

# HS4 Route and Service Plans

## *HS4 Route Mk1A*

Following the referendum on EU membership and the decision to disengage from the EU, several changes have been made to the plans for HS rail, most importantly, abandoning GC-gauge, and building all new infrastructure to standard UK loading gauge. This has, in most cases, very little impact on the routes proposed, but significant impact on the service plans. In certain cases it is now proposed to include sections of classic route in the HS route, rather than building exclusively new throughout. (Note that this is different from the previous proposals to run classic compatible services on classic lines, **beyond** the HS route; this actually incorporates classic sections, upgraded as appropriate, in the HS route itself.)

Appendix G lists all specific changes of route, for HS4 and associated routes, principally HS7, which are also, of course, incorporated in the various route sections, following.

One specific new section of route needs to be highlighted – the connection to the South Western classic route at Basingstoke, allowing new services (on the existing, classic lines,) to Southampton, Bournemouth, Weymouth, Salisbury and Exeter to be added. Linked with this, the route around Reading has been completely re-planned (including a new Reading Parkway station). A fundamental requirement of the design is to provide extra capacity at the London end of the GWML, ideally out as far as Swindon. Accordingly, completely new infrastructure is proposed out as far as (just past) Didcot, with enhancement of the classic line thereafter (140mph line speed thence to Bristol Parkway, with quadrupling to Wootton Bassett Junction).

Because of the significant changes introduced at Mk1A, the latest versions of all the Mk1 plans (v9.3 in the case of HS4) have been preserved, available in an archive section on the website.

## *HS4 Route Mk2*

As noted above, the Mk1A changes have, except around Reading, little impact on the routes proposed (but great impact on the service plans). HS4 is the big exception amongst the Mk1A plans of the various routes, in that, because of the superb alignments of the existing GWML, the incorporation of sections of classic route in HS4 is very extensive. (Indeed, HS4 and the GWML are best considered together as an integrated set of routes.) Mk1A may thus be viewed as a cut-down version of the original proposals, much quicker and very much less expensive to implement, but nonetheless delivering a large proportion of the advantages of those proposals. (However, it must be admitted that the estimated journey times for the Plymouth service are disappointing at Mk1A. Accordingly, an extra, fast service from Paddington to Plymouth, and on to Cornwall, via the Berks & Hants line, is proposed at Mk1A, which does give satisfactory journey times. This will not need to be carried forward to Mk2.)

HS4 Mk2 is therefore proposed, which is effectively the reinstatement of those parts of the original plans removed for Mk1A, on a piecemeal basis, as and when the build-up of traffic on Mk1A makes extra capacity desirable. If this is implemented in full, we end up with the original design, except for the change of route around Reading, but having enjoyed years of service from the MK1A version in the interim.

The current document thus retains all the original content, but rearranged to emphasise what is Mk1A and what is now Mk2.

This all comes about from abandoning GC-gauge. The original plans required so much new infrastructure, because it all had to be to GC-gauge. Building to UK loading gauge instead allows so much existing, first rate infrastructure to be incorporated.

## *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 makes 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, gives my own thoughts of what such a network should look like. Naturally, this involves 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 HS4, the route from London to South Wales, and, in association with HS7, to Bristol and the West Country.

The general route is decided on strategic and business grounds, thus which locations are to be served. This gives the general alignment, at a very high, superficial level. I plan the detailed route using Ordnance Survey maps, taking careful account of the shape of the landscape, from the contours. I note the location of all significant infrastructure, thus tunnels (generally, over about a quarter mile in length), viaducts and major river crossings. I simultaneously make a virtual tour of the route from my computer, via satellite maps, to make sure, as far as possible, that there is actually room for my lines where I wish to put them, and that, for example, a housing estate has not materialised in an inconvenient location since the (paper) map was published. (I understand that the images used by satellite maps are up to a maximum of three years old, so not exactly real-time, but still pretty good.) I make a great effort to avoid any housing. I’m blasé about demolishing warehouses – after all, all that’s required there is to build a (better) new one nearby, and the owners will be very happy. But I regard demolishing housing (or even getting very close to it) as a thoroughly bad idea; people just don’t like it, and I understand their feelings. If ever I must (knowingly) propose to demolish housing, I will point out the fact. These considerations apply in extreme form when, as in the present case, the route starts from London. Here there are simply no free routes available. The design has to follow an existing route, widened where there is space for it, (this involves searching, via satellite maps at a high magnification, where there is space to fit extra tracks within the existing alignment or where there is adjoining space to widen the alignment,) with recourse to tunnelling where there isn’t.

In general I try to follow an existing alignment, railway or motorway, (or, very occasionally, of a non-motorway road,) if there is a suitable one available, simply because it’s there already, in the right place, with good layout, (somebody else has done all the hard work!) and, except in very few places, there’s plenty of room available adjacent to it. (In this context, motorways are particularly helpful. Nobody wants to live close to one, so house builders don’t develop new estates at the side of motorways, leaving plenty of space available for new railways.) Also, most importantly, it minimises disruption, and so I (optimistically, perhaps) expect it to maximise public support and minimise opposition.

When I am following an existing alignment, (this obviously includes taking over the route and trackbed of a former railway, now closed,) I don’t generally worry about gradients, confident that they will be well within the capacity of HS trains. Very occasionally, when following a motorway or (more likely) non-

motorway road, the contour pattern suggests that there might be a problem, and then I do check the gradients, (and state what these are, in the route plan). When I am obliged to design a completely new alignment, then the gradient profile forms part of the design, and will be stated, (unless, from the contours, it's obviously essentially level, or undulating but with no significant underlying change of level). The present article contains no gradients, as the new alignments – Shinfield to Reading Parkway and on to Didcot, Cardiff to Cardiff (Rhoose) Airport, and, (at Mk2) Bristol Parkway to Cardiff and Cardiff Airport to Swansea – are essentially level, or, for the approaches to the HS Severn Tunnel, whatever gradient we choose, affecting merely the length of the approach.








I believe that this approach gives a route which in general terms is practicable and satisfies the requirements, though obviously a lot of work, especially detailed surveying on the ground, would be needed to turn it into an implementable design. Specifically, I can say nothing about cuttings and embankments, though I may note that a particular piece of landscape is strongly undulating, so cuttings and embankments will be required. Also, when I take the route alongside an existing railway or motorway alignment, I don't attempt to design it in any detail around (particularly motorway) junctions, although I do note on which side it runs, and wherever it is necessary to cross over to the other side.

## *The Maps*

Naturally, the chosen route must be illustrated with maps. I briefly describe the route, 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 HS4, including sections of other routes over which HS4's services run. These overall maps come at the end of the 'Route' description, and also show HS4'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:

standard colours		
HS1		yellow R/G/B 255/242/0 255/242/0
HS2		dark red R/G/B 136/0/21
HS3		red R/G/B 237/28/36
HS4		brown R/G/B 185/122/87
HS5		rose R/G/B 255/174/201
HS6		indigo R/G/B 63/72/204
HS7		green R/G/B 34/177/76
HS8		turquoise R/G/B 0/162/232
HS9		purple R/G/B 163/73/164
HS10		lavender R/G/B 200/191/231
HS11		orange R/G/B 255/127/39
HS12		gray 50% R/G/B 127/127/127
custom colours		
HS13		true blue R/G/B 0/0/255
HS14		light blue R/G/B 0/192/255
HS13		pure green R/G/B 0/255/0

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 HS4.

## *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.

HS4 services fall into three categories:

1. Long(er) Distance, limited stop, Ultra-High-Speed services to the South West, Bristol and South Wales, non-stop between LHR Interchange and Bristol Parkway (or Swindon, at Mk1A).
2. High Speed Metro on that part of the route east of Bristol and Cardiff, stopping at all stations.
3. Services involving significant distances on classic routes, termed HS-Classic (what were formerly called classic-compatible, but with the abandonment of GC-gauge, **all** services are now in effect classic compatible). The service to Plymouth and Cornwall counts as both UHS and HS-C.

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.



Reading Parkway has non-stop lines through the centre of the layout, and Swindon has (at Mk2) a tunnel under the station, but all the other HS4 (and HS7) stations are served by all services, so don't need overtaking/avoiding lines. At the end(s) of a route, the traffic density may not be sufficient to warrant this level of provision, so a single island platform (or two single platforms within some other arrangement) would suffice; this is the case with HS4 west of Cardiff (and HS7 south of Bristol) – but see Appendix E concerning Cardiff Airport.

The point of insisting on two platforms in each direction is **either** to enable cross-platform interchange between different services, (both HS or HS and RM,) **or** to maximise capacity, (especially when all services stop at the station,) by allowing a second train to arrive at the station before the preceding train has departed. (It also promotes resilience, if a failing train can make it at least as far as the next station, to be taken out of service.) Note that Bristol Parkway is an example of the former type, with Interchange between HS4 and HS7.

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. I used to take 16tph as the maximum throughput, but, following new capacity calculations (expounded in appendix B of the article 'Same Speed Railways', which do include the effect of junctions,) I am now considerably more relaxed on this, and will countenance loadings of up to 24tph. (The quoted appendix contains my justification for this choice.) As stated above, the service plans deliberately quote maximum frequencies; initial services will almost certainly be to lower frequencies.

In the present article, the southern half of HS7, the NE-SW route, must also be considered, as HS4 and HS7 are intimately linked in providing the overall service pattern. The final result (as far ahead as these plans consider) is a combined service of 8tph to both Cardiff and Bristol, and 4tph beyond those, with cross-platform interchange at Bristol Parkway HS, so both London and Birmingham (strictly Birmingham **Interchange**) have 4tph direct to both Cardiff and Bristol, and another 4tph with one cross-platform change, giving exactly the same journey time. (Indeed London has an extra 2tph to each, but these are HS-Classic services, intended primarily for the benefit of intermediate locations.)

Two types of services are contained in the plans, those featuring High Speed trains: Ultra High Speed (UHS – limited stop), HS Metro (all stations) and HS-C, which all travel on HS4 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).

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. (In this context it is worth pointing out that if, when HS lines come into service, the current ridiculous and illogical franchising system is still in operation, it will be necessary to include the corresponding classic route(s) in the same franchise as a HS route, with a strict contractual obligation on the franchisee to ensure close integration of HS and classic services. It certainly won't happen otherwise.)

## *Estimated Journey Times*

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

The Mk2 route brings significant accelerations. Estimates are produced for a series of Mk2 versions, with increasing amounts of new infrastructure (restored from Mk1). This would in practice be implemented piecemeal, as extra capacity became needed.

## *HS4 Route – Introduction and Assumptions*

Except for those parts of the route between Shinfield, Reading Parkway and Didcot, and between Cardiff and Cardiff Airport, and, at Mk2, between the HS Severn Tunnel eastern approach and Cardiff HS, and between Ewenny South Junction and Swansea HS, HS4 closely follows existing alignments, railway and motorway.

HS4's long-term HS-C services begin at Paddington, and the UHS and HS Metro services are all cross-London inter-regional, via Euston Cross. This is an underground station with 6 platforms, (with passive provision for 8,) located on a west-east axis between Euston and St. Pancras / King's Cross stations, the precise location, horizontal position and depth, to be determined by the configuration of all the other tunnels in that area. Euston Cross and its approaches are shared by HS4 and HS2, HS services only. It is a through station; nothing starts or terminates there. HS4's services via Euston Cross continue into East Anglia and North Kent, as routes HS11 and HS12. Appendix A gives full details of Euston Cross and its approaches. Full details of the services on HS11/HS12 are contained in the article 'HS East Anglia and N. Kent Routes and Service Plans (HS11 and HS12)'. Summary details of the inter-regional services are in the service plans of the present article.

The maximum speed for HS4 is 360kph (225mph) between LHR Interchange and Foxhall HS Junction, immediately west of Didcot station. At Mk2 this extends all the way to Bristol Parkway (via the tunnel under Swindon), and on to Swansea.

HS4 is based closely on the classic GW alignment, certainly in the sections from Paddington to Langley and west of Didcot. This really is a no-brainer; it's by far the best alignment available. For the section from Langley to west of Maidenhead, a less than ideal alignment along the M4 was originally chosen in the Mk1 plans, but this has now been replaced by a tunnel under Slough (which was suggested as an alternative at Mk1). The original plan for the section from Maidenhead to Didcot, was very tricky, passing to the north of Reading, in tunnel under Caversham, then along the Thames, avoiding the Goring Gap by a tunnel under Streatley. This section has been completely replaced, joining the M4 alignment immediately after the Slough tunnel, and following this to Shinfield, where it diverges to the new Reading Parkway station. It then passes round the west side of Reading, partly in tunnel, and re-joins the Mk1 alignment after Streatley. From Didcot westwards, as far as Bristol Parkway, HS4 is again based closely on the classic alignment; this could hardly be improved on in any significant respect.

At Mk1A, HS4 actually takes over the GWML, with quadrupling, between Foxhall HS Junction, immediately west of Didcot, and Wootton Bassett Junction, with upgrading to 225kph, 140mph, to Bristol Parkway, (of just the fast lines, as far as Wootton Bassett). The existing GWML is used from Bristol Parkway to Temple Meads and South Wales (assumed line speed 160kph, 100mph). A new section is provided between Cardiff and Cardiff (Rhoose) Airport; then joining the Vale of Glamorgan line to reach Bridgend. At Mk2, a new alignment is provided from Bristol Parkway to Cardiff, and, for the rest of the route beyond Cardiff Airport and Swansea, existing alignments are followed. Note that, even at Mk1A, the main line is now the Vale of Glamorgan route, upgraded as necessary. The original main line between Cardiff and Bridgend is thus now just for local and metro traffic, and for freight.

HS4 serves Heathrow Airport, but not directly. Heathrow is served on the Paddington – Reading axis by an express shuttle service of at least 6tph, serving Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange (the former Langley, extensively redeveloped) – Slough. HS4 services will all stop at Old Oak Common and LHR Interchange. Beyond Slough the Heathrow Shuttle splits into three half-hourly services:

- Slough – Reading – Thatcham – Newbury – Kintbury – Hungerford – Bedwyn – Pewsey
- Slough – Maidenhead – Twyford – Reading – Tilehurst – Pangbourne – Goring & Streatley – Cholsey – Didcot – Oxford
- Slough – Reading – Didcot (for stations to Oxford) – Wantage Road – Swindon

I envisage that the existing Heathrow Express service would be subsumed within the Shuttle. This of course belongs (as does the railway itself between Airport Junction and Terminal 5) to the Airport holding company, so some advanced bargaining would doubtless be required before the necessary deal was concluded.

The Airport Shuttle incorporates all local services on the GWML, and of course connects with Crossrail (at Reading, Maidenhead, Slough, LHR Interchange, Old Oak Common and Paddington). At a later date, three further Shuttle routes will be added. Further details are in Appendix C. Full details of all classic services on the GWML and associated routes is contained in the article ‘GWML Service Plans’; these are structured to correspond exactly with the service plans in the current article.

## *HS4 Route – Junctions*

There are various junctions on the route of HS4, (though surprisingly few,) enabling connections with other HS and classic routes. These are identified in the description of the route, but it is convenient to list them all here, together with their map references and identifying remarks, since, when discussing the capacity/loading of different sections of route, the end points are usually junctions (occasionally stations). The junction names are my own suggestions.

One feature of the following list needs clarification: certain of the junctions are given as east / west. These are all the junctions of station loops, and are where the services stopping at that station diverge from / re-join the main line. Their location is precisely defined by the acceleration / deceleration rates of the trains. (They decelerate more rapidly than they accelerate, which is just as well.) The junction where a service re-joins the main line, having accelerated up to the turnout limit speed from a stop is thus further from the station than the junction where trains diverge, at the turnout limit speed, and decelerate to standing at the platform. (**Very** roughly the acceleration distance is about 50% greater than the stopping distance.) Note

that this **only** applies to station loops; for a genuine route junction, where one route diverges from another, and no station is involved, junctions in both directions can be and usually are at the same location.

- Old Oak Common East TQ220821 HS4 diverges from HS2, with which it has shared tracks from Euston Cross, immediately east of Old Oak Common (Low Level). (The given location is **approximate** – it's underground!)
- Old Oak Common West TQ213818 Allows classic-compatible services from Paddington to join HS4, west of Old Oak Common station. (The given location is **approximate** – it's underground!)
- Thimble Farm SU875777 Connection to GWML diverges from HS4 immediately after Slough tunnel.
- Shottesbrooke Farm SU842785 Connection from Thimble Farm Junction joins fast lines of GWML. Used for regular services only at Service Plan 0, but retained for operational convenience (in particular, for engineering work closures of the section of HS4 around Reading).
- Shinfield SU760695 (East) Eastbound services, having stopped at Reading Parkway, join / re-join the main line.
- SU731689 (West) Westbound services stopping at Reading Parkway diverge from the main line.
- Three Mile Cross SU713682 Link to Grazeley Junction on classic route diverges from (station loop tracks of) HS4.
- Grazeley SU693675 South-facing connections from HS4, east and west, join the classic Reading – Basingstoke route, immediately north of Reading Parkway HL station.
- Burghfield SU673683 Link from Grazeley Junction joins (station loop tracks of) HS4.
- Theale East SU665704 Immediately before Theale Junction (East), below, on **both** station loop lines, a connection to Wilts & Berks line diverges.
- Theale HS SU655711 Connection from HS4 joins Wilts & Berks, 1km east of Theale station.
- Theale SU664705 (East) Eastbound services stopping at Reading Parkway diverge from the main line.
- SU644724 (West) Westbound services, having stopped at Reading Parkway, join / re-join the main line.
- Aston SU572857 (South) Southbound services, having stopped at Didcot Parkway, or coming from Oxford, avoiding Didcot, join / re-join the main line.
- SU553875 (North) Northbound services stopping at Didcot Parkway, or proceeding to Oxford, avoiding Didcot, diverge from the main line.
- Foxhall HS SU522907 Route junction, of HS4 and the GWML, immediately west of Didcot station. At Mk1A it is also a track junction, since HS4 merges with the GWML fast tracks at this point. At Mk2 it is no longer a track junction, the additional HS4 tracks following the south side of the GWML alignment west from here.
- Magic Roundabout SU218874 (East) Eastbound services having stopped at Swindon re-join the main line.

(Mk2 only)	SU188867	(West) Westbound services stopping at Swindon diverge from the main line.
• Mannington (Mk2 only)	SU117828	(East) Eastbound services stopping at Swindon diverge from the main line.
	SU088819	(West) Westbound services having stopped at Swindon re-join the main line.
• Wapley Common (Mk2 only)	ST710806	HS4 diverges from classic tracks just east of Westerleigh Junction. Thereafter it has its own tracks (as does HS7, joining at Coalpit Heath,) all the way to Bristol Parkway HS.
• Coalpit Heath (Mk2 only)	ST685803	HS7 joins alignment of HS4. Note that this is a route junction, but not a track junction. The track junctions are at Pye Corner, next. (Note that, at Mk1A, the existing GWML infrastructure, and thus the existing Westerleigh Junction, is used.)
• Pye Corner (Mk2 only)	ST635797	Connects HS4 and HS7 with each other (with totally non-conflicting junctions), just east of Bristol Parkway
• Brentry (Mk2 only)	ST572797	HS7 South to West chord joins HS4 (enables services between West Country and South Wales, without reversal at Bristol Parkway).
• Aberthaw	ST032673	HS4 joins alignment of Vale of Glamorgan line. (Used by all services at Mk1A, retained for operational flexibility at Mk2.)
• Ewenny South (Mk2 only)	SS902763	Connection to classic Vale of Glamorgan line diverges from HS4. (Allows HS services to reach Bridgend.)
• Ewenny North (Mk2 only)	SS900774	Connection from HS4 joins Vale of Glamorgan line, before Bridgend.

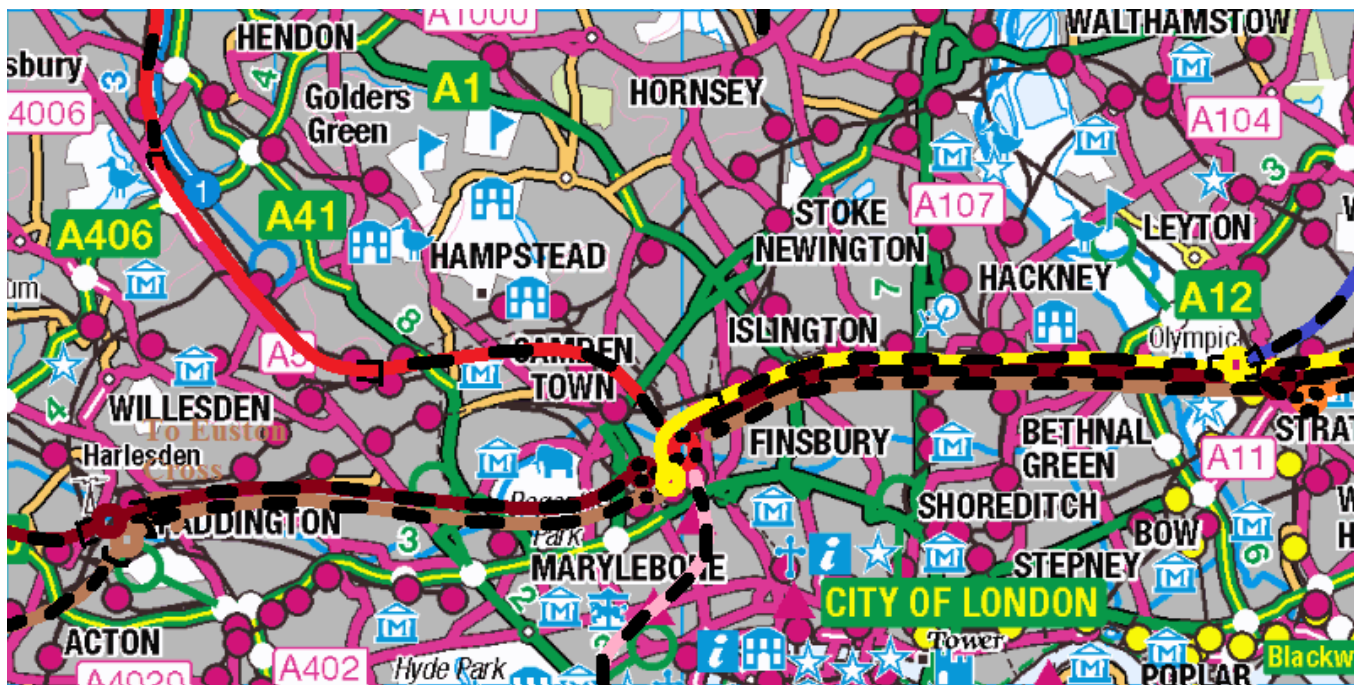
Magic Roundabout. Mannington, Brentry and Ewenny South and North Junctions are Mk2 only. For Shinfield East and Theale West Junctions, the precision of join / re-join is that services on the HS4 main line, having stopped at Reading Parkway LL, **re-join** the main line, but services off the classic line from Basingstoke, having stopped at Reading Parkway HL, **join** the main line. Refer to appendix I for the track layout at Reading Parkway, which should clarify this.

There are various other links between HS4 and classic lines, for operational purposes and not intended for regular services, so not relevant in the present context.

There now follows the definition of the actual route, in several logical sections. Note that the maps illustrate the Mk2 state. At Mk1A, HS4 does not have an alignment independent of the GWML, over most of the route west of Didcot.

## 1. Euston Cross – Reading Parkway

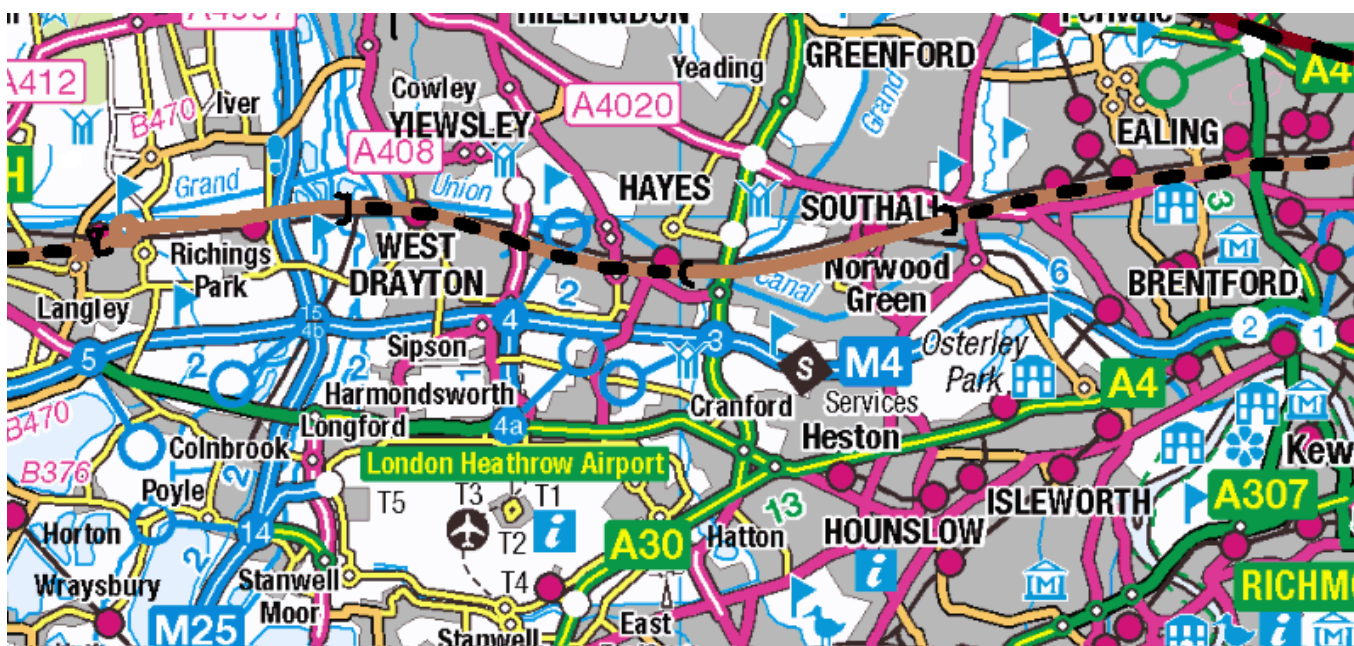
HS4 arrives at Old Oak Common East Junction (TQ220821) in tunnel from Euston Cross, which it shares with HS2; it diverges from HS2 and has its own platforms at Old Oak Common (Low Level). It is joined at Old Oak Common West Junction (TQ213818) by a connection from the classic route, from Paddington, used by the classic-compatible services, which serve platforms at Old Oak Common (Ground Level). Appendix A clarifies.



1.1 Euston Cross – Old Oak Common

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It follows the classic GW alignment, still in tunnel, for a further 5 miles to just after the bridge over the Uxbridge Road, at TQ140801. This section is fully built up on both sides of the alignment, with no practical scope for surface running. For nearly 3 miles from that point to just before Hayes and Harlington station (TQ100794), it follows the south side of the GW alignment. This area includes a lot of sidings, some warehousing, and actually some open land; it may be necessary to demolish the odd warehouse, but



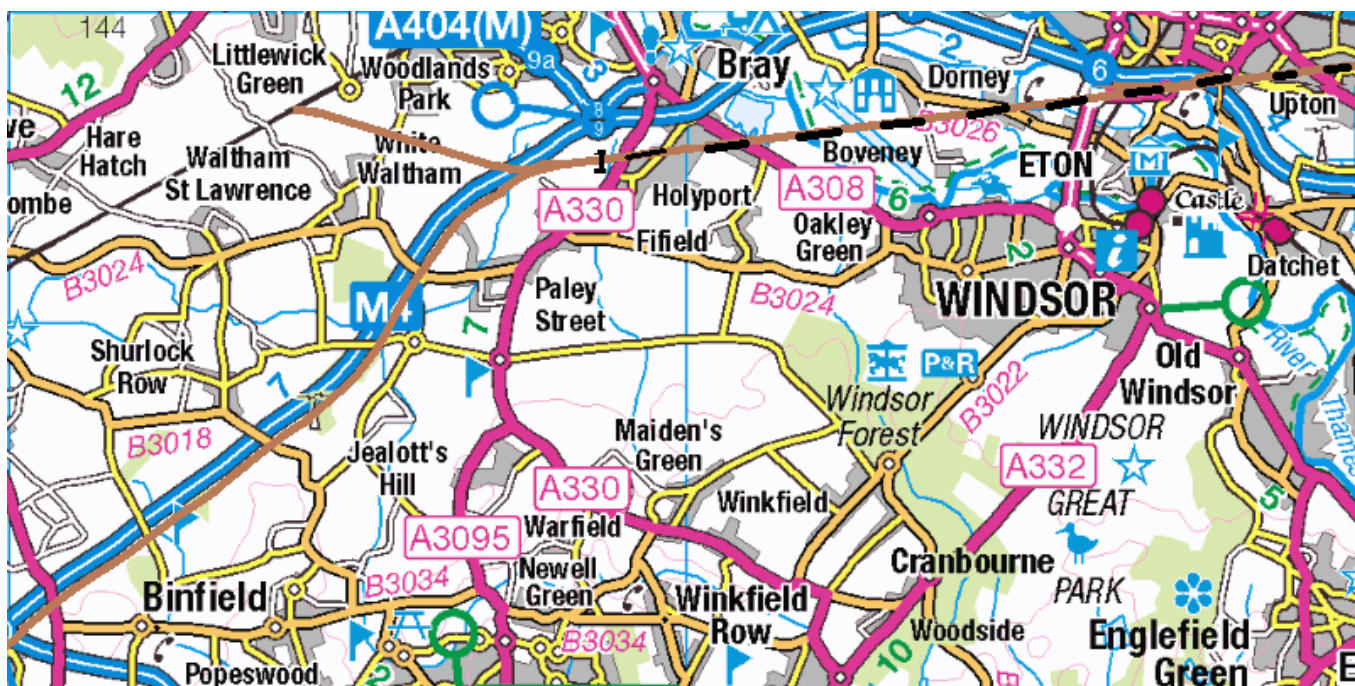
1.2 Ealing – Langley

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no housing is threatened. It will be necessary to provide a flyover or diveunder at TQ129799 for the Brentford freight branch, if that is still in service.

HS4 enters a 2½ mile tunnel from Hayes and Harlington to just past West Drayton (TQ055801), emerging on the north side of the GW alignment and following that to LHR Interchange / Langley station. I imagine the new station will be slightly – 200 yds, say – to the east of the present one (TQ017798), as there's more room for expansion there. HS4 will have two island platforms, on the north side of the alignment; there will likewise be two island platforms for the classic fast lines, and thus the shuttle service, and a single island platform in the middle for Crossrail, with extensive lifts, escalators and perhaps even travelators to facilitate interchange).



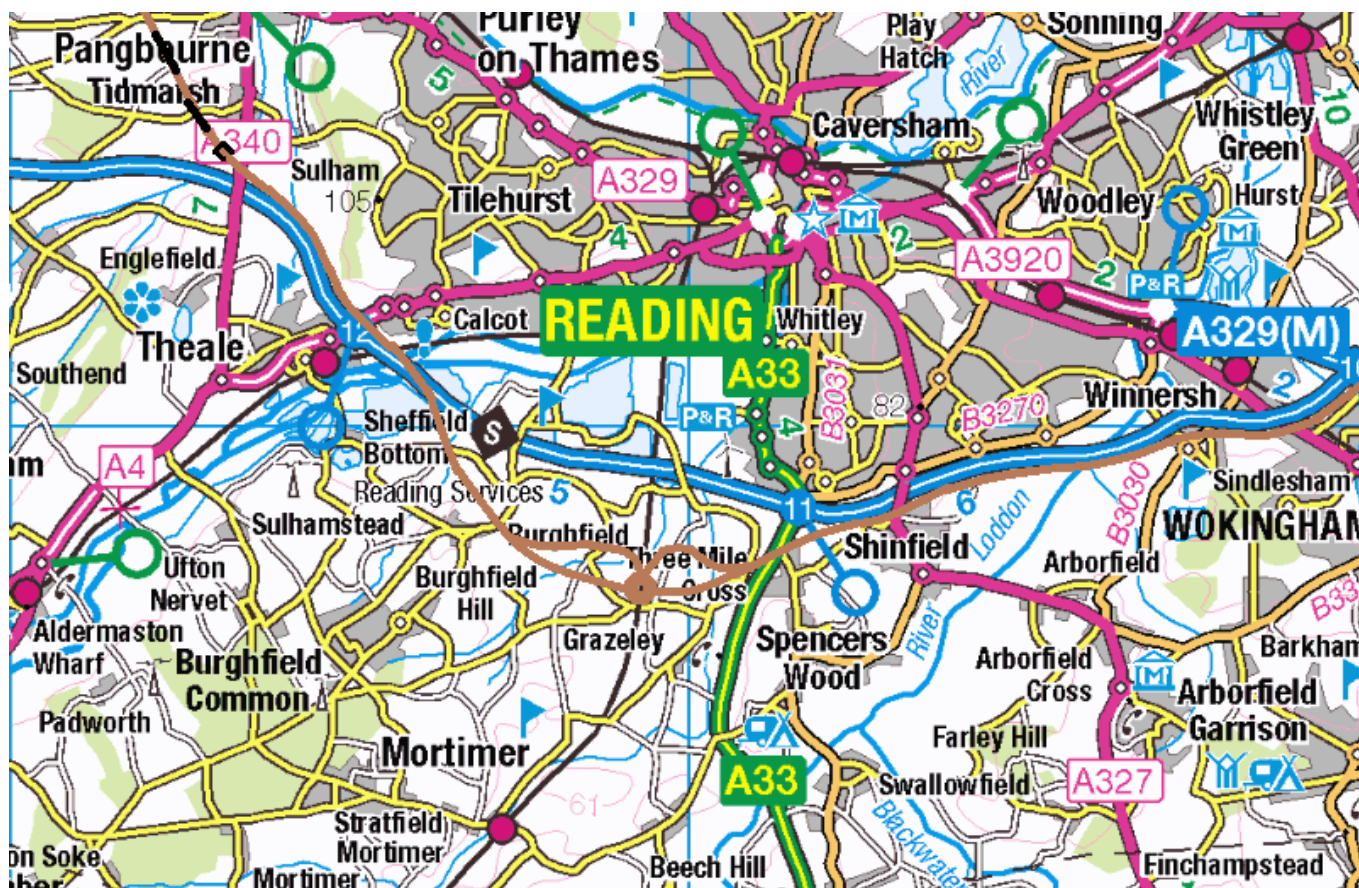
1.3 Slough – Binfield

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From LHR Interchange, there is no room for expansion on either side of the GW alignment until west of Maidenhead without extensive demolition of housing. The best available alignment is chosen, which involves a 9 mile tunnel, between LHR Interchange, immediately west of the station, and SU888779, just south of the M4 junction 8/9. Shortly after, at SU875777, it joins the south side of the M4 alignment, and follows this for the next several miles to Three Mile Cross, south of Reading. A link to the GWML diverges at SU875777, Thimble Farm Junction, and joins the fast lines of the GWML at SU842785, Shottesbrook Farm Junction. (This link to the GWML, but without a junction there, was part of the original design. It's worth leaving in place, since the two routes are so close at this point, for operational convenience, although little regular, long-term traffic is currently foreseen.)

HS4 follows the south side of the M4 until SU720685, just before Three Mile Cross, where it diverges, curving gently to the south and then to the west, to arrive at the new Reading Parkway LL station, at SU693674, just north of Poundgreen, where the classic route from Reading to Basingstoke crosses over it, with HL platforms. The HS4 station has through lines in the centre of the alignment, to allow for non-stop traffic. The station loops are, westbound, between Shinfield West Junction, at SU731689, and Theale West Junction, at SU644724, and, eastbound, between Theale East Junction, at SU664706, and Shinfield East Junction, at SU760695. Southbound connections to the classic line diverge from the station loop lines, at Three Mile Cross Junction, SU713682, and Burghfield Junction, SU673683, curving round to the south to join the classic route (both of them) at Grazeley Junction, SU693675, just north of the HL

station, enabling service to/from Basingstoke and points south and west thereof. It sounds a little involved, describing it, but appendix I has a track diagram, which should elucidate matters.



1.4/2.1 Wokingham– Tidmarsh

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## 2. *Reading Parkway – Didcot*

HS4 curves gently to the north after Reading Parkway LL, and re-joins the M4 at SU667802, just past Reading Services, immediately crossing to the north side of the alignment, and following that until SU635734, just before the A340 crosses it. It diverges to the north and enters a 5½ mile tunnel at SU630740, emerging at SU589820, just north of Streatley, indeed, the tunnel endpoint is the same as that of the tunnel under Streatley in the original Mk1 design. From here on, the original design is resumed. (A connection is provided to the Berks and Hants line 1km east of Theale station, to enable a UHS Paddington – Penzance service at Mk1A. This is replaced at Mk2 by a HS Metro service of all stations to Plymouth only, as the HS4 times to Plymouth via Bristol Parkway are then comparable or better.)

[One point worth mentioning, which should please the environmentalists (if they are capable of feeling pleasure, that is,) is that the revised design around Reading no longer encroaches on the Thames **at all**. Another point is that I **am** sure that the Readingites will be delighted to get an extra new station. (Reading was to some extent a loser in the original Mk1 design.) I regret that it's a Parkway type, but there's no avoiding this. There is no way that Reading station could be extended yet again, after its recent rebuilding, and in any case, a fundamental requirement of HS4 is to provide relief to the overloaded GWML east of Didcot, better still east of Swindon.]

