

## Turning south London orange

### Passenger demand, proposed main schemes and new stations / interchanges

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#### Background

The foreseen passenger demand is the driving force for the type and scale of service and investment interventions proposed in this report.

The study area is essentially the South Central suburban network, along with complementary services which are inextricably associated with this complex operating network, and where logical opportunities for shared services and benefits can be defined.

The services and stations reviewed therefore start at Victoria, Thameslink/Blackfriars and London Bridge, and on the West and East London Lines.

The key intermediate points where existing or potential train services mesh or overlap are:

- Zone 2: Clapham Junction, Brixton/Herne Hill, Peckham Rye, Lewisham
- Zone 3: Wimbledon, Balham, the Streatham area and Tulse Hill, Crystal Palace and Catford

- Zone 4: Norwood Junction, Beckenham Junction
- Zone 5/6: Sutton, West Croydon, East Croydon.

The potential for any one train service to impact on others has been discussed in the previous chapter. It is considerable. The Centre for London team agree with the principles already set out by Transport for London, in its initial proposals for simplifying and intensifying services on the South Central network, that marginal changes are not the solution here. Evolution in this case must be accelerated, to achieve more of a metro-style frequent and trusted service.

Understanding the foreseeable demand characteristics is our starting point, from which we consider that the TfL proposals represent an interim stage of metro-isation, and that more investment will be required, in the 2020s and through the 2030s. They would cost more than a Thameslink but less than a complete Crossrail, around £10-15 billion pounds. Not all of that needs to be spent at once. Planning should be clear about where the long term points, and work backwards from that to create a series of investment stages.

### Current entry+exit demand

TfL has assessed passenger demand on its relevant lines in 2031 as of the order of an additional 100 million passenger kilometres carried annually (so perhaps another 10-15 million passengers), capital costs as £1.3 bn, additional operating costs £3.9 bn, with on the plus side time savings £8.5 bn and road benefits (mainly decongestion) £3 bn. These are undiscounted figures.

Without access to this scale of modelling, Centre for London has looked at the South London suburban station demand going forwards. There has been a remarkable growth in demand in the past decade, stimulated by:

- increasing road congestion
- additional population
- introduction of Oyster and Pay As You Go ticketing which integrates main line passenger journeys with TfL services
- better services from the mid-2000s, some paid for directly by TfL on the South London network (although not at a quality level which justified their inclusion within Overground marketing)
- introduction of Overground services on several corridors – WLL to Clapham Junction from November 2007 with later service improvements, ELL southwards to Crystal Palace and West Croydon from 2010, ELL via South London Line to Clapham Junction from December 2012.

Some summary tables set out recent years' changes in demand, by aggregating groups of stations. Some stations are included also in other analyses. It is the overall demand change that we are looking for, to understand the headline volume changes. There are two main ways to 'cut the pack': by Oyster Zone, and by Route Corridor Group. Services frequencies will be variable between individual stations, and between corridors, but it is possible to identify some clear trends in demand.

## By Oyster Zone

Total passenger entry+exit volume	LUL:	2005	2010	2014	2005>2014	2010>2014	2013>2014
	Main lines, Overground, DLR, Tramlink:	2005-06	2010-11	2014-15	% change	% change	% change
<b>Zone 2 main line stations in study area</b>	21 stations including Clapham Jn	38,305,641	50,070,905	74,575,290	+95%	+49%	+10%
Average for Zone 2	excluding Clapham Jn (26.5m 2014-15)	1,293,955	1,519,978	2,405,473	+86%	+58%	+14%
<b>Zone 3 main line stations in study area</b>	22 stations including Wimbledon	33,659,799	56,573,362	71,431,898	+112%	+26%	+5%
Average for Zone 3 (Eastfields opened 2008)	excluding Wimbledon (19.5m 2014-15)	1,092,962	1,921,662	2,471,667	+126%	+29%	+6%
<b>Zone 4 main line stations in study area</b>	16 stations	9,356,256	14,785,569	18,332,908	+96%	+24%	+4%
Average for Zone 4		584,766	924,098	1,145,807	+96%	+24%	+4%
<b>Zone 5/6/7 main line stations in study area</b>	14 stns incl East Croydon, Epsom as 'Z7'	28,344,066	39,238,605	45,922,776	+62%	+17%	+4%
Average for Zones 5/6/7	excluding East Croydon (22.8m 2014-15)	995,842	1,472,151	1,781,214	+79%	+21%	+4%
This contrasts with other types of services:							
<b>Tube stations in South London Zone 2</b>	9 stations	68,062,290	87,241,570	112,323,001	+65%	+29%	+7%
Average for Zone 2	excluding Brixton (29.4m 2014)	6,183,156	8,245,591	10,368,693	+68%	+26%	+7%
<b>Tube stations in South London Zones 3/4</b>	7 stations, only Morden is in Z4	45,757,325	53,462,166	63,824,929	+39%	+19%	+11%
Average for Zones 3/4		6,536,761	7,637,452	9,117,847	+39%	+19%	+11%
<b>District Line in South London Zones 2/3</b>	4 stations	22,734,134	23,811,054	29,380,914	+29%	+23%	+6%
Average for Zones 2/3	excluding Wimbledon	3,955,611	4,046,098	4,694,095	+19%	+16%	+4%
Average for Zones 2/3	including Wimbledon	5,683,534	5,952,764	7,345,229	+29%	+23%	+6%
<b>DLR in S &amp; SE London (mainly Z2, Woolwich Z4)</b>	6 stations	9,017,154	28,650,389	40,481,444	+349%	+41%	+12%
Average per station		1,803,431	4,775,065	6,746,907	+274%	+41%	+12%
<b>Tramlink main stops in South London (flat fare)</b>	7 stops (in rail zones 4/5)	no data	20,927,619	24,636,530	?	+18%	+4%

There is a powerful growth in demand in Zone 2 at main line stations, whether served by Overground or not, during the last year. ORR has had a reputation for under-estimating passenger volumes in city regions in past years, but the proportional changes compared to other zones suggests strongly that this is a real and underlying trend. The increased demand is 3-4 times the underlying economic growth rates.

Even projecting this scale of demand change five years further would pressurise existing and future additional capacities where those are planned. Looking ahead 15 years to 2031 could create fundamental capacity problems on existing main line services, when it is those that are being looked at to provide the vital capacity safety valve for the increasingly full tube lines. We consider that substantial extra train and line capacity to be able to serve Zone 2 adequately – which is where higher housing densities are also foreseen – is a critical matter to address. Automatic Train Operation and European Train Control System (ATO/ETCS) systems are a starting point for action.

In the zones further out, there is a steady 4-6% increase in usage in the last year, about twice the rate of economic growth, and visibly a faster rate of growth in Zone 3 compared to outer zones. The benefits of the previous years' service improvements appear to have run their course. The output is also comparable with District Line and Tramlink recent growth, which of course started in 2005 at a higher demand baseline. London 2050 planning is looking to significant additional population growth in many of the outer suburbs, so the observed growth rate could be higher in further years in zones 4-6.

It is instructive to note that the change in demand in Zone 2 tube stations is much less than at equivalent main line stations, albeit from a much higher per station starting point. It is plausible to suggest that the crowded tubes within Zone 2 are creating conditions of suppressed demand.

While the Northern Line has the scope for substantial service increases if the line is converted to two railways in the mid 2020s after the Battersea extension and rebuilding of Camden Town, and the Jubilee may benefit in the short term from Crossrail 1, the Victoria Line only has room for another two peak trains per hour and then it is full – until Crossrail 2 comes along.

DLR in South and South East London is still showing great vitality in growth. It demonstrates that there is suppressed cross-river travel demand still to be unleashed. More and better cross-river links are desirable. We shall return to this point.

A further material fact is the comparative rate of passenger entry+exit at each station, by zone and type of service. At main line stations (including Overground-served stations), the Zone 2 and Zone 3 averages are around the 2.4m mark annually, which contrasts with 9-10m at Zone 2 and Zone 3 tube stations. To these extent that more comprehensive metro-isation and Overground marketing can be achieved, with higher rates of station usage, then this will be a welcome step change and a relief for nearby tube services – albeit that the main line service has to step up to the mark.

The District Line might provide a token of what is achievable – with limited evidence of an average 4 to 5 million demand if excluding Wimbledon. However this may be more a function of the District's cross-river service offer, where rail transport is in short supply outside Central London. A future study could consider what a reasonable 'upper limit' between types of stations might be for a Overground offer, allowing for different catchments and service offers.

### By Route Corridor Group

Total passenger entry+exit volume	LUL:	2005	2010	2014	2005>2014	2010>2014	2013>2014
	Main lines, Overground, DLR, Tramlink:	2005-06	2010-11	2014-15	% change	% change	% change
Cross-SLL/Thameslink to SE London (15 stns)	Wands.Rd-Lough Jn-Peckham-Lewisham-	15,408,118	26,996,154	37,254,078	+142%	+38%	+7%
Average via SLL/Tlink to SE Lon entry+exit per stn	Catford/Catford Bge-Beckenham Jn	1,027,208	1,799,744	2,483,605	+142%	+38%	+7%
Via Crys.Pal to Tulse Hill, S. Bermondsey (13 stns)	Beck Jn-CPal-Streatham stns-Tulse Hill-	11,575,995	21,771,890	29,099,804	+151%	+34%	+6%
Average via Crystal Palace entry+exit per stn	Peckham-South Bermondsey	890,461	1,674,761	2,238,446	+151%	+34%	+6%
Via Sutton-Croydon/Mitcham to Batt.Pk (22 stns)	Epsom-Ep.Downs-Sutton-via W.Croydon/	24,665,008	40,538,345	49,414,372	+100%	+22%	+5%
Average via Croydon/Mitcham entry+exit per stn	via Mitcham-Balham-Battersea (not CJn)	1,174,524	1,842,652	2,246,108	+91%	+22%	+5%
Thameslink Loop stns excl Wimbledon (8 stns)	Tooting-Wimbledon Chase-West Sutton	1,210,512	2,655,162	3,819,956	+216%	+44%	+8%
Average Thameslink entry+exit per stn		151,314	331,895	477,495	+216%	+44%	+8%
Sydenham Line, ELL and New Cross ELL (14 stns)	WCroy/CryPal-NXG/NX ELL - Rotherhithe	25,190,466	29,605,777	48,319,246	+92%	+63%	+13%
Average Sydenham Line entry+exit per stn		1,799,319	2,114,698	3,451,375	+92%	+63%	+13%
Total South London Line (excl CJn) (6 stns)	Wands.Rd-Peckham-South Bermondsey	4,199,282	8,683,986	15,141,178	+261%	+74%	+9%
Average South London Line entry+exit per stn		699,880	1,447,331	2,523,530	+261%	+74%	+9%
TOTAL SLL/South Overground excl CJn, ECroy	Combination of the two entries above	29,389,748	38,289,763	63,460,424	+116%	+66%	+12%
Total major Southern stations (3 stns)	Clapham Jn, East Croydon, Wimbledon	39,625,216	55,990,444	68,759,720	+74%	+23%	+4%

The largest changes in recent years in passenger demand are shown here as those which include the new London Overground services provided by the East London Line. This is 4 to 5 times the economic growth in the same period and demonstrates the considerable trust by prospective passengers and the willingness of South Londoners to ally their travelling requirements with a good Overground service.

The rate of change of demand in the last year and indeed over the whole past 10 years is much greater than the numbers seen at South London's three busiest interchange stations, Clapham Junction, East Croydon and Wimbledon. There the passenger entry+exit volume rose only by 4%. This is still above the economic growth rate but suggests that there is a degree of maturity in

passenger demand at a station already benefiting from high frequencies, where an Overground influence (already present at Clapham Junction) will have less impact on passenger generation.

On the other route corridors the recent growth rate is unsurprisingly a middle range of demand at +5% to +7%. This is a reflection of averaging the different rates of demand across the inner, middle and outer suburbs. There is one different result to note, which is the change of usage at local Thameslink stations between Streatham and Sutton via Wimbledon (but excluding those three stations). Here the recent growth has been 8% per annum despite only a 2tph service. The reason for this is unclear.

## Modelling future demand

The Centre for London team has modelled the prospective changes in passenger demand at the study area stations. The base line has been taken as the recently published Office for Rail and Road data (ORR) for 2014-15<sup>1</sup>. CfL has adopted a cautious compound growth based on an annual 2% growth in demand deriving from the economy, and overlaid with most stations also allocated an average population growth element of 0.57% p.a. The latter is the study area's estimated share on a straight-line basis of the forecast central increase in London population to 2050, which is about 300,000 people locally. Some stations which are outside Greater London or have poor train service levels, are given lower increases.

The starting point in overall volume is 224.2 million passengers entering and exiting at the study area stations in 2014-15. With the compound economic growth by 2031, and a straight line addition of 0.57% p.a. of 2014-15 passenger travel (so equivalent to a straight line population growth), this would be 308 million passengers entry+exit, using these cautious growth rates, a demand increase of 38%. By 2050 the passenger demand could be 448 million, which is a doubling from 2015.

This is of course relying on unconstrained demand, and on averages across South London, whereas in reality one would expect higher growth in some stations and less elsewhere, and some fares increases higher than RPI. TfL models RPI+1% to 2020, then RPI +½%, which may knock back the economic growth element as a stimulant for passenger travel. However the growth rates assigned by CfL are in general only half of the recently observed change in demand at study area stations, and those overall rates seen in the past decade are similar or greater.

