HS7 Route and Service Plans

HS7 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 HS7 and associated routes, principally HS3 and HS4, which are also, of course, incorporated in the various route sections, following.

Two specific new section of route need to be highlighted – the section north of Birmingham to the junction with HS3 at Nuthall North Junction, and also the southern exit from Birmingham and the direct route between Exeter and Plymouth. The former is unavoidable as the existing NE/SW route has no extra capacity available in this area. The latter satisfies the necessity of providing an alternative to the vulnerable existing classic route via Dawlish.

Because of the significant changes introduced at Mk1A, the latest versions of all the Mk1 plans (v6.5 in the case of HS7) have been preserved, available in an archive section on the website.

HS7 Route Mk2

As noted above, the Mk1A changes have, in general, little impact on the routes proposed (but great impact on the service plans). HS7 is the no exception to this. The only realistic opportunities to incorporate segments of classic route are south of Birmingham, as far as Westerleigh Junction, then along the GWML with HS4 to Bristol Parkway, and between Bristol Temple Meads and Exeter. The alignments of these parts of the NE/SW route are in fact very good, and should be readily upgradeable to 140mph line speed. Mk1A may thus be viewed as a cut-down version of the original proposals, somewhat quicker and less expensive to implement, but nonetheless delivering a large proportion of the advantages of those proposals.

This will not, however, satisfy the increasing capacity requirements beyond the fairly short term. HS7 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. In the first case, the section between Bristol Parkway and Temple Meads, would be implemented, simultaneously with capacity enhancements to HS4. If these were implemented in full, we would end up with the original design, 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 HS7, the NE/SW route from Newcastle to Bristol and the West Country, and, in association with HS4, to South Wales.

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.

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 a 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 gradient profiles for the new alignments Birmingham Interchange to

Barnt Green and Exeter to Plymouth, but not for Derby to Polesworth as this section, though undulating, is level overall.

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 HS7, including sections of other routes over which HS7's services run. These overall maps come at the end of the 'Route' description, and also show HS7'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:

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 HS7.

The Service Plans

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

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

A standard HS station has two island platforms, thus two platformed tracks in each direction. If some of the services passing through the station are non-stop, then the main line must pass through the layout without adjacent platforms, either through the centre of the alignment, in tunnel below or on viaduct above, or the station must be on a branch loop off the main line, which thus bypasses it completely. In fact, all HS7 stations are served by all services, so don't need overtaking/avoiding lines. (An exception to this is the set of local stations between Exeter and Plymouth. These are served only by a trans-Dartmoor stopping service, not by HS services, which are all non-stop. These stations all have a single platform face in each direction, on a short loop, to allow the HS services to overtake.) 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 HS7 south of Bristol (and HS4 west of Cardiff).

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 HS7 and HS4.

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, HS4, the route from London to South Wales, must also be considered, as HS7 and HS4 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 Bristol and Cardiff, 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 Bristol and Cardiff, each of which makes a cross-platform connection with the service to the other destination, giving exactly the same journey time, thus 8tph overall from each origin to each destination..

Two types of services are contained in the plans, those featuring High Speed trains, which travel on HS7 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.

HS7 Route – Introduction and Assumptions

The route from Newcastle, via Leeds, to Nuthall North Junction, Nottingham, is shared with HS3. This is fully described in 'HS3 Route and Service Plans', and will not be repeated here (but this part will of course feature in the service plans). The route from Nuthall North Junction to just west of Polesworth is a new alignment, in part taking over the route of a closed line. From Polesworth into Birmingham Curzon Street, the route taken is that proposed by the HS2 Project Team for the eastern arm of the HS2 'Y' configuration. There is a new alignment from Birmingham to Barnt Green. Between Barnt Green and Exeter St. David's, HS7 closely follows existing alignments, railway and motorway (but with short sections of new alignment in the Droitwich, Cheltenham, Gloucester and Bristol areas). (Indeed, at Mk1A, HS7 **consists of** existing alignments, almost exclusively, sharing track with the existing classic routes,) Between Exeter and Plymouth an entirely new alignment is chosen (avoiding Dawlish!).

The maximum speed for the new HS7 infrastructure is 300kph, 187.5mph, except for the section shared with HS3 between Darlington and Nuthall North Junction, where it is 360kph, 225mph. (From Newcastle to Darlington, HS3 also has a maximum of 300kph, 187.5mph.) This is because the non-stop distances travelled on HS7 are not long enough to take advantage of the higher speed (likewise for HS4, west of Cardiff). The incorporated classic sections, whose alignments are already very good, will be upgraded to 225kph, 140mph. HS7 in its entirety has the characteristics of a HS Metro.

HS7 Route – Junctions

There are various junctions on the route of HS7, 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.

• Nuthall North	SK514469	HS7 diverges from HS3 main line
• Awsworth	SK484444	Spur from HS3 Nottingham branch (passing over HS3 main line) joins HS7 main line
• Strelley	SK512423	HS7 link diverges from HS3 Nottingham branch
• Marston	SP190943	HS7 (north) joins HS2
• Water Orton:		
– North	SP190913	HS7 Birmingham avoiding line diverges from route to Birmingham Curzon Street from the north
– West	SP172904	HS7 Birmingham Curzon Street routes join
– South	SP192892	HS7 Birmingham avoiding line joins route from Birmingham Curzon Street to the south
• Birmingham Interchange	SP203831	HS7 (south) diverges from HS2 just south of Birmingham Interchange, and scissors crossovers are provided at both ends of the island platforms. HS7 trains normally use the outermost tracks at the station. Trains sort themselves by route normally via the north end crossovers. (There are 6 tracks between here and Water Orton S.)

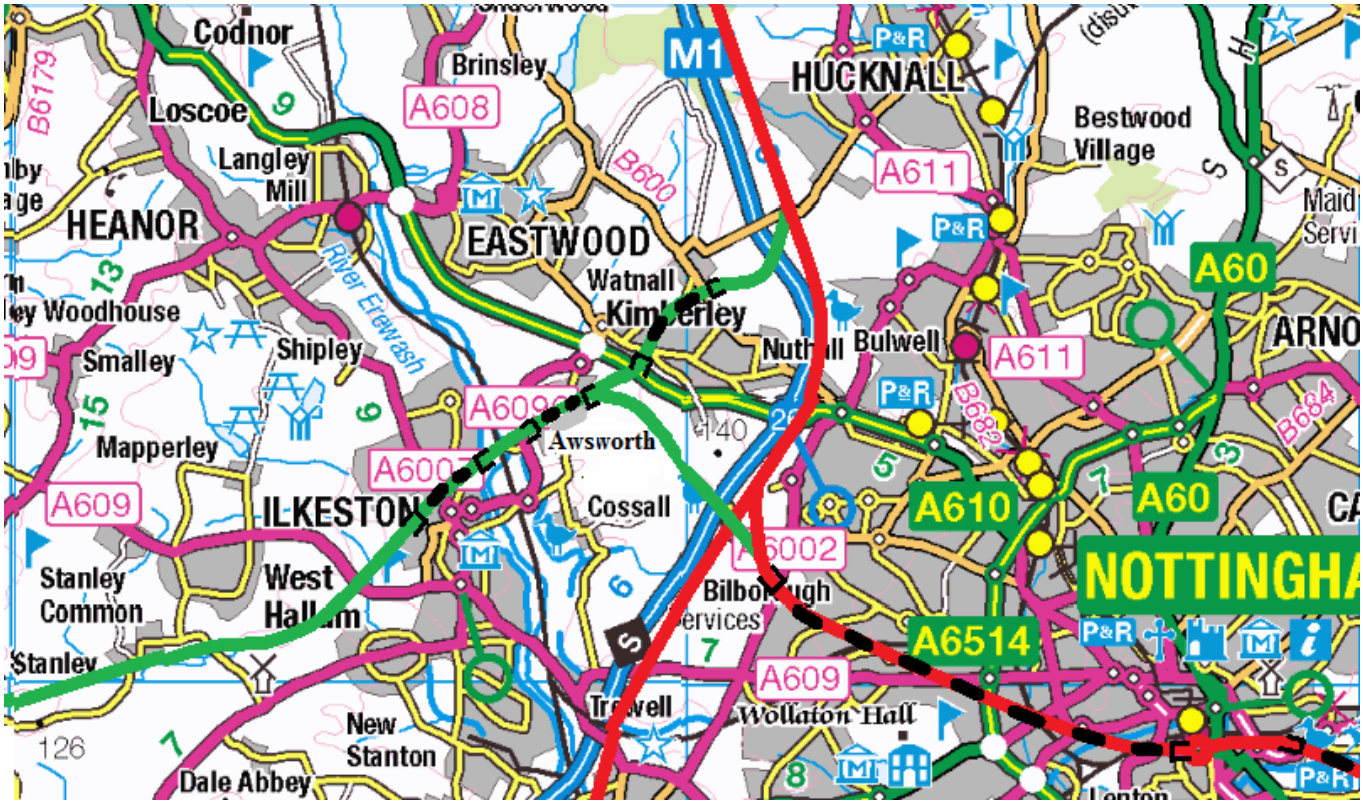
• Cofton Hall	SP012750	HS7 joins the classic route just north of Barnt Green, thence, at Mk1A, sharing classic tracks to Bristol Parkway
• Coalpit Heath (Mk2 only)	ST685803	HS7 joins alignment of HS4. Note that this is a route junction, but not a track junction. The track junctions are at Pye Corner, next. (Note that, at Mk1A, the existing GWML infrastructure, and thus the existing Westerleigh Junction, is used.)
• Pye Corner (Mk2 only)	ST635797	Connects HS7 and HS4 with each other (with totally non-conflicting junctions), just east of Bristol Parkway
• Brentry (Mk2 only)	ST572797	West to south chord diverges from HS4 (enables services between South Wales and the West Country, without reversal at Bristol Parkway).
• Stadium (Mk2 only)	ST604750	West to South chord joins HS7 main line.
• St. Philip's (Mk2 only)	ST604734	HS7 divides in tunnel; north branch goes to Bristol Temple Meads (Brunel Trainshed) and main line goes to the HS platforms on the east side of the station.

There are various other links between HS7 and classic lines, for operational purposes and not intended for regular services, so not relevant in the present context. (There are also many other junctions on the section shared with HS3, but these are of little interest here.)