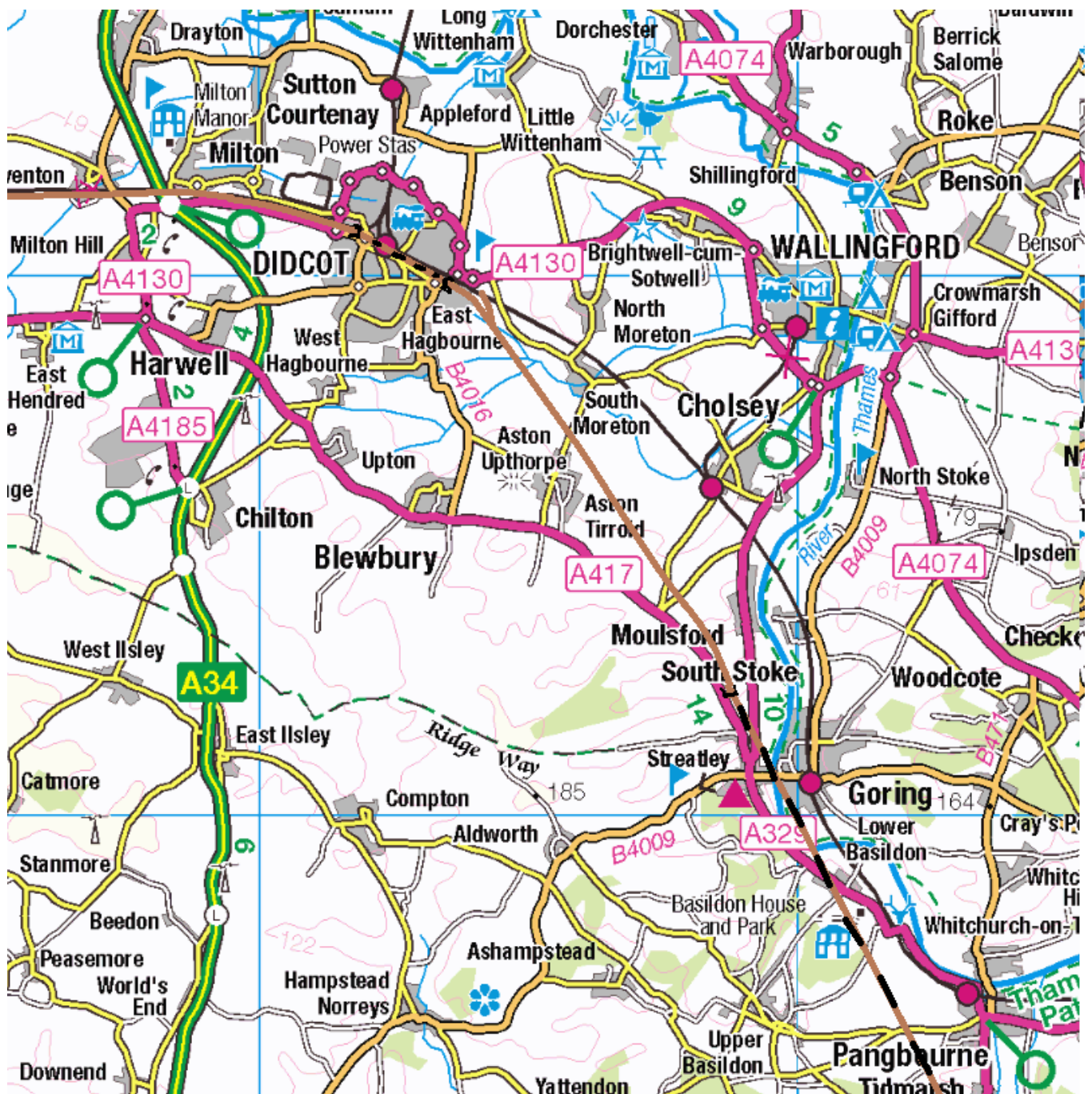
HS4 then runs along the slope of the Berkshire Downs, roughly following the A417 road, passing north of Astons Tirrold and Upthorpe, and approaching Didcot. This is a strongly undulating landscape in the HS4 Route and Service Plans v11.0



southern part, likely to need heavy earthworks. There is a link to the GWML at Aston Junctions, which allow services to call at Didcot Parkway or, actually crosses under the four tracks, to make a connection with the Didcot Station Avoiding Line, to enable services from Southampton and points west thereof to travel to Oxford and the north, with no conflicting movements at Didcot.

HS4 itself tunnels under Didcot station for 1 mile from SU532899 to SU522907, emerging (at Mk2) on the south side of the GW alignment, but, at Mk1A it merges at that point, Foxhall HS Junction, with the fast tracks of the GWML.

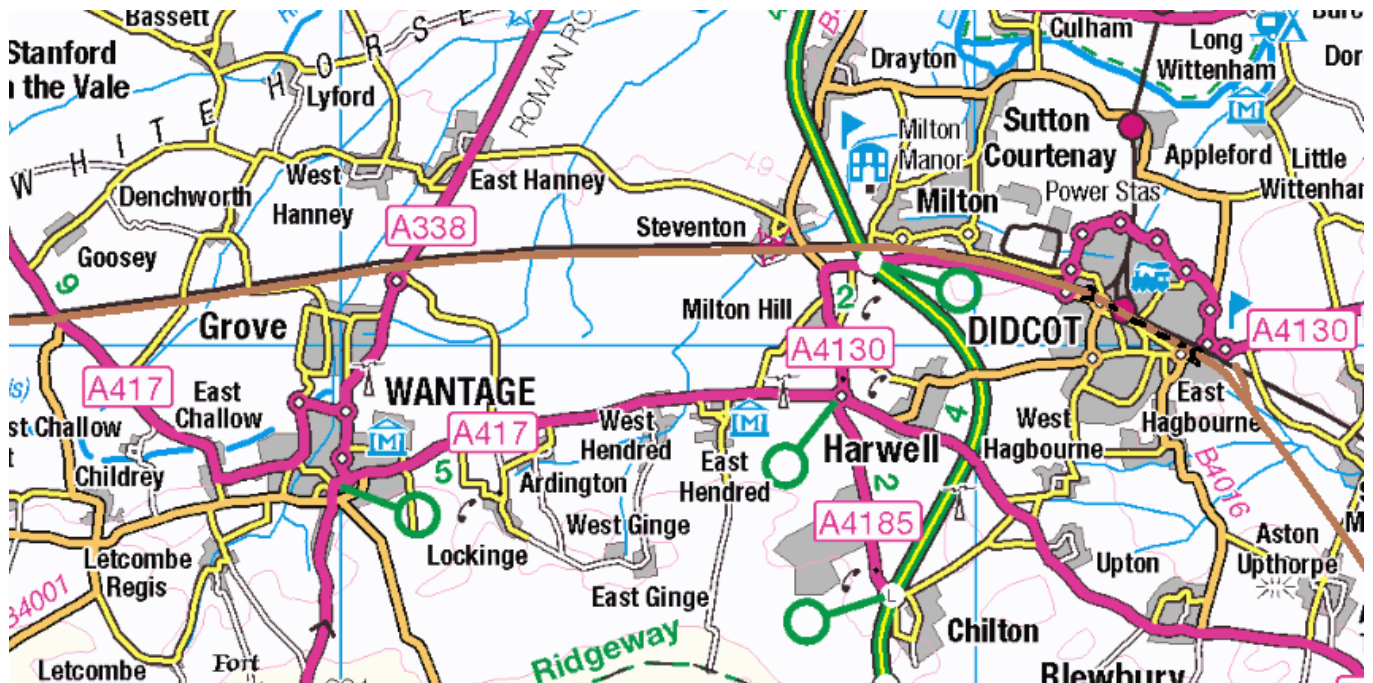
### 3. *Didcot - Swindon*



2.2/3.1 Tidmarsh – Steventon

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At Mk1A, HS4 shares tracks (the fast lines) with the GWML from Foxhall HS Junction to Wootton Bassett Junction, and beyond that to Bristol Parkway. The section between Foxhall HS Junction and Wootton Bassett Junction is widened to four tracks by the addition of a relief track on each side. There is already space for the extra tracks over essentially the whole of this distance, including most of the overbridges. The fast tracks between Foxhall HS Junction and Bristol Parkway are upgraded to 225kph, 140mph, throughout.



3.2 Aston Upthorpe - Challow

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3.3 Challow – Stratton St. Margaret

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At Mk2, the additional HS4 tracks follow the south side of the GW alignment very closely, from Didcot to the approach to Swindon, at SU192869 (just before the famous Magic Roundabout, hence the name of the junction). There is a connection from HS to classic line at this point, to allow stopping services to leave the HS line and enter Swindon station. The HS line enters a 4 mile tunnel under Swindon, emerging at SU132839, on the north side of the GW alignment. There is a connection from classic to HS line at this

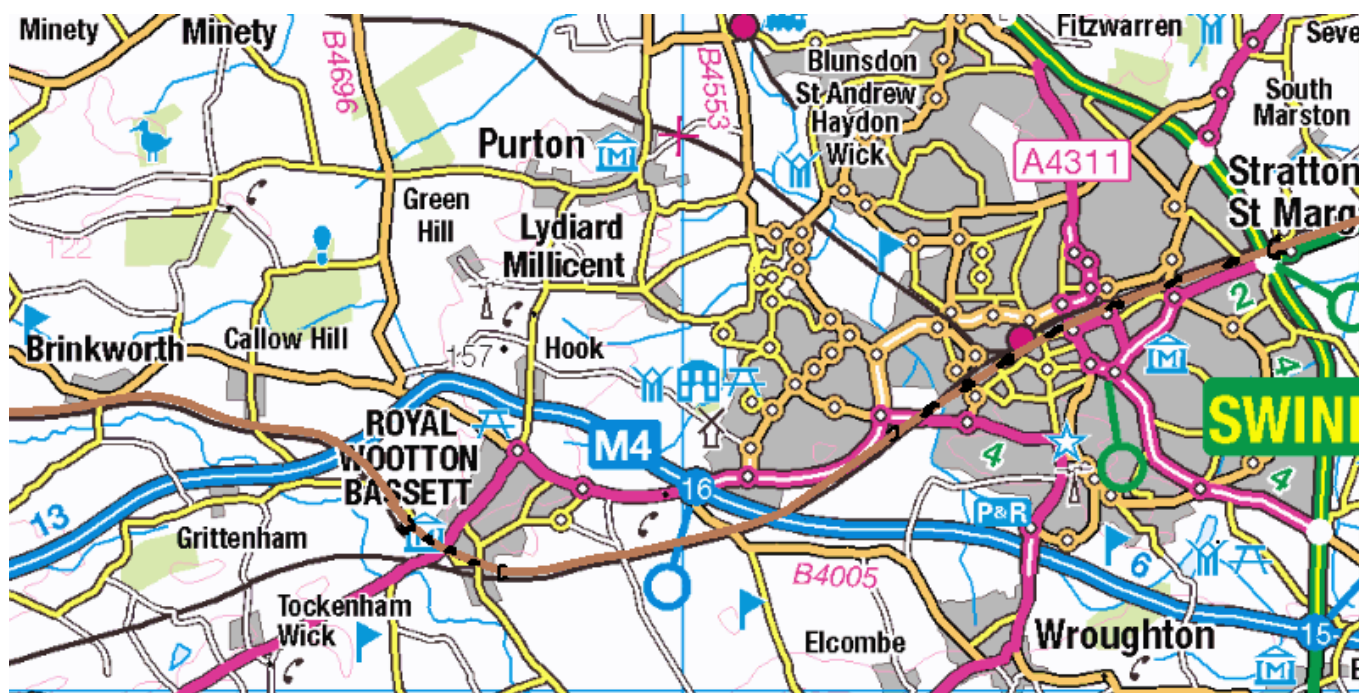


point, Mannington Junction. This allows the HS-C service to Swansea to regain the HS route after serving Swindon (and regain the classic route at Pye Corner Junction, just before Bristol Parkway). The above details do not apply at Mk1A, where HS4 and the GWML share track throughout.

#### 4. *Swindon – Cardiff*

At Mk1a HS4 and the GWML share tracks between Swindon and Cardiff.

At Mk2, HS4 follows the GW alignment very closely (current thinking is that it converts the GWML to HS standards – see appendix H,) from Swindon to Bristol Parkway. It tunnels for 1 mile under Royal Wootton Bassett, from SU073817 to SU058824, also easing the curvature there.



4.1 Swindon – Brinkworth

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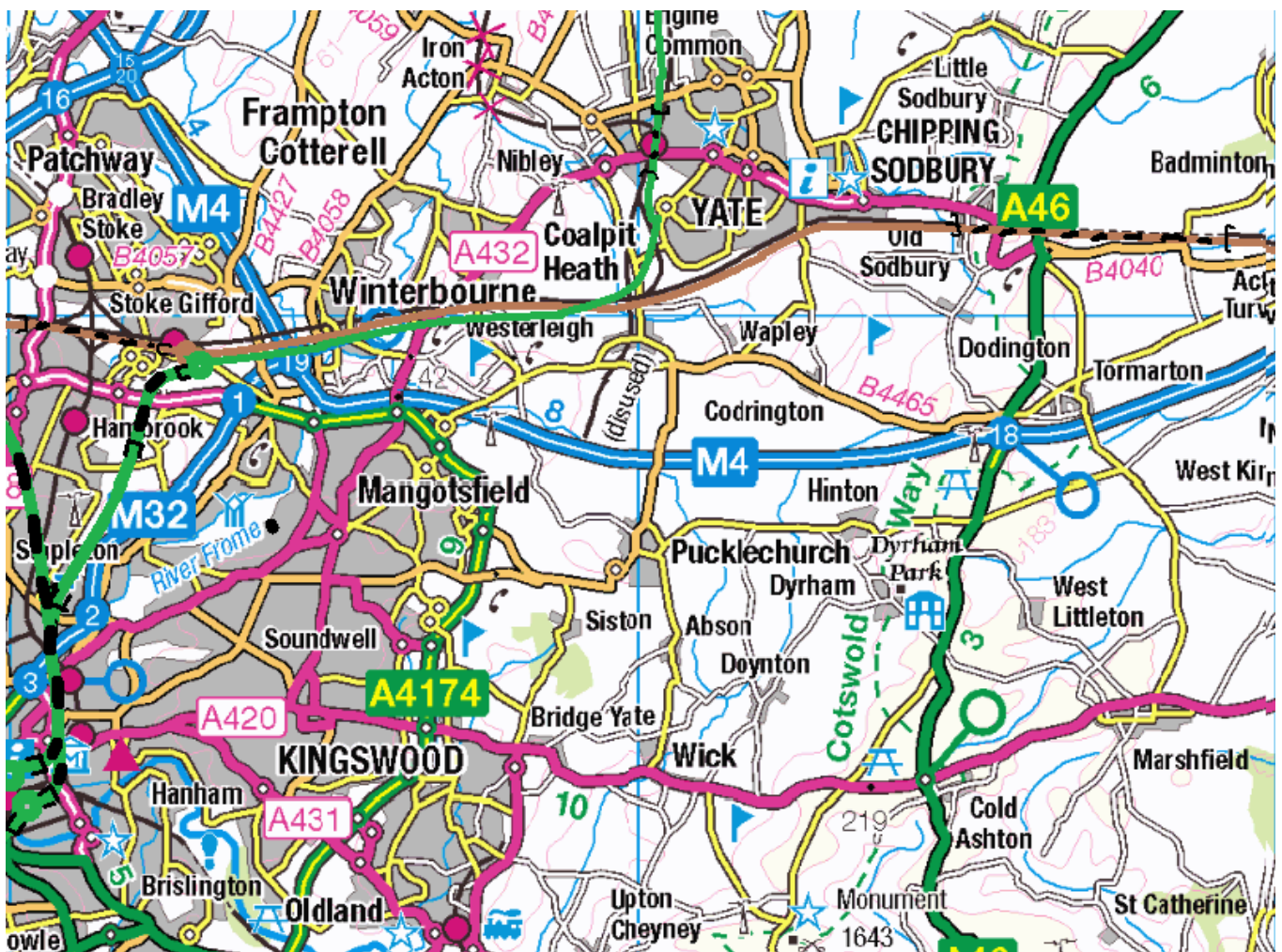
Just before the site of Badminton station (ST810813) the HS route crosses over to the south side of the classic route, since the north side of the alignment is built-up in Chipping Sodbury, but unobstructed on the south side. (Indeed the south side of the GW alignment is clear all the way to Bristol Parkway station.) There is space at Bristol Parkway for two more island platforms on the south side; the odd warehouse may need to be demolished. At Mk1A, the existing station is used, but with an extra, westbound platform.

HS7 joins HS4 at ST685803, just before Coalpit Heath, the westbound line crossing under HS4 and running along the south side. HS4 and HS7 run together, paired by direction, either side of the GWML as a 6-track section, (so I suppose that really means tripled by direction,) thence to Bristol Parkway. Note that this is a route junction, but not a track junction. Non-conflicting junctions between HS4 and HS7 tracks are provided at Pye Corner Junction, just east of Bristol Parkway. These arrangements allow trains from either London or the W. Midlands to be routed on the appropriate line to Bristol Parkway HS for either South Wales or Bristol/SW and for trains from South Wales or Bristol/SW, on the appropriate line from Bristol Parkway HS to be routed to either London or the Midlands. Appendix H describes suitable layouts around Bristol Parkway, at Mk1A and Mk2. It also considers the argument for an upgrade of the classic route to HS standards between Swindon and Bristol Parkway, as the now-preferred alternative to new-build.



4.2 Little Somerford – Badminton

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4.3 Chipping Sodbury – Bristol

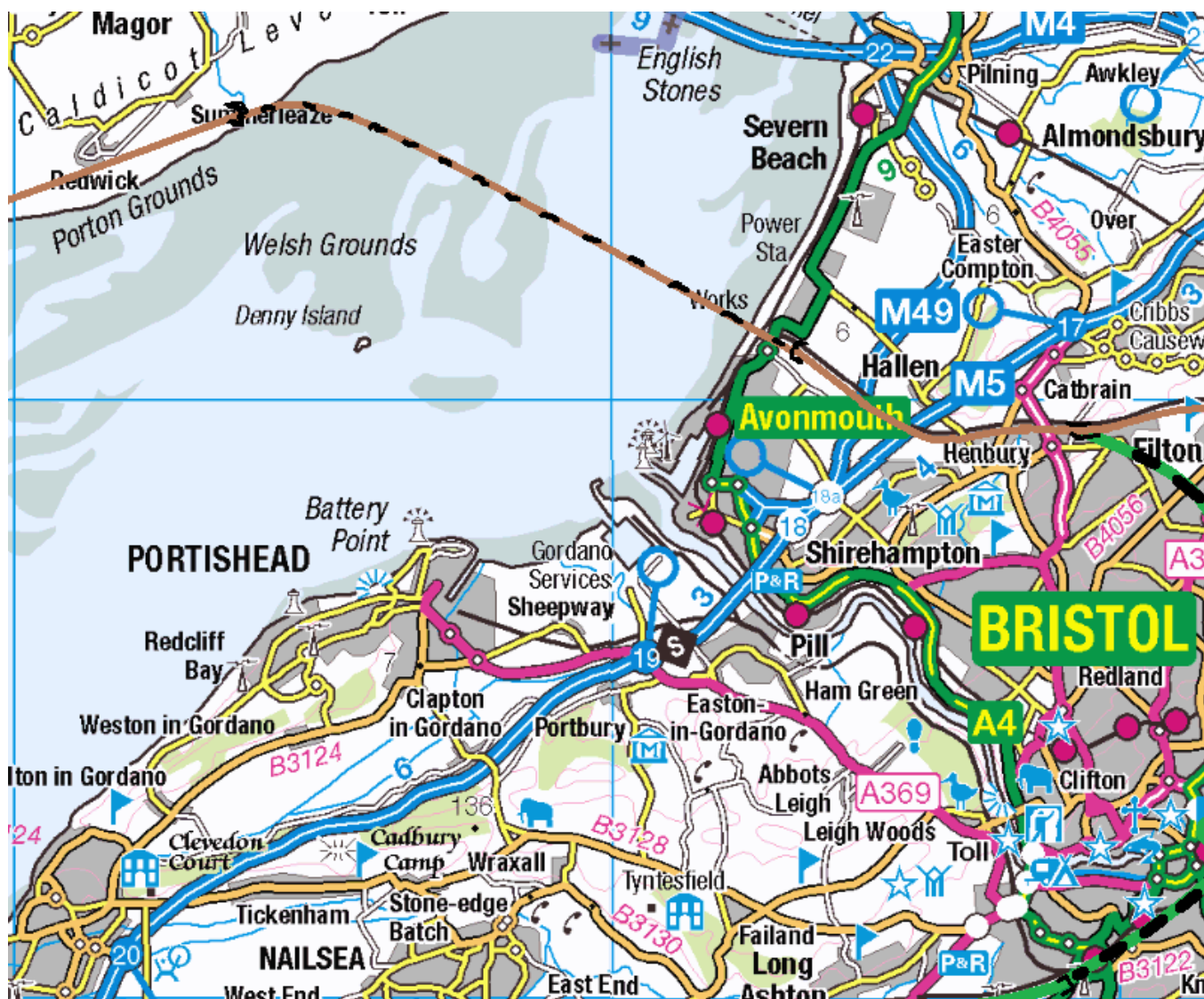
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The original idea was to have the track junctions at Coalpit Heath, but that would require the fastest junction trackwork available, and also impose time penalties on the services. By relocating the track



junctions westwards, to where speed will already have been seriously reduced, in readiness for the Bristol Parkway stop, perfectly ordinary pointwork is suitable, and no time penalties are incurred..

The point of all this (anticipating the Service Plan) is that trains from London serve S. Wales and Bristol/SW alternately, and trains from the W. Midlands serve Bristol/SW and S. Wales alternately. These services make cross-platform connections at Bristol Parkway HS. There are no conflicting movements between the two groups. In the ideal situation, trains from London and the W. Midlands approach Bristol Parkway HS at full line speed, arriving simultaneously, and likewise departing simultaneously, whatever their destination. Trains to Bristol/SW always depart from platform 5 (the most southerly), and those to S. Wales always depart from platform 6. (Refer to the Mk2 track layout in appendix H.)



4.4 Bristol – Magor

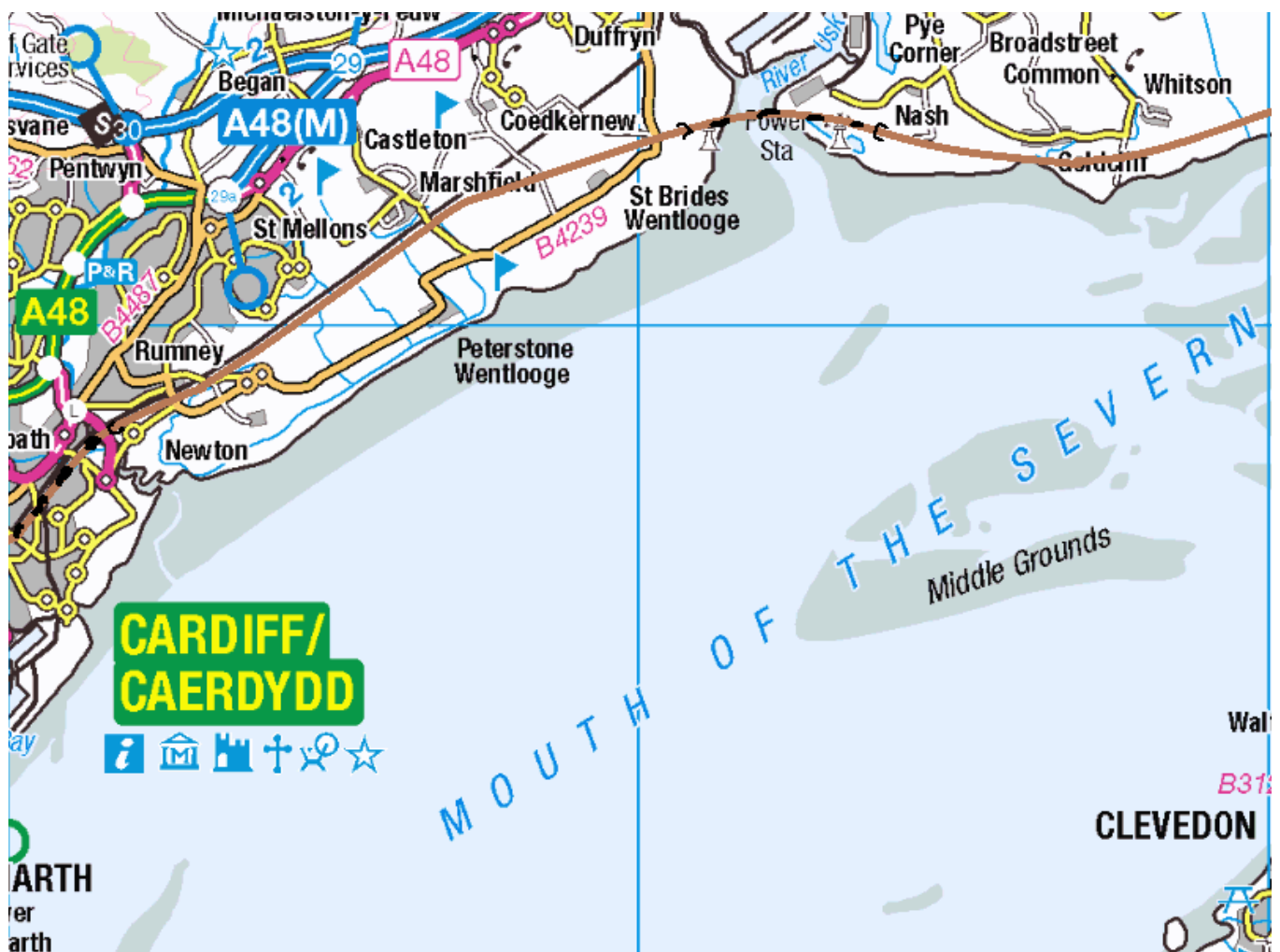
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Likewise trains from S. Wales and Bristol/SW approach Bristol Parkway HS at full line speed, ideally arriving simultaneously, likewise departing simultaneously. But trains **from** S. Wales always arrive at platform 8 and those from Bristol/SW always arrive at platform 7. The sorting by destination is done post hoc, at Coalpit Heath. (I would have liked to have eastbound trains also sorted by destination, but there simply isn't room for (half of a) Pye Corner-type junction west of Bristol Parkway.)

Immediately west of Bristol Parkway, HS4 and HS7 diverge, and HS4 enters a tunnel to avoid the classic route junctions. It enters a 1.3 mile tunnel at ST622797 and emerges at ST602800, alongside the Hallen Marsh line. This it follows to the entrance to the 6 mile Severn Tunnel at ST530810. On this section, at

Brentry Junction, ST572797, the HS7 chord from Stadium Junction joins, enabling services between the West Country and South Wales, without reversal at Bristol Parkway. HS4 emerges from the new Severn Tunnel at Magor Pill (ST440850). HS4 tunnels under the Usk estuary between ST335832 and ST305833, joining the alignment of the South Wales railway at Marshfield. It follows this alignment all the way to the Cardiff HS station, immediately to the south of Central station, in tunnel between ST215785 and the station itself.

The situation is similar at Mk1A, except that only the existing 2 tracks are used: HS4 and HS7 both share tracks with the GWML. They merge at the existing Westerleigh Junction. (Coalpit Heath and Pye Corner junctions, and four new HS tracks, don't come into being until Mk2.) The section between there and Bristol Parkway, (the existing station, extended to 4 platforms, if that hasn't happened already) will require careful scheduling, since south- / west-bound tHS7 services, given the severe speed restriction (30mph) for that route at Westerleigh Junction, must arrive at Bristol Parkway just before the corresponding westbound HS4 service, to make cross-platform connections, with minimum delays.



4.5 Uskmouth – Cardiff

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At Mk1A, services to S.Wales travel via Patchway and the existing Severn Tunnel, and HS7 services to Bristol and the West Country via Filton Abbey Wood. See appendix H for track diagrams at Mk1A and Mk2, which should elucidate the unavoidable complexities.

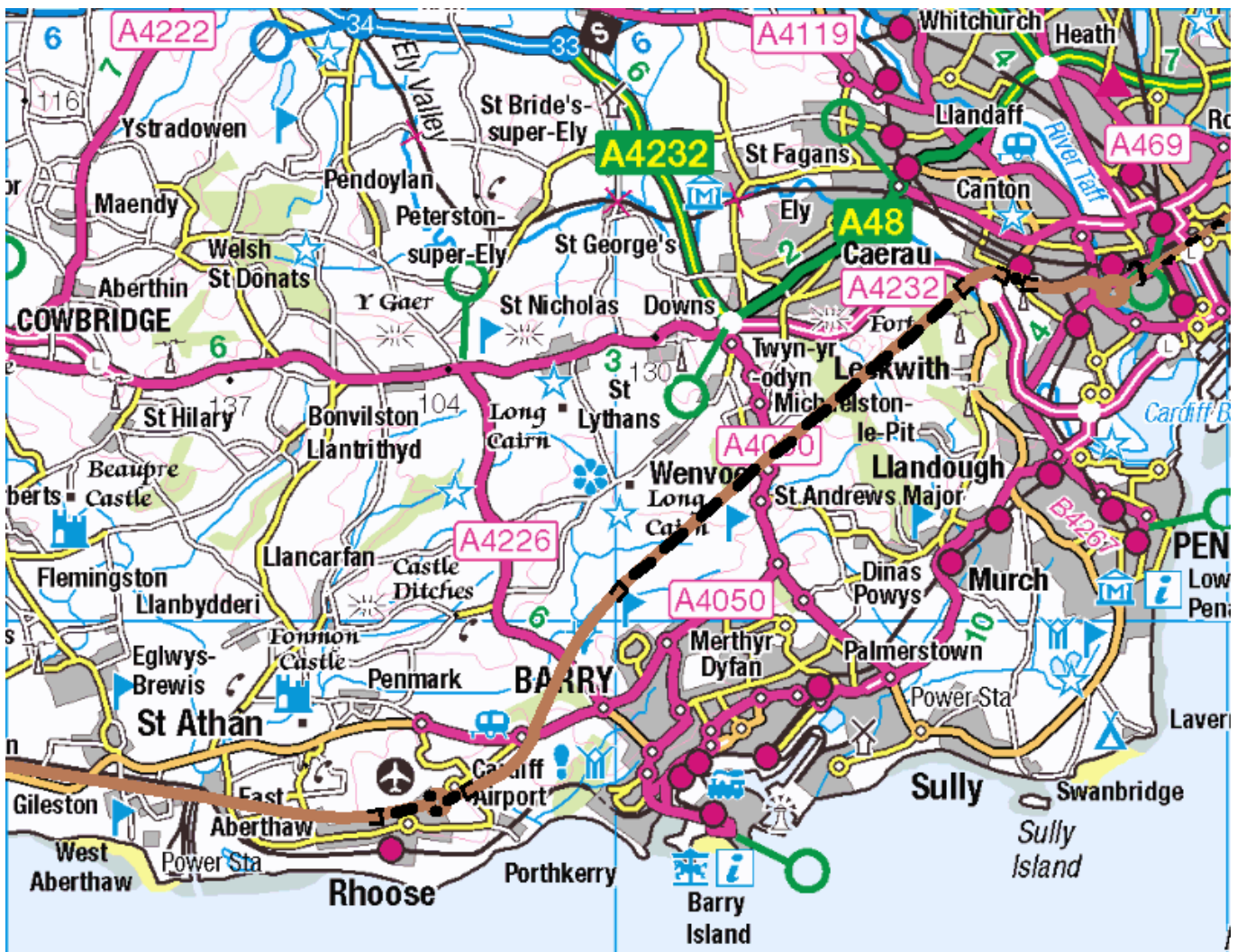


## 5. Cardiff - Swansea

HS4 crosses the Taff adjacent to the existing bridge. Pendyris St. has warehouses / industrial buildings (but also some student housing) on the north side leaving adequate space for the HS tracks – we don't have to worry about getting too close to a warehouse. It climbs to cross the Barry and Penarth line at ST175758, curves round the south side of Canton depot, (with an operational connection thereto, for services terminating at Cardiff), and follows the City Line to just short of Ninian Park, where it enters a short (¼ mile) tunnel at ST168758, curving to the south, and emerging at ST164757, curving round the north west side of the sports stadium, crossing the Ely River at ST156757, finally entering a 5 mile tunnel at ST155756, and emerging at ST105705, a little to the north of Barry. It crosses the A422 at ST090693 and again at ST081680, to arrive at Cardiff (Rhoose) Airport. It passes under the airport in a 1 mile tunnel, between ST075677 and ST059672, with the station under the terminal building, at ST069675.

At Mk1A, the airport route is already in place, with connections from/to the existing Cardiff station (a flyover connection will be needed for eastbound trains). This remains in place at Mk2.

At Mk2, Cardiff HS is immediately to the south of Cardiff General, and is the standard HS two islands.



5.1 Cardiff – Gileston

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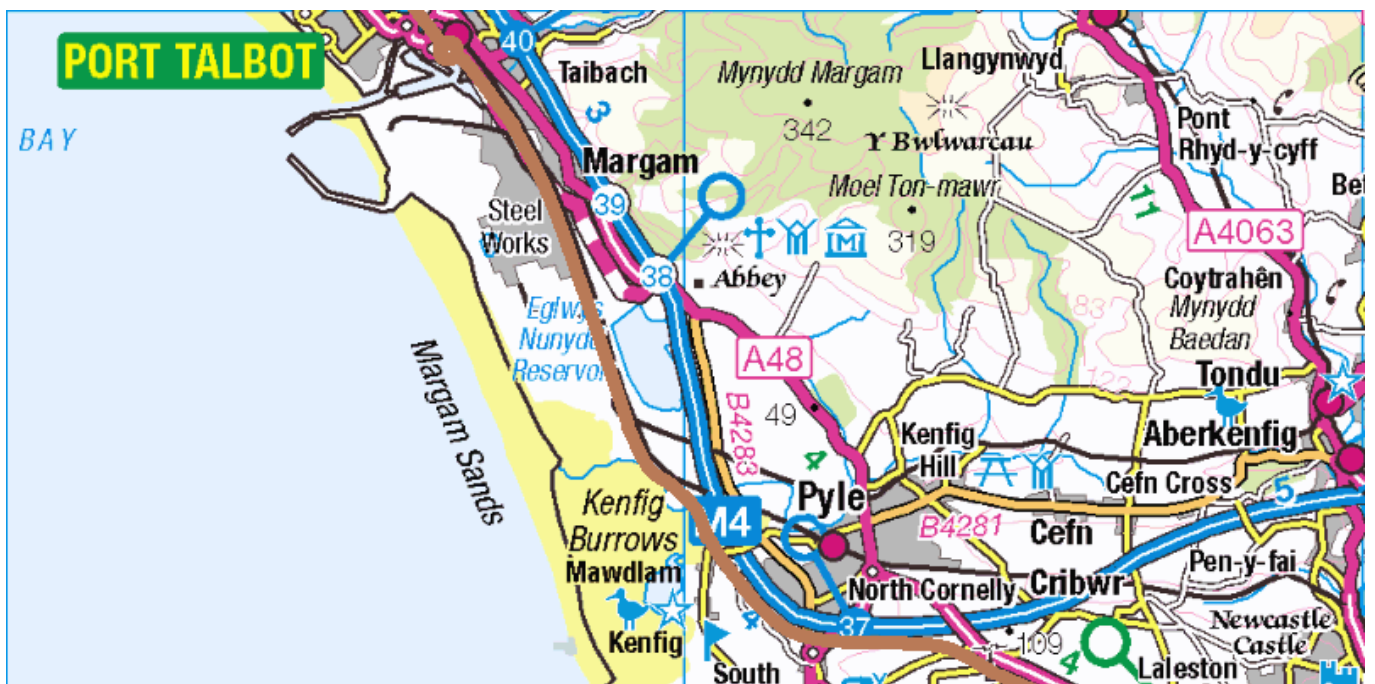
No HS4 services terminate at Cardiff; all are extended at least as far as the airport. Reversing and servicing facilities are provided immediately following the airport tunnel.