Also there is no allowance in our estimates for the supplementary effects of the Overground where it does not already exist and which may have shorter or longer term fundamental impacts on demand levels. They make no allowance for higher quality stations and/or higher frequency train services. Overall the foreseeable demand could be greater across the study area network than we have modelled.

We have applied the growth rates to stations which are shared with other train operators, such as Clapham Junction and Wimbledon which are shared with South West Trains. This is because economic growth and housing growth should apply regardless of operator. There is a vital observation which arises, that by the 2050s a South London network if largely converted to Overground standards could be facing double the present passenger volumes with

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<sup>1</sup> ORR station usage statistics for 2014-15, published 15<sup>th</sup> December 2015.  
<http://orr.gov.uk/statistics/published-stats/station-usage-estimates>

massive consequences for the scale of station, train and line capacities that should be planned for now and built in successive decades. It is nothing less than a fundamental reshaping for passenger benefit and London's benefit of the entire South London network.

It also shows that TfL's current South London proposals are an important and necessary starting point, but that they might or might not keep pace with the underlying demand until the 2030s – by which time other larger scale investment appears to be needed. This should be being planned for now, as a coherent long term strategy, with short and medium term interventions designed not to conflict with the long term infrastructure needs.

## Interchanges and Connectivity

Historically on many routes in South London it has been the case that suburban stations have offered direct trains to several London termini rather than just one. These might offer a spread between City and West End destinations, for example.

Although the South London network has many lines crossing each other there are also relatively few locations where a useful interchange is offered. This has also limited the extent to which, despite appearances, it is easy to get between suburbs in south London. Centre for London considers that there will need to be important improvements both in local accessibility and with easier interchange, to enable simplification of service structures so that higher frequency and more reliable services can be operated.

The 2014-15 identified interchange volume at suburban South London stations was 52 million of which 69% took place at just two stations, Clapham Junction 28.5 million and East Croydon 7.5 million. This illustrates the shortage of other useful main line suburban interchanges across South London.

The bulk of tube interchanges are in Zone 1 or its borders, though Balham has a useful role, and Canada Water another vital cross-river function by joining much of the South London network to Canary Wharf via the Jubilee Line. Canada Water entry+exit on the ELL rose in one year from 6.2 million in 2013-14 to 10.3m in 2014-15, and because interchange between national rail and the Underground is counted as an exit from one operator and an entry in the statistics of the other operator, these figures point to a sharp rise in ELL/JLE interchange numbers.

By the 2030s Crossrail 2 should be built and this will also stimulate much additional interchange within the South London suburbs, especially at Clapham Junction, Balham and Wimbledon. Interchange is to be encouraged if it improves the range of accessible origins and destinations.

## New Services and Objectives

### *Satellite Activity Zones*

Centre for London has built on the initial thinking by TfL in this section. We start with a big challenge. While the South London rail network historically has focussed on serving Central London, and in some instances other parts of London via Clapham Junction, the geographical structure is changing to create major job clusters not just in the centre but also in inner North West and East London. The Old Oak Common and Park Royal Mayoral Development Corporation (OPDC) is forecasting 55,000

jobs in its environs, Stratford has a similar potential, while Canary Wharf and its vicinity are heading beyond 200,000 jobs.

So far there is no equivalent 'Satellite Activity Zone' (SAZ) proposed in inner South London, while the previously dense office cluster in central Croydon is metamorphosing to fewer higher quality offices and high density housing. It is for someone else to consider whether there should be a South London SAZ which might help to contain some of the demand for travel. In its absence there is an urgent need to create direct rail services from the South London suburbs to these locations, not just rely on the West and East London lines which mostly require (WLL) interchange at Clapham Junction or (ELL) interchange at Canada Water despite its constricted 4 car platforms on the ELL, and Jubilee Line crowding.

Projecting our baseline growth estimates to 2050 shows Clapham Junction entry+exit at 53 million compared to 26 million now (the interchange numbers are similar and additional), while Canada Water could rise to over 20 million. The latter is physically impossible at an 8/10/12-car scale, without a complete reconstruction not just of this station but also other ELL tunnel stations and parts of the complete railway, as the railway tunnel approaches to stations would require alteration in some cases. If one looks this far ahead, a financial study may show that it is no more expensive and will produce additional journey time benefits, to build a relief ELL nonstop between Lewisham and Canary Wharf (4.2 miles if from Ladywell to north of Canary Wharf). This would also relieve DLR.

There is a wider strategic opportunity to use an existing (Mid-Kent) railway line most of the way to Croydon southwards, and northwards to consider a new direct line to Stratford in due course. We don't underestimate the scale of investment this might require, but for example it is now impossible to imagine a circumstance when the ELL might have to be shut for 2 or 3 years to change it from a 5-car to a 10-12 car railway. The Jubilee Line would not accommodate the interchange numbers either.

The desire for new capacity to the SAZ destinations therefore provides a starting point for our additional priorities for new and improved services in South London. We support the TfL proposal to raise service frequencies on the WLL and to run 4tph through trains between East Croydon and Old Oak Common (OOC). This will also achieve a direct link to HS2 providing that the through trains from South London can serve OOC, which is not yet certain.

### *Underlying railway technical changes*

The main step change which is required in all contexts is the adoption during the 2020s and not later, of ATO/ETCS technology as discussed in the preceding chapter. This standard of automated signalling is to be introduced on the sub-surface lines of London Underground over the next 7 years and will allow frequencies on that complex network (with flat junctions all round the Circle Line) of up to 32tph. Mainline trains are longer and may take longer to clear junction sections but a minimum target of 24tph can be aimed for, and more where possible now and where track layouts can be adjusted. We also advocate greater adoption of 'flying' rather than flat junctions – like a motorway intersection – at busy suburban locations. We have a number of detailed suggestions which are in the online Annex. These will become necessary in our view in order to accommodate the additional passenger capacity and train frequency pressures foreseen by 2050.

There are 4 substantial proposals which merit discussion in greater detail. A diagrammatic map of the preferred peak service frequencies and new links is shown there.

### *Streatham 'Virtual Tube'*

There is a long-standing aspiration in the Streatham area for a tube extension. There were official proposals once for a Victoria Line extension from Brixton but the Victoria line is now nearly full. A Northern Line extension was canvassed but that opportunity has been taken up by the Battersea extension. The other tube which has been championed, the Bakerloo Line, is now proposed towards South East not South London.

Yet it is a plausible objective, at any rate to achieve a 'tube-type' service frequency. Streatham is in Zone 3 so well within a tube's capabilities, while the whole of Streatham is a large source of bus passengers who choose to make their way to Brixton because that is the easiest tube interchange. The main line railway has three stations all on different lines but no one of those three offers a high frequency tube-type service. At Streatham there are trains to Thameslink and London Bridge. At Streatham Common there are trains to London Bridge and Victoria, while at Streatham Hill there are only 4 tph just to Victoria.

TfL has sought to address the shortfall by proposing a Streatham interchange. This would be south of Streatham town centre at the convergence of the Thameslink, London Bridge and Victoria lines near Streatham Common. New high level Streatham platforms would be relocated southwards, with a walking interchange to an extended Streatham Common station. Train services would be directed towards Victoria only from the Streatham Common platforms, and to Thameslink and London Bridge only from the Streatham platforms. No trains would run via Streatham Common to London Bridge.

The outcome would be a useful new suburban interchange, simpler service structures and better service frequencies with greater reliability. However Streatham town centre would continue to be poorly served for travel in the direction of Clapham Junction, Victoria and the West End including the new Crossrail 2 interchanges. Streatham Hill might see an increase to 6tph.

The Centre for London team has started with its estimated baseline change in demand. The three stations catered for 10m passenger entry+exit in 2014-15. Nearly 14m are foreseen for 2031 and 20m in 2050. These are numbers which make a clear case for radical change. The Centre for London proposal is to take advantage of the hilly ground which has existing railway tunnels east of Streatham Hill and north of Streatham stations, and build a tunnelled flying junction between the two lines. Streatham station would be 4 tracked with parallel lines in each direction and within-station interchange between services. The tunnel distance would be 3 km (so 6 km for 2 tunnels) if including 2 tracks underground, less if surface 4-tracking were possible through Streatham.

A further flying junction with the Streatham Common local tracks would complete a 'virtual tube' capability at Streatham station, and also allow a much higher frequency at Streatham Hill at the north end of the town centre. Many Victoria stopping trains could be rerouted via Streatham Hill and Streatham to provide extra services. Streatham itself would see a service frequency of 2-3 minute intervals in peak periods.

While in the context of 2031 demand modelling the TfL proposal has the attraction of lower cost, looking to the 2050s the ability to offer and sustain a 'tube-type' frequency has considerable attractions. It would also enable the development of a primary bus-rail interchange at Streatham, from neighbouring communities. It could stimulate new developments in Streatham town centre with greatly improved accessibility at the northern and southern nodes of the town.

### *A new South London Line*

The South London Line is the east west railway across South London within Zone 2. Starting at Victoria or Clapham Junction, it nominally but incompletely serves the town centres of Clapham, Brixton, Peckham Rye and Lewisham. It also serves the major hospital campus at Denmark Hill, and other inner suburban locations.

It is a 4-track railway for much of its route but the different tracks do different things. The ELL service over the southern pair of tracks goes through Brixton town centre without stopping as the engineering to achieve that could cost upwards of £100m. The South Eastern service from Victoria is now an all-day service at 2tph, and 3tph in peaks, but doesn't stop until Denmark Hill. Its low frequency also denies a business case for a new east-west station at Brockley near Lewisham, which could open up a new interchange there with the north-south Overground route serving cross-river travel, Crystal Palace and Croydon. Looking to the future, Zone 2 is an area of increasing development densities and fast growing travel demand, as we have seen with the 2014-15 data. The GLA Opportunity Area plans include a high density housing objective in the New Cross, Lewisham and Catford area.

Putting together this chain of missed opportunities and foreseeable high growth creates the underlying case for investment in new platforms where they are missing and improved service frequencies. The existing stations in total handle nearly 28m passengers entry+exit between them. Growth projections without additional services point to 38m in 2031 and nearly 56m in 2050. It is inconceivable that all these passengers will solely want Central London. Allied to housing densities, there is a good basis for establishing a better frequency and a more joined-up cross-South London corridor.

Subject to the business case for necessary route investment, we support an increase in ELL services from Clapham Junction to 6tph, and an additional 3tph making 6tph in total on the Southeastern route to Lewisham. To serve the GLA Opportunity Area better and to avoid operating complexities at Lewisham junction, we propose that the additional 3tph be continued to Catford and Beckenham Junction to terminate there. This keeps the extra trains continuously on the south side of Lewisham junction.

We are aware of TfL proposals to extend the Bakerloo Line to Lewisham by the 2030s, potentially as phase 1 of a later extension towards Catford and Hayes. However we also see the merits of achieving early service improvements along the South London Line and of supporting the GLA housing objectives, which will have good Gross Value Added and can be included in the business case of a railway franchise devolved to a TfL Overground concession.

### *Thameslink, Herne Hill, and a resolution for Brixton*

This report has not focussed in detail on Thameslink service options, within the limits of study resources. We have noted and support the TfL proposal to double the Thameslink loop services via Streatham, Wimbledon and Sutton, from 2tph to 4 tph each way. This would benefit a poorly served area of south and southwest London. With ATO/ETCS in the inner and middle suburbs, TfL considers that this additional frequency should be feasible with the extra trains starting and ending their journey at Blackfriars.

The main constraints on the Thameslink route within the suburbs are at Herne Hill, where they can conflict with fast trains on the Victoria/Bromley/Kent services with both routes then capacity-constrained, and at Tulse Hill where Thameslink also has flat junctions with the South London

services to London Bridge. A further consequence of the present junction designs is that trains are limited to 8-car length on this Thameslink route and the same length constraint applies to the London Bridge trains. Looking forwards it is highly desirable that junctions are reorganised with conflict-avoiding tracks and to enable trains to extend to 10 or 12-car lengths.

TfL has not proposed such major interventions in its South London scheme, but Centre for London thinks this will become essential when looking towards 2050. The scale of costs would be considerable. At Herne Hill when looked at on its own the apparent option is to put Thameslink into tunnel with overall costs of over £100m per single track kilometre (this depends if single or double track tunnels were adopted) and a possible station underground costing at least £200m unless cut-and-cover were possible, or enlargement from within the running tunnels. A scheme costing up to £1 bn looks likely, particularly if a northern tunnel portal had to be north of Loughborough Junction so incurring a second deep-level station. A much lower cost would be incurred at Tulse Hill which has the space for a flyover and additional platforms on that line.

Centre for London has therefore re-examined the combination of both Brixton, see above, and Herne Hill, and proposes a different solution for those difficult locations where longer trains and higher frequency stopping services are desired. The common feature at both locations is the Victoria/Kent fast services. The proposition is to put the Victoria/Kent fasts into a new tunnel between the Battersea rail lands near Wandsworth Road, and southeast of Herne Hill (5 km tunnel route). This would incur tunnelling costs but avoid the need for tunnelled stations on the Thameslink route at Herne Hill. It would free track capacity for additional stopping services and new Brixton platforms on the Southeastern line towards Peckham. In turn the ELL trains using the SLL might be able to use those tracks and platforms, and so avoid a ~£100m sum for a Brixton high level station.

