

# HS1 Route and Service Plans

## *The Purpose, Background and Method*

This article refers to and should be read in conjunction with my article ‘Towards a High Speed **Network**’. That article sought to make the case for developing a network plan for all the HS routes which will eventually be needed, and, as a contribution to getting the discussion started, gave my own thoughts of what such a network could look like. Naturally, this involved describing a number of routes, in varying but superficial detail. This lays me open to the charge, something on the lines of ‘That’s all very easy to say, but how would you actually go about doing it?’ Accordingly, a decent respect to the opinions of the interested public requires that I should go into more detail on the individual routes. The present article deals with HS1, the route from London to Kent and East Sussex (and the Channel Tunnel, of course – 4tph of international traffic is allowed for). Unlike the other articles in this series, the route here is already in service, except for the connections with other HS lines, and three small but important additions. I have reproduced the maps, to the usual standards, but not changed them in any way, other than the HS connections and these three additions. What I have changed are the service plans, to integrate HS1 with the rest of the network, HS and classic.

## *The Maps*

Naturally, the chosen route must be illustrated with maps. I briefly describe the route of the additions, giving the map reference of all significant points (invariably of tunnel end points and significant river bridges), but the accompanying maps are the real definition. Mapping software can be very expensive, but fortunately the Ordnance Survey makes available, free of charge, the OS OpenData product suite, of which I use two components, the 1:250000 Scale Colour Raster data set and the Strategi Dataset. The former comes as a set of TIFF files, each containing one of the standard National Grid 100km Reference squares. These are easily converted into Microsoft Paint files and edited. These are, in other words, pure graphics, and are the basis of the detailed maps in the ‘Route’ section. The maps reproduced in the text all represent an area 20km in width (unless noted otherwise) and 10 km high (if the detail I wish to show will fit within that, but otherwise as high as necessary). They do actually contain contours, but not many; the scale is too small for contours to be really informative. For the present purposes, this scale is adequate; if you need more detail, use them as an index to the corresponding 1:50000 Landranger or 1:25000 Explorer maps.

The Strategi Dataset contains GIS (Geographical Information Systems) data, which has to be processed by special software; I have used the Open Source QGIS product. This has been used to produce an overall map of HS1, including sections of other routes over which HS13/HS14’s services run. These overall maps come at the end of the ‘Route’ description, and also show HS1’s classic compatible services on classic lines (these are shown as dotted lines). Also included there are maps of the overall HS Network.

In all the maps I use the following colour scheme for the various routes:

|      |   |                            |
|------|---|----------------------------|
|      |   | <b>standard colours</b>    |
| HS1  |  | yellow                     |
| HS2  |  | dark red                   |
| HS3  |  | red                        |
| HS4  |  | brown                      |
| HS5  |  | rose                       |
| HS6  |  | indigo                     |
| HS7  |  | green                      |
| HS8  |  | turquoise                  |
| HS9  |  | purple                     |
| HS10 |  | lavender                   |
| HS11 |  | orange                     |
| HS12 |  | gray 50%                   |
|      |   | <b>custom colours</b>      |
| HS13 |  | true blue R/G/B 0/0/255    |
| HS14 |  | light blue R/G/B 0/192/255 |

As the various route plans have been developed, the maps have been updated, so now they show all routes, as relevant. The maps in the present article are thus not limited to HS1.

## *The Service Plans*

The Route section of this document describes the complete lines in their final, full configuration (as far ahead as the plans consider). The service plans explain how that final state is reached: the order in which sections are opened, and the services which run on these partial configurations. The aim is always to get useful services running as soon as possible, to maximise return on the investment.

The service plans deliberately envisage maximum frequencies, to give an impression of just how much the system **could** accommodate. Initial services would certainly not be so intensive, probably no more than half of the frequencies quoted.

A standard HS station has two island platforms, thus two platformed tracks in each direction. If some of the services passing through the station are non-stop, then the main line must pass through the layout without adjacent platforms, either through the centre of the alignment, in tunnel below or on viaduct above, or the station must be on a branch loop off the main line, which thus bypasses it completely. All the stations on the main line of HS1 (St. Pancras International – the Channel Tunnel, i.e. Stratford HS, Ebbsfleet and Ashford International) must provide for non-stop international trains and thus have avoiding lines through the centre.

Several service plans are developed, reflecting the piecemeal development of the network. As new sections open, further services come into operation. In all cases, consideration is given to maximum loadings – which section(s) are fully loaded and thus determine the maximum service frequencies. In general I take 16tph as the maximum throughput; if this is ever exceeded, the fact will be highlighted.

Two types of services are contained in the plans, those featuring High Speed trains (GC gauge and classic compatible) which travel on HS1 for at least part of their journey, and those featuring Regional Metro

(semi-fast) services on the corresponding classic route(s). Connections between the services (both HS and RM) are shown for the relevant interchange stations (the connections are usually cross-platform), together with the clock-face hourly departure plan. (Note that these plans are **representative**; the **actual** times are determined by the coordination of interchanges at multiple locations). HS1 is, however, unusual in that there are no **formal** cross-platform connections planned between HS and RM services, but given the frequency of services in the entire area served by HS1, this is scarcely a deficiency; good, **informal** connections between HS and RM are available at Dover, Hastings, Ashford, Maidstone and Ebbsfleet.

In the service plans I distinguish some of the GC gauge services as double deck. Originally this linked the Brighton services of HS5 with the HS Metro services of HS3, to York and Preston. It's all rather arbitrary, at present. Provided that there are no difficult technical issues in running double deck trains at 300kph, 187.5mph, and that public reaction to them is favourable, I would like to see all GC gauge services run with double deck trains. (The Swiss like them.)

It is important always to bear in mind that the HS network is **not** a separate, stand-alone system, but an integral part of the complete railway network, hence the importance I attach to showing precisely how HS services interact with classic (RM) ones.

An allowance of 4tph is made for international traffic.

## *Estimated Journey Times*

Following the service plans, estimated journey times are produced for all GC-gauge services. The assumptions and approximations made are explained.

## *HS1 Route – Junctions:*

There are various junctions on the route of HS1, enabling connections with other HS and classic routes. It is convenient to list them here, together with map references and identifying remarks, since when discussing the capacity/loading of the different sections of route, the end points are usually junctions (occasionally stations). The junction names are my suggestions.

- |                      |          |   |
|----------------------|----------|---|
| • York Way           | TQ300831 | Connections from Pancras Cross and St. Pancras East join HS1.   |
| • Hitchcock Lane     | TQ387848 | HS6 diverges from HS1 at platform ends at Stratford HS North station.   |
| • Stratford HS South | TQ387847 | HS4 diverges from HS2 immediately east of Stratford HS South, and metamorphoses into HS11. (The given location is <b>approximate</b> – it's underground!) |
| • Woodgrange Road    | TQ416853 | HS2 merges with HS1. (The given location is <b>approximate</b> – it's underground!)   |
| • Pilgrim's Way      | TQ750607 | HS1 Maidstone branch diverges from main line  |
| • Saltwood HS        | TR182372 | HS1 Dover branch diverges from main line  |

In addition Ashford West Junction is an existing junction allowing HS services to join the classic tracks (eastbound) at Ashford.

There are various other links between HS1 and classic lines, for operational purposes and not intended for regular services, so not relevant in the present context.

## ***HS1 Route***

### ***1. Inter-Regional HS Connections:***

The type of traffic with which this article is primarily concerned is HS Inter-Regional services from HS2, via Euston Cross, and joining HS1 at Woodgrange Road Junction. Appendix A gives full details of Euston Cross and its approaches.

In addition, HS1 shares track between York Way Junction and Stratford HS with HS6, whose GC-gauge services come from Pancras Cross and its classic-compatible services from St. Pancras East (the ‘Javelin’ platforms). HS1 itself has a single classic-compatible service, from St. Pancras East. Appendix B gives full details of Pancras Cross and its surroundings. Full details of HS6’s services are contained in the article ‘HS Eastern Routes and Service Plans (HS6 and HS10)’.

### ***2. Maidstone Branch:***

At Pilgrim’s Way Junction (TQ750607) the Maidstone branch diverges from the main line. It immediately crosses to the west side of the A229, following that for 1 mile until junction 6 with the M20. It diverges from the A220 at TQ753587, crosses the M20 at TQ751584 and the Medway at TQ750581, and joins the east side of the alignment of the Strood – Paddock Wood line at TQ748574. This it follows to Maidstone Barracks station, which is in exactly the right location, just where the line from Otford Junction to Ashford crosses. The HS platforms are on the east side of Barracks station, and new platforms are provided on the Ashford line.

### ***3. Hastings Branch:***

There is a connection between HS and classic tracks at Ashford West Junction. HS1 simply takes over the line to Hastings and enlarges it to GS gauge. The only significant work is probably Ore and Mount Pleasant tunnels just before Hastings, but it would be quite acceptable simply to single the tracks through Ore tunnel. Mount Pleasant tunnel is very short, and could be widened to GC gauge. This would allow the Coastline services to be extended through Hastings to Ore (as used to be the case), terminating at a bay platform there, to save a bit of capacity at Hastings. The HS1 service has Ore tunnel to itself.

