

# Supplementary Committee Agenda



## **Overview and Scrutiny Committee Tuesday, 16th July, 2013**

**Place:** Council Chamber, Civic Offices, High Street, Epping

**Time:** 7.30 pm

**Committee Secretary:** Simon Hill, Senior Democratic Services Officer, The Office of the Chief Executive  
email:democraticservices@eppingforestdc.gov.uk Tel: 01992 564249

---

### **8. CROSSRAIL 2 CONSULTATION (Pages 3 - 16)**

(Director of Planning Services) to consider the attached supplementary report written by Jonathan Roberts who is an experienced consultant who looked at some of the issues which had been raised and has produced the attached document; members attention is drawn in particular to those about the Central Line.

This page is intentionally left blank



To: John Preston, EFDC  
From: Jonathan Roberts, JRC

27<sup>th</sup> June 2013

## Crossrail 2 impact for Epping Forest District Council (EFDC)

Dear John

Thank you for a copy of EFDC's initial Crossrail 2 assessment. You have developed a balanced approach, to understand what the various groupings of opportunities are, for EFDC communities and stakeholders.

I have used my database of LUL station volumes up to every quarter-hour, from 1971 to 2011 (and most originally provided by TfL), in order to take a view on the relative merits of various options. Then I have tried to see what other 'optioneering' is possible. The commentary below is my assessment, and you are very welcome to use it as you wish.

I believe that there are gaps in the TfL approach, in respect of the EFDC catchment and possibly other stakeholders, based on this review. Essentially I have tried below to make sense of what the geography and the numbers mean in shorter and longer term.

I'd be happy to discuss the topic further.  
Kind regards

Jonathan Roberts

<b>Crossrail 2 and Central Line safeguarding</b> .....	2
<b>Broad geography</b> .....	3
<b>Crossrail 1 outcome</b> .....	3
<b>Crossrail 2</b> .....	4
<b>Central Line volumes</b> .....	5
<b>Piccadilly and Victoria Line volumes</b> .....	5
<b>Service consequences of PART of Crossrail 2 along the Central Line</b> .....	6
<b>Comparisons with the Central Line tube capacity</b> .....	8
<b>Crossrail 2 options review</b> .....	8
<b>CR2 NE A – present TfL proposals – Alexandra Palace, West Anglia, no Central Line</b> .....	9
<b>CR2 NE B – 2 branches - Alexandra Palace, Epping - and interchange with West Anglia</b> ...9	
<b>CR2 NE C – 3 branches - Alexandra Palace, West Anglia main line, Epping</b> .....	10
<b>CR2 NE D – 3 branches – variant of CR2 NE C</b> .....	10
<b>CR2 NE E – 3 branches - Alexandra Palace, West Anglia via Seven Sisters, Epping</b> .....	11
<b>CR2 NE F – 3 branches – Alexandra Palace, West Anglia, via Leytonstone to Barking</b> .....	11
<b>Assessment of Crossrail 2 optioneering</b> .....	12
<b>CR2 NE G – modified Crossrail 2 and Victoria Line extension</b> .....	13
<b>Other comments</b> .....	13
<b>Conclusion: Broad impacts of current and revised Crossrail 2 ideas</b> .....	14

## JRC assessment of Crossrail 2 impact on Epping Forest DC

### Crossrail 2 and Central Line safeguarding

There are three primary consequences of new high volume transport links which provide an urban focus:

- Practical capacity implications within the transport system – these should allow and stimulate further sustainable growth.
- Increased interest in residential accommodation, because of improved access.
- Increased interest in business location, because of improved connectivity.

Crossrail 2 – formerly the Chelsea-Hackney Line – has been safeguarded since 1991 north-east of London as an additional railway joining with the Central Line north of Stratford. It would split the line northwards at Leytonstone into two railways rather than the present one, in round numbers doubling the current capacity, with the Hainault branch remaining as the Central Line, and the Epping branch as the new Crossrail.

There is a particular opportunity with the line from Leytonstone to Woodford, Loughton and Epping, that it was built as a main line railway, was converted to a tube line in the 1930s-40s, and has the ability to be reconverted to main line if the business case justified that. This is relevant because journey times and capacity and comfort levels on the current tube to Epping might compare unfavourably with a modern suburban main line offer – or a Crossrail if proposed as a Regional railway not a Metro.

Changes to safeguarding are now advocated by Transport for London (who is consulting on the proposals) and other London stakeholders including London First. There are two consultations under way: a non-statutory discussion on preferences for a Metro (tube) or Regional (main line size), while local authorities have also been asked for views on the new outline statutory alignments. In the north/north-east, these would amount to two railways, in tunnel from Central London via Dalston and Seven Sisters to Alexandra Palace, and in tunnel via Hackney to the Lea Valley, surfacing there to serve Tottenham Hale and then various options via the West Anglia Main Line to Cheshunt or as far as Stansted Airport. The details of the West Anglia scheme are not yet very clear, but could be a stopping service or a Stansted Express, but possibly not both.

This might put the Central Line's catchment into limbo, with no positive proposals for improved capacity or access/connectivity, with consequential risks for Epping Forest DC.

This JRC note tries to take a 'helicopter' view of options and issues, and is intended to stimulate views on practicable options to take forward in various Crossrail 2 contexts.

JRC would be happy to assist if any propositions merited further analysis and advocacy.