The existing ELL tracks through Brixton would then be available for use as a freight train management loop, and help to provide yet further passenger rail capacity across South London. Fast trains should gain more line capacity through the busy inner suburbs, and a faster run giving shorter journey times. Centre for London proposes that the full chain of benefits that could arise from any fast train tunnel should be explored in detail.

### *An 'R25' Outer Orbital*

Centre for London discussions with Surrey and Kent County Councils demonstrated considerable interest in Overground proposals that did not limit themselves to the Greater London boundary. By definition there are practical limits to the useful journey time that a stopping train should be scheduled to do, but equally a limited stop service can and should go further. London 2050 planning is forecasting significant increases in housing numbers and density in outer London suburbs. In such suburbs normal expectations would be for a considerable increase in car ownership and use, particularly on orbital journeys, although this creates sustainability issues. It is reasonable to expect the housing changes to drive additional use of the M25 as a bypass between outer suburbs and also to reach neighbouring towns to access jobs.

We consider that this combination of issues starts to make the case for specification of a limited stop 4tph service paralleling the M25 and directly associated with the London suburbs, rather than using the North Downs Line via Redhill, in order to minimise orbital road traffic within those London suburbs and to relieve the M25. A further benefit of a 4tph service is that it can be competitive in turn-up-and-go with a motor car. A limited stop service reduces journey times and in this specific instance the train interiors can be designed to a standard closer to that of a car, with more seats, Wi-Fi etc.

We have given careful thought to the stops which would be of most use within and outside Greater London. An outline proposal is to start trains in Surrey at Woking, with a new platform on the southwest side, then stop only at the following locations. Guildford (reverse in bay), Horsley (Surrey railhead), Leatherhead, Epsom, Sutton, Wallington, West Croydon, Norwood Junction (then new tunnel to Kent House), Beckenham Junction, Bromley South, St Mary Cray, Swanley, then 2tph to Medway stations and 2tph to Maidstone East. Passengers would be expected to use the train for journey segments, not the whole distance. This is just how the Overground is used.

The tunnel between north of Norwood Junction and Kent House (3.2 km route) could also be used by the Canary Wharf/Lewisham/Croydon service suggested above.

We recognise that this would be breaking new ground for inter-suburban and orbital travel and offering a new type of service. We consider that historically the nominal administrative boundary between Greater London and the neighbouring Home Counties has been seen as a block to cross-boundary service development, particularly where it did not conform to the classic radial railway offer. The M25 when conceived was not thought of as a main development corridor in its own right, rather a London strategic bypass. In practice it has stimulated large scale developments within accessible distance of the motorway. Looking to future decades, an affordable railway solution, which is possible on this occasion, may be a desirable strategic option to adopt.

The London 2050 proposals themselves contained an outline scheme for an outer orbital passenger railway which in north London made extensive use of the Hounslow-OOC-Neasden and Gospel Oak-Barking railways. However in South London it faced large-scale costs in trying to drive a route orbitally in inner London across complex junctions which favoured radial services, or required extensive tunnelling to achieve an outer London orbital and so hindered its business case. Centre for London's proposal endeavours to minimise additional infrastructure, with the largest single cost being the tunnel.

## New stations, platforms and interchanges

As part of the metro-isation strategy, Centre for London has reviewed the existing location of stations and undertake a high-level assessment of the scope to provide new stations or better accesses, at places where access to the South London rail network is a problem. We have identified 13 sites where new stations or additional platforms (*if allowing other services to call*) could be considered. This excludes some additional platforms suggested in the online Annex for operational and capacity reasons.

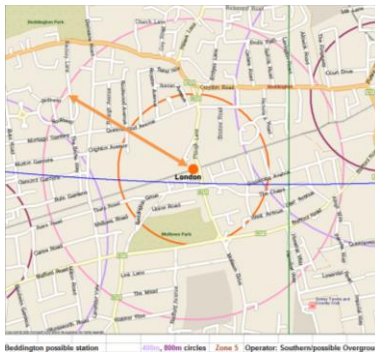
The choices were made by considering built up areas with a long gap between stations, providing much of the catchment was more than 800 metres from an existing station, so could improve an area's Public Transport Accessibility Level (PTAL). Another check was made to see if high density areas only had limited access from services which passed by, and where a demand case might be made for a new station *or* new platforms to increase accessibility and service volume. We took into account the proposal for a Bakerloo Line extension south east most probably towards Old Kent Road, New Cross Gate and Lewisham. The following possible locations are put forward for consideration:

- **Battersea 'Bark'**



On the Southeastern lines into Victoria and close to the Dogs' Home. Its purpose would be to provide direct service to the Battersea development catchment from the SLL and inner SE London. It would replace that former function at Battersea Park, which lost SLL services in December 2012. It would also provide interchange with the adjoining new NLL terminus at Battersea Power Station. A further option is for the Southeastern Victoria/Brixton/Orpington trains also to call. The stop could be on either the low level or high level pair of tracks.

- **Beddington**



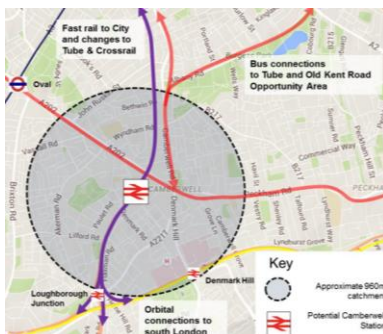
A substantial 'metro' size of gap between stations in the outer South London network between Croydon and Wallington and onwards to Sutton. It would serve the Beddington suburb and would also be accessible from the Roundshaw Estate to the south.

- **Brockley**



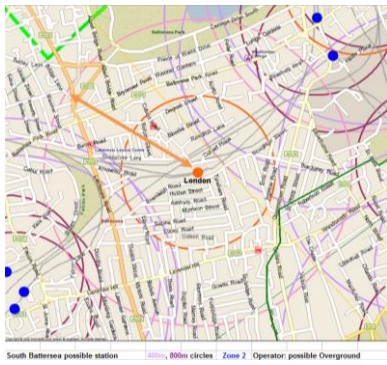
As described earlier, this would be a new pair of platforms on the east-west SLL between Nunhead and Lewisham, so opening up those travel directions for the suburb and also provide direct interchange with the existing ELL Overground and Southern route.

- **Camberwell**



A recent Bakerloo Line scheme might have served this instead of Old Kent Road. However it is still possible to serve Camberwell by rail with a station built on Thameslink where the pre-World War One station existed south of Camberwell New Road. This would close a 2 mile gap in rail coverage between Elephant & Castle and Denmark Hill. The introduction of ATO/ETCS would help make this additional station workable on the approaches to Elephant and Blackfriars.

- **Clapham East**



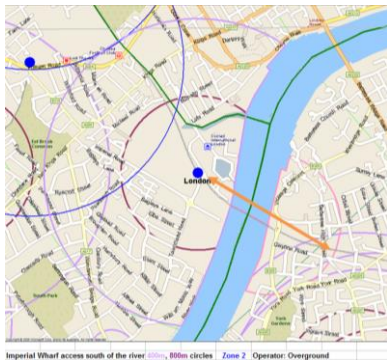
Despite the very high Public Transport Accessibility Levels in the catchment of Clapham Junction and the various Battersea stations, there is an accessibility ‘cliff edge’ between those clusters, and PTAL falls from the highest rating, 6A or 6B, to the lowest, 1A or 1B. Consequently Centre for London has given some thought to the merits of a local station in that no man’s land. There is also land potentially available for development in the area. It could not be on the main radial lines, and the only option would be a local station on the ELL SLL route, at a point where it adjoins freight running lines. Centre for London suggests that the practicability of such a station should be investigated, before a business case were taken further.

- **Clapham High Street and Wandsworth Road**



Platforms on the Southeastern tracks at these stations would enable a direct service to Victoria to be reinstated. This had been withdrawn in December 2012 when the original SLL service was withdrawn and replaced by the ELL to Clapham Junction, as part of wider changes to London Bridge services. An alternative option of moving Southeastern services onto the ELL tracks through these stations is unlikely to be feasible as the tracks are configured in relation to neighbouring junctions. It could help interchange awareness, to rename Clapham High Street station as Clapham North as it provides an interchange with that Northern Line station.

- **Imperial Wharf access south of the river for Battersea Village**



Imperial Wharf station is close to the river Thames among new developments on the north side of the river. Battersea Village is within potential catchment distance on the south bank and itself is beyond easy access of Clapham Junction station. The local authorities and other interests are proposing that a footpath should be constructed alongside the railway bridge over the river, and this would create a direct south of river catchment.

[illegible]

The solution proposed by Centre for London's consultant JRC is to create a new Lewisham South interchange platform on the SE mainline itself, which would avoid the need for those trains to access Lewisham directly (not that there is capacity to do so). A 550 metre travolator could connect Lewisham South with Lewisham junction interchange and also give direct access intermediately to the shopping centre and thereby achieve a considerable improvement in access and connectivity. Further details of the proposal are available at this link:

The link should also anticipate the Bakerloo Line extension, due around 2030.



- **Penge West to Penge East interchange**



This is an option for connectivity between the Southeastern and South Central networks, as a short and medium term scheme before any Norwood Junction-Kent House tunnel was built for R25 and other trains, or in case that scheme did not progress. A walkway would be constructed alongside each railway line, to the point where they intersect.

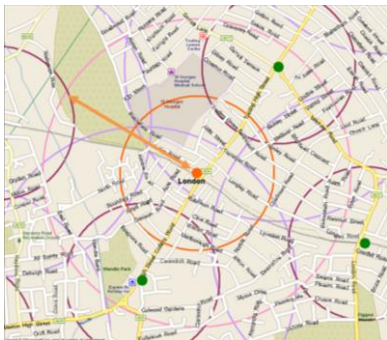
TfL has researched the option, and concluded that it does not achieve high benefits. It would be a long interchange, up

to 650 metres, with no travolators. Centre for London considers that a shorter interchange could be achieved, if Penge West station were relocated to head north rather than south. This would reduce the walking distance to 400 metres. However it would be a higher cost option, and limited to the stopping services designated to call at either of the two stations. It would not offer a serious 'R25' outer orbital capability.

- **Streatham Interchange**

This is discussed in the section above, about the Streatham 'Virtual Tube'.

- **Tooting St George's**



The initial reason is St George's Hospital with its huge catchment, yet with poor/no rail access from the bulk of South London, other than the Northern Line. A St George's station would also interchange with the main A24 bus corridor, and increase the 'within 400 metre' local rail catchment for development. The area between Colliers Wood and Tooting Broadway is already seeing extensive investment in high density housing. Moving the Thameslink loop from 2tph to 4tph would be a helpful start, while a later

ELL Wimbledon service could help make this station as successful as Denmark Hill for hospital access, and also relieve the crowded Northern Line.

### *Passenger estimates for new stations*

Passenger estimates for stations are based simply on similar stations elsewhere in Greater London. Some stations may be able to be authorised quickly, but it will be potentially 2020 before first stations might be opened. In TfL's planning, it assumed no substantial change in rail service levels until 2026 when first stage works were complete. That might influence the effective opening dates of some stations if taken forwards. A commentary is set out below. Streatham 'Virtual Tube' has been excluded from this analysis.

In summary, the additional stations if all taken forwards could have an equivalent passenger entry+exit volume of roundly 15-20m at 2014-15 levels, taking a broad view of potential demand (central estimate 17¾m). With the same baseline growth as applied to the existing South London

station network, passenger numbers could rise to 22-27m in 2031, and 33-38m in 2050. These are substantial numbers, in aggregate, and achieve an 8% gain in overall passenger numbers.