Variable platforms would be needed at Ashford. There looks to be not quite enough room on the north side of Hastings station for a 2 platform HS island, but a possible solution would be for HS1 to take over the northern of the two existing island platforms, and build another, single classic platform to the north of that – there is room for this. Local services between Ashford and Hastings would use GC-gauge stock, or

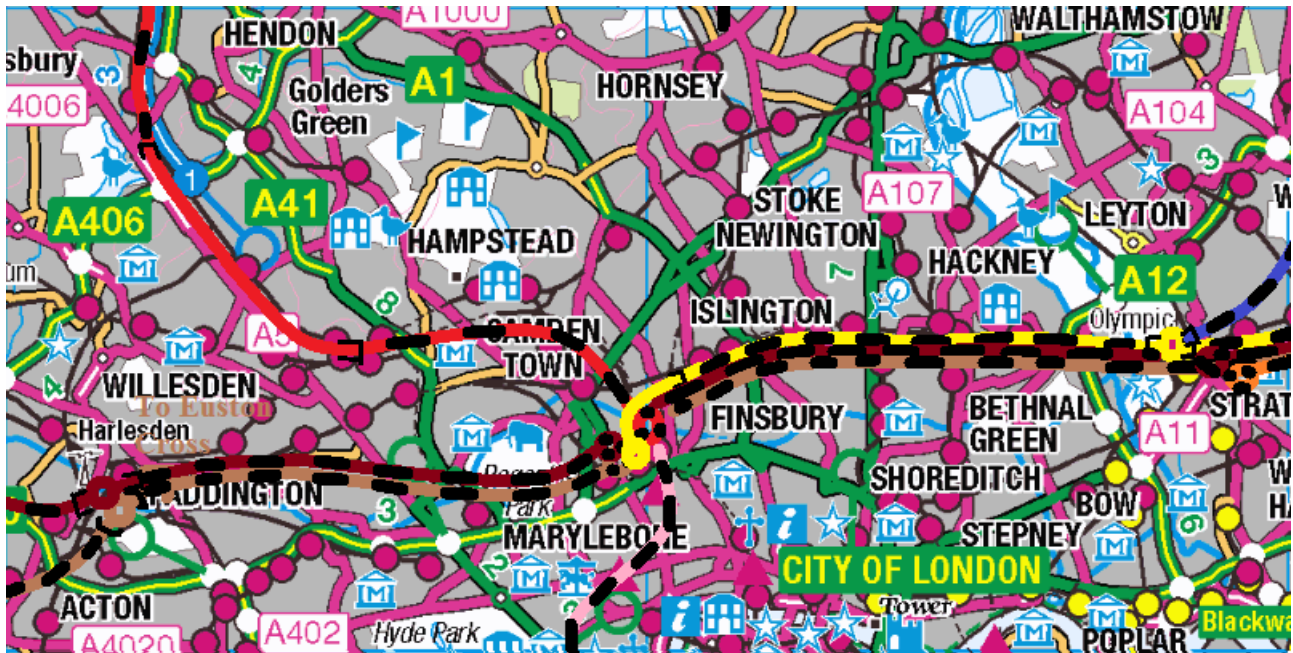
possibly the HS services could provide the local service on this very short section (Winchelsea, Rye and Appledore are worth a regular HS service, the others served perhaps by alternate services?)

#### *4. Dover Branch:*

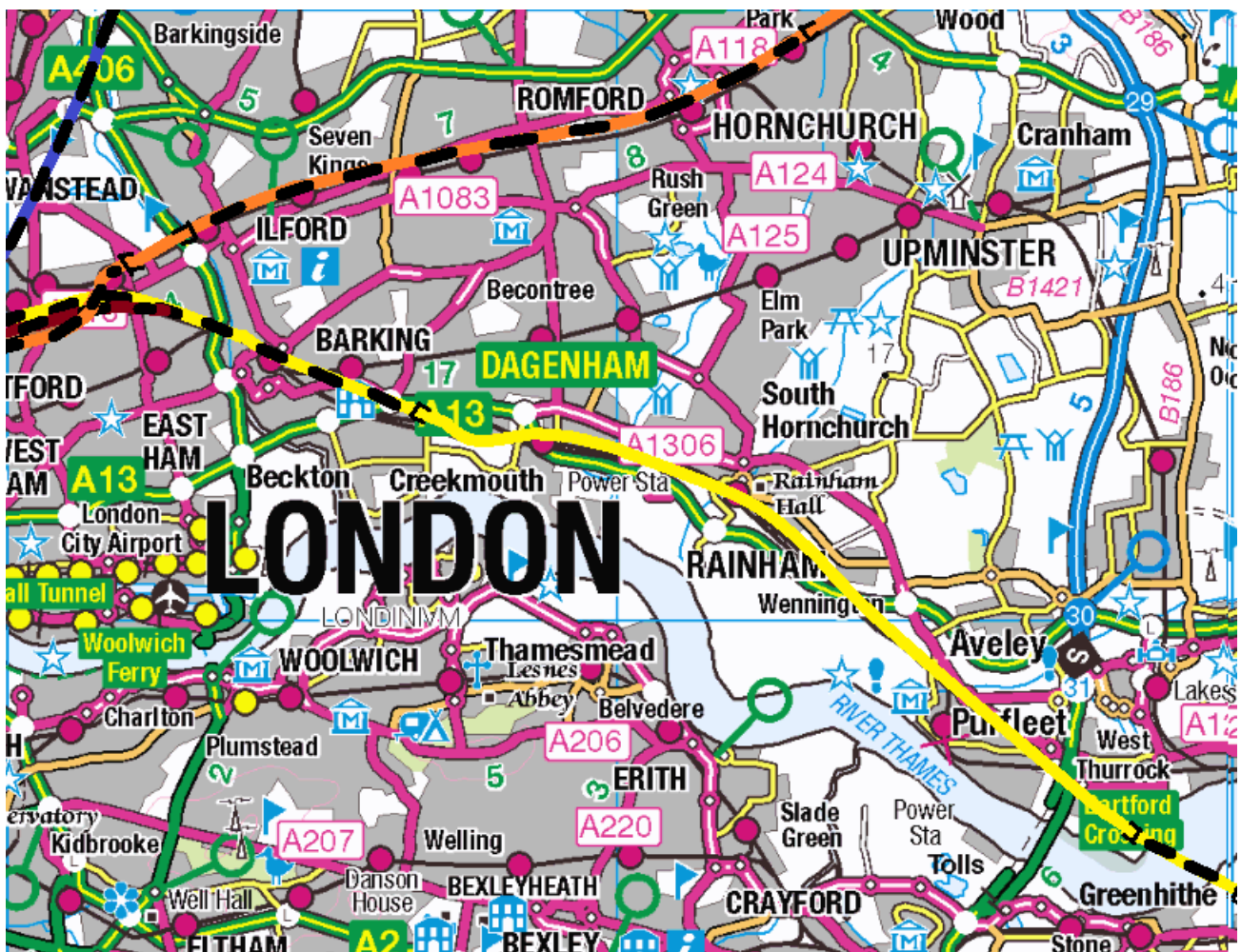
There is an embarrassment of choices here.

1. The conceptually simplest solution would be a junction actually inside the Channel tunnel, at around TR280399, followed by a c.2½ mile tunnel curving gently to the north, emerging immediately to the west of Priory station, at TR313414, with plenty of room for a 2 platform HS island on the west side of the station. However, given security concerns at the Channel Tunnel Terminal, and also the shuttle service, this is probably a non-starter, though it would certainly be possible technically.
2. Diverge from HS1 before the entrance to the Channel Tunnel terminal, at Saltwood HS Junction, TR182372, and follow the north side of the M20, followed by the A20, alignment to just before Dover, at TR287394, diverging and following the valley immediately north of Aycliff to TR313408, followed by a very short (¼ mile) tunnel to Priory station, as above.
3. As #2 above, but follow the A20 a little further to TR308400, diverging and crossing to the south of the A20 to join the Ashford – Dover railway, immediately to the east of Shakespeare Cliff tunnel. Follow the north then west side of the classic alignment to Priory station. (Note that this keeps the HS tracks separate.)
4. Diverge as for #2 above (but at the existing Saltwood Junction), and join and take over the classic route, enlarged to GC gauge all the way to Dover Priory station (HS1 to share the enlarged classic tracks, but have its own platforms at Priory station). ‘Enlarged to GC gauge’ is very easy to say, but not necessarily easy to do; there may well be problems, particularly with the Folkestone viaduct. There is serious work to be done to enlarge the tunnels, of course, but this is a known quantity. If this is a practical solution, it is probably the best, as it serves Folkestone also.

Option #3 is the one illustrated on the maps.