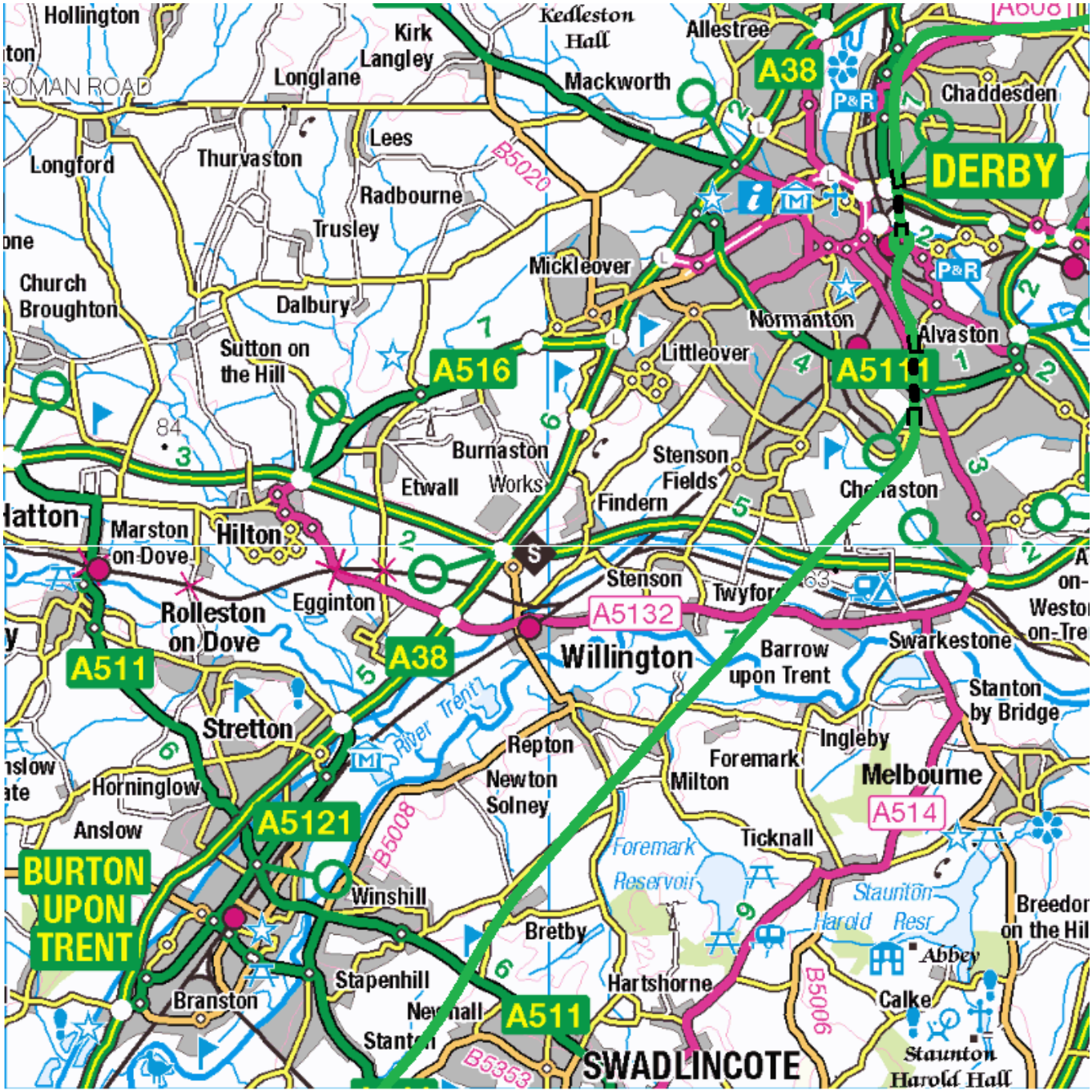
There now follows the definition of the actual route, in several logical sections.

1. *Nuthall North Junction – Birmingham Curzon Street*

HS7 shares the route of HS3 from Newcastle to Nuthall North Junction (SK514469), where it diverges, and has its own route from there to Plymouth. It takes over the trackbed of the former Great Northern branch from Nottingham to Derby at SK508451, and follows that to near where it crosses the Midland line, north of Derby. A ¾ mile tunnel under Kimberley extends from SK507451 (Main Road) to SK496447 (Church Hill). At Awsworth Junction (SK484444) it is joined by the spur from Strelley Junction (SK512423) on the Nottingham branch of HS3, this passes over the HS3 main line, and completes a HS route between Nottingham and Derby. A ½ mile tunnel under Awsworth itself extends from SK483444 (Gin Close Way, immediately west of the junction,) to SK478442 (A6096). There immediately follows that noted survivor, the splendid Bennerley Viaduct, which, it is sincerely hoped, may be brought back into use (otherwise a short sideways diversion will be required). Just before the viaduct is the course of the currently derelict Nottingham canal; an adequate bridge should be provided, so as not to impede future restoration. Shortly after the viaduct there is a further ½ mile tunnel under Ilkeston, between SK469437 and SK463427. There is the choice of a very short tunnel under the A609, High Lane East, or demolishing perhaps 3 houses; I make no recommendation. These 3, perhaps 4 tunnels are all to avoid housing which has been built since the original line closed, 50 years ago; there are no further obstructions until immediately before Derby. For a route closed for 50 years, this is remarkably little obstruction. HS7 thereafter follows the trackbed without further note until it reaches the A61, Sir Frank Whittle Road, at SK363383. Beyond this, the original route has disappeared beneath an industrial estate, however there is plenty of space on the east side of the A61 (and on a very good alignment) as far as SK362370, with a ¾ mile tunnel from there underneath the Derwent to SK362358, emerging (at the appropriate location amongst the tracks, i.e. between the classic routes to Birmingham and London) actually in Derby station. This is in fact a much better approach to Derby than using the original route to join the Midland alignment.

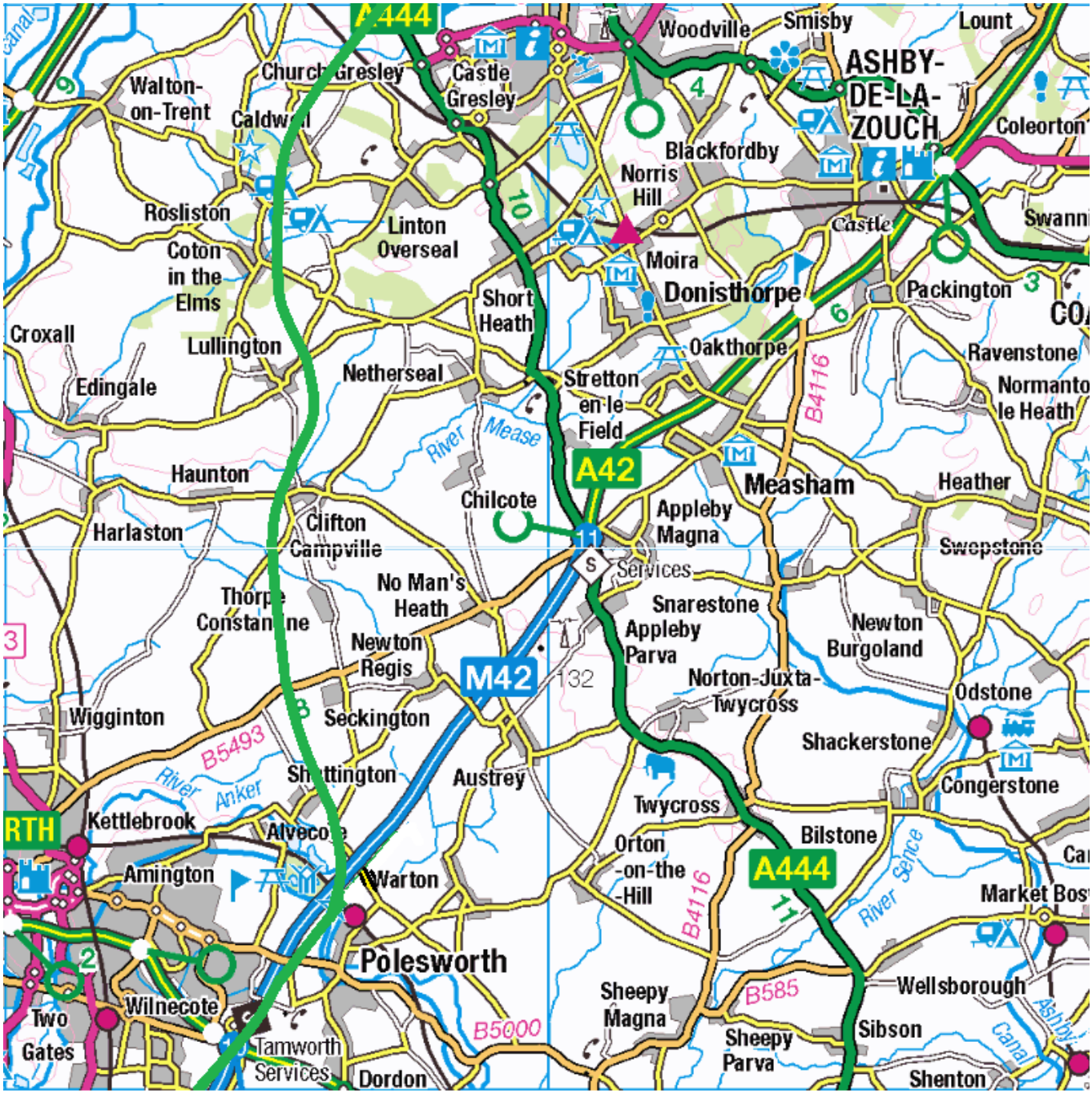


1.1 Nuthall North Junction – Stanley



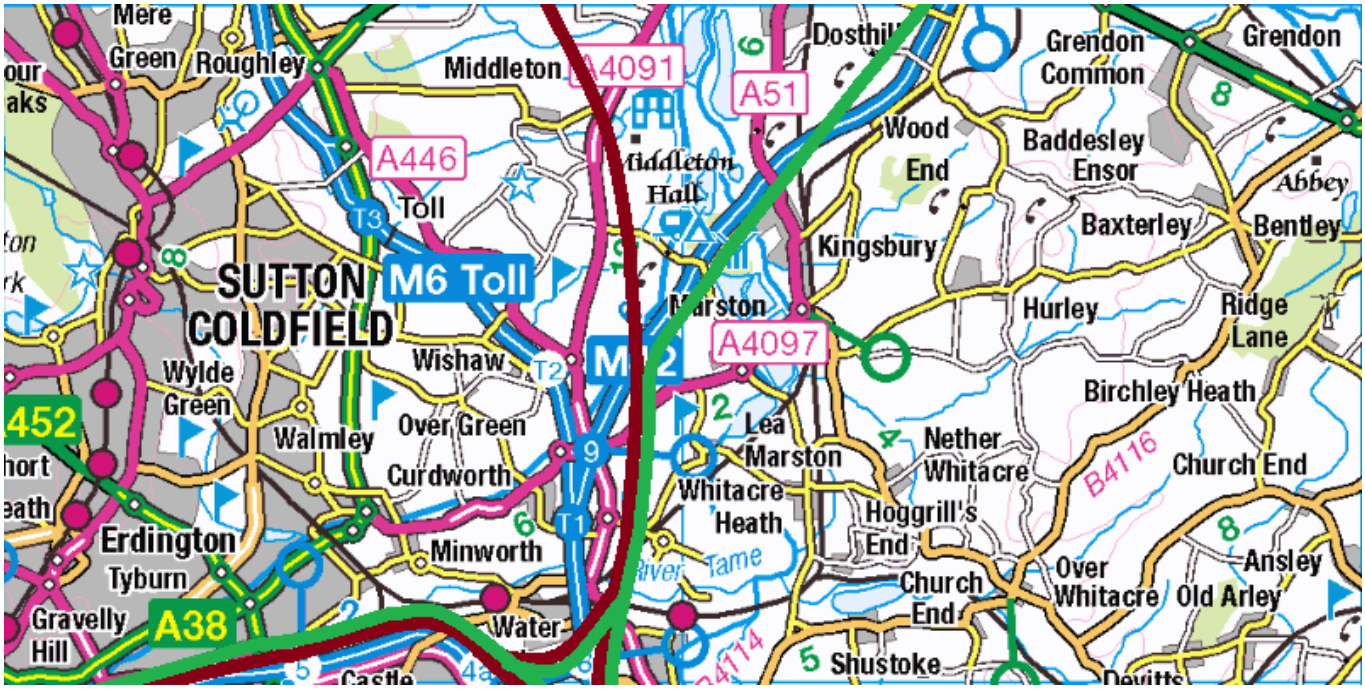
1.2 Derby – Stanton

Leaving Derby, HS7 passes through the Litchurch Lane industrial estate on existing tracks and enters a ¾ mile tunnel at SK366338, passing under Osmaston and emerging at SK366323. It veers to the west, passing round the south side of Sinfin (Wilmore Road). It crosses Sinfin Moor and proceeds straight to SK308253, south east of Repton. Continuing in a straight course to Stanhope Bretby (SK285222), it takes over the trackbed of a former mineral branch to SK263193, shortly before that would have joined the Leicester – Burton line. It follows roughly the course of the 250ft contour, passing to the east of Rosliston, Coton in the Elms and Lullington, then to the west of Clifton Campville, Thorpe Constantine and Seckington, and finally to the east of Shuttington (a particularly nice selection of village names) it joins the route proposed in the HS2 plans for the eastern arm of the HS2 ‘Y’ at SK258036 and follows that all the way to Birmingham Curzon Street. See appendix F for the precise track layout in this area; it’s rather complicated!