TSLO proposed station/works	Type	Location	Comparable station	Why?	2014-15 pax entry+exit	2031 pax entry+exit	2050 pax entry+exit
Battersea 'Bark'	Simple access, complex rail works	Zone 2 development area, adjoins new	DLR West India Dock	Overshadowed by neighbouring stations, slightly remote	1,500,000	2,067,729	3,008,384
Beddington	Simple access, standard rail works	Zone 5 outer suburbs, estates	Hackbridge	Mix of common land, old settlement and suburbia	1,000,000	1,378,486	2,005,590
Brockley	New interchange platforms	Zone 2, inner South London terraces, mixed use	Nunhead (entry+exit), Tulse Hill (key interchange flows)	Adjoining station in similar catchment (1.3m), plus interchange flow to add (0.7m)	2,000,000	2,756,971	4,011,179
Camberwell	Complex access, complex rail works	Within operational railway viaduct, Zone 2, inner South London terraces	Queens Road, Peckham	Similar viaduct presence (less visible), up-and-coming inner neighbourhood	1,800,000	2,481,274	3,610,061
Clapham East	Complex access, complex rail works	Zone 2, inner South London terraces, mixed use	Loughborough Junction	Hemmed in between other lines, deprived catchment, only 4 tph	1,400,000	1,929,880	2,807,825
Clapham High Street	Complex access, complex rail works	Zone 2, inner South London terraces, mixed use	Clapham High Street	Half pre-2013 destination riders, before service diverted and raised from 2tph to 4tph (x3 use)	extra pax 600,000	827,091	1,203,354
Imperial Wharf	Complex works, river footbridge	Zone 2, upmarket residential area	Imperial Wharf	Expansion of existing catchment by 40%	extra pax 800,000	1,102,789	1,604,472
Lewisham/Lewisham South	Complex access, complex works + travelator	Zone 2 inner SE London town centre and main interchange	Stratford International (but NOT on Oyster/PAYG)	Similar distance existing <> new station, long interchange traverse, more destinations (x2 for PAYG)	extra pax 2,000,000	2,756,971	4,011,179
New Cross/New Cross Gate	Complex access, complex works + travelator	New travelator link to replace railway spur	New Cross	New Cross ELL suggested for closure, replacement access via NXG, longer interchange but shorter	assume same pax 0	0	0
Penge West/Penge East interchange	Complex access, complex rail works, walking link between stns	Zone 4 suburbia, stations adjoin town centre	Streatham	Difficult to forecast if suppressed demand between SE and SC networks. Streatham suburban interchange points to 500,000 p.a.	could be higher 500,000	689,243	1,002,795
Streatham Interchange	Complex access, complex rail works	Zone 3, South London terraces and semis, mixed use, edge of town centre	Streatham stations	Cumulation of Streatham and Streatham Hill stations, some upheaval of pax flows, some additional connectivity	assume same pax then grow 2,000,000	2,756,971	4,011,179
Streatham 'Virtual Tube'	Complex access, high profile large scale rail works	Zone 3, South London terraces and semis, mixed use, edge of town centre	Streatham stations greatly enhanced in service levels	More comparable to new tube project, large scale modelling required	not estimated	0	0
Tooting St George's	Simple access, standard rail works, platforms possibly on different side of	Zone 3, busy South London mixed use catchment and access to major hospital, large developments in	Tulse Hill (2.6m) mixed use catchment, Ladywell for hospital (1.1m)	Middle suburbia, allows for City/Canary and Thameslink destinations, stn could be up to 10 tph with better Thameslink and ELL to Wimbledon. Allowance for Half pre-2013 destination riders, before service diverted and raised from 2tph to 4tph (x3 use)	3,700,000	5,100,397	7,420,681
Wandsworth Road	Complex access, complex rail works	Zone 2, inner South London terraces, mixed use	Wandsworth Road		extra pax 450,000	620,319	902,515
					17,750,000	24,468,121	35,599,215

## Resources required

The TfL proposals establish a baseline for required resources. It is not certain that all the Centre for London schemes can be adopted, as each will require a business case and project delivery validation. We are however clear that, on the scale of foreseen passenger demand, a large-scale of ramping up of investment beyond TfL's 2026-31 delivery objective will be unavoidable, if 2050 volumes are to be accommodated. It is not an either/or, as it looks like the demand will come with the economic and population changes, while the estimates we have set out are on the low side compared to recent years' increases in travel volume.

The difference in scale will comprise a series of individual big projects and some route upgrading programmes:

- A multi-billion scheme – whichever is adopted – to refresh the ELL cross-river route's capacity to accommodate, in the long term, 10 or 12-car trains.
- Substantial works over and above simple platform lengthening, and/or flying junctions, at a significant number of stations and intersections, including Balham, Brixton, Lewisham/Lewisham South, Norwood Junction, Sutton and Tulse Hill.

- Either the Streatham 'Virtual Tube' project, or TfL's Streatham Interchange scheme.
- Additional interchange/travolator works at Lewisham/Lewisham South, and New Cross/New Cross Gate, the latter also associated with works to support a new ELL route corridor to Wimbledon.
- The cross-South London SLL corridor upgrade via Lewisham.
- An 'R25' Outer Orbital in partnership with Kent and Surrey.
- The potential for 3 new, short tunnel projects in addition to the ELL capacity refresh:
  - Norwood Junction to Kent House for 'R25' – and a surface or cut-and-cover spur to New Beckenham for any Croydon-Lewisham link.
  - The Streatham 'Virtual Tube' as discussed above.
  - A tunnelled fast line past Brixton to free up the surface lines through Brixton and Herne Hill, and to enable more frequent stopping trains on ELL via SLL, Southeastern and Thameslink.
- Associated depot provision for additional and longer train sets, and stabling sidings.
- A cumulative volume of other necessities and unavoidable which come with railways.

Put in an aggregate form, this would be of the order of £10-15 bn overall, even if tunnelling was undertaken sequentially to minimise one-off costs. So this would be beyond the costs of a Thameslink, and towards the cost of a Crossrail, on top of unavoidable and necessary renewals costs such as signalling replacement (by new ATO/ETCS equipment), and with some of the train fleets also due for early replacement (though this is revenue expenditure if they are leased). The tunnel schemes would be the largest 'big ticket' item.

What the funding buys, however, is not along one corridor but a complete metro standard railway throughout South London, over 175 square kilometres of Britain's capital city, and also supporting London's neighbours. This is many more bangs for the bucks, a complete transformation of the travelling experience in South London and some neighbouring areas, and the underpinning stimulus for economic growth, with South London then able to play its full part in London's and the nation's future.

Furthermore the expenditure would not all be upfront, but afforded over several sequences of Spending Reviews and railway investment Control Periods. The development stimulus discussed elsewhere in this report also helps to achieve payback on the railway investment through Gross Value Added and Treasury net receipts.

JRC/TSLO  
8.1.2016

## ANNEX: TSLO discussion paper on new stations and interchanges

### Public Transport Accessibility assessment for new/alterd stations in TSLO proposals

27 October 2015/JRC

**Note:** In the assessment below, the PTAL estimates are based on TfL's new WebCAT system.

- **orange point** shows potential station entrance
- **orange circle** shows potential nearby high density catchment with 400m access circle equivalent to about 480m if you have to detour (not all straight line access)
- more distant catchment of 800m **pink circle** is equivalent to 960m, which is rail PTAL limit
- other stations' **400m** and **800m** catchments also shown.

#### New stations (six stations)

**Battersea 'Bark'**

**Beddington**

**Camberwell**

**Clapham East**

**Lewisham 'South' interchange**

**Tooting St Georges**

**Battersea 'Bark'** (OS 528968, 177166) – The former South London Line route into Victoria from inner South London has been severed at Battersea Park station by platform extensions. Trains still make the journey into Victoria via SE tracks, but the configuration of tracks and platforms, and complex timetabling, means trains cannot easily serve intermediate stops between Denmark Hill and Victoria. So these trains miss out Brixton, Clapham High Street, Wandsworth Road and the Battersea catchment.

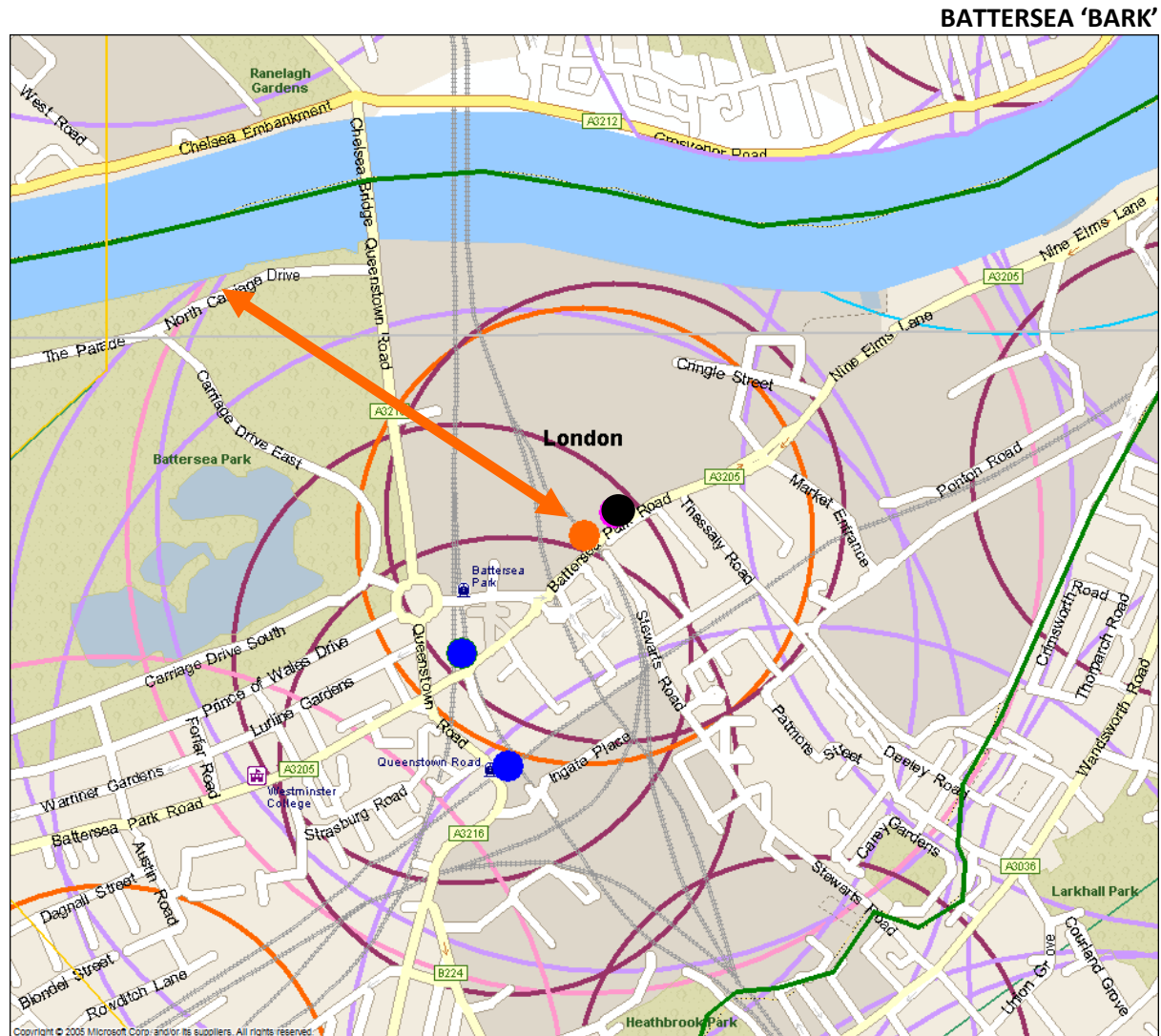
In easier operating circumstances, a frequent Metro-type service would be expected to call at some or all of these areas as part of a strengthened inner London network serving growing population densities and busy centres such as Brixton. Solutions are suggested elsewhere in this note for Clapham High Street and Wandsworth Road. These propose additional platforms on the SE tracks, a comparable solution adopted also in North London to operate multiple Overground services (ELL, and NLL) over a busy network in the Highbury and Canonbury area. Separate options are suggested in this note for Brixton, in tandem with operational and infrastructure issues in the Brixton and Herne Hill areas.

This leaves direct access between inner South London and the rapidly renewing and high density Battersea area, as the remaining journey pairs to be addressed. The SE tracks offer both high level and low level lines through the Battersea area, including scope for an intermediate station adjoining the Battersea Power Station development and the planned Northern Line extension terminus. To distinguish between the existing Battersea Park station – and because it adjoins the Dogs' Home – a potential station on the SE tracks is called Battersea 'Bark' for working purposes. Train services are intended primarily as the new Cross-South London Overground at 6 tph each way, serving Victoria-Lewisham-SE London, adapted and improved from the existing Victoria-Dartford service. A further option is for Southeastern Victoria-Brixton-Beckenham-Orpington trains to call additionally or instead.