HS4 joins the south side of the alignment of the Vale of Glamorgan line, at ST030673, and follows this to just before Llantwit Major, At SS988684 it joins the north side of the B4265, follows this round to the



5.2 Llantwit Major – Bridgend

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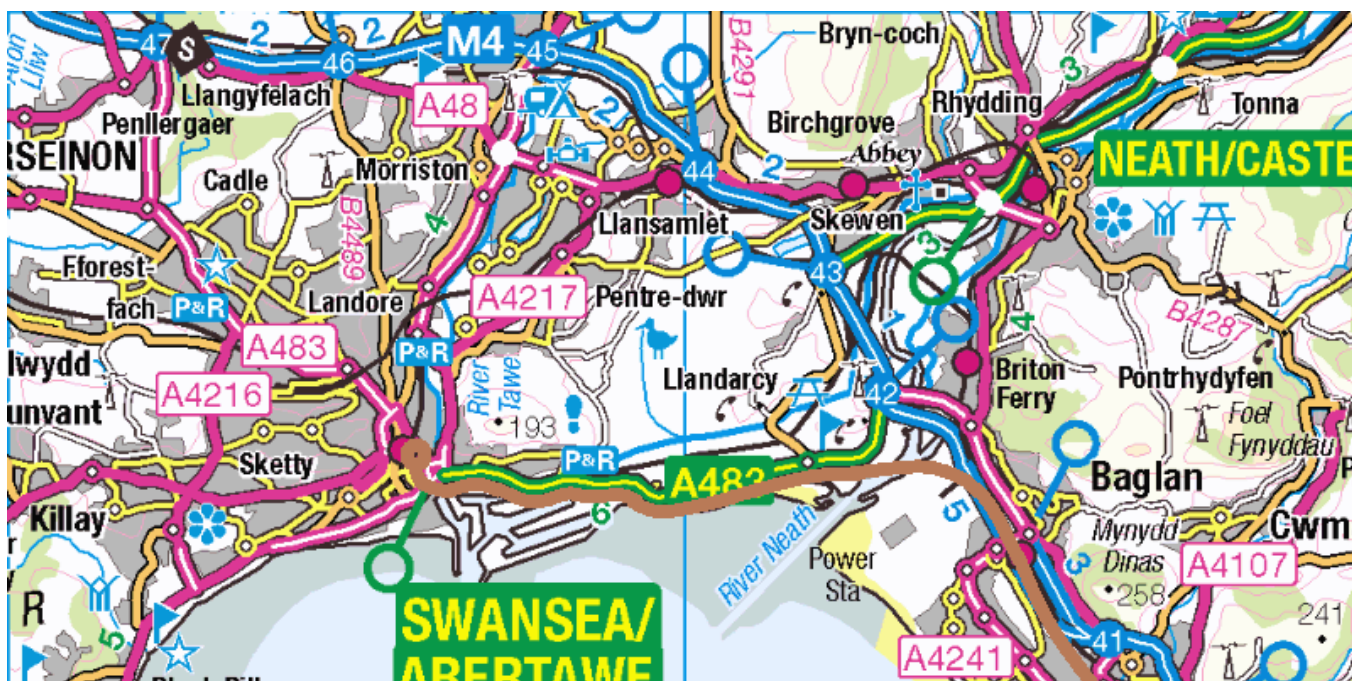
5.3 Laleston – Port Talbot

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north of Llantwit Major as far as SS972696 then continues straight ahead, re-joining the Vale of Glamorgan alignment at SS950718. It crosses to the west side of the alignment at SS941926 then straightens out a major curve between there and SS926739, re-joining the alignment at the latter point. It finally diverges at Ewenny South Junction (SS902763), passing to the south of Bridgend and joining the south side of the A48 at SS878792. It follows this, and later the M4, until it joins the south west side of the South Wales railway at SS802829. This it follows to Port Talbot.

There's plenty of room on the west side of the station for a second island platform. Either HS4 or the classic route (whichever is the more convenient) has one line cross over the other route before the station, and back again afterwards, to enable cross-platform interchange between them. (Interchange will be between HS4 and a local service, providing connections to and from stations between Port Talbot and Swansea.) It continues along the west side of the alignment to SS745926, where it diverges, crossing the M4, then crossing the River Neath at SS730932 and joining the south side of the A483 at SS726934. This it follows to the River Tawe, crossing this at SS661931, possibly reusing the piers of the original railway bridge at this point. It crosses the A4067 then across an area of car parks, to Swansea High St. station. The HS island is parallel to the existing station, on the river side, and the tracks continue north to the servicing/stabling area.



5.4 Baglan – Swansea

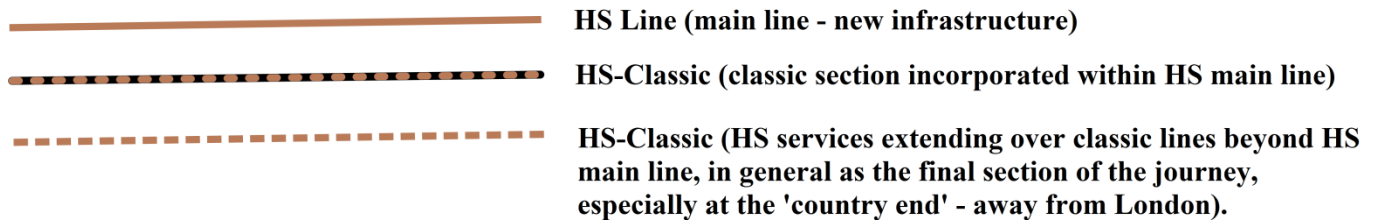
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At Mk1A, HS4 joins and merges with the Vale of Glamorgan line at ST032673, Aberthaw Junction, just past East Aberthaw, and continues with this, rejoining the South Wales line at Bridgend. It continues with the South Wales line all the way to Swansea.

At Mk2, a connection is provided between HS4 and the Vale of Glamorgan line between Ewenny South and North Junctions, SS900771 and SS901778 respectively, to allow the service from Paddington to Swansea, via all the South Wales stations, to reach Bridgend after serving the airport.

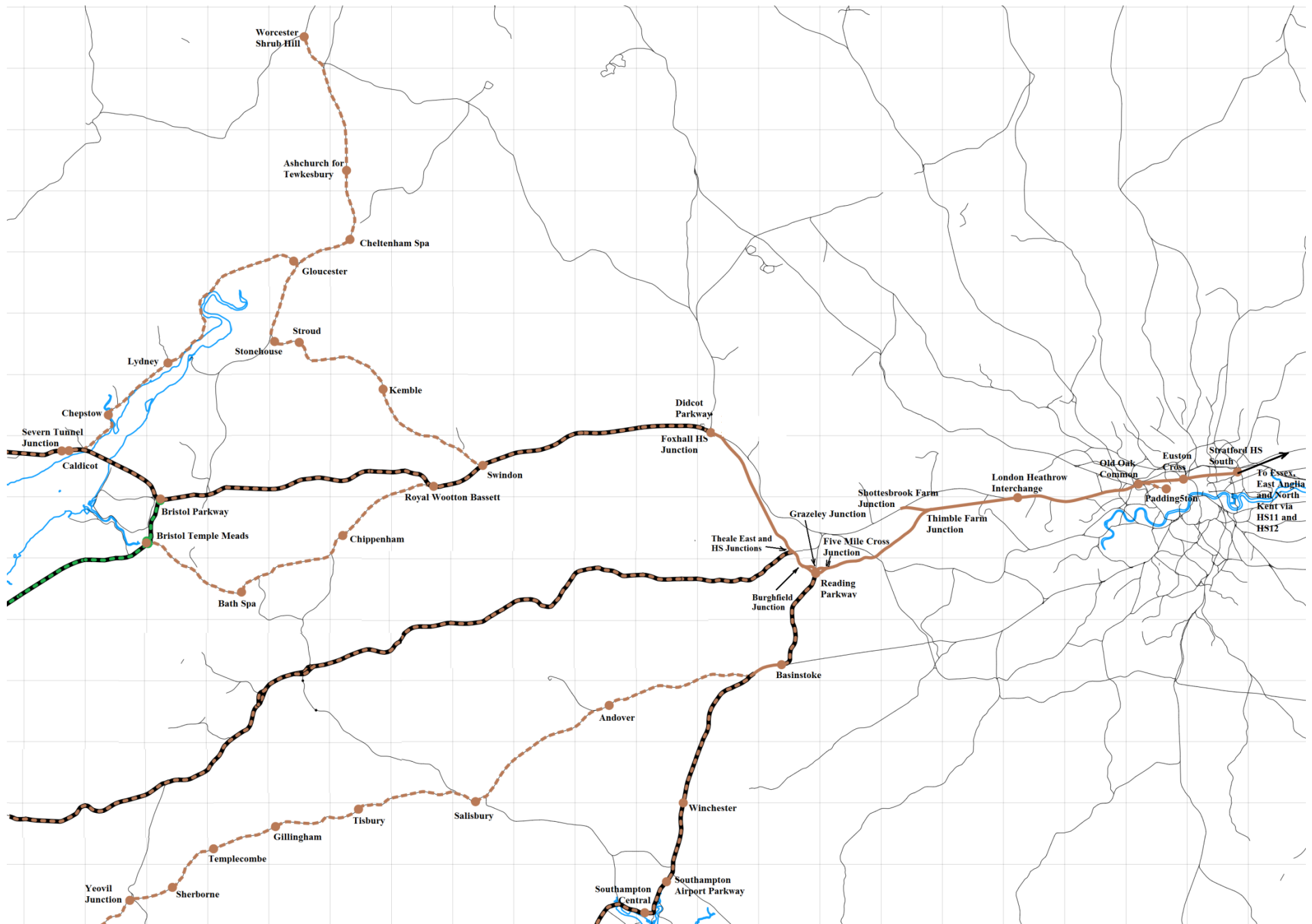
## Overall Maps

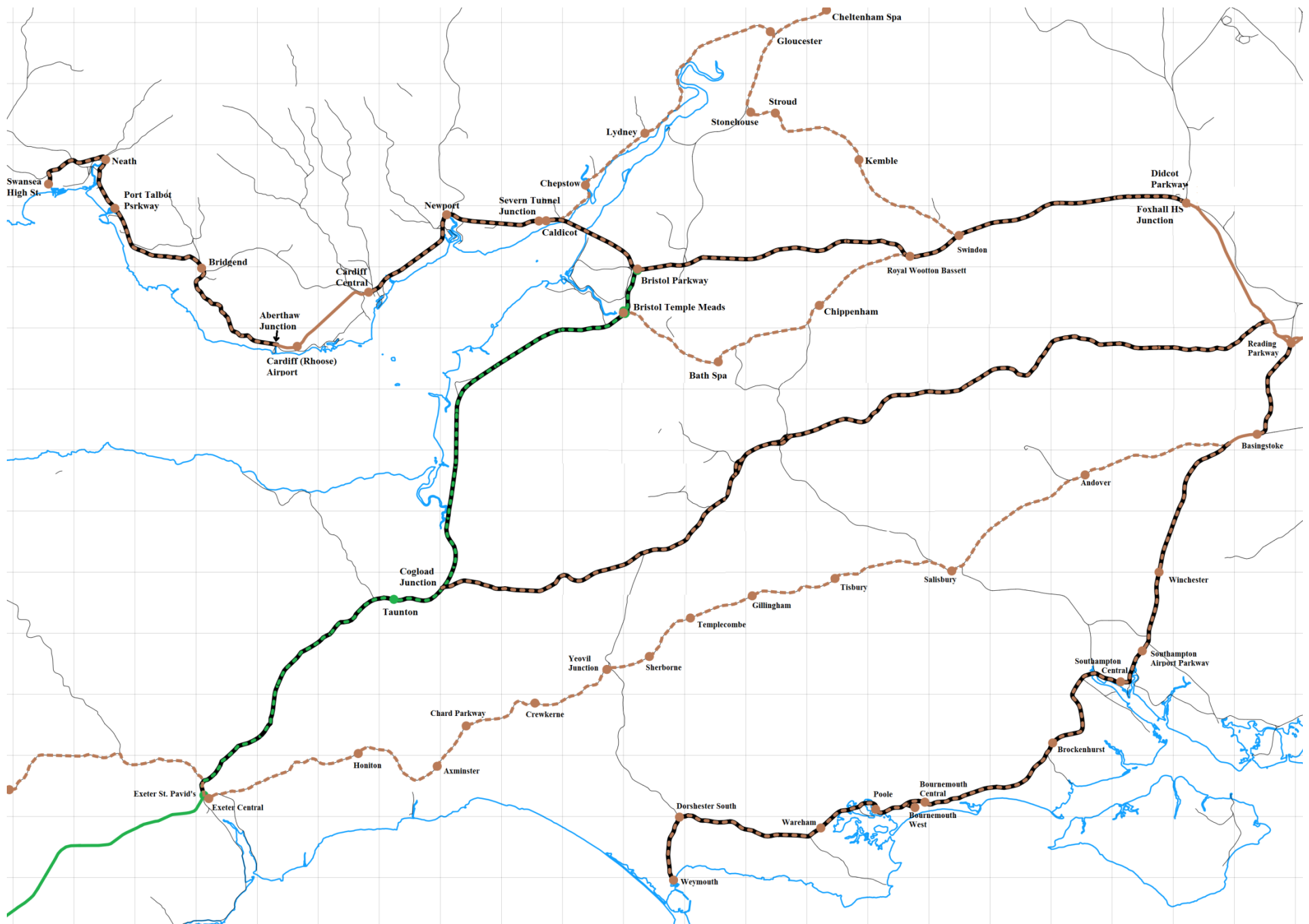
There follow maps of the overall HS4 route (and portions of other associated HS routes used by HS4's services). At Mk1A, those portions of the main lines of HS4 which incorporate sections of classic route, and the sections of HS4's HS-Classic services extending over classic routes beyond the HS4 main lines, are shown as dotted lines, but differently. The following schematic should clarify:

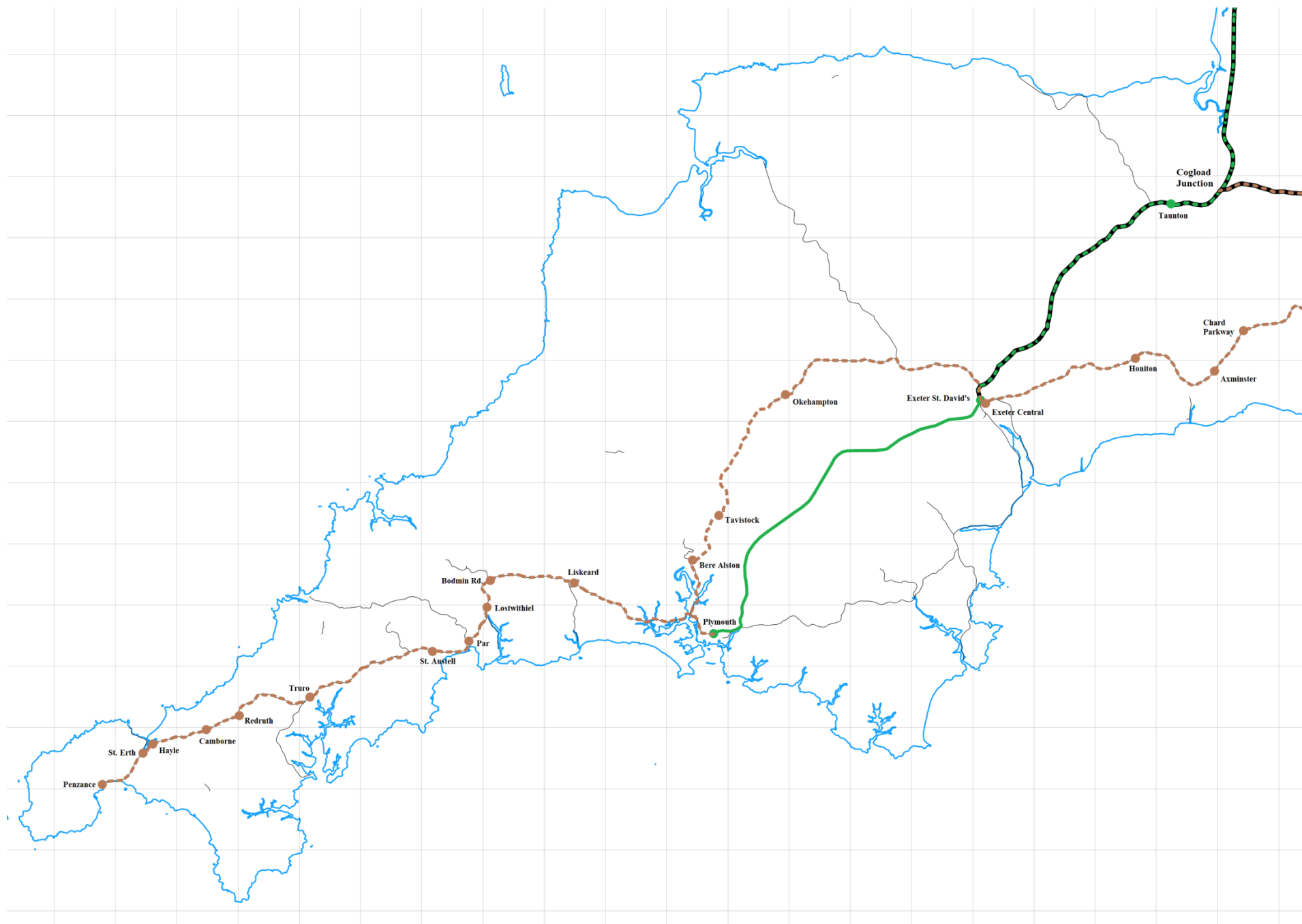


If the full Mk2 is implemented, there will no longer be any sections of classic route incorporated within the HS4 main line; it will all be new infrastructure. Accordingly, the middle of the above line symbols is no longer used. The connections between HS and classic routes will all remain, of course, no longer used by scheduled services, but immensely valuable for operational flexibility, in particular when engineering work is carried out on the main line.

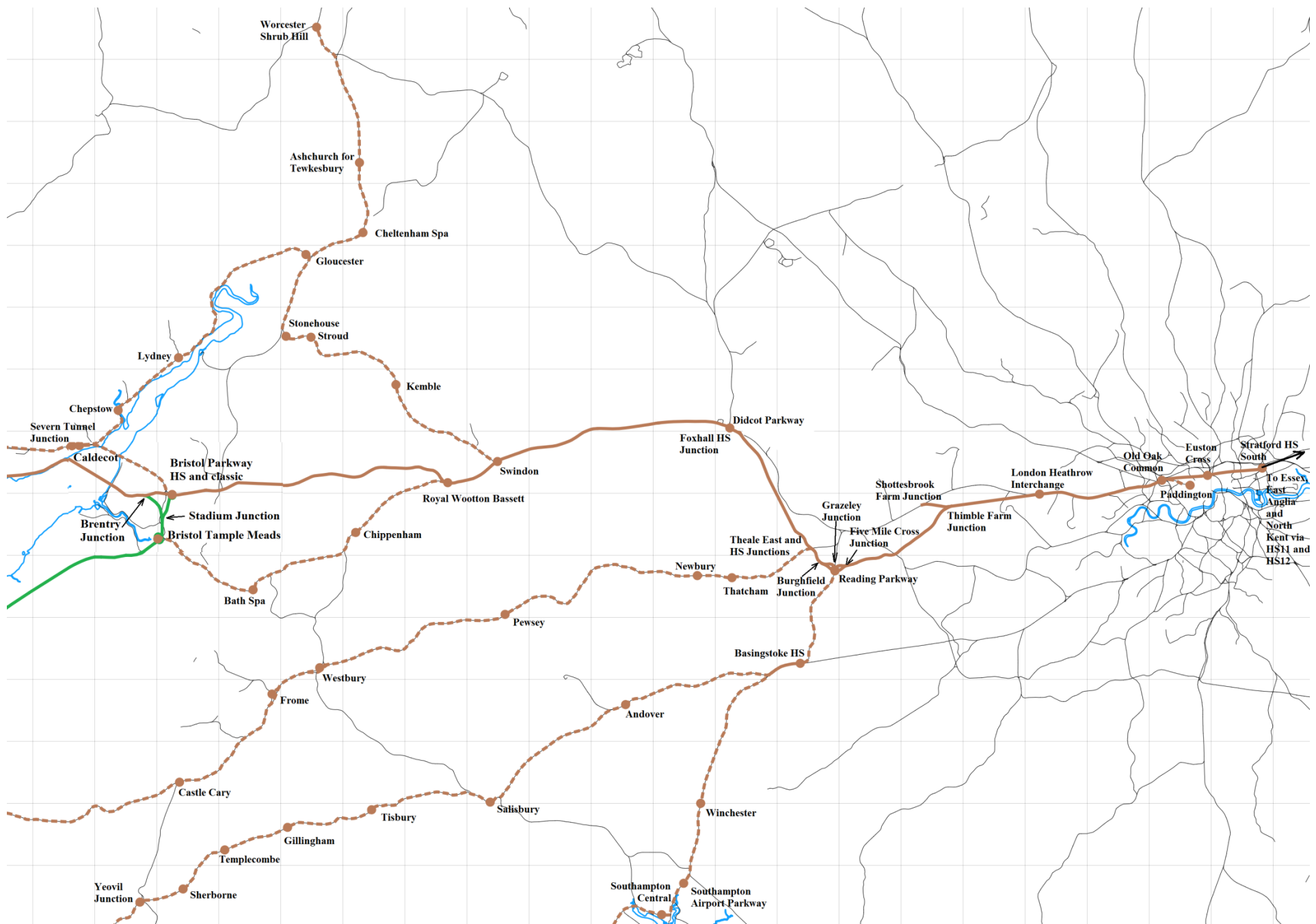
The first three maps show the HS4 routes (east, central and south west sheets) at Mk1A. They show the alignments changed from Mk1, including sections of classic route incorporated into HS4. These are followed by the full Mk2 versions of the same sheets. Finally the maps of the overall network are presented, in Mk1A and extended form. Note that these will be updated over the coming months as the various Route and Service Plans articles are reissued incorporating the Mk1A changes.