1.3 Church Gresley – Tamworth

See also appendix C on the impact on HS7 of the Coventry Variant of HS2. This affects the sections around Birmingham.



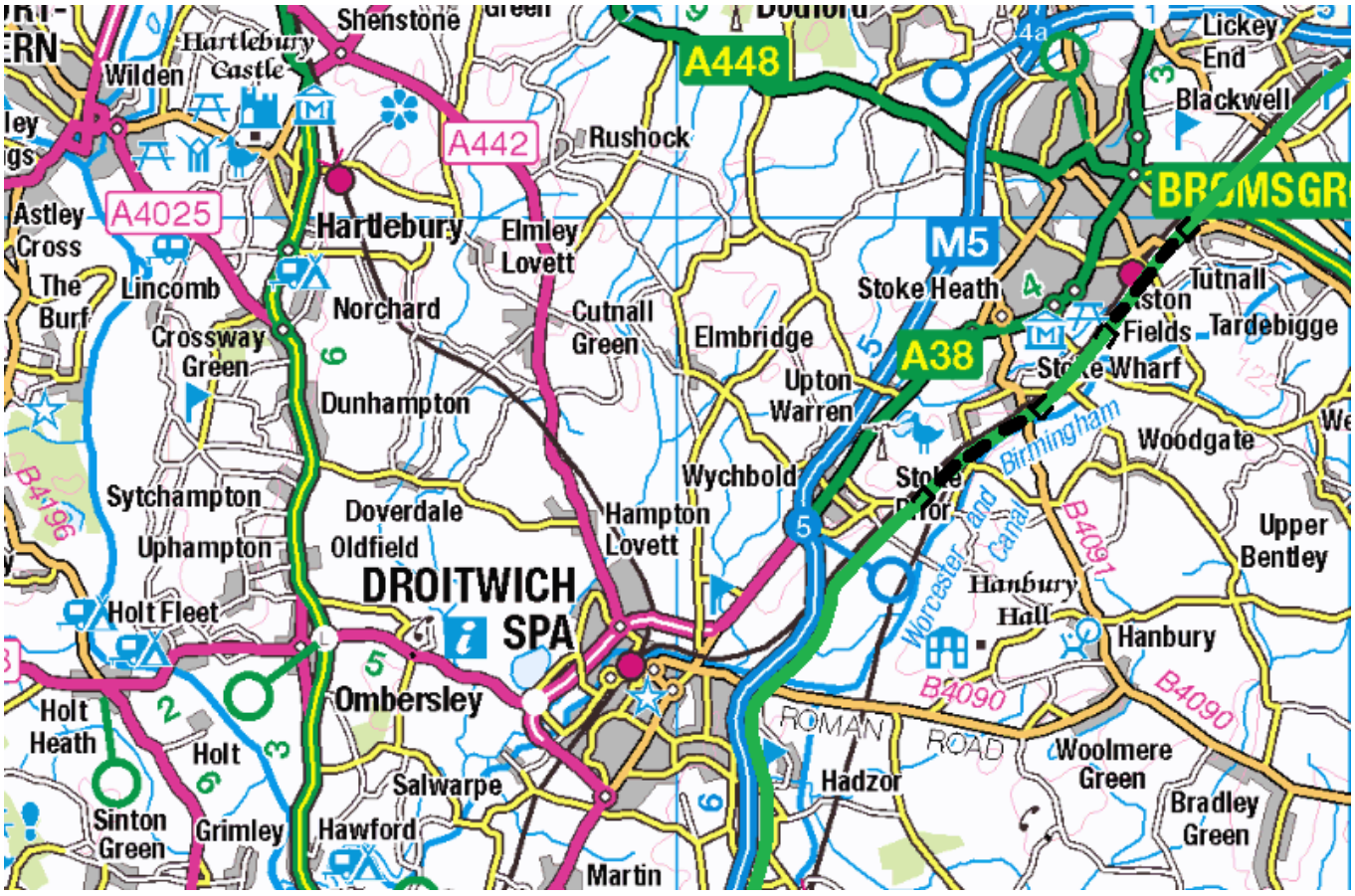
1.4 Dosthill – Gravelly Hill

1.5 Water Orton – Birmingham

2. *Birmingham – Worcester*

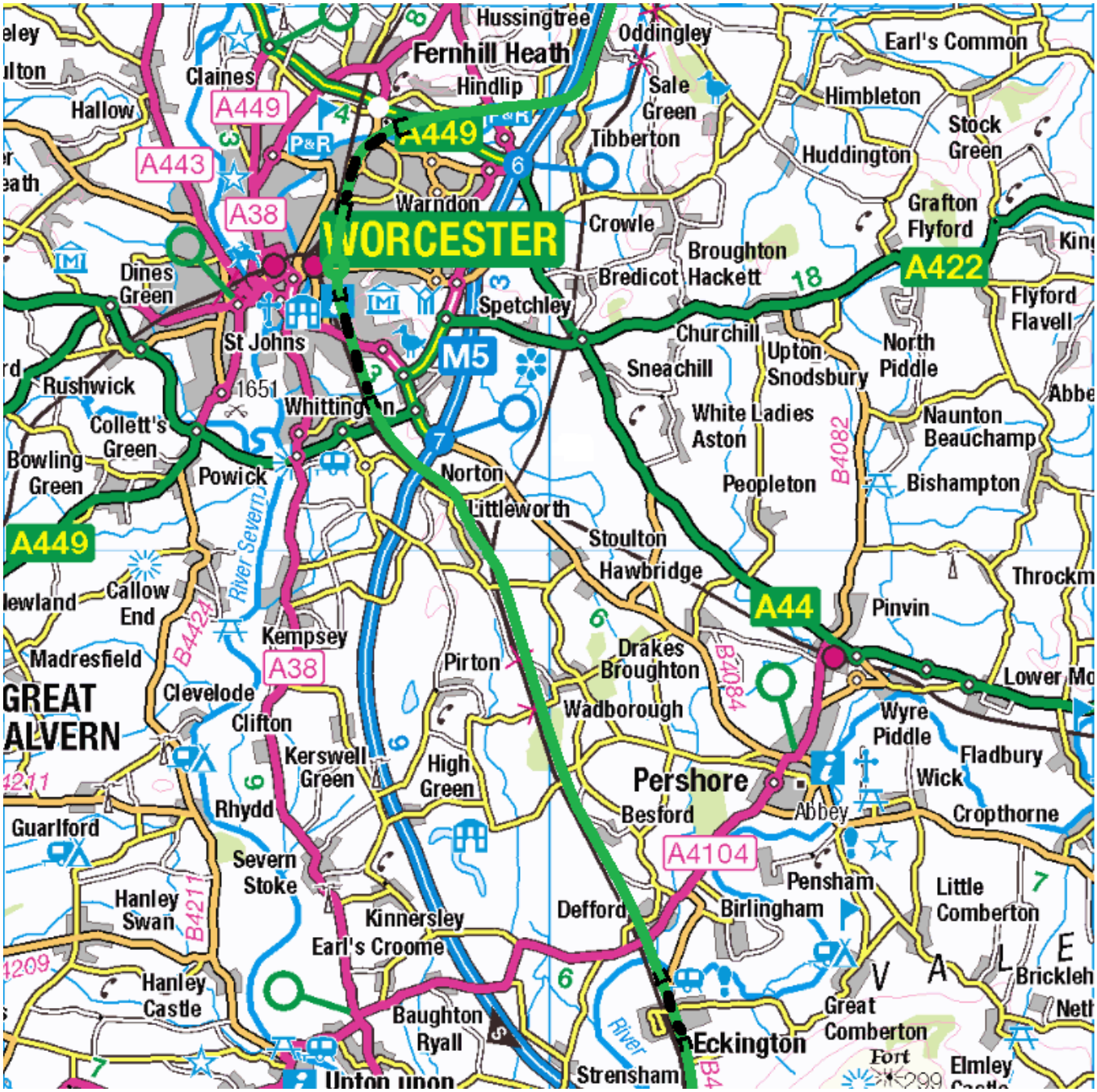
As noted above, HS7 has its own pair of tracks throughout the Birmingham region, duplicating those of HS2 on the common routes. HS7 and HS2 offer cross-platform interchange at Birmingham Interchange, with HS7 tracks on the outside, where, immediately on leaving the station, HS7 enters a 7 mile tunnel, initially curving sharply to the west, (which doesn't matter as all trains stop there,) passing beneath

2.1 Eastcote – Barnt Green Contains Ordnance Survey data © Crown copyright and database right 2013



2.2 Bromsgrove – Droitwich Spa Contains Ordnance Survey data © Crown copyright and database right 2013

Solihull and Shirley, and emerging at SP101782, just west of Shirley station. It continues in a more or less straight line, crossing the Alcester Road at SP081780 – the only bit not built-up – and skirting round the south of Hawkesley (passing through SP45768), on to SP027767, near High Hill. It then veers to the south west and joins the Midland route on the eastern side of the alignment at Cofton Hall, SP012750. Average gradients on this section are 1 in 370 through the tunnel, 1 in 120 thence to High Hill, and 1 in 66 descending to Cofton Hall Junction, where, at Mk1A, it joins the classic route.