The existing PTAL level is 6a (Accessibility Index 25.47 in 2011, 26.38 in TfL's 2031 forecasts with committed schemes – the latter excludes the planned Northern Line extension). Addition of +6 tph

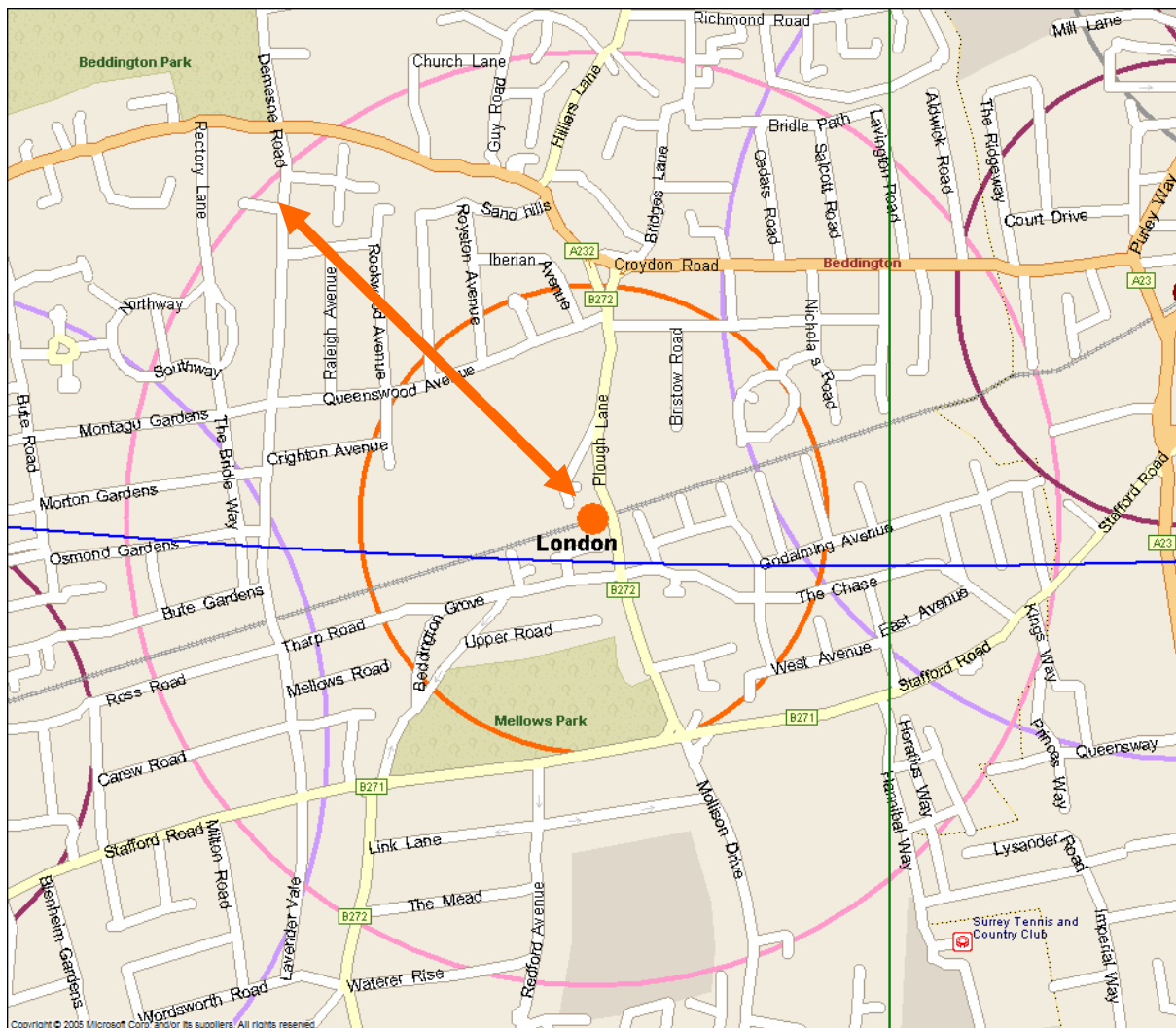
(combined +12 tph two-way) will not on its own to move the immediate catchment to PTAL 6b, however the addition of the Northern Line extension at up to 33-36 tph each way then makes the difference and PTAL 6b is achieved.

The possible location of a Battersea 'Bark' station is shown on the adjoining map. An alternative location is on the neighbouring viaduct to the west. The Northern Line station location adjoins and is shown in black.



**Beddington** (OS 530123, 164398) – The location is at Plough Lane between Waddon and Wallington. There is a substantial 'Metro' gap between stations in the outer GLA rail network in South London, between Croydon and Wallington and onwards to Sutton. [A long-gone halt was called 'Bandon', but the village proper is Beddington, so station named after that.] Much development has taken place, eg Roundshaw to the south, but more may be possible. Local scope for developments on vacant lands, also existing residential areas with poor access to local rail services, plus Roundshaw estate nearby. Bus services provide existing background PTAL volume of 2 (Accessibility Index 8.45 in 2011, 8.68 in 2031). At least +4 tph to be provided (combined +8 tph). Incl. buses, +1 improvement in PTAL is achievable across the catchment. Alternatively, + 6 tph would achieve +2 PTAL, to level 4, close to the station entrance, with an Accessibility Index of over 16.

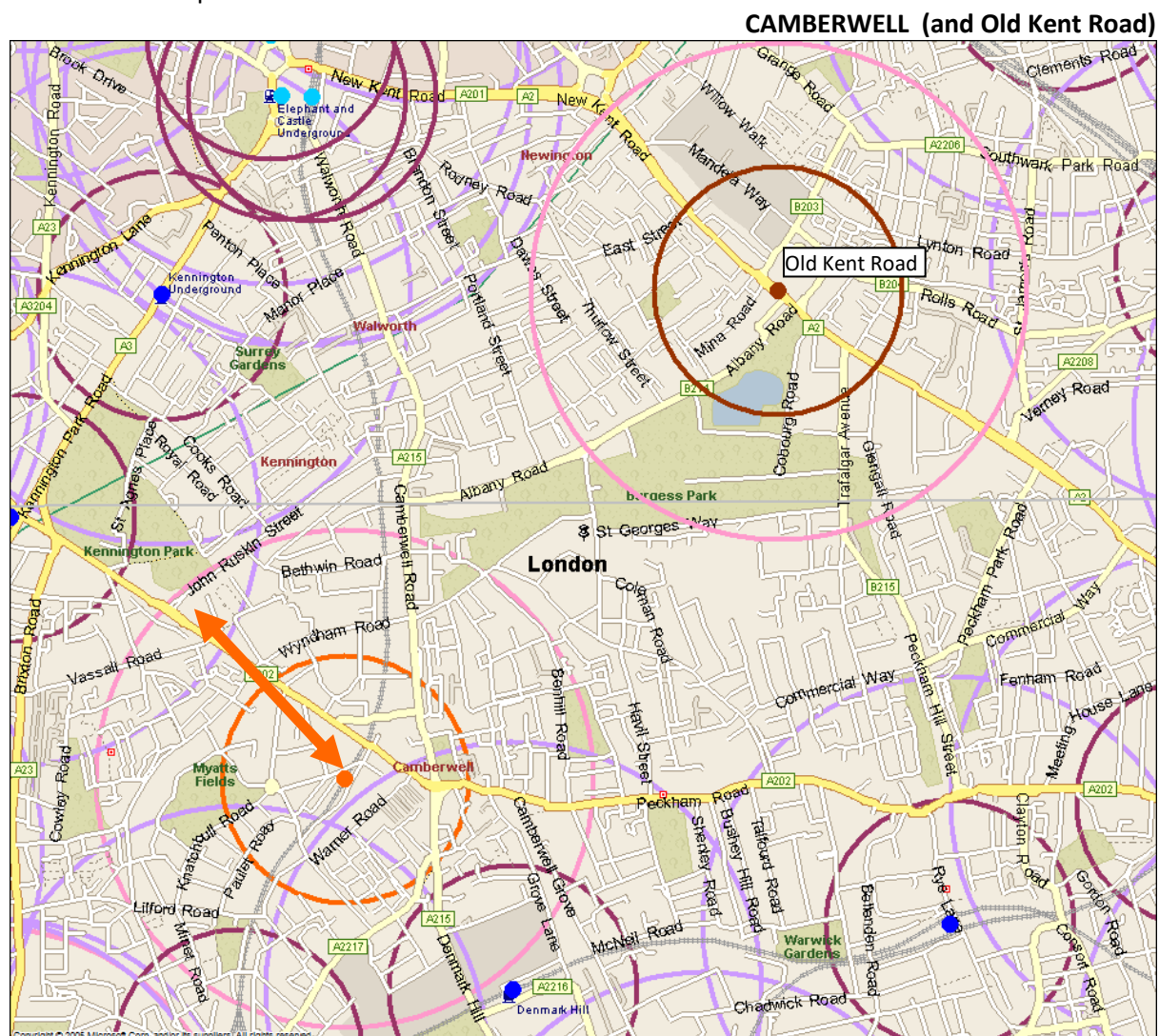
## BEDDINGTON



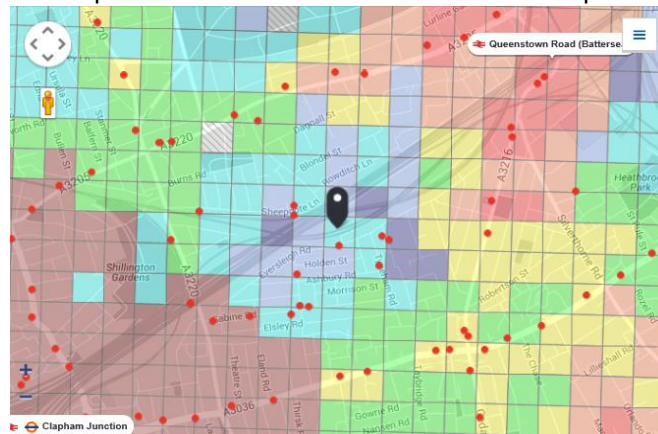
**Camberwell** (OS 532234, 176738) – not directly on the proposed expanded Overground network, but on Thameslink which doesn't stop south of Elephant & Castle for 1½-2 miles, until Loughborough Junction, Denmark Hill or Herne Hill. There has been a century-long call for better local rail services, since the last Camberwell station was closed in WW1. There have been nine separate Bakerloo schemes since the 1920s, and a tenth is under consideration, which reviews different alignments for a Bakerloo-SE London extension. Since the 1980s a new Cross-River tram service has also been considered but not approved.

The viaduct space of the former Camberwell station still exists, south of Camberwell New Road, and this could be re-used with adaptation. With South London area investment in improved operability in the 2020s, the Thameslink specification could be revisited to insert a station in what is otherwise an inner London rail desert, in an area receiving heavy renewal and investment. A local station catchment map shows that a combination of a Camberwell Thameslink station and at least one Old Kent Road Bakerloo extension station could put much of this part of inner SE London 'on the map'. This would be allied with higher density developments, for example at Old Kent Road.

The existing PTAL level near the former Camberwell station is 5 (Accessibility Index 24.45 in 2011, 24.75 in 2031) in TfL's PTAL planning. Addition of +4 tph one way (combined +8 tph) would raise the PTAL level to 6a. A further increase in service levels would benefit connectivity, for example with the possibility of direct services with Streatham/Sutton/Wimbledon and Peckham/Catford/Bromley. However the step to PTAL 6b would not be achieved.

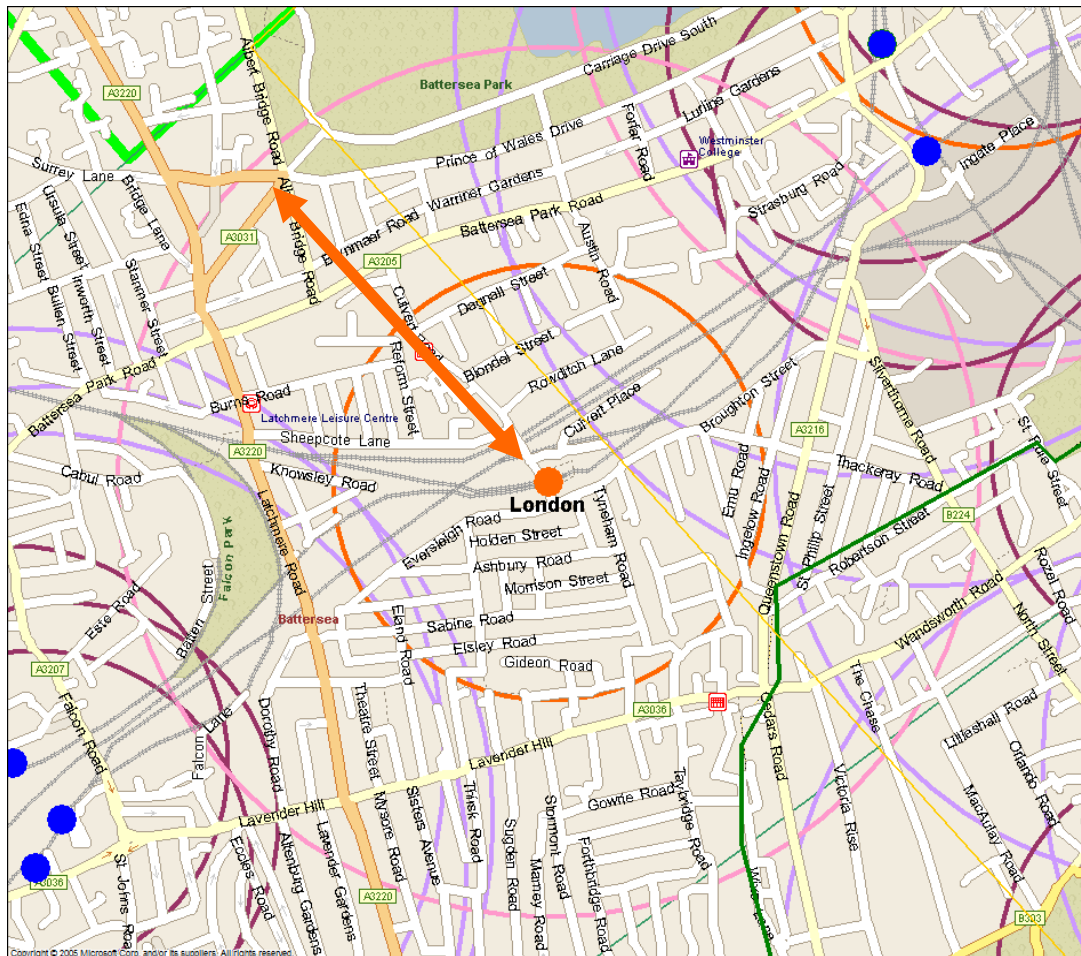


**Clapham East/South Battersea** (OS 528139, 176149) – There is a significant gap between stations in this high density inner London area, while PTALs drop dramatically in a short space from 6b to 1-3 within the catchment. See map below. Yet the area offers some development potential.



