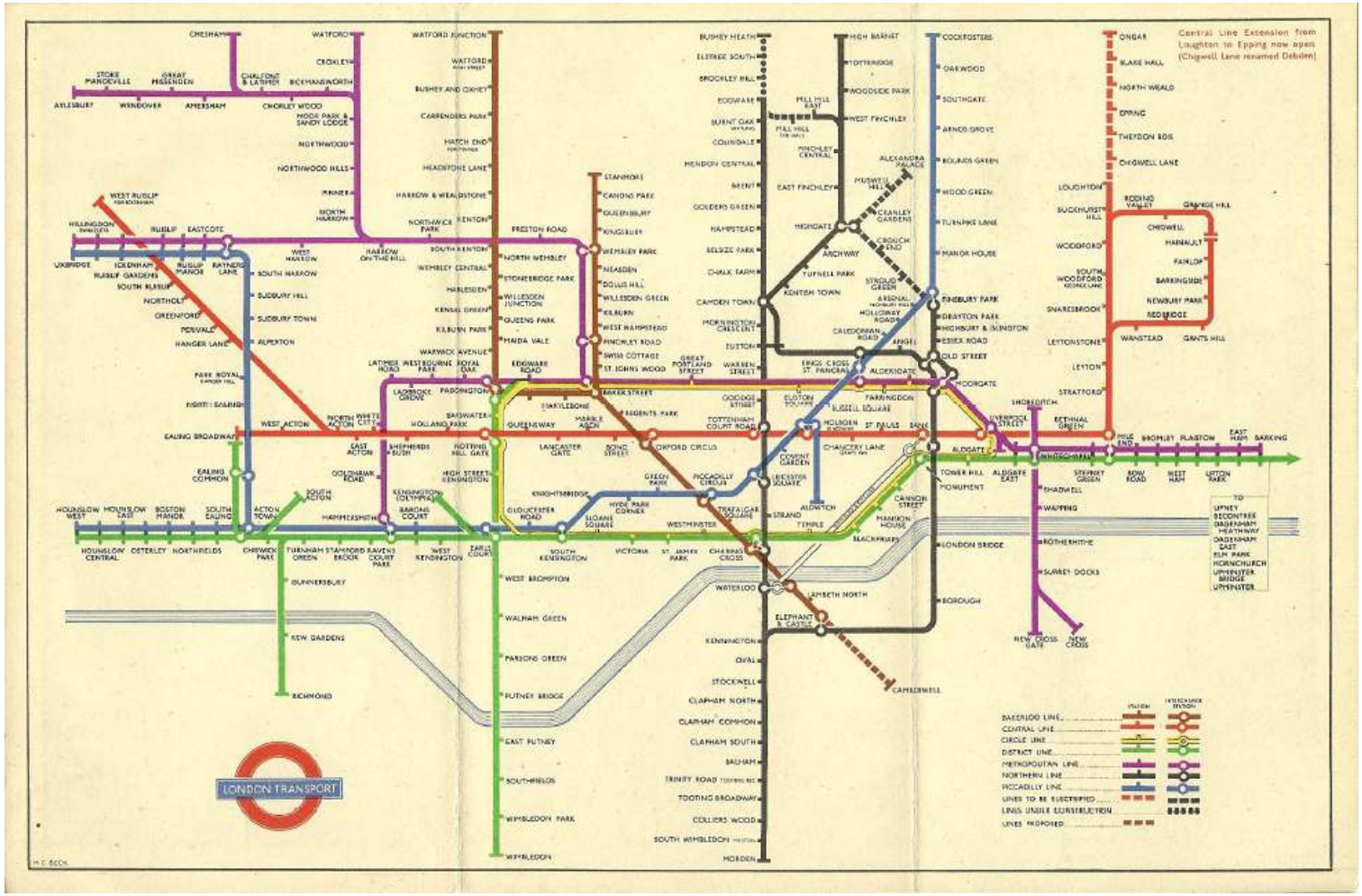

1957 LT South London studies


1965 Railway Plan for London


1970s scheme to Peckham


1980s scheme to Docklands

June 1949 tube map



Past route options

It’s the straight line which is unusual!

See the 1990 options for SE London, and predecessors

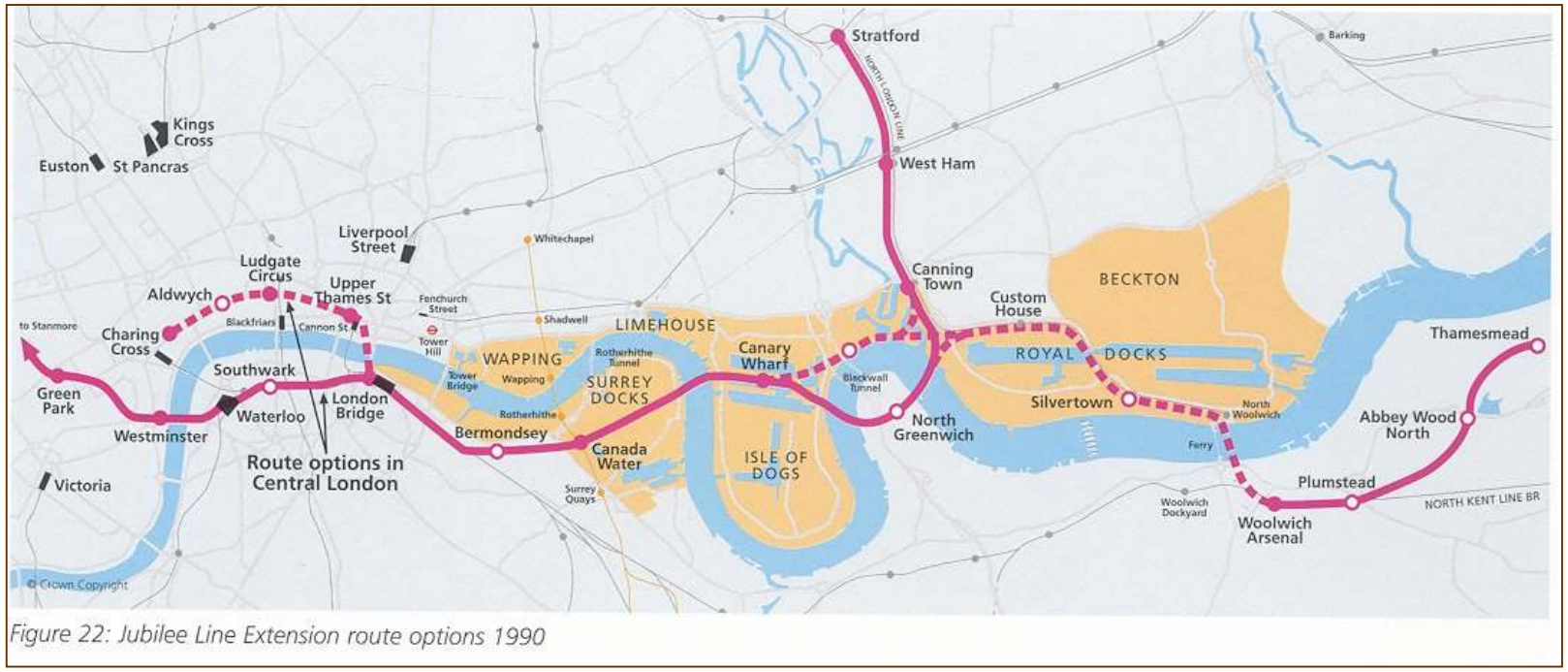
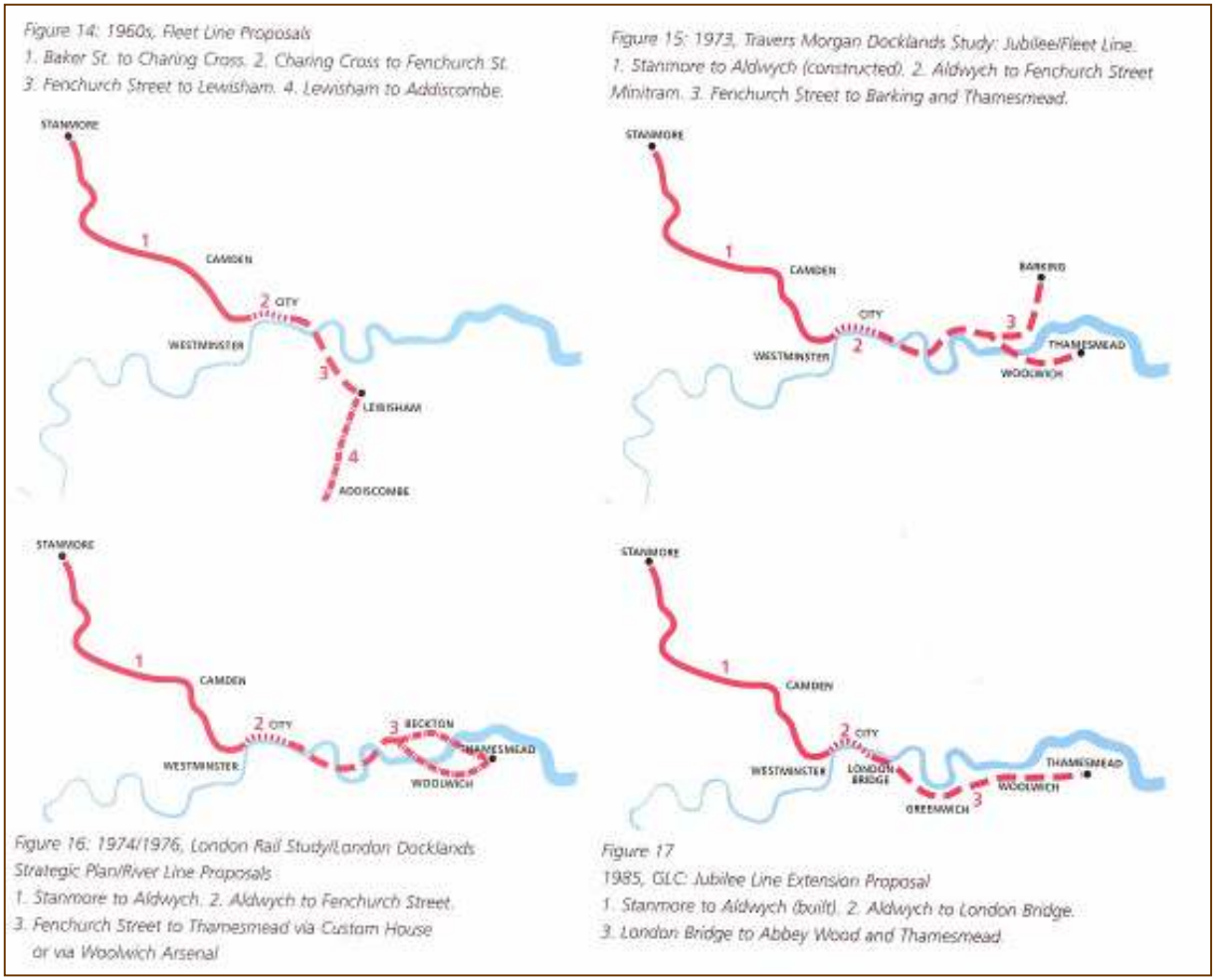


Figure 22: Jubilee Line Extension route options 1990

Source: http://www.lddc-history.org.uk/transport/tranmon3.html

Past route options



Past route options

Figure 18: 1988, Olympia & York: Bakerloo Line Extension
1. Waterloo to Isle of Dogs via London Bridge
2. Waterloo to Isle of Dogs via Bricklayers Arms.
3. Isle of Dogs to Stratford and Tottenham Hale
4. Isle of Dogs to Beckton.

Figure 19
1988, Olympia & York: Docklands Second Rail Line
Waterloo to Westcombe Park

Figure 20: 1989, Central London Rail Study: Jubilee Line Extension
1. Aldwych to Ludgate. 2. Ludgate to Stratford
3. Ludgate to London Bridge. 4. Stratford to Ilford.
5. Stratford to Hainault.

Figure 21: 1990, East London Rail Study: Jubilee Line Extension
1 Green Park to Stratford – now under construction
2 Aldwych to London Bridge via City
3 Canary Wharf to Canning Town via Leamouth
4 North Greenwich to Thamesmead

Lessons from history

Five main criteria to be met

- Business case
- Merits and priority against other projects
- Government and stakeholder backing
- Funding / financing
- Affordability

Any case for an extension?