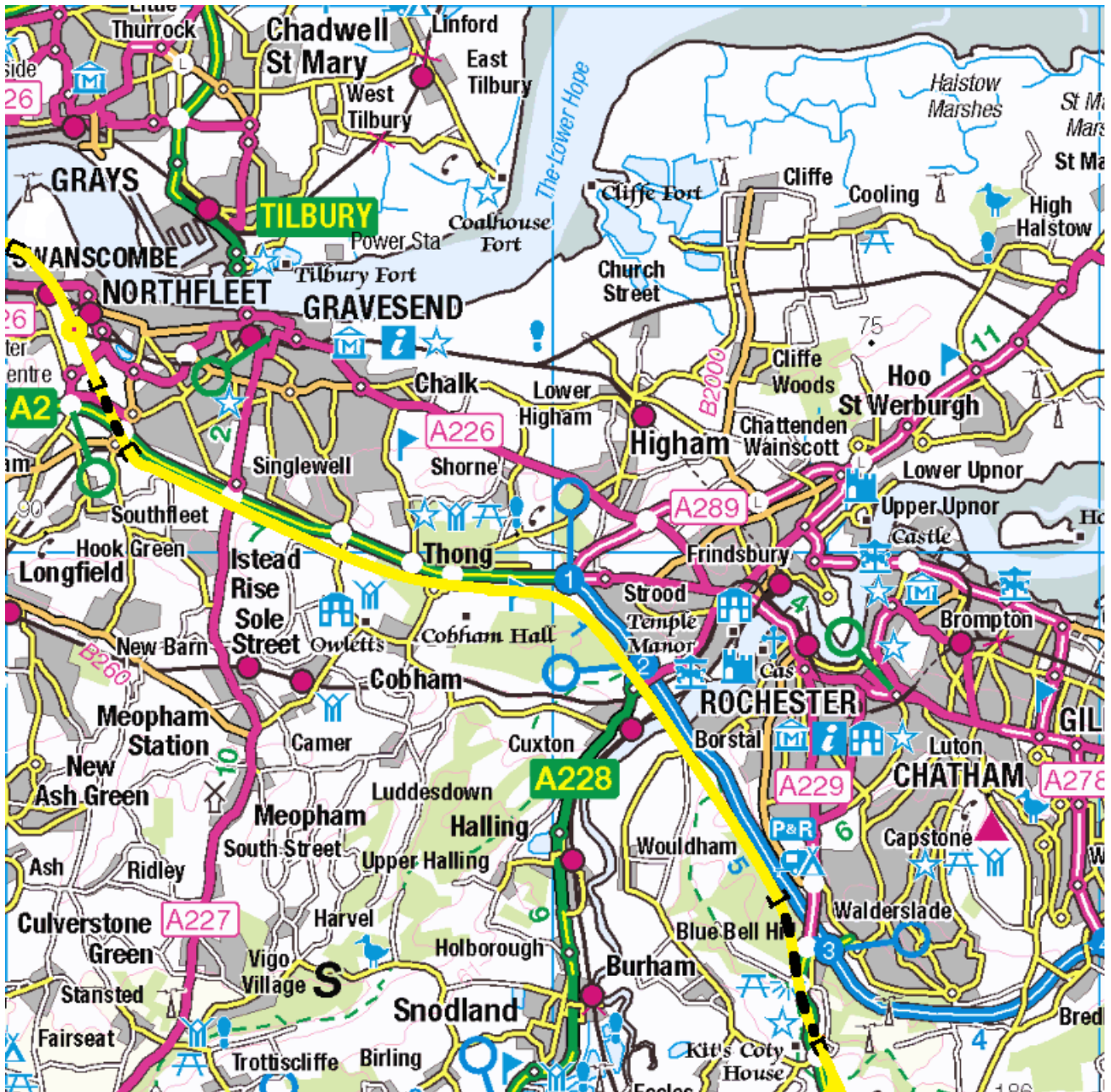


1. St. Pancras Int'l – Stratford HS North Contains Ordnance Survey data © Crown copyright and database right 2013



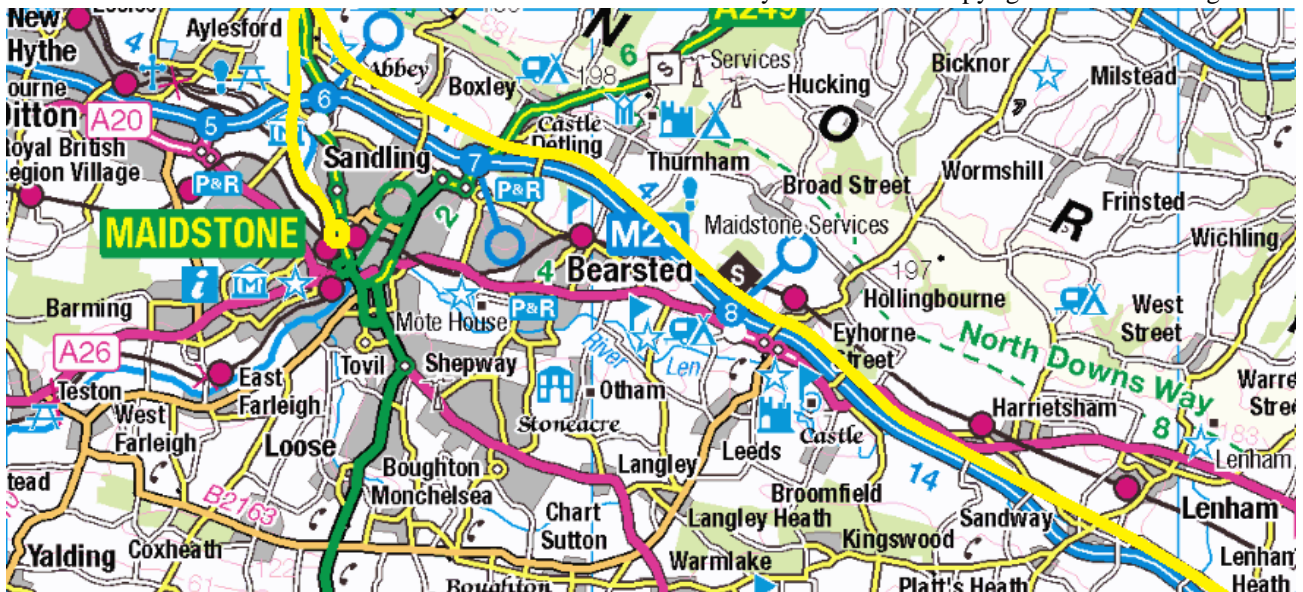
2. West Ham – Greenhithe Contains Ordnance Survey data © Crown copyright and database right 2013





3. Swanscombe – Walderslade

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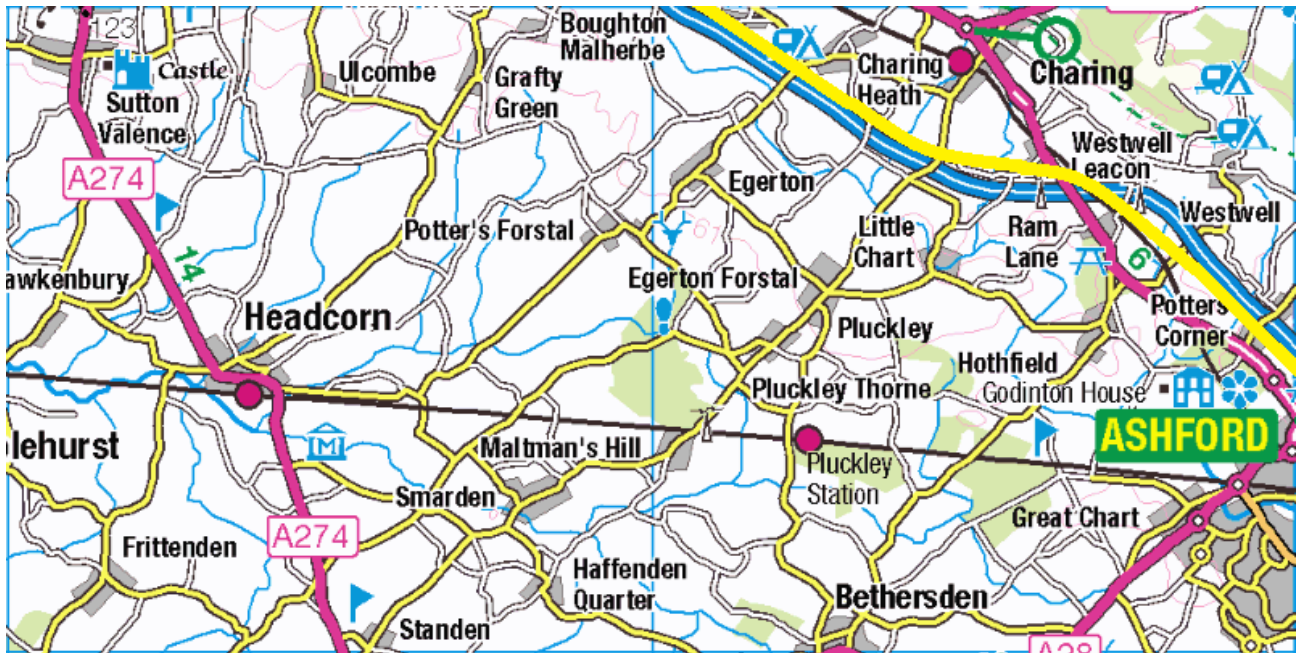


4. Aylesford – Lenham

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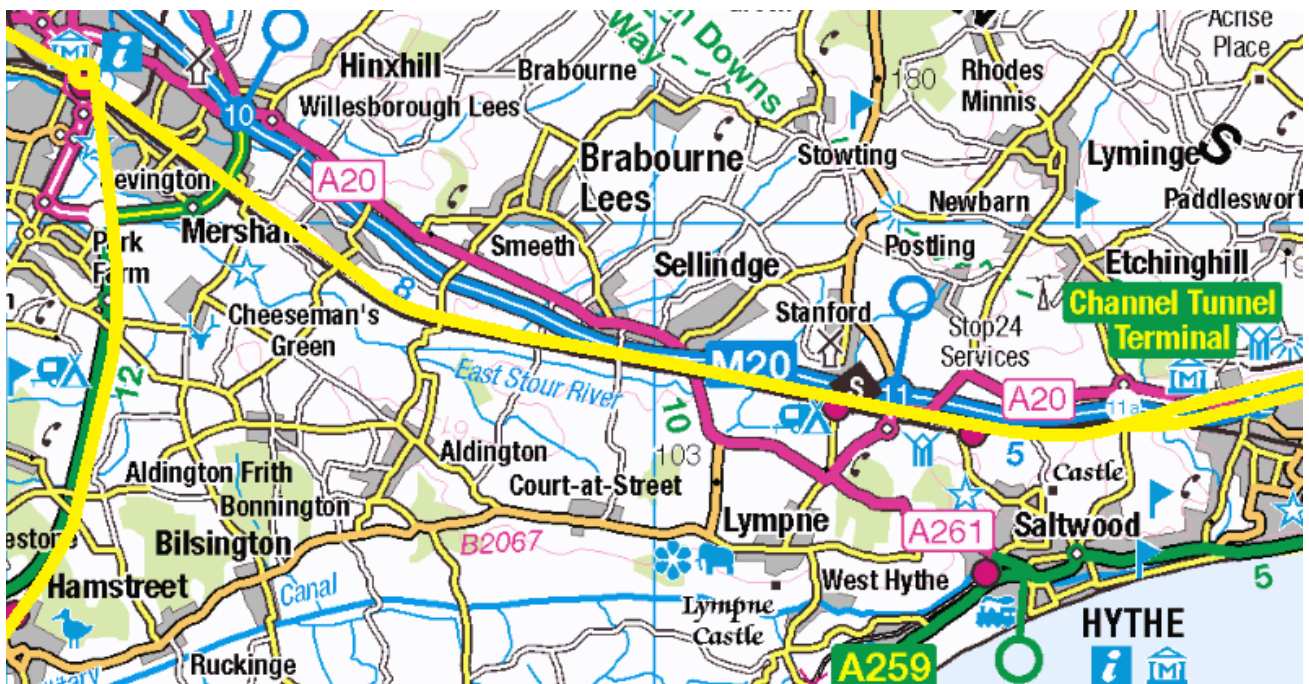
Note that this map is wider than 20km (c.22km)