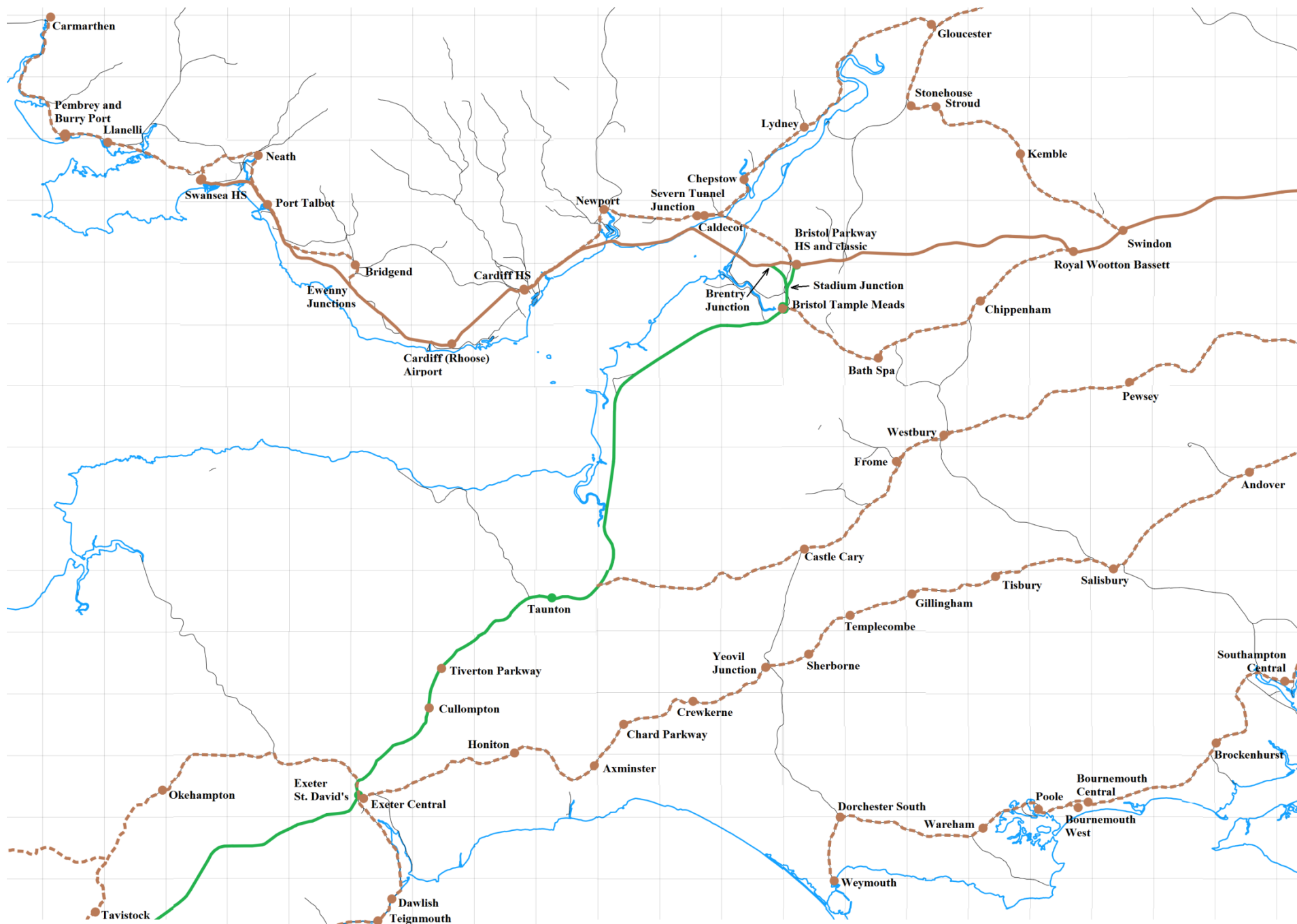


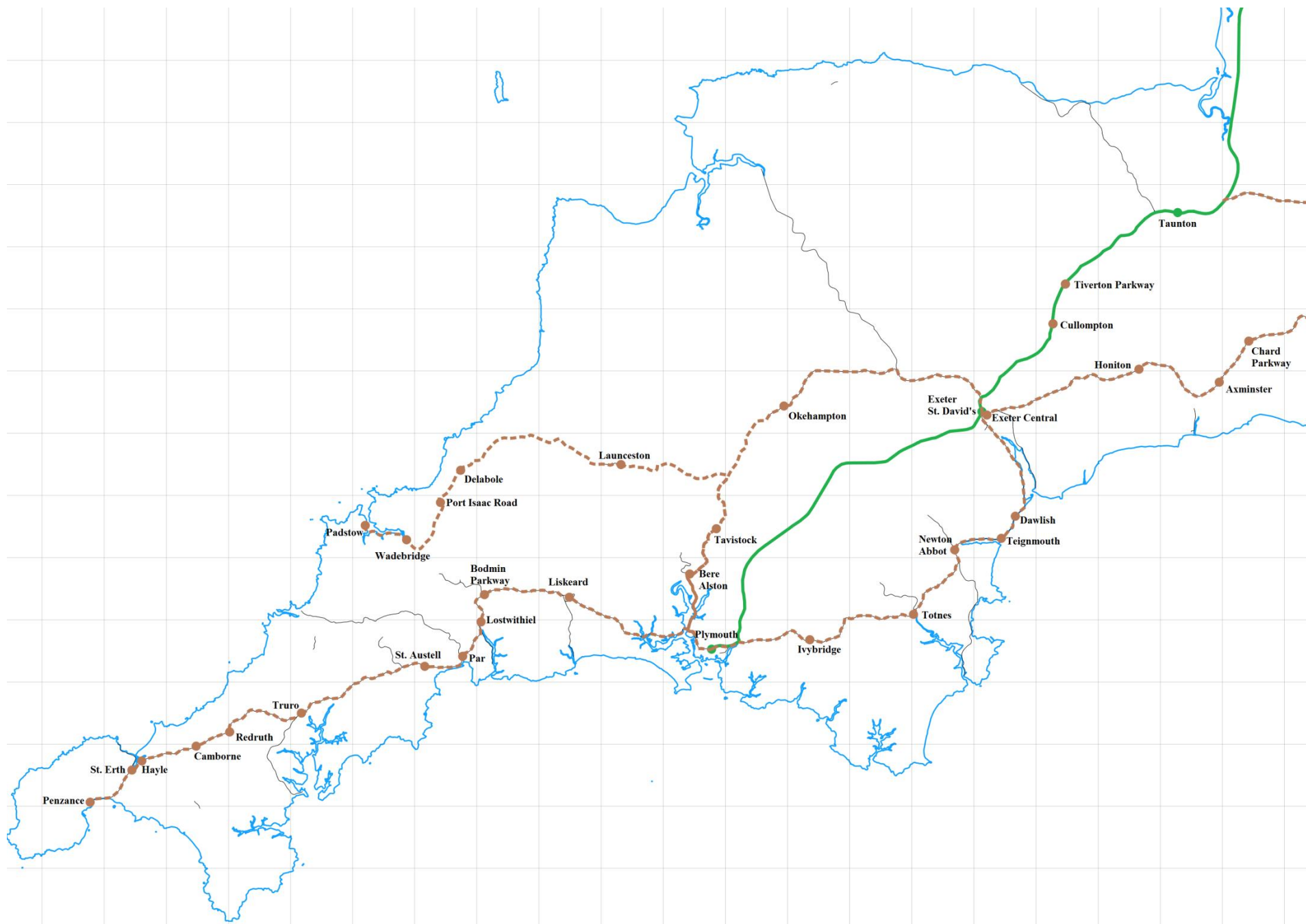




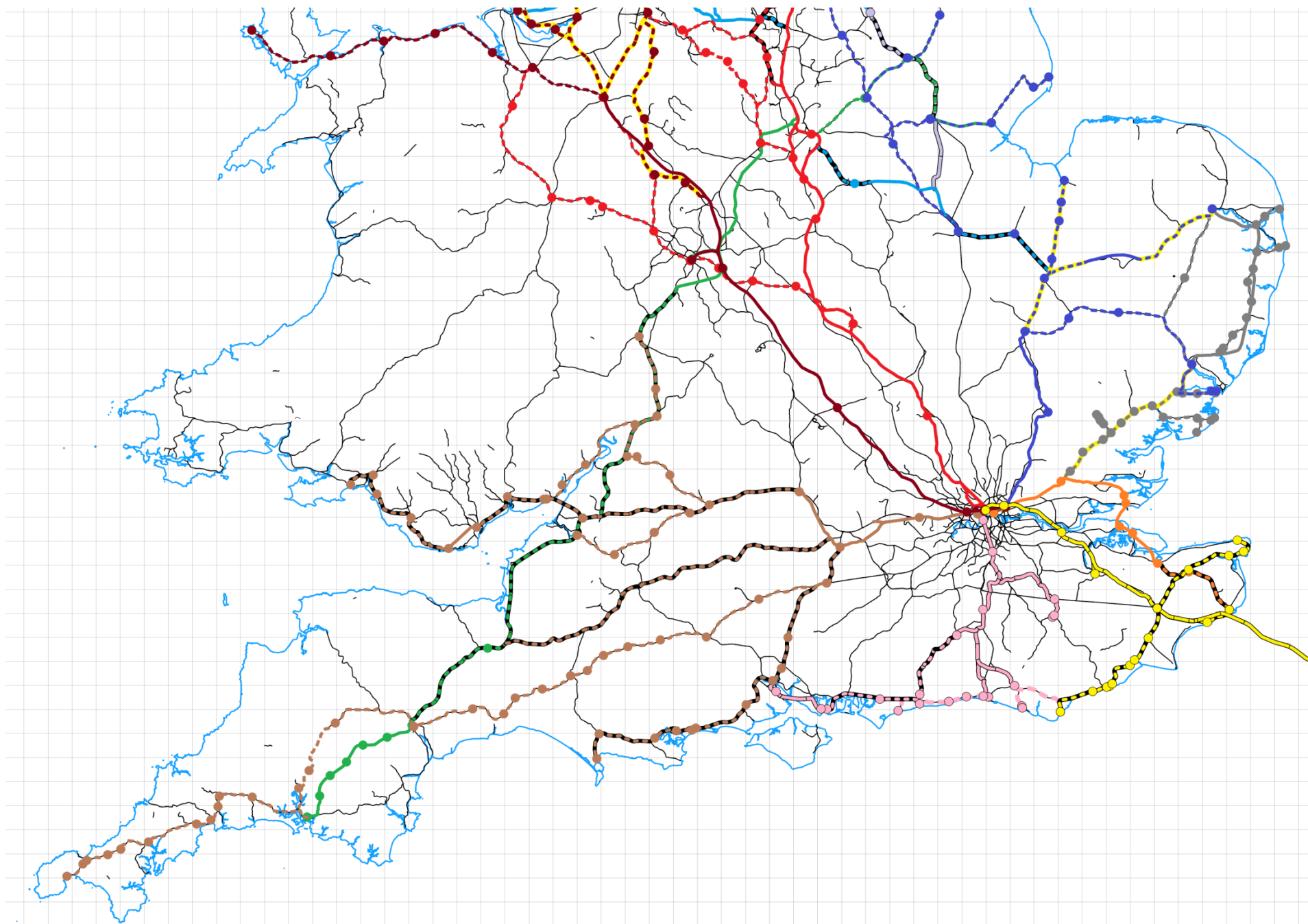


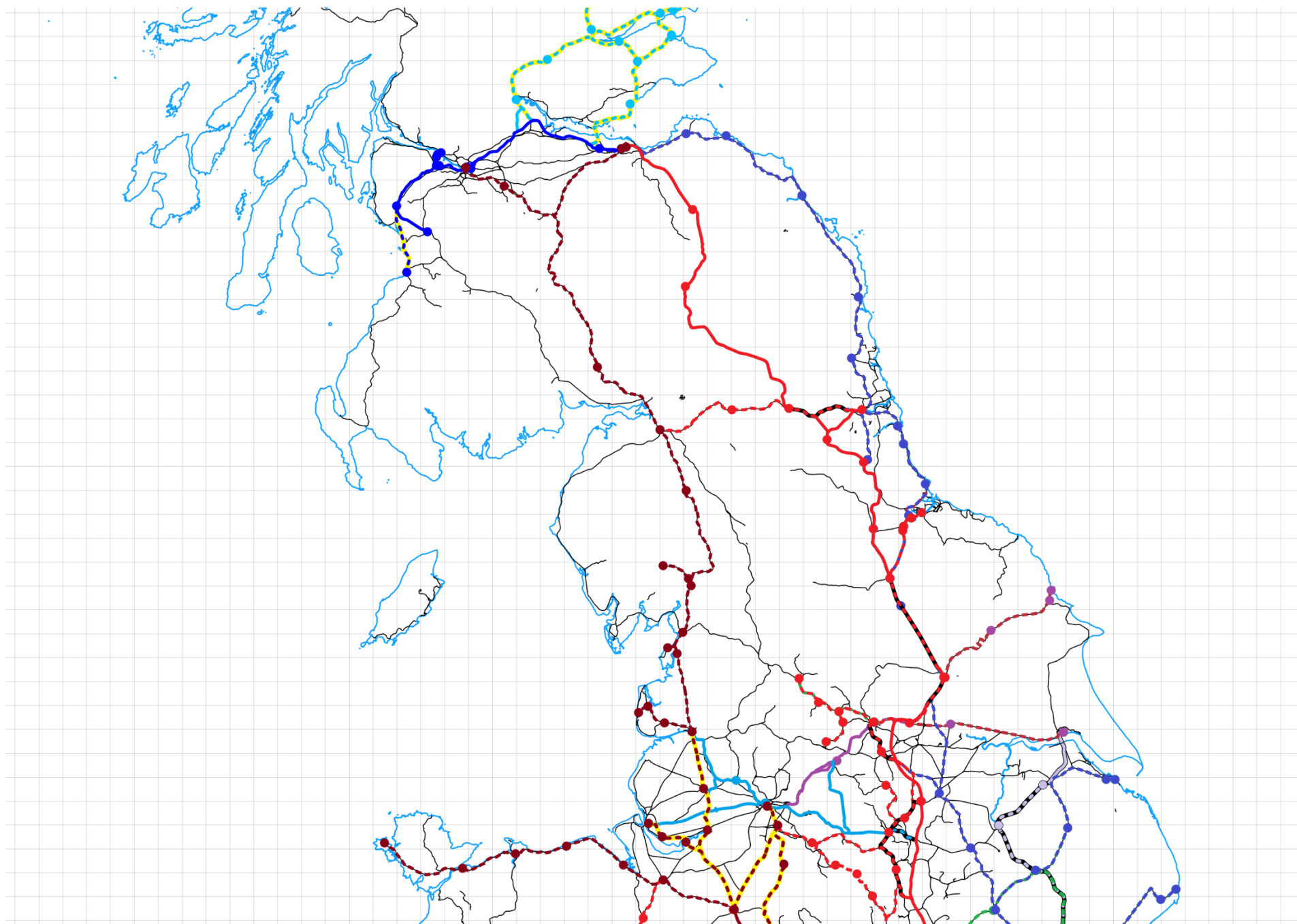


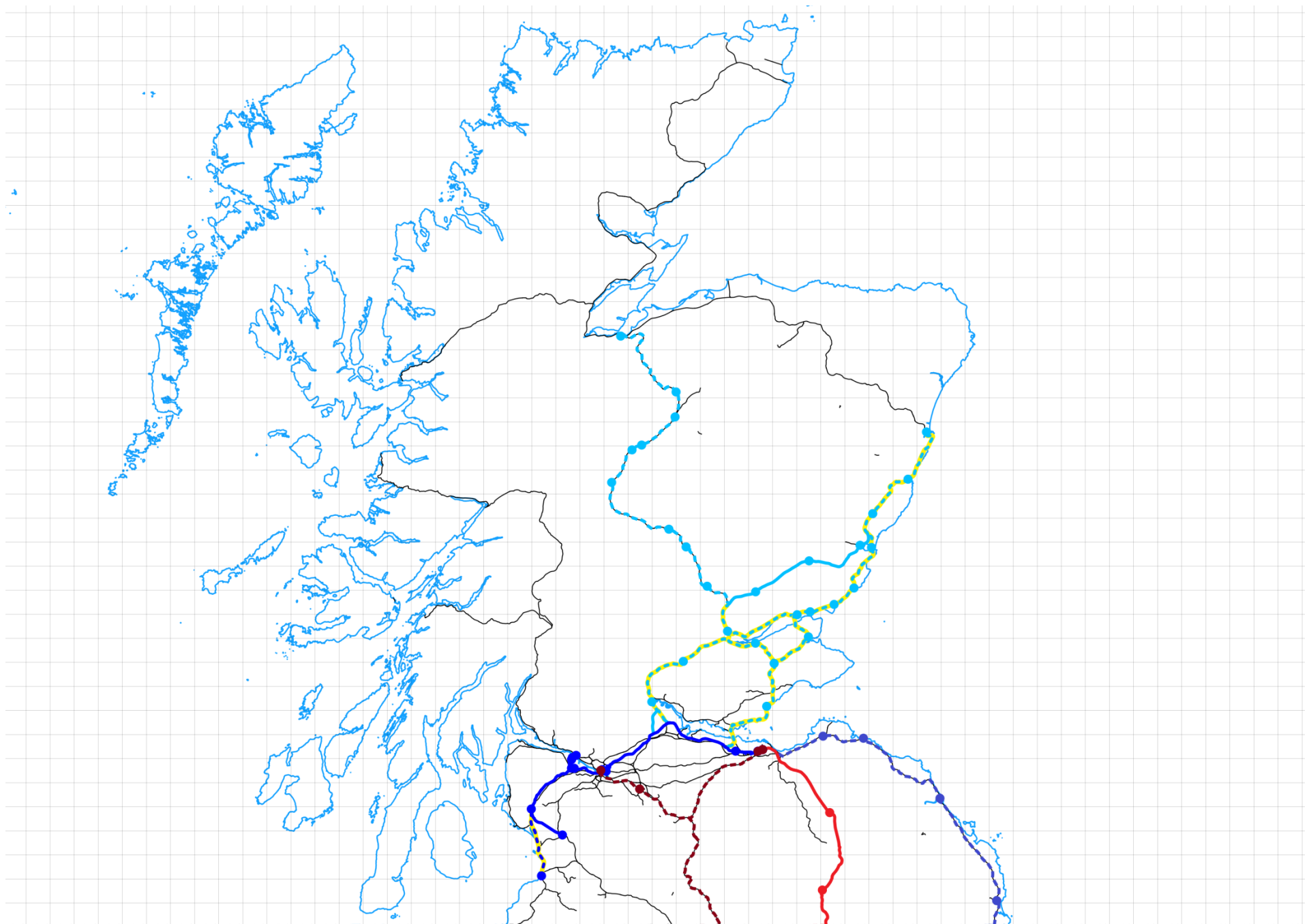


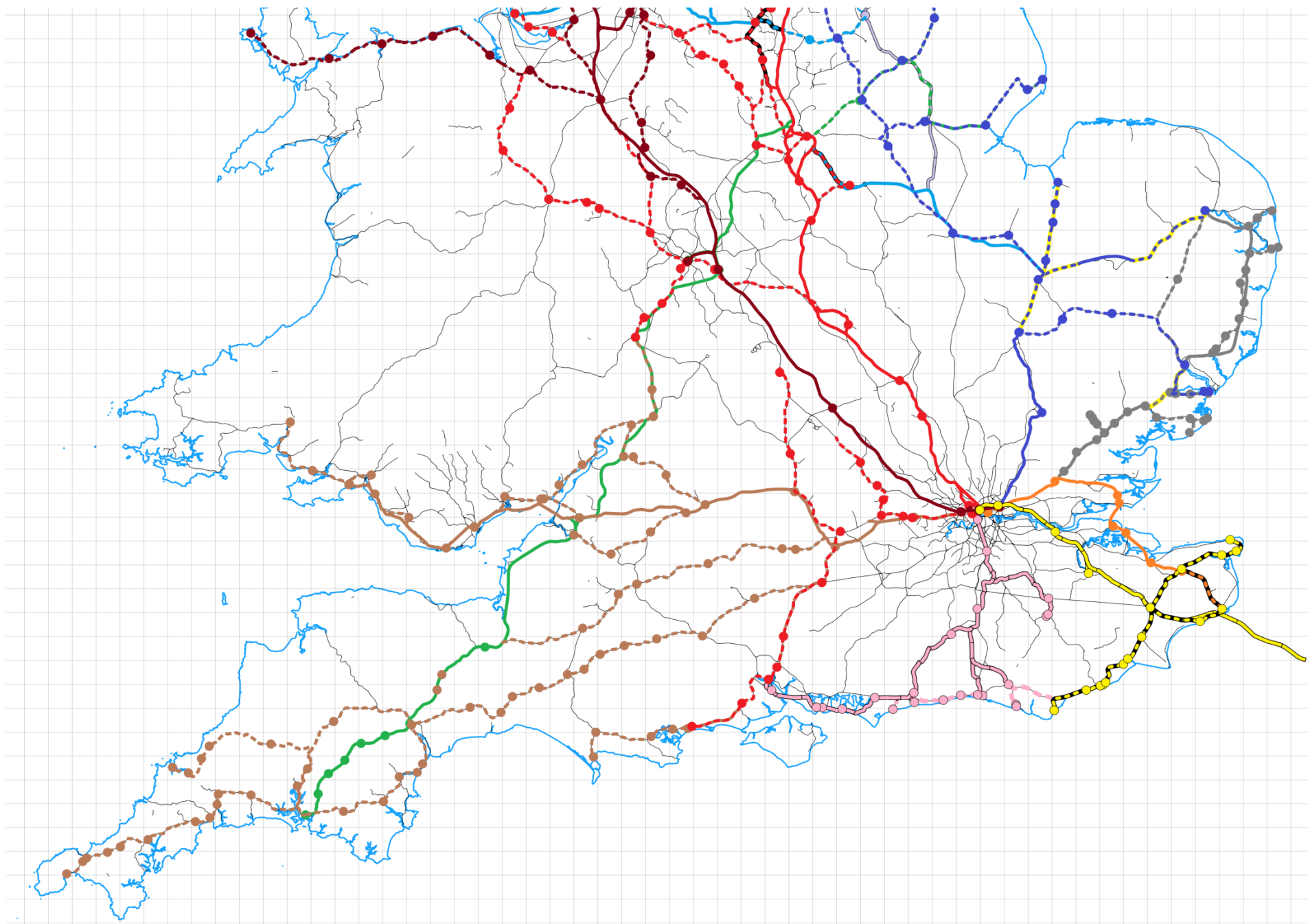


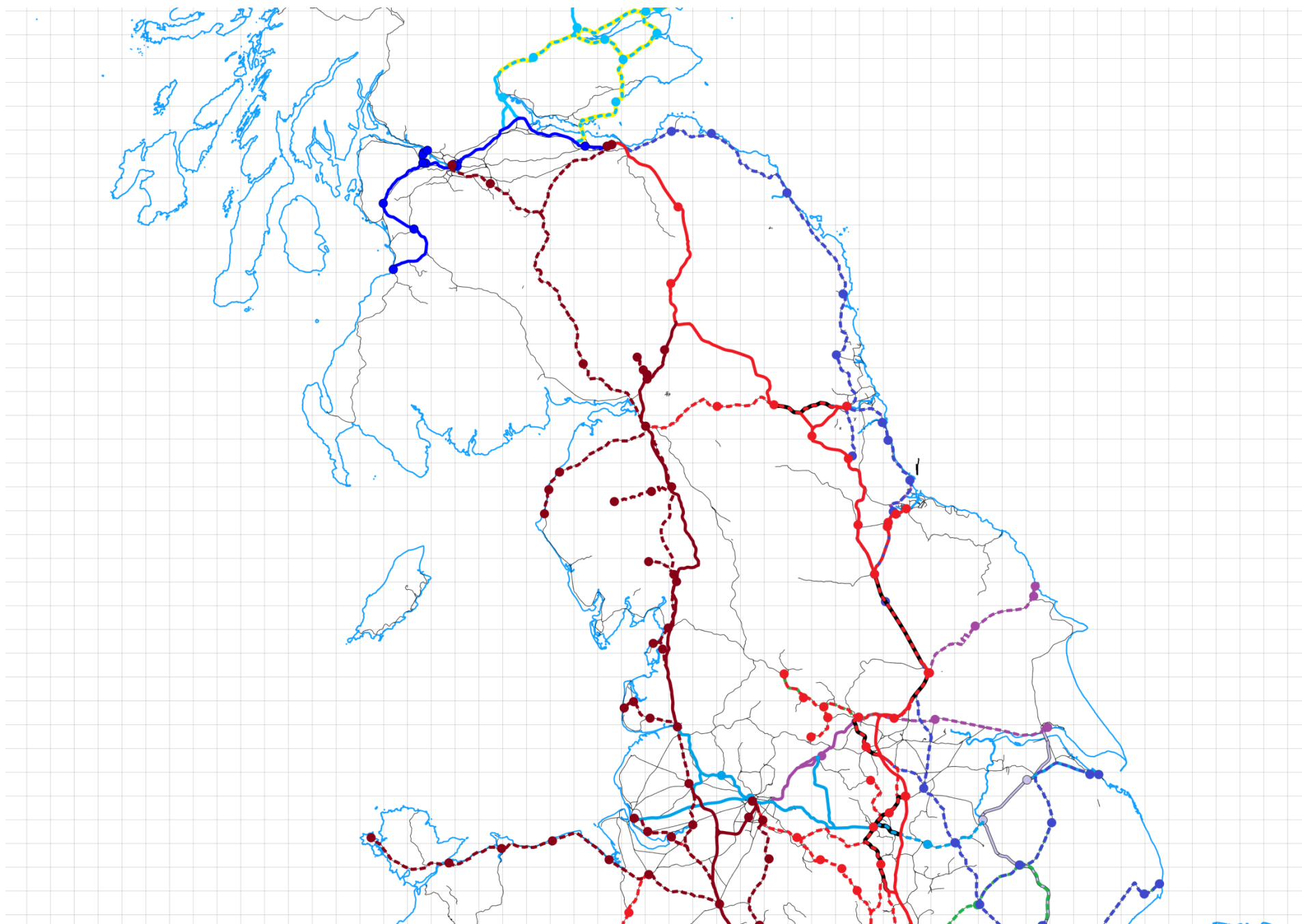




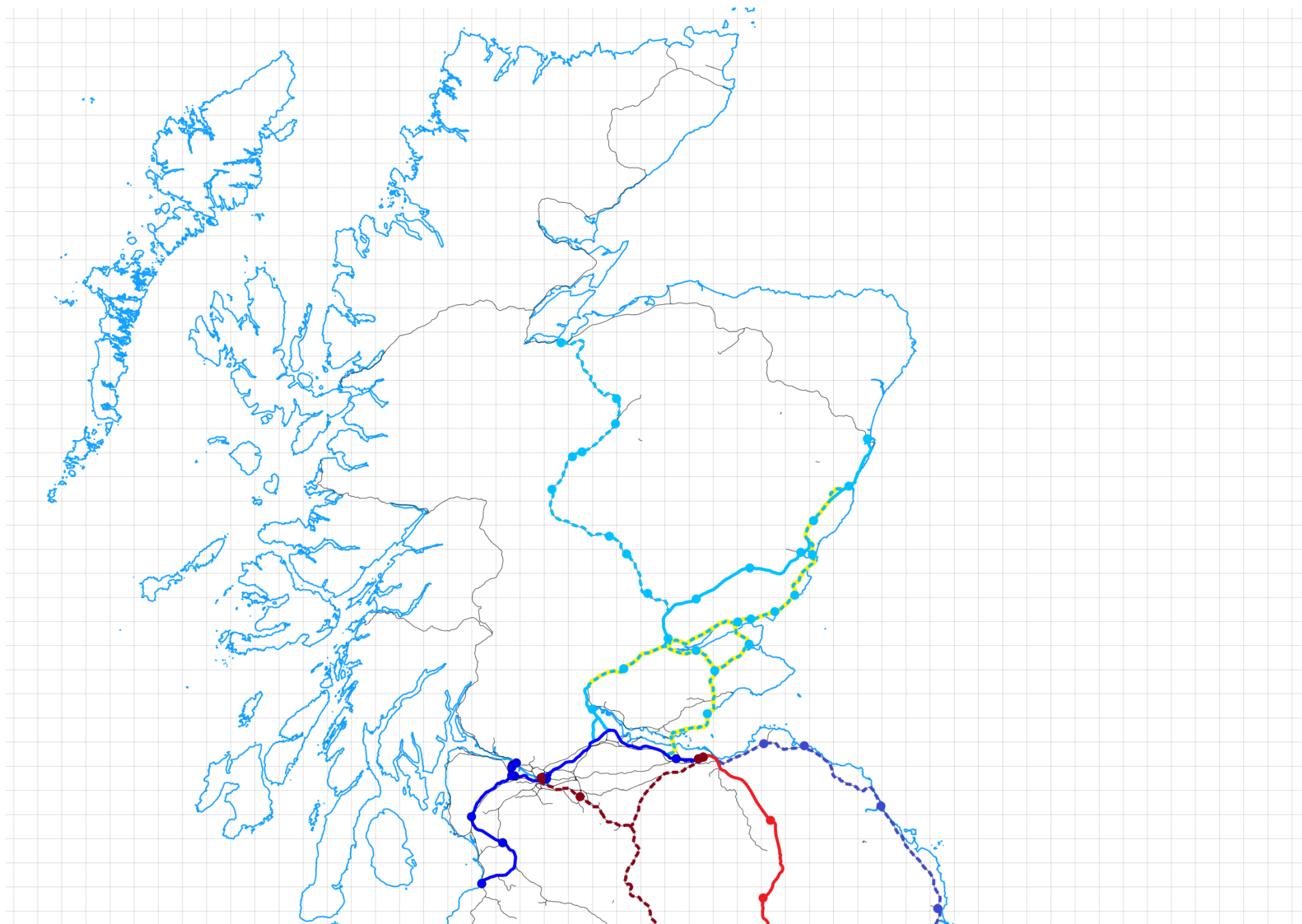












## *The Service Plans*

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 HS4 itself. This most commonly occurs when a new section of HS4 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
- H        High Speed train – at least part of the journey being on the HS main line
- R        Regional Metro train, semi-fast service
- RS      Regional Metro train, stopping service (all stations)

High Speed trains invariably travel over classic lines also (even if only those sections incorporated in the HS main line). Regional Metro services generally travel their entire journey over classic lines, though this is not an absolute requirement; but if they do travel over any HS section, they must be formed of HS stock – obviously!

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

As was mentioned earlier, the service plans deliberately envisage maximum frequencies. The results may thus seem, at least initially, somewhat optimistic.

### *Service Plan 0*

This is not really a service plan at all, in that essentially it doesn't involve any change to existing services or frequencies. It comes into effect when the first section of HS4 is opened, from Old Oak Common West Junction to Shottesbrook Farm Junction, east of Reading, and the following, existing services are diverted onto it. This gives some instant relief to the most congested section of the GWML. (I am assuming that the Brunel Trainshed – designated by the BT suffix – at Bristol Temple Meads has previously been brought back into use.)

- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading – Didcot Parkway – Swindon – Bristol Parkway – Bristol Temple Meads BT
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading – Didcot Parkway – Swindon – Chippenham – Bath Spa – Bristol Temple Meads
- 1tphH Paddington – Old Oak Common – LHR Interchange – Reading – Didcot Parkway – Swindon – Bristol Parkway – Newport – Cardiff
- 1tphH Paddington – Old Oak Common – LHR Interchange – Reading – Didcot Parkway – Swindon – Bristol Parkway – Newport – Cardiff – Bridgend – Port Talbot – Neath – Swansea
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading – Didcot Parkway – Swindon –Kemble – Stroud – Stonehouse – Gloucester (splis / joins) –:  
– Lydney – Chepstow – Caldicot – Severn Tunnel Junction – Newport – Cardiff  
– (reverse) Cheltenham Spa – Ashchursh – Worcester Shrub Hill

This brings interim benefits, while the major section around Reading, including the new Reading Parkway station and its junctions, is being built.

## *Service Plan 1*

The first proper service plan comes into effect when the section from Thimble Farm Junction to Foxhall HS Junction opens, where HS4 merges with the GWML, together with the 4-tracking thence to Wootton Bassett and the new, grade-separated junction there, (the main line, via Badminton, being the middle tracks). The new station opens at Royal Wootton Bassett. This includes the full configuration of Reading Parkway 2-level station, including the connection to the Berks and Hants line, but only passive provision for its connections to the classic Basingstoke route. The section between Thimble Farm and Shottesbrook Farm junctions no longer sees scheduled use, but remains valuable as a diversion, particularly during maintenance on the HS route around Reading. There are no dependencies on any other HS route. The classic express service from Paddington to Plymouth and on to Penzance, via the Berks and Hants line, is moved on to HS4, and serves Reading Parkway, joining the Berks and Hants line at Theale HS Junction. Relevant RM services on the GWML are included also.

### HS4 services:

- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Bristol Temple Meads BT
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Newport – Cardiff – Bridgend – Port Talbot – Neath – Swansea
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading Parkway LL – Taunton – Exeter St. David's – Plymouth – Liskeard – Bodmin Road – Lostwithiel – Par – St. Austell – Truro – Redruth – Camborne – Hayle – St. Erth – Penzance
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading Parkway LL – Didcot Parkway – Swindon – Chippenham – Bath Spa – Bristol Temple Meads
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading Parkway LL – Didcot Parkway – Swindon – Kemble – Stroud – Stonehouse – Gloucester (splits / joins) –:  
– Lydney – Chepstow – Caldicot – Severn Tunnel Junction – Newport – Cardiff  
– (reverse) Cheltenham Spa – Ashchursh – Worcester Shrub Hill

### GWML Services:

- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Didcot – Wantage Road – Swindon (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Maidenhead – Twyford – Reading – Tilehurst – Pangbourne – Goring and Streatley – Cholsey – Didcot – Oxford (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Thatcham – Newbury – Kintbury – Hungerford – Bedwyn – Pewsey (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Interchange – Slough – Reading – Thatcham – Newbury – Pewsey – Westbury – Taunton – Tiverton Parkway – Cullompton – Exeter St. David's – Dawlish – Teignmouth – Newton Abbot – Totnes – Ivybridge – Plymouth
- 2tphR Paddington – Old Oak Common – LHR Interchange – Slough – Reading – Didcot – Wantage Road – Swindon – Royal Wootton Bassett – Chippenham – Melksham – Holt Junction – Trowbridge – Westbury – Frome – Castle Cary – Yeovil Pen Mill – Dorchester West – Weymouth



- 2tphR Paddington – Old Oak Common – LHR Interchange – Slough – Reading – Didcot – Oxford – Hanborough – Charlbury – Kingham – Moreton in March – Honeybourne – Evesham – Pershore – Worcester Shrub Hill – Worcester Foregate Street – Malvern Link – Great Malvern – Colwell – Ledbury – Hereford

With this service plan, Bristol, Bath, Chippenham, Swindon, Swansea, Neath, Port Talbot, Bridgend, Cardiff, Newport, Bristol Parkway, Cheltenham, Gloucester, Stonehouse, Stroud and Kemble all retain their existing services to Paddington (with the addition of a connection for Heathrow), at the same or better frequencies, and comparable or faster times at Mk1A (**much** faster times at Mk2).

Representative Hourly Cross-Platform Interchange Pattern at Swindon (refer to Appendix B for the revised layout at Swindon):

00H Paddington – Gloucester – Cardiff / Worcester (platform 5; no interchange)

07H Paddington – Bristol Temple Meads BT (platform 1)

R Heathrow Shuttle (platform 2; reverse then return from platform 3)

15H Paddington – Bristol Temple Meads via Bath (platform 1; no interchange)

23H Paddington – Swansea (platform 1)

R Paddington – Weymouth (platform 2)

– repeating at 30, 37, 45, and 53 minutes past.

Representative Hourly Cross-Platform Interchange Pattern at Westbury:

00R Paddington – Plymouth

R Paddington – Weymouth

– repeating at 30 minutes past.

Representative Hourly Cross-Platform Interchange Pattern at Cardiff:

00H Paddington – Swansea

H Paddington – Cardiff via Gloucester (arrives first)

– repeating at 30 minutes past.

It imposes the following HS4 loadings:

- |                           |  |     |       |
|---------------------------|--|-----|-------|
| • Euston Cross            | – Old Oak Common East Junction             | (*) | 0tph  |
| • Old Oak Common East Jn. | – Old Oak Common West Junction             |     | 0tph  |
| • Paddington              | – Old Oak Common station (ground level *)  |     | 10tph |
| • Old Oak Common station  | – Old Oak Common West Junction             |     | 10tph |
| • Old Oak Common West Jn. | – Theale East Junction                     |     | 10tph |
| • Theale East Junction    | – Aston North Junction                     |     | 8tph  |
| • Aston North Junction    | – Foxhall HS Junction (via Didcot station) |     | 4tph  |
| • Aston North Junction    | – Foxhall HS Junction (avoiding station)   |     | 4tph  |
| • Foxhall HS Junction     | – Swindon station                          | (*) | 8tph  |
| • Swindon station         | – Wootton Bassett Junction                 | (*) | 8tph  |

- |                            |                          |     |      |
|----------------------------|--------------------------|-----|------|
| • Wootton Bassett Junction | – Westerleigh Junction   |     | 4tph |
| • Westerleigh Junction     | – Bristol Parkway        | (*) | 4tph |
| • Bristol Parkway          | – Severn Tunnel Junction | (*) | 2tph |
| • Severn Tunnel Junction   | – Cardiff                | (*) | 4tph |
| • Cardiff                  | – Swansea                | (*) | 2tph |

(\*) There will of course additionally be non-HS4 services on these sections. Didcot – Wootton Bassett Junction is 4-track, the rest 2-track.

## *Service Plan 2*

This service plan comes into effect when:

- HS4 opens from Old Oak Common West to East Junction, and thus connects to the route to Euston Cross, which is already in service for HS2.
- HS4 opens between Cardiff Central and Aberthaw Junction,
- HS11 opens from Southend Airport and Shenfield to Euston Cross. (Since Euston Cross is a through station only, when HS4 commences serving it, the balancing services on HS11 must commence simultaneously. (This is HS11/12 SP2. The short section of HS12 linking to the GEML at Shenfield North Junction has been open since HS11/12 SP1.)
- HS7 opens from Birmingham Curzon St. to Bristol Temple Meads. (This is HS7 SP1.)

HS4 services formerly terminating at Cardiff are extended to Cardiff (Rhoose) Airport, and terminate there. Turnround and servicing facilities are provided just beyond the airport tunnel. Services to Swansea are rerouted between Cardiff and Bridgend via the airport and the Vale of Glamorgan line. This is the new main line. The previous main line between Cardiff and Bridgend now carries only local, metro and freight traffic.

HS7 at Mk1A has new infrastructure initially only from Birmingham HS to Cofton Hall Junction, before Barnt Green, where it merges with the classic NE/SW route. Between Coalpit Heath and Stoke Gifford junctions it has its own tracks, on each side of HS4, but see appendix H for clarification of the layout, in particular how the platforms are assigned at Bristol Parkway. More details later.

The following inter-regional services are introduced. HS4 and HS7 services make cross-platform connections at Bristol Parkway, as noted.

- 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads]
- 2tphH Southend Airport – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Bristol Temple Meads BT [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport]

- 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Bristol Temple Meads [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea]
- 2tphH Southend Airport – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads BT]

(The HS12 services are on classic tracks before Shenfield North Junction.)

The existing HS4 services from SP1 still apply:

- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading Parkway LL – Taunton – Exeter St. David's – Plymouth – Liskeard – Bodmin Rd. – Lostwithiel – Par – St. Austell – Truro – Redruth – Camborne – Hayle – St. Erth – Penzance
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading Parkway LL – Didcot Parkway – Swindon – Chippenham – Bath Spa – Bristol Temple Meads
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading Parkway LL – Didcot Parkway – Swindon – Kemble – Stroud – Stonehouse – Gloucester (splis / joins) –:  
– Lydney – Chepstow – Caldicot – Severn Tunnel Junction – Newport – Cardiff –  
Cardiff (Rhoose) Airport  
– (reverse) Cheltenham Spa – Ashchurch – Worcester Shrub Hill

In addition, the following NE-SW Regional Metro services are introduced:

- 2tphR York – Micklefield – Leeds City – Wakefield Westgate – South Yorkshire LL – Rotherham – Sheffield Midland – Chesterfield – Derby – Burton on Trent – Tamworth – Birmingham New St. – University – Bromsgrove – Droitwich Spa – Worcester Shrub Hill – Ashchurch – Cheltenham Spa – Gloucester (reverse) – Bristol Parkway – Bristol Temple Meads – Weston Super Mare – Highbridge – Bridgwater – Taunton – Tiverton Junction – Cullompton – Exeter St. David's – Dawlish – Teignmouth – Newton Abbot – Totnes – Ivybridge – Plymouth

Representative Hourly Cross-Platform Interchange at Bristol Parkway:

- |     |   |
|-----|---|
| 00H | Norwich via Diss – Euston Cross – Swansea                 |
| H   | Birmingham HS – Bristol Temple Meads                      |
| 07H | Southend Airport – Euston Cross – Bristol Temple Meads BT |
| H   | Birmingham HS – Cardiff Airport                           |
| 15H | Norwich via Diss – Euston Cross – Bristol Temple Meads    |
| H   | Birmingham HS – Swansea                                   |
| 23H | Southend Airport – Euston Cross – Cardiff Airport         |
| H   | Birmingham HS – Bristol Temple Meads BT                   |

– repeating at 30, 37, 45 and 53 minutes past.

#### Representative Hourly Cross-Platform Interchange at Worcester Shrub Hill:

- 00H Birmingham HS – Bristol Temple Meads  
H Worcester – Gloucester – Paddington
- 07H Birmingham HS – Cardiff Airport  
R York – Plymouth
- 15H Birmingham HS – Swansea  
R Hereford – Paddington
- 23H Birmingham HS – Bristol Temple Meads BT  
RS Birmingham New St. – Hereford

– repeating at 30, 37, 45 and 53 minutes past.

#### Representative Hourly Cross-Platform Interchange Pattern at Swindon (refer to Appendix B for the revised layout at Swindon):

- 00H Norwich via Diss – Euston Cross – Swansea (platform 1)  
H Paddington – Gloucester – Cardiff Airport / Worcester (platform 5; i/change not cross-platform)
- 07H Southend Airport – Euston Cross – Bristol Temple Meads BT (platform 1)  
R Heathrow Shuttle (platform 2; reverse then return from platform 3)
- 15H Norwich via Diss – Euston Cross – Bristol Temple Meads (platform 1)  
H Paddington – Bristol Temple Meads via Bath (platform 2)
- 23H Southend Airport – Euston Cross – Cardiff Airport (platform 1)  
R Paddington – Weymouth (platform 2)

– repeating at 30, 37, 45, and 53 minutes past.

### *Service Plan 2A*

This service plan comes into effect when:

- The connections between HS4 and the classic route to Basingstoke open, specifically between Three Mile Cross and Grazeley, and between Grazeley and Burghfield, junctions.
- A new station, Basingstoke HS, is built immediately adjacent to, and on the north side of the existing station.
- The line between Grazeley Junction and Basingstoke HS is quadrupled.
- A new, 2-track section is opened, on the north side of the existing tracks, between Basingstoke HS and Worting Junction, making grade-separated connections there with the Southampton and Salisbury routes.
- The line is reopened, with a new station as close as practicable to the original location, between Gasworks Junction and Bournemouth West.

(This is HS12 SP2A. The relevant services previously terminating at Liverpool St. are switched to Euston Cross, but there are no other changes.)



The following services are introduced:

- 2tphH Lowestoft – Oulton Broad South – Beccles – Brampton – Halesworth – Darsham – Saxmundham – Wickham Market – Woodbridge – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Poole – Wareham – Dorchester South – Weymouth
- 2tphH Harwich Town – Dovercourt – Harwich Parkeston Quay – Wrabness – Mistley – Manningtree – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Bournemouth West
- 2tphH Clacton – )  
Walton – Frinton – ) Thorp le Soken (joins/splits) – Wivenhoe – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Salisbury – Tisbury – Gillingham – Templecombe – Sherborne – Yeovil Junction – Crewkerne – Chard Parkway – Axminster – Honiton – Exeter Central – Exeter St. David’s – Okehampton – Tavistock – Bere Alston – Plymouth
- 2tphH Braintree – Braintree Freeport – Cressing – White Notley – Witham – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Overton – Whitchurch – Andover – Grateley – Salisbury
- 2tphH Oxford – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Bournemouth West

(The HS12 services are on classic tracks before Shenfield North Junction.)

(The Oxford – Bournemouth service will later be extended northwards, as a HS3 service, to Newcastle and Middlesbrough. The current proposal acts as a ‘placeholder’ for it, and provides some immediate traffic for the western link from Grazeley Junction.)

## *Service Plan 2B*

This service plan comes into effect when:

- HS11 opens from Southend Airport to Faversham. (This is HS11/12 SP2B.)
- HS12 opens between Beccles and Reedham. (This is also HS11/12 SP2B.)

HS11 at Mk1A has new infrastructure all the way from Euston Cross to Faversham. Beyond Faversham, it shares the classic route to Dover Priory, via Canterbury East.

HS12 at Mk1A shares HS11’s new infrastructure as far as Shenfield, and has its own infrastructure thence for the short distance to Shenfield HS junction, where it merges with the classic route to Norwich. A section of new infrastructure between Beccles and Reedham allows a service to Yarmouth as well as Lowestoft (splitting / joining at Beccles), via the East Suffolk line. (New infrastructure, of which the Yarmouth connection is an early instalment, will be added later – see SP5.)

Several of the existing HS4 inter-regional services have their originating station changed:

- 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads]
- 2tphH Dover Priory – Canterbury East – Faversham – Sheerness – Grain – Southend HS – Southend Airport – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Bristol Temple Meads BT [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport]
- 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Bristol Temple Meads [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea]
- 2tphH Dover Priory – Canterbury East – Faversham – Sheerness – Grain – Southend HS – Southend Airport – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads BT]
- 2tphH Lowestoft – Oulton Broad South – )  
Yarmouth – Breney Arms – Reedham South – ) Beccles (joins/splits) – Brampton – Halesworth – Darsham – Saxmundham – Wickham Market – Woodbridge – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Poole – Wareham – Dorchester South – Weymouth
- 2tphH Harwich Town – Dovercourt – Harwich Parkeston Quay – Wrabness – Mistley – Manningtree – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Bournemouth West
- 2tphH Clacton – )  
Walton – Frinton – ) Thorp le Soken (joins/splits) – Wivenhoe – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Salisbury – Tisbury – Gillingham – Templecombe – Sherborne – Yeovil Junction – Crewkerne – Chard Parkway – Axminster – Honiton – Exeter Central – Exeter St. David's – Okehampton – Tavistock – Bere Alston – Plymouth
- 2tphH Braintree – Braintree Freeport – Cressing – White Notley – Witham – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Overton – Whitchurch – Andover – Grateley – Salisbury

- 2tphH Oxford – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Bournemouth West

Representative Hourly Cross-Platform Interchange at Bristol Parkway:

- 00H Norwich via Diss – Euston Cross – Swansea  
H Birmingham HS – Plymouth
- 07H Dover Priory – Euston Cross – Bristol Temple Meads BT  
H Birmingham HS – Cardiff Airport
- 15H Norwich via Diss – Euston Cross – Bristol Temple Meads  
H Birmingham HS – Swansea
- 23H Dover Priory – Euston Cross – Cardiff Airport  
H Birmingham HS – Bristol Temple Meads BT

– repeating at 30, 37, 45 and 53 minutes past.

Representative Hourly Cross-Platform Interchange at Worcester Shrub Hill:

- 00H Birmingham HS – Bristol Temple Meads  
H Worcester – Gloucester – Paddington
- 07H Birmingham HS – Cardiff Airport  
R York – Plymouth
- 15H Birmingham HS – Swansea  
R Hereford – Paddington
- 23H Birmingham HS – Bristol Temple Meads BT  
RS Birmingham New St. – Hereford

– repeating at 30, 37, 45 and 53 minutes past.

Representative Hourly Cross-Platform Interchange Pattern at Swindon (refer to Appendix B for the revised layout at Swindon):

- 00H Norwich via Diss – Euston Cross – Swansea (platform 1)  
H Paddington – Gloucester – Cardiff Airport / Worcester (platform 5; i/change not cross-platform)
- 07H Dover Priory – Euston Cross – Bristol Temple Meads BT (platform 1)  
R Heathrow Shuttle (platform 2; reverse then return from platform 3)
- 15H Norwich via Diss – Euston Cross – Bristol Temple Meads (platform 1)  
H Paddington – Bristol Temple Meads via Bath (platform 2)
- 23H Dover Priory – Euston Cross – Cardiff Airport (platform 1)  
R Paddington – Weymouth (platform 2)

– repeating at 30, 37, 45, and 53 minutes past.

Representative Hourly Interchange at Reading Parkway (cross-platform at both HL and LL):

00H	LL	<i>Norwich via Diss – Euston Cross – Swansea</i>	<i>NON-STOP</i>
H	LL	Dover Priory – Euston Cross – Bristol Temple Meads BT	
H	LL	Paddington – Bristol Temple Meads via Bath	
H	HL	Lowestoft / Yarmouth – (joins / splits Beccles) – Euston Cross – Weymouth	
RS	HL	Henley – Basingstoke all station	
07H	HL	Clacton / Walton – (joins / splits Thorpe le Soken) – Euston Cross – Plymouth	
R	HL	XC Manchester – Bournemouth West	
15H	LL	<i>Norwich via Diss – Euston Cross – Bristol Temple Meads</i>	<i>NON-STOP</i>
H	LL	Dover Priory – Euston Cross – Cardiff Airport	
H	LL	Paddington – Gloucester – Cardiff Airport / Worcester Shrub Hill	
H	HL	Harwich – Euston Cross – Bournemouth West	
RS	HH	Reading – Basingstoke all stations	
23H	LL	Paddington – Penzance	
H	HL	Braintree – Euston Cross – Salisbury	
R	HL	XC York – Bournemouth West	

– repeating at 30, 37, 45, and 53 minutes past.

(See SP3 for an elucidation of the above.)

Service Plan 2 overall imposes the following loadings on HS4:

• Euston Cross	– Old Oak Common East Junction	(*)	16tph
• Old Oak Common East Jn.	– Old Oak Common West Junction		16tph
• Paddington	– Old Oak Common station (ground level *)		6tph
• Old Oak Common station	– Old Oak Common West Junction		6tph
• Old Oak Common West Jn.	– Three Mile Cross Junction		22tph
• Three Mile Cross Junction	– Burghfield Junction		14tph
• Three Mile Cross Junction	– Grazeley Junction		8tph
• Grazeley Junction	– Basingstoke HS	(*)	10tph
• Grazeley Junction	– Burghfield Junction		2tph
• Burghfield Junction	– Theale East Junction		16tph
• Theale East Junction	– Aston North Junction		14tph
• Aston North Junction	– Foxhall HS Junction (via Didcot station)		4tph
• Aston North Junction	– Foxhall HS Junction (avoiding station)		8tph
• Foxhall HS Junction	– Swindon station	(*)	12tph
• Swindon station	– Wootton Bassett Junction	(*)	10tph
• Wootton Bassett Junction	– Westerleigh Junction		8tph
• Westerleigh Junction	– Bristol Parkway	(*)	16tph
• Bristol Parkway	– Severn Tunnel Junction	(*)	8tph
• Severn Tunnel Junction	– Cardiff	(*)	10tph
• Cardiff	– Cardiff (Rhoose) Airport		10tph
• Cardiff (Rhoose) Airport	– Swansea	(*)	4tph



(\*) There will of course additionally be non-HS4 services on these sections. Didcot – Wootton Bassett Junction is 4-track, the rest 2-track.

### *Service Plan 3*

This service plan comes into effect when:

- HS7 opens from Bristol through to Plymouth. (This is HS7 SP2.)

HS7 at Mk1A shares the track of the classic Bristol and Exeter railway between, oddly enough, Bristol and Exeter. It uses the existing, but currently disused, central island platform at Taunton. But it has new infrastructure, on a completely new alignment, between Exeter and Plymouth.

HS11 at Mk1A has new infrastructure all the way from Euston Cross to Faversham. Beyond Faversham, it shares the classic route to Dover Priory, via Canterbury East.

HS12 at Mk1A shares HS11's new infrastructure as far as Shenfield, and has its own infrastructure thence for the short distance to Shenfield HS junction, where it merges with the classic route to Norwich. A section of new infrastructure between Beccles and Reedham allows a service to Yarmouth as well as Lowestoft (splitting / joining at Beccles), via the East Suffolk line. (New infrastructure, of which the Yarmouth connection is an early instalment, will be added later – see SP5.)

The HS4 and HS7 services terminating at Bristol Temple Meads (**not** BT), are extended through to Plymouth. The fast service from Paddington to Plymouth and on to Cornwall via the Berks and Hants line continues, as it offers significantly better journey times than the much longer route via Bristol Parkway. (This will remain the case at Mk1A. If and when Mk2 is implemented, the HS service Euston Cross – Plymouth will take over the service to Cornwall, and the fast service via the Berks and Hants will be withdrawn, but its slot in the schedules, as far as Theale East Junction, will be taken over by the current RM Paddington – Plymouth service, stopping at all major stations on the Berks and Hants and South Devon lines.) Possibly the Penzance splits at Plymouth, one half proceeding to Penzance and the other to Launceston, Wadebridge and Padstow, assuming that route has by then been reopened.