## Broad geography

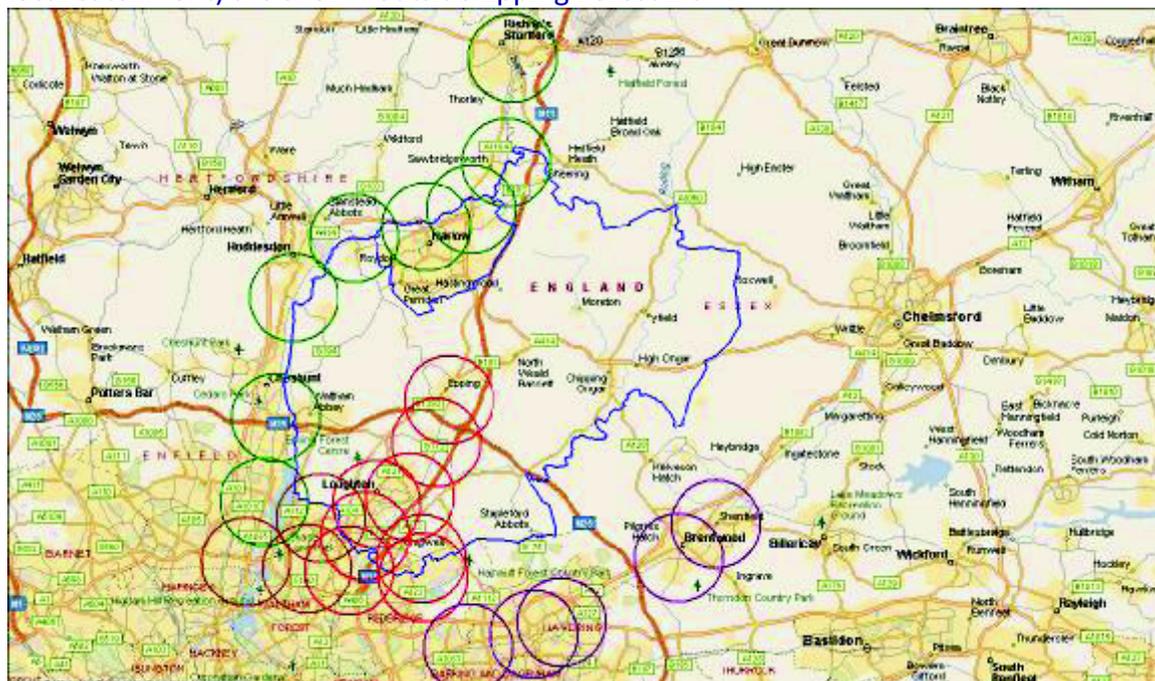
Epping Forest District Council (EFDC) has a tube railway through its central zone:

- Central Line north of Woodford (red stations below) to Buckhurst Hill, Loughton, Debden, Theydon Bois and Epping, and a branch towards Roding Valley, Chigwell, Grange Hill and Hainault;

and two main lines on its NE and SE peripheries:

- West Anglia Main Line (green stations below) towards Hertford/Stansted/Cambridge, via the Lea Valley through local London stations, Waltham Abbey, Cheshunt, Broxbourne, Roydon and Harlow to Sawbridgeworth
- Great Eastern Main Line (purple stations below) via Stratford and Romford to Brentwood, Shenfield, and towards Chelmsford and East Anglia. Its local service to Shenfield will become part of Crossrail 1 in phases during 2015-2019.

A map shows the geography below. Only relevant railhead stations (with 2½ kilometre local catchment) are shown outside Epping Forest DC:



## Crossrail 1 outcome

The implication of Crossrail 1 is that EFDC will be directly advantaged. This is because there will be better catchment access via Crossrail 1 stations such as Romford, Gidea Park, Brentwood and Shenfield, while the large levels of crowding which occur on the Central Line west of Stratford (with cross-platform flows from the Great Eastern) may be relieved.

However Crossrail 1 may also stimulate some additional passenger volume on the Central Line from the NE corridor towards Stratford, in order to be able to access Crossrail 1. At present, congested travel on the Central Line west of Stratford can put off passengers who then seek other ways of reaching their destination. So paradoxically a

railway which relieves the Central Line from Stratford to Central London may also worsen matters in parts of the NE corridor. There is also the continuing growth of jobs in and around Docklands, such as Canary Wharf and Wood Wharf, beyond previous safeguarding predictions. This increases AM peak demand southwards on the Central Line as far as Stratford where passengers transfer to other connecting lines (eg, DLR, Jubilee) to reach their destination.

Overall we see a relieving investment (Crossrail 1), which in practice is unlikely to relieve the NE Corridor from Stratford adequately because of other geographical dynamics in East London. This also ignores the outcome of the 2011 census describing population growth, where East London boroughs are among the fastest growing in the whole of Britain let alone within London, again beyond safeguarding predictions. The dynamics of growth are not confined to Opportunity Areas.

**An EFDC perspective could therefore be to view Crossrail 1 as a relief railway yet where new and unforeseen pressures still require serious attention to mitigate the Central Line's NE corridor capacity.**

This still recognises the benefits to EFDC eastern territories, of the generally increased rail capacity achieved by combining the GE main line with a full Crossrail 1 by 2019, plus a share of the Central Line – particularly the Hainault branch.

## Crossrail 2

The driving forces behind Crossrail 2 are the foreseeable continuing growth in London's population and economy, with another 2 million population expected and another ca. 750,000-1 million jobs by the early 2030s. Specific projects such as HS2 also accelerate the need for more capacity in Central London as a distribution system from the main lines. Overall rail travel within London is expected to rise by 2/3rds, not least because of the separation between residential and working locations.

With Crossrail 1 on a broadly east-west corridor, and Thameslink on north-south, the other main corridors to be relieved are NE-SW, and potentially (but not yet under heavy pressure) NW-SE. TfL is envisaging an upgraded and extended Bakerloo Line as a NW-SE artery in the 2020s, but an entirely new line is needed as an 'Albert' to consort with the Victoria Line because it is already busy, at least within Central London.

According to TfL, modelling has now pointed to the North / North East London catchments as having top priority for the Crossrail 2 exit from Central London, because of anticipated growth there. The Lee Valley regeneration zones, the London Stansted Cambridge corridor and plans to grow the use of Stansted Airport, also point to a NE spur joining up with the West Anglia Main Line. Hence the risk that the Central Line corridor would lose out, if there were only two branches beyond Central London.