5. Charing – Ashford

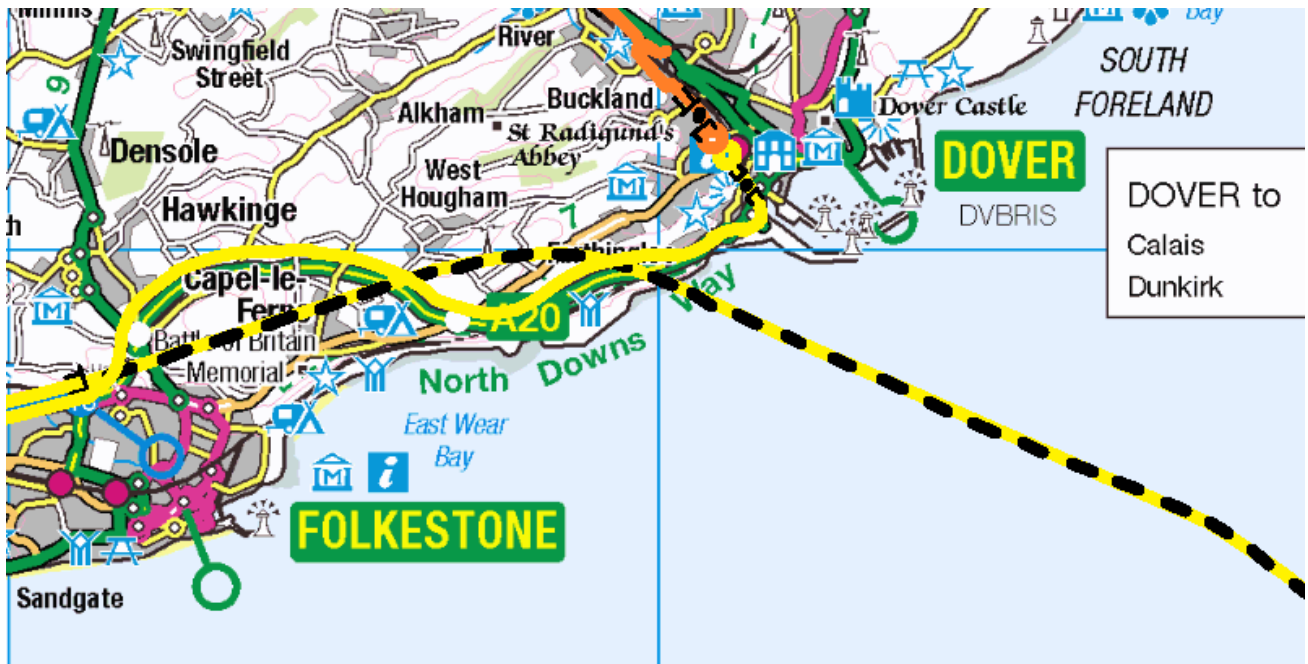
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6. Ashford – Channel Tunnel

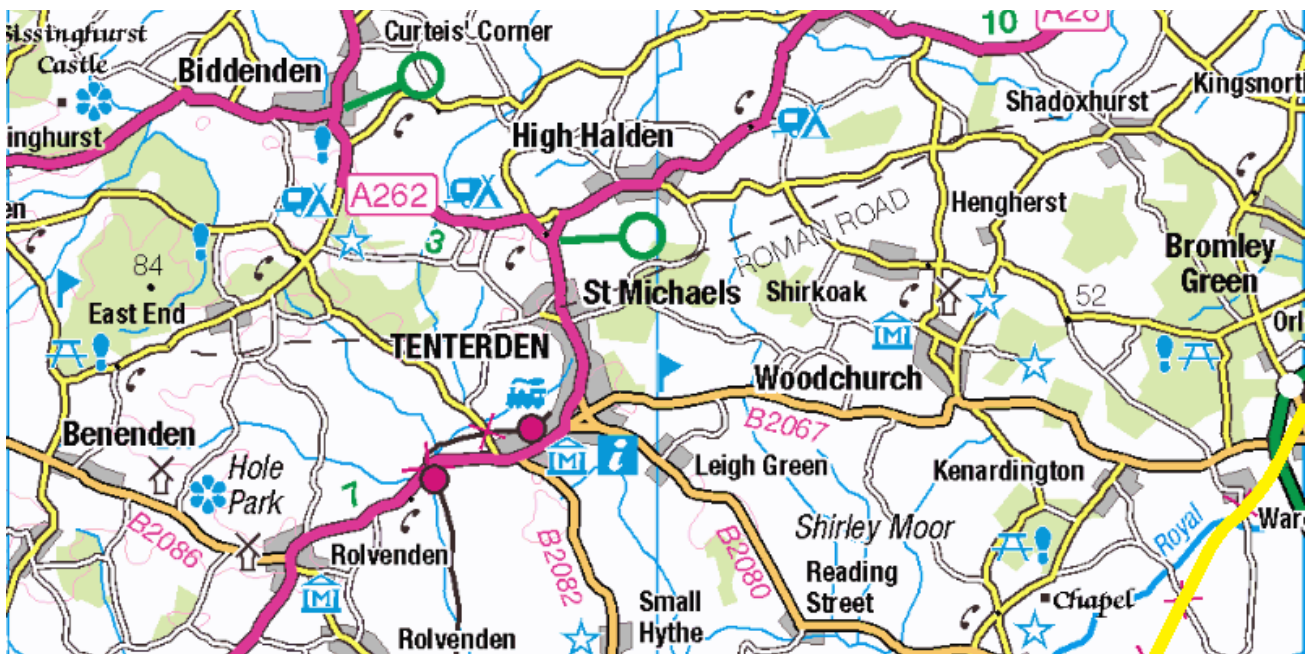
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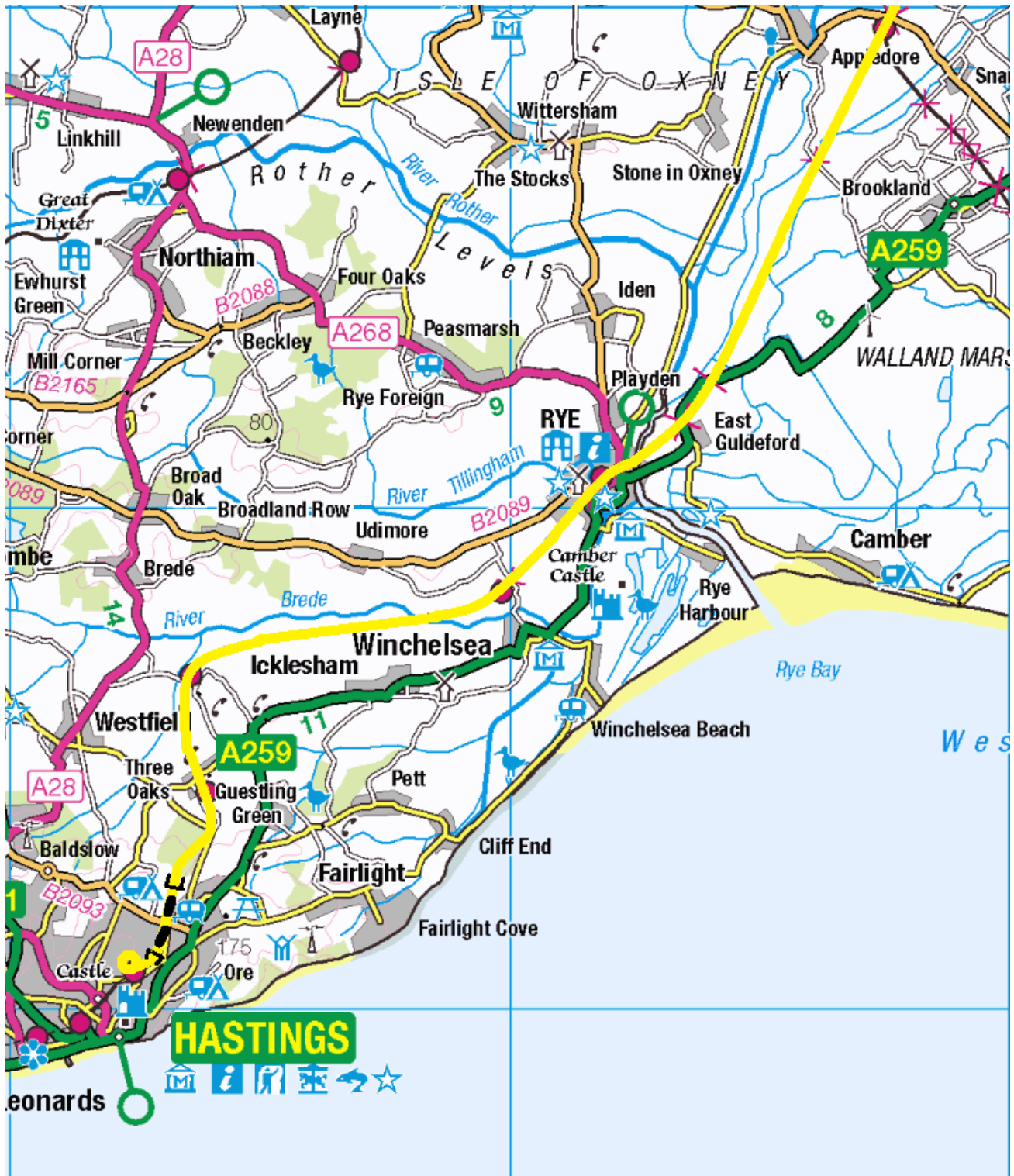
7. Folkestone – Dover