The only service change at SP3 are those extended to Plymouth, thus:

- 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David's - Plymouth]
- 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David's – Plymouth [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea]

Representative Hourly Cross-Platform Interchange at Bristol Parkway:

- 00H    Norwich via Diss – Euston Cross – Swansea  
      H    Birmingham HS – Plymouth
- 07H    Dover Priory – Euston Cross – Bristol Temple Meads BT  
      H    Birmingham HS – Cardiff Airport
- 15H    Norwich via Diss – Euston Cross – Plymouth  
      H    Birmingham HS – Swansea
- 23H    Dover Priory – Euston Cross – Cardiff Airport  
      H    Birmingham HS – Bristol Temple Meads BT

– repeating at 30, 37, 45 and 53 minutes past.

Representative Hourly Cross-Platform Interchange at Worcester Shrub Hill:

- 00H    Birmingham HS – Plymouth  
      H    Worcester – Gloucester – Paddington
- 07H    Birmingham HS – Cardiff Airport  
      R    York – Plymouth
- 15H    Birmingham HS – Swansea  
      R    Hereford – Paddington
- 23H    Birmingham HS – Bristol Temple Meads BT  
      RS   Birmingham New St. – Hereford

– repeating at 30, 37, 45 and 53 minutes past.

Representative Hourly Cross-Platform Interchange Pattern at Swindon (refer to Appendix B for the revised layout at Swindon):

- 00H    Norwich via Diss – Euston Cross – Swansea  
      H    Paddington – Gloucester – Cardiff Airport / Worcester (platform 5; i/change not cross-platform)
- 07H    Dover Priory – Euston Cross – Bristol Temple Meads BT (platform 1)  
      R    Heathrow Shuttle (platform 2; reverse then return from platform 3)
- 15H    Norwich via Diss – Euston Cross – Plymouth (platform 1)  
      H    Paddington – Bristol Temple Meads via Bath (platform 2)
- 23H    Dover Priory – Euston Cross – Cardiff Airport (platform 1)  
      R    Paddington – Weymouth (platform 2)

– repeating at 30, 37, 45, and 53 minutes past.

Representative Hourly Interchange at Reading Parkway (cross-platform at both HL and LL):

00H	LL	<i>Norwich via Diss – Euston Cross – Swansea</i>	<i>NON-STOP</i>
H	LL	Dover Priory – Euston Cross – Bristol Temple Meads BT	
H	LL	Paddington – Bristol Temple Meads via Bath	
H	HL	Lowestoft / Yarmouth – (joins / splits Beccles) – Euston Cross – Weymouth	
RS	HL	Henley – Basingstoke all station	
07H	HL	Clacton / Walton – (joins / splits Thorpe le Soken) – Euston Cross – Plymouth	
R	HL	XC Manchester – Bournemouth West	
15H	LL	<i>Norwich via Diss – Euston Cross – Plymouth</i>	<i>NON-STOP</i>
H	LL	[Dover Priory – ] Euston Cross – Cardiff Airport	
H	LL	Paddington – Gloucester – Cardiff Airport / Worcester Shrub Hill	
H	HL	Harwich – Euston Cross – Bournemouth West	
RS	HH	Reading – Basingstoke all stations	
23H	LL	Paddington – Penzance	
H	HL	Braintree – Euston Cross – Salisbury	
R	HL	XC York – Bournemouth West	

– repeating at 30, 37, 45, and 53 minutes past.

Several aspects of the above interchange arrangements are worth highlighting. Reading Parkway LL has some services not stopping, thus passing through the centre of the layout, passing stopping services on the station loop lines. As a rule of thumb, stopping a train at a station, on a HS route, inflicts a time penalty of c.7 minutes on that train, as compared with travelling non-stop through the station at line speed. Thus the four stopping services on the HS4 main line, (ignoring the Penzance service, not relevant in the present context,) incur a time penalty of 7 minutes at Reading Parkway. The two services from Paddington also stop at Discot Parkway, thus incurring a further 7 minute penalty. Therefore, when the services reach Swindon (where they all stop), the Shenfield – Swansea service is 7 minutes ahead of the Dover – Bristol service, and a further 7 minutes ahead of the Paddington Bristol service, and has caught up with the Paddington – Cardiff Airport / Worcester service. Likewise, the Norwich – Plymouth service is 7 minutes ahead of the Dover – Cardiff Airport service,, and a further 7 minutes ahead of the Paddington – Cradiff Airport / Worcester service, and has caught up with the Paddington – Bristol service. Readers should consult the interchange pattern at Swindon to confirm that this is exactly what does happen.

*(Smartarse!!!)* These main line services connect at Reading with a service to Bournemouth, and perhaps Weymouth, in the HL platforms, and also a stopping service of all stations from Reading General (possibly starting from Henley) to Basingstoke. The service pattern in the intervening intervals affects only the HL station. HS Services to Salisbury, or on to Exeter and Plymouth (via Okehampton), make connection with a classic cross country service to Bournemouth (which has just called at Reading General, where it reverses). Thus every service has a connection from Reading General, which is located right in the centre of the town, one of the very best located of all stations.

The loadings imposed on HS4 by SP3 are unchanged from SP2; all that has changed is that most of the originating stations on HS11 and HS12 have changed – indeed only Norwich via Diss– Euston Cross – Swansea/Plymouth are unchanged.

## *Service Plan 4*

This service plan comes into effect when:

- HS7 is opened north of Birmingham, to York and Leeds, also to Nottingham. (This is HS7 SP3.)
- HS9 opens its initial section between Leeds and Garforth. (This is HS8/9 SP0A.)

As far as HS7's services south of Birmingham (and thus relevant to HS4) are concerned, the only changes are that the Plymouth service now starts from York, and one of the Swansea services start from Nottingham. These services now do not serve Birmingham HS, but travel directly from Water Orton North Junction to Birmingham Interchange.

## *Service Plan 4A*

This service plan comes into effect when:

- HS7 is extended from York to Newcastle, via Durham (Relly Mill) and Consett. (HS7 SP3A.)

The only change relevant here is that the Plymouth service now starts at Newcastle and Middlesborough (2 portions, joining / splitting at York HS), and the NE/SW route is now complete.

## *Service Plan 4B*

This service plan comes into effect when:

- HS8 opens between Huddersfield and Ladybower Junction. (This is HS8/9 SP2.)

The only significance of this, in the present context, is that NE-SW services now travel between York and Wales Junction via Leeds, Huddersfield and Sheffield, rather than via South Yorkshire.

## *Service Plan 4C*

This service plan comes into effect when:

- HS8 opens between Nottingham and Ely, via Peterborough. (This is HS8/9 SP2A.)

The only significance of this, in the present context, is that the service from Nottingham to Swansea now starts from Norwich.

All of the changes at the various stages of SP4 affect only HS7, and are relevant only to those services interchanging with HS7 at Bristol Parkway. Thus:

- 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS  
South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway –  
Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea

[Interchange with HS7 2tphH:

Newcastle – Consett – Durham Relly Mill – Darlington Bank Top –:

Middlesborough – Thornaby – Eaglescliffe – Yarm – Northallerton –:

(joins / splits) York HS – Leeds HS – Huddersfield – Sheffield HS – Derby – Birmingham

Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple

Meads – Taunton – Exeter St. David’s – Plymouth]

- 2tphH Dover Priory – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Bristol Temple Meads BT [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport]
- 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David’s – Plymouth [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea]
- 2tphH Dover Priory – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Ashchurch – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads BT]

The other HS4/HS12 services are now:

- 2tphH Lowestoft / Yarmouth – (joins / splits Beccles) – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Poole – Wareham – Dorchester South – Weymouth
- 2tphH Harwich – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Bournemouth West
- 2tphH Clacton / Walton – (joins / splits Thorpe le Soken) – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Salisbury – Tisbury – Gillingham – Templecombe – Sherborne – Yeovil Junction – Crewkerne – Chard Parkway – Axminster – Honiton – Exeter Central – Exeter St. David’s – Okehampton – Tavistock – Bere Alston – Plymouth
- 2tphH Braintree – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Overton – Whitchurch – Andover – Grateley – Salisbury

Representative Hourly Cross-Platform Interchange at Bristol Parkway:

00H Norwich via Diss – Euston Cross – Swansea

H Newcastle / Middlesborough – (joins / splits York HS) – Plymouth

07H Dover Priory – Euston Cross – Bristol Temple Meads BT

H Birmingham HS – Cardiff Airport

15H Norwich via Diss – Euston Cross – Plymouth

H Norwich – Swansea



23H Dover Priory – Euston Cross – Cardiff Airport  
H Birmingham HS – Bristol Temple Meads BT

– repeating at 30, 37, 45 and 53 minutes past.

Representative Hourly Cross-Platform Interchange at Worcester Shrub Hill:

00H Newcastle / Middlesborough – (joins / splits York HS) – Plymouth  
H Worcester – Gloucester – Paddington

07H Birmingham HS – Cardiff Airport  
R York – Plymouth

15H Norwich – Swansea  
R Hereford – Paddington

23H Birmingham HS – Bristol Temple Meads BT  
RS Birmingham New St. – Hereford

– repeating at 30, 37, 45 and 53 minutes past.

Representative Hourly Cross-Platform Interchange Pattern at Swindon (refer to Appendix B for the revised layout at Swindon):

00H Dover Priory – Euston Cross – Bristol Temple Meads BT (platform 1)  
R Heathrow Shuttle (platform 2; reverse then return from platform 3)

07H Norwich via Diss – Euston Cross – Plymouth (platform 1)  
H Paddington – Bristol Temple Meads via Bath (platform 2)

15H Dover Priory – Euston Cross – Cardiff Airport (platform 1)  
R Paddington – Weymouth (platform 2)

23H Norwich via Diss – Euston Cross – Swansea  
H Paddington – Gloucester – Cardiff / Worcester (platform 5; not cross-platform)

– repeating at 30, 37, 45, and 53 minutes past.

Representative Hourly Interchange at Reading Parkway (cross-platform at both HL and LL):

00H	LL	<i>Norwich via Diss – Euston Cross – Swansea</i>	<i>NON-STOP</i>
H	LL	Dover Priory – Euston Cross – Bristol Temple Meads BT	
H	LL	Paddington – Bristol Temple Meads via Bath	
H	HL	Lowestoft / Yarmouth – (joins / splits Beccles) – Euston Cross – Weymouth	
RS	HL	Henley – Basingstoke all station	
07H	HL	Clacton / Walton – (joins / splits Thorpe le Soken) – Euston Cross – Plymouth	
R	HL	XC Manchester – Bournemouth West	
15H	LL	<i>Norwich via Diss – Euston Cross – Plymouth</i>	<i>NON-STOP</i>
H	LL	Dover Priory – Euston Cross – Cardiff Airport	
H	LL	Paddington – Gloucester – Cardiff Airport / Worcester Shrub Hill	

H HL Harwich – Euston Cross – Bournemouth West

RS HH Reading – Basingstoke all stations

23H LL Paddington – Penzance

H HL Braintree – >Euston Cross – Salisbury

R HL XC Newcastle – Bournemouth West

– repeating at 30, 37, 45, and 53 minutes past.

(See SP3 for an elucidation of the above.)

The loadings imposed on HS4 by the overall SP4 are unchanged from SP2; all that has changed is that most of the originating stations on HS11 and HS12 have changed – indeed only Shenfield – Euston Cross – Swansea is unchanged.

## *Service Plan 5*

This final service plan comes into effect much later, when:

- HS12 is extended from Pinewood Junction to Norwich, via Beccles. (This is HS11/12 SP3, incorporating the section between Beccles and Reedham, introduced at HS11/12 SP2A.)

At Mk1A, HS12 has new infrastructure between Pinewood Junction, on the GEML just south of Ipswich, to Norwich including a new Ipswich HS station, underneath and at right angles to the existing station, then in tunnel under Ipswich and joining the alignment of the East Suffolk line, (just after the Felixstowe branch has diverged, so there is no conflict with freight traffic,) which it follows very roughly, straightening out all the curves, until Beccles, where it interchanges with the Lowestoft and Yarmouth service, which uses the East Suffolk line but does also use the new station at Ipswich). Between Shenfield North Junction and Pinewood Junction, HS12 continues to share tracks with the GEML.

The Norwich – Swansea service is now routed via Beccles, and, as mentioned above, the Yarmouth / Lowestoft – Weymouth service is also routed via the new Ipswich HS station. Beyond these, there are no changes to HS4 services, (in particular, the Norwich – Plymouth service continues to travel via Diss,) and no changes whatever, on HS4 tracks.

HS4's loadings are still as they were at SP2.

## *Service Plan 5 Summary*

It's worth summarising the full set of services at service plan 5, as this represents the final, complete state of these plans, (at Mk1A,) and the services have so far been introduced piecemeal, at the various stages.

HS4 services (including interchange at Bristol Parkway where appropriate):

- 2tphH Norwich – Beccles – Ipswich HS – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea  
[Interchange with HS7 2tphH:  
Newcastle – Consett – Durham Relly Mill – Darlington Bank Top –:  
Middlesborough – Thornaby – Eaglescliffe – Yarm – Northallerton –:  
(joins / splits) York HS – Leeds HS – Huddersfield – Sheffield HS – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David's – Plymouth]
- 2tphH Dover Priory – Canterbury East – Faversham – Sheerness – Grain – Southend HS – Southend Airport – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Bristol Temple Meads BT [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport]
- 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David's – Plymouth [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea]
- 2tphH Dover Priory – Canterbury East – Faversham – Sheerness – Grain – Southend HS – Southend Airport – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Ashchurch – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads BT]
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading Parkway LL – Taunton – Exeter St. David's – Plymouth – Liskeard – Bodmin Rd. – Lostwithiel – Par – St. Austell – Truro – Redruth – Camborne – Hayle – St. Erth – Penzance
- 2tphH Lowestoft – Oulton Broad South – )  
Yarmouth – Breney Arms – Reedham South – ) Beccles (joins/splits) – Brampton – Halesworth – Darsham – Saxmundham – Wickham Market – Woodbridge – Ipswich HS – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Poole – Wareham – Dorchester South – Weymouth
- 2tphH Harwich Town – Dovercourt – Harwich Parkeston Quay – Wrabness – Mistley – Manningtree – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Winchester –

Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Bournemouth West

- 2tphH Clacton – )  
Walton – Frinton – ) Thorp le Soken (joins/splits) – Wivenhoe – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Salisbury – Tisbury – Gillingham – Templecombe – Sherborne – Yeovil Junction – Crewkerne – Chard Parkway – Axminster – Honiton – Exeter Central – Exeter St. David's – Okehampton – Tavistock – Bere Alston – Plymouth
- 2tphH Braintree – Braintree Freeport – Cressing – White Notley – Witham – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Overton – Whitchurch – Andover – Grateley – Salisbury
- 2tphH Oxford – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Bournemouth West
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading Parkway LL – Didcot Parkway – Swindon – Chippenham – Bath Spa – Bristol Temple Meads
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading Parkway LL – Didcot Parkway – Swindon – Kemble – Stroud – Stonehouse – Gloucester (splits / joins) –:  
– Lydney – Chepstow – Caldicot – Severn Tunnel Junction – Newport – Cardiff –  
Cardiff (Rhoose) Airport  
– (reverse) Cheltenham Spa – Ashchurch – Worcester Shrub Hill

#### GWML Regional Metro:

- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Didcot – Wantage Road – Swindon (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Maidenhead – Twyford – Reading – Tilehurst – Pangbourne – Goring and Streatley – Cholsey – Didcot – Oxford (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Thatcham – Newbury – Hungerford – Bedwyn – Pewsey – Devizes – Holt Junction – Bradford on Avon – Bath – Bristol Temple Meads (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Thatcham – Newbury – Kintbury – Hungerford – Bedwyn – Savernake – Marlborough (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Maidenhead – Bourne End (connections to and from Marlow) High Wycombe – Princes Risborough – Little Kimble – Aylesbury – Aylesbury Vale Parkway – Calvert (for HS2) – Winslow – Bletchley – Milton Keynes (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Maidenhead – Twyford – Wargrave – Shiplake – Henley (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – Slough – Reading – Thatcham – Newbury – Pewsey – Westbury – Taunton – Tiverton Parkway – Cullompton – Exeter St. David's – Dawlish – Teignmouth – Newton Abbot – Totnes – Ivybridge – Plymouth

- 2tphR Paddington – Old Oak Common – Slough – Reading – Didcot – Wantage Road – Swindon – Royal Wootton Bassett – Chippenham – Melksham – Holt Junction – Trowbridge – Westbury – Frome – Castle Cary – Yeovil Pen Mill – Dorchester West – Weymouth
- 2tphR Paddington – Old Oak Common – Slough – Reading – Didcot – Oxford – Hanborough – Charlbury – Kingham – Moreton in March – Honeybourne – Evesham – Pershore – Worcester Shrub Hill – Worcester Foregate Street – Malvern Link – Great Malvern – Colwell – Ledbury – Hereford

Note that the GWML services have also changed, in response to HS4 changes. In particular, the fast service from Paddington to Penzance has been replaced by the Norwich via Diss – Penzance service on HS12/HS4, and that now the Heathrow Shuttle service has six arms. (Refer to the article ‘GWML Service Plans’ for full details of how classic services change, in sync. with HS services.)

#### HS7 South of Birmingham:

- 2tphH Newcastle – Consett – Durham Relly Mill – Darlington Bank Top –: Middlesborough – Thornaby – Eaglescliffe – Yarm – Northallerton –: (joins / splits) York HS – Leeds HS – Huddersfield – Sheffield HS – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David’s – Plymouth
- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport
- 2tphH Norwich – Peterborough – Nottingham – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea
- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Ashchurch – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads BT

#### NE-SW Regional Metro:

- 2tphR York – Micklefield – Leeds City – Wakefield Westgate – South Yorkshire LL – Rotherham – Sheffield Midland – Chesterfield – Derby – Burton on Trent – Tamworth – Birmingham New St. – University – Bromsgrove – Droitwich Spa – Worcester Shrub Hill – Ashchurch – Cheltenham Spa – Gloucester (reverse) – Bristol Parkway – Bristol Temple Meads – Weston Super Mare – Highbridge – Bridgwater – Taunton – Tiverton Junction – Cullompton – Exeter St. David’s – Dawlish – Teignmouth – Newton Abbot – Totnes – Ivybridge – Plymouth

#### Cross Country (XC) Services:

- 2tphR York – Micklefield – Leeds City – Wakefield Westgate – South Yorkshire LL – Sheffield Midland – Chesterfield – Derby – Burton upon Trent – Tamworth HL – Birmingham New St. (reverse) – Birmingham International – Coventry – Leamington Spa – Banbury – Oxford – Reading General (reverse) – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Bournemouth West
- 2tphR Manchester Piccadilly – Stockport – Macclesfield – Stoke upon Trent – Stafford – Wolverhampton – Birmingham New St. – Birmingham International – Coventry – Leamington Spa – Banbury – Oxford – Reading General (reverse) – Reading Parkway HL – Basingstoke HS –



Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst –  
Bournemouth Central – Bournemouth West

Representative Hourly Cross-Platform Interchange at Bristol Parkway:

- 00H Norwich via Beccles – Euston Cross – Swansea
- H Newcastle / Middlesbrough – (joins / splits York HS) – Plymouth
- 07H Dover Priory – Euston Cross – Bristol Temple Meads BT
- H Birmingham HS – Cardiff Airport
- 15H Norwich via Diss – Euston Cross – Plymouth
- H Norwich via Birmingham – Swansea
- 23H Dover Priory – Euston Cross – Cardiff Airport
- H Birmingham HS – Bristol Temple Meads BT

– repeating at 30, 37, 45 and 53 minutes past.

Representative Hourly Cross-Platform Interchange at Worcester Shrub Hill:

- 00H Newcastle / Middlesbrough – (joins / splits York HS) – Plymouth
- H Worcester – Gloucester – Paddington
- 07H Birmingham HS – Cardiff Airport
- R York – Plymouth
- 15H Norwich – Swansea
- R Hereford – Paddington
- 23H Birmingham HS – Bristol Temple Meads BT
- RS Birmingham New St. – Hereford

– repeating at 30, 37, 45 and 53 minutes past.

Representative Hourly Cross-Platform Interchange Pattern at Swindon (refer to Appendix B for the revised layout at Swindon):

- 00H Norwich via Beccles – Euston Cross – Swansea (platform 1)
- H Paddington – Gloucester – Cardiff / Worcester (platform 5; not cross-platform)
- 07H Dover Priory – Euston Cross – Bristol Temple Meads BT (platform 1)
- R Heathrow Shuttle (platform 2; reverse then return from platform 3)
- 15H Norwich via Diss – Euston Cross – Plymouth (platform 1)
- H Paddington – Bristol Temple Meads via Bath (platform 2)
- 23H Dover Priory – Euston Cross – Cardiff Airport (platform 1)
- R Paddington – Weymouth (platform 2)

– repeating at 30, 37, 45, and 53 minutes past.

Representative Hourly Interchange at Reading Parkway (cross-platform at both HL and LL):

00H	LL	<i>Norwich via Beccles – Euston Cross – Swansea</i>	<i>NON-STOP</i>
H	LL	Dover Priory – Euston Cross – Bristol Temple Meads BT	
H	LL	Paddington – Bristol Temple Meads via Bath	
H	HL	Lowestoft / Yarmouth – (joins / splits Beccles) – Euston Cross – Weymouth	
RS	HL	Henley – Basingstoke all station	
07H	HL	Clacton / Walton – (joins / splits Thorpe le Soken) – Euston Cross – Plymouth	
R	HL	XC Manchester – Bournemouth West	
15H	LL	<i>Norwich via Diss – Euston Cross – Plymouth</i>	<i>NON-STOP</i>
H	LL	Dover Priory – Euston Cross – Cardiff Airport	
H	LL	Paddington – Gloucester – Cardiff Airport / Worcester Shrub Hill	
H	HL	Harwich – Euston Cross – Bournemouth West	
RS	HH	Reading – Basingstoke all stations	
23H		Paddington – Penzance	
	HL	Braintree – Euston Cross – Salisbury	
R	HL	XC York – Bournemouth West	

– repeating at 30, 37, 45, and 53 minutes past.

Representative Hourly Cross-Platform Interchange Pattern at Westbury:

00R	Paddington – Plymouth
R	Paddington – Weymouth

– repeating at 30 minutes past.

The overall loading imposed on HS4 (unchanged from SP2) is as follows:

• Euston Cross	– Old Oak Common East Junction	(*)	16tph
• Old Oak Common East Jn.	– Old Oak Common West Junction		16tph
• Paddington	– Old Oak Common station (ground level *)		6tph
• Old Oak Common station	– Old Oak Common West Junction		6tph
• Old Oak Common West Jn.	– Three Mile Cross Junction		22tph
• Three Mile Cross Junction	– Burghfield Junction		14tph
• Three Mile Cross Junction	– Grazeley Junction		8tph
• Grazeley Junction	– Basingstoke HS	(*)	10tph
• Grazeley Junction	– Burghfield Junction		2tph
• Burghfield Junction	– Theale East Junction		16tph
• Theale East Junction	– Aston North Junction		14tph
• Aston North Junction	– Foxhall HS Junction (via Didcot station)		4tph
• Aston North Junction	– Foxhall HS Junction (avoiding station)		8tph
• Foxhall HS Junction	– Swindon station	(*)	12tph
• Swindon station	– Wootton Bassett Junction	(*)	10tph
• Wootton Bassett Junction	– Westerleigh Junction		8tph
• Westerleigh Junction	– Bristol Parkway		16tph

- Bristol Parkway – Severn Tunnel Junction (\*) 8tph
- Severn Tunnel Junction – Cardiff (\*) 10tph
- Cardiff – Cardiff (Rhoose) Airport 10tph
- Cardiff (Rhoose) Airport – Swansea (\*) 4tph

(\*) There will of course additionally be non-HS4 services on these sections. Except for Bristol Parkway – Severn Tunnel Junction and Cardiff Airport – Swansea (and, of course, Euston Cross – Old Oak Common,) these are all 4-track.

### *Service Patterns at Reading*

The interchange pattern at Reading Parkway has been given in the relevant service plans. The service pattern at Reading General is of direct interest also. The following summarises the westbound service sequence there, at SP5, and is taken from the article ‘GWML Service Plans’. These are just the semi-fast RM services. There are also stopping services to Newbury, Basingstoke and Henley, and Crossrail. See the ‘GWML Service Plans’ article for full details. In particular, the service between Reading and Basingstoke, alternate ones originating from Henley, have been mentioned earlier, as they provide connections to most of the services at Reading Parkway (the XC services provide connections with the rest).

- 00 LHR Shuttle – Swindon
- 00 Gatwick Airport – Milton Keynes
- 10 Bournemouth – Manchester (rev)
- 10 LHR Shuttle – Devizes – Bristol
- 12 Manchester – Bournemouth (rev)
- 15 Paddington – Weymouth
- 15 LHR Shuttle – Oxford
- 24 Paddington – Hereford
- 25 Bournemouth – York (rev)
- 25 LHR Shuttle – Marlborough
- 27 York – Bournemouth (rev)
- 28 Paddington – Plymouth

– repeating at 30 minutes past.

## 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. However, comparing my estimated distances with actual distances, where these are appropriate, leads me to believe they are accurate to c.2%.

The crudest approximation is the assumption that, once line speed has been reached, that speed (360kph on new infrastructure, between LHR Interchange and Didcot,) is maintained until it becomes necessary to decelerate for a junction or a station stop. These times are accumulated over the journey, and a notional wait time of 3 minutes added for each intermediate station stop.

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

Two versions are produced for each table, the summary version, containing results only for stations at which the service stops, and any locations, (invariably junctions,) where there is a change of line speed. The second version, suffixed P, contains the same results as previously, and, in addition, *passing times* (so indicated) for all other locations which are of interest for one reason or another. Note that **station loop junctions** are included in the passing times, where this is appropriate (does not apply to routes where the services are of type HS Metro, where there is no requirement for overtaking at stations). These junction locations are easily derived from the location of the station:

- a diverging junction (to stop at the station) is 4.1km before the station
- a converging junction (to re-join the main line after the station) is 6.8km after the station

My estimated distances are:

• Euston Cross – Old Oak Common	8km	(*)
• Paddington – Old Oak Common	5km	(*)
• Old Oak Common – LHR Interchange	20km	(200kph)
• LHS Interchange – Reading Parkway LL	37km	(360kph)
• Reading Parkway LL – Three Mile Cross Junction	2.2km	(360kph)
• Reading Parkway LL – Burghfield Junction	2.1km	(360kph)
• Reading Parkway LL – Theale HS Junction	5km	(360kph)
• Reading Parkway LL – Didcot Parkway	30km	(360kph)
• Reading Parkway LL – Foxhall HS Junction	30.5km	(360kph)
• LHR Interchange – Foxhall HS Junction	67.5kph	(360kph)
• Foxhall HS Junction – Swindon	38.4km	(225kph)
• Cardiff – Cardiff (Rhoose) Airport	15km	(360kph *)
• Cardiff (Rhoose) Airport – Aberthaw Junction	4km	(160kph but built for 360kph)
• Aberthaw Junction – Bridgend	22km	(160kph Vale of Glamorgan)
• Exeter St. David’s – Plymouth	65km	(360kph)
• Okehampton – Tavistock	24km	(160kph)
• Tavistock – Bere Alston	9km	(160kph)

- Reading Parkway HL – Basingstoke HS 17km (160kph)
- Bournemouth Central – Bournemouth West 6km (\*)

(The distance to Reading Parkway HL is taken as the same as to LL, though it will be slightly longer because of the curvature of the approaches.) The above are all distances on HS4/HS7's new infrastructure.

In addition, they share the following sections of classic routes, whose lengths are known exactly!

- Didcot Parkway – Swindon 38.9km (225kph)
- Swindon – Bristol Parkway 55.5km (225kph)
- Swindon – Westerleigh Junction 48.1km (225kph)
- Westerleigh Junction – Bristol Parkway 7.4km (225kph)
- Bristol Parkway – Severn Tunnel Junction 18.8km (160kph)
- Severn Tunnel Junction – Newport 15.9km (160kph)
- Bristol Parkway – Newport 34.7km (160kph)
- Newport – Cardiff 20.5km (160kph)
- Aberthaw Junction – Bridgend 22.0km (160kph)
- Bridgend – Port Talbot 19.6km (160kph)
- Port Talbot – Neath 10.7km (160kph)
- Neath – Swansea 14.2km (160kph)
- Swansea – Llanelli 18.1km (160kph)
- Llanelli – Pembrey and Burry Port 6.4km (160kph)
- Pembrey and Burry Port – Carmarthen 26.3km (160kph)
- Swindon – Kemble 22.0km (200kph)
- Kemble – Stroud 18.0km (200kph)
- Stroud – Stonehouse 4.4km (\*)
- Stonehouse – Gloucester 14.7km (200kph)
- Gloucester – Lydney 31.2km (160kph)
- Lydney – Chepstow 12.8km (160kph)
- Chepstow – Caldicot 10.7km (160kph)
- Caldicot – Severn Tunnel Junction 1.2km (\*)
- Gloucester – Cheltenham Spa 14.0km (200kph)
- Cheltenham Spa – Ashchurch 11.7km (200kph)
- Ashchurch – Worcester Shrub Hill 22.4km (200kph)
- Swindon – Royal Wootton Bassett 9.0km (225kph\*)
- Royal Wootton Bassett – Chippenham 17.8km (200kph)
- Chippenham – Bath Spa 20.8km (200kph)
- Bath Spa – Bristol Temple Meads 18.5km (200kph)
- Bristol Parkway – Bristol Temple Meads 9.2km (200kph)
- Bristol Temple Meads – Taunton 72.0km (200kph)
- Bristol Temple Meads – Cogload Junction 64.7km (200kph)
- Cogload Junction – Taunton 7.3km (200kph)
- Theale HS Junction (1km east of Theale) – Taunton 164.5km (200kph)
- Taunton – Exeter St. David's 49.5km (200kph)



• Taunton – Tiverton Parkway	22.9km	(200kph)
• Tiverton Parkway – Exeter St. David's	26.6km	(200kph)
• Basingstoke HS – Winchester	30.1km	(200kph)
• Winchester – Southampton Airport Parkway	13.4km	(200kph)
• Southampton Airport Parkway – Southampton Central	7.1km	(*)
• Southampton Central – Brockenhurst	21.9km	(160kph)
• Brockenhurst – Bournemouth Central	24.5km	(160kph)
• Bournemouth Central – Poole	9.3km	(160kph)
• Poole – Wareham	11.1km	(160kph)
• Wareham – Dorchester South	24.1km	(160kph)
• Dorchester South – Weymouth	11.4km	(160kph)
• Basingstoke HS – Salisbury	57.6km	(200kph)
• Salisbury – Tisbury	20.3km	(160kph)
• Tisbury – Gillingham	14.7km	(160kph)
• Gillingham – Templecombe	12.5km	(160kph)
• Templecombe – Sherborne	11.3km	(160kph)
• Sherborne – Yeovil Junction	7.3km	(160kph)
• Yeovil Junction – Crewkerne	15.8km	(160kph)
• Crewkerne – Chard Parkway	12.9km	(160kph)
• Chard Parkway – Axminster	8.2km	(160kph)
• Axminster – Honiton	16.5km	(160kph)
• Honiton – Exeter Central	28.3km	(160kph)
• Exeter Central – Exeter St. David's	1.1km	(*)
• Exeter St. David's – Okehampton	40.5km	(160kph)
• Bere Alston – Plymouth	18.3km	(160kph)

The line speeds are chosen as follows:

- All new HS4 infrastructure has a line speed of 360kph (except Old Oak Common – LHR Interchange, which isn't long enough to reach that speed, for which 200kph is chosen).
- HS7 new infrastructure (i.e. Exeter – Plymouth) is likewise 360kph.
- All sections of the GWML classic routes from Didcot to Bristol Parkway are upgraded to a line speed of 225kph.
- The GWML between Swindon and Bristol Temple Meads via Bath, and between Swindon and Gloucester, and the Berks & Hants between Theale HS Junction (where the connection from the HS4 main line joins) and Cogload Junction, before Taunton, are upgraded to a line speed of 200kph.
- The section between Bristol Parkway and Bristol Temple Meads, and on to Exeter, merged into HS7, are upgraded to 200kph.
- The South Western line between Basingstoke and Southampton Airport Parkway, and between Basingstoke and Salisbury, is likewise upgraded to 200kph.
- 160kph is taken as the line speed everywhere else, when nothing higher seems reasonable; no respectable railway should ever be slower than this.

- Those sections marked (\*) are between Adjacent Stations, where the distance is insufficient for the line speed to be reached. The times between stations are given below, for a regime of acceleration switching to deceleration without any intervening steady speed.

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

- Acceleration from stationary to 360kph, 225mph, takes 16.67km and 333 seconds
- Acceleration from stationary to 300kph, 187.5mph, takes 11.57km and 278 seconds
- Acceleration from stationary to 230kph, 143.8mph, takes 6.80km and 213 seconds
- Acceleration from stationary to 225kph, 140mph, takes 6.51km and 208 seconds
- Acceleration from stationary to 200kph, 125mph, takes 5.14km and 185 seconds
- Acceleration from stationary to 160kph, 100mph, takes 3.29km and 148 seconds
- Deceleration from 360kph to stationary takes 10.00km and 200 seconds
- Deceleration from 300kph to stationary takes 6.945km and 167 seconds
- Deceleration from 230kph to stationary takes 4.08km and 128 seconds
- Deceleration from 225kph to stationary takes 3.91km and 125 seconds
- Deceleration from 200kph to stationary takes 3.07km and 111 seconds
- Deceleration from 160kph to stationary takes 1.98km and 89 seconds
- Time to travel from Euston Cross to Old Oak Common (start to stop) is 292 seconds
- Time to travel from Paddington to Old Oak Common (start to stop) is 231 seconds
- Time to travel from Cardiff to Cardiff (Rhoose) Airport (start to stop) is 400 seconds
- Time to travel from Stroud to Stonehouse (start to stop) is 217 seconds
- Time to travel from Caldicot to Severn Tunnel Junction (start to stop) is 112 seconds
- Time to travel from So’ton Airport Parkway to So’ton Central (start to stop) is 275 seconds
- Time to travel from Bournemouth Central to Bournemouth West is 253 seconds
- Time to travel from Exeter Central to Exeter St. David’s is 106 seconds

Whereas it is useful to quote the specific values input explicitly to the journey time spreadsheets for the routes dealt with in the current article, there is no point in describing the methodology other than at the most superficial level. The calculation of journey times is described in full and exhaustive detail in Appendix C of the ‘Same Speed Railways’ article, and Appendix D of the same article lists all the explicit times encountered throughout the network, explaining precisely what they are and why they are specified explicitly. To reproduce this information would inflate the current article (and every other Route and Service Plans article) by some forty-odd pages with negligible benefit – they’re long enough anyway. The general reader needs to be interested only in the results. Those geeks who just have to have the really raw, hard-core stuff know where they can find it. (As a fully-paid-up geek myself, I love this stuff and it has been an immense pleasure and satisfaction to derive and document it, but I don’t kid myself that it’s of interest to more than a handful of people in the UK, or indeed the world. Nor need it be.)

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 intermediate stations, and this is added into the accumulated time at each stop.