The attached spreadsheet sets out LUL station data for the period 1971 to 2011, which JRC has extracted. There are various tables:

### Central Line

- Annual station usage 2011, 2006, 2001 in NE Corridor north of Stratford.
- AM Peak station entry volumes 0630 or 0700 to 0930, at these stations, in 2011, 2006, 2001, 1991, 1981, 1971.

### Piccadilly Line and Victoria Line

- Annual station usage 2011, 2006, 2001 in N/NE Corridor north of Finsbury Park.
- AM Peak station entry volumes 0630 or 0700 to 0930, at these stations, in 2011, 2006, 2001, 1991, 1981, 1971.

### **Central Line volumes**

Safeguarding for Crossrail 2 via the Central Line was put in place in 1991. The AM peak entries 07:00-09:30 were then 34,743 at stations Leyton to Hainault/Ongar inclusive (34,623 Leyton to Hainault/Epping). Clearly some passengers exited at intermediate stations who had also boarded in the Corridor, but this will also apply to the comparator data for the Piccadilly and Victoria Lines. The highest quarter hour flow allowing for travel time displacement (so that an earlier boarding further up the line correlates with later boardings further south) was about 5,250.

Since then, the equivalent data for 2001, 2006 and 2011 during 07:00-09:30 have been:

<b>Central Line NE</b>	<b>1991</b>	<b>2001</b>	<b>2006</b>	<b>2011</b>	<b>% change 1991-2011</b>
AM Peak entries	34,623	35,550	41,024	46,968	+36%
Busiest ¼ hr (aprx)	5,250	5,670	5,900	6,750	+29%

This is a 36% growth in boardings over 2½ hours of the AM peak, and a 29% growth in travel in the busiest quarter-hour. The wider spread of travel growth is probably because starting times in the financial world have become earlier, and because of crowding in the busiest peak periods encouraging more passengers to travel at the shoulders of the peak.

### **Piccadilly and Victoria Line volumes**

Comparative figures are given below for the Piccadilly and Victoria Lines. In 1991 the AM peak entries 07:00-09:30 were 25,050 at stations Manor House to Cockfosters inclusive, with highest quarter hour flow allowing for travel time displacement being about 3,700. On the Victoria Line, the respective volumes were 22,323 entries during 07:00-09:30 at stations Seven Sisters to Walthamstow Central inclusive, and 3,380 during a ¼ hour.

Since then, the equivalent data for 2001, 2006 and 2011 during 07:00-09:30 have been:

<b>Piccadilly Line N</b>	<b>1991</b>	<b>2001</b>	<b>2006</b>	<b>2011</b>	<b>% change 1991-2011</b>
AM Peak entries	25,050	24,486	25,638	27,628	+10%
Busiest ¼ hr (aprx)	3,700	3,600	3,400	3,760	+ 2%
<b>Victoria Line NE</b>	<b>1991</b>	<b>2001</b>	<b>2006</b>	<b>2011</b>	<b>% change 1991-2011</b>
AM Peak entries	22,323	21,067	23,621	25,229	+13%
Busiest ¼ hr (aprx)	3,380	3,030	3,020	3,180	- 6%

1991 Victoria Line data may be overstated if original Seven Sisters data included main line entries.

On the face of it, there is every reason why the single Central Line handling roundly double the passenger volume on a quarter-hourly basis as each of the other two lines in

the N / NE suburbs, should continue to be the beneficiary of Crossrail 2. It is also showing much higher growth rates, even with the Victoria Line/main line interchanges at various NE London stations.<sup>1</sup>

It is of course likely that it is the relative volume of rail/tube interchange flows at Finsbury Park or Stratford (with Crossrail 1), and the main line termini at Liverpool Street (also with Crossrail 1) and Kings Cross, St Pancras and Euston which hugely influence that Crossrail 2 should be prioritised via the Northern main line termini. But most of this has been the case since the 1991 safeguarding, so there is nothing new there.

The new features are the Alexandra Palace route and the connections via Tottenham Hale. These elements appear to be sufficient, in official statements, to displace the entire Crossrail 2 link-up with the Central Line. However the suburban passenger volumes shown above refute that position.

It appears particularly unreasonable that there is no relief at all advocated for the Central Line within its own NE Corridor catchment, when intervention of that sort would balance out the via Gants Hill and via Woodford flows to volumes similar to those seen on the individual Piccadilly and Victoria Lines – providing that the shared relief continued as far south as Leytonstone.

This point is because the stations at South Woodford, Snaresbrook and Leytonstone on their own generate as many as 90% of the AM peak entries seen on the whole of the Woodford-Epping section. There is a similar 90% comparison with the Wanstead-Hainault branch, if entries there were reduced by say 10% local diversion to Crossrail 1. Adding in Leyton would increase the 3-then-4 stations proportion at South Woodford-Leyton to 140% of the NE branches.

**Therefore there is a continuing case to be argued for part of Crossrail 2 to be adopted via Leyton or Leytonstone. If Crossrail 2 emerges as a Regional scheme (to a main line design), then any Central Line relief if offered as a through service would best be directed towards Epping, along a former main line railway.** It is not feasible to run main line trains through the Hainault branch tunnels under Eastern Avenue. However there is less of a case to take over part of the Central Line if service levels were split in 3 directions north of Central London. This issue is now discussed.

### **Service consequences of PART of Crossrail 2 along the Central Line**

The issue is what capacity could be best allocated, and how, to the Central Line, if only part of Crossrail 2 not the whole railway is to be sent there. Is this a realistic option?

The basic Crossrail 1 will have 10-car main line size trains (extendable eventually to 12-car), running at 24 tph. The eventual design capacity is 12-car trains at 30 tph (a 50%

---

<sup>1</sup> JRC has checked the 2011 LUL quarterly-hourly flows against the recorded station users alighting at Tottenham Hale in the AM peak from main line trains in 2011 – using WARG counts – and they are comparable after allowing for other interchange, exit and entry numbers. So the main line interchanges are included in the LUL entry numbers above.

increase in the basic capacity). If a similar specification were adopted for Crossrail 2, each train could accommodate 1,500 (eventually 1,800) passengers on a 'planning standard' basis, 150 passengers per car with about 40 seated (400 per 10-car train).