- Lack of line doesn't justify automatically!
- In Mayor's revised Transport Strategy
- Recent ideas within official rail planning
- Not limited to SE London
- Needs to show wide benefits
- **Unlikely as tube project in isolation**
  - more likely as part of wider strategy

Recent examples

Projects driven by over-riding capacity and access priorities

- 1970s split Bakerloo NW into two lines
- 1990s Jubilee extension to Docklands and Stratford
- 2000s East London Line
- 2010s Crossrail, Thameslink

Mayor's transport strategy

MTS May 2010

- **TfL Business Plan > ~~2017/18~~ now 31 March 2015**
- **Unfunded projection > 2031**

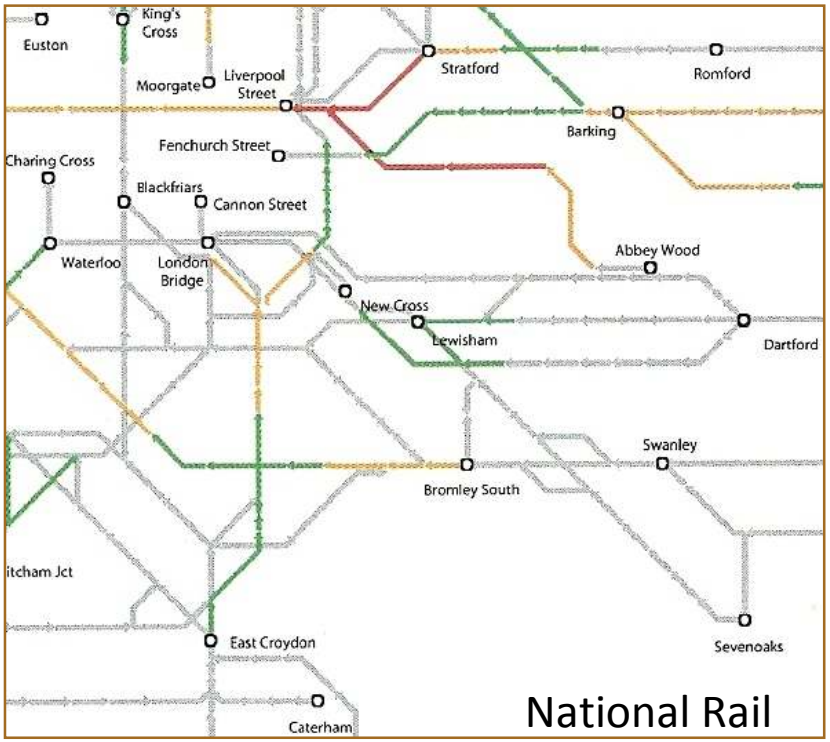
- Support economic development and population growth
- Enhance the quality of life for all Londoners
- Improve the safety and security of all Londoners
- Improve transport opportunities for all Londoners
- Reduce transport's contribution to climate change and improve its resilience
- Support delivery of the London 2012 Olympic and Paralympic Games and its legacy

MTS and Bakerloo SE

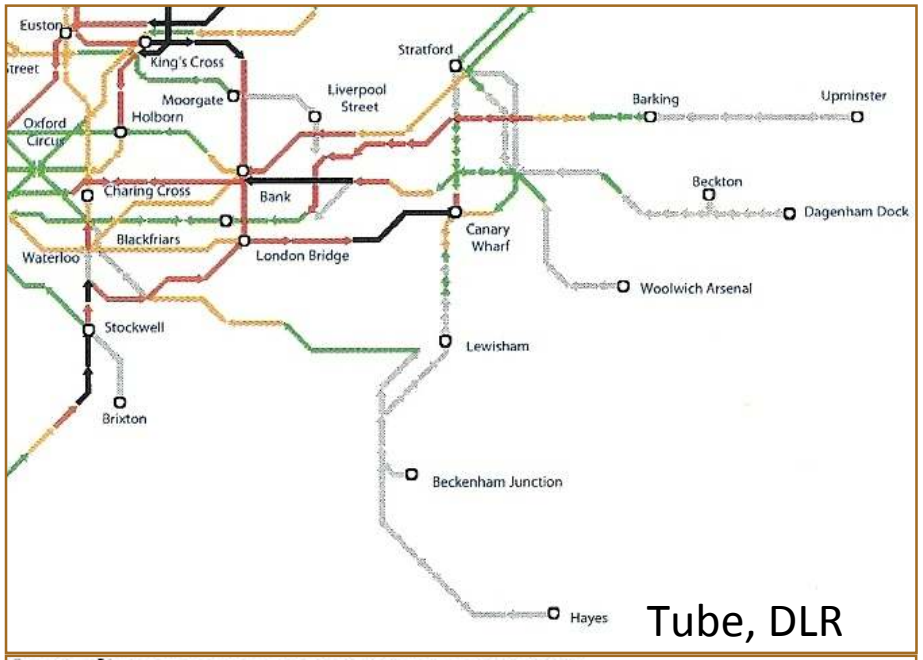
Various aspiring statements

- By 2020, Bakerloo Line tube upgrade will be complete
- Lighter, more energy efficient, higher capacity Bakerloo trains – and more of them
- Important NW-SE strategic role for Bakerloo
- Serve regeneration zones: Harlesden, Paddington, Elephant & Castle, inner SE London
- Improve transport accessibility
- Free up National Rail capacity at London Bridge
- **Project to be reviewed further: no funding or timescale**

MTS crowding levels in 2031



National Rail

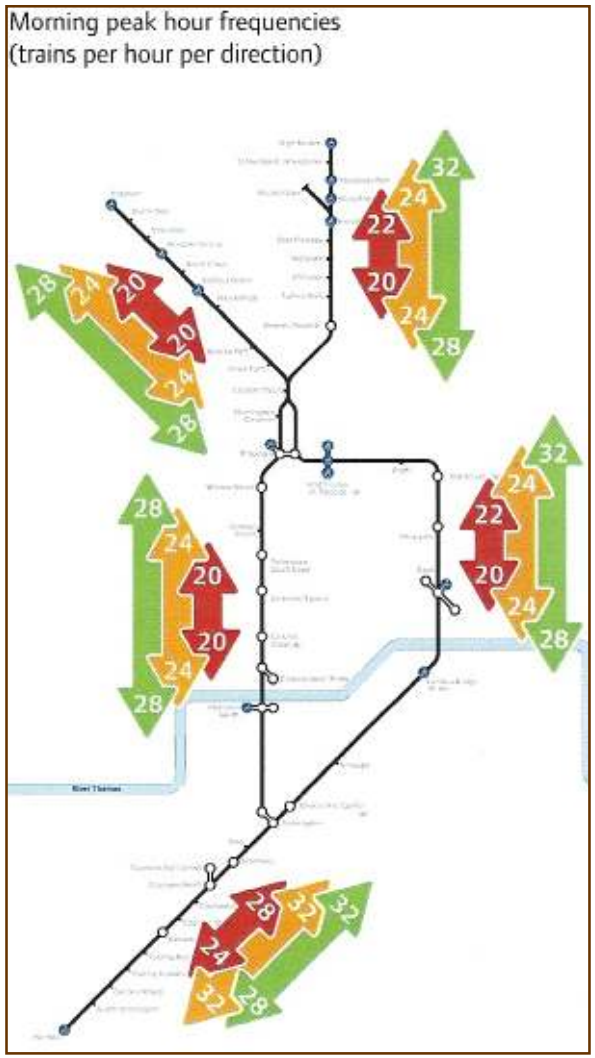


Tube, DLR

If all preferred schemes proceed

Tube upgrade example

- Northern Line example here:
- Bakerloo is last in the queue
- Now late 2010s **or later** (affordability, project basis)
- Issues will arise, eg depot, station and termini capacity
- **Desirable to design upgrade to allow for any extensions NW and SE**

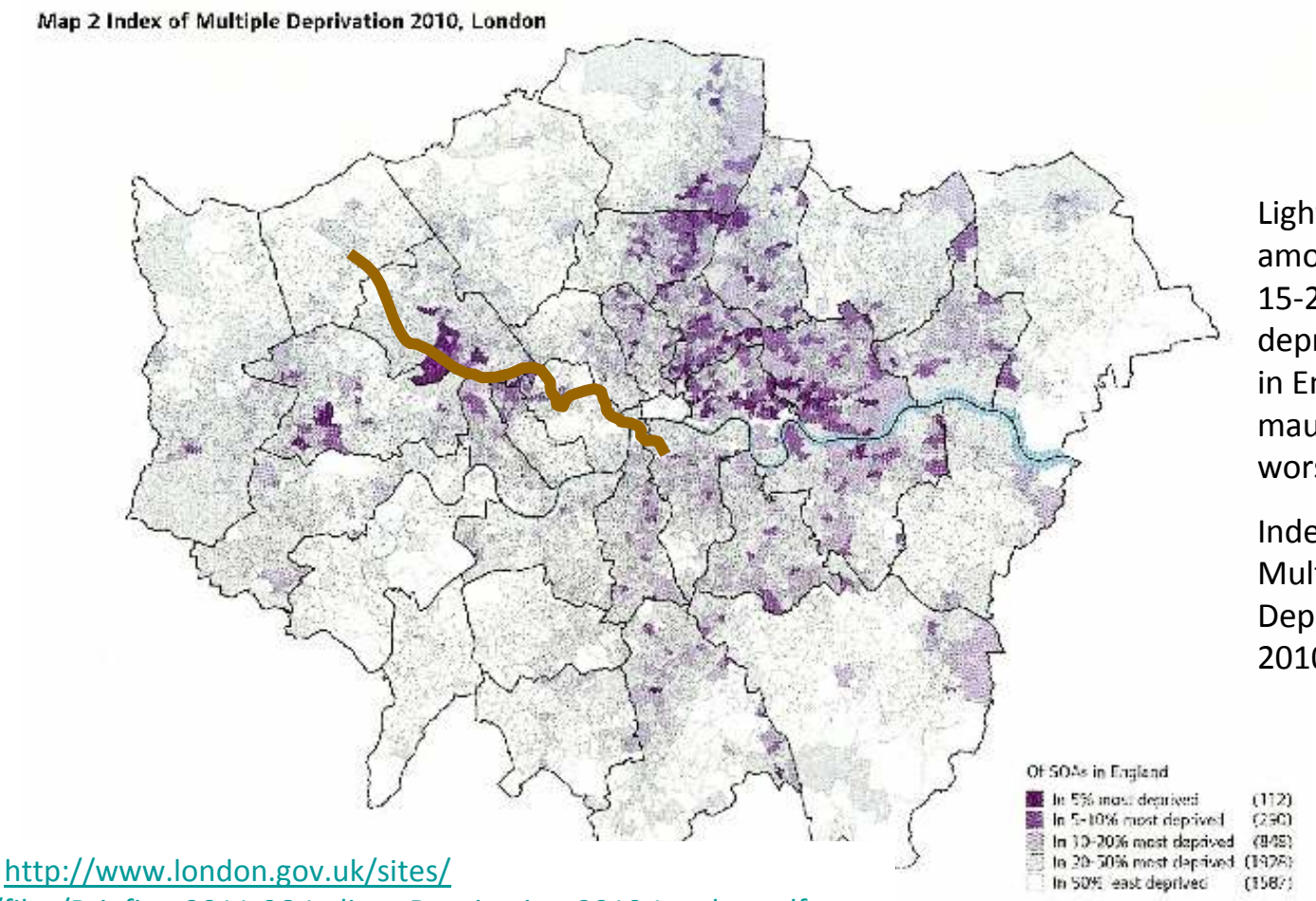


Reasons now and future?

Six main elements

- Regeneration & skills & access
- Investment and economic growth zones
- Capacity vs. demand on rail & transit
- Housing & population growth
- Environment / petrol prices / low carbon
- Slots released on main line tracks

Regeneration needs

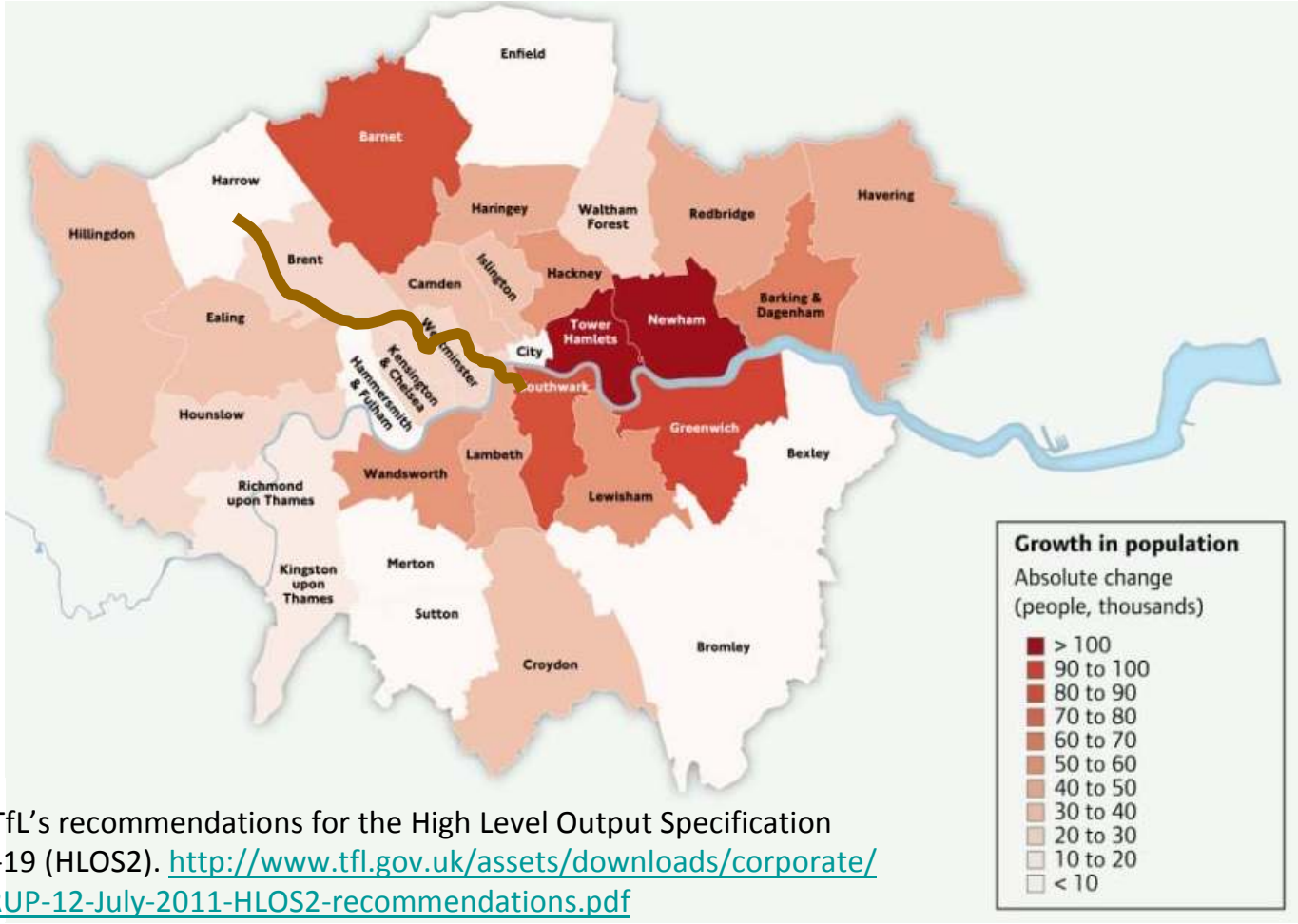


Light pink is among worst 15-20% deprivation in England, mauve is in worst 5%.