*1. HS Euston Cross – Swansea / Plymouth (10/7 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Foxhall HS Junction	67.5	95.5	14.3	27.6	
Foxhall HS Junction - Swindon	38.4	133.9	11.3	38.9	44.9
Swindon - Bristol Parkway	55.5	189.4	17.6	56.5	65.5
Bristol Parkway - Newport	34.7	224.1	15.0	71.4	83.4
Newport - Cardiff	20.5	244.6	9.7	81.1	96.1
Cardiff - Cardiff Airport	15.0	259.6	6.7	87.8	105.8
Cardiff Airport - Bridgend	26.0	285.6	11.7	99.5	120.5
Bridgend - Port Talbot Parkway	19.6	305.2	9.3	108.8	132.8
Port Talbot Parkway - Neath	10.7	315.9	6.0	114.8	141.8
Neath - Swansea	14.2	330.1	7.3	122.1	152.1
Bristol Parkway - Bristol Temple Meads	9.2	198.6	5.2	61.7	73.7
Bristol temple Meads - Taunton	72.0	270.6	24.1	85.8	100.8
Taunton - Exeter St. David's	49.5	320.1	17.3	103.1	121.1
Exeter St. David's - Plymouth	65.0	385.1	15.3	118.4	139.4

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

• Swindon	52	[45]
• Bristol Parkway	79	[66]
• Newport	105	[83]
• Cardiff	121	[96]
• Bridgend	144	[121]
• Port Talbot	157	[133]
• Neath	165	[142]
• Swansea	178	[152]
• Bristol Temple Meads	99	[74]
• Taunton	102	[101]
• Exeter St. David's	120	[121]
• Plymouth	179	[139]

*1P. HS Euston Cross – Swansea / Plymouth (10/7 stops; with passing times):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - <i>Shinfield (W.) Jn. (pass)</i>	32.9	60.9	8.3	<i>21.6</i>	<i>27.6</i>
<i>Shinfield (W.) Jn. (pass) - 3 Mile Cross Jn. (pass)</i>	1.9	62.8	0.3	<i>21.9</i>	<i>27.9</i>
<i>3 Mile Cross Jn. (pass) - Reading Pkwy LL (pass)</i>	2.2	65.0	0.4	<i>22.3</i>	<i>28.3</i>
<i>Reading Pkwy LL (pass) - Burghfield Jn. (pass)</i>	2.1	67.1	0.4	<i>22.6</i>	<i>28.6</i>
<i>Burghfield Jn. (pass) - Theale (West) Jn. (pass)</i>	4.7	71.8	0.8	<i>23.4</i>	<i>29.4</i>
<i>Theale (West) Jn. (pass) - Aston North Jn. (pass)</i>	19.1	90.9	3.2	<i>26.6</i>	<i>32.6</i>
<i>Aston North Jn. (pass) - Foxhall HS Jn. (pass)</i>	4.6	95.5	1.0	<i>27.6</i>	<i>33.6</i>
<i>Foxhall HS Jn. (pass) - Swindon</i>	38.4	133.9	11.3	38.9	44.9
Swindon - <i>Westerleigh Jn. (pass)</i>	48.1	182.0	14.6	<i>53.4</i>	<i>62.4</i>
<i>Westerleigh Jn. (pass) - Bristol Parkway</i>	7.4	189.4	3.0	56.5	65.5

Bristol Parkway - Newport	34.7	224.1	15.0	71.4	83.4
Newport - Cardiff	20.5	244.6	9.7	81.1	96.1
Cardiff - Cardiff Airport	15.0	259.6	6.7	87.8	105.8
Cardiff Airport - <i>Aberthaw Jn. (pass)</i>	4.0	263.6	2.7	<i>90.5</i>	<i>111.5</i>
<i>Aberthaw Jn. (pass)</i> - Bridgend	22.0	285.6	9.0	99.5	120.5
Bridgend - Port Talbot Parkway	19.6	305.2	9.3	108.8	123.8
Port Talbot Parkway - Neath	10.7	315.9	6.0	114.8	132.8
Neath - Swansea	14.2	330.1	7.3	122.1	143.1
Bristol Parkway - Bristol Temple Meads	9.2	198.6	5.2	61.7	73.7
Bristol Temple Meads - <i>Cogload Junction (pass)</i>	64.7	263.3	21.0	<i>82.6</i>	<i>97.6</i>
<i>Cogload Junction (pass)</i> - Taunton	7.3	270.6	3.1	85.8	100.8
Taunton - <i>Tiverton Parkway (pass)</i>	22.9	293.5	8.4	<i>94.2</i>	<i>112.2</i>
<i>Tiverton Parkway (pass)</i> - Exeter St. David's	26.6	320.1	8.9	103.1	121.1
Exeter St. David's - Plymouth	65.0	385.1	15.3	118.4	139.4



## 2. *HS Paddington – Plymouth [– Cornwall] (5 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Paddington - Old Oak Common	5.0	5.0	3.9	3.9	3.9
Old Oak Common - LHR Interchange	20.0	25.0	8.5	12.4	15.4
LHR Interchange - Reading Parkway LL	37.0	62.0	10.6	23.0	29.0
Reading Parkway LL - Taunton	169.5	231.5	53.3	76.3	85.3
Taunton - Exeter St. David's	49.5	281.0	17.3	93.6	105.6
Exeter St. David's - Plymouth	65.0	346.0	15.3	108.9	123.9

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

- Taunton 102 [85]
- Exeter St. David's 120 [106]
- Plymouth 179 [124]

Current fastest time (minutes) from Reading (General) [and the above times (from Reading Parkway)] to:

- Taunton 74 [53]
- Exeter St. David's 93 [74]
- Plymouth 152 [92]

(remembering to subtract 3 minutes for the Reading wait time.)

## 2P. *HS Paddington – Plymouth [– Cornwall] (5 stops; with passing times):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Paddington - Old Oak Common	5.0	5.0	3.9	3.9	3.9
Old Oak Common - LHR Interchange	20.0	25.0	8.5	12.4	15.4
LHR Interchange - <i>Shinfield (W.) Jn. (pass)</i>	32.9	57.9	8.5	<i>20.9</i>	<i>26.9</i>

<i>Shinfield (W.) Jn. (pass) - 3 Mile Cross Jn. (pass)</i>	1.9	59.8	0.6	21.4	27.4
<i>3 Mile Cross Jn. (pass) - Reading Parkway LL</i>	2.2	62.0	1.6	23.0	29.0
<i>Reading Parkway HL - Burghfield Jn. (pass)</i>	2.1	64.1	2.0	25.0	34.0
<i>Burghfield Jn. (pass) - Theale HS Jn. (pass)</i>	2.9	67.0	1.1	26.0	35.0
<i>Theale HS Jn. (pass) - Thatcham (pass)</i>	14.3	81.3	4.3	30.3	39.3
<i>Thatcham (pass) - Newbury (pass)</i>	5.7	87.0	1.7	32.0	41.0
<i>Newbury (pass) - Pewsey (pass)</i>	35.8	122.8	10.7	42.8	51.8
<i>Pewsey (pass) - Heywood Rd. Jn. (pass)</i>	31.0	153.8	9.3	52.1	61.1
<i>Heywood Rd. Jn. (pass) - Fairwood Jn. (pass)</i>	3.9	157.7	1.2	53.2	62.2
<i>Fairwood Jn. (pass) - Clink Road Jn. (pass)</i>	28.2	185.9	8.5	61.7	70.7
<i>Clink Road Jn. (pass) - Blatchbridge Jn. (pass)</i>	6.3	192.2	1.9	63.6	72.6
<i>Blatchbridge Jn. (pass) - Bruton (pass)</i>	12.3	204.5	3.7	67.3	76.3
<i>Bruton (pass) - Castle Cary (pass)</i>	5.6	210.1	1.7	69.0	78.0
<i>Castle Cary (pass) - Cogload Jn. (pass)</i>	14.1	224.2	4.2	73.2	82.2
<i>Cogload Jn. (pass) - Taunton</i>	7.3	231.5	3.1	76.3	85.3
<i>Taunton - Tiverton Pkwy (pass)</i>	22.9	254.4	8.4	84.7	96.7
<i>Tiverton Pkwy (pass) - Exeter St. David's</i>	26.6	281.0	8.9	93.6	105.6
<i>Exeter St. David's - Plymouth</i>	65.0	346.0	15.3	108.9	123.9

### 3. *HS Euston Cross – Cardiff Airport / Bristol Temple Meads (7/5 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Reading Parkway LL	37.0	65.0	10.6	23.9	29.9
Reading Parkway LL - Foxhall HS Junction	30.5	95.5	8.1	32.0	
Foxhall HS Junction - Swindon	38.4	133.9	11.3	43.3	52.3
Swindon - Bristol Parkway	55.5	189.4	17.6	60.9	72.9
Bristol Parkway - Newport	34.7	224.1	15.0	75.9	90.9
Newport - Cardiff	20.5	244.6	9.7	85.6	103.6
Cardiff - Cardiff Airport	15.0	259.6	6.7	92.2	113.2
Bristol Parkway - Bristol Temple Meads	9.2	198.6	5.2	66.1	81.1

Current fastest time (minutes) from Reading (General) [and the above times (from Reading Parkway)] to:

- Swindon                      26      [19]
- Bristol Parkway            52      [44]
- Newport                     78      [62]
- Cardiff                      94      [75]
- Bristol TM                  72      [53]

(remembering to subtract 3 minutes for the Reading wait time.)

**3P. HS Euston Cross – Cardiff Airport / Bristol Temple Meads**  
*(7/5 stops; with passing times):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - <i>Shinfield (W.) Jn. (pass)</i>	32.9	60.9	8.5	<i>21.8</i>	<i>27.8</i>
<i>Shinfield (W.) Jn. (pass) - 3 Mile Cross Jn. (pass)</i>	1.9	62.8	0.6	<i>22.4</i>	<i>28.4</i>
<i>3 Mile Cross Jn. (pass) - Reading Pkwy LL</i>	2.2	65.0	1.6	23.9	29.9
Reading Pkwy LL - <i>Burghfield Jn. (pass)</i>	2.1	67.1	2.0	<i>25.9</i>	<i>34.9</i>
<i>Burghfield Jn. (pass) - Theale (West) Jn. (pass)</i>	4.7	71.8	1.6	<i>27.5</i>	<i>36.5</i>
<i>Theale (West) Jn. (pass) - Aston North Jn. (pass)</i>	19.1	90.9	3.5	<i>31.0</i>	<i>40.0</i>
<i>Aston North Jn. (pass) - Foxhall HS Jn. (pass)</i>	4.6	95.5	1.0	<i>32.0</i>	<i>41.0</i>
<i>Foxhall HS Jn. (pass) - Swindon</i>	38.4	133.9	11.3	43.3	52.3
Swindon - <i>Westerleigh Jn. (pass)</i>	48.1	182.0	14.6	<i>57.9</i>	<i>69.9</i>
<i>Westerleigh Jn. (pass) - Bristol Parkway</i>	7.4	189.4	3.0	60.9	72.9
Bristol Parkway - Newport	34.7	224.1	15.0	75.9	90.9
Newport - Cardiff	20.5	244.6	9.7	85.6	103.6
Cardiff - Cardiff Airport	15.0	259.6	6.7	92.2	113.2
Bristol Parkway - Bristol Temple Meads	9.2	198.6	5.2	66.1	81.1

4. *HS Paddington – Bristol / Cardiff / Worcester (8/15/11 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Paddington - Old Oak Common	5.0	5.0	3.9	3.9	3.9
Old Oak Common - LHR Interchange	20.0	25.0	8.5	12.3	15.3
LHR Interchange - Reading Parkway LL	37.0	62.0	10.6	22.9	28.9
Reading Parkway LL - Didcot Parkway	30.0	92.0	9.4	32.4	41.4
Didcot Parkway - Swindon	38.9	130.9	13.2	45.5	57.5
Swindon - Royal Wootton Bassett	9.0	139.9	5.2	50.7	65.7
Royal Wootton Bassett - Chippenham	17.8	157.7	7.8	58.5	76.5
Chippenham - Bath Spa	20.8	178.5	8.7	67.2	88.2
Bath Spa - Bristol Temple Meads	18.5	197.0	8.0	75.2	99.2
Swindon - Kemble	22.0	152.9	9.1	54.6	69.6
Kemble - Stroud	18.0	170.9	7.9	62.5	80.5
Stroud - Stonehouse	4.4	175.3	4.6	67.0	88.0
Stonehouse - Gloucester	14.7	190.0	6.9	73.9	97.9
Gloucester - Lydney	31.2	221.2	13.7	87.6	114.6
Lydney - Chepstow	12.8	234.0	6.8	94.4	124.4
Chepstow - Caldicot	10.7	244.7	6.0	100.3	133.3
Caldicot - Severn Tunnel Junction	1.2	245.9	1.8	102.1	138.1
Severn Tunnel Junction - Newport	15.9	261.8	7.9	110.1	149.1
Newport - Cardiff	20.5	282.3	9.7	119.7	161.7
Cardiff - Cardiff Airport	15.0	297.3	6.7	126.4	171.4
Gloucester - Cheltenham Spa	14.0	204.0	6.7	80.6	107.6
Cheltenham Spa - Ashchurch	11.7	215.7	6.0	86.6	116.6
Ashchurch - Worcester Shrub Hill	22.4	238.1	9.2	95.7	128.7



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

• Reading	24	[29]
• Didcot	38	[41]
• Swindon	52	[58]
• Chippenham	70	[77]
• Bath Spa	83	[88]
• Bristol TM	99	[99]
• Kemble	72	[70]
• Stroud	90	[80]
• Stonehouse	93	[88]
• Gloucester	113	[98]
• Lydney	157	[115]
• Chepstow	152	[124]
• Cheltenham Spa	130	[108]
• Ashchurch	139	[117]
• Worcester	123	[129]

Current fastest time (minutes) from Reading (General) [and the above times (from Reading Parkway)] to:

• Didcot	13	[10]
• Swindon	26	[269]
• Chippenham	41	[45]
• Bath Spa	56	[56]
• Bristol TM	72	[67]
• Kemble	47	[38]
• Stroud	62	[49]
• Stonehouse	68	[56]
• Gloucester	86	[66]
• Lydney	136	[83]
• Chepstow	125	[92]
• Cheltenham Spa	102	[76]
• Ashchurch	111	[85]
• Worcester	93	[97]

(remembering to subtract 3 minutes for the Reading wait time.)

*4P. HS Paddington – Bristol / Cardiff / Worcester  
(8/15/11 stops; with passing times):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Paddington - Old Oak Common	5.0	5.0	3.9	3.9	3.9
Old Oak Common - LHR Interchange	20.0	25.0	8.5	12.3	15.3
LHR Interchange - <i>Shinfield (W.) Jn. (pass)</i>	32.9	57.9	8.5	<i>20.8</i>	<i>26.8</i>
<i>Shinfield (W.) Jn. (pass) - 3 Mile Cross Jn. (pass)</i>	1.9	59.8	0.6	<i>21.4</i>	<i>27.4</i>
<i>3 Mile Cross Jn. (pass) - Reading Pkwy LL</i>	2.2	62.0	1.6	22.9	28.9
Reading Pkwy LL - <i>Burghfield Jn. (pass)</i>	2.1	64.1	2.0	<i>24.9</i>	<i>33.9</i>
<i>Burghfield Jn. (pass) - Theale (West) Jn. (pass)</i>	4.7	68.8	1.6	<i>26.5</i>	<i>35.5</i>
<i>Theale (West) Jn. (pass) - Aston North Jn. (pass)</i>	19.1	87.9	3.8	<i>30.2</i>	<i>39.2</i>
<i>Aston North Jn. (pass) - Didcot Parkway</i>	4.1	92.0	2.1	32.4	41.4
Didcot Parkway - <i>Foxhall HS Jn. (pass)</i>	0.5	92.5	1.0	<i>33.3</i>	<i>45.3</i>
<i>Foxhall HS Jn. (pass) - Swindon</i>	38.4	130.9	12.2	45.5	57.5
Swindon - Royal Wootton Bassett	9.0	139.9	5.2	50.7	65.7
Royal Wootton Bassett - Chippenham	17.8	157.7	7.8	58.5	76.5
Chippenham - Bath Spa	20.8	178.5	8.7	67.2	88.2
Bath Spa - Bristol Temple Meads	18.5	197.0	8.0	75.2	99.2
Swindon - Kemble	22.0	152.9	9.1	54.6	69.6
Kemble - Stroud	18.0	170.9	7.9	62.5	80.5
Stroud - Stonehouse	4.4	175.3	4.6	67.0	88.0
Stonehouse - Gloucester	14.7	190.0	6.9	73.9	97.9
Gloucester - Lydney	31.2	221.2	13.7	87.6	114.6
Lydney - Chepstow	12.8	234.0	6.8	94.4	124.4
Chepstow - Caldicot	10.7	244.7	6.0	100.3	133.3
Caldicot - Severn Tunnel Junction	1.2	245.9	1.8	102.1	138.1

Severn Tunnel Junction - Newport	15.9	261.8	7.9	110.1	149.1
Newport - Cardiff	20.5	282.3	9.7	119.7	161.7
Cardiff - Cardiff Airport	15.0	297.3	6.7	126.4	171.4
Gloucester - Cheltenham Spa	14.0	204.0	6.7	80.6	107.6
Cheltenham Spa - Ashchurch	11.7	215.7	6.0	86.6	116.6
Ashchurch - Worcester Shrub Hill	22.4	238.1	9.2	95.7	128.7

Note that, for the remaining two sets of services, involving the LSW routes to Dorset and the West Country, passing time calculations are not included, since the bulk of the journeys – everything beyond Reading Parkway – are on classic routes, and there are few if any locations, other than the stations served, for which timings are of interest.

5. *HS Euston Cross – Weymouth / Bournemouth West (12/9 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Reading Parkway HL	37.0	65.0	10.6	23.9	29.9
Reading Parkway HL - Basingstoke HS	17.0	82.0	8.4	32.3	41.3
Basingstoke HS - Winchester	30.1	112.1	11.5	43.8	55.8
Winchester - So'ton Airport Parkway	13.4	125.5	6.5	50.3	65.3
So'ton Airport Parkway - Southampton Central	34.7	160.2	4.6	54.9	72.9
Southampton Central - Brockenhurst	21.9	182.1	10.2	65.0	86.0
Brockenhurst - Bournemouth Central	24.5	206.6	11.2	76.2	100.2
Bournemouth Central - Poole	9.3	215.9	5.5	81.7	108.7
Poole - Wareham	11.1	227.0	6.1	87.8	117.8
Wareham - Dorchester South	24.1	251.1	11.0	98.8	131.8
Dorchester South - Weymouth	11.4	262.5	6.3	105.1	141.1
Bournemouth Central - Bournemouth West	6.0	212.6	4.2	80.4	107.4

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

- Basingstoke HS      42      [41]
- Winchester          57      [56]
- So'ton Airport Pkwy 66      [65]
- Southampton Central 74      [73]
- Brockenhurst        89      [86]
- Bournemouth Central 105      [100]
- Poole                  121      [109]
- Wareham              133      [118]
- Dorchester South    149      [132]
- Weymouth            160      [141]

6. *HS Euston Cross – Salisbury / Exeter / Plymouth (19 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Reading Parkway HL	37.0	65.0	10.6	23.9	29.9
Reading Parkway HL - Basingstoke HS	17.0	82.0	8.4	32.3	41.3
Basingstoke HS - Salisbury	30.1	112.1	11.5	43.8	55.8
Salisbury - Tisbury	20.3	132.4	9.6	53.4	68.4
Tisbury - Gillingham	14.7	147.1	7.5	60.9	78.9
Gillingham - Templecombe	12.5	159.6	6.7	67.5	88.5
Templecombe - Sherborne	11.3	170.9	6.2	73.7	97.7
Sherborne - Yeovil Junction	7.3	178.2	4.7	78.5	105.5
Yeovil Junction - Crewkerne	15.8	194.0	7.9	86.4	116.4
Crewkerne - Chard Parkway	12.9	206.9	6.8	93.2	126.2
Chard Parkway - Axminster	8.2	215.1	5.1	98.2	134.2
Axminster - Honiton	16.5	231.6	8.2	106.4	145.4
Honiton - Exeter Central	28.3	259.9	12.6	119.0	161.0
Exeter Central - Exeter St. David's	1.1	261.0	1.8	120.8	165.8
Exeter St. David's - Okehampton	40.5	301.5	17.2	137.9	185.9
Okehampton - Tavistock	24.0	325.5	11.0	148.9	199.9
Tavistock - Bere Alston	9.0	334.5	5.4	154.3	208.3
Bere Alston - Plymouth	18.3	352.8	8.8	163.1	220.1

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

- Basingstoke HS      42      [41]
- Salisbury            82      [56]
- Tisbury               106     [68]
- Gillingham          116     [79]
- Templecombe       125     [89]
- Sherborne           132     [98]
- Yeovil Junction     138     [106]
- Crewkerne           148     [116]
- Axminster           162     [134]
- Honiton              175     [145]
- Exeter Central       195     [161]
- Exeter St. David's   203     [166]

### *Mk1A vs Mk1 Estimated Journey Times*

It is worth summarising the journey time estimates at Mk1A, with the original Mk1 results.

London to:	Current	Mk1	Mk1A
Swindon	52.0	38.2	44.9
Bristol Parkway	79.0	48.4	65.5
Cardiff	121.0	63.8	96.1
Cardiff Airport		73.5	105.8
Port Talbot	157.0	88.0	132.8
Swansea	178.0	97.2	152.1
Bristol Temple Meads	99.0	56.3	73.7
Taunton	102.0	76.2	85.3
Exeter St. David's	120.0	92.5	105.6
Plymouth	179.0	112.2	123.9

These are the absolute fastest times now, as predicted at Mk1 and now Mk1A. Clearly the Mk1A values are slower than Mk1, a lot slower in many cases, but good results nonetheless. They all show worthwhile improvement on current timings. Mk1A is, of course, a fraction of the price of Mk1, the original proposal, and could be implemented in a much shorter time. (Note that the Mk1A West Country times are via the Berks and Hants route. The corresponding values via Bristol at Mk1A are 100.8, 121.1 and 139.4.)

Mk1A can be regarded as a 'cut-down' Mk1. The following sections consider what the effects would be of piecemeal inclusion of the Mk1 parts which had been left out. We call this Mk2 because, even if all the excluded sections were re-included, the result would not be identical to the original Mk1, since the original design has been completely reworked around Reading, allowing Reading services to be provided also, which were not originally present, and also enabling the completely new provision of services on the South Western lines to Bournemouth and the West Country, thus providing valuable relief to Waterloo.

There are few changes proposed to the services provided.



## HS4 Mk2 Enhancements – Mk2.0

This reinstates the provision of new track between Didcot and Bristol Parkway, including Magic Roundabout and Mannington Junctions, and the tunnel bypassing Swindon station. Foxhall HS Junction is removed, but Aston Junctions remain (of course!) allowing connection to the GWML before Didcot and also to the station avoiding line, for northbound services. Note that at this SP, only the West Country services travel non-stop through Swindon. The South Wales services still call at Swindon.

The same distances apply to the new lines, since they are so closely aligned with the GWML, merely the line speed is now 360kph throughout between LHR Interchange and Bristol Parkway. The line speed remains 160kph, 100mph, from Bristol Parkway to Swansea, and 200kph, 125mph, from Bristol Parkway to Exeter St. David's.

The journey time estimates are now:

London to:	Current	Mk1	Mk1A	Mk2.0
Swindon	52.0	38.2	44.9	41.4
Bristol Parkway	79.0	48.4	65.5	50.7
Cardiff	121.0	63.8	96.1	88.8
Cardiff Airport		73.5	105.8	98.4
Port Talbot	157.0	88.0	132.8	125.5
Swansea	178.0	97.2	152.1	144.8
Bristol Temple Meads	99.0	56.3	73.7	58.9
Taunton	102.0	76.2	85.3	86.0
Exeter St. David's	120.0	92.5	105.6	106.3
Plymouth	179.0	112.2	123.9	124.6

This has made a very significant difference. The fastest journey times to Swindon, Bristol Parkway and Temple Meads are now directly comparable with the Mk1 values, 2 to 3 minutes longer, this being explained by the different configuration around Reading – 9km longer than the Mk1 route.

The times to the South Wales destinations are, very roughly, three quarters of the way between the Mk1 and Mk1A estimates; Mk2.0 is still serving Newport, Bridgend and Neath, travelling via the classic route between Bristol Parkway and Swansea, except between Cardiff and Bridgend, whereas Mk1 had new routes between Bristol Parkway and Cardiff, between Cardiff Airport and Port Talbot, and between Port Talbot and Swansea.

The times to Taunton, Exeter and Plymouth via Bristol are now directly comparable with the Mk1A times via the Berks and Hants. The Paddington – Penzance via the Berks & Hants is therefore withdrawn at Mk2.0, and replaced by the proper HS4 service via Bristol Parkway, which is of course now extended through to Cornwall. The previous RM service Paddington – Plymouth via the Berks and Hants is taken into HS4, taking the same slot of the now cancelled service, between Paddington and Theale East Junction. These are the only service, as opposed to timing, changes.

The Mk2.0 journey time estimate tables (numbers 1 and 3) for Swansea / Plymouth and Cardiff Airport / Bristol Temple Meads are now given. The other tables are all unchanged from Mk1A, except that table 2, via the Berks and Hants, no longer applies.

*Mk2.0/1. HS Euston Cross – Swansea / Plymouth (10/6 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Swindon	105.9	133.9	22.1	35.4	41.4
Swindon - Bristol Parkway	55.5	189.4	13.7	49.1	58.1
Bristol Parkway - Newport	34.7	224.1	15.0	64.1	76.1
Newport - Cardiff	20.5	244.6	9.7	73.8	88.8
Cardiff - Cardiff Airport	15.0	259.6	6.7	80.4	98.4
Cardiff Airport - Bridgend	26.0	285.6	11.7	92.2	113.2
Bridgend - Port Talbot Parkway	19.6	305.2	9.3	101.5	125.5
Port Talbot Parkway - Neath	10.7	315.9	6.0	107.5	134.5
Neath - Swansea	14.2	330.1	7.3	114.8	144.8
LHR Interchange - Bristol Parkway	161.4	189.4	31.3	44.7	50.7
Bristol Parkway - Bristol Temple Meads	9.2	198.6	5.2	49.9	58.9
Bristol temple Meads - Taunton	72.0	270.6	24.1	74.0	86.0
Taunton - Exeter St. David's	49.5	320.1	17.3	91.3	106.3
Exeter St. David's - Plymouth	65.0	385.1	15.3	106.6	124.6

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

- Swindon 52 [41]
- Bristol Parkway 79 [51]
- Newport 105 [76]
- Cardiff 121 [89]
- Bridgend 144 [113]
- Port Talbot 157 [126]

- Neath 165 [135]
- Swansea 178 [145]
- Bristol Temple Meads 99 [59]
- Taunton 102 [86]
- Exeter St. David's 120 [1067]
- Plymouth 179 [125]

*Mk2.0/2 HS Paddington – Plymouth (18 stops)*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Paddington - Old Oak Common	5.0	5.0	3.9	3.9	3.9
Old Oak Common - LHR Interchange	20.0	25.0	8.5	12.3	15.3
LHR Interchange - Reading Parkway LL	37.0	62.0	10.6	22.9	28.9
Reading Parkway HL - Theale HS Junction	5.0	67.0	3.0	26.0	
Theale HS Jn. - Thatcham	14.3	81.3	5.2	31.2	40.2
Thatcham - Newbury	5.7	87.0	4.2	35.4	47.4
Newbury - Pewsey	35.8	122.8	13.2	48.6	63.6
Pewsey - Westbury	32.6	155.4	12.2	60.8	78.8
Westbury - Frome	32.1	187.5	12.1	72.9	93.9
Frome - Castle Cary	23.0	210.5	9.4	82.3	106.3
Castle Cary - Cogload Jn.	14.0	224.5	5.7	88.0	
Cogload Jn. - Taunton	7.3	231.8	3.1	91.2	118.2
Taunton - Tiverton Pkwy	22.8	254.6	9.3	100.5	130.5
Tiverton Parkway - Cullompton	6.7	261.3	4.5	104.9	137.9
Cullompton - Exeter St. David's	20.0	281.3	8.5	113.4	149.4
Exeter St. David's - Dawlish	19.6	300.9	8.3	121.8	160.8
Dawlish - Teignmouth	4.4	305.3	3.6	125.4	167.4
Teignmouth - Newton Abbot	10.0	315.3	5.5	130.8	175.8
Newton Abbot - Totnes	12.5	327.8	6.2	137.1	185.1
Totnes - Ivybride	18.5	346.3	8.0	145.1	196.1
Ivybridge - Plymouth	18.7	365.0	8.1	153.2	207.2

*Mk2.0/3. HS Euston Cross – Cardiff Airport /Bristol TM (7/5 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Reading Parkway LL	37.0	65.0	10.6	23.9	29.9
Reading Parkway LL - Swindon	68.9	133.9	15.9	39.9	48.9
Swindon - Bristol Parkway	55.5	189.4	13.7	53.6	65.6
Bristol Parkway - Newport	34.7	224.1	15.0	68.6	83.6
Newport - Cardiff	20.5	244.6	9.7	78.2	96.2
Cardiff - Cardiff Airport	15.0	259.6	6.7	84.9	105.9
Bristol Parkway - Bristol Temple Meads	9.2	198.6	5.2	58.8	73.8

Current fastest time (minutes) from Reading (General) [and the above times (from Reading Parkway)] to:

- Swindon                      26      [16]
- Bristol Parkway            52      [33]
- Newport                     78      [51]
- Cardiff                      94      [63]
- Bristol TM                  72      [41]

(remembering to subtract 3 minutes for the Reading wait time.)

## HS4 Mk2 Enhancements – Mk2.1

This reinstates the provision of new HS track between Aberthaw Junction, shortly after Cardiff Airport , and Ewenny North Junction, where it merges with the classic route on the approach to Bridgend. The line speed between Cardiff Airport and Ewenny South Junction is 360kph. The distance from Cardiff Airport to Bridgend, via the new infrastructure, is 24km, some 2km shorter than via the classic route, as it avoids the detour through Llantwit Major, and a big loop at Llandow.

The journey time estimates are now:

London to:	Current	Mk1	Mk1A	Mk2.0	Mk2.1
Swindon	52.0	38.2	44.9	41.4	41.4
Bristol Parkway	79.0	48.4	65.5	50.7	50.7
Cardiff	121.0	63.8	96.1	88.8	88.8
Cardiff Airport		73.5	105.8	98.4	98.4
Port Talbot	157.0	88.0	132.8	125.5	122.2
Swansea	178.0	97.2	152.1	144.8	141.5
Bristol Temple Meads	99.0	56.3	73.7	58.9	58.9
Taunton	102.0	76.2	85.3	86.0	86.0
Exeter St. David's	120.0	92.5	105.6	106.3	106.3
Plymouth	179.0	112.2	123.9	124.6	124.6

This has made a small but worthwhile improvement to the South Wales times.

The new distances are:

- Cardiff (Rhoose) Airport – Aberthaw Junction      4km    (360kph)
- Aberthaw Junction – Ewenny South Junction      16km    (360kph)
- Ewenny South Junction – Ewenny North Junction    1km    (230kph)
- Ewenny North Junction – Bridgend                    3km    (200kph)

Cardiff Airport and Bridgend are now adjacent stations, with a start-stop time of 506sec. Trains accelerate to their intermediate maximum, c342kph (212mph) at 15km ( $\frac{5}{8}$  of the distance) then decelerate to 230kph at Ewenny South Junction, where they diverge from the 360kph track, decelerating further down to 200kph at Ewenny North Junction (where they join the existing classic Vale of Glamorgan track) and decelerate down to a standstill at Bridgend in the remaining 3km. The locations of the two Ewenny junctions are of course carefully chosen to ensure precisely this.

### *Mk2.1/1. HS Euston Cross – Swansea / Plymouth (10/6 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9

Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Swindon	105.9	133.9	22.1	35.4	41.4
Swindon - Bristol Parkway	55.5	189.4	13.7	49.1	58.1
Bristol Parkway - Newport	34.7	224.1	15.0	64.1	76.1
Newport - Cardiff	20.5	244.6	9.7	73.8	88.8
Cardiff - Cardiff Airport	15.0	259.6	6.7	80.4	98.4
Cardiff Airport - Bridgend	24.0	283.6	8.4	88.9	109.9
Bridgend - Port Talbot Parkway	19.6	303.2	9.3	98.2	122.2
Port Talbot Parkway - Neath	10.7	313.9	6.0	104.2	131.2
Neath - Swansea	14.2	328.1	7.3	111.5	141.5
LHR Interchange - Bristol Parkway	161.4	189.4	31.3	44.7	50.7
Bristol Parkway - Bristol Temple Meads	9.2	198.6	5.2	49.9	58.9
Bristol temple Meads - Taunton	72.0	270.6	24.1	74.0	86.0
Taunton - Exeter St. David's	49.5	320.1	17.3	91.3	106.3
Exeter St. David's - Plymouth	65.0	385.1	15.3	106.6	124.6

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

- Swindon 52 [41]
- Bristol Parkway 79 [51]
- Newport 105 [76]
- Cardiff 121 [89]
- Bridgend 144 [110]
- Port Talbot 157 [122]
- Neath 165 [131]
- Swansea 178 [142]
- Bristol Temple Meads 99 [59]
- Taunton 102 [86]
- Exeter St. David's 120 [107]
- Plymouth 179 [125]



## HS4 Mk2 Enhancements – Mk2.2

This reinstates the remainder of the new infrastructure used by South Wales services, specifically a new route between Bristol Parkway and Cardiff, and a new station, Cardiff HS, immediately to the south of the existing one, also between Ewenny South Junction, (where the connection to the Vale of Glamorgan line at Ewenny North Junction and on to Bridgend) diverges, and Swansea, via Port Talbot, with an interchange station there, the approach to Swansea High St. station from the south, with new HS platforms there, on the east side.

The journey time estimates are now:

London to:	Current	Mk1	Mk1A	Mk2.0	Mk2.1	Mk2.2
Swindon	52.0	38.2	44.9	41.4	41.4	41.4
Bristol Parkway	79.0	48.4	65.5	50.7	50.7	50.7
Cardiff	121.0	63.8	96.1	88.8	88.8	66.1
Cardiff Airport		73.5	105.8	98.4	98.4	75.8
Port Talbot	157.0	88.0	132.8	125.5	122.2	89.7
Swansea	178.0	97.2	152.1	144.8	141.5	98.9
Bristol Temple Meads	99.0	56.3	73.7	58.9	58.9	58.9
Taunton	102.0	76.2	85.3	86.0	86.0	86.0
Exeter St. David's	120.0	92.5	105.6	106.3	106.3	106.3
Plymouth	179.0	112.2	123.9	124.6	124.6	124.6

This has made a very great improvement to the South Wales times.

An important change occurs in the service plan. A new service from Paddington is introduced, serving all the South Wales stations, but calling at Reading Parkway LL, additionally, and extended beyond Swansea to Llanelli, Pembrey and Burry Port, and Carmarthen. The existing service from Norwich still travels through to Swansea, but using the new infrastructure, thus serving, in South Wales, only Cardiff, Cardiff Airport, Port Talbot and Swansea (exactly as for Mk1). It also, like the West Country service, bypasses Swindon. (which is served by the new service from Paddington).

The new distances are:

- Bristol Parkway – Cardiff HS 48km (360kph)
- Cardiff HS – Cardiff (Rhoose) Airport 15km (360kph \*)
- Cardiff Airport – Port Talbot Parkway 39km (360kph)
- Port Talbot Parkway – Swansea HS 13km (360kph \*)

(\*) Like Cardiff and the airport, Port Talbot and Swansea are Adjacent Stations, and the time taken, start to stop, to travel between them is 372 seconds.

The Mk2.2 journey time estimate tables (numbers 1 and 3) for Swansea / Plymouth and Cardiff Airport / Bristol Temple Meads are now given. The other tables are all unchanged from Mk2.1, in fact from Mk1A, except that the original Swansea service now starts from Paddington, and is included in table no. 4, which thus also follows.

*Mk2.2/1. HS Euston Cross – Swansea / Plymouth (6/6 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Bristol Parkway	161.4	189.4	31.3	44.7	50.7
Bristol Parkway - Cardiff HS	48.0	237.4	12.4	57.1	66.1
Cardiff HS - Cardiff Airport	15.0	252.4	6.7	63.8	75.8
Cardiff Airport - Port Talbot Parkway	39.0	291.4	10.9	74.7	89.7
Port Talbot Parkway - Swansea	13.0	304.4	6.2	80.9	98.9
Bristol Parkway - Bristol Temple Meads	9.2	198.6	5.2	49.9	58.9
Bristol temple Meads - Taunton	72.0	270.6	24.1	74.0	86.0
Taunton - Exeter St. David's	49.5	320.1	17.3	91.3	106.3
Exeter St. David's - Plymouth	65.0	385.1	15.3	106.6	124.6

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

- Bristol Parkway      79      [51]
- Cardiff                121      [66]
- Port Talbot            157      [90]
- Swansea                178      [99]
- Bristol Temple Meads 99      [59]
- Taunton                102      [86]
- Exeter St. David's    120      [107]
- Plymouth              179      [125]

*Mk2.2/3. HS Euston Cross – Cardiff Airport /Bristol TM (6/5 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Reading Parkway LL	37.0	65.0	10.6	23.9	29.9
Reading Parkway LL - Swindon	68.9	133.9	15.9	39.9	48.9
Swindon - Bristol Parkway	55.5	189.4	13.7	53.6	65.6
Bristol Parkway - Cardiff HS	48.0	237.4	12.4	66.0	81.0
Cardiff HS - Cardiff Airport	15.0	252.4	6.7	72.7	90.7
Bristol Parkway - Bristol Temple Meads	9.2	198.6	5.2	58.8	73.8

Current fastest time (minutes) from Reading (General) [and the above times (from Reading Parkway)] to:

- Swindon                      26      [16]
- Bristol Parkway            52      [33]
- Cardiff                        94      [48]
- Bristol TM                    72      [41]

(remembering to subtract 3 minutes for the Reading wait time.)