It is not realistic with railway operations and topography to insert a station on the main running lines towards Victoria and Waterloo. However the link to South London Line, served by orbital Overground ELL trains, may allow insertion of a station on the section between Clapham Junction and Wandsworth Road station, where trains often only crawl so may incur little or no additional journey time. Central London passengers could travel via Clapham Jcn, with the interchange there aiding much other suburban travel. So there is a prima facie case to be reviewed. The Battersea MP before 2010, Martin Linton, had advocated a station here. Adequate freight train holding facilities would be required on adjoining running lines, as the location is used as a train management location for cross-London freight services.

#### CLAPHAM EAST

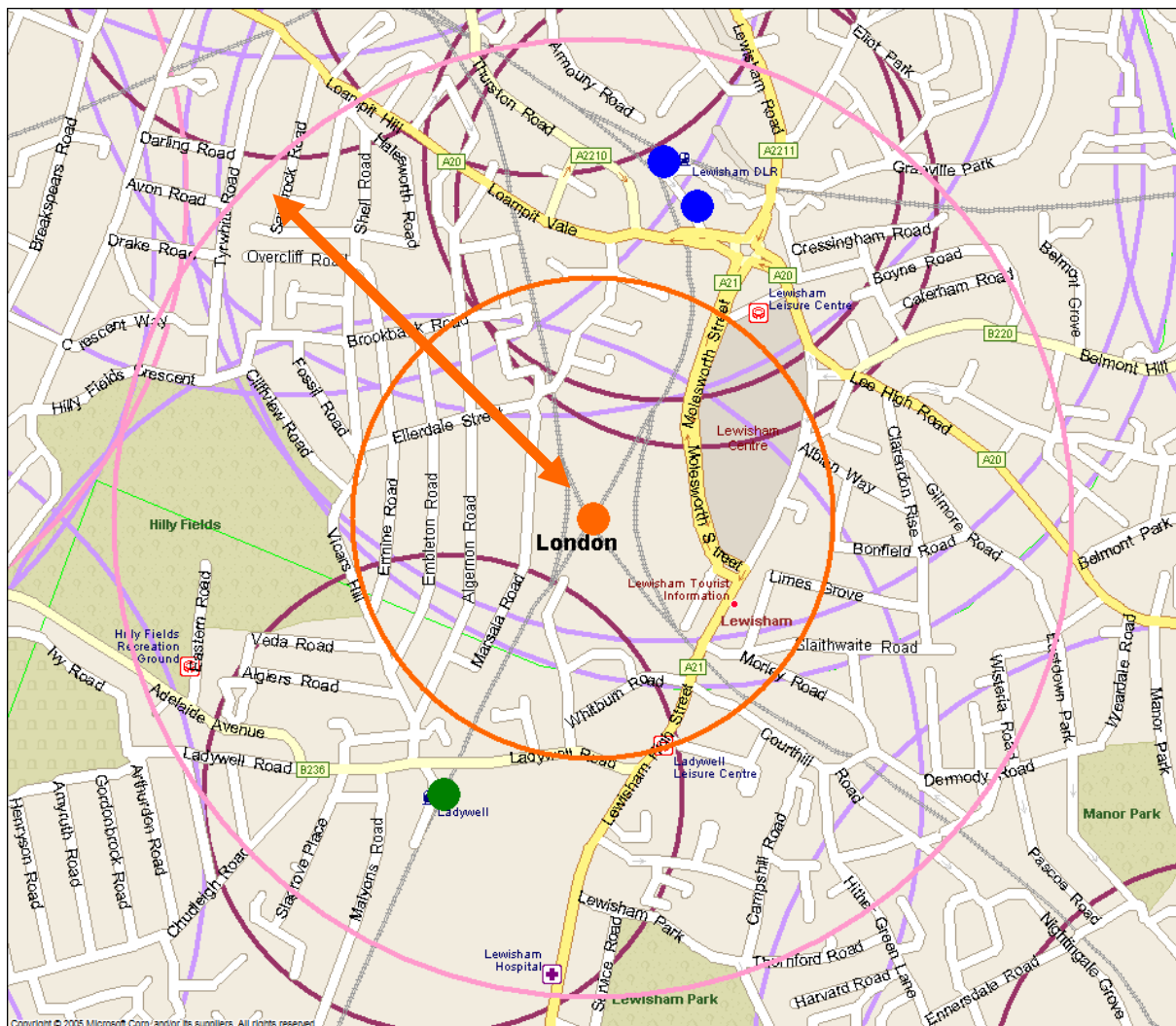


**Lewisham 'South' interchange** (OS 537960, 175366) – a background briefing paper [Future Railway at Grove Park] is linked below, including outline google mapping. Allows SE main line train services to serve Lewisham with travolator or DLR link from 'South' platforms. Most of these currently bypass Lewisham. It would offer a new local station entrance for the additional platforms, and could also have intermediate access if travolator, by the shopping centre on link between existing Lewisham 'Junction' station and Lewisham 'South'.

<http://www.jrc.org.uk/PDFs/Future%20Railway%20at%20Grove%20Park.pdf>

Significant improvement expected in local PTAL levels, currently PTAL 4 (Accessibility Index 18.56 in 2011, but a worse projected access of 18.08 in 2031). +12 tph or more each way (combined +24 tph or more) across catchment would achieve +2 PTAL, to level 6a, even with long access distances to Lewisham Town Centre. Would be closer access distances to Lewisham Shopping Centre and southern end of Lewisham High Street, so PTAL potentially improved there towards 6a, if it were currently at 5. Existing Lewisham station is at PTAL 6b.

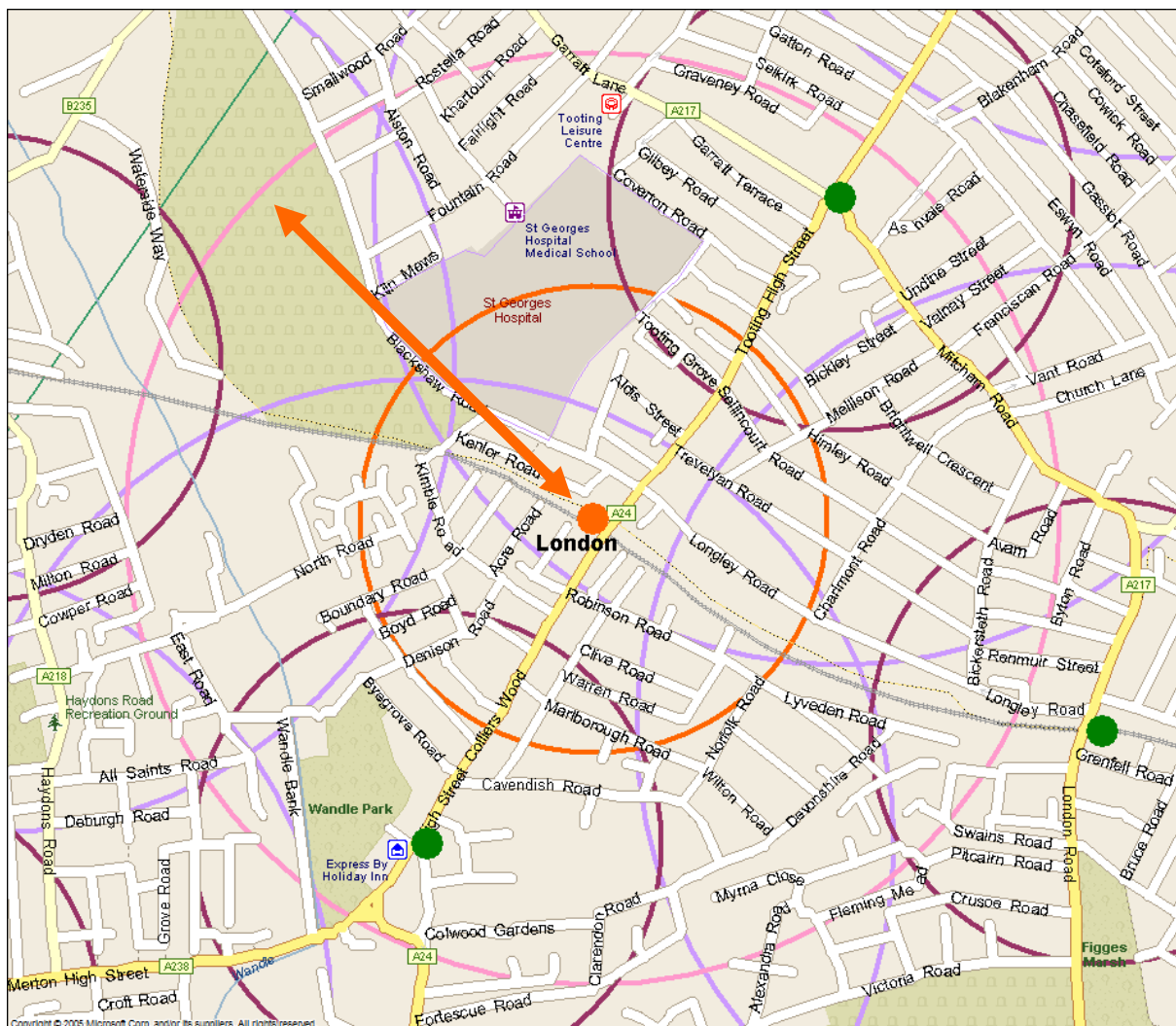
#### LEWISHAM 'SOUTH' INTERCHANGE



**Tooting St Georges** (OS 527071, 170916) – Main hospital with poor access from much of South London catchment. As well as the hospital campus, a new station on the Thameslink route can serve new high rise catchments towards Colliers Wood, and rest of existing catchment currently with poor access to railway stations. If 4 tph or better Thameslink service – TSLO also proposes 6 tph ELL Wimbledon service here – the overloaded Northern Line can be relieved of significant passenger volumes.

Entrance on Tooting/Colliers Wood High Street, in-between Northern Line Tooting Broadway and Colliers Wood stations. Existing PTAL level at notional station entrance is PTAL 5 (Accessibility Index 20.32 in 2011, with a similar but reduced 19.39 in 2031, moving the PTAL back to 4). Adding +4 tph each way (combined +8 tph) will ensure a consistent PTAL of 5, but does not improve PTAL to 6a. Adding an ELL service at +6 tph (combined +12 tph) is sufficient to raise PTAL to 6a, close to the station.

## TOOTING ST GEORGE'S



## Potential interchanges (four locations)

**Brixton town centre/interchange**

**Brockley interchange**

**Penge interchange**

**Streatham interchange**

**Brixton town centre station** (OS 531104, 175499) **and interchange** – This main line suburban station is in a side street, and not very visible, compared to Brixton tube station on the main road. It is currently served only by the Victoria-Brixton-Beckenham-Orpington trains, with platforms on the line via Herne Hill. Its annual usage was nearly 1 million entry/exit passengers in 2013/14, about 1/30<sup>th</sup> of the tube station at nearly 30 million passengers. The station entrance PTAL is the highest possible already, 6b, because of the density of bus and tube services, which is very little to do with the main line.

The main rationale for additional main line services is therefore the ability to interchange between main lines and buses, and to a lesser extent with the Victoria Line, to relieve the tube of passengers who could with advantage move their journeys upstairs, and also to offer quick journey links between Brixton and neighbouring main town centres and interchanges such as Clapham Junction, Denmark Hill, Peckham and Lewisham. It will also manifest Brixton's better all-round public transport linkage and so assist local economic growth, and provide extra capacity for specific flows such as Victoria-Brixton where the tube has virtually no more available capacity (the tube's forecast peak operating frequency is 36 tph, and it is already at 34 tph in peaks) and that capacity is better made available for other inter-station flows.