Index of Multiple Deprivation 2010

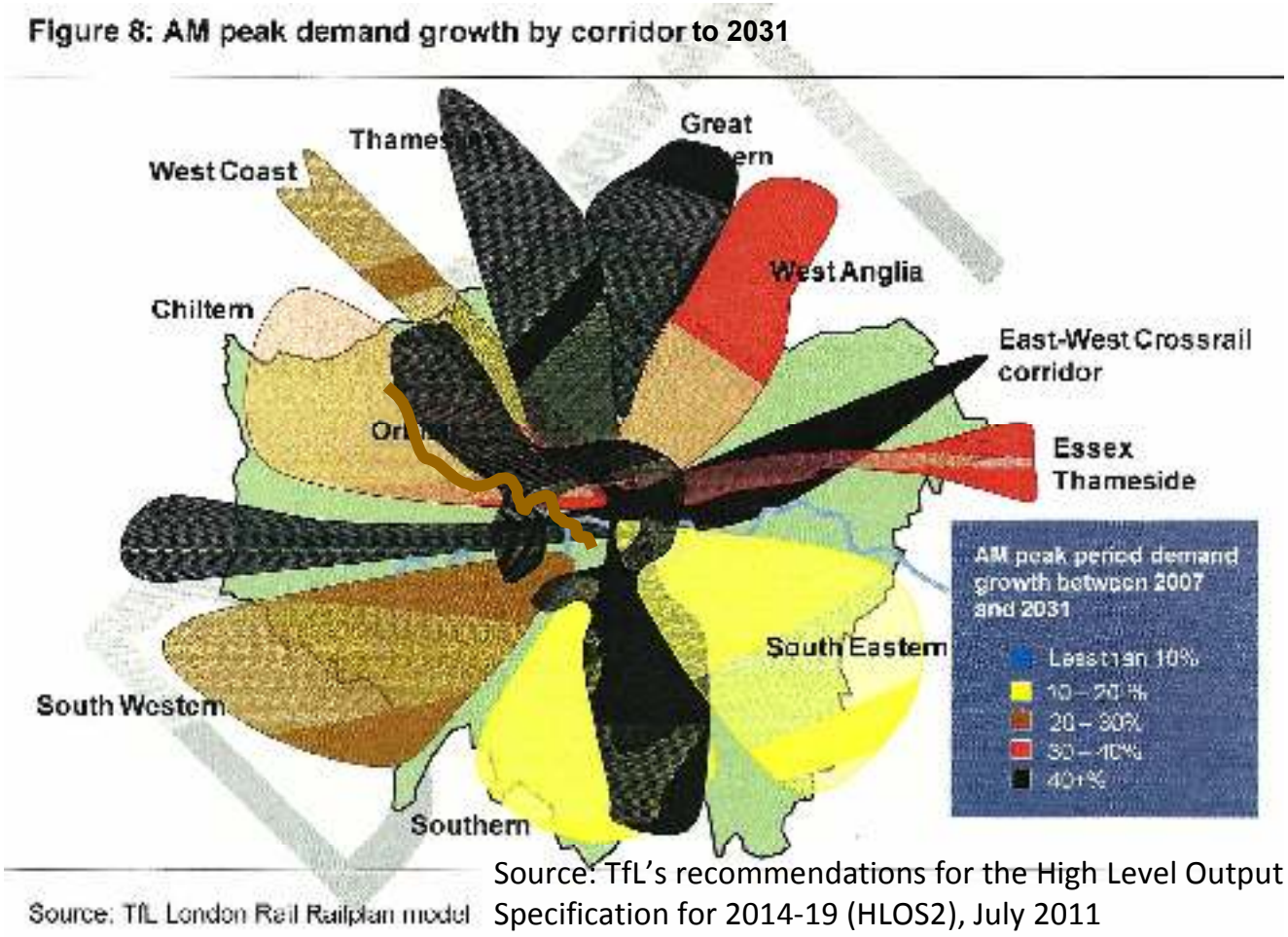
Source: http://www.london.gov.uk/sites/default/files/Briefing-2011-06-Indices-Deprivation-2010-London.pdf

Investment & economic growth



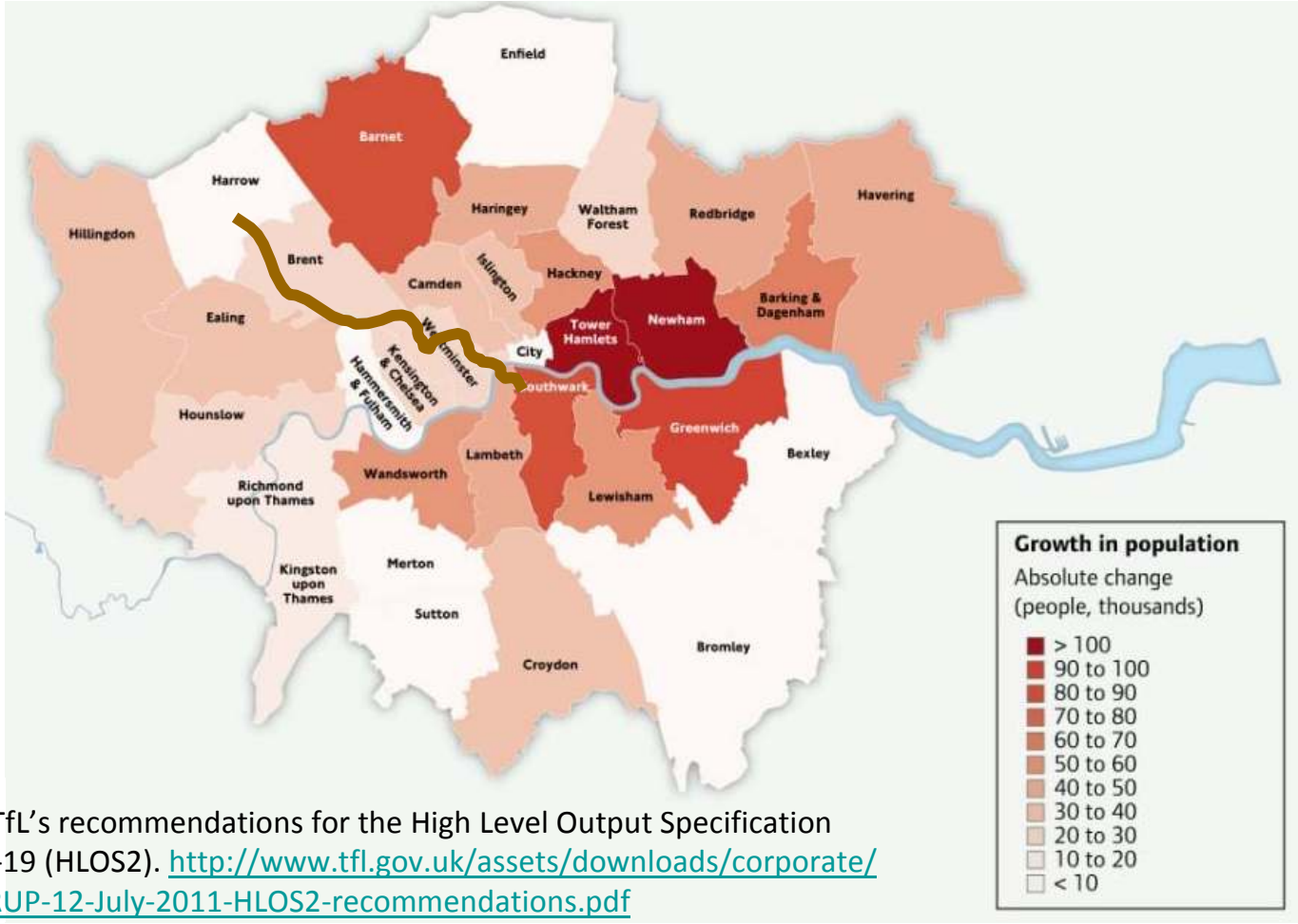
Source: TfL's recommendations for the High Level Output Specification for 2014-19 (HLOS2). http://www.tfl.gov.uk/assets/downloads/corporate/Item05-RUP-12-July-2011-HLOS2-recommendations.pdf

Capacity on rail



Source: TfL's recommendations for the High Level Output Specification for 2014-19 (HLOS2), July 2011

Housing: population to 2031



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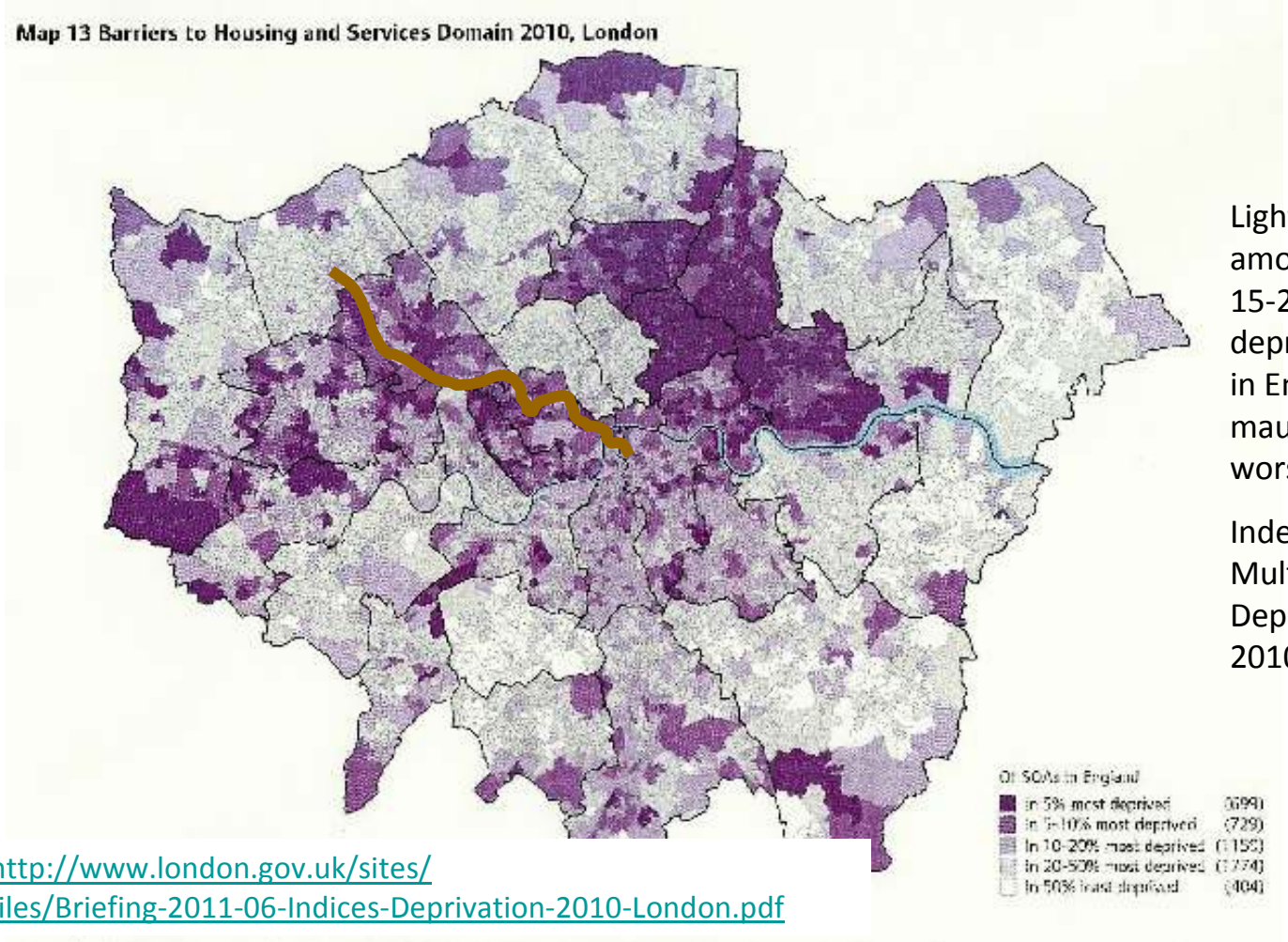
Housing: poor housing stock