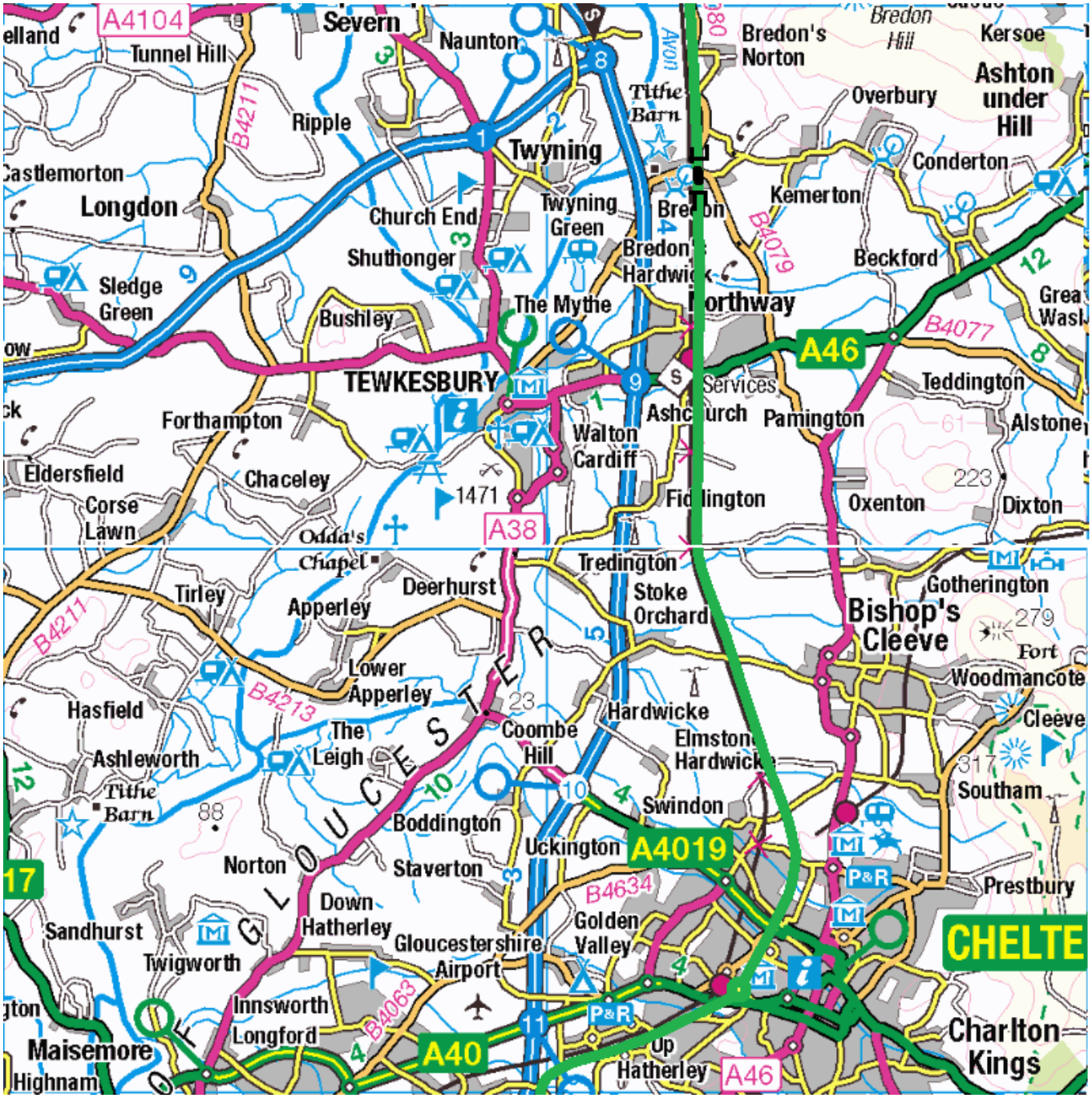


2.3/3.1 Worcester – Eckington Contains Ordnance Survey data © Crown copyright and database right 2013

(At Mk2:) HS7 follows the east side of the Midland alignment on to the Droitwich route, as far as the M5 crossing at SO920644. During this section it tunnels for ½ mile under Barnt Green, between SP009741 and SP045768, for 1 mile under Bromsgrove between SO976701 and SO966689, and for ½ mile under Stoke Works between SO951672 and SO940664. In all these cases, the tunnelling is to avoid housing, but in the first and third cases also advantageously passes beneath a junction. Some warehouses need relocation near Stoke Pond (SO961682). HS7 follows the east side of the Droitwich line until SO920644,

as noted above, where it diverges to follow the east side of the M5. It would be very difficult to take the route through Droitwich without extensive tunnelling or heavy demolition, hence the diversion. It follows the M5 until just before it crosses the Worcester and Birmingham canal. HS7 crosses over the M5 at SO903584 and follows a little to the north of the canal until SO870578, where it enters a 1 mile tunnel under the Blackpole industrial estate and a built-up area alongside the Worcester line, emerging at SO862564 (King George's Field) on the east side of the Worcester route. This it follows (with a tunnel at the same place under Rainbow Hill) all the way to Shrub Hill station, taking over a pair of goods lines approaching Shrub Hill, to avoid the junction from Foregate Street. There is plenty of railway land on the east side of Shrub Hill station, for a full HS station.

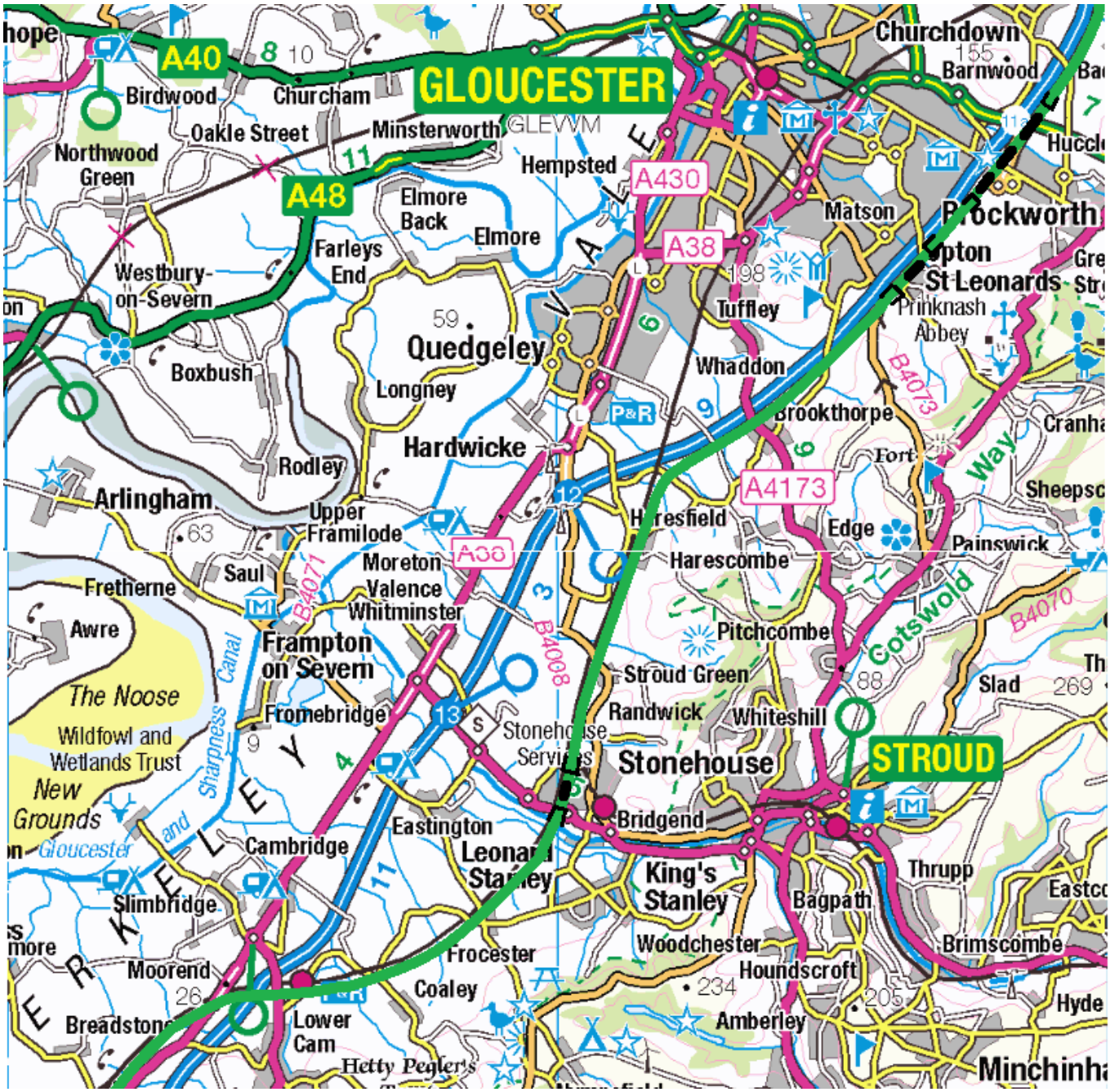
3. Worcester – Bristol Parkway



3.2 Bredon – Cheltenham

The route south from Worcester follows the east/north side of the alignment all the way to Norton. It is in tunnel between SO860547 and SO864533, purely to avoid housing, but apart from this, that side of the alignment is completely unobstructed. At Norton (SO886509) it crosses on viaduct the Cotswold and Birmingham and Gloucester lines, joining the east side of the B&G at SO889499.

It follows the east side of the alignment all the way to Brockhampton (SO939259). In this distance there are only two obstructions, due to housing, and tunnelled under, each ¼ mile, at Eckington, between SO920417 and SO923411, and at Bredon, between SO926370 and SO926365. From Brockhampton, HS7 veers away from the Birmingham and Gloucester alignment to join the alignment (taking over the trackbed) of the GW route from Honeybourne, just south of Hunting Butts tunnel, at SO947244, and follows that through Cheltenham to its own station adjacent to Lansdowne (the alignment and all the bridges except one are still in place). I see merit in the idea of a racecourse station at Hunting Butts – just for special traffic associated with meetings.



3.3 Churchdown – Lower Cam

The line used to be 4 track between Cheltenham and Stonehouse Junction (the Midland and GW each having their own tracks. Two tracks were removed in the '60s (I presume) and in the intervening period, the spare alignment has been severely encroached on. In particular, the area surrounding the alignment through Gloucester is very congested. Accordingly the M5 alignment is followed to pass round the south of Gloucester. HS7 diverges from the Birmingham and Gloucester alignment at SO902205 and joins the east side of the M5 alignment at SO898201. It follows the M5 until it intersects with the Gloucester – Bristol line at SO819118. Two tunnels are nonetheless needed on this section, to avoid built-up areas which encroach surprisingly closely to the motorway – 1½ miles between SO888183 and SO873164 (this also passes under a motorway junction, which I don't normally consider), and ½ mile between SO866157 and SO861150.

HS7 re-joins the Bristol – Gloucester route at SO818115, and follows the east side of the alignment until Wickwar. It tunnels for ½ m under Stonehouse, between SO801060 and SO798052 (not forgetting to provide an adequate bridge over the Stroudwater Navigation, currently under restoration). It tunnels for ½ mile under Charfield, between ST721928 and ST727919. It switches to the west side of the alignment approaching Wickwar, at ST728895, and stays on that side until Yate, where it tunnels for ½ m under the station, between ST703837 (west side) and ST701824 (east).