There are four main line options at Brixton:

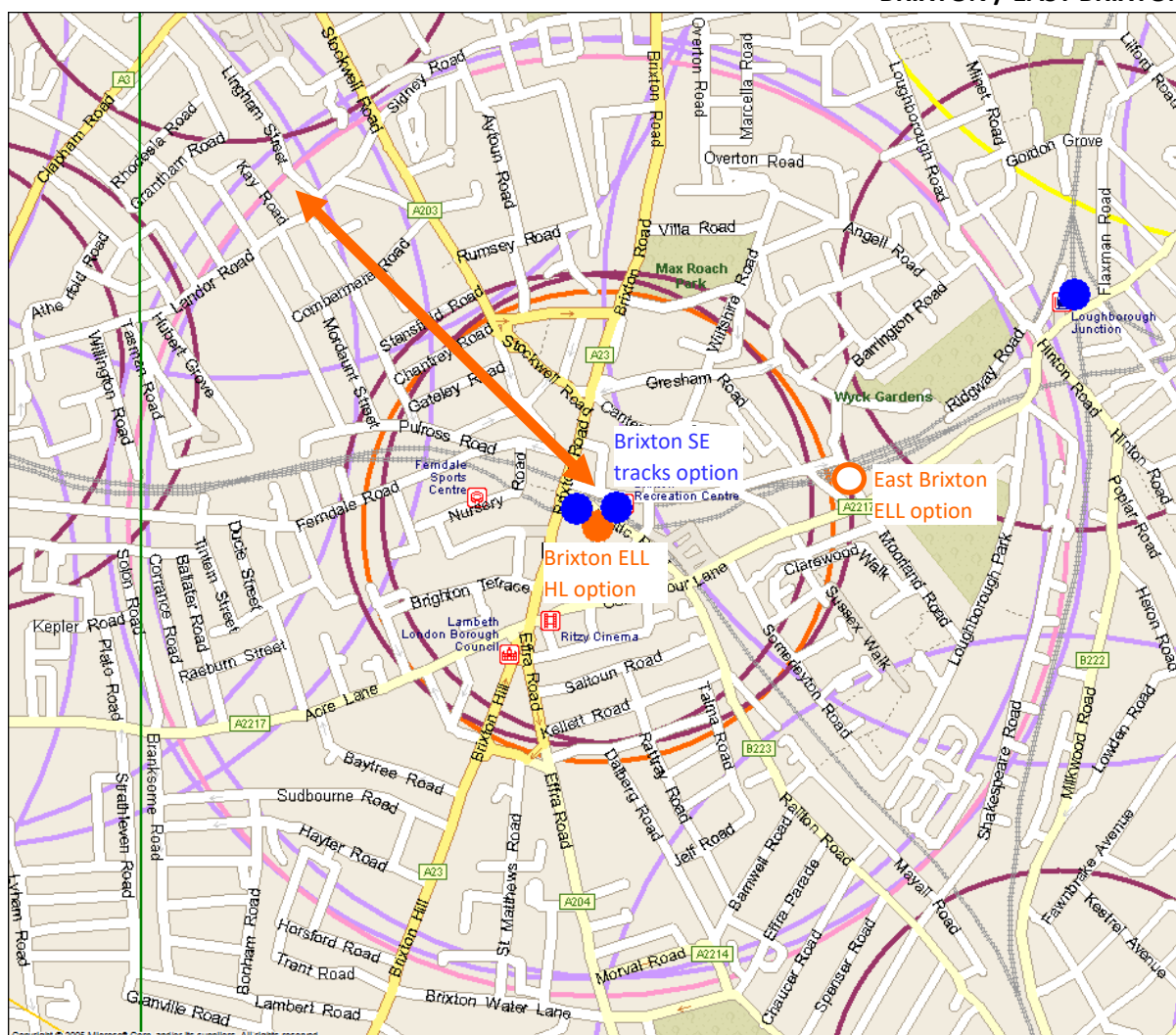
1. Build a high level station on the ELL 'Atlantic Line' tracks at Brixton, two storeys up. Changes to alignment and curvature may be required to confirm with modern railway station design regulations. Impacts on neighbouring properties may arise, although as the location is within the Brixton Town Centre renewal area, this may be feasible with sensitive designs. A cost of up to £100m may arise. It might be possible, subject to a timetable review, for some or all Victoria-Lewisham-SE London local trains also to call there.
2. Reopen the disused platforms on the Catford Loop lines for the Victoria-Lewisham-SE London service, which this study favours for early development at lower cost, subject to available capacity on the SE tracks and through Brixton junction. This station might reduce the case for ELL trains to call at Brixton, although Clapham Junction-Brixton passengers would then need to change en route.
3. Studies undertaken by LB Lambeth suggest a lower cost ELL option might be available at the former East Brixton SLL station site, near Barrington Road, on the Overground tracks. A combined output might include an East Brixton Overground stop plus Victoria-Peckham-Lewisham-SE London trains calling at re-instated Brixton main line platforms. This Southeastern service could be increased in frequency and become part of the Overground.
4. There are rail capacity and operability issues already arising at Herne Hill station, where the Victoria-Kent main line and Thameslink via Elephant services conflict now, as well as the station having only 8-car platforms, which limits future train lengths. In the context of future intensive South London metro (Overground) services, the combination of Brixton and Herne Hill stations and junctions are expected to be a significant capacity block, where a flying junction separation at Herne Hill is not feasible. One solution which may be more economical is to build a new main line tunnel for non-stop services, between Wandsworth and SE of Herne Hill, in order to free up existing stations and tracks at Brixton and Herne Hill for more intensive use by metro and

Thameslink trains only, and for freight. Alterations to Herne Hill surface platforms would then be possible with a less complicated surface track layout enabling 10- or 12-car platforms. In that event, new Catford loop platforms at Brixton might become available for use also by ELL services across South London, with ELL trains sharing the SE tracks for some distance.

In summary, options 2 and 4 start with a similar station requirement – reopened platforms on the Catford Loop at Brixton main line – and, with option 4, track simplification and longer platforms at Herne Hill – while option 3 would add an Overground station at East Brixton in place of an ELL Brixton stop. Option 1 would be a new high level pair of ELL platforms.

The map below shows the general location of a high level ELL station at Brixton, which would be little different in location to an enlarged Brixton main line station. The location of an East Brixton Barrington Road station is also shown, though not its catchment; it would overlap extensively with the high density elements of Brixton and Loughborough Junction stations, so with little PTAL gain locally. No addition to PTAL would be possible at Brixton as it is already at PTAL 6b. Improved main line (=expanded Overground) services at Brixton would however offer some additional developer stimulus as well as travel benefits, with increased orbital connectivity and extra carrying capacity.

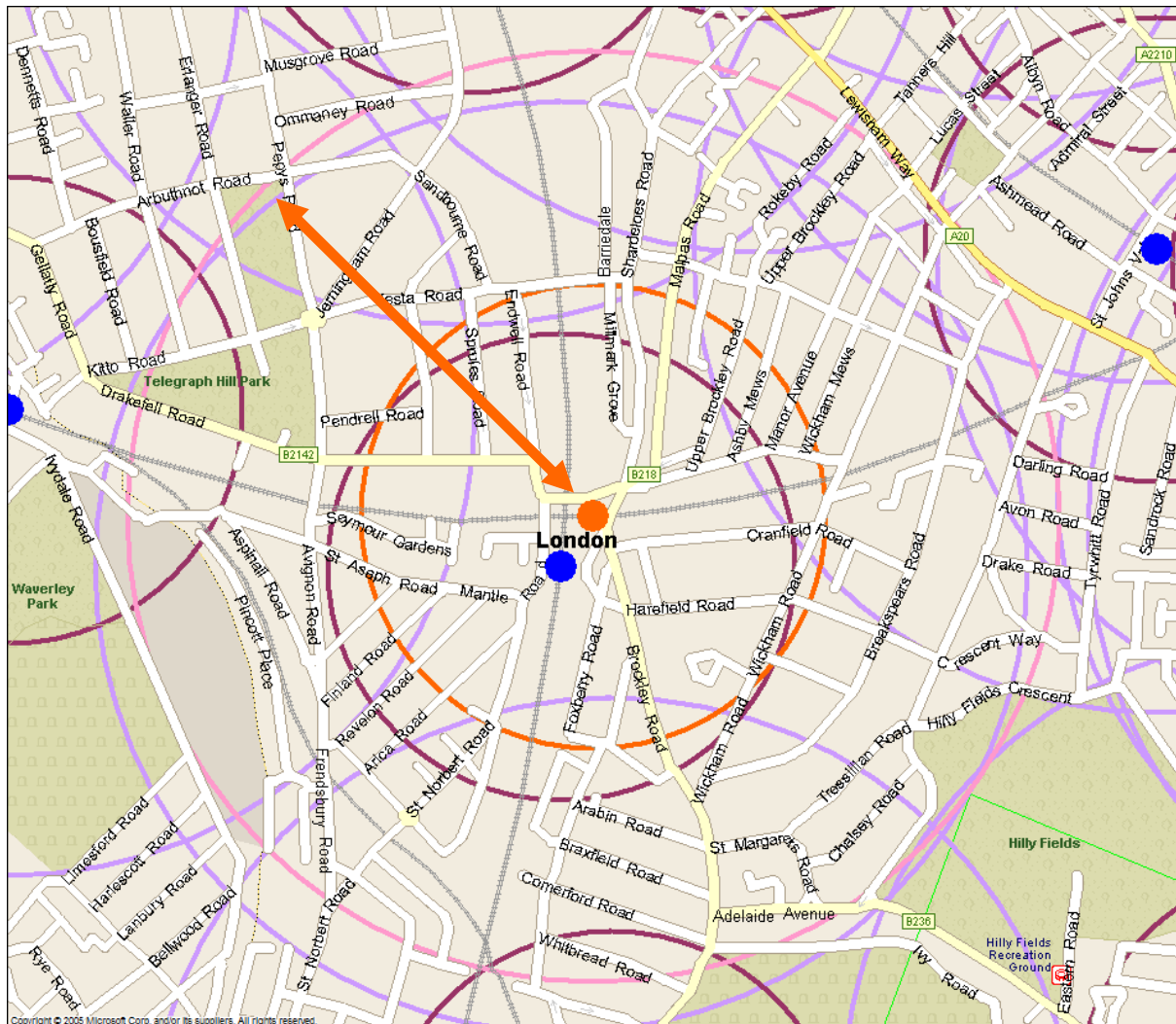
#### BRIXTON / EAST BRIXTON



**Brockley Interchange** (OS 536418, 175839) – new east-west platforms crossing over current north-south station. No large-scale station entrance changes assumed, though might be additional accesses. Extra rail services (and more buses by 2031) will raise PTAL level. New comprehensive interchange between different service groups, helps to open up South London connectivity and achieve shorter journey times.

Existing PTAL level is 4 (Accessibility Index 19.02 in 2011, 18.81 in 2031), so adding +6 tph each way (combined +12 tph) on the new east-west Overground will bring PTAL to 5.

#### BROCKLEY



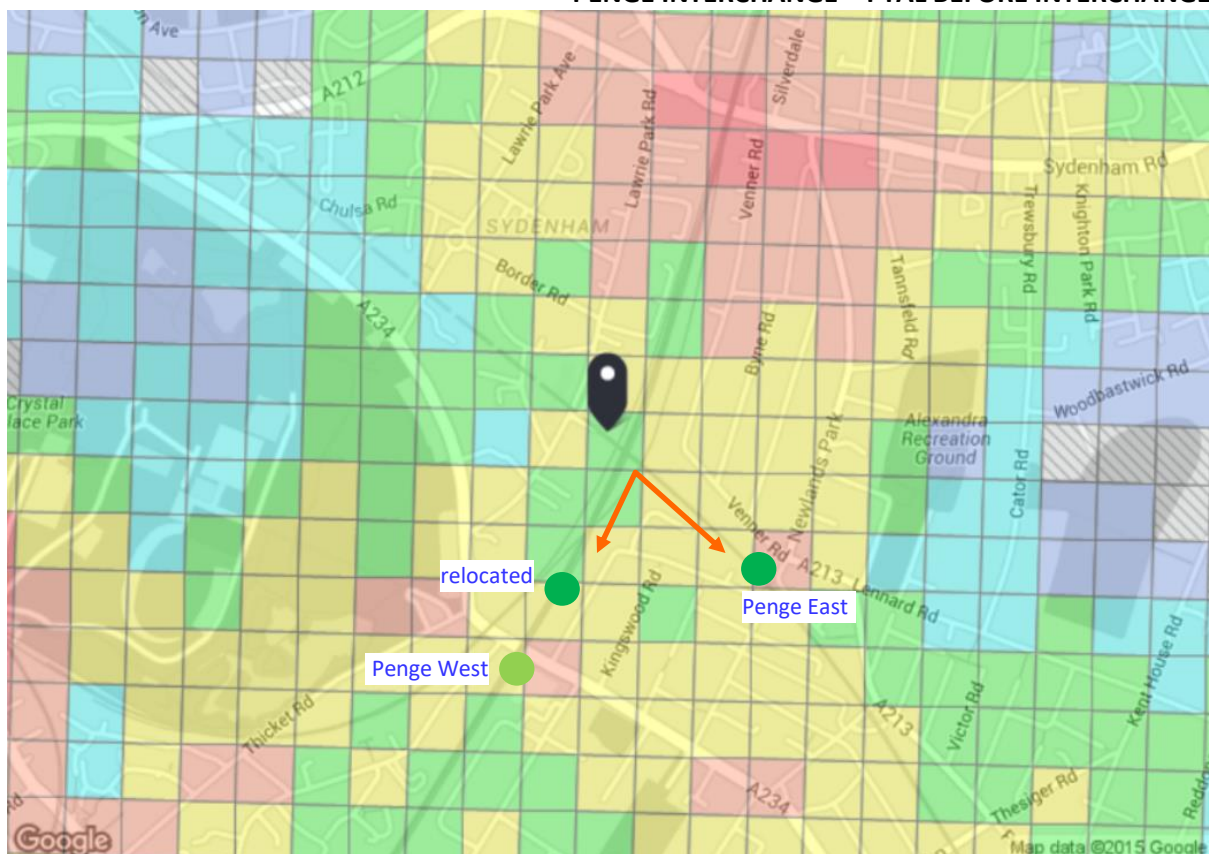
**Penge interchange** (OS 534940, 170512) – proposed new interchange between Penge West and East stations, following railway lands. There would be a reduced interchange distance if Penge West platforms were relocated north of Penge High Street, to be closer to the SE line at Penge East.

This would not vary the PTAL score for Penge West entrance, nor probably for the southern catchment as access via street to Penge East entrance is also possible. However there would be a general stimulus for new development because of the overall visibility and perceived greater accessibility of development lands in the combined station catchments, thanks to the marketing of the interchange and the greater range of services now linked up.