With splitting of Crossrail 2 routes north of Central London, the outcome for the Central Line will critically depend on whether there is a 2 or 3 or even 4 branch railway north of Central London. 3 or 4 branches would spread frequencies thinner, ca. 8 tph or 6 tph per branch on average as a basic pattern, nearly 8 tph on average if 30 tph overall.

If the proposed Alexandra Palace line has strong claims on frequency – TfL says this is so – then with one other branch that allows a 50/50 service to each branch or 60/40 or 67/33. With a 24 tph core volume, 12 tph would be a branch maximum, going as low as 8 tph on a 67/33 basis, for the non-Ally Pally route.

With 3 branches, unless services were equalised to roughly 8 tph each, two of those branches might have to make do with half or less of the main service, itself then split between two railways. This would point to a outcome of 4-6 tph per branch, which is infrequent and not necessarily repaying the high capital costs of a main line sized railway kit in tunnels, and possibly with underground stations as well. Only with 30 tph in the Crossrail core can frequencies be raised by 2-4 tph on these other two branches, to an average of 10 tph each or a more varied 8-10-12 tph.

4 branches doesn't look viable in terms of lots of new track or tunnels. So while SW London could see Crossrail 2 split into multiple branches on lower frequencies over existing lines, the N / NE needs are better served by fewer branches with more intensive frequencies.

The outcomes with 2 or 3 branches N / NE would amount to:

Crossrail route capacity analysis			
Core frequency	train length (20m cars, 150 passengers/car)		
<b>24 trains per hour</b>		<b>10</b>	<b>12</b>
2 number of N / NE branches			
frequency range on NE branch			
min	8 tph	12,000	14,400
mid	10 tph	15,000	18,000
max	12 tph	18,000	21,600
3 number of N / NE branches			
frequency range on NE branch options			
min	4 tph	6,000	7,200
mid	6 tph	9,000	10,800
max	8 tph	12,000	14,400
<b>30 trains per hour</b>		<b>10</b>	<b>12</b>
2 number of N / NE branches			
frequency range on NE branch			
min	12 tph	18,000	21,600
mid	14 tph	21,000	25,200
max	16 tph	24,000	28,800
3 number of N / NE branches			
frequency range on NE branch options			
min	6 tph	9,000	10,800
mid	8 tph	12,000	14,400
max	10 tph	15,000	18,000

Contrasted with Central Line capacity now and with 'EVO Stock'		
Central Line frequencies halved to represent an individual branch		
All 8-car trains or equivalent		
1992 Stock is 272 seats and 620 standees @ 4 passengers/sq.m		
New 'EVO Stock' design has +11% capacity		
	<b>1992 Stock</b>	<b>EVO</b>
	<b>892</b>	<b>passengers 990</b>
<b>15 trains per hour (AM peak hour with flow)</b>		
	13,380	14,850
<b>16.5 trains per hour (AM peak hour with flow, increased service)</b>		
	14,718	16,335

Note that 12-car Crossrail trains might be seen as the long term planning margin so unlikely to be adopted as an initial starter basis, but if Alexandra Palace required a capacity increase, then that route might have priority for longer trains.

### Comparisons with the Central Line tube capacity

The Crossrail capacity is of course geared to the Central London needs, not those on the individual branches. Similarly the present Central Line capacities and frequency are dictated by Central London needs, and comparable figures are set out above. Each 8-car train Central Line is unextendable because of platform dimensions in tunnels.

The current 1992 Stock has 272 seats and standee space for 620 more (based on 4 passengers per square metre). There is an 'EVO-stock' project for a new articulated tube train with 11% more capacity, but this has not yet been proved with an experimental design. Notional EVO capacity with 33 tph (10% more trains) is also contrasted above.

It can be seen that Crossrail 2 offering only a partial service to the Central Line is only really effective as a full-scale capacity relief in the following circumstances, if it is assumed that an entire Central Line branch had to be taken over:

- With 1 Crossrail branch of 2, with most frequencies (but not if 8 tph or lower)
- With 1 branch of 3, but only in the case that the relevant branch frequency was at least 10 tph with 10-car trains.

### Crossrail 2 options review

With a 2 branch option, this effectively puts a direct Crossrail 2 - Central Line service into direct competition with the West Anglia spur, assuming that the North Corridor towards Alexandra Palace would also be prioritised by TfL. Interchange with the West Anglia main line would be achieved via Hackney or Stratford. (Shown as **CR2 NE B**, if the current scheme is **CR2 NE A**).