*Mk2.2/4. HS Paddington – Bristol / S.Wales / Worcester (8/14/15/11 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Paddington - Old Oak Common	5.0	5.0	3.9	3.9	3.9
Old Oak Common - LHR Interchange	20.0	25.0	8.5	12.3	15.3
LHR Interchange - Reading Parkway LL	37.0	62.0	10.6	22.9	28.9
Reading Parkway LL - Swindon	68.9	130.9	15.9	38.9	47.9
Swindon - Bristol Parkway	55.5	186.4	13.7	52.6	64.6
Bristol Parkway - Newport	34.7	221.1	15.0	67.5	82.5
Newport - Cardiff	20.5	241.6	9.7	77.2	95.2
Cardiff - Cardiff Airport	15.0	256.6	6.7	83.9	104.9
Cardiff Airport - Bridgend	24.0	280.6	8.4	92.3	116.3
Bridgend - Port Talbot Parkway	19.6	300.2	9.3	101.6	128.6
Port Talbot Parkway - Neath	10.7	310.9	6.0	107.6	137.6
Neath - Swansea (reverse)	14.2	325.1	7.3	114.9	149.9
Swansea - Llanelli	18.1	343.2	8.8	123.7	161.7
Llanelli - Pembrey and Burry Port	6.4	349.6	4.4	128.1	169.1
Pembrey and Burry Port - Carmarthen	26.3	375.9	11.8	139.9	183.9
Reading Parkway LL - Didcot Parkway	30.0	92.0	9.4	32.4	41.4
Didcot Parkway - Swindon	38.9	130.9	13.2	45.5	57.5
Swindon - Royal Wootton Bassett	9.0	139.9	5.2	50.7	65.7
Royal Wootton Bassett - Chippenham	17.8	157.7	7.8	58.5	76.5
Chippenham - Bath Spa	20.8	178.5	8.7	67.2	88.2
Bath Spa - Bristol Temple Meads	18.5	197.0	8.0	75.2	99.2
Swindon - Kemble	22.0	152.9	9.1	54.6	69.6
Kemble - Stroud	18.0	170.9	7.9	62.5	80.5

Stroud - Stonehouse	4.4	175.3	4.6	67.0	88.0
Stonehouse - Gloucester	14.7	190.0	6.9	73.9	97.9
Gloucester - Lydney	31.2	221.2	13.7	87.6	114.6
Lydney - Chepstow	12.8	234.0	6.8	94.4	124.4
Chepstow - Caldicot	10.7	244.7	6.0	100.3	133.3
Caldicot - Severn Tunnel Junction	1.2	245.9	1.8	102.1	138.1
Severn Tunnel Junction - Newport	15.9	261.8	7.9	110.1	149.1
Newport - Cardiff	20.5	282.3	9.7	119.7	161.7
Cardiff - Cardiff Airport	15.0	297.3	6.7	126.4	171.4
Gloucester - Cheltenham Spa	14.0	204.0	6.7	80.6	107.6
Cheltenham Spa - Ashchurch	11.7	215.7	6.0	86.6	116.6
Ashchurch - Worcester Shrub Hill	22.4	238.1	9.2	95.7	128.7

Note that a 5min wait time is assumed for reversal at Swansea.

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

- Reading 24 [29]
- Swindon 52 [48]
- Bristol Parkway 79 [65]
- Newport 105 [83]
- Cardiff 121 [95]
- Bridgend 144 [116]
- Port Talbot 157 [129]
- Neath 165 [138]
- Swansea 178 [148]
- Llanelli 215 [162]
- Pembrey and Burry Port 222 [169]
- Carmarthen 245 [184]
- Didcot 38 [41]
- Swindon 52 [58]
- Chippenham 70 [77]
- Bath Spa 83 [88]
- Bristol TM 99 [99]
- Kemble 72 [70]
- Stroud 90 [81]
- Stonehouse 93 [88]
- Gloucester 113 [98]
- Lydney 157 [115]

- Chepstow 152 [124]
- Cheltenham Spa 130 [108]
- Ashchurch 139 [117]
- Worcester 123 [129]

Current fastest time (minutes) from Reading (General) [and the above times (from Reading Parkway)] to:

- Swindon 26 [16]
- Bristol Parkway 52 [33]
- Newport 78 [51]
- Cardiff 94 [63]
- Bridgend 117 [84]
- Port Talbot 130 [97]
- Neath 138 [106]
- Swansea 151 [116]
- Llanelli 188 [130]
- Pembrey and Burry Port 195 [137]
- Carmarthen 218 [152]
- Didcot 13 [9]
- Swindon 26 [26]
- Chippenham 41 [45]
- Bath Spa 56 [57]
- Bristol TM 72 [67]
- Kemble 47 [38]
- Stroud 62 [48]
- Stonehouse 68 [56]
- Gloucester 86 [66]
- Lydney 136 [83]
- Chepstow 125 [92]
- Cheltenham Spa 102 [76]
- Ashchurch 111 [85]
- Worcester 93 [97+]

(remembering to subtract 3 minutes for the Reading wait time.)



## HS4 Mk2 Enhancements – Mk2.3

This reinstates the remainder of the new HS7 infrastructure, between Cofton Hall Junction, Bristol Parkway and Exeter St. David's. This includes a new station, Bristol Parkway HS, a standard HS 2-platform 4-faces arrangement, immediately to the south of the existing, classic station. It would be advantageous if this were in a cutting, i.e. lower than the existing station, since both HS4 and HS7 need to be in tunnel immediately of leaving the station; HS7 diverges immediately to the south, and is in tunnel for most of the way to Temple Meads. Likewise, HS4 needs to pass beneath the extensive junctions of Filton and Stoke Gifford, immediately to the west of the station. A new section of HS7 is the south to west link between Stadium and Bentry Junctions, enabling services between the West Country and South Wales, without reversal at Bristol Parkway. HS7's distance between Bristol Parkway HS and Temple Meads is slightly shorter than via the classic route – 8km vs.9.2 – and, since the line speed is now 360kph, Parkway HS and Temple Meads are adjacent stations, and the start/stop time to travel between them is 292 seconds. HS7 follows the route of the Bristol and Exeter Railway very closely, so the distances used already still apply. Several interesting new services are introduced, in particular Holyhead – Swansea via Birmingham International, and Plymouth – Swansea via the new south to west link just mentioned. But these are HS7 services, affecting HS4 only west of Bristol Parkway (or, indeed, Bentry Junction,) and full details are to be found in the HS7 Route and Service Plans article. These services do, however appear here in the loadings of the relevant track sections (and in the associated HS4 Mk2 Route Loadings article).

The journey time estimates are now:

London to:	Current	Mk1	Mk1A	Mk2.0	Mk2.1	Mk2.2	Mk2.3
Swindon	52.0	38.2	44.9	41.4	41.4	41.4	41.4
Bristol Parkway	79.0	48.4	65.5	50.7	50.7	50.7	50.7
Cardiff	121.0	63.8	96.1	88.8	88.8	66.1	66.1
Cardiff Airport		73.5	105.8	98.4	98.4	75.8	75.8
Port Talbot	157.0	88.0	132.8	125.5	122.2	89.7	89.7
Swansea	178.0	97.2	152.1	144.8	141.5	98.9	98.9
Bristol Temple Meads	99.0	56.3	73.7	58.9	58.9	58.9	58.5
Taunton	102.0	76.2	85.3	86.0	86.0	86.0	78.0
Exeter St. David's	120.0	92.5	105.6	106.3	106.3	106.3	93.7
Plymouth	179.0	112.2	123.9	124.6	124.6	124.6	112.0

This has made a significant improvement to the West Country times.

The Mk2.3 journey time estimate tables (numbers 1 and 3) for Swansea / Plymouth and Cardiff Airport / Bristol Temple Meads are now given (as are the versions with passing times). The other tables are all unchanged from Mk2.2, in fact from Mk1A, (except for table 4, which underwent change at Mk2.2, but has no further changes here).

*Mk2.3/1. HS Euston Cross – Swansea / Plymouth (6/6 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Bristol Parkway HS	161.4	189.4	31.3	44.7	50.7
Bristol Parkway HS - Cardiff HS	48.0	237.4	12.4	57.1	66.1
Cardiff HS - Cardiff Airport	15.0	252.4	6.7	63.8	75.8
Cardiff Airport - Port Talbot Parkway	39.0	291.4	10.9	74.7	89.7
Port Talbot Parkway - Swansea HS	13.0	304.4	6.2	80.9	98.9
Bristol Parkway - Bristol Temple Meads	8.0	197.4	4.9	49.5	58.5
Bristol Temple Meads - Taunton	72.0	269.4	16.4	66.0	78.0
Taunton - Exeter St. David's	49.5	318.9	12.7	78.7	93.7
Exeter St. David's - Plymouth	65.0	383.9	15.3	94.0	112.0

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

- Bristol Parkway      79      [51]
- Cardiff                121      [66]
- Port Talbot            157      [90]
- Swansea                178      [99]
- Bristol Temple Meads 99      [59]
- Taunton                102      [78]
- Exeter St. David's    120      [94]
- Plymouth              179      [112]

*Mk2.3/1P. HS Euston Cross – Swansea / Plymouth*  
*(6/6 stops; with passing times):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - <i>Shinfield (W.) Jn. (pass)</i>	32.9	60.9	8.3	<i>21.6</i>	<i>27.6</i>
<i>Shinfield (W.) Jn. (pass) - 3 Mile Cross Jn. (pass)</i>	1.9	62.8	0.3	<i>21.9</i>	<i>27.9</i>
<i>3 Mile Cross Jn. (pass) - Reading Pkwy LL (pass)</i>	2.2	65.0	0.4	<i>22.3</i>	<i>28.3</i>
<i>Reading Pkwy LL (pass) - Burghfield Jn. (pass)</i>	2.1	67.1	0.4	<i>22.6</i>	<i>28.6</i>
<i>Burghfield Jn. (pass) - Theale (West) Jn. (pass)</i>	4.7	71.8	0.8	<i>23.4</i>	<i>29.4</i>
<i>Theale (West) Jn. (pass) - Aston North Jn. (pass)</i>	19.1	90.9	3.2	<i>26.6</i>	<i>32.6</i>
<i>Aston North Jn. (pass) - Foxhall HS Jn. (pass)</i>	4.6	95.5	0.8	<i>27.4</i>	<i>33.4</i>
<i>Foxhall HS Jn. (pass) - Magic Rndbt Jn. (pass)</i>	34.3	129.8	5.7	<i>33.1</i>	<i>39.1</i>
<i>Magic Rndbt Jn. (pass) - Swindon Av. Line (pass)</i>	4.1	133.9	0.7	<i>33.8</i>	<i>39.8</i>
<i>Swindon Av. Line (pass) - Man'gton W. Jn. (pass)</i>	6.8	140.7	1.1	<i>34.9</i>	<i>40.9</i>
<i>Man'gton W. Jn. (pass) - Coalpit Heath Jn. (pass)</i>	41.3	182.0	6.9	<i>41.8</i>	<i>47.8</i>
<i>Coalpit Heath Jn. (pass) - Bristol Parkway</i>	7.4	189.4	2.9	44.7	50.7
Bristol Parkway - Cardiff HS	48.0	237.4	12.4	57.1	66.1
Cardiff HS - Cardiff Airport	15.0	252.4	6.7	63.8	75.8
Cardiff Airport - <i>Aberthaw Jn. (pass)</i>	4.0	256.4	2.7	66.5	81.5
<i>Aberthaw Jn. (pass) - Ewenny S. Jn. (pass)</i>	16.0	272.4	3.4	69.9	84.9
<i>Ewenny S. Jn. (pass) - Port Talbot Parkway</i>	19.0	291.4	4.8	74.7	89.7

Port Talbot Parkway - Swansea HS	13.0	304.4	6.2	80.9	98.9
Bristol Parkway - Bristol Temple Meads	8.0	197.4	4.9	49.5	58.5
Bristol Temple Meads - <i>Cogload Jn. (pass)</i>	64.7	262.1	13.6	<i>63.1</i>	<i>75.1</i>
<i>Cogload Jn. (pass)</i> - Taunton	7.3	269.4	2.8	66.0	78.0
Taunton - <i>Tiverton Pkwy (pass)</i>	22.8	292.2	6.6	<i>72.6</i>	<i>87.6</i>
<i>Tiverton Pkwy (pass)</i> - <i>Cullompton (pass)</i>	6.7	298.9	1.1	<i>73.7</i>	<i>88.7</i>
<i>Cullompton (pass)</i> - Exeter St. David's	20.0	318.9	5.0	78.7	93.7
Exeter St. David's - Plymouth	65.0	383.9	15.3	94.0	112.0

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*Mk2.3/3. HS Euston Cross – Cardiff Airport /Bristol TM (6/5 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Reading Parkway LL	37.0	65.0	10.6	23.9	29.9
Reading Parkway LL - Swindon	68.9	133.9	15.9	39.9	48.9
Swindon - Bristol Parkway	55.5	189.4	13.7	53.6	65.6
Bristol Parkway - Cardiff HS	48.0	237.4	12.4	66.0	81.0
Cardiff HS - Cardiff Airport	15.0	252.4	6.7	72.7	90.7
Bristol Parkway - Bristol Temple Meads	8.0	197.4	4.9	58.4	73.4

Current fastest time (minutes) from Reading (General) [and the above times (from Reading Parkway)] to:

- Swindon                      26      [16]
- Bristol Parkway            52      [33]
- Cardiff                        94      [46]
- Bristol TM                    72      [40]

(remembering to subtract 3 minutes for the Reading wait time.)

(The only change from Mk2.2 is the saving of slightly less than half a minute to Bristol Temple Meads – though this now rounds down!)

*Mk2.3/3P. HS Euston Cross – Cardiff Airport /Bristol TM*  
*(6/5 stops; with passing times):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - <i>Shinfield (W.) Jn. (pass)</i>	32.9	60.9	8.5	<i>21.8</i>	<i>27.8</i>
<i>Shinfield (W.) Jn. (pass) - 3 Mile Cross Jn. (pass)</i>	1.9	62.8	0.6	<i>22.4</i>	<i>28.4</i>
<i>3 Mile Cross Jn. (pass) - Reading Pkwy LL</i>	2.2	65.0	1.6	23.9	29.9
Reading Pkwy LL - <i>Burghfield Jn. (pass)</i>	2.1	67.1	2.0	<i>25.9</i>	<i>34.9</i>
<i>Burghfield Jn. (pass) - Theale (West) Jn. (pass)</i>	4.7	71.8	1.6	<i>27.5</i>	<i>36.5</i>
<i>Theale (West) Jn. (pass) - Aston North Jn. (pass)</i>	19.1	90.9	3.5	<i>31.0</i>	<i>40.0</i>
<i>Aston North Jn. (pass) - Foxhall HS Jn. (pass)</i>	4.6	95.5	0.8	<i>31.8</i>	<i>40.8</i>
<i>Foxhall HS Jn. (pass) - Magic Rndbt Jn. (pass)</i>	34.3	129.8	5.9	<i>37.7</i>	<i>46.7</i>
<i>Magic Rndbt Jn. (pass) - Swindon</i>	4.1	133.9	2.1	39.9	48.9
Swindon - <i>Man'gton W. Jn. (pass)</i>	6.8	140.7	3.5	<i>43.4</i>	<i>55.4</i>
<i>Man'gton W. Jn. (pass) - Coalpit Heath Jn. (pass)</i>	41.3	182.0	7.2	<i>50.7</i>	<i>62.7</i>
<i>Coalpit Heath Jn. (pass) - Bristol Parkway</i>	7.4	189.4	2.9	53.6	65.6
Bristol Parkway - Cardiff HS	48.0	237.4	12.4	66.0	81.0
Cardiff HS - Cardiff Airport	15.0	252.4	6.7	72.7	90.7
Bristol Parkway - Bristol Temple Meads	8.0	197.4	4.9	58.4	73.4

## Service Plan 6

This service plan assumes that Mk2 has been implemented in full, i.e. Mk2.3 in the previous sections. It is very similar to SP5, with the following significant changes:

- New services are introduced in conjunction with HS7, from Holyhead to Swansea via Birmingham, and from Plymouth to Swansea, using the new chord between Stadium and Brentry junctions, avoiding reversal at Bristol Parkway.
- The services from Euston Cross to Swansea (which does not now call at Swindon) and to Cardiff Airport now travel directly between Bristol Parkway and Cardiff HS. The Swansea service calls only at Part Talbot after the airport.
- The service from Euston Cross to Swansea via Newport et al is replaced by a service from Paddington, with the same stopping pattern but also with a Reading Parkway stop added. It is extended beyond Swansea to Llanelli and Carmarthen.
- The fast service to Plymouth and on to Penzance via the Berks and Hants route is withdrawn. The service from Euston Cross to Plymouth (which does not now call at Swindon) is now extended into Cornwall, splitting / joining at Plymouth, the two portions serve stations to Penzance and to Padstow.
- The previous RM service from Paddington to Plymouth, via the Berks and Hants route and serving all major stations, now travels on HS4, still originating from Paddington, and taking the slot of the withdrawn Penzance service (as far as Theale East Junction).
- The Oxford – Bournemouth West service is, eventually, extended to start from Newcastle and Middlesborough, joining / splitting at York. This is dependent on a Mk2 development of HS2 – the Coventry Variant (refer to the article ‘HS2 Route and Service Plans’ for full details. The entry in this service plan includes the extension {enclosed in curly braces}, to indicate that this is not going to happen in the same time-scale as the rest.

### HS4:

- 2tphH Norwich – Beccles – Ipswich HS – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea [Interchange with HS7 2tphH:  
Newcastle – Consett – Durham Relly Mill – Darlington Bank Top –:  
Middlesborough – Thornaby – Eaglescliffe – Yarm – Northallerton –:  
(joins / splits) York HS – Leeds HS – Huddersfield – Sheffield HS – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David’s – Plymouth]
- 2tphH Dover Priory – Canterbury East – Faversham – Sheerness – Grain – Southend HS – Southend Airport – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Bristol Temple Meads BT [Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport]
- 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David’s – Plymouth (splits / joins) –:  
– Liskeard – Bodmin Rd. – Lostwithiel – Par – St. Austell – Truro – Redruth – Camborne – Hayle



- St. Erth – Penzance
- Bere Alston – Tavistock – Launceston – Delebole – Port Isaac Rd. – Wadebridge - Padstow  
[Interchange with HS7 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill  
– Cheltenham Spa – Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend  
– Port Talbot – Neath – Swansea]
- 2tphH Dover Priory – Canterbury East – Faversham – Sheerness – Grain – Southend HS –  
Southend Airport – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common –  
LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway – Newport – Cardiff –  
Cardiff (Rhoose) Airport [Interchange with HS7 2tphH Birmingham HS – Birmingham  
Interchange – Worcester Shrub Hill – Ashchurch – Cheltenham Spa – Bristol Parkway – Bristol  
Temple Meads BT]
- 2tphH Lowestoft – Oulton Broad South – )  
Yarmouth – Breney Arms – Reedham South – ) Beccles (joins/splits) – Brampton –  
Halesworth – Darsham – Saxmundham – Wickham Market – Woodbridge – Ipswich HS –  
Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak  
Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Winchester –  
Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central –  
Poole – Wareham – Dorchester South – Weymouth
- 2tphH Harwich Town – Dovercourt – Harwich Parkeston Quay – Wrabness – Mistley –  
Manningtree – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross –  
Old Oak Common – LHR Interchange – Reading Parkway HL – Basingstoke HS – Winchester –  
Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central –  
Bournemouth West
- 2tphH Clacton – )  
Walton – Frinton – ) Thorp le Soken (joins/splits) – Wivenhoe – Colchester - Chelmsford  
– Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange –  
Reading Parkway HL – Basingstoke HS – Salisbury – Tisbury – Gillingham – Templecombe –  
Sherborne – Yeovil Junction – Crewkerne – Chard Parkway – Axminster – Honiton – Exeter  
Central – Exeter St. David's – Okehampton – Tavistock – Bere Alston – Plymouth
- 2tphH Braintree – Braintree Freeport – Cressing – White Notley – Witham – Chelmsford –  
Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange –  
Reading Parkway HL – Basingstoke HS – Overton – Whitchurch – Andover – Grateley –  
Salisbury
- 2tphH Paddington – Old Oak Common = LHR Interchange – Reading Parkway LL – Swindon –  
Bristol Parkway – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath  
– Swansea (reverse) – Llanelli – Pembrey and Burry Port – Carmarthen
- 2tphH Paddington – Old Oak Common – LHR Interchange – Reading parkway LL – Thatcham –  
Newbury – Pewsey – Westbury – Frome – Castle Cary – Taunton – Tiverton Parkway –  
Cullompton – Exeter St. David's – Dawlish – Teignmouth – Newton Abbot – Totnes – Ivybridge  
– Plymouth
- 2tphH Paddington – Old Oak Common = LHR Interchange – Reading Parkway LL – Didcot  
Parkway – Swindon – Chippenham – Bath Spa – Bristol Temple Meads
- 2tphH Paddington – Old Oak Common = LHR Interchange – Reading Parkway LL – Didcot  
Parkway – Swindon – Kemble – Stroud – Stonehouse – Gloucester (splis / joins) –:  
– Lydney – Chepstow – Caldicot – Severn Tunnel Junction – Newport – Cardiff –

Cardiff (Rhoose) Airport  
– (reverse) Cheltenham Spa – Ashchursh – Worcester Shrub Hill

#### GWML Regional Metro:

- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Didcot – Wantage Road – Swindon (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Maidenhead – Twyford – Reading – Tilehurst – Pangbourne – Goring and Streatley – Cholsey – Didcot – Oxford (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Thatcham – Newbury – Hungerford – Bedwyn – Pewsey – Devizes – Holt Junction – Bradford on Avon – Bath – Bristol Temple Meads (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Thatcham – Newbury – Kintbury – Hungerford – Bedwyn – Savernake – Marlborough (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Maidenhead – Bourne End (connections to and from Marlow) High Wycombe – Princes Risborough – Little Kimble – Aylesbury – Aylesbury Vale Parkway – Calvert (for HS2) – Winslow – Bletchley – Milton Keynes (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Maidenhead – Twyford – Wargrave – Shiplake – Henley (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – Slough – Reading – Didcot – Wantage Road – Swindon – Royal Wootton Bassett – Chippenham – Melksham – Holt Junction – Trowbridge – Westbury – Bruton – Castle Cary – Yeovil Pen Mill – Dorchester West – Weymouth
- 2tphR Paddington – Old Oak Common – Slough – Reading – Didcot – Oxford – Hanborough – Charlbury – Kingham – Moreton in March – Honeybourne – Evesham – Pershore – Worcester Shrub Hill – Worcester Foregate Street – Malvern Link – Great Malvern – Colwell – Ledbury – Hereford

Note that the GWML services have also changed, in response to HS4 changes. In particular, the fast service from Paddington to Penzance has been replaced by the Norwich via Diss – Penzance service on HS12/HS4, and that now the Heathrow Shuttle service has six arms. (Refer to the article ‘GWML Service Plans’ for full details of how classic services change, in sync. with HS services.)

#### HS7 South of Birmingham:

- 2tphH Newcastle – Consett – Durham Relly Mill – Darlington Bank Top –:  
Middlesborough – Thornaby – Eaglescliffe – Yarm – Northallerton –:  
(joins / splits) York HS – Leeds HS – Huddersfield – Sheffield HS – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway HS – Bristol Temple Meads HS – Taunton – Exeter St. David’s – Plymouth
- 2tphH Norwich – Ely (reverse) – Peterborough – Nottingham – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway HS – Cardiff HS – Cardiff (Rhoose) Airport – Port Talbot – Swansea HS
- 2tphH Liverpool Lime St. – Liverpool South Parkway – Runcorn – Crewe – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway HS – Bristol Temple

Meads – Taunton – Exeter St. David’s – Plymouth

Included for completeness, although it travels over no part of HS4.]

- 2tphH Holyhead – Bangor – Llandudno Junction – Rhyl – Flint – Chester – Crewe – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway HS – Cardiff HS – Cardiff (Rhoose) Airport – Port Talbot – Swansea
- 2tphH Plymouth – Exeter St. David’s – Taunton – Bristol Temple Meads – Cardiff HS – Cardiff (Rhoose) Airport – Port Talbot – Swansea
- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway HS – Cardiff HS – Cardiff (Rhoose) Airport
- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway HS – Bristol Temple Meads BT

#### Regional Metro Services:

- 2tphR York – Micklefield – Leeds City – Wakefield Westgate – South Yorkshire LL – Rotherham – Sheffield Midland – Chesterfield – Derby – Burton on Trent – Tamworth – Birmingham New St. – University – Bromsgrove – Droitwich Spa – Worcester Shrub Hill – Ashchurch – Cheltenham Spa – Gloucester (reverse) – Bristol Parkway – Bristol Temple Meads – Weston Super Mare – Highbridge – Bridgwater – Taunton – Tiverton Junction – Cullompton – Exeter St. David’s – Dawlish – Teignmouth – Newton Abbot – Totnes – Ivybridge – Plymouth
- 2tphR Stalybridge – Ashton-under-Lyne – Manchester Victoria – Salford Central – Eccles – Warrington Bank Quay – Helsby – Chester – Wrexham General – Ruabon – Chirk – Gobowen – Shrewsbury – Church Stretton – Craven Arms – Ludlow – Leominster – Hereford – Abergavenny – Pontypool & New Inn – Cwmbran – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea  
[This service alternates between Stalybridge and Newport with the service from Stalybridge to Plymouth, which reverses in Newport.]
- 2tphR Plymouth – Ivybridge – Brent – Totnes – Newton Abbot – Teignmouth – Dawlish – Exeter St. David’s – Cullompton – Tiverton Parkway – Taunton – Bridgwater – Highbridge – Weston Super Mare – Bristol Temple Meads – Filton Abbey Wood – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea  
[This service alternates between Plymouth and Newport with the service from Plymouth to Stalybridge, which reverses at Newport.]
- 2tphR Stalybridge – Ashton-under-Lyne – Manchester Victoria – Salford Central – Eccles – Warrington Bank Quay – Helsby – Chester – Wrexham General – Ruabon – Chirk – Gobowen – Shrewsbury – Church Stretton – Craven Arms – Ludlow – Leominster – Hereford – Abergavenny – Pontypool & New Inn – Cwmbran – Newport (reverse) – Filton Abbey Wood – Bristol Temple Meads – Weston Super Mare – Highbridge – Bridgwater – Taunton – Tiverton Parkway – Cullompton – Exeter St. David’s – Dawlish – Teignmouth – Newton Abbot – Totnes – Ivybridge – Plymouth
- 2tphR Cleethorpes – Grimsby Town – Barnetby – Market Rasen – Lincoln – Newark Castle – Nottingham – Derby (reverse) – Burton upon Trent – Tamworth – Birmingham New St. – University – Bromsgrove – Droitwich Spa – Worcester Shrub Hill – Ashchurch – Cheltenham Spa – Gloucester – Lydney – Chepstow – Newport – Cardiff Central – Cardiff (Rhoose) Airport
- 2tphR Portsmouth Harbour – Portsmouth & Southsea – Fratton – Cosham – Fareham – Southampton – Romsey – Salisbury – Warminster – Westbury – Trowbridge – Bradford-on-Avon

– Bath Spa – Bristol Temple Meads (reverse) – Filton Abbey Wood – Newport – Cardiff Central – Cardiff (Rhoose) Airport

#### Cross Country (XC) Services:

- 2tphR York – Micklefield – Leeds City – Wakefield Westgate – South Yorkshire LL – Sheffield Midland – Chesterfield – Derby – Burton upon Trent – Tamworth HL – Birmingham New St. (reverse) – Birmingham International – Coventry – Leamington Spa – Banbury – Oxford – Reading General (reverse) – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Bournemouth West
- 2tphR Manchester Piccadilly – Stockport – Macclesfield – Stoke upon Trent – Stafford – Wolverhampton – Birmingham New St. – Birmingham International – Coventry – Leamington Spa – Banbury – Oxford – Reading General (reverse) – Reading Parkway HL – Basingstoke HS – Winchester – Southampton Airport Parkway – Southampton Central – Brockenhurst – Bournemouth Central – Bournemouth West

#### Representative Hourly Cross-Platform Interchange at Bristol Parkway HS:

- 00H Norwich via Beccles – Euston Cross – Swansea  
H Newcastle / Middlesborough – (joins / splits York HS) – Plymouth
- 05H Dover Priory – Euston Cross – Bristol Temple Meads BT  
H Birmingham HS – Cardiff Airport
- 10H Liverpool – Plymouth  
(no connection, but the service Plymouth – Swansea occupies the slot into South Wales)  
H Paddington – Swansea – Carmarthen ) These services use the Bristol Parkway classic platforms,  
R York – Plymouth ) and have cross-platform interchange with each other.
- 15H Norwich via Diss – Euston Cross – Plymouth – Penzance / Padstow  
H Norwich – Birmingham – Swansea
- 20H Dover Priory – Euston Cross – Cardiff Airport  
H Birmingham HS – Bristol Temple Meads BT
- 25H Holyhead – Swansea  
(no connection, but the Swansea – Plymouth service occupies the slot into the West Country)

– repeating at 30, 35, 40, 45, 50 and 55 minutes past.

#### Representative Hourly Cross-Platform Interchange at Worcester Shrub Hill:

- 00H Newcastle / Middlesborough – (joins / splits York HS) – Plymouth  
H Worcester – Gloucester – Paddington (travels on classic tracks)
- 05H Birmingham HS – Cardiff Airport  
R York – Plymouth
- 10H Liverpool – Plymouth  
RS Birmingham New St. – Worcester

15H Norwich – Swansea  
R Hereford – Paddington

20H Birmingham HS – Bristol Temple Meads BT  
RS Worcester – Oxford

25H Holyhead – Swansea  
RS Birmingham New St. – Hereford

– repeating at 30, 35, 40, 45, 50 and 55 minutes past.

Representative Hourly Cross-Platform Interchange Pattern at Swindon (refer to Appendix B for the revised layout at Swindon):

00H Paddington – Gloucester – Cardiff / Worcester (platform 5)  
(no connection)

05H [Dover Priory – ] Euston Cross – Bristol Temple Meads BT (platform 1)  
R Heathrow Shuttle (platform 2; reverse then return from platform 3)

10H Paddington – Swansea – Carmarthen (platform 2)  
(no connection)

15H Paddington – Bristol Temple Meads via Bath (platform 2)  
(no connection)

20H [Dover Priory – ] Euston Cross – Cardiff Airport (platform 1)  
R Paddington – Weymouth (platform 2)

– repeating at 30, 35, 40, 45, and 50 minutes past.

Representative Hourly Interchange at Reading Parkway (cross-platform at both HL and LL):

00H	LL	<i>Norwich via Beccles – Euston Cross – Swansea</i>	<i>NON-STOP</i>
	H	LL	Dover Priory – Euston Cross – Bristol Temple Meads BT
	H	LL	Paddington – Bristol Temple Meads via Bath
	H	HL	Lowestoft / Yarmouth – (joins / splits Beccles) – Euston Cross – Weymouth
	RS	HL	Henley – Basingstoke all station
05H	LL	Paddington – Swansea – Carmarthen	
	H	HL	Clacton / Walton – (joins / splits Thorpe le Soken) – Euston Cross – Plymouth
	R	HL	XC Manchester – Bournemouth West
15H	LL	<i>Norwich via Diss – Euston Cross – Penzance / Padstow</i>	<i>NON-STOP</i>
	H	LL	Dover Priory – Euston Cross – Cardiff Airport
	H	LL	Paddington – Gloucester – Cardiff Airport / Worcester Shrub Hill
	H	HL	Harwich – Euston Cross – Bournemouth West
	RS	HH	Reading – Basingstoke all stations
20H	HL	Braintree – Euston Cross – Salisbury	
	R	HL	XC York – Bournemouth West

– repeating at 30, 37, 45, and 53 minutes past.

#### Representative Hourly Cross-Platform Interchange Pattern at Westbury and Castle Cary:

00H    Paddington – Plymouth  
      R    Paddington – Weymouth

– repeating at 30 minutes past. A little elucidation is needed. The Plymouth service departs first and calls at Frome and Castle Cary. The Weymouth service departs second and calls at Bruton and Castle Cary, overtaking the Plymouth service by the Frome avoiding line. It then waits at Castle Cary for the Plymouth service. In the up direction, the Plymouth service departs Castle Cary first, and also reaches Westbury first, where it must wait for the Weymouth service. This provides connections at both Frome and Bruton to and from both Plymouth and Weymouth, and Paddington by both routes, without both services having to serve both stations. Clever stuff, eh? (There already is cross-platform interchange at Castle Cary in the down direction, but a new platform is needed in the up direction. There already is cross-platform interchange at Westbury in the up direction, but a new platform is required in the down direction.)

#### Representative Hourly Cross-Platform Interchange Pattern at Cardiff Airport:

00H    Norwich – Swansea via London  
      R    Cleethorpes – Cardiff Airport

05H    Birmingham – Cardiff Airport  
      R    Portsmouth Harbour – Cardiff Airport

10H    Plymouth – Swansea  
      R    Stalybridge – Manchester – Swansea

15H    Norwich – Birmingham – Swansea  
      H    Paddington – Cardiff Airport via Gloucester

20H    Dover – Cardiff Airport  
      H    Paddington – Swansea – Carmarthen

25H    Holyhead – Swansea  
      R    Plymouth – Swansea

– repeating at 30, 35, 40, 45, 50 and 55 minutes past.

#### Representative Hourly Cross-Platform Interchange Pattern at Cardiff Central (as opposed to Cardiff HS):

00H    Paddington – Swansea – Carmarthen  
      H    Paddington – Cardiff Airport via Gloucester

10R    Stalybridge – Manchester – Swansea  
      R    Portsmouth Harbour – Cardiff Airport

25R    Plymouth – Swansea  
      R    Cleethorpes – Cardiff Airport

– repeating at 30, 40 and 55 minutes past.

Representative **Complete** Hourly Cross-Platform Interchange Pattern at Newport:

- 00H    Paddington – Swansea – Carmarthen
- 08R    Portsmouth Harbour – Cardiff Airport  
      R    Cardiff Airport – Cleethorpes
- 10R    Stalybridge – Manchester – Swansea  
      R    Swansea – Plymouth  
      R    Plymouth – Manchester – Stalybridge (reverse; not cross-platform. Arrives 05. departs 15.)
- 12H    Cardiff Airport – Paddington via Gloucester
- 15H    Carmarthen – Swansea – Paddington
- 23R    Cleethorpes – Cardiff Airport  
      R    Cardiff Airport – Portsmouth Harbour
- 25R    Plymouth – Swansea  
      R    Swansea – Manchester – Stalybridge  
      R    Stalybridge – Manchester – Plymouth (reverse; not cross-platform. Arrives 20, departs 30.)
- 27R    Cardiff Airport – Portsmouth Harbour  
      H    Paddington – Cardiff Airport via Gloucester

– repeating at 30, 37, 45 and 53 minutes past.

The Stalybridge – Plymouth service reverses in platform 1, where it spends c.10 minutes. The other pair of trains at 10 and 25 are each travelling in opposite directions, and have a cross-platform interchange, using platforms 2 and 3. There is thus plenty of time for non-cross-platform interchange with the Stalybridge – Plymouth service. The point of all this is that these timings at Newport enable a service of 4tph between each pair Stalybridge – Plymouth, Plymouth – Swansea and Swansea – Stalybridge, in both directions, 2tph being through services and the other 2tph involving one change, at Newport, giving the same arrival times as the through services. Hence the necessity to give the complete service, in both directions, at Newport.



The overall loading imposed on HS4 is as follows, (remembering that HS4 and HS7 each have their own tracks between Coalpit Heath Junction and Bristol Parkway HS):

• Euston Cross	– Old Oak Common East Junction	(*)	16tph
• Old Oak Common East Jn.	– Old Oak Common West Junction		16tph
• Paddington	– Old Oak Common station (ground level *)		8tph
• Old Oak Common station	– Old Oak Common West Junction		8tph
• Old Oak Common West Jn.	– Three Mile Cross Junction		24tph
• Three Mile Cross Junction	– Burghfield Junction		16tph
• Three Mile Cross Junction	– Grazeley Junction		8tph
• Grazeley Junction	– Basingstoke HS	(*)	10tph
• Grazeley Junction	– Burghfield Junction		2tph
• Burghfield Junction	– Theale East Junction		18tph
• Theale East Junction	– Aston North Junction		16tph
• Aston North Junction	– Didcot station avoiding line (to Oxford)		2tph
• Aston North Junction	– Foxhall HS Junction (via Didcot station)		4tph
• Aston North Junction	– Foxhall HS Junction (avoiding station)		10tph
• Foxhall HS Junction	– Magic Roundabout Junction		14tph
• Magic Roundabout Junction	– Mannington Junction		4tph
• Magic Roundabout Junction	– Swindon station	(*)	10tph
• Swindon station	– Mannington Junction	(*)	8tph
• Mannington Junction	– Wapley Common Junction		10tph
• Wapley Common Junction	– Bristol Parkway (classic)		2tph
• Bristol Parkway (classic)	– Patchway Junction	(*)	2tph
• Patchway Junction	– Severn Tunnel Junction	(*)	8tph
• Severn Tunnel Junction	– Newport	(*)	12tph
• Newport	– Cardiff Central	(*)	12tph
• Pye Corner Junction	– Bristol Parkway HS		8tph
• Bristol Parkway HS	– Brentree Junction		10tph
• Brentree Junction	– Cardiff HS		12tph
• Cardiff (Central and HS)	– Cardiff (Rhoose) Airport		24tph
• Cardiff (Rhoose) Airport	– Ewenny South Junction		14tph
• Ewenny South Junction	– Swansea (via Bridgend)	(*)	6tph
• Ewenny South Junction	– Swansea (HS4 direct)		8tph

(\*) There will of course additionally be non-HS4 services on these sections. Except for Bristol Parkway (classic) – Cardiff Central and Ewenny North Junction – Swansea (and, of course, Euston Cross – Old Oak Common,) these are all 4-track.