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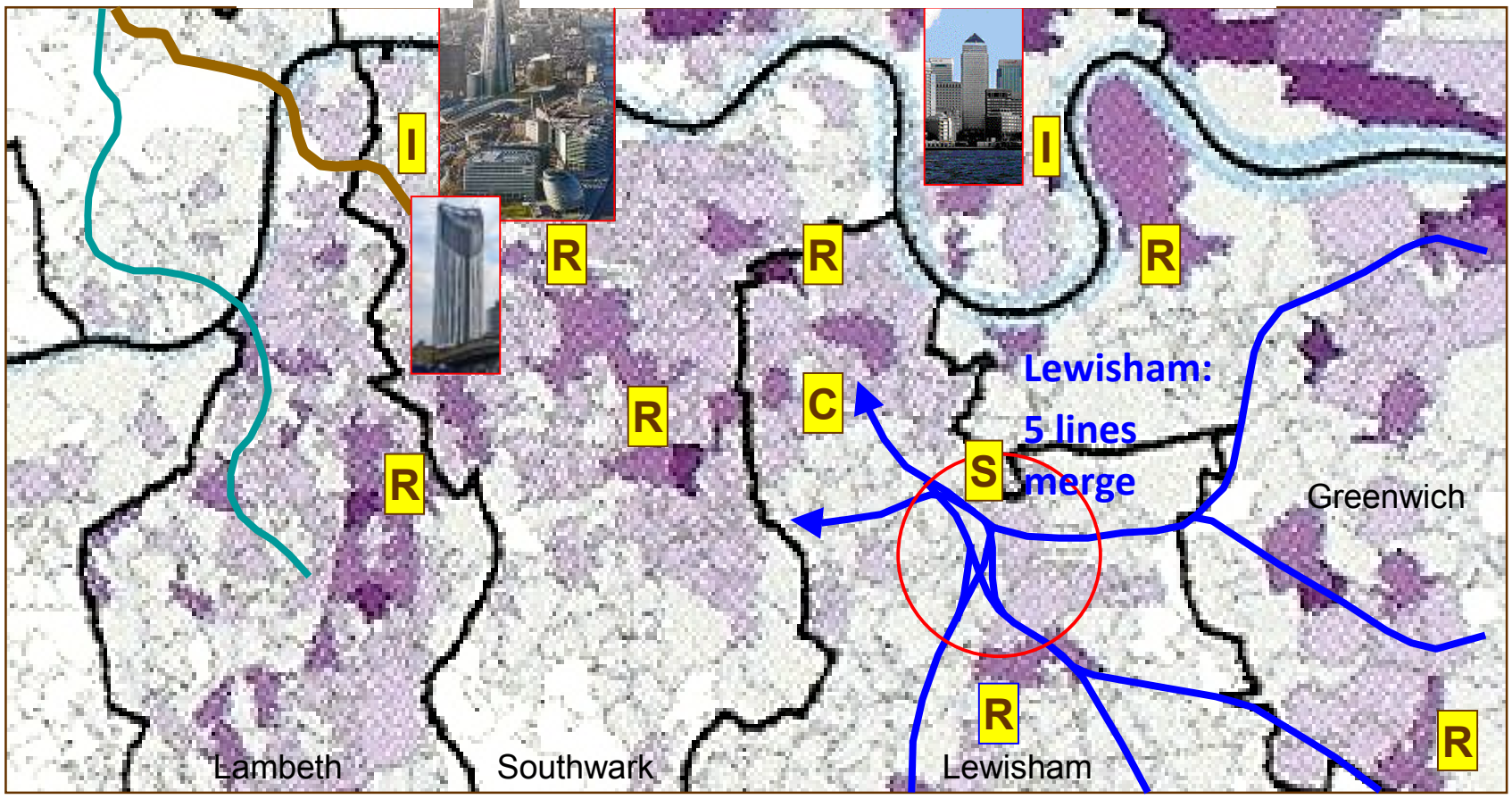
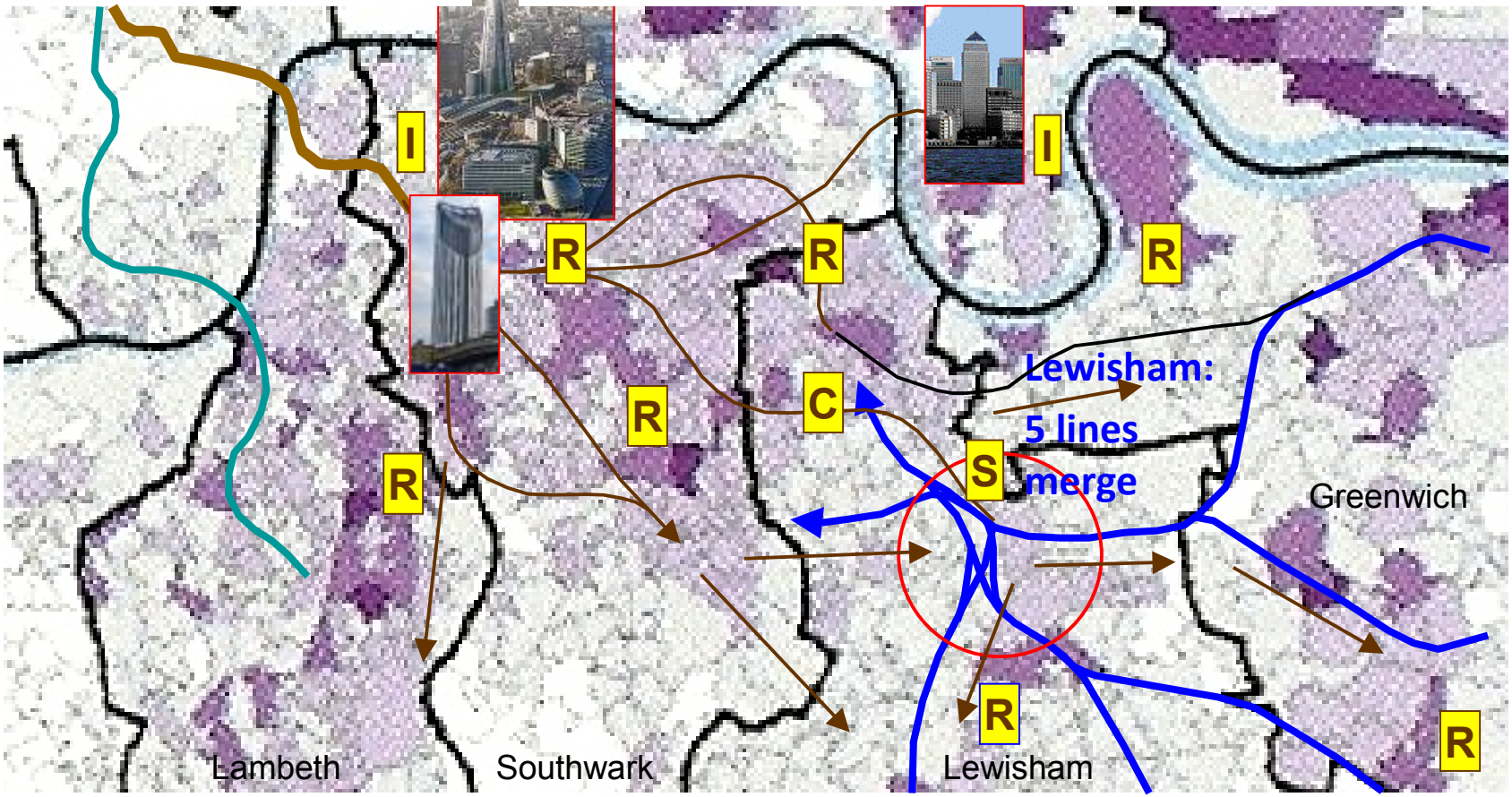
Inner SE London needs



R: Regeneration I: Investment and growth C: Capacity H: Housing (borough-wide)
E: Environment, carbon (borough-wide) S: Slots for main line

Inner SE London needs



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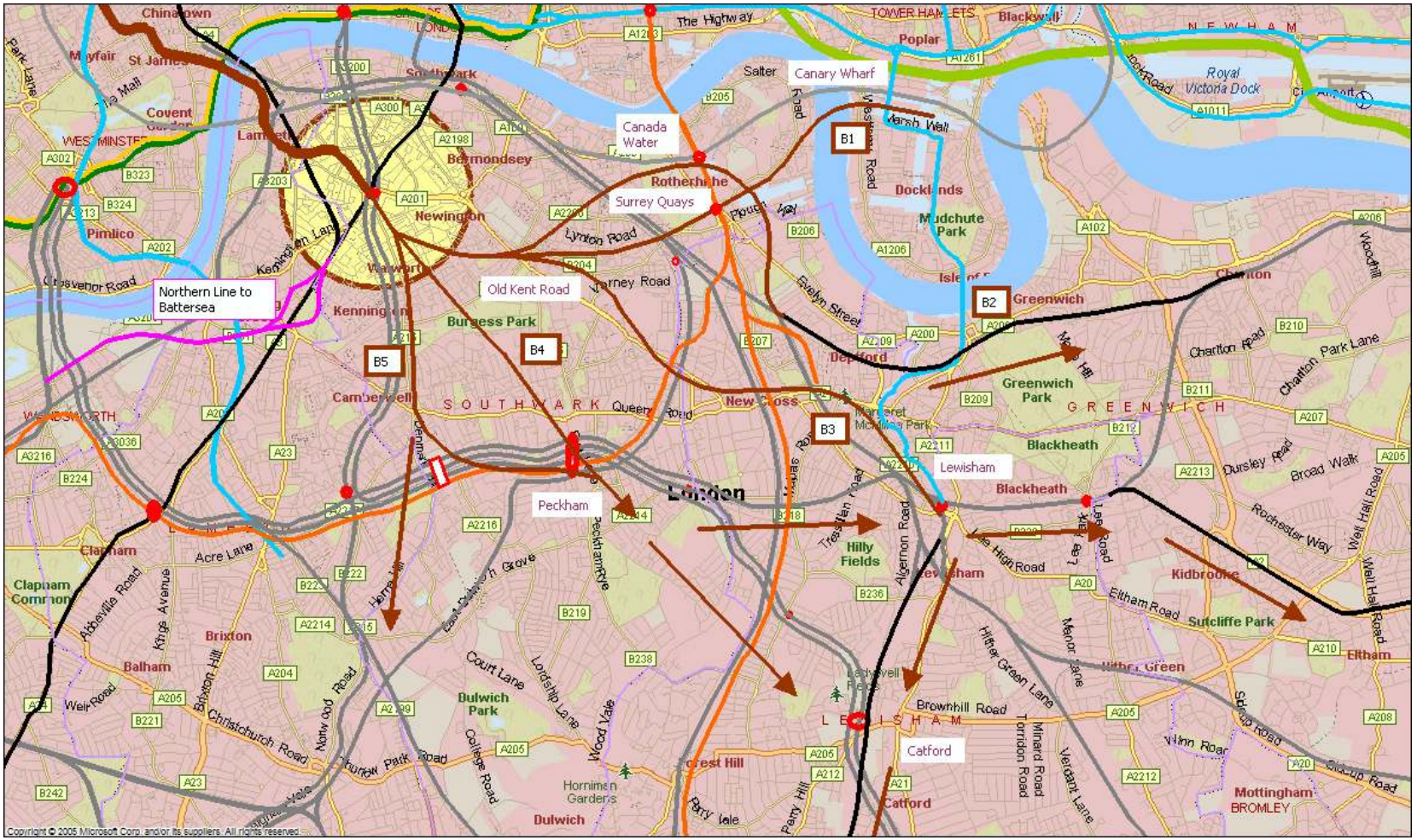
JRC - inner London options



Capital costs

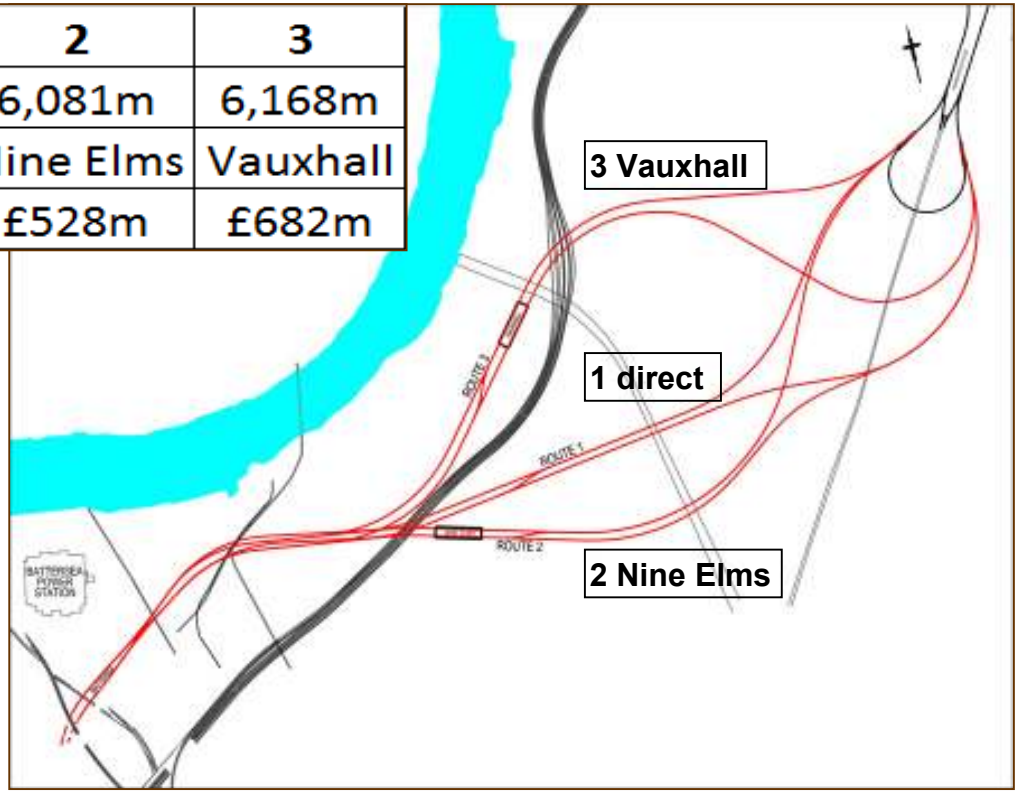
Based on Northern Line to Battersea

- also some guidance from JLE Green Park-Stratford.
- Source: analysis of October 2009 'Tunnel Talk' on Kennington-Battersea
- http://tunneltalk.com/London-Underground-Oct09-Northern-Line-extension-to-Battersea.php

Battersea capital costs

OPTION	1	2	3
Twin tunnels	5,840m	6,081m	6,168m
Intermediate Stn?	no	Nine Elms	Vauxhall
Main costs	£428m	£528m	£682m

Other costs in **£750m-£1bn** total:
land acquisition, engineering and project management, risk management. It is unclear if these Battersea costs included financing or Treasury 'optimism bias'.