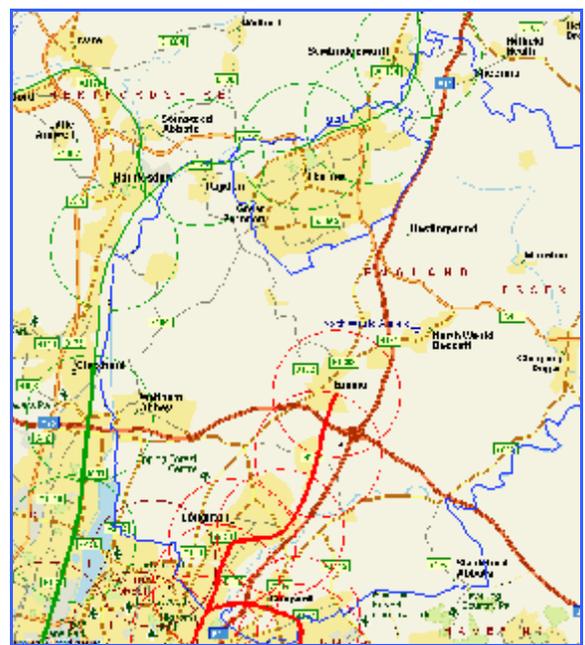
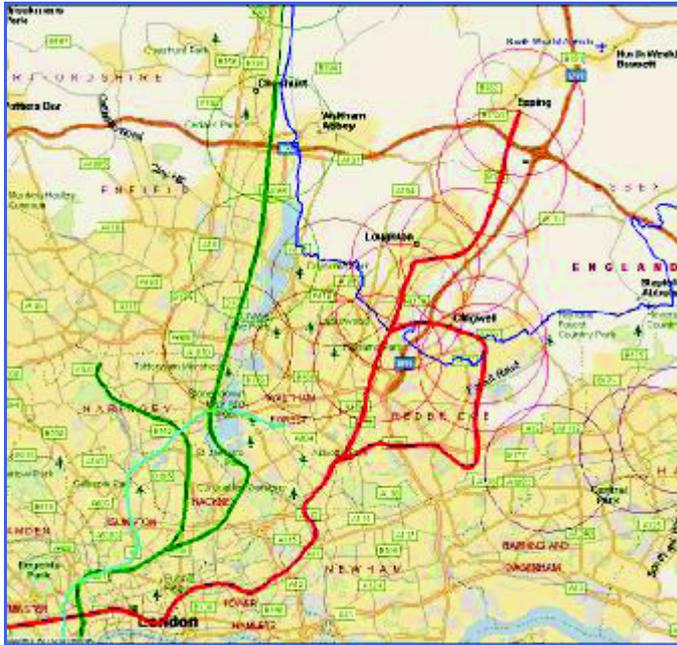
The alignment for a 3<sup>rd</sup> branch would need further consideration. Should it be:

- **(CR2 NE C)** a direct spur to Leytonstone and then towards Epping, off the proposed Crossrail-West Anglia corridor...
- **(CR2 NE D)** ...or can that be prioritised via Hackney-Stratford-Leytonstone, with a West Anglia connection achieved closer to Stratford?
- **(CR2 NE E)** A further option would be to redefine the West Anglia corridor as a branch off the Alexandra Palace line at Seven Sisters, then direct to Tottenham Hale or Meridian Water. Central Hackney would then be served on the Leytonstone line.

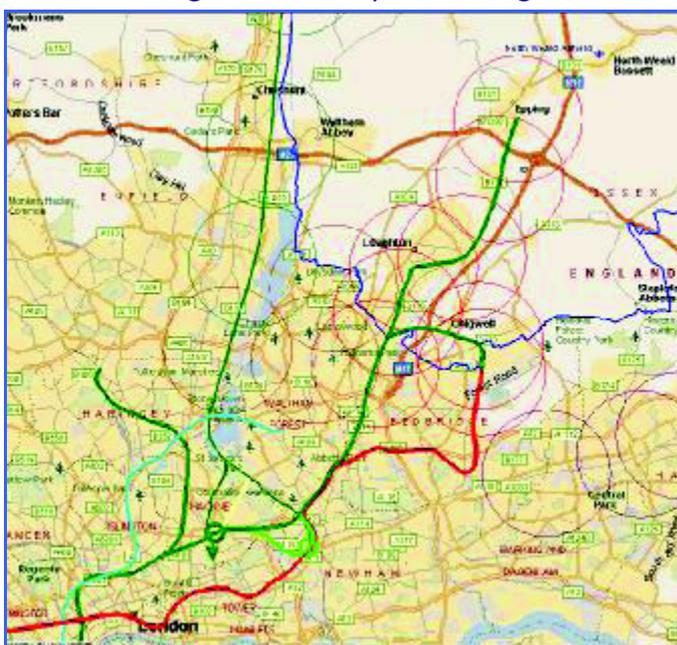
It does NOT look possible with any reasonable combination of connections also to achieve a Thames Riverside branch, without losing either the Central Line or West Anglia direct service. It might be possible to achieve some Central Line benefit (and relief) by defining a 3<sup>rd</sup> branch **(CR2 NE F)** to serve Leytonstone direct then towards Barking – but Stratford would then lose out.

The maps below illustrate the options. Thick lines are direct services, thin are interchange only.

**CR2 NE A – present TfL proposals – Alexandra Palace, West Anglia, no Central Line**  
 Not shown as direct trains beyond Cheshunt, though services might run to Hertford/Harlow/Stansted:

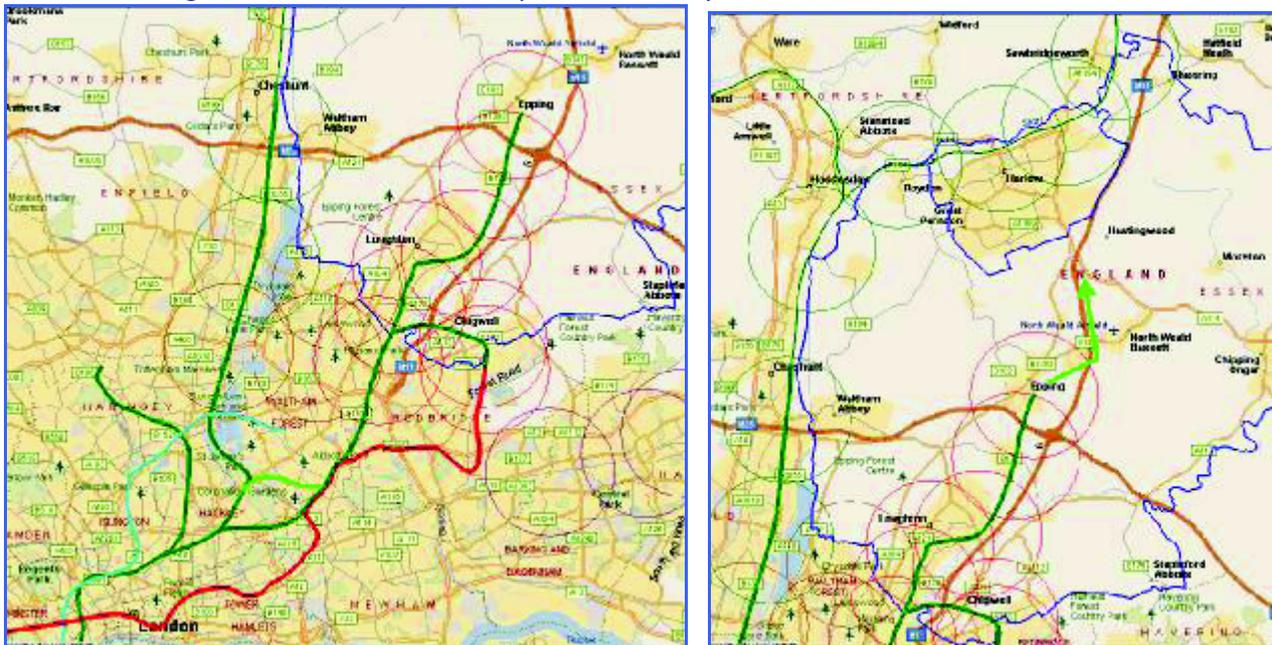


**CR2 NE B – 2 branches - Alexandra Palace, Epping - and interchange with West Anglia**  
 West Anglia reached by interchange at Hackney or Stratford:



There is the possibility with this option of a Crossrail 2 extension towards Harlow or Stansted from Epping, via an M11 Parkway station at Junction 7.

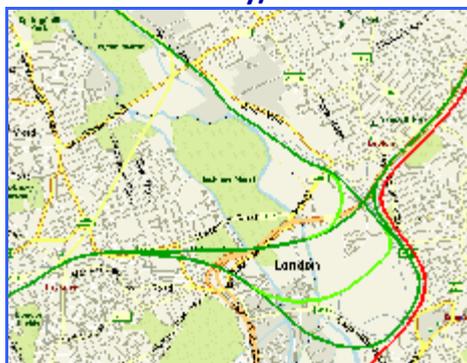
**CR2 NE C – 3 branches - Alexandra Palace, West Anglia main line, Epping**  
 Providing there is a minimum 10 tph towards Leytonstone:



There is the possibility with this option of a Crossrail 2 extension towards an M11 Parkway station at Junction 7. Through services via West Anglia main line could serve Harlow/Stansted.

**CR2 NE D – 3 branches – variant of CR2 NE C**

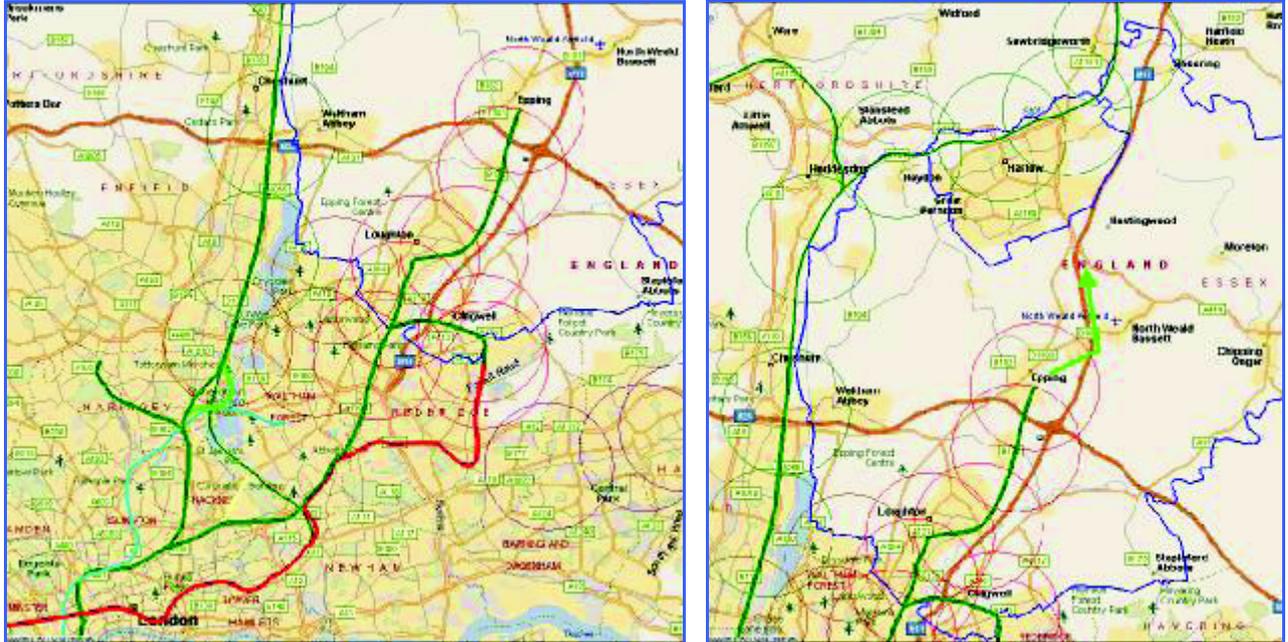
Routing closer to Stratford/ Leytonstone, with one option possibly using part of the Temple Mills loop. **Variant shown in Hackney/Stratford locality only:**



**CR2 NE E – 3 branches - one to Alexandra Palace, one to West Anglia main line as a branch off the Seven Sisters tunnel, one to Central Line Epping branch, providing there is a minimum 10 tph towards Leytonstone.**