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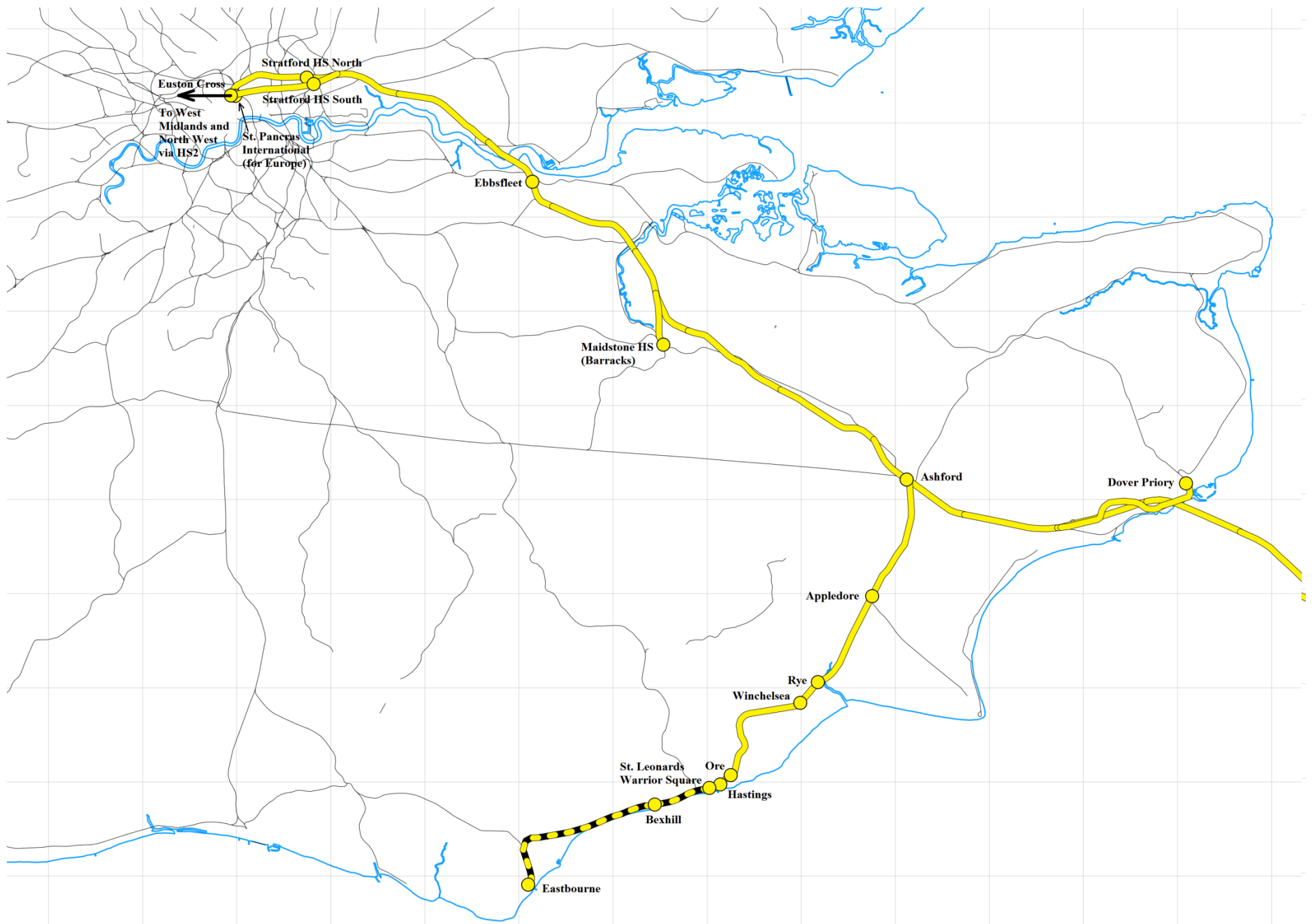
8. Bromley Green – Reading Street

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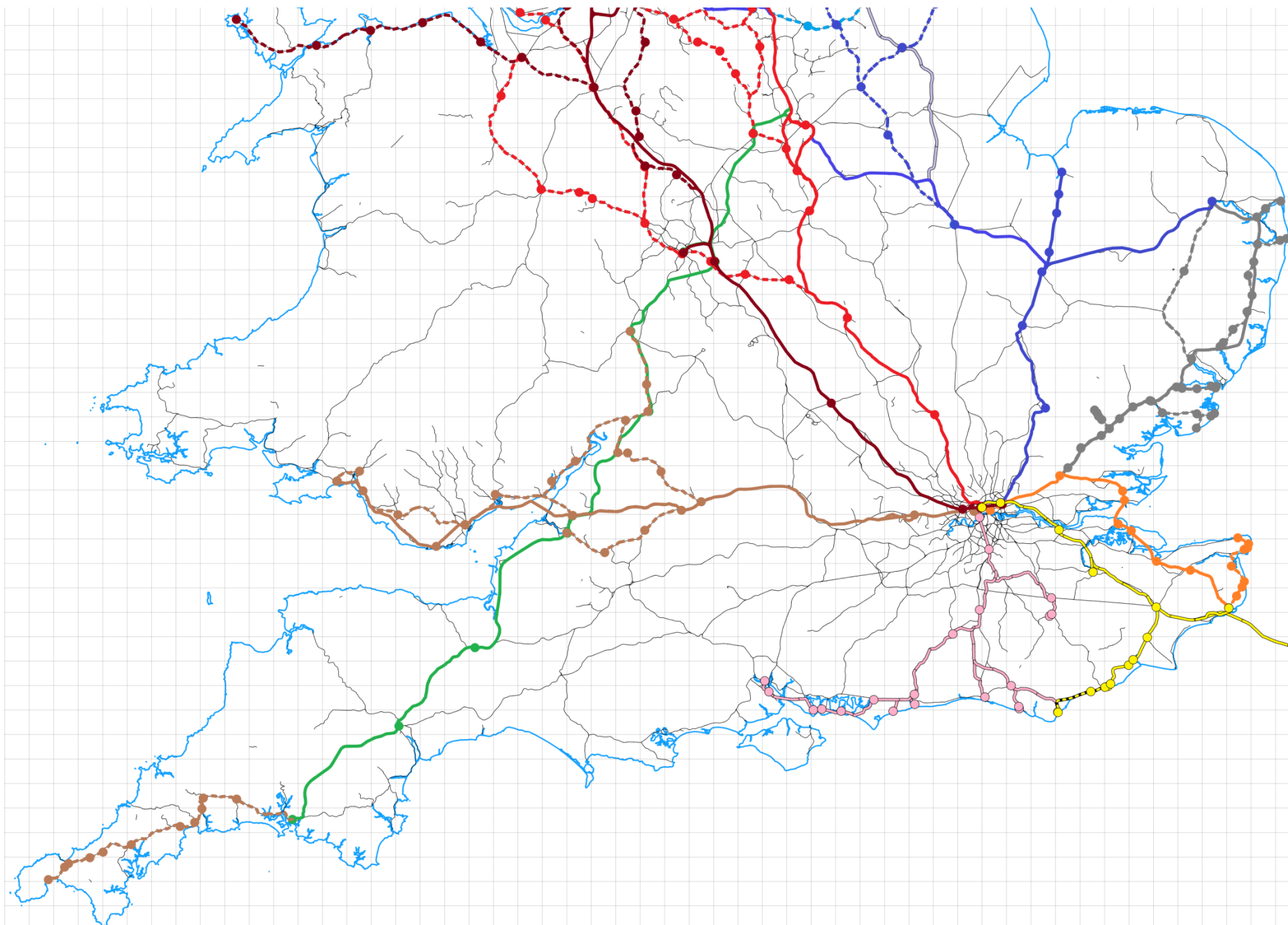