Bakerloo capital costs

Cost break-down to re-use on Bakerloo

Basic costs to consider include:

- Number of additional trains
- Type of station construction
- Complexity of interchanges
- Tunnelling costs in SE London
- Costs of converting any surface railways.

Facilities such as control centre extension, escape shafts, environmental mitigation, and depot /siding expansion are within proportional extra costs.

Cost schedule adopted for Bakerloo extensions:

Stations: new in tube **£100m**, adaptation from main line **£30m**,
extra interchange: **£50m**

Tunnels: £180m per twin-track mile

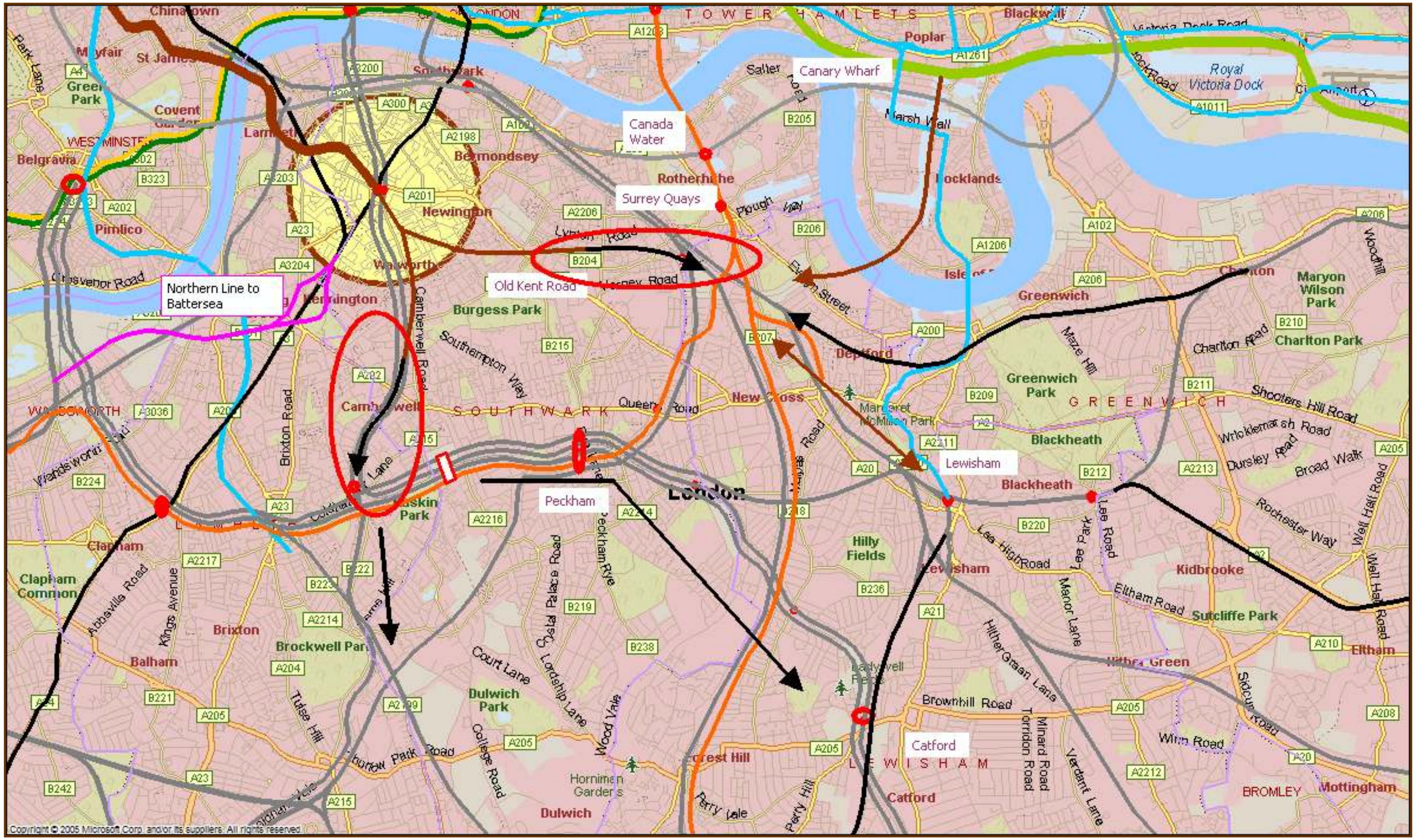
Adaptation of main line: £40m /mile

Trains: 7-car: rounded **£10m** /train

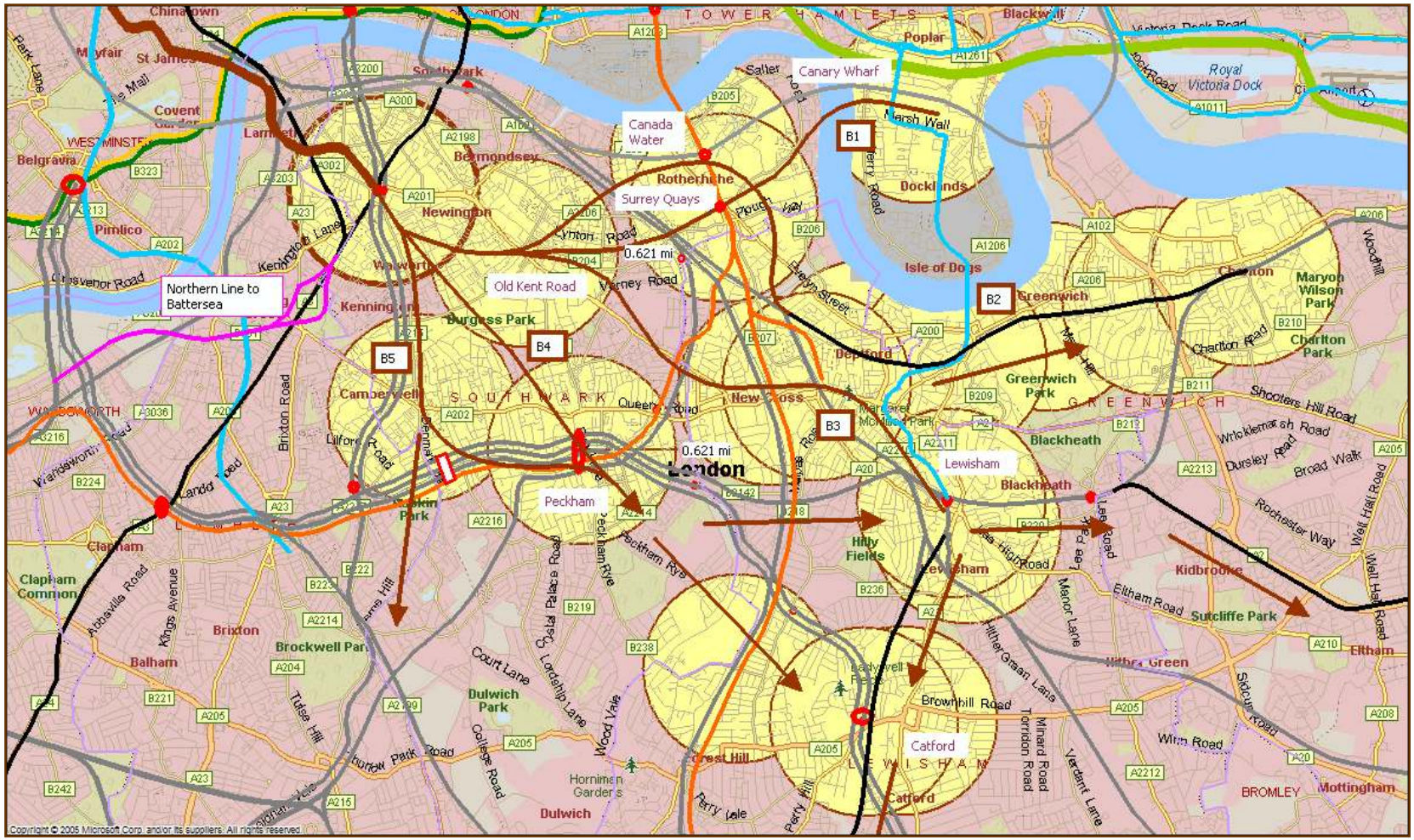
Other charges: £130m per twin-track mile for tunnel section, **£30m** per mile for surface section.

Main purpose of costs is to show relative size of funding for options.