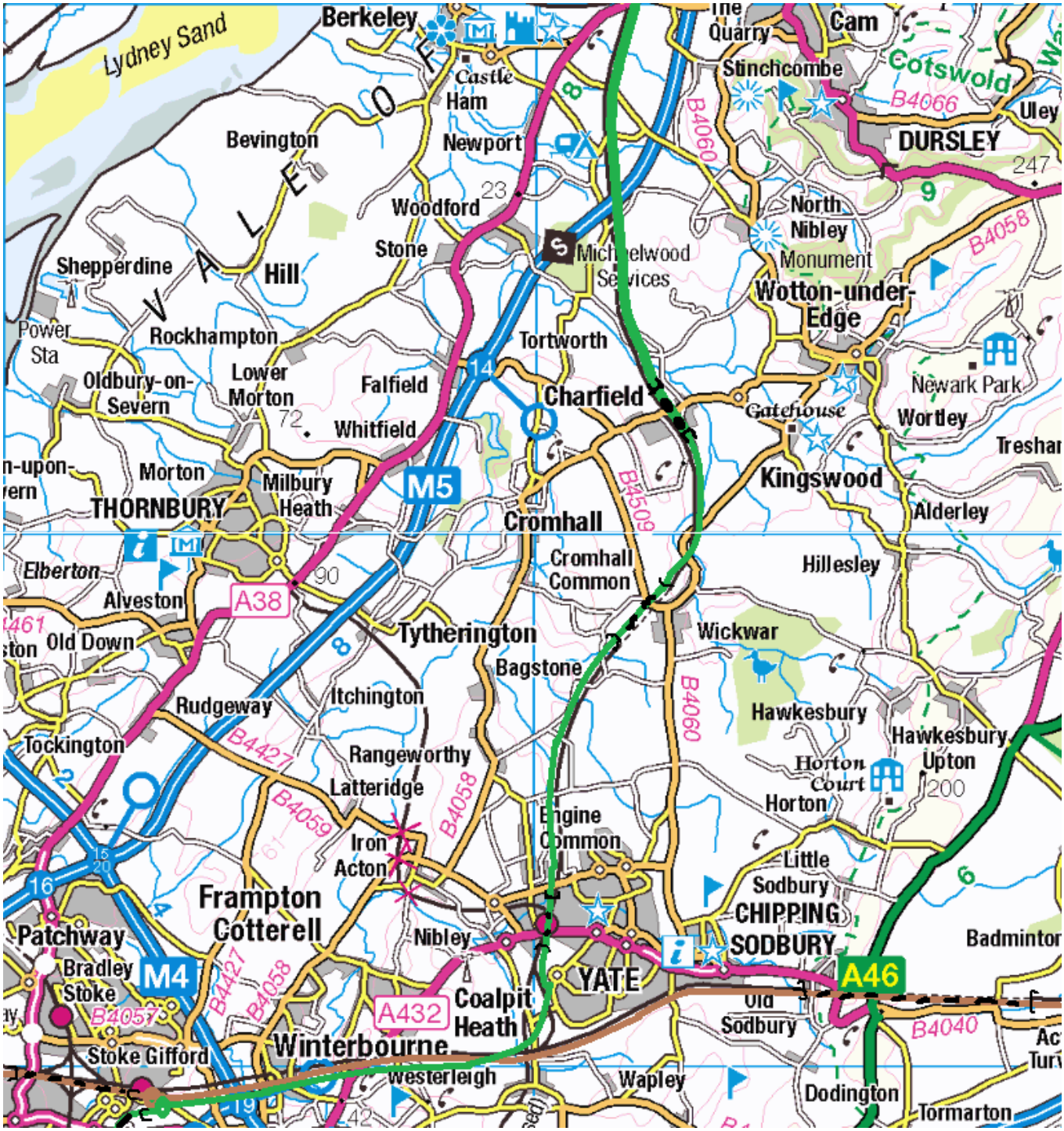
HS7 joins HS4 at ST685803, just before Coalpit Heath, the westbound line crossing under HS4 and running along the south side. HS4 and HS7 run together, paired by direction, either side of the GWML as a 6-track section, (so I suppose that really means tripled by direction,) thence to Bristol Parkway. 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. A suitable layout is shown in appendix D.

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 D.)

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.)

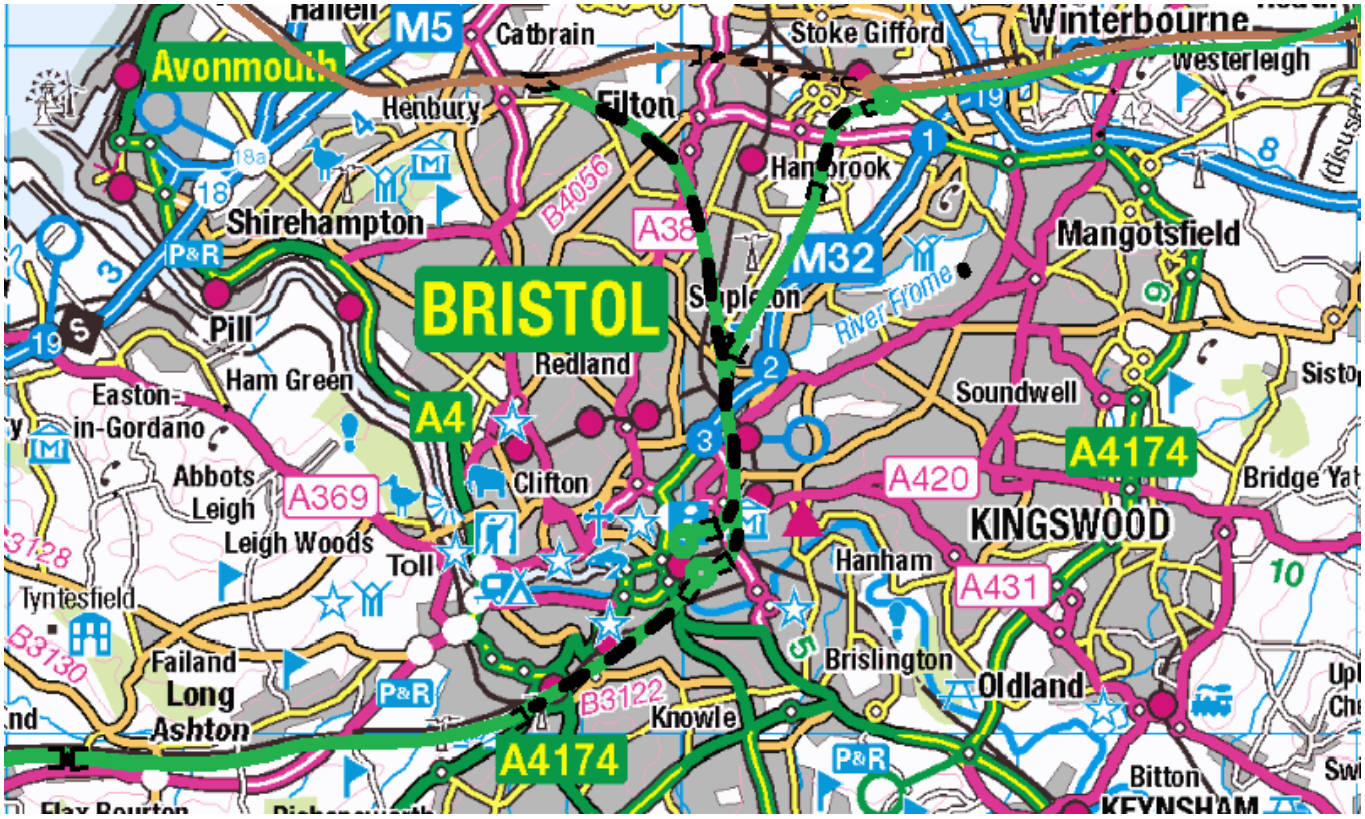
At Mk1A, HS7 shares tracks with the classic route over this entire section.



3.4 Berkeley Road – Bristol Parkway

4. Bristol Parkway – Bristol Temple Meads

Immediately west of Bristol Parkway, HS4 and HS7 diverge. HS7 enters a 1 mile tunnel immediately, at ST621797, and emerges at ST616780. It skirts the eastern edge of Lockleaze, and enters a 2 mile tunnel at ST604756, all the way to Temple Meads station. At Stadium Junction (ST604750) the link from HS4 at Brentry Junction (ST572797), on the route to South Wales, joins. This enables services from South Wales to the West Country without reversal at Bristol Parkway. The link, of length 3¾miles (6km), is entirely in tunnel, from immediately after diverging from HS4; Stadium Junction is itself in tunnel. At St. Philip's



4.1 Bristol Parkway – Long Ashton Contains Ordnance Survey data © Crown copyright and database right 2013

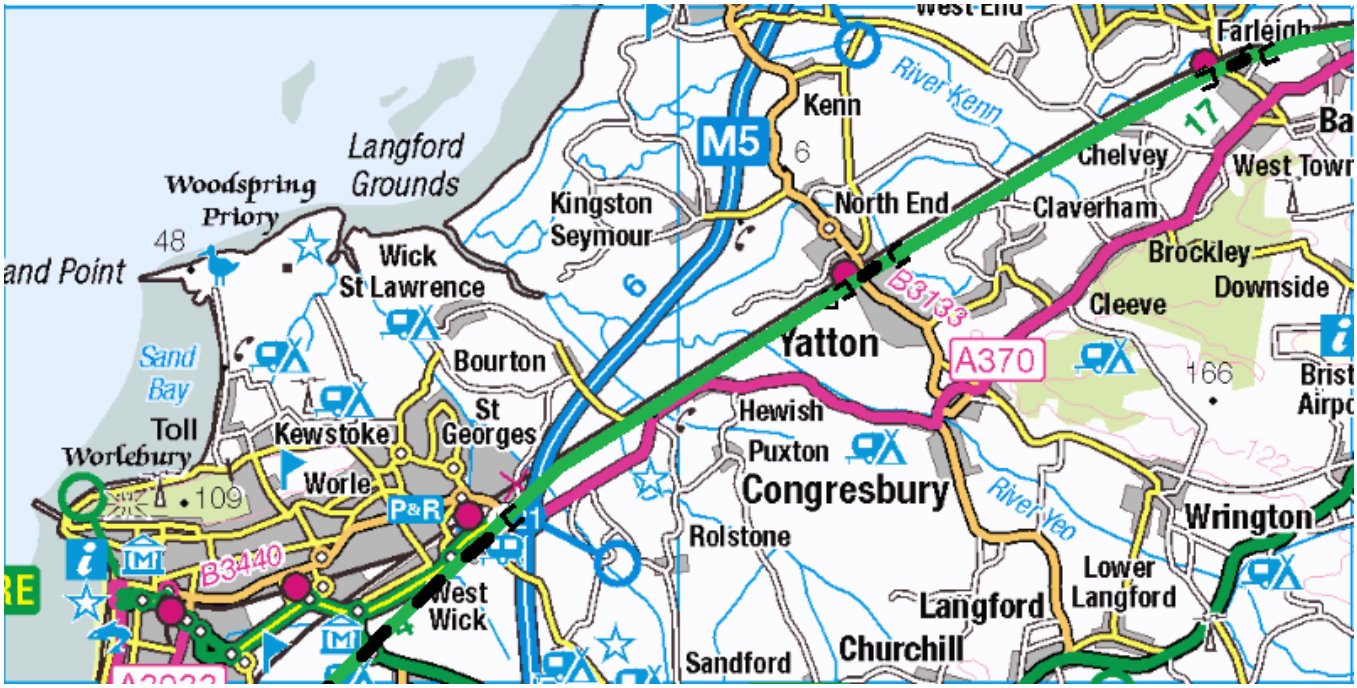
Junction, ST604734, the line divides (still in tunnel). The northern branch emerges from tunnel at ST600728, crosses the Avon at ST599726 and enters the Brunel Trainshed platforms at Bristol Temple Meads. These become the exclusive province of HS7, used by the premier Bristol expresses from London and Birmingham, very deluxe. The southern branch (actually the main line) is quite different. The area adjoining Bristol Temple Meads station to the east is currently one of appalling dereliction. The old cattle market and the Post Office building closed almost a decade ago, since when the area has simply festered, a public scandal and a disgrace to Bristol (I am by no means alone in this opinion!). What better location for a new HS station, promoting its regeneration, and making it the prime location in the city? Accordingly the HS7 main line emerges from tunnel at ST602726, between Kingsland Road and Gas Lane, crossing the Avon at ST599725 and entering the new Bristol HS station.