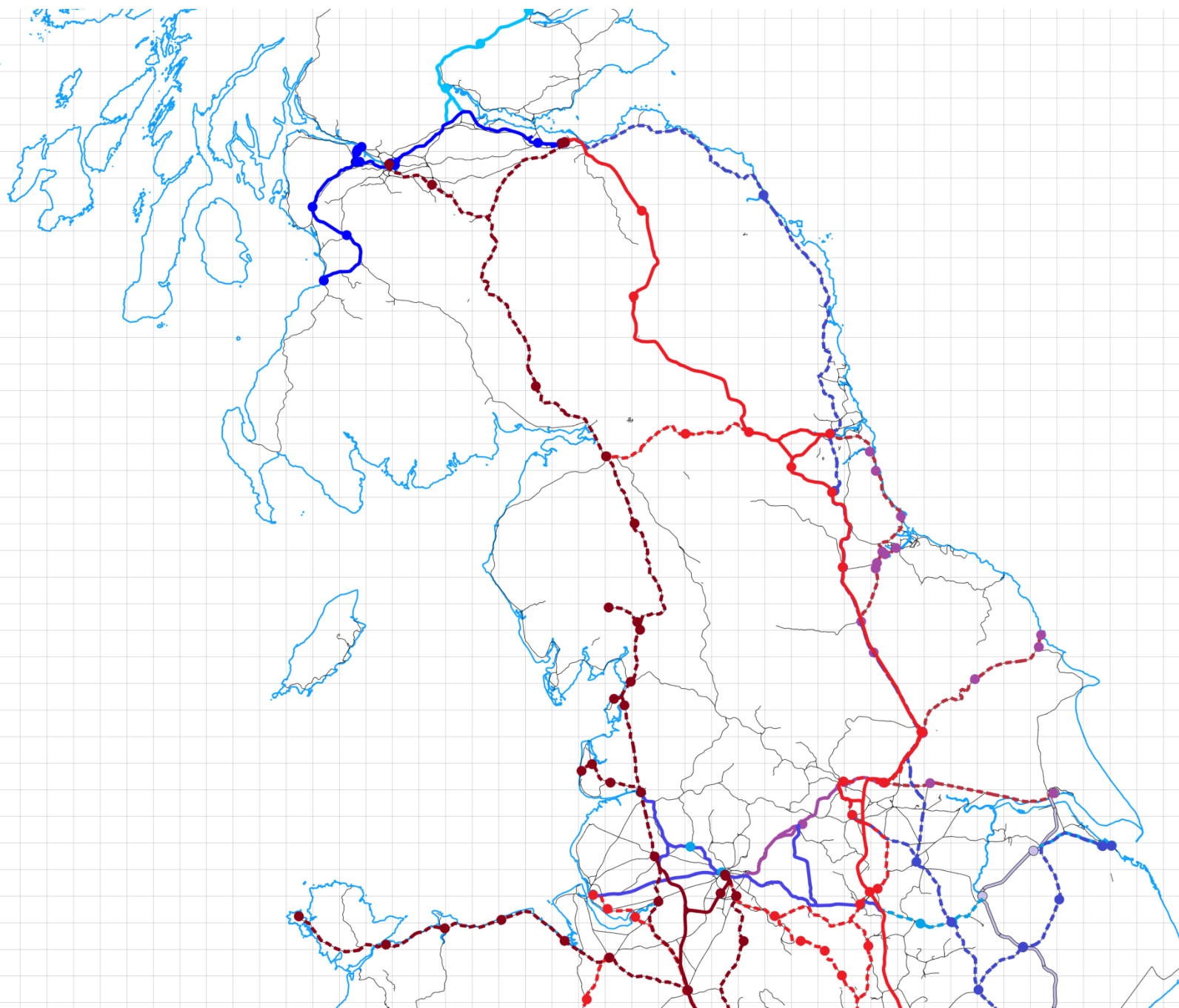
9. Appledore – Hastings

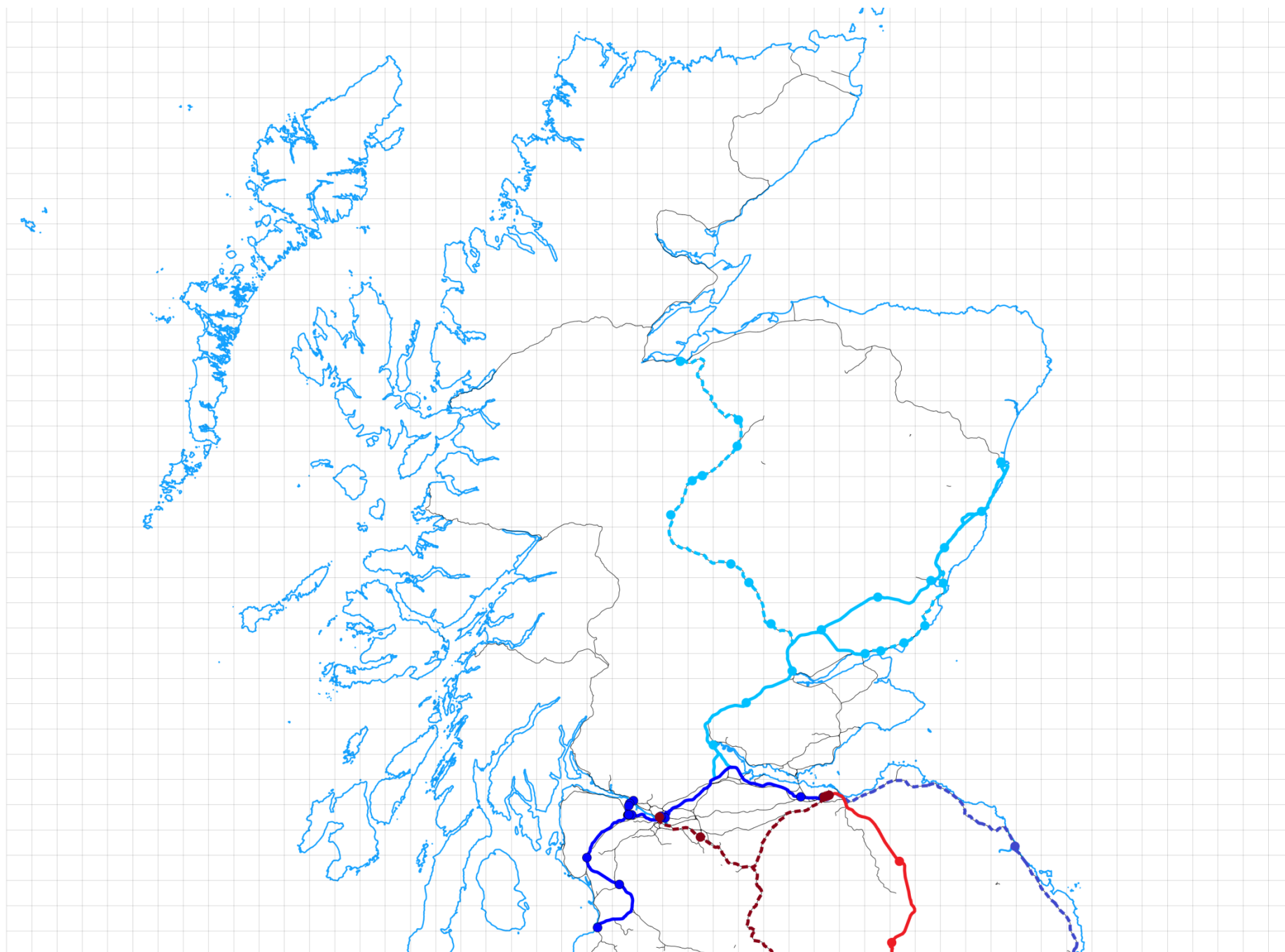
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## *The Service Plans*

A new service plan comes into effect when some significant change takes place which causes a change to the service loadings of one or more sections of HS1 itself. This most commonly occurs when a new section of HS1 opens, but it may also be a consequence of a change on some other HS route.

The service plans use the following notation:

- tph      trains per hour
- G        GC gauge train
- GG      GC gauge, double deck train
- C        classic-compatible train
- R        Regional Metro train, semi-fast service
- RS      Regional Metro train, stopping service (all stations)

Occasionally other notations are used; these will be defined when used.

### *Service Plan 1*

The first service plan comes into effect when:

- HS1's branches to Maidstone HS, Dover Priory and Hastings open.
- HS2 phase 2B opens from Crewe HS South Junction to Manchester and Wigan, and from Old Oak Common North Junction through Euston Cross to Woodgrange Road Junction, where it merges with HS1.

The full service on HS1/HS2 is thus (including the HS2 origins of the GC-gauge inter-regional services):

- 4tphGG [Birmingham HS →] Euston Cross – Stratford HS South – Ebbsfleet – Maidstone HS
- 4tphGG [Manchester HS →] Euston Cross – Stratford HS South – Ebbsfleet – Ashford – Dover Priory
- 2tphGG [Liverpool Lime Street →] Euston Cross – Stratford HS South – Ebbsfleet – Ashford – Hastings
- 2tphC St. Pancras East – Stratford HS North – Ebbsfleet – Ashford – Appledore – Rye – Winchelsea – Ore – Hastings – St. Leonards Warrior Square – Bexhill – Eastbourne

(The main purpose of the classic-compatible service is to give Bexhill also a HS service to London, which would not be practicable with GC-gauge trains because of the tunnels west of Hastings. This would by itself hardly justify widening these, and the existing traffic levels exclude the possibility of singling the track, as at Ore.)

In addition HS1's suggested international services are:

- 1tphG St. Pancras Int'l – Paris Gare du Nord.
- 1tphG St. Pancras Int'l – Ebbsfleet Int'l – Ashford Int'l – Fréthun – Lille Europe – Paris Gare du Nord
- 1tphG St. Pancras Int'l – Ebbsfleet Int'l – Ashford Int'l – Lille Europe – Brussels Midi – Brussels Nord – Antwerp – Rotterdam Centraal – Schiphol Airport – Amsterdam Centraal

- 1tphG St. Pancras Int'l – Ebbsfleet Int'l – Ashford Int'l –Lille Europe – Brussels Midi – Brussels Nord – Liège Guillemins – Aachen Hbf – Cologne Hbf

The following loadings are imposed on HS1:

|                               |                               |       |
|-------------------------------|-------------------------------|-------|
| • Euston Cross                | – Stratford HS South Junction | 10tph |
| • Stratford HS South Junction | – Woodgrange Rd. Junction     | 10tph |
| • St. Pancras International   | – York Way Junction           | 4tph  |
| • St. Pancras East            | – York Way Junction           | 2tph  |
| • Pancras Cross               | – York Way Junction           | 0tph  |
| • York Way Junction           | – Hitchcock Lane Junction     | 6tph  |
| • Hitchcock Lane Junction     | – Woodgrange Rd. Junction     | 6tph  |
| • Woodgrange Rd. Junction     | – Pilgrim's Way Junction      | 16tph |
| • Pilgrim's Way Junction      | – Maidstone HS Station        | 4tph  |
| • Pilgrim's Way Junction      | – Ashford West Junction       | 12tph |
| • Ashford West Junction       | – Saltwood HS Junction        | 8tph  |
| • Saltwood HS Junction        | – Dover Priory Station        | 4tph  |
| • Saltwood HS Junction        | – Europe                      | 4tph  |
| • Ashford West Junction       | – Hastings Station            | 4tph  |

## *Service Plan 2*

This service plan comes into effect when:

- HS8 and HS9 open between Manchester HS and Liverpool / Bolton and Preston. A connection is made between HS2 at Bamfurlong Junction and HS8 at Gibb Farm Junction making available a GC-gauge route between London and Preston.
- HS4 has opened between Old Oak Common West and East Junctions, and HS11 between Woodgrange Road East Junction and Manor Park Junction. This affects only the section loading between Euston Cross and Woodgrange Road East Junction.

There is just the one new service:

- 2tphGG [Preston →] Euston Cross – Stratford HS South – Ebbsfleet – Ashford – Hastings

The loadings imposed on HS1 are now:

|                               |                               |       |
|-------------------------------|-------------------------------|-------|
| • Euston Cross                | – Stratford HS South Junction | 18tph |
| • Stratford HS South Junction | – Woodgrange Rd. Junction     | 12tph |
| • St. Pancras International   | – York Way Junction           | 4tph  |
| • St. Pancras East            | – York Way Junction           | 2tph  |
| • Pancras Cross               | – York Way Junction           | 0tph  |
| • York Way Junction           | – Hitchcock Lane Junction     | 6tph  |
| • Hitchcock Lane Junction     | – Woodgrange Rd. Junction     | 6tph  |
| • Woodgrange Rd. Junction     | – Pilgrim's Way Junction      | 18tph |
| • Pilgrim's Way Junction      | – Maidstone HS Station        | 4tph  |

|                          |                         |       |
|--------------------------|-------------------------|-------|
| • Pilgrim's Way Junction | – Ashford West Junction | 14tph |
| • Ashford West Junction  | – Saltwood HS Junction  | 8tph  |
| • Saltwood HS Junction   | – Dover Priory Station  | 4tph  |
| • Saltwood HS Junction   | – Europe                | 4tph  |
| • Ashford West Junction  | – Hastings Station      | 6tph  |

## *Service Plan 2A*

This service plan comes into effect when HS6 opens. This merely adds 6tph classic-compatible services between St. Pancras East and Hitchcock Lane Junction, and a further 6tph GC-gauge3 between York Way and Hitchcock Lane Junctions. It doesn't affect HS1's services at all.