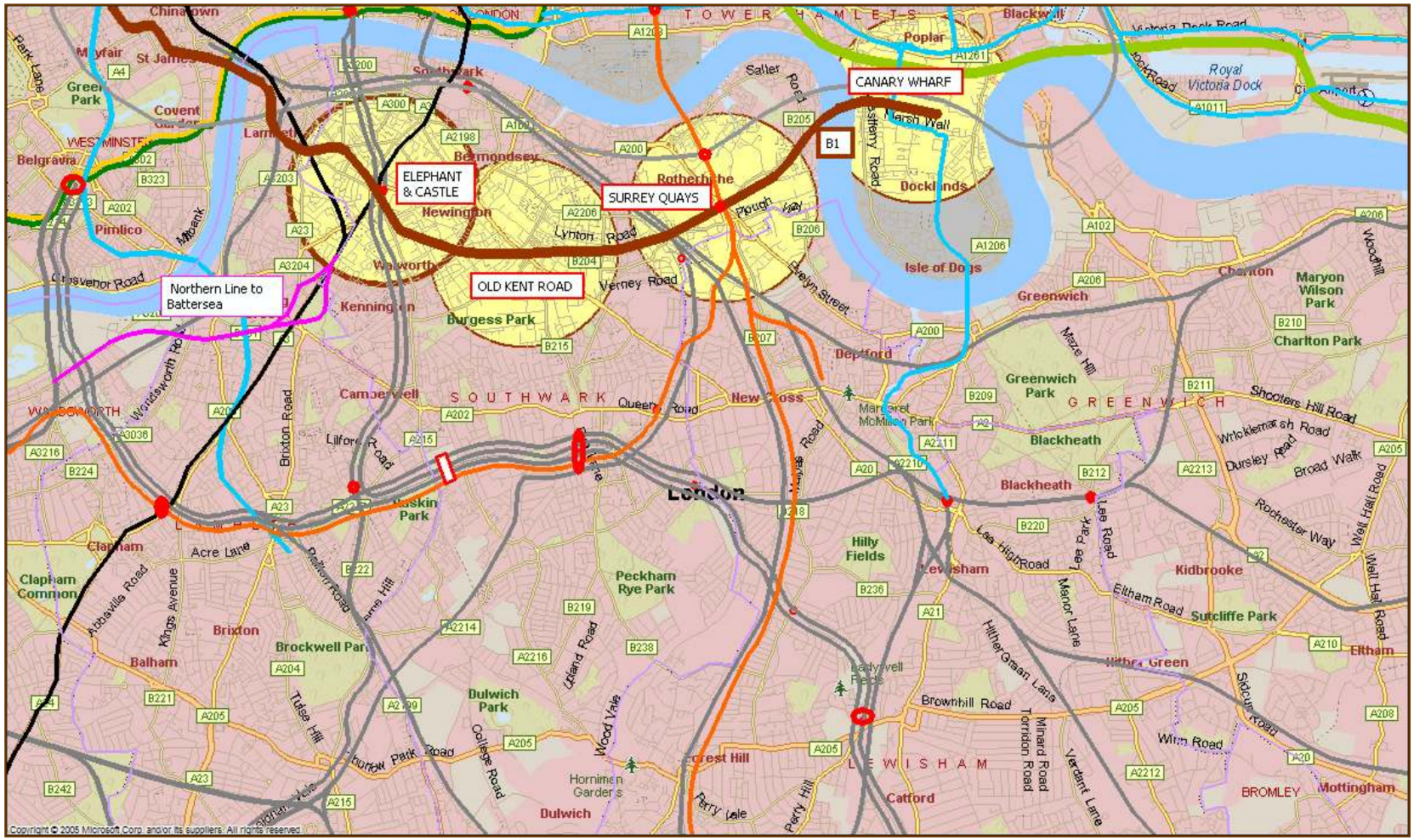
Inner London – non-options



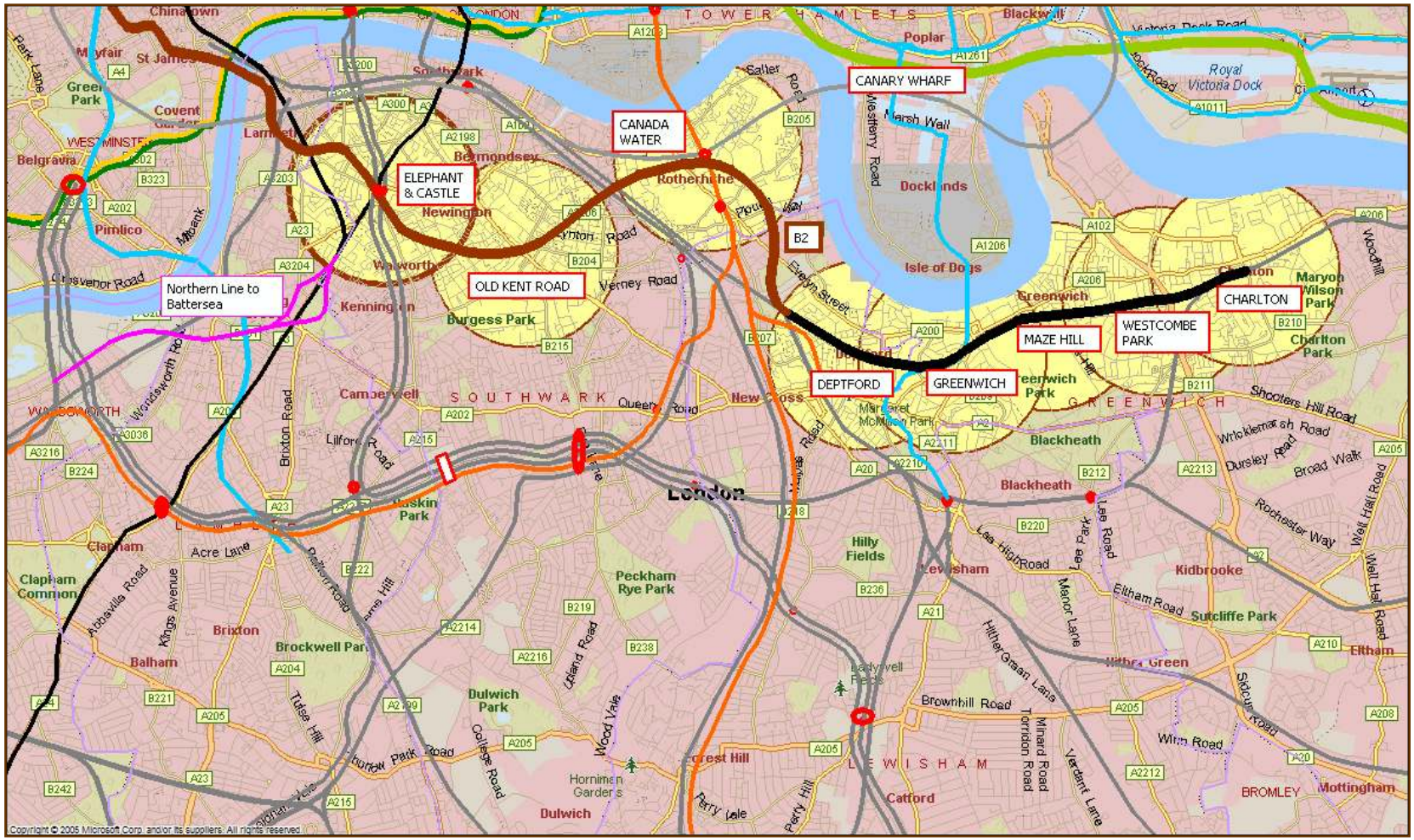
Inner London main catchments



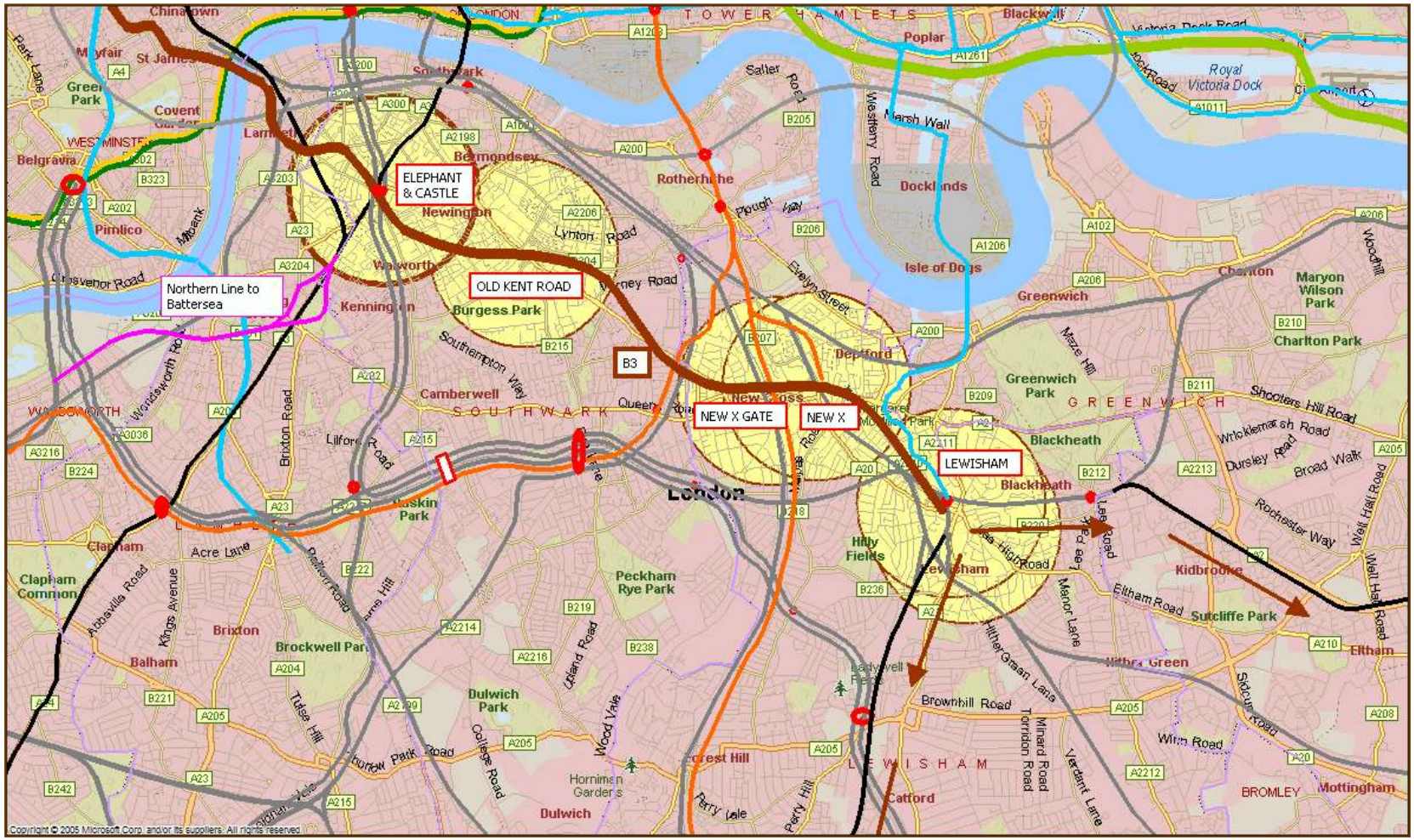
Inner London B1 – Canary Wharf



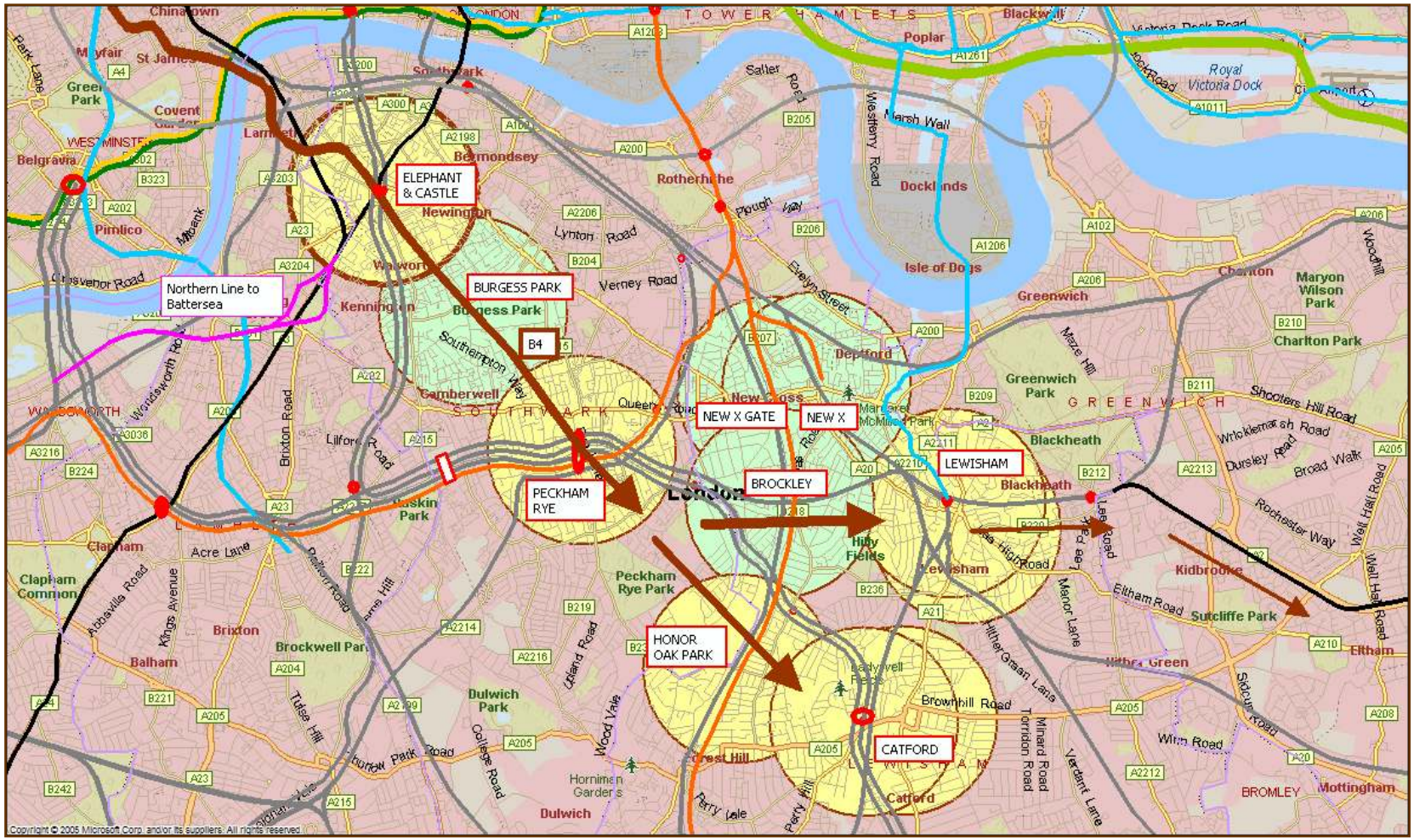
Inner London B2 – Charlton



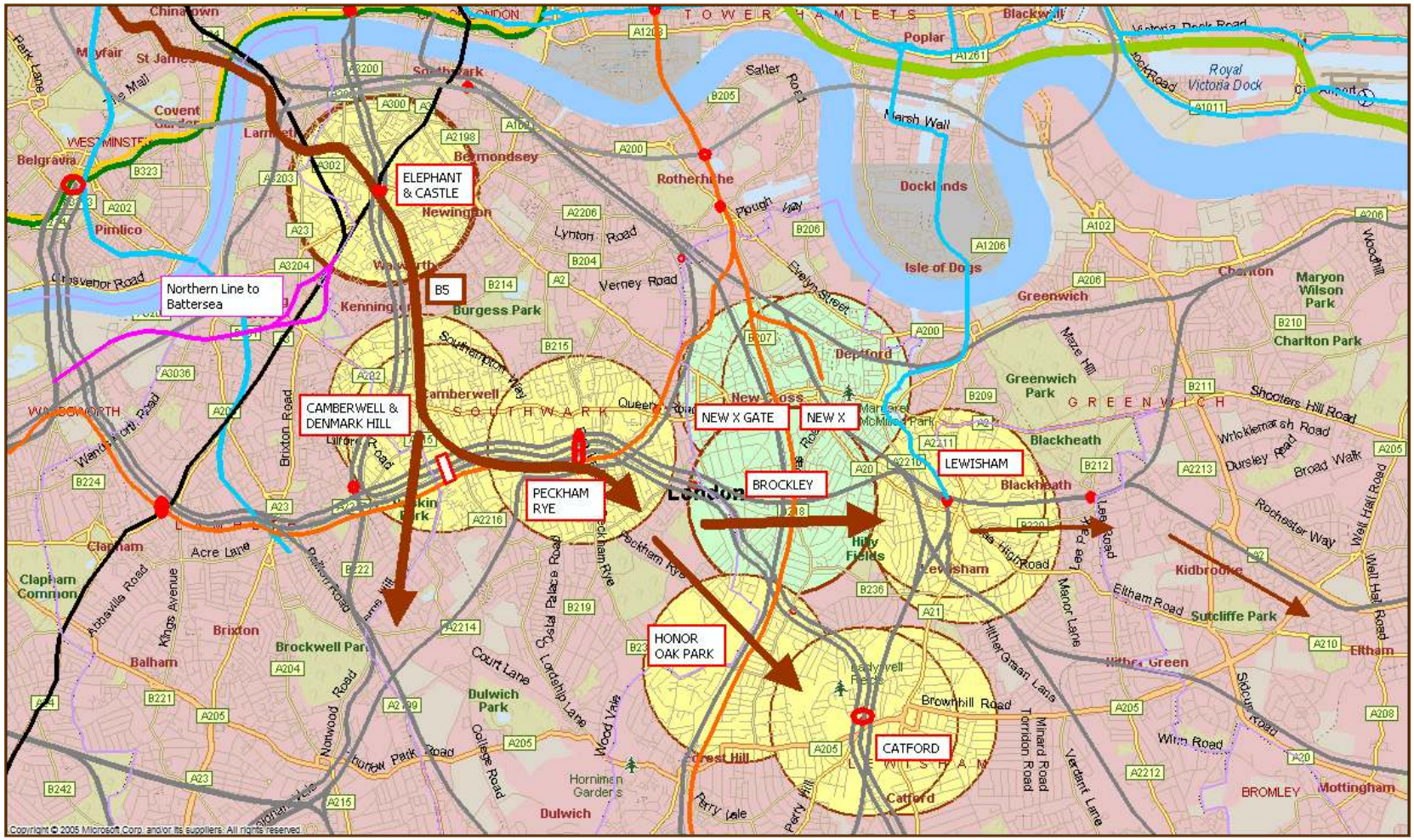
Inner London B3 – NX-Lewisham



Inner London B4 – Peckham direct



Inner London B5 – via Camberwell



Inner London B1 – Canary Wharf

Headline case	
Serves expanding demand to major UK economic growth location	
Other significant transport and regeneration benefits	