At Mk1A, HS7 shares tracks with the classic route between Bristol Parkway and Temple Meads stations.

5. Bristol Temple Meads – Taunton

Leaving Bristol HS, HS7 immediately enters a 2½ mile tunnel between ST597721 and ST515697, emerging at Bedminster Junction, on the south side of the alignment. A very short (¼ mile) tunnel under Cambridge Batch between ST522697 and ST515697, a ½ mile tunnel under Backwell between ST484694 and ST478692, and a further ½ mile tunnel under Yatton between ST428663 and ST423659 are all to avoid housing. In addition, a few farm buildings will need to be relocated at Claverham Court (ST445673).

There are so many separate obstructions on the section round the south east of Weston-Super-Mare that it simply isn't worth trying to avoid them individually. Accordingly a single tunnel of 4½ miles is proposed between ST378632 and ST325577.

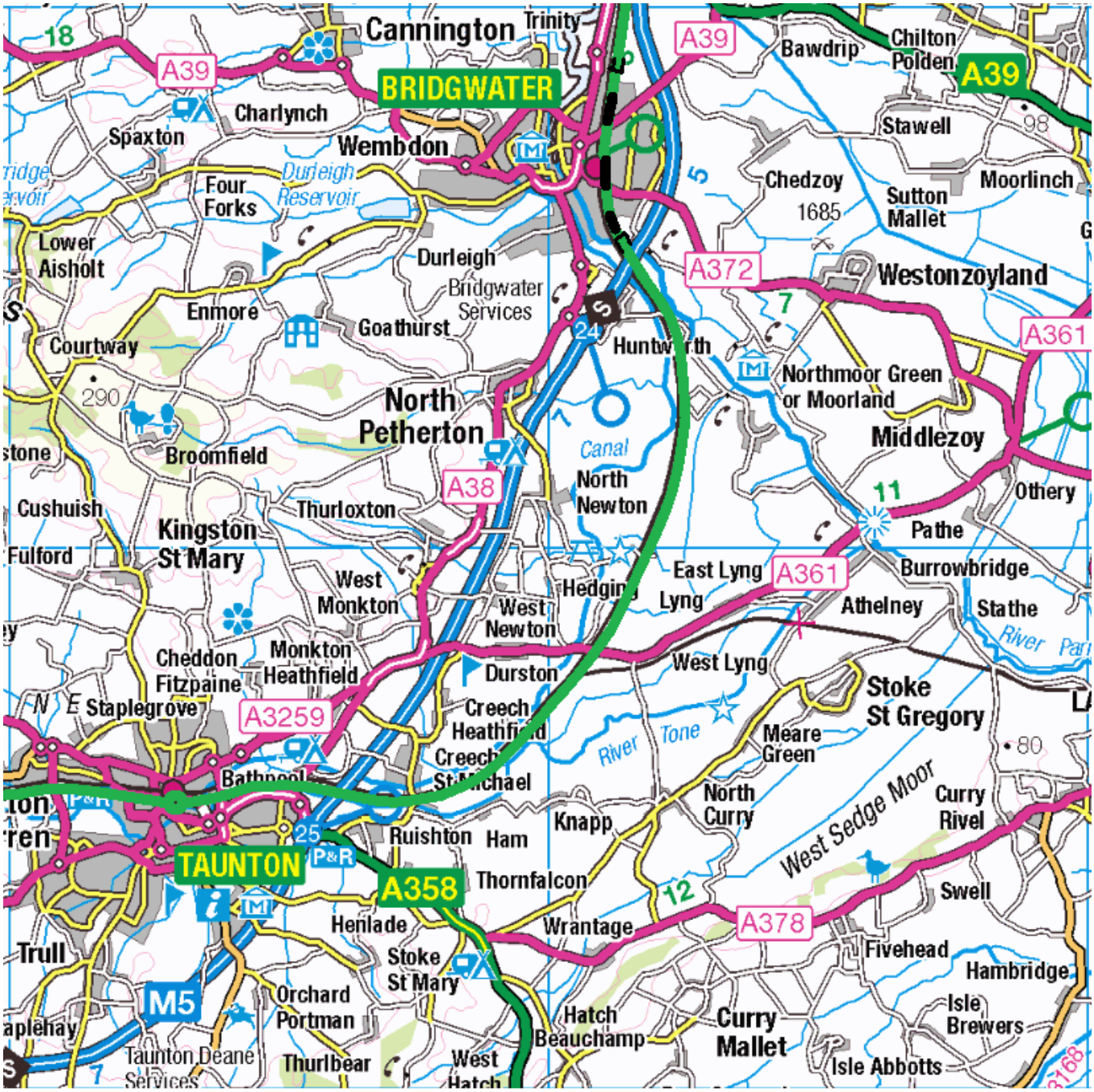


5.1 Bristol Parkway – Long Ashton Contains Ordnance Survey data © Crown copyright and database right 2013

Thereafter there are no obstructions beyond the odd farm building at Batts Bow Bridge (ST321461) until Bridgwater, which has a 2 mile tunnel between ST310387 and ST310359. Then a bit more agricultural relocation at Bankland Farm (ST316299) and that's it all the way to Taunton. Just before Creech St. Michael (at, say, ST282257) the HS tracks cross to the middle of the alignment, (thus the classic tracks are on the outside of a 4-track railway). There is plenty of room for 4 tracks all the way to Taunton and beyond. HS7 takes over the island platform in the middle of the alignment at Taunton station, suitably modified to GC gauge. (Two platforms are certainly adequate here.)

At Mk1A, HS7 shares tracks with the classic route over the entire serction. It uses the middle island platform as Taunton, as just described, the infrastructure there being already in place.