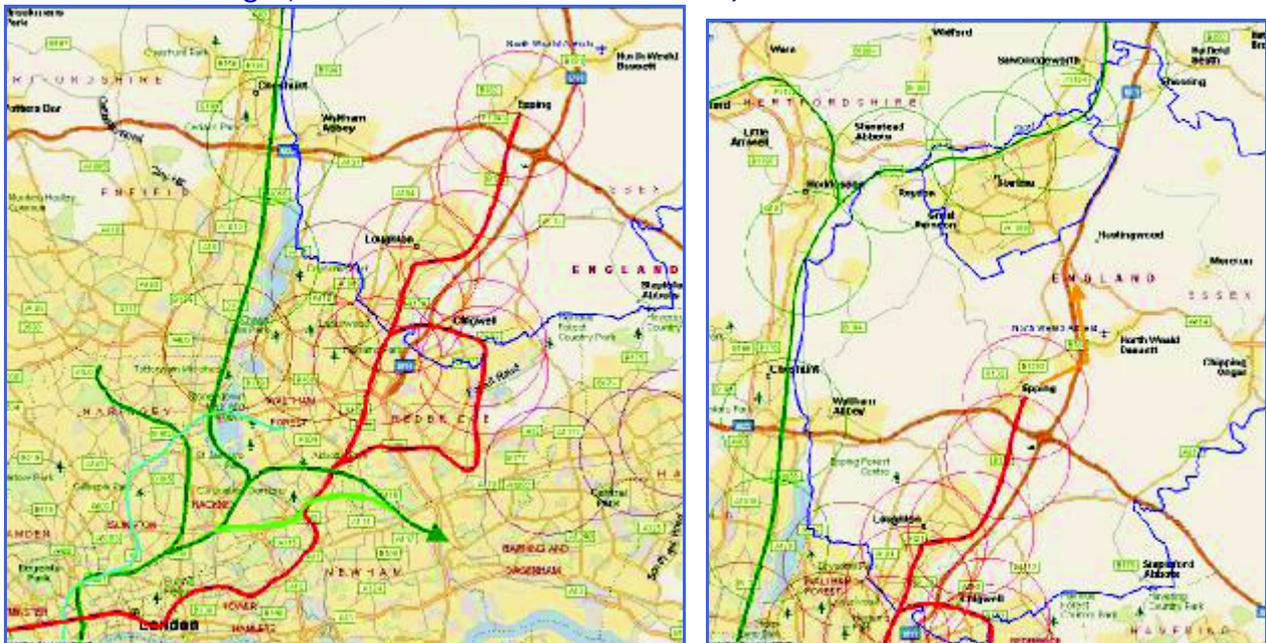
This option relies on enough passengers being served via Seven Sisters with the combined Alexandra Palace and West Anglia services, to allow reduced Crossrail 2 frequency to Turnpike Lane and Alexandra Palace. The Piccadilly Line station usage suggests that a lower frequency might be adequate for the Piccadilly suburbs, but the overall change depends on the scale of interchange modelled by TfL at Alexandra Palace with the main line. Options include West Anglia link via Tottenham Hale or direct from Seven Sisters to Meridian Water.

**CR2 NE E – 3 branches - Alexandra Palace, West Anglia via Seven Sisters, Epping**  
 Providing there is a minimum 10 tph towards Leytonstone.



There is the possibility with this option of a Crossrail 2 extension towards an M11 Parkway station at Junction 7. Through services via West Anglia main line could serve Harlow/Stansted.

**CR2 NE F – 3 branches – Alexandra Palace, West Anglia, via Leytonstone to Barking**  
 No direct Central Line service, nor service to Stratford, but interchange at Leytonstone, 3<sup>rd</sup> Crossrail branch towards Barking and Thames Riverside zone. For Alexandra Palace and West Anglia, the routes could be variants of A, C or E:



The Central Line could possibly be extended towards M11 J7. Crossrail 2 would not serve Stratford, but interchange with the Central Line at Leyton or Leytonstone.

## Assessment of Crossrail 2 optioneering

There is a high dependency on the TfL views (and any external moderator's views – does that person exist?) about the supposedly high volume of Crossrail 2 service required via Alexandra Palace. There is NO evidence that this is needed based on existing tube catchments, so what is TfL's underlying rationale?

Most of the 3-branch options that JRC has set out above, require at least 10 tph on a Crossrail 2 branch, to justify any attempt to maintain a Crossrail 2 service towards the Central Line and the Epping branch (since that line should be re-convertible to main line operation). Otherwise the internal alternative, of a new 'EVO-Stock' tube train (not yet proved feasible) would be at least as good for capacity.<sup>2</sup>

JRC has used a working assumption that this could require 30 tph on Crossrail 2, to secure at least 10 tph on the Epping branch, but it might yet be feasible on a 24 tph Crossrail 2 providing that the combined West Anglia and Alexandra Palace components did not exceed 14 tph.

A 2-branch Crossrail 2 would have to reject direct trains to the West Anglia lines, in order to create capacity for a direct route to the Central Line.

Some stakeholders hope that a Crossrail 2 route via Hackney to Stratford could be beneficial to stakeholders including the Central Line and the EFDC catchments, and that therefore there can be a happy alignment of local interests embracing the Central Line NE Corridor, and East London and Thames Riverside, to stimulate a Crossrail 2 branch in that direction.

JRC's analysis shows that this might be helpful indirectly, but that the passenger density on the Central Line begins to be high south of Leytonstone, and passengers would have to put up with rapidly increasing train loadings between South Woodford, Leytonstone Leyton and Stratford in order to benefit from such a new railway branch. (So there may be benefits to EFDC, but not large.)

Looking in a focused way on the Central Line NE Corridor and hence the EFDC catchment, there is a better result for EFDC if any Crossrail 2 intervention were at Leyton or Leytonstone rather than Stratford. This will include journey times and the extent of travel comfort. The various options set out above illustrate that.

JRC's CR2 NE B and D options nevertheless show that a direct Central Line relief via Stratford is feasible in outline, but it can't also serve Barking and Riverside if the Central Line catchment including EFDC were to desire important, direct gains.

---

<sup>2</sup> Note that an assumption of higher capacity but lower frequency main line trains on the Epping branch might also generate an adverse journey time.