Reasons	
Regeneration	Old Kent Road and South Bermondsey
Investment	More Southwark and Isle of Dogs growth
Capacity	Inner SE London and cross-river: Jubilee Line and ELLX relief
Housing	North Southwark priorities
Environment	Sustainable growth
Slots	None directly, new inner orbital links

Specification	**Estimates**	**Rounded £m capital cost**	**1,580**
Tube line	3.6 miles twin tunnel		1,100
Stations	3 new underground stations (2 interchanges)		400
Trains	Approx 8 trains if 2½ min. service		80
Risks	Low risk of overloading Central London, ? Higher freq.		
Other	No slots released directly on main line		

Inner London B2 – Charlton

Headline case	
Serves London housing regeneration and expansion areas	
Relieves Jubilee Line, North Kent line (but London Bdge-Greenwich passgrs use JLE)	
Reasons	
Regeneration	Old Kent Road, Deptford and Greenwich Peninsula
Investment	More Southwark and Thames-side growth
Capacity	Inner SE London: Jubilee Line, North Kent and ELLX relief
Housing	North Southwark, Lewisham and Greenwich priorities
Environment	Sustainable growth
Slots	Approx 3 tph into London Bridge, limited by Lewisham Jcn capacity

Specification	**Estimates**	**Rounded £m capital cost**	**1,940**
Tube line	3.7 miles twin tunnel to ramp, 3.1 miles ex main line		1,350
Stations	2 new underground stns (1 interchange), 5 main line (1 i/ch)		450
Trains	Approx 14-15 trains if 2½ min. service, half after Maze Hill		140
Risks	Medium risk of overloading Central London, ? Higher freq.		
Other	Rejected £2.35bn option via B3 to New X then Greenwich-Charlton		

Inner London B3 – NX-Lewisham

Headline case	
Direct West End tube to Lewisham SE London strategic centre and interchange	
Benefits communities along route, scope to extend further onto main lines	
Reasons	
Regeneration	Old Kent Road, North Peckham, Lewisham catchment
Investment	Lewisham gateway schemes
Capacity	Inner SE London: South Eastern network and ELLX relief
Housing	North Southwark and Lewisham priorities
Environment	Sustainable growth
Slots	No slots released directly on main line

Specification	**Estimates**	**Rounded £m capital cost**	**1,940**
Tube line	4.5 miles twin tunnel		1,400
Stations	3-4 new underground stns (3 interchanges, 2 double-ended)		550
Trains	Approx 9 trains if 2½ min. service		90
Risks	Medium risk of overloading Central London, ? Higher freq.		
Other	2 stations costed above for Old Kent Road, saving if only one		-100

Inner London B4 – Peckham direct

Headline case	
Direct West End tube to Peckham interchange, scope for further extension	
Benefits high deprivation communities	
Reasons	
Regeneration	Aylesbury Estate, North Peckham
Investment	Peckham Partnership
Capacity	Inner SE London: South Eastern network and ELLX relief
Housing	Southwark priorities
Environment	Sustainable growth
Slots	No slots released directly on main line

Specification	**Estimates**	**Rounded £m capital cost**	**950**
Tube line	2.1 miles twin tunnel		650
Stations	2 new underground stations (1 interchange)		250
Trains	Approx 5 trains if 2½ min. service (no more spares assumed)		50
Risks	Low risk of overloading Central London, ? Higher freq.		
Other	Lowest capital cost scheme, separate info for Lewisham or Catford		

Inner London B5 – via Camberwell

Headline case		
West End tube to Peckham via central Camberwell, scope for further extension		
Benefits high deprivation catchments, serves Denmark Hill health community		
Reasons		
Regeneration	Loughborough area, North Brixton, North Peckham	
Investment	Includes Peckham Partnership	
Capacity	Inner SE London: South Eastern network and ELLX relief	
Housing	Southwark priorities	
Environment	Sustainable growth	
Slots	No slots released directly on main line	
Specification	**Estimates** **Rounded £m capital cost**	**1,200**
Tube line	2.7 miles twin tunnel	840
Stations	2 new underground stns (1 interchange, 1 double-ended)	300
Trains	Approx 6 trains if 2½ min. service (no more spares assumed)	60
Risks	Low risk of overloading Central London, ? Higher freq.	
Other	Low capital cost scheme, separate info for Lewisham or Catford	

B4 or B5 to Lewisham or Catford

Headline case								
Extension includes Lewisham centre and i'change, or Catford centre and i'change								
Expands SE catchment with overall costs similar to B3								
Reasons								
Regeneration	Additional areas: Lewisham catchment or Catford catchment							
Investment	Lewisham gateway schemes or Catford town centre renewal							
Capacity	Inner SE London: South Eastern network and ELLX relief							
Housing	Southwark and Lewisham priorities							
Environment	Sustainable growth							
Slots	No slots released directly on main line							
Specification	**B4 + Lewisham**		**B4 + Catford**		**B5 + Lewisham**		**B5 + Catford**	
B3 Tot 1,940	**Grand Tot**	2,065	**Grand Tot**	2,096	**Grand Tot**	2,315	**Grand Tot**	2,346
Tube line	+2.5 miles	775	+2.6 miles	806	+2.5 miles	775	+2.6 miles	806
Stations	**2** or 3, 2 i'c	300	2 stn, 2 i'c	300	**2** or 3, 2 i'c	300	2 stn, 2 i'c	300
Trains	+4 to Lew	40	+4 to Cat	40	+4 to Lew	40	+4 to Cat	40
Capacity risks	Medium		Medium		Medium		Medium	
	Tube extensions: Lewisham via Brockley, Catford via Honor Oak Pk							

Outer route options

Basis for assessment

- Most suburbs built-up, so gains are:
  - new main line train slots + reliability
  - lower carbon use (e.g. less car travel)
  - new links to key growth areas (homes, jobs)
- Only a top destination justifies more tunnelling
- Aim for surface line conversion or vacant route
- Joint tube/main line unlikely with disability rules

Outer route options

Choices between routes

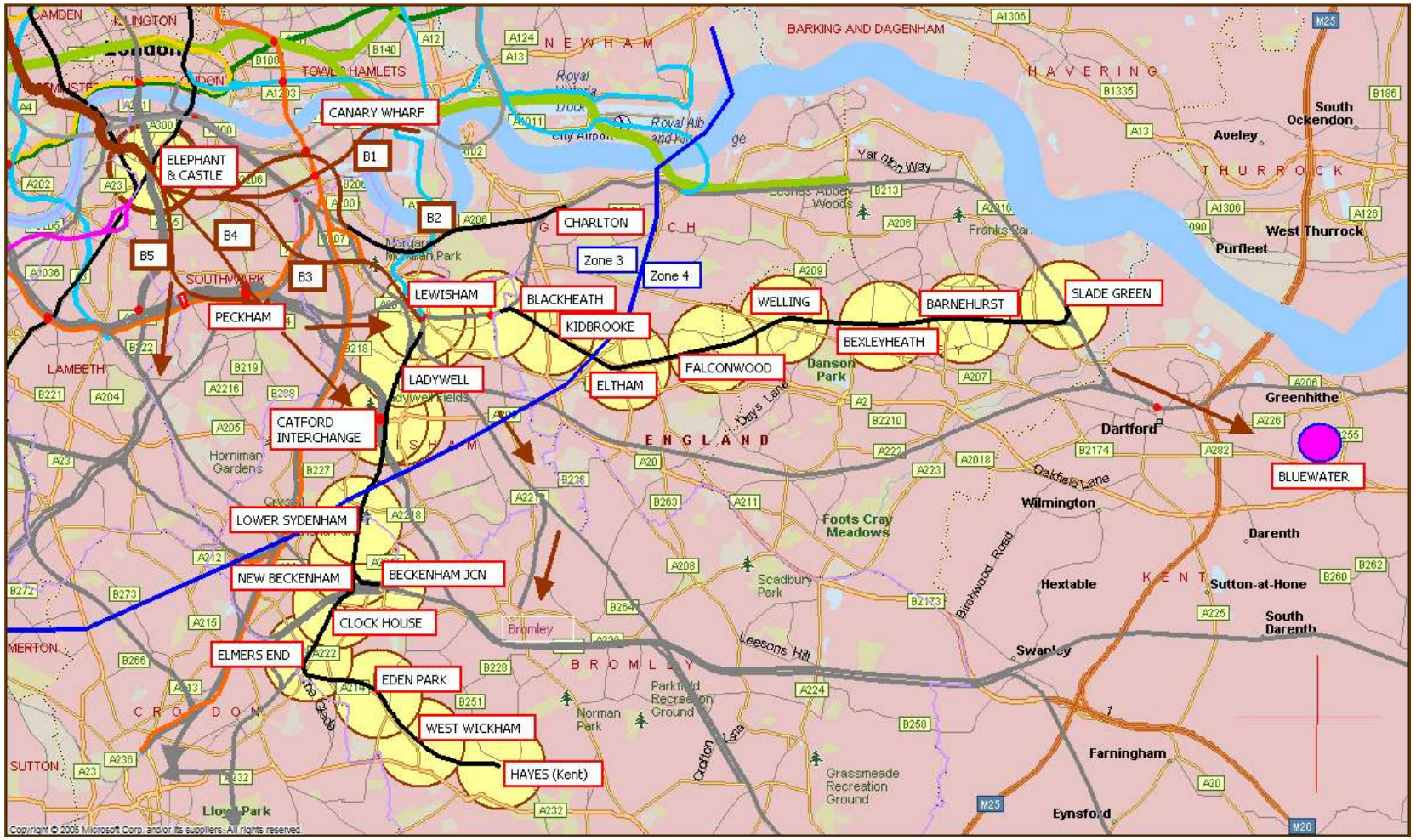
- B1 east of Isle of Dogs – not relevant with DLR and Crossrail
- B2 east of Charlton – not relevant with Crossrail
- Beyond Lewisham:
  - B3/B4/B5 Blackheath then Bexleyheath Line
  - B3/B4/B5 Hither Green then Grove Park, Bromley North Line
  - B3 Catford then Hayes Line (incl. Beckenham Junction)
- Beyond Peckham via Catford:
  - B4/B5 options to Catford on surface or in tube
  - B4/B5 options beyond Catford towards Hayes/Beckenham Jcn

Outer route options

Optioneering

- Bexleyheath:
  ? depot sharing at Slade Green
  ? long term potential to Bluewater on surface line
- Bromley North:
  major SE town centre
  but no main line slot release, slow times to London
  (? Better as light rail, referenced in LSE RUS and SELRAS)
- Catford and Hayes:
  already separate from other lines after Lewisham
- **So main options Bexleyheath, Hayes**

Outer route options



Outer London capital costs

Headline case							
Substitution of main line branch creates new train slots via Lewisham / New Cross							
Local usage gain despite fewer London destinations, scope for new outer rail flows							
Reasons							
Regeneration	New workforce catchments; Bexleyheath helps Thames Gateway						
Investment	Promotes more of SE London on tube map						
Capacity	Allows service expansion on other SE London and Kent lines						
Housing	Outer London Borough priorities						
Environment	Sustainable growth						
Slots	8 released from Bexleyheath line (Vic. not counted), 6 from Hayes						
Specification	**B3 + Bexleyh'th**		**B4 + Bexleyh'th**		**B5 + Bexleyh'th**		**B3 + Hayes/BJc**
	Grand Tot	**3,231**	**Grand Tot**	**3,356**	**Grand Tot**	**3,606**	**Grand Tot** **3,232**
	Outer Total					**1,291**	**1,292**
Tube/Surface	½ mile tube/ramp, 8.8 miles surface					771	+½**T**+8¼**S** 732
Stations	8 surface stations (Blackheath 4 track), 2 i'change					340	10 stn, 2 i'c 400
Trains	up to 18 more trains, incl. Ctl.Lon extras					180	+16 > Bex 160
Capacity risks	High risk in Central London, more capacity needed						High in Ctl.Lon