The loadings imposed on HS1 are now:

|                               |                               |       |
|-------------------------------|-------------------------------|-------|
| • Euston Cross                | – Stratford HS South Junction | 18tph |
| • Stratford HS South Junction | – Woodgrange Rd. Junction     | 12tph |
| • St. Pancras International   | – York Way Junction           | 4tph  |
| • St. Pancras East            | – York Way Junction           | 8tph  |
| • Pancras Cross               | – York Way Junction           | 6tph  |
| • York Way Junction           | – Hitchcock Lane Junction     | 18tph |
| • Hitchcock Lane Junction     | – Woodgrange Rd. Junction     | 6tph  |
| • Woodgrange Rd. Junction     | – Pilgrim's Way Junction      | 18tph |
| • Pilgrim's Way Junction      | – Maidstone HS Station        | 4tph  |
| • Pilgrim's Way Junction      | – Ashford West Junction       | 14tph |
| • Ashford West Junction       | – Saltwood HS Junction        | 8tph  |
| • Saltwood HS Junction        | – Dover Priory Station        | 4tph  |
| • Saltwood HS Junction        | – Europe                      | 4tph  |
| • Ashford West Junction       | – Hastings Station            | 6tph  |



## *Estimated Journey Times*

The conditions governing acceleration, deceleration, behaviour at junctions and line capacity of high speed lines are dealt with exhaustively in appendix B of the article ‘Same Speed Railways’. Technically-minded readers, who want all the hard details, should look there. Only the required results are quoted here.

The following calculations are only approximate. Distances, to the nearest km, are derived from my own maps.

The crudest approximation, usually, is the assumption that, once line speed has been reached, that speed (300kph) is maintained until it becomes necessary to decelerate for a junction or a station stop. In fact, given the excellent alignments of this particular route, I am considerably more confident of this assumption than on certain other routes (Trans-Pennine, in particular).

The results are, in any case, valuable in giving a **feel** for the journey times possible.

My estimated distances (between stations) are:

|                                     |        |
|-------------------------------------|--------|
| • Euston Cross – Stratford HS South | 8km    |
| • Stratford HS South – Ebbsfleet    | 28km   |
| • Ebbsfleet – Maidstone HS          | 25km   |
| • Ebbsfleet – Ashford               | 52km   |
| • Ashford – Dover Priory            | 34km   |
| • Ashford – Appledore               | 13.6km |
| • Appledore – Rye                   | 10.4km |
| • Rye – Winchelsea                  | 3.2km  |
| • Winchelsea – Ore                  | 12.8km |
| • Ore – Hastings                    | 1.5km  |

The distances between Ashford and Hastings are exact – this is the existing classic line, converted to GC-gauge.

Acceleration/deceleration distances and times (taken from ‘Same Speed Railways’ appendix B) are:

- Acceleration from stationary to 300kph takes 11.57km and 278 seconds
- Deceleration from 300kph to stationary takes 6.945km and 167 seconds
- Time to travel from Euston Cross to Stratford HS South (start to stop) is 292 seconds
- Time to travel from Ashford to Appledore (start to stop) is 381 seconds
- Time to travel from Appledore to Rye (start to stop) is 332 seconds
- Time to travel from Rye to Winchelsea (start to stop) is 185 seconds
- Time to travel from Winchelsea to Ore (start to stop) is 369 seconds
- Time to travel from Ore to Hastings (start to stop) is 126 seconds

The final time needs elucidation. When the distance between stations is less than 18.5km, a train accelerating from the first station is not able to reach line speed, before it has to begin decelerating for the next station. ‘Same Speed Railways’ contains a table of times taken to travel between adjacent stations, for inter-station distances of up to 18.5km, and the above times are taken from this.

The procedure in calculating journey times between station stops is to take the two values of acceleration / deceleration distance, and the two times, as given in the first 2 lines of the above list, and sum them, thus acceleration / deceleration takes  $11.57 + 6.95 = 18.52\text{km}$  and  $278 + 167 = 445$  seconds. The appropriate distance value is subtracted from the inter-station distance, and the remaining length is assumed to be travelled at line speed, taking time = distance / speed. This time is then added to the acceleration / deceleration time to obtain the actual journey time between the stations. This is all very laborious (error-prone, too!) to perform manually, so I have developed spreadsheets to do the work and present the results. For those sections less than 18.5km in length, the time-calculating formula in the spreadsheet cell is replaced by the actual value, as given in the above list. The various section times are accumulated to obtain the overall journey times. One further refinement: a standard wait time of 3 minutes is assumed at stations, and this is added into the accumulated time at each stop.

*HS Euston Cross – Maidstone / Dover / Hastings (2/3/7 stops):*

| Section                           | Distance (km) | Cumulative Distance (km) | Start - Stop Time (minutes) | Cumulative Journey Time (minutes) | Elapsed Time from London, inc. Station Wait Times |
|-----------------------------------|---------------|--------------------------|-----------------------------|-----------------------------------|---|
| Euston Cross - Stratford HS South | 8             | 8                        | 4.9                         | 4.9                               | 4.9   |
| Stratford HS South - Ebbsfleet    | 28            | 36                       | 9.3                         | 14.2                              | 17.2  |
| Ebbsfleet - Maidstone HS          | 25            | 61                       | 8.7                         | 22.9                              | 28.9  |
| Ebbsfleet - Ashford               | 52            | 88                       | 14.1                        | 28.3                              | 34.3  |
| Ashford - Dover Priory            | 34            | 122                      | 10.5                        | 38.8                              | 47.8  |
| Ashford - Appledore               | 14            | 102                      | 6.4                         | 34.6                              | 43.6  |
| Appledore - Rye                   | 10            | 112                      | 5.5                         | 40.2                              | 52.2  |
| Rye - Winchelsea                  | 3             | 115                      | 3.1                         | 43.3                              | 58.3  |
| Winchelsea - Ore                  | 13            | 128                      | 6.2                         | 49.4                              | 67.4  |
| Ore - Hastings                    | 2             | 130                      | 2.1                         | 51.5                              | 72.5  |

Current fastest time (minutes) from London [and the above values] to:

- Ebbsfleet                      17                      [18]
- Maidstone                      56                      [29]
- Ashford                      36                      [35]
- Dover                      83 (Javelin – 1 change)                      [48]
- Rye                      72                      [53]
- Winchelsea                      77                      [59]
- Hastings                      91                      [73]



# Appendix A – Euston Cross and the Inter-Regional Connections

## General

By routing the classic-compatible services of HS2 and HS4 into Euston and Paddington, respectively, and all the GC-gauge services of both routes through Euston Cross, and on to HS1 and HS11/HS12, superlative cross-London inter-regional HS services are enabled, between the West Midlands / North West and Kent / East Sussex, and between South Wales / West Country and North Kent / East Anglia. The classic compatible services of HS1 (there's only one) and HS11/HS12 are likewise routed into St. Pancras East (the 'Javelin' platforms) and Liverpool Street respectively. The GC-gauge services of HS1 (not the international ones) and HS11/HS12 balance exactly those of HS2 and HS4. There is thus no need for any rebuilding work at the four terminal stations to accommodate GC-gauge trains. (Euston certainly needs rebuilding because it's such a disgusting mess, but it need not expand significantly beyond its current footprint, Paddington needs nothing more than a good clean and a fresh coat of paint, St. Pancras and Liverpool Street probably need nothing at all.) Given the GC-gauge loadings of the London end of HS2 and HS1 (12tph) and of HS4 and HS11/HS12 (6tph) – these are at the final service plans of each route – a single tunnel in each direction, with a minimum of 6 platforms, (passive provision for 8,) at Euston Cross, would suffice. That a single Euston Cross station, with a single pair of approach tunnels, would serve two HS inter-regional routes should seriously enhance its business case. I would like to see **passive** provision for 8 platforms, as is indicated in the diagrams.

The following sections illustrate the significant locations on the Euston Cross cross-London, inter-regional route. The track diagrams all use the colour scheme:



## Old Oak Common

Old Oak Common station is on two levels, (3 actually, including London Overground, but that, although important, is not relevant in the current context):