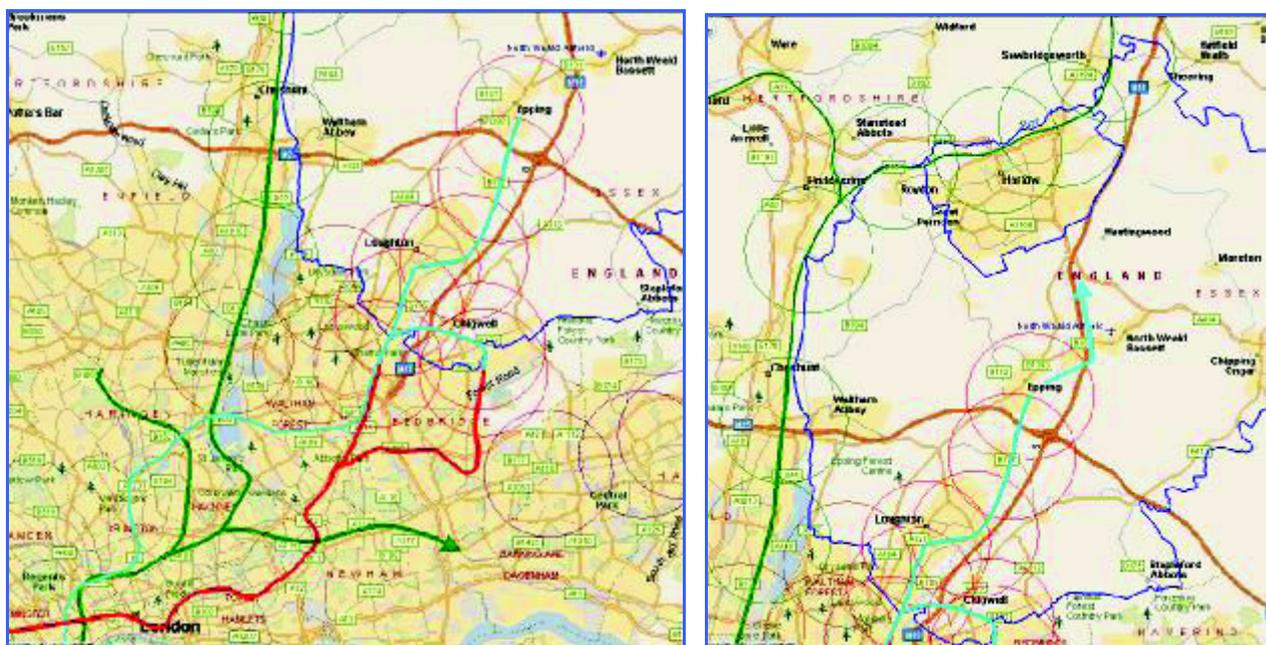
## CR2 NE G – modified Crossrail 2 and Victoria Line extension

There is one possibility for EFDC getting two bites of the capacity and journey time cherries and also being able to work in alliance with Stratford and Barking/Riverside interests:

- to accept there will be relief with the present Crossrail 2 thinking for the Victoria Line, at either or both of Seven Sisters and Tottenham Hale – and preferably both
- to then propose extension of the relieved Victoria Line, beyond Walthamstow Central over 2¾ miles to Woodford, and for the Epping branch (and Hainault loop) to be served in future by the Victoria Line
- finally, a 3<sup>rd</sup> Crossrail 2 branch could then be taken from Hackney via Stratford to Barking and Riverside.

The relative volumes of ex-Central Line demand and Crossrail 2 (Albert) Line relief of the Victoria Line look manageable, with a broad 2 : 1 ratio of relief to diverted demand.

Clearly this would require some additional gross capital cost. However the whole life 60-year BCR could be high. JRC estimates that a Walthamstow-Woodford link should cost £1.5-2bn so potentially 10% of the whole Crossrail 2 project as presently envisaged. A map shows the possible East and NE London rail network in this developed format:



## Other comments

The limitations of current route choice north of Central London can be contrasted unfavourably with the optioneering for Crossrail 2 in SW London, where multiple branches are envisaged, although these are on potentially lower frequencies and need less new infrastructure than a Stratford and/or Central Line link-up, as JRC has recognised.

However the visible proximity of two new Crossrail 2 tunnels chasing each other N/NE of London to Seven Sisters and to Tottenham Hale has already drawn some adverse views, not least from commentators outside London who are concerned about the amount of capital spend that is potentially directed to the London regions compared to Midlands and Northern cities.

It appears that TfL in outline planning has argued for a high urban frequency towards Seven Sisters and Alexandra Palace – presumably to draw in main line commuters early on up the line, since the Piccadilly Line on its own doesn't justify anything like that. In which case, the NE spur would get fewer trains and apparently can only justify 8-12 trains – so not easily divisible further in useful capacity for large scale relief – while Alexandra Palace would get more trains.

This raises as an issue the credibility of the Alexandra Palace route modelling vs modelling for a third route 'via Stratford'. (We take West Anglia and its rather limited service volume as a given.)

#### **Conclusion: Broad impacts of current and revised Crossrail 2 ideas**

It is important to think about the impacts of Crossrail 2's new ideas, on Epping Forest DC.

As with Crossrail 1, there is some gain. EFDC's western zone is accessible in catchment terms from both the West Anglia Main Line (WAML) and from the Central Line. Further north than Epping/South Harlow, it is the West Anglia main line which is most relevant. So improvements in services and capacity along the West Anglia routeing will undoubtedly be of benefit to EFDC communities and businesses.

However this avoids the central EFDC zone, with high population volumes. There is no doubt about it, the core high density population volume of EFDC is the Central Line NE Corridor.

So where is the 'natural focus' for capacity relief and for maximum local economic growth? Essentially, the EFDC catchment should either aim for strong benefit via the West Anglia route, which would have to be very large indeed to overcome the natural geography which favours the Central Line NE Corridor, or that, in whatever form proves practicable, there should also be direct benefits for the Central Line corridor.

This report is not an economic benefit analysis, so cannot replicate such an assessment of the local benefits. However the implications are that if Crossrail 2 were to ignore the Central Line, then there could be significant disbenefit in travel capacity and economic accessibility and natural economic growth, along an important part of the London Stansted Cambridge corridor, compared to the current safeguarded route.

Jonathan Roberts  
JRC 27 June 2013