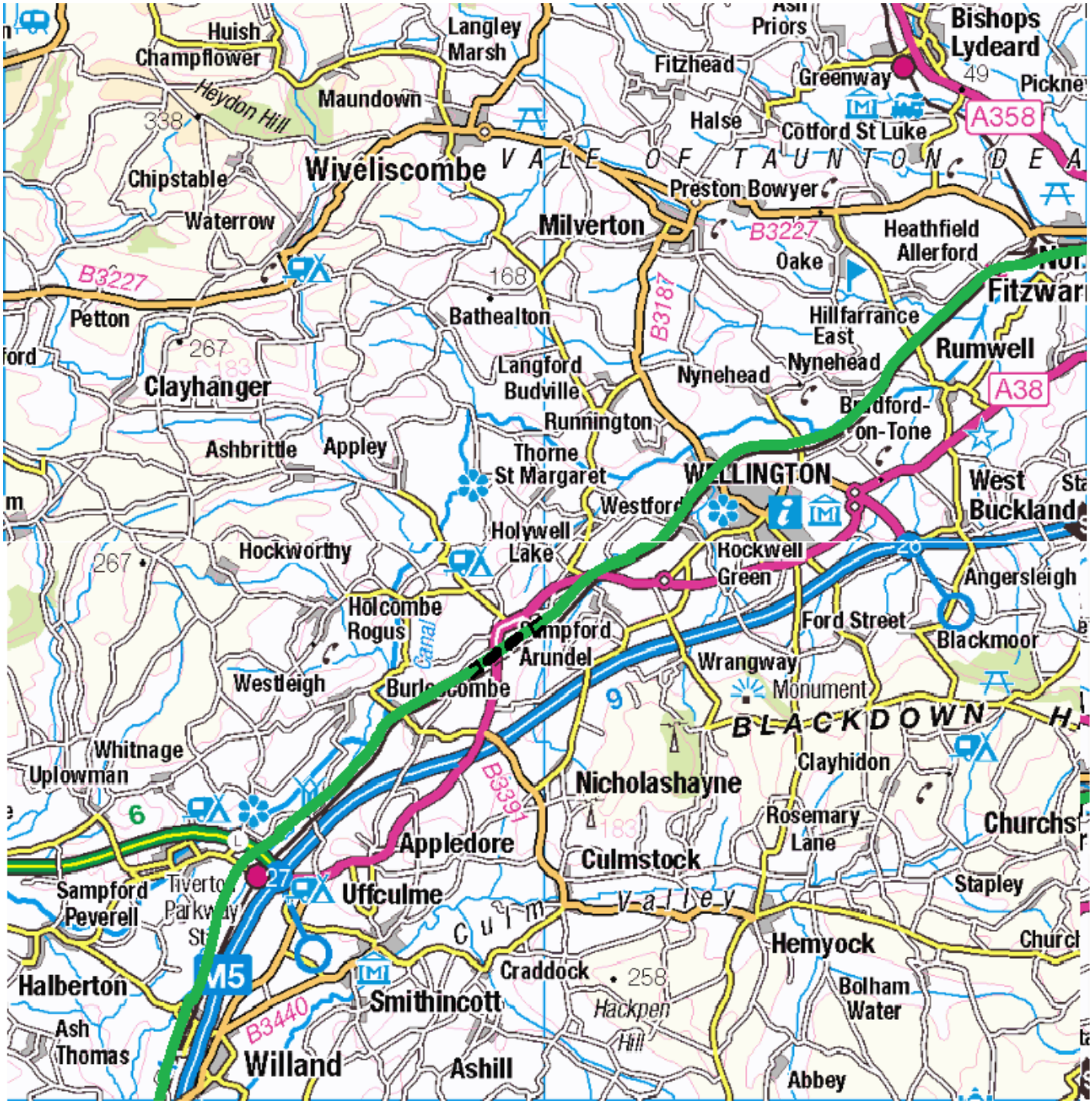
5.2 Weston-Super-Mare – Puriton



5.3 Bridgwater – Taunton

6. Taunton - Exeter

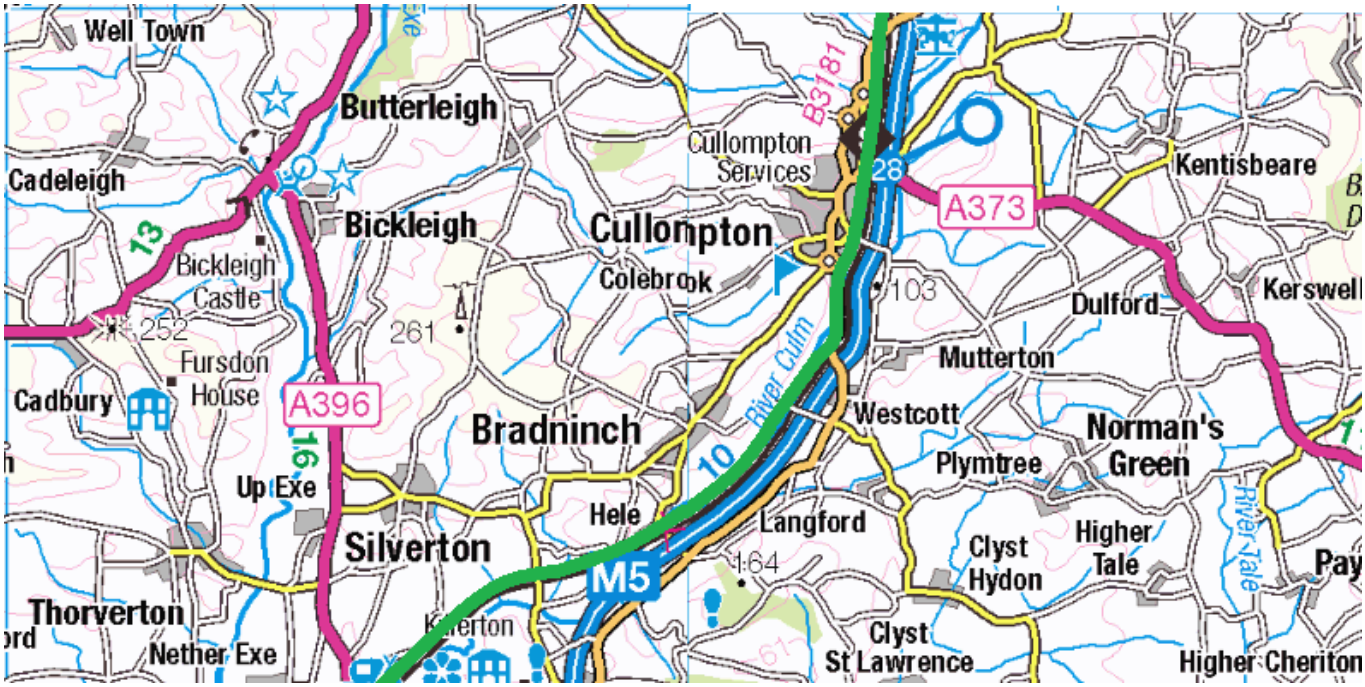
HS7 continues in the centre of the 4-track alignment until Norton Fitzwarren (ST188254), where it switches to the west/north side. (The only reason not to continue in this fashion all the way to Exeter is the problems it would cause at Whiteball Tunnel – there's plenty of room for it.) A little agricultural relocation will be required at Ash Farm (ST155223). The alignment is almost completely free through Wellington; I think it may be necessary to demolish one house on Milverton Road (because HS7 gets uncomfortably close to it, rather than actually through it). It may also be necessary to demolish 2 or 3 houses in Westford (ST123203) and relocate a farm at Beam Bridge (ST108194). HS7 has its own Whiteball Tunnel adjacent to the classic one. A very short tunnel will be required at Great Fossend, or demolish a row of 4 houses and relocate a warehouse (ST072169). A slight diversion (of say 200 yards)



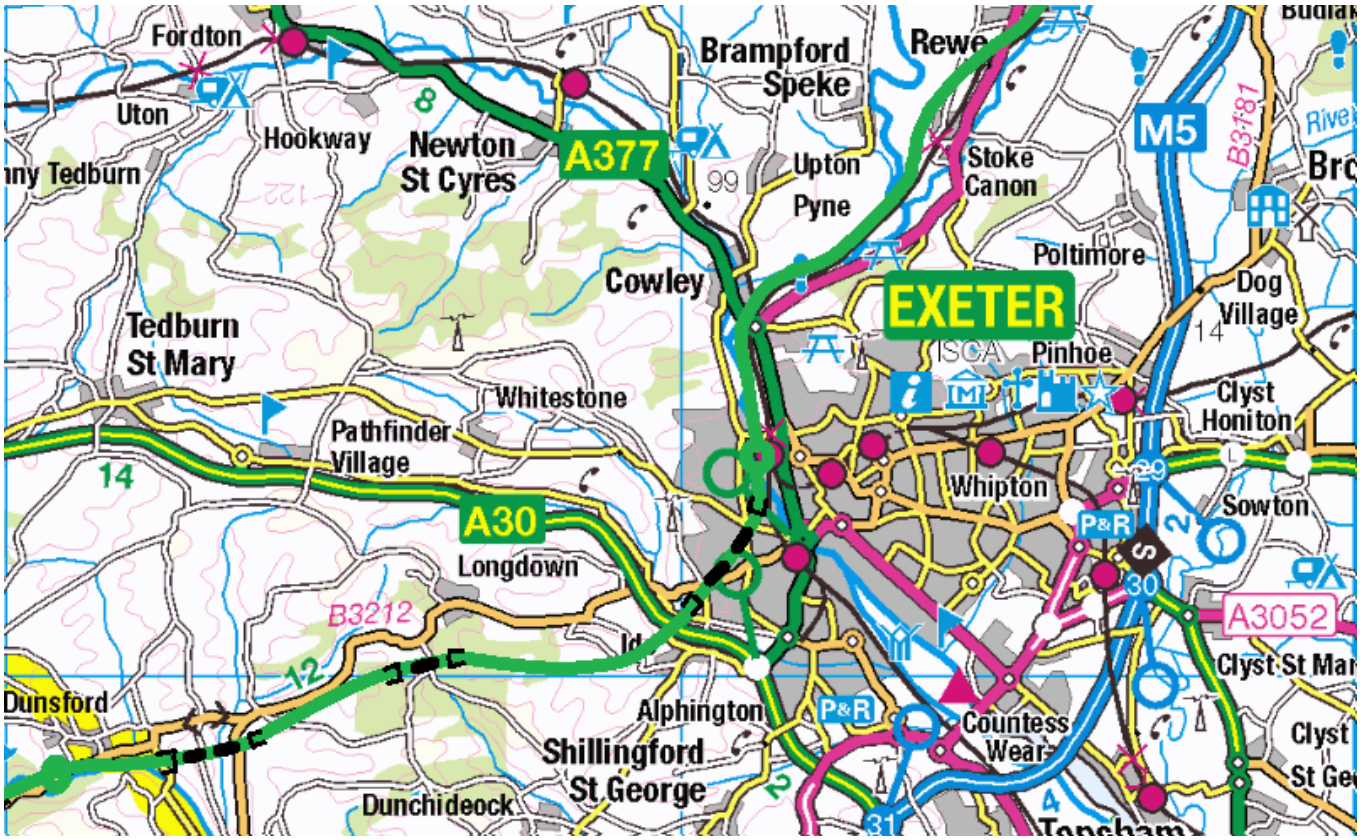
6.1 Norton Fitzwarren – Willand

to the west is desirable at Tiverton Parkway, between ST055149 and ST042133, say, to avoid the station building and car park, which are on the west side of the alignment. There are already 4 tracks through the former Tiverton Junction station; the classic tracks will need to be slewed to the east to make room for the HS tracks, and the freight passing loops relocated a little to the south. A further slight diversion to the west is required, between SX943992 to SX934976, say, (which actually gives a mild improvement to the alignment,) to avoid buildings at Stoke Cannon. Thereafter there are no obstructions into Exeter. It would be desirable to carry the line on a low viaduct from just south of Stoke Cannon to a mile or so north of Exeter St. David's because of the tendency to flooding in this area.

At Mk1A, HS7 shares tracks with the classic route over this entire section.