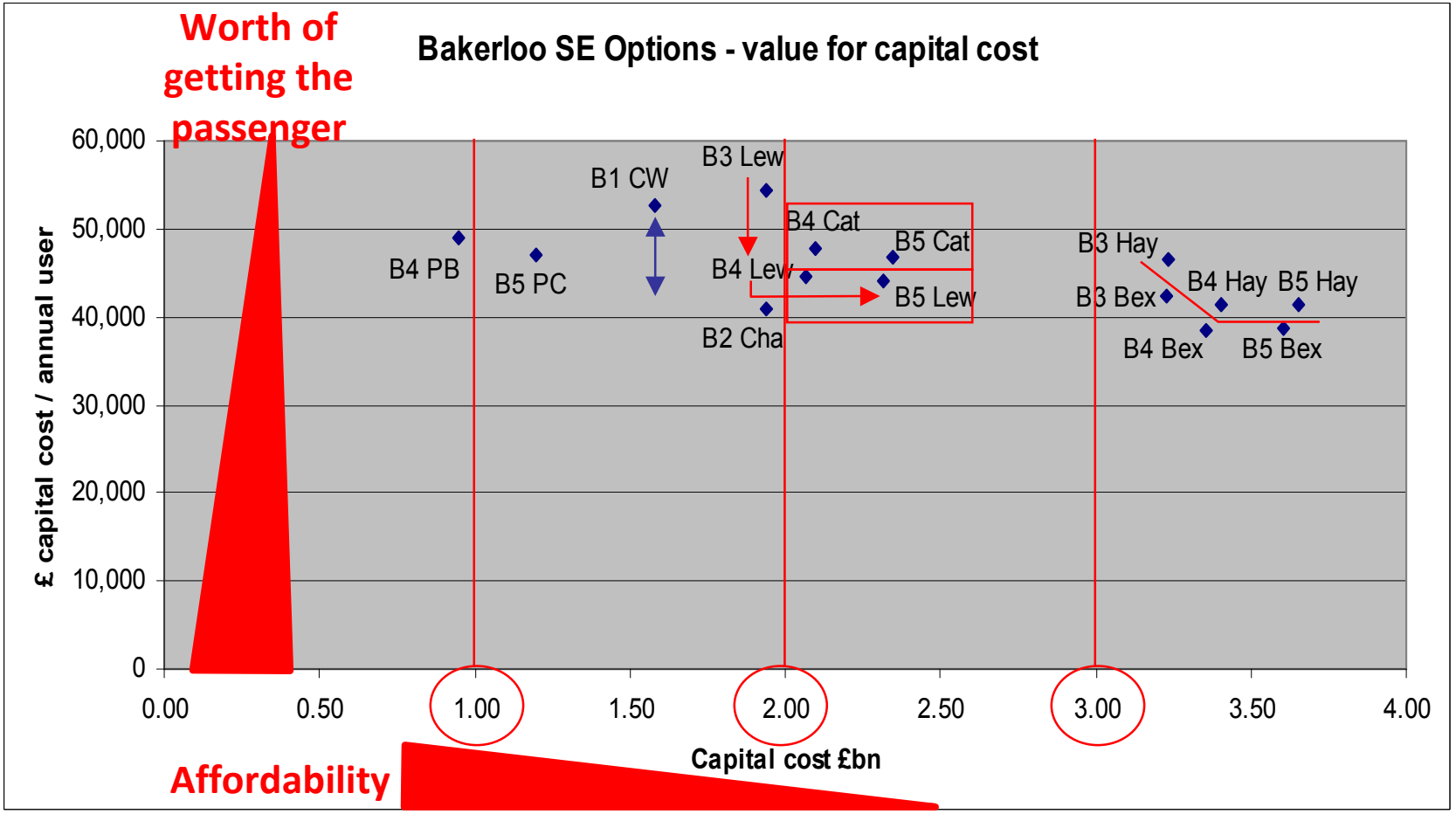
Value for money

Relative use: compare to relative capital cost

- Tube stations attract different passenger volume !
- Piccadilly North Z45 v GN Z456 = x 3.2-3.7
- Northern North (ex GN) v GN Z456 = x 2.3-2.7
- Northern South v main Southern Z3 = x 2.9
- Northern South v Thameslink loop Z3 = x 13.7
- Various U/D Z2 v nearby main line Z2 = x 15-20
- **Apply some usage factors consistently**

Rounded = x 3

Value for money

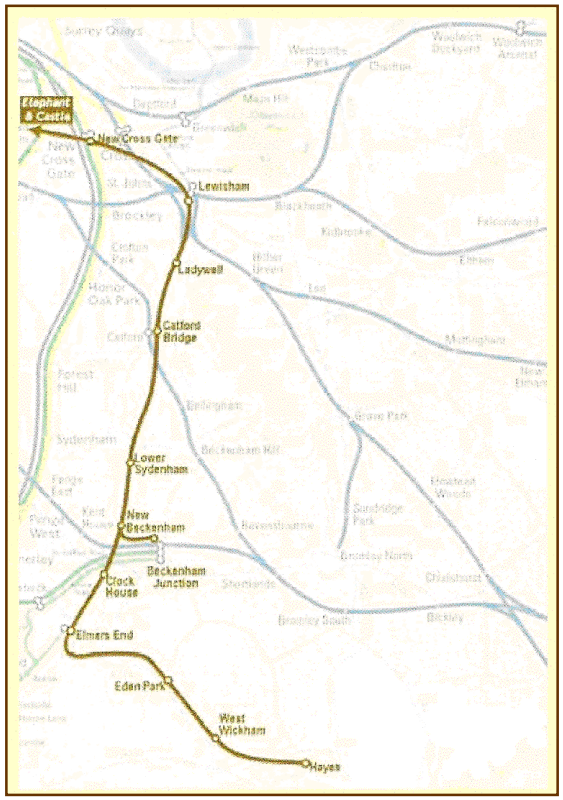


Bakerloo SE – official analysis

What London & South East RUS says

8.6 Gap N – Bakerloo Line Southern Extension

8.6.1 The established Kent RUS identified that a potential scheme to convert the Hayes branch for use by London Underground services could alleviate main line and suburban routes via London Bridge, with services on this line rerouted via a southern extension to the London Underground Bakerloo Line. Such a line would also provide additional capacity in inner South London, greatly improving travel opportunities for areas such as Denmark Hill and Camberwell. There may also be capacity relief to the Elephant & Castle corridor to Blackfriars, depending on the specific route chosen.



Bakerloo SE – TfL position

SE London Rail Access Study (SELRAS) objectives

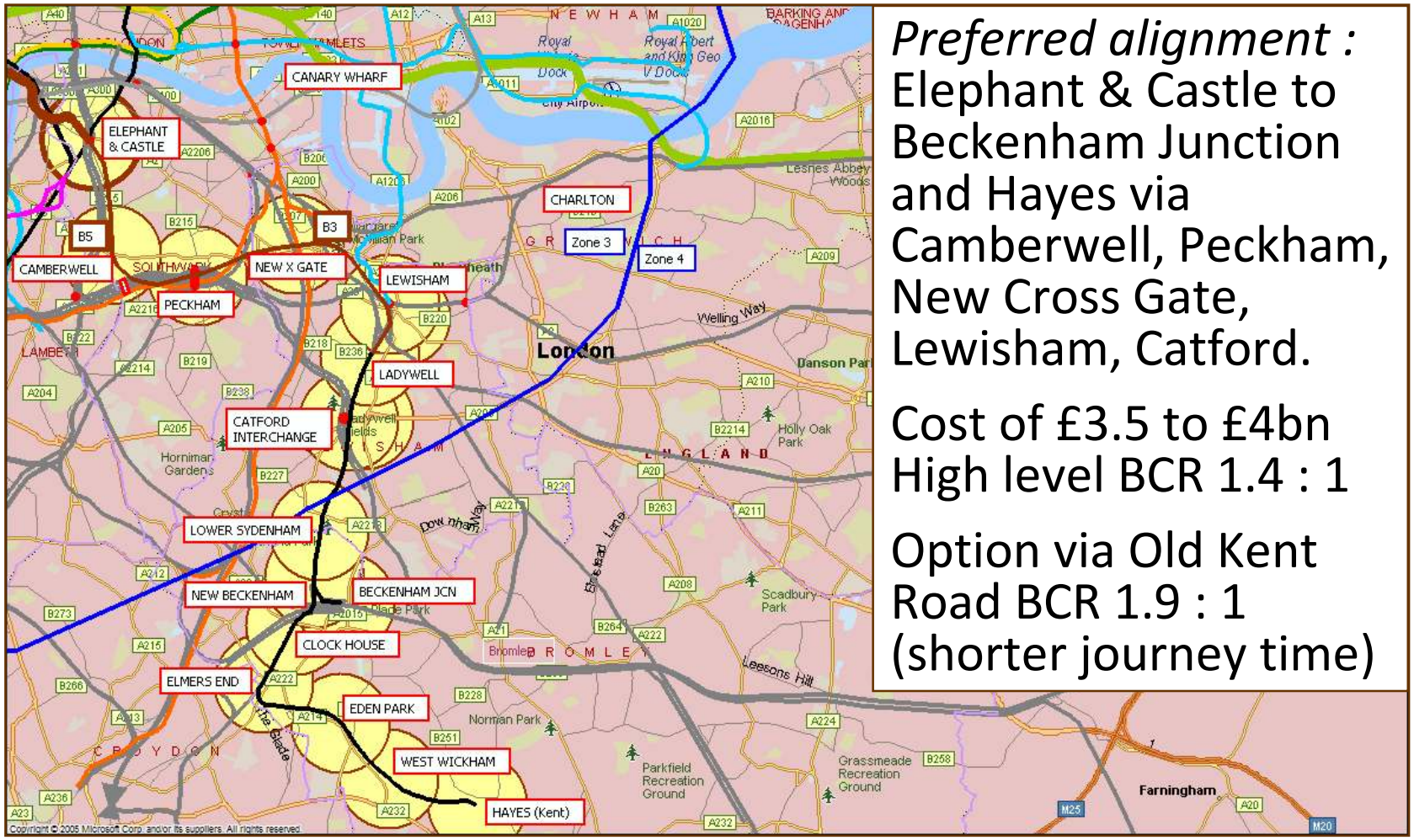
- regeneration and development in opportunity areas
- improve connectivity
- reducing crowding on National Rail and at termini
- maximise Underground efficiency
- value for money

Bakerloo gives most benefits – at high cost

Schemes tested

- DLR to Bromley North
- bus link along Hayes branch
- Bakerloo to Bromley or Hayes

TfL Bakerloo SE – 2010 view



Preferred alignment :
Elephant & Castle to Beckenham Junction and Hayes via Camberwell, Peckham, New Cross Gate, Lewisham, Catford.

Cost of £3.5 to £4bn
High level BCR 1.4 : 1

Option via Old Kent Road BCR 1.9 : 1
(shorter journey time)

Bakerloo – why not South?

There is a case, but lower than SE

- Project timings put Crossrail 2 (Victoria Line relief) ahead of Bakerloo southwards
- Victoria Line just 1 mile to Herne Hill
- Only Bakerloo available for SE London
- Other main line options for S London
- Major spend needed on Southern network likely in 2030s

Lessons from history

Five main criteria to be met

- Business case
- Merits and priority against other projects
- Government and stakeholder backing
- Funding / financing
- Affordability

Business case - benefit:cost ratio

- Preferred TfL scheme BCR 1.4 : 1
- Better schemes already exist, eg 1.9 : 1
- DfT currently sets 2 : 1 as value passmark for new investment
- JRC analysis shows:
  - via Camberwell to Hayes is highest cost option
  - Hayes options costlier per passenger than Bexleyheath
  - **Phasing (affordable?) may support good BCR**

Merits & priorities vs others

- Serves fewer critical areas / objectives than some other rail projects
- London's new priorities already emerging:
  - more Crossrail extensions
  - Crossrail 2 (possibly phased)
  - Orbital capacity, Lea Valley, SWT etc
- More main line capacity, eg 12-car SE London
- Accommodating the impacts of HS2
- **Bakerloo not yet justifying priority attention**

Government & stakeholders

A matter for the Mayor of London

- London needs to prioritise its own spend
- Less national benefit than Crossrail, HS2
- Is it good value to spend (net) £1.3bn on outer extension to gain 6-8 peak slots/hr?
- Lack of clarity on best value route, boroughs not yet signed up or lobbying
- A promoter (TfL) with a long shopping list

Funding and financing

- TfL doesn't know where its funding will come from, to 2021 let alone 2031
- Currently bidding for 2014-19 National Rail investment priorities
- Crossrail taking Supplementary Business Rate, who might be next for that?
- Northern Line to Battersea relying on developer gain/Tax Increment Financing
- Few large developments in Bakerloo catchment

Spending pressures in 2020s

Affordability + some large bids

Network Rail control periods	CP5	CP6	CP7	CP8
£bn spend Years	2012-13	2014-19	2019-24	2024-29	2029-34
Govt spending review	•	•	• •	• •	• •
General elections		?	?	?	?
Mayoral elections	•	•	• •	•	•
Crossrail 1		14.5			
TfL to 2017/18	2008-15	38 →	seeks	3½-4½	annually
Crossrail 2			6- 22		within TfL?
Trams anyone?			?	?	within TfL?
HS2 Phase 1		7- 9			
HS2 Phase 2			15-25		
Tube upgrades		1-2 annually	1-2 annually		within TfL
Bakerloo SE			2-4 sometime		within TfL?

Some practical questions

- Depot location if many trains for SE?
- Is it efficient to replace 12-car SE peak train with 2 shorter Bakerloo trains (& are there fewer seats)?
- Why spend £1bn+ to turn commuter line into tube?
- Only solves 1 of 5 Lewisham Jcn. lines, and will annoy users who like direct City **&** West End trains
- If SE and Kent see even more demand in 2030s, could need further, main line scheme
- South London also needs more relief in 2030s

Bakerloo SE – JRC assessment

- Good to strong, but **not** overwhelming case
- Risks being high cost project without strong passenger support
- Not yet sufficient TfL priority and attention
- Moderate political and stakeholder interest
- Remains ‘nice to have’
- Probable funding gap - phasing needs care
- Risk of an ‘ideas gap’ as well as funding gap

What else with £2-4 bn?

Is Bakerloo the only London SE option?

- No it isn't. Eg Cross river tram £1bn+
- Would give a different spread of benefits
- Is Bakerloo the only rail solution?
- No, but it's the only one now on the table
- Is it right to marry inner and outer proposals in one scheme?
- It's simpler to focus on an inner London tube, but it may not ring enough bells to get approval

Bakerloo SE – a new way?

- Build Bakerloo in phases in 2020s, but please design for 2040s-2050s?
- Think of main line options that might solve Lewisham Jcn issues without some of the apparent downsides for local commuters
- Is Mile End a relevant example of easy interchange for City / West End passengers?
- How might such opportunity be achieved?

Mayor's questions 14.9.11

'Future transport projects 2'

Q 2665 / 2011 - *Val Shawcross*:

'The TfL business plan has demonstrated enthusiasm for the extension of the Bakerloo line southwards via Southwark and Lewisham to Hayes. When do you envisage that development of this plan will be included in the TfL business plan?'


Beyond the Elephant

Another way?