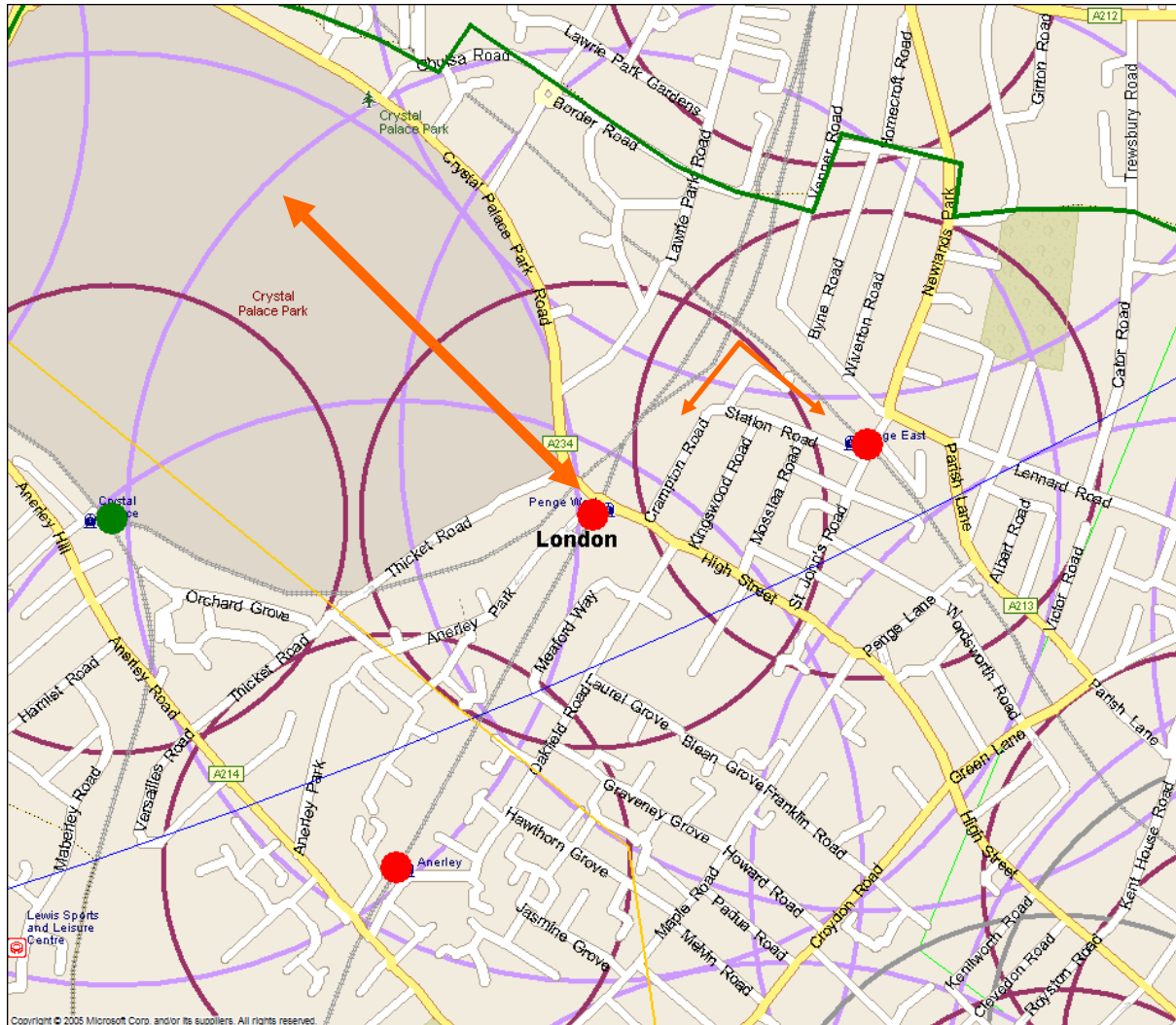
If a northern access were opened up, across the railway lands to the NW catchment area (eg, Lawrie Park Road, via a new entrance at OS 535134, 170952), then new development opportunities may arise specifically with the interchange project. The existing PTAL at that location is 3 (Accessibility Index 11.22 in 2011, 11.18 in 2031), but only makes provision for local buses and a long walk to Penge West station. A shorter walk to both Penge West and Penge East stations can bring the PTAL to level 4, near to the new entrance.

It is also worth noting that the introduction of a similar station-to-station interchange behind the barriers, between two nearby inner North London Overground stations, at Hackney Downs and Hackney Central, has already achieved a Benefit-Cost ratio of nearly 7 to 1, only 3 months after opening. So creating greater connectivity can achieve good and fast payback in the right circumstances, just in transport terms and before any development added value.

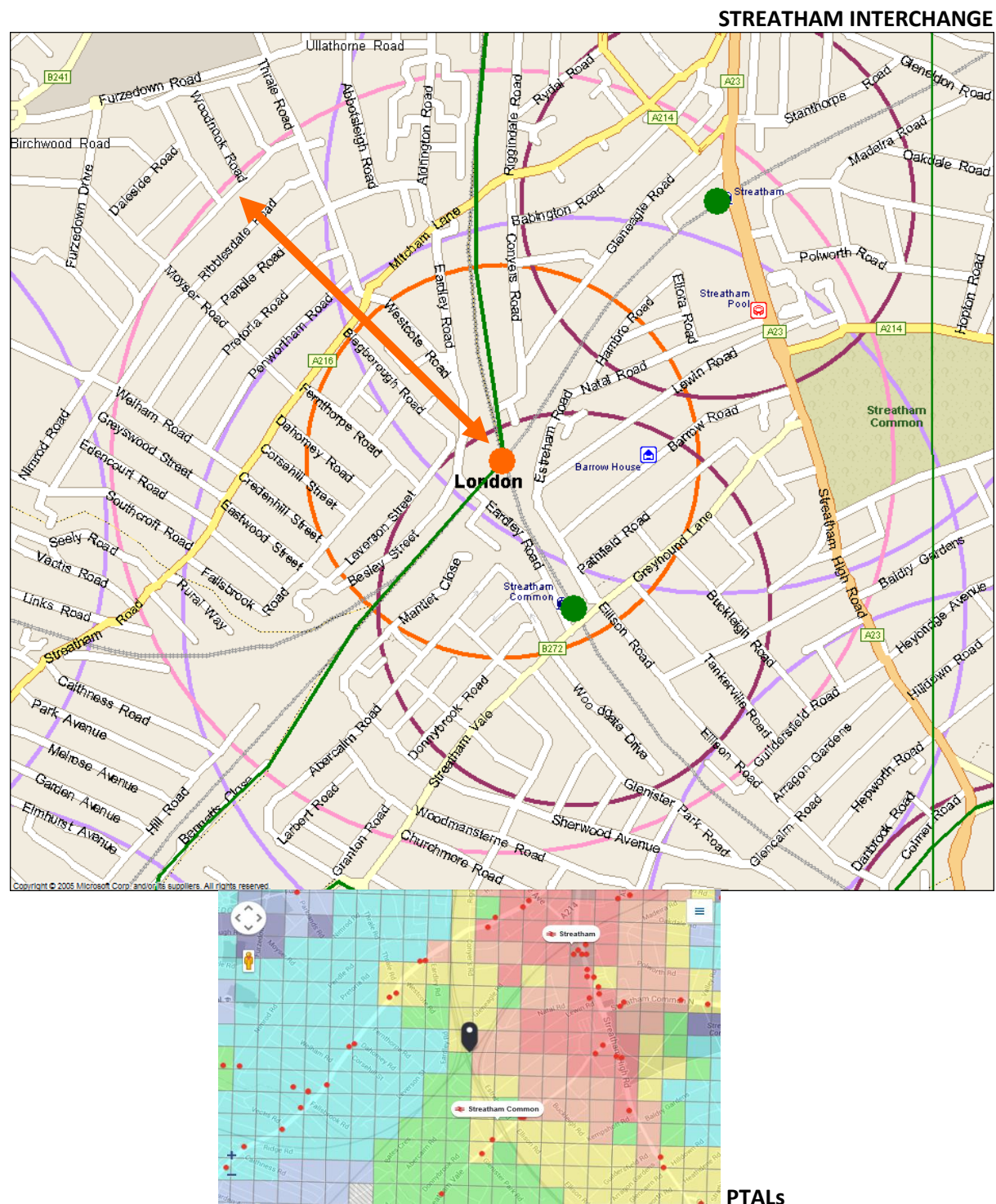
#### **PENGE INTERCHANGE – PTAL BEFORE INTERCHANGE**



## PENGE INTERCHANGE – STREET MAP AND CATCHMENT



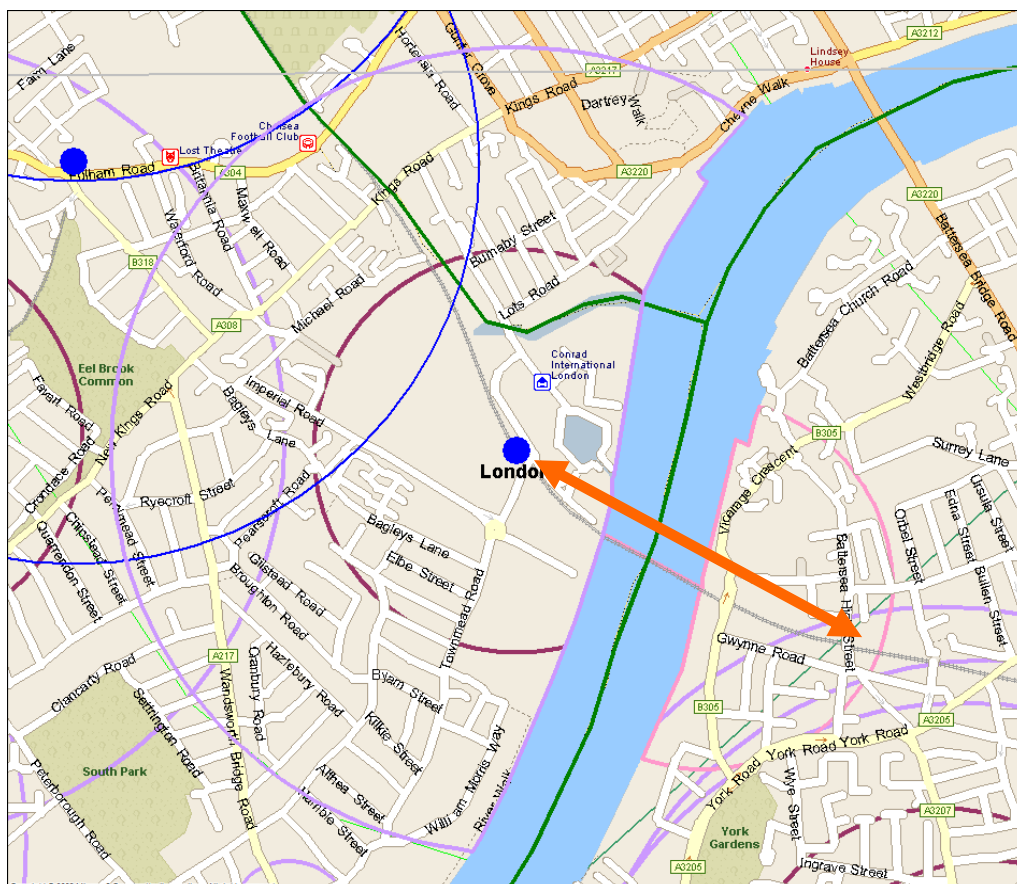
**Streatham interchange** – TfL scheme for a Streatham Interchange, not TSLO's. Possible platform extension for Streatham station, with platforms extended towards railway junction, however main station entrance might not change, so PTAL might not vary if counted from station entrance. Access from Streatham Common would probably remain as is. There **might** be additional station entrance(s) in the neck of the various railway lines, near OS 529577, 170762. The location is on the cusp of wide variability in PTALs, 2-3-4-5, depending on the direction of access – see mapping which follows. An additional entrance would bring PTALs towards 5 for the existing community, but local development – mainly terrace and semi-detached housing, with some local shops and other facilities – may not enable much new build locally.



**Imperial Wharf south bank entrance** – There is a gap between the effective Clapham Junction station catchment and parts of the high value high density Battersea district. PTALs drop dramatically in a short space from 6b to 0-3 closer to the river frontages. See PTAL map below.



## IMPERIAL WHARF – SOUTH BANK ENTRANCE



**Clapham High Street and Wandsworth Road** – potential additional platforms on the SE pair of tracks alongside the existing SLL pair of tracks for current Overground services – these would enable additional local stops by SE trains (Victoria-Orpington and/or the improved Victoria-Cross South London-Lewisham service, without complicated train weaving between lines (difficult to timetable) onto and possibly off the SLL pair. Station entrances would however not change, so PTAL unchanged as a consequence of station works, though PTAL may rise with better service levels. Clapham High Street is already PTAL 5 (Accessibility Index 23.68 in 2031) near the station entrance, and this would improve to PTAL 6a with an additional Overground service. Wandsworth Road is at PTAL 3 (AI 14.68 in 2031), so would improve to PTAL 4 with an additional Overground service.

Other stations with additional operational platforms possibly required – eg **Balham, Clapham Junction, East Croydon** and **Norwood Junction** – this should not in principle affect PTALs unless entrances required radical changes in consequence – as service frequency impacts have already been considered in modelling. No access changes are modelled here. East Croydon already has a modelled additional northern entrance in the documentation, which is partly open at present, as part of the Croydon Town Centre/Whitgift renewal scheme. An entrance even further north is also beng planned for East Croydon, taking advantage of the northwards platform location for South Coast longer distance trains.