## *Service Patterns at Reading*

The interchange pattern at Reading Parkway has been given in the relevant service plans. The service pattern at Reading General is of direct interest also. The following summarises the westbound service sequence there, at SP5, and is taken from the article ‘GWML Service Plans’. These are just the semi-fast RM services. There are also stopping services to Newbury, Basingstoke and Henley, and Crossrail. See the ‘GWML Service Plans’ article for full details. In particular, the service between Reading and Basingstoke, alternate ones originating from Henley, have been mentioned earlier, as they provide connections to most of the services at Reading Parkway (the XC services provide connections with the rest).

The only difference from the pattern at Mk1A is that the Paddington- Plymouth service at 28 minutes past has no disappeared – it has moved to HS4.

00	LHR Shuttle – Swindon
00	Gatwick Airport – Milton Keynes
10	Bournemouth – Manchester (rev)
10	LHR Shuttle – Devizes – Bristol
12	Manchester – Bournemouth (rev)
15	Paddington – Weymouth
15	LHR Shuttle – Oxford
24	Paddington – Hereford
25	Bournemouth – York (rev)
25	LHR Shuttle – Marlborough
27	York – Bournemouth (rev)

– repeating at 30 minutes past.

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

## *General*

By routing the HS-C services of HS2 and HS4 into Euston and Paddington, respectively, and all the UHS and HS Metro 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 HS-C services HS11/HS12 are routed into Liverpool Street. The UHS and HS Metro 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 these 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 service loadings of the London end of HS2 and HS1, and of HS4 and HS11/HS12, a single tunnel in each direction, with a minimum of 6 platforms, (passive provision for 8,) at Euston Cross, should 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):

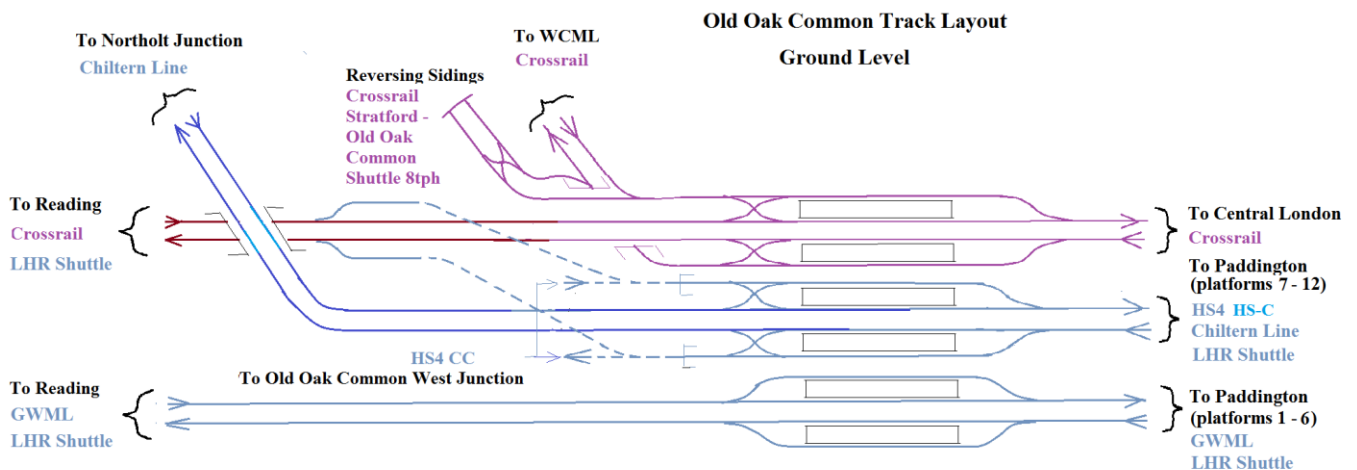
Ground Level, consisting of three sets of four platforms, serving the routes:

- GWML (Classic, long distance, and Heathrow Shuttle services,) on the fast lines.
- HS4 HS-C and Chiltern Line services, also some Shuttle services, on the relief lines, all of which diverge immediately west of the platforms, the HS-Cs to join HS4 at Old Oak Common West Junction, at the low level, the Chiltern Line services to Northolt Junction and the Shuttle services to join Crossrail on the relief lines west of Old Oak Common.

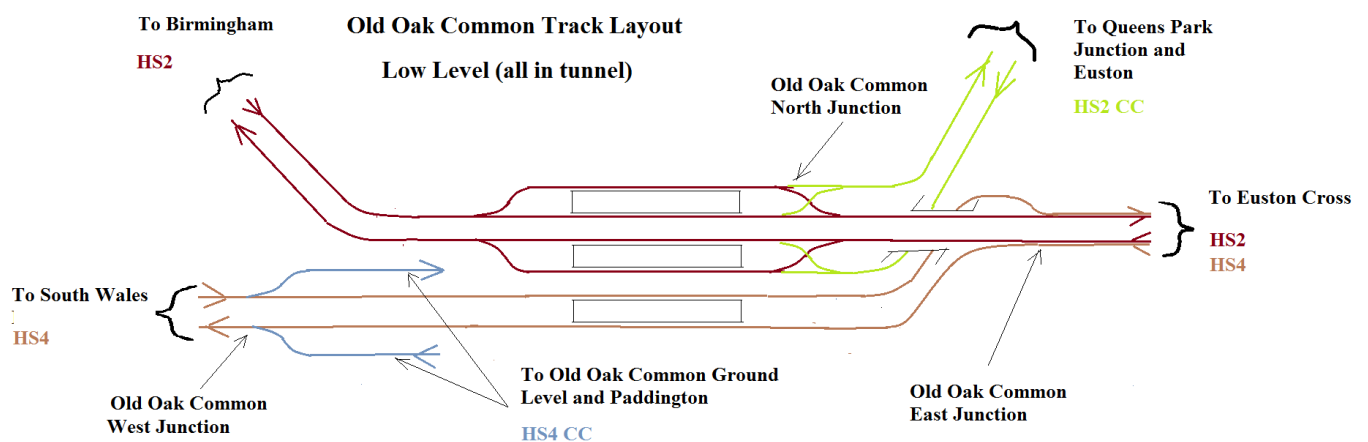
- Crossrail, of which the arm to the WCML and the Stratford Shuttle reversing sidings diverges immediately west of the platforms, and the GWML arm takes over the relief lines.

Low Level, consisting of HS2 (all services), and HS4 (UHS 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 services to share the same pair of tracks, the HS-C 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 HS-C 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.

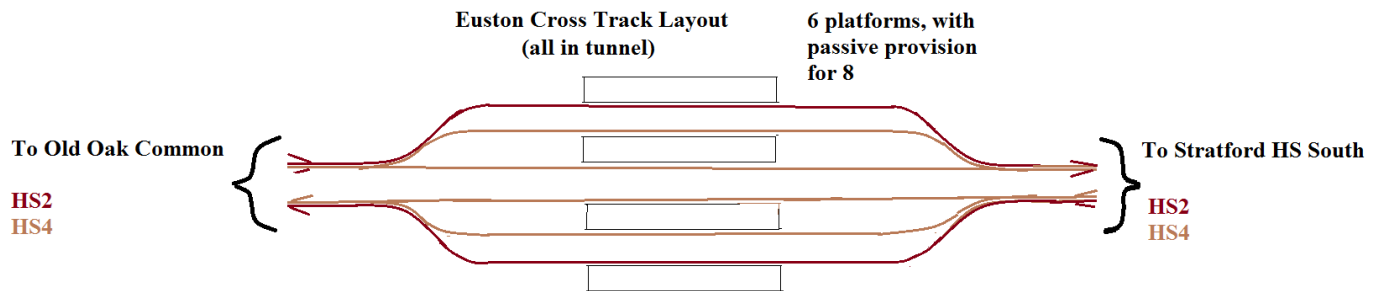


See the article 'GWML Service Plans' for a full explanation of the services between Paddington and Old Oak Common; as is clear from the diagram, the arrangement is rather complex.



## *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.

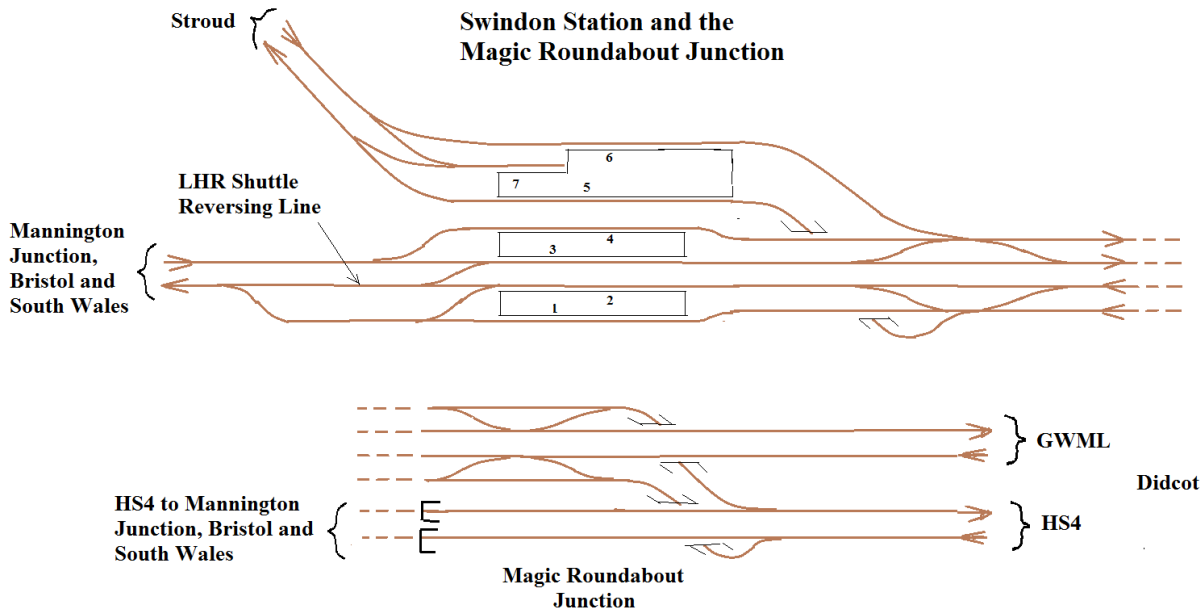
HS2 continues to Woodgrange Road Junction in Forest Gate, where it merges with HS1.

Stratford HS South corresponds in many respects to Old Oak Common. Both are served by all the cross-London 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 – Swindon Station Arrangements

Swindon needs a few more platforms.

3 & 4 are the existing island platform, unchanged. The westbound platform has been slewed one track's width north – through lines are not required – and another platform face opened on the other side (there should be room between the railway alignment and the adjacent office block. This is 1 & 2. Platforms 5 & 6 are an island on the north side, formerly sidings. 7 is a short bay.



1 & 2 deal with westbound services. 1 generally takes classic-compatibles to Bristol and South Wales, and 2 the Swindon arm of the LHR shuttle and the Paddington – Weymouth Regional Metro service.

3 & 4 deal with eastbound services. 4 generally takes classic-compatibles from Bristol and South Wales, and 3 the returning LHR shuttle and the Weymouth – Paddington Regional Metro service.

5 & 6 deal with classic-compatibles to and from Stroud, Gloucester (split / join) and Cardiff / Worcester. 7 deals with the Cirencester shuttle, via the restored line from Kemble, a service of 2tph timed to provide connections at Kemble for Cirencester – Gloucester and vice versa (there's plenty of stuff for it to connect into at Swindon).

# Appendix C – The Heathrow Shuttle

The initial 3 Shuttle services:

- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Didcot – Wantage Road – Swindon (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Maidenhead – Twyford – Reading – Tilehurst – Pangbourne – Goring and Streatley – Cholsey – Didcot – Oxford (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Thatcham – Newbury – Kintbury – Hungerford – Bedwyn – Pewsey

actually predate service plan 1. They are part of the basic service plan 0 on the GWML (which assumes that various projects currently being implemented or imminent, in particular the GW electrification, Crossrail and the western approach to Heathrow, have been completed).

At service plan 2, the rerouting of the classic express service to Plymouth and stations in Cornwall onto HS4 frees up 2 slots on the GWML, and advantage is taken of this to introduce 3 further Shuttle services, and extend the existing Pewsey one:

- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Thatcham – Newbury – Hungerford – Bedwyn – Pewsey – Devizes – Holt Junction – Bradford on Avon – Bath – Bristol Temple Meads (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Reading – Thatcham – Newbury – Kintbury – Hungerford – Bedwyn – Savernake – Marlborough (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Maidenhead – Bourne End (connections to and from Marlow) High Wycombe – Princes Risborough – Little Kimble – Aylesbury – Aylesbury Vale Parkway – Calvert (for HS2) – Winslow – Bletchley – Milton Keynes (LHR Shuttle)
- 2tphR Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange – Slough – Maidenhead – Twyford – Wargrave – Shiplake – Henley (LHR Shuttle)

The Swindon, Marlborough and Devizes / Bristol services travel west of Slough on the main lines, and the Oxford, Milton Keynes and Henley ones on the relief lines. This involves integrating them with Crossrail. ‘GWML Service Plans’ has all the information on this and everything else on the (London end of the) GWML, in extensive, comprehensive and thoroughly exhausting detail.

## Appendix D – Royal Wootton Bassett to Yate – New Build or Conversion?

This appendix has been superseded by an extension to appendix H. The preference is now for conversion of the section from Swindon and Bristol Parkway, for reasons explained there. The layout of Bristol Parkway and its associated junctions (essentially the section between Chipping Sodbury and Stoke Gifford Junction) has been completely redesigned for Mk1A and Mk2.



## Appendix E – Cardiff (Rhoose) Airport

There is, I understand, a proposal to develop Cardiff Airport as an extension/overflow to Heathrow. It's very difficult to find any details of this, let alone any formal plan. It may, indeed, be something of an urban legend. Certainly the Davies report on London's airports paid no attention to it.

But, assuming that there actually is such a proposal, then, given the intense opposition that any major extension to Heathrow (as Davies actually recommends) is bound to encounter, it's not beyond the bounds of possibility that a political compromise actually might go for the Cardiff solution. So, while not arguing for or against it, I merely consider what effect it would have on the current proposals for HS4.

The traffic through Rhoose would clearly be very greatly increased, and require a much enhanced service from HS4. Accordingly, the airport station would be the standard HS 2-island affair, with a turnback facility for services from the east. HS4 at service plan 2 would be extended to the airport, not just to Cardiff (indeed, it may be worthwhile to extend it immediately all the way to Swansea). Those services (from London and Birmingham) originally proposed to terminate at Cardiff would instead terminate at the airport. The services to the airport (over the section of line between Cardiff, General and HS, and Ewenny South Junction,) would be a mixture of HS and RM.

## Appendix F – Distance Table for GWML

Distance Table for GWML		
Paddington to:	miles:chains	km
Old Oak Common	3:0	4.8
Langley	16:18	26.1
Reading	35:78	57.9
Didcot Parkway	53:10	85.5
Swindon	77:19	124.3
Westerleigh Junction	107:14	172.4
Bristol Parkway	111:62	179.8
Bristol Temple Meads via Bristol Parkway	118:02	189.9
Severn Tunnel Junction via Bristol Parkway	123:66	199.2
Newport	134:55	216.7
Cardiff	145:35	234.0
Bridgend	165:50	266.5
Port Talbot	177:64	285.8
Neath	183:25	294.9
Swansea	191:12	307.6
Llanelli (via reversal at Swansea High St.)	202:35	325.7
Pembrey and Burry Port (ditto)	206:30	332.1
Carmarthen (ditto)	222:70	358.6
Chippenham	93:76	151.2
Bath Spa	106:71	171.0
Bristol Temple Meads via Bath	118:31	190.5
Weston -super-Mare via Bath	137:33	221.1
Cogload Junction (Down) via Bath	158:50	255.2
Tainton via Bath	163:12	262.5
Tiverton Parkway via Bath	177:28	285.4
Exeter St. David's via Bath	193:72	312.0
Theale via Reading General	41:22	66.4
Thatcham	49:45	79.7
Newbury	53:06	85.4
Pewsey	75:26	121.2
Heywood Road Junction	94:45	152.2
Fairwood Junction	97:02	156.1
Clink Road Junction	114:44	184.3
Blatchbridge Junction	118:37	190.6
Bruton	126:09	202.9
Castle Cary	129:45	208.5
Cogload Junction (Down) via Newbury	138:30	222.6
Taunton via Newbury	142:72	229.9
Kemble	90:79	146.4
Stroud	102:13	164.4
Stonehouse	104:74	168.8

Gloucester	114:04	183.5
Lydney	133:37	214.7
Chepstow	141:33	227.5
Caldicot	148:02	238.2
Severn Tunnel Junction via Gloucester	148:61	239.4
Theale (1km west of Theale HS Junction) to:	miles:chains	km
Thatcham	8:23	13.3
Newbury	11:64	19.0
Pewsey	34:04	54.8
Westbury (via Westbury saves 1ch vs avoiding line)	54:25	87.4
Frome via Westbury (via Frome adds 15ch)	74:23	119.5
Bruton via Westbury and Frome	85:01	136.8
Castle Cary via Westbury and Frome	88:47	142.5
Cogload Junction (Down) via Westbury and Frome	97:22	156.5
Taunton (this and all the following via Westbury and Frome)	101:64	163.8
Tiverton Parkway	116:14	186.9
Cullompton		193.6
Exeter St. David's	132:58	213.6
Dawlish	144:73	233.2
Teignmouth	147:56	237.6
Newton Abbot	153:71	247.6
Totnes	161:52	260.1
Ivybridge	173:13	278.6
Plymouth	184:61	297.3

The source of the above data is 'Track Atlas of Mainland Britain' (TRACKmaps 2009). The values are given in miles and chains (80 chains = 1 mile). The complicating factor for the GWML is historical: the distances to South Wales are measured along the original route via Gloucester. To adjust them to via Bristol Parkway involves three separate data: Paddington – Patchway Junction no.2 (just past Parkway), Bristol – Severn Tunnel Junction and Paddington – South Wales via Gloucester; a sufficiently tedious process to make it worth preserving the results, so that I don't ever have to do it again.

There is one special case: the distance of Cullompton – 6.7km beyond Tiverton Parkway – is measured from the 1"=mile (7<sup>th</sup> series) OS map, using dividers.

The distances from Theale include the effect of the station loops for Westbury and Frome. Passing through Westbury station actually saves 1ch (22yd = 20m) as compared with the (correctly named – it clearly is not a cutoff) avoiding line, whereas calling at Frome adds 15ch (330yd = 302m) as compared with the avoiding line.

# Appendix G – Changes at Mk1A

The changes of route at Mk1A, from Mk1, are as follows:

- The tunnel under Slough, between LHR Interchange station and Thimble Farm Junction, replaces the section following the M4 around the south of Slough.
- The section from Thimble Farm Junction to Shottesbrook Farm, on the GWML now joins the GWML there in the eponymous junction.
- HS4 now passes to the south and west of Reading, via Shinfield and Theale, and re-joins the Mk1 route in the tunnel under Streatley. (The original, Mk1 route is replaced by the new design.)
- There is a new station, Reading Parkway, on two levels, where the Reading – Basingstoke line crosses. South-facing connections towards Basingstoke are made from HS4 from both directions.
- HS4 now makes a connection to the GWML fast tracks **and** to the station avoiding line at Aston Junctions (allowing some trains to serve Didcot Parkway, or travel north, avoiding the station).
- The main line of HS4 tunnels under Didcot still, but now actually merges with the GWML immediately to the west of Didcot station, at Foxhall HS Junction. The section of GWML between Foxhall HS Junction and Wootton Bassett Junction is quadrupled, and the fast tracks upgraded to 140mph.
- The Mk1 junctions at Magic Roundabout and Mannington are postponed to Mk2, as is the tunnel under Swindon. All trains serve Swindon at Mk1A.
- HS4 continues to share tracks with the GWML, upgraded to 140mph, between Wootton Bassett Junction and Bristol Parkway (the existing, classic station, with a fourth platform added, if that has not been done already).
- The section between Westerleigh Junction and Bristol Parkway is unchanged from present arrangements, but assuming that the currently proposed fourth platform has been implemented/
- But west of Bristol Parkway, the section is 4-tracked to Stoke Gifford Junction, reconfigured to allow for parallel departures / arrivals, (as illustrated in the next appendix, giving the track layouts at both Mk1A and Mk2).
- HS4 continues to share tracks with the classic GWML between Bristol Parkway and Cardiff, via the original Severn tunnel. The line speed is upgraded to 100mph as necessary.
- At Cardiff, the new route is implemented between Cardiff Central and Aberthaw Junction, with a new station for Cardiff (Rhoose) Airport. This section is built for a line speed of 360kph. Reversing and servicing facilities are provided beyond the airport station.
- HS4 continues along the Vale of Glamorgan line, between Aberthaw Junction and Bridgend. This becomes the new main line. The original main line, via Pontyclun, is given over to local and metro services, and to freight.
- HS4 follows, and shares tracks with the existing, classic route, between Bridgend and Swansea.
- HS7 shares tracks with the existing NE/SW classic route, between Bristol Parkway and Exeter St. David's
- The new section of HS7, between Exeter and Plymouth, is implemented as for the Mk1 plans, and to a 360kph line speed.

## Appendix H – Upgrade rather than New-Build between Swindon and Bristol Parkway

Given the already superb alignment of this section, and also the isolated and sparsely populated area through which it passes, the temptation is very strong to upgrade the existing classic route to full HS standards. Given further the decision to abandon the GC loading gauge, and that this route is already built to the more generous (in UK terms!) loading gauge of the GW, the temptation becomes even stronger.

So, imagine the existing two tracks upgraded to 360kph line speed. As far as I can see from my OS maps, there are no level crossings on this section. There aren't many overbridges, either, just 17, many of which are for agricultural access – no road over them. Some will presumably need to be rebuilt to give adequate clearance. But the only significant infrastructure problems I can see are the two tunnels, at Alderton and Chipping Sodbury.

It would, I imagine, be very undesirable (note – irony warning!!) to have HS trains passing in a single tunnel bore. This could, in theory, be solved by timetabling – services are scheduled never to cross in the tunnels. This would work, but I regard it as highly unsatisfactory, in particular as it would not be fail-safe. So here are a few blue-sky ideas:

Install a vertical membrane between the tracks, from the tunnel invert to the tunnel roof. The single-bore tunnel is thus converted into two physically separate logical tunnels, with no air passages between them. (Structural engineers and materials specialists will need to advise on the practicality of this.)

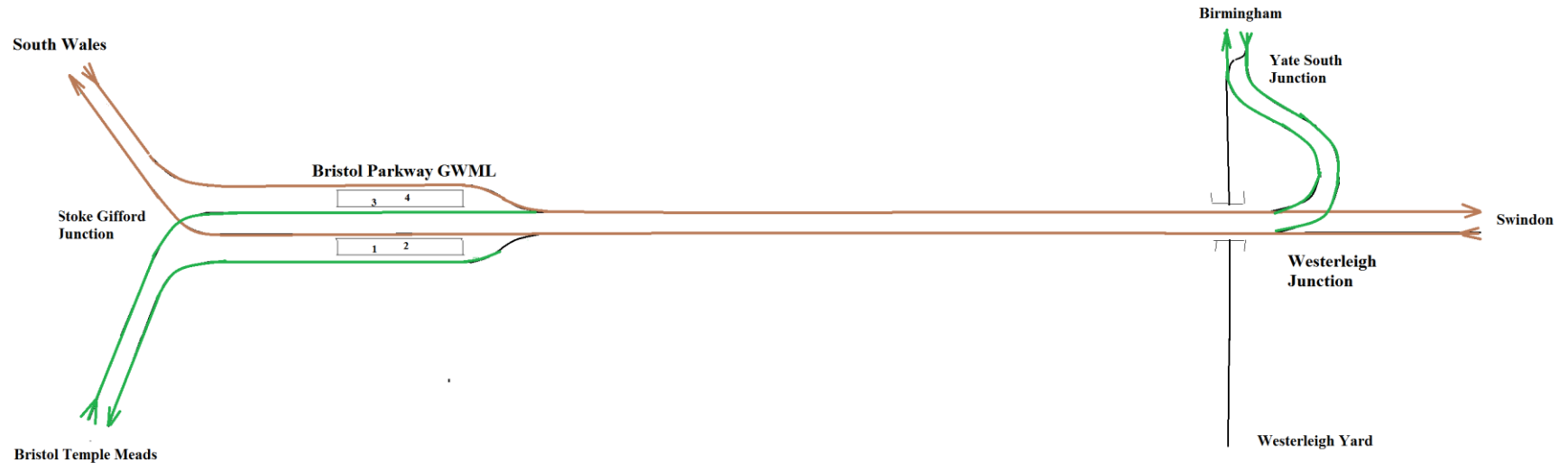
The pressure shock when a train enters the new, single tunnel at speed is relieved by techniques similar to those used on the new Gotthard Base Tunnel, with release passages at the entrance to allow the compressed air to escape. This is achieved either by an extension to the tunnel entrance, with release holes in the sides, growing further apart the further into the tunnel. A better idea would be for release pipes carried from different distances into the tunnel entrance area, simply running back out through the tunnel entrance. The pipes should be carried along the mid height of the tunnel wall, where there is most room for them, and turned away from the tracks at the tunnel entrance, so that the out-vent is not affected by the pressure wave from an approaching train.

I don't know what the level of freight on this section is likely to be, but suggest giving freight free access through the night hours, when there is no HS traffic. (The usual objection to freight on a HS line is that the line is likely to have gradients unfeasibly severe for freight. This obviously does not apply in the present case.)

I think that the upgrade to HS standards is, *prima facie*, a very attractive proposition for the Swindon – Bristol Parkway section.

It is, finally, necessary to consider the layouts for the final section, between Westerleigh Junction and Bristol Parkway, where HS7 traffic is also present. There follow suggestions for this, at Mk1A and at the full Mk2.

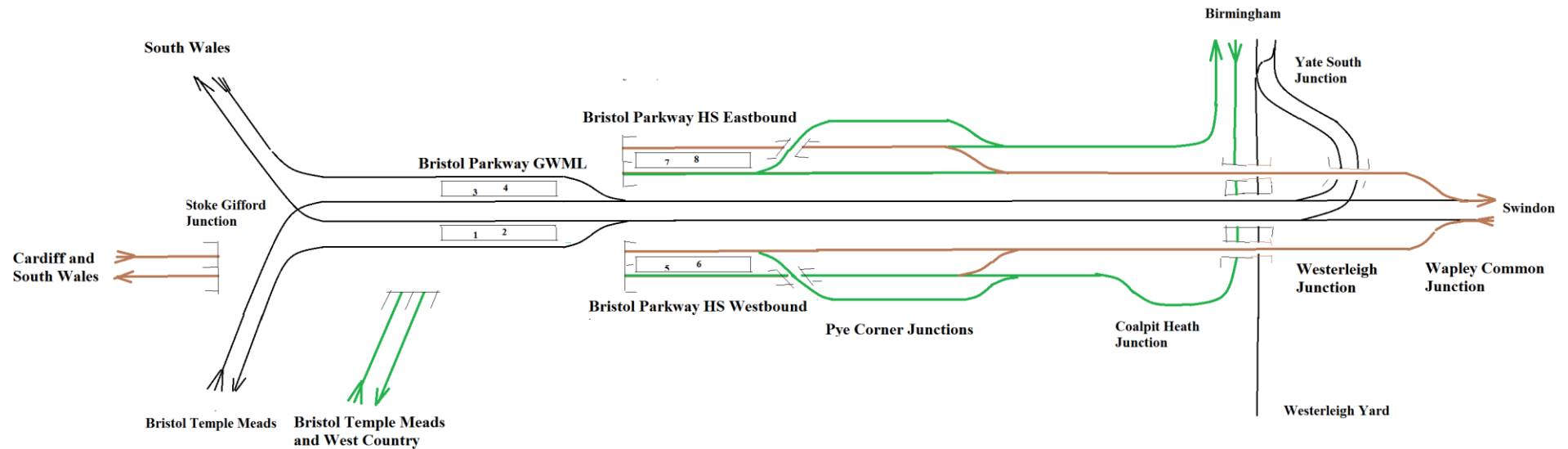
# Bristol Parkway Station and Junctions at HS4/HS7 Mk1A



This is essentially the existing track layout, (assuming that the fourth platform has finally been added!). The only changes are immediately west of Bristol Parkway, where four tracks are extended right up to the junctions, keeping South Wales and West Country services entirely separate, so that a train to South Wales and a train to the West Country can depart simultaneously, likewise a train from South Wales and a train from the West Country can arrive simultaneously (but arrivals and departures must be kept separate, naturally).

The above diagram shows only lines relevant in the present context.. In particular, the line to Avonmouth via Henbury is omitted, as is the connection between Filton and Patchway Junctions. There will be extra crossovers at Bristol Parkway, for operational flexibility.

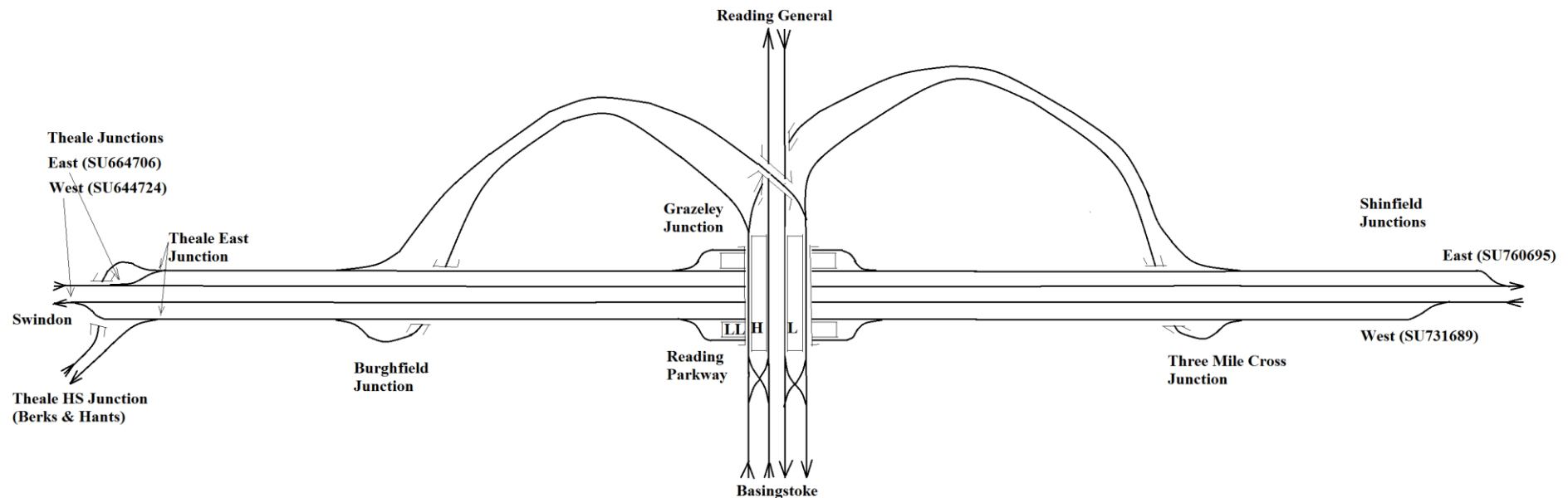
# Bristol Parkway Station and Junctions at HS4/HS7 Mk2



All the track at Mk1A is still present, but a significant amount of new track has clearly been added. The HS4 tracks diverge from the classic tracks (strictly, the classic tracks diverge from HS4, since this is the main line) at Wapley Common Junction, a little to the east of Westerleigh Junction. The HS4 tracks are carried over the HS7 tracks, which come in at Coalpit Heath Junction (which is a route, not a track junction). Connections between HS4 and HS7 are at Pye Corner Junctions, immediately before Bristol Parkway (so all trains will be traveling slowly, before calling at Bristol Parkway HS, therefore only ordinary pointwork is needed). The HS platforms are immediately east of the GWML platforms, since the HS tracks need to be in tunnel straight afterwards, to pass underneath the complex of junctions at Stoke Gifford. Pye Corner allows for conflict-free switching between HS4 and HS7 simultaneously, and in both directions. The desired ideal is that trains from London and Birmingham approach Parkway simultaneously, at full speed, and come to a stand simultaneously, in the correct departure platform for their destination, for cross-platform interchange between them. Likewise, trains from South Wales and Bristol / West Country approach Parkway at full speed, and come to a stand simultaneously in the correct arrival platform, for cross-platform interchange between them. They then depart simultaneously, and are routed at Pye Corner onto their correct destination track.

On HS4, the Paddington to South Wales service via Newport (and on to Carmarthen) proceeds along the classic route to Bristol Parkway GWML. Regional Metro services from the Birmingham classic route join the classic GW route at Westerleigh Junction.

## Appendix I – Reading Parkway Station and Junctions



The diagram should be self-explanatory. The LL station allows through trains to overtake stopping trains. The station loops diverge from / re-join the main line at Shinfield and Theale Junctions, which are, of course, as for all HS station loops, at different locations, hence designated East and West, together with their map references. Theale East Junction is perhaps misleadingly named, except that it coincides with the eastern of the pair of Theale junctions, for the station loops. The connection to the Berks & Hants line diverges there.

Three Mile Cross and Burghfield junctions are where the links from both directions to the HL station diverge. They join the Reading – Basingstoke line at Grazeley Junction, immediately to the north of the station.



## Appendix Q – Journey Times for Line Speed 225kph, 140mph

The article ‘Line Capacity vs. Speed for High Speed Railways’ points out (in the section ‘Consequences of the Results’) that a good case can be made for a line speed of 225kph, 140mph, because this offers a good compromise between speed and line capacity (theoretical capacity 49tph at 225kph with basic Train Separation Distance as compared with 29tph at 360kph with extended TSD). Even more important is the fact that this is just within the current (as at 2014) Turnout Limit Speed of 230kph, 144mph. This is the maximum speed at which trains can diverge from the main line of a HS railway, using the fastest available pointwork. What this means is that diverging trains can leave the main line at full line speed; there is no need to decelerate on the main line before diverging. This means that the Extended Train Separation Distance standard, which allows diverging trains to decelerate on the main line, without affecting a following straight-ahead train, which continues at full line speed, is no longer necessary, which allows major simplification in the operation of HS railways. (Note that these preceding remarks apply only to routes where **overtaking** takes place – specifically to HS2, HS3, HS4 and HS14. They do not apply to routes with an HS-Metro service pattern. But the journey times for line speed 225kph is of interest for all routes.)

This new appendix Q is being added to every Route and Service Plans article, to show what the effect would be for the journey times of the various services. No recommendation is actually being made for this change, but it is important that the supporting information be available to allow a reasoned decision to be made.

*1. UHS Services: Euston Cross – Swansea / Plymouth (6/6 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Bristol Parkway HS	161.4	189.4	45.8	59.2	65.2
Bristol Parkway HS - Cardiff HS	48.0	237.4	15.6	74.7	83.7
Cardiff HS - Cardiff Airport	15.0	252.4	6.7	81.4	93.4
Cardiff Airport - Port Talbot Parkway	39.0	291.4	13.2	94.6	109.6
Port Talbot Parkway - Swansea HS	13.0	304.4	6.2	100.8	118.8
Bristol Parkway - Bristol Temple Meads	8.0	197.4	4.9	64.1	73.1
Bristol Temple Meads - Taunton	72.0	269.4	22.0	86.0	98.0
Taunton - Exeter St. David's	49.5	318.9	16.0	102.0	117.0
Exeter St. David's - Plymouth	65.0	383.9	20.1	122.1	140.1

Comparative journey times:

London to:	Current	Mk1	Mk1A	Mk2.0	Mk2.1	Mk2.2	Mk2.3	224kph
Swindon	52.0	38.2	44.9	41.4	41.4	41.4	41.4	56.1
Bristol Parkway	79.0	48.4	65.5	50.7	50.7	50.7	50.7	65.2
Cardiff	121.0	63.8	96.1	88.8	88.8	66.1	66.1	83.7
Cardiff Airport		73.5	105.8	98.4	98.4	75.8	75.8	93.4
Port Talbot	157.0	88.0	132.8	125.5	122.2	89.7	89.7	109.6
Swansea	178.0	97.2	152.1	144.8	141.5	98.9	98.9	118.8
Bristol Temple Meads	99.0	56.3	73.7	58.9	58.9	58.9	58.5	73.1
Taunton	102.0	76.2	85.3	86.0	86.0	86.0	78.0	98.0
Exeter St. David's	120.0	92.5	105.6	106.3	106.3	106.3	93.7	117.0
Plymouth	179.0	112.2	123.9	124.6	124.6	124.6	112.0	140.1

2. *UHS Services: Euston Cross – Cardiff Airport / Bristol TM (6/5 stops):*

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from London, inc. Station Wait Times
Euston Cross - Old Oak Common	8.0	8.0	4.9	4.9	4.9
Old Oak Common - LHR Interchange	20.0	28.0	8.5	13.3	16.3
LHR Interchange - Reading Parkway LL	37.0	65.0	12.6	26.0	32.0
Reading Parkway LL - Swindon	68.9	133.9	21.2	47.1	56.1
Swindon - Bristol Parkway	55.5	189.4	17.6	64.7	76.7
Bristol Parkway - Cardiff HS	48.0	237.4	15.6	80.3	95.3
Cardiff HS - Cardiff Airport	15.0	252.4	6.8	87.1	105.1
Bristol Parkway - Bristol Temple Meads	8.0	197.4	4.9	69.6	84.6