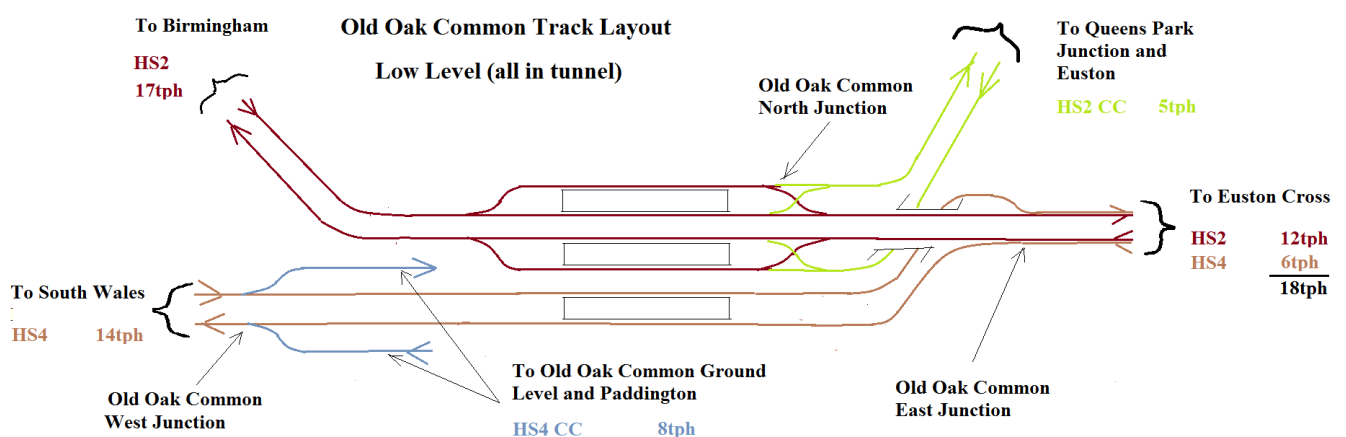
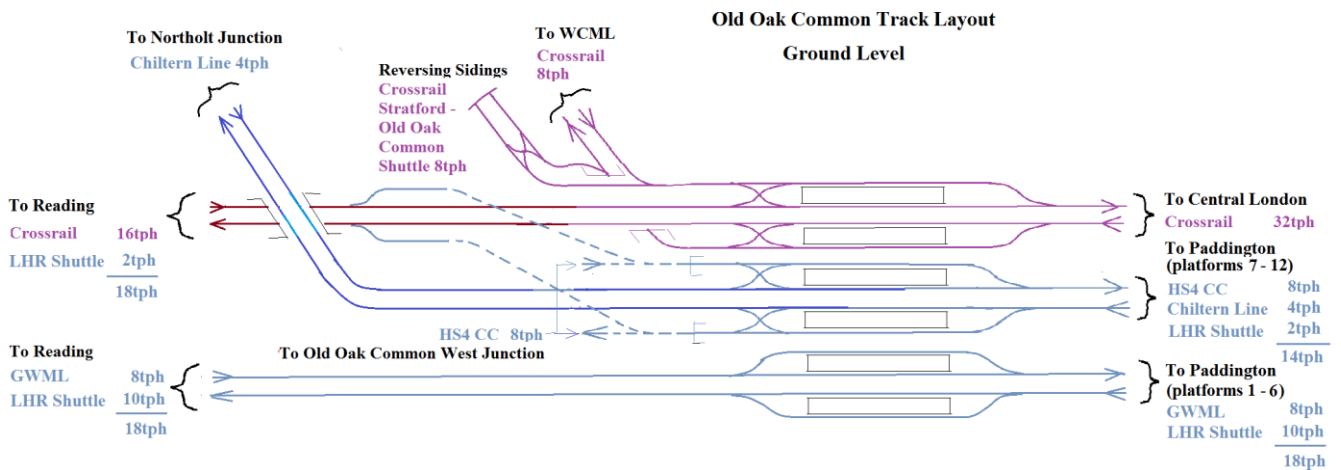
Ground Level, consisting of three sets of four platforms, serving the routes:

- GWML (Classic, long distance, and Heathrow Shuttle services,) on the fast lines
- HS4 Classic Compatibles and Chiltern Line services on the relief lines, both of which diverge immediately west of the platforms, the CCs to join HS4 at Old Oak Common West Junction, at the low level and the Chiltern Line services to Northolt Junction

- Crossrail, of which the arm to the WCML and the Stratford Shuttle reversing sidings diverges immediately west of the platforms, and the GWML arm takes over the relief lines

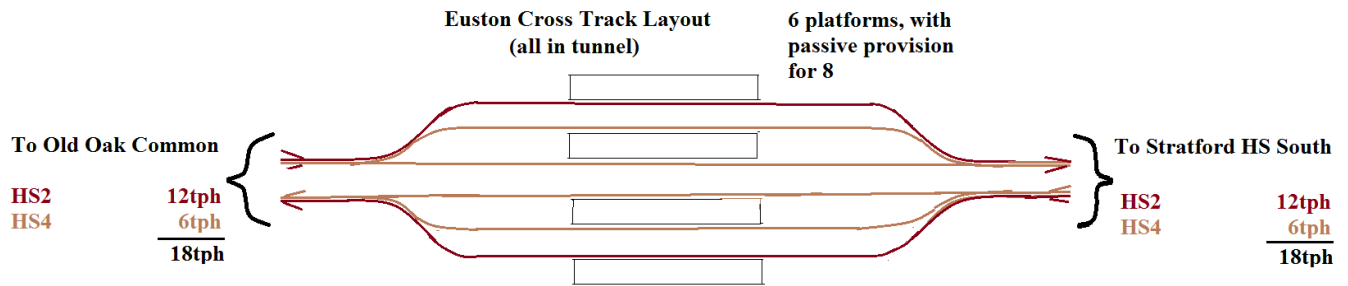
Low Level, consisting of HS2 (all services, so variable platforms will be required) and HS4 (GC-gauge services).

Ideally, these should be one above the other, with the passenger entrances and circulating area between them, with lifts, escalators and stairs directly to all platforms. In order for HS2 and HS4 GC-gauge services to share the same pair of tracks, the classic-compatible services must first diverge, those of HS4 **before** the LL station (heading east), at Old Oak Common West Junction (then using the GWML platforms at ground level), and those of HS2 immediately after the LL station, at Old Oak Common North Junction. HS2 and HS4 merge shortly after that, at Old Oak Common East Junction. HS2's London-bound classic-compatible trains join the WCML at Queens Park Junction. In the original Euston Cross plans, this was seen as actually at Queens Park (since there was then no need to get them off HS2 as soon as possible after Old Oak Common). In fact Queens Park Junction (I'll keep the name as it's already in the literature) would best be located immediately west of the Kensal Green tunnels – there's plenty of room for it there, and it's only about ½ mile from Old Oak Common North Junction.



## Euston Cross

This is trivial, a two track route widening to serve 6 platforms. The middle two platform faces would ordinarily be served by HS4 trains, and the two outer pairs by HS2.



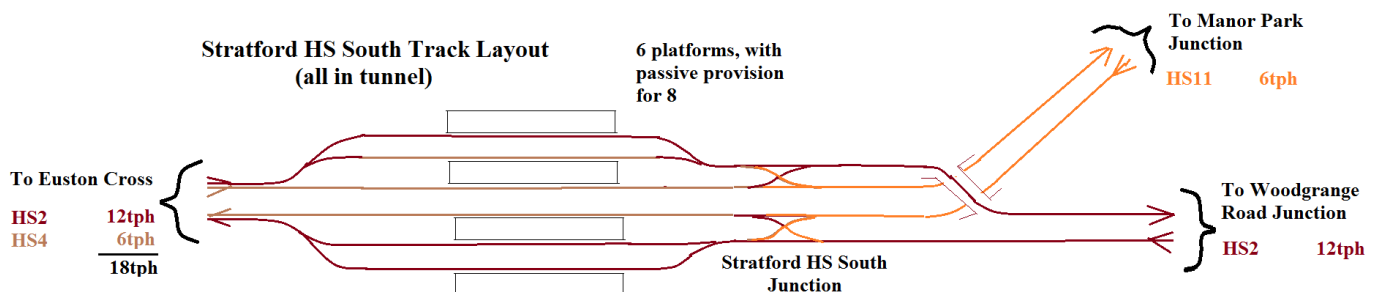
## Stratford HS South

HS2/HS4 follow, in tunnel, the alignment of HS1, but a little to the south of it, from north of St. Pancras to Stratford. Thus whereas HS1/HS6 arrive at Stratford HS North station (the former Stratford International, which it never was,) HS2/HS4 arrive at Stratford HS South station, underneath Stratford (Regional) station. This is similar to Euston Cross – the route widens to serve 6 platforms, with HS4 occupying the middle two – but afterwards the HS4 tracks diverge from the HS2 tracks at Stratford HS South Junction, and HS4 metamorphoses into route HS11. The scissors crossovers are provided for operational flexibility but should not normally be used.

HS11 emerges from tunnel on the north side of the GEML and is joined by a connection from the classic route, at Manor Park Junction.

HS2 continues to Woodgrange Road Junction in Forest Gate, where it merges with HS1.

Stratford HS South corresponds in many respects to Old Oak Common. Both are served by all the GC-gauge inter-regional services, and afford convenient interchange with Crossrail. The Crossrail tracks are likewise in the high level station, having taken over the former slow lines, thus providing cross-platform interchange with the LT Central Line. Stratford HS South is on the Shenfield branch of Crossrail, and thus has a 12tph service, but additionally is served by the 8tph shuttle between Stratford and Old Oak Common.



# Appendix B – Pancras Cross and the Inter-Regional Connections

## *General*

By routing the classic-compatible services of HS3 into St. Pancras West (the MML platforms), and of HS6 into St. Pancras East (the ‘Javelin’ platforms), and all the GC-gauge services of both routes through Pancras Cross and on to HS5 (which has no classic-compatible services), superlative cross-London inter-regional HS services are enabled, between Scotland, the North East, Yorkshire and the East Midlands (HS3), likewise West Anglia and Lincolnshire (HS6/HS10), and Sussex, West Kent and Hampshire. Given the GC-gauge loadings of the London end of HS3 (10tph) and of HS6/HS10 (6tph), balancing exactly those of HS5(16tph) – these are at the final service plans of each route – a single tunnel in each direction and 6 platform faces, (passive provision for 8,) would suffice. That a single Pancras Cross station, with a single pair of approach tunnels, would serve two HS inter-regional routes should seriously enhance its business case. I would like to see **passive** provision for 8 platforms, as is indicated in the diagram.

The track diagram of Pancras Cross and its surroundings is on the next page. The layout is not especially complicated, but there are a few points to note.

The middle two platform faces at Pancras Cross would ordinarily be used by HS6 trains and the two outer pairs by HS3. The scissors crossovers are provided for operational flexibility, but should not normally be used. I would like to see **passive** provision for 8 platforms, as is indicated in the diagram.

HS6’s GC-gauge services from Pancras Cross, and its classic-compatible services from St. Pancras East, (and also HS1’s single classic-compatible service,) all join HS1’s GC-gauge route from St. Pancras International, at York Way Junction. They then all share the same tracks as far as Stratford HS North station (formerly Stratford International, which it never was). The track diagram for Stratford HS North is deliberately simplified, omitting the extra through tracks and the connection to Temple Mills. The station exists already, and has a single platformed track in each direction (a rather inadequate provision; it may well prove necessary to add extra platform faces on the outside). This is served by all HS6/HS10 services, and also by HS1’s single classic-compatible service. HS1’s international services pass through the centre, as they always have. (HS1’s GC-gauge inter-regional services join HS1 later, from Euston Cross at Woodgrange Road Junction.) HS6 diverges from HS1 at Hitchcock Lane Junction, immediately east of the station, without rejoining the main lines of HS1. There is the existing connection from the platform lines to the main lines, used by HS1’s classic-compatible service.