6.2 Cullompton – Silverton Contains Ordnance Survey data © Crown copyright and database right 2013

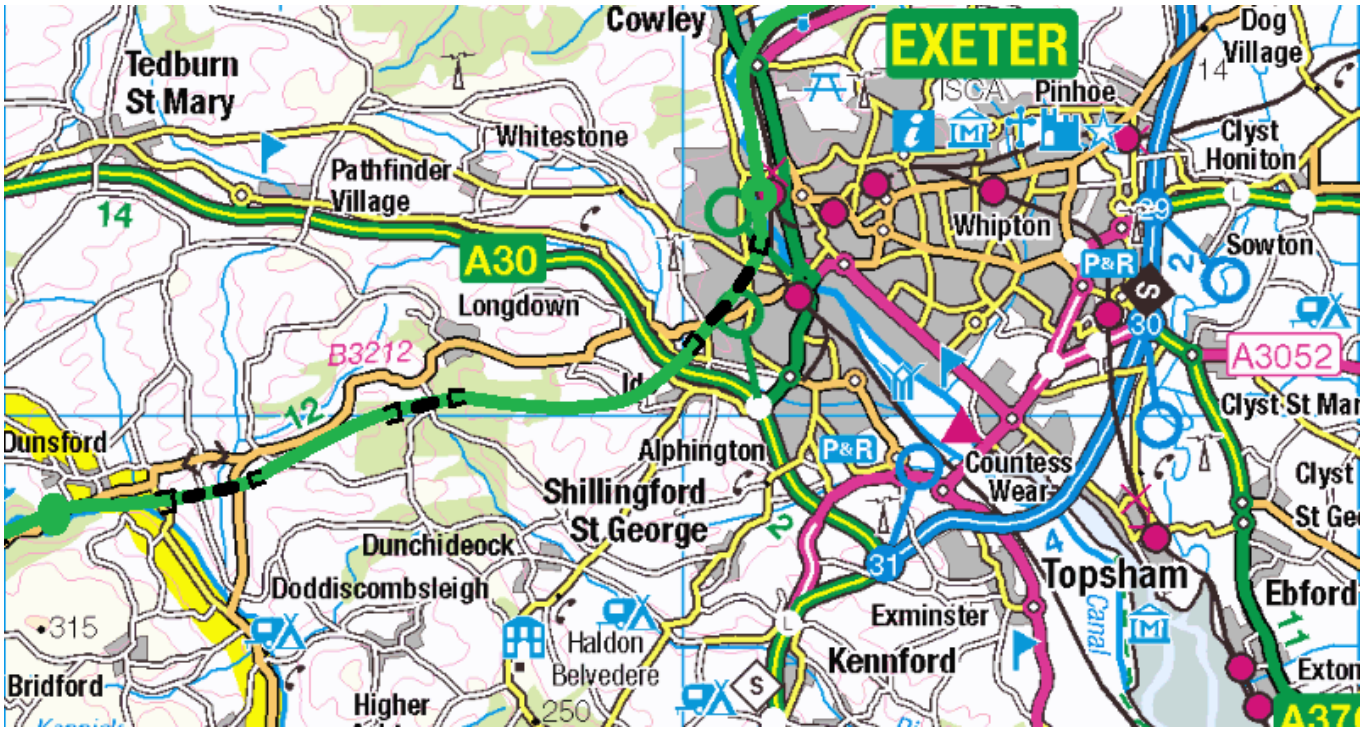


6.3 Rewe – Exeter Contains Ordnance Survey data © Crown copyright and database right 2013

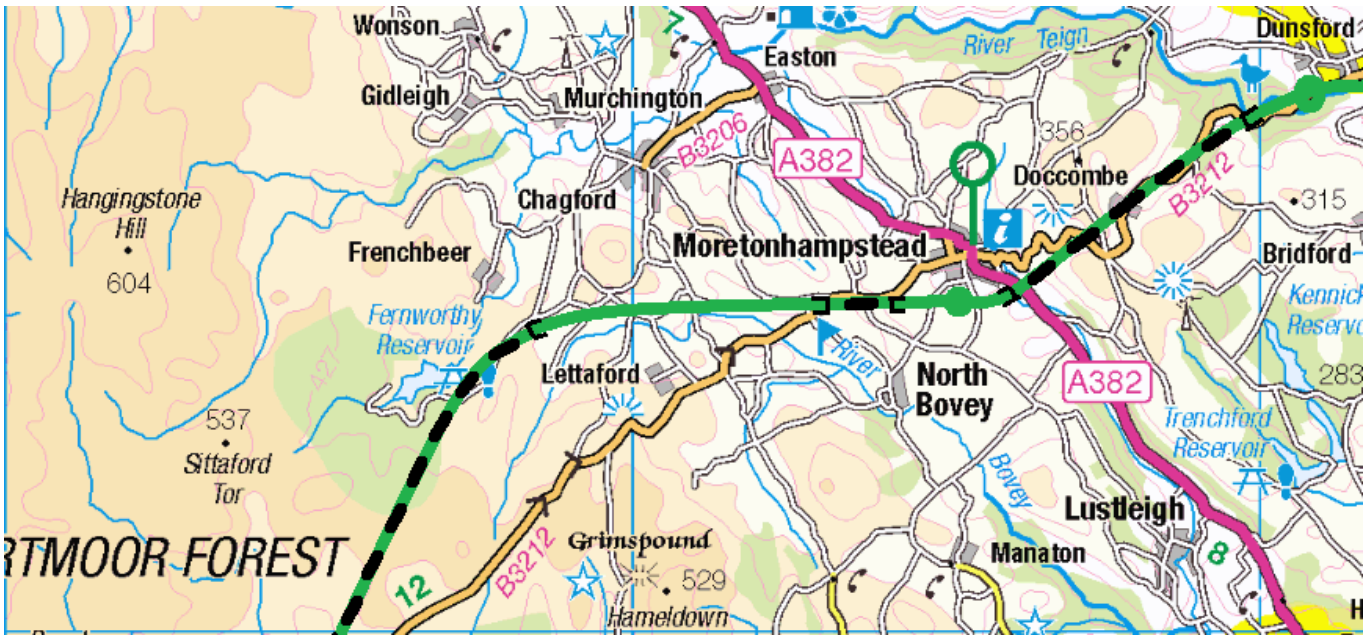
7. *Exeter – Plymouth*

There is no easy solution between Exeter and Plymouth (or it would have been built already).

Given a sufficiently generous budget, my solution would be to take it in an essentially straight line, the shortest route possible, directly across (or under!) the middle of Dartmoor. Those who think this manifestly insane are referred to appendix A, which demonstrates its essential practicability in engineering terms. In fact, the real difficulty on this section is the extraordinarily complex landscape immediately west of Exeter; once you've fought your way through to Moretonhampstead, the way across Dartmoor is pretty obvious.



7.1 Exeter – Dunsford Contains Ordnance Survey data © Crown copyright and database right 2013

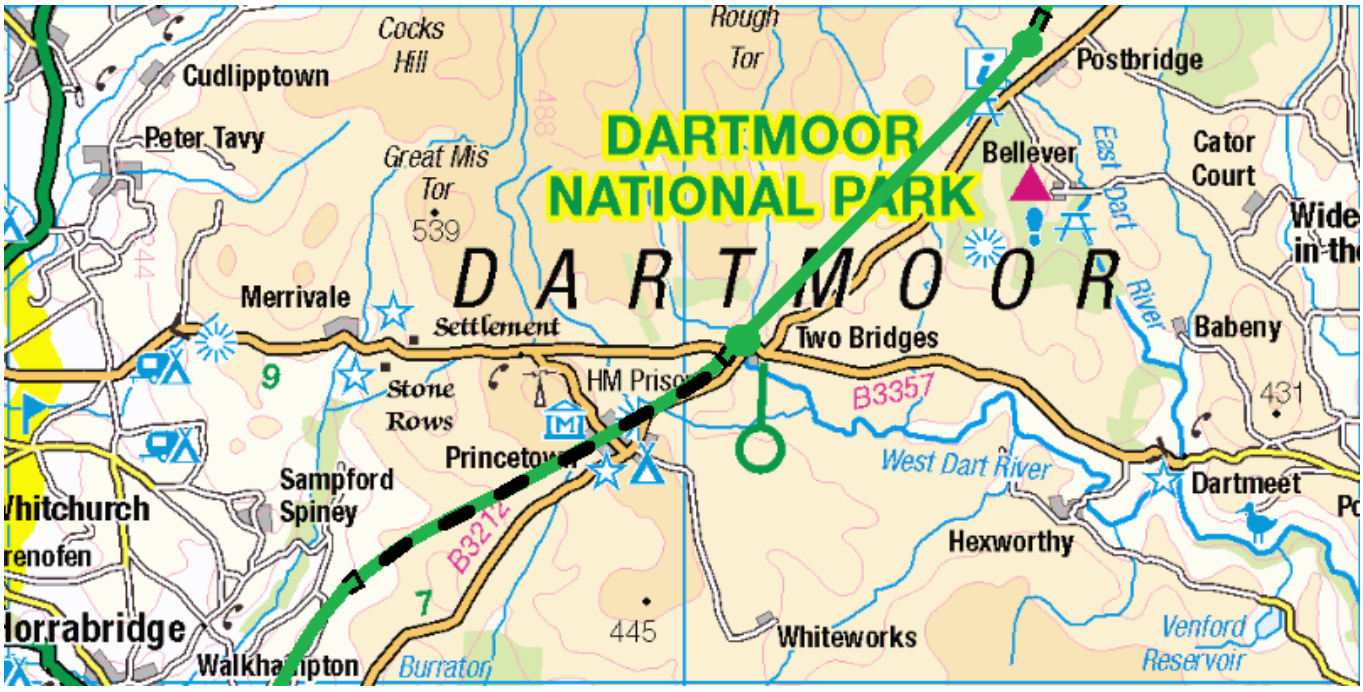


7.2 Dunsford – Moretonhampstead Contains Ordnance Survey data © Crown copyright and database right 2013

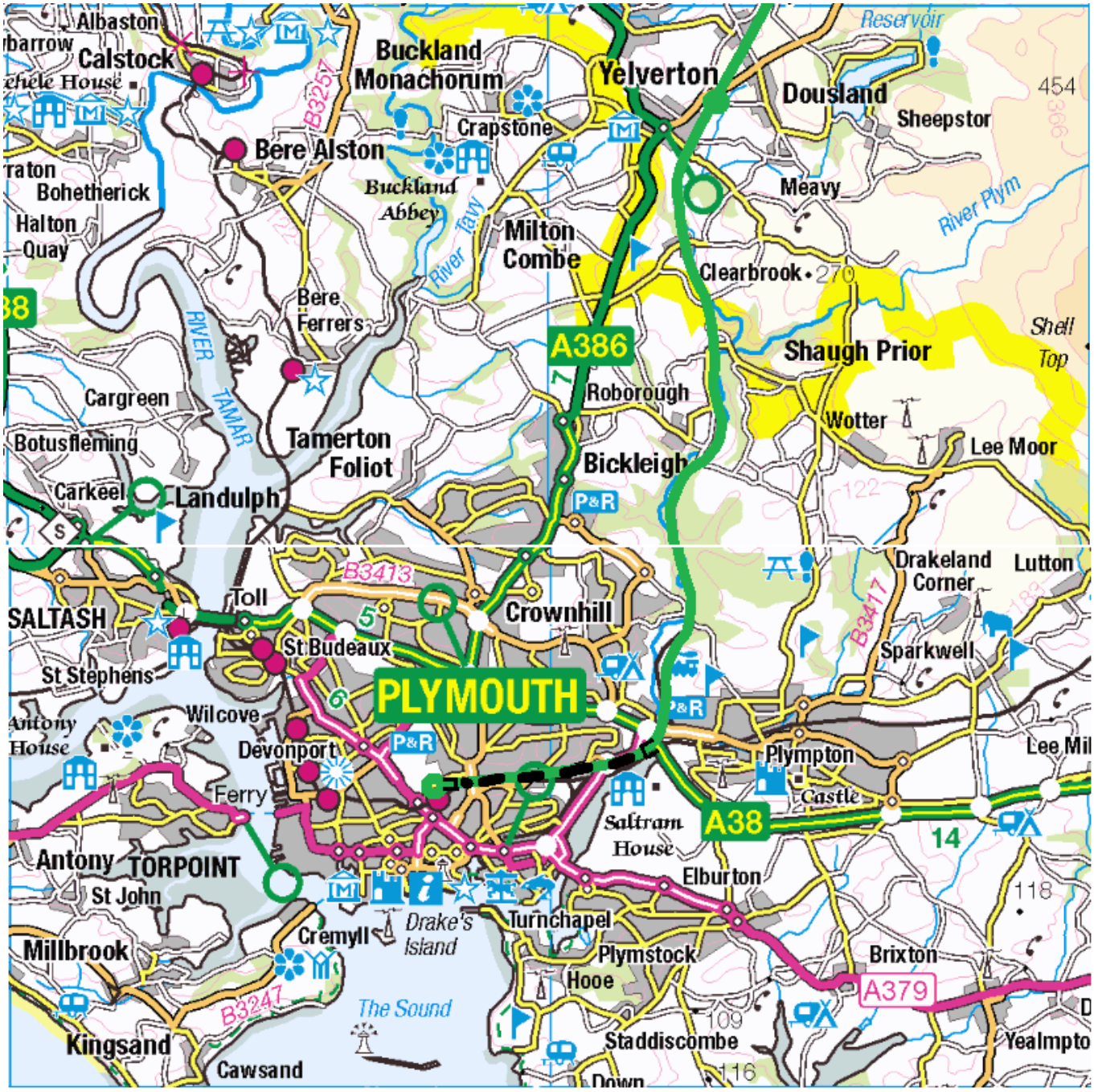
HS7 diverges from the GW alignment immediately on leaving Exeter St. David's. It crosses the Exe slightly upstream of the existing bridge, cuts across some allotments and enters a 1 mile tunnel at SX909924, emerging at SX900910. Continuing to SX888903, it joins the trackbed of the long-closed line between Exeter and Newton Abbot via Chudleigh, and follows that (with variations to improve the alignment) until Farrant's Bridge (SX836894). Gradients on the two sections between the allotments and the disused line are 1 in 66 and 1 in 80. On the re-used alignment, Perridge tunnel, ½ mile between SX865904 and SX857903, is enlarged to GC gauge and a second bore provided alongside. A 1 mile tunnel between Farrant's Bridge (SX834894) and Reedy (SX821892) leads to Dunsford. HS7 passes to the south of Dunsford, crossing the River Teign at SX816887 and following the south bank until the river turns sharply north, and HS7 enters a 3 mile tunnel to Moretonhampstead, between SX797883 and SX760855. Between Farrant's Bridge and the tunnel, the alignment is essentially level, at around 250ft altitude, while through the tunnel the gradient is 1 in 53. HS7 passes around the south of Moretonhampstead, following the course of Wadley Brook, to a further 1 mile tunnel between SX740856 and SX720850, and following the course of the (very young) River Bovey to Shapley (SX683848). The average gradient between Moretonhampstead and Shapley is 1 in 60.

HS7 now enters a 4 mile tunnel to Postbridge, between Shapley and SX652798, (gradient 1 in 141,) then following the 1150ft contour to Two Bridges, 4 miles essentially level. A 4 mile tunnel leads from Two Bridges, at SX606750, to a point on the 750ft contour, above Ward Bridge, at SX548715. It descends along the side of the hill, passing to the west of Walkhampton, and through the saddle between Lake and Yelverton, joining the trackbed of the former Launceston – Plymouth branch at SX521665, following that (with easing of curves) all the way to Marsh Mills, where it joins the classic route to Plymouth – amazingly, there are no obstructions. The average gradient from Two Bridges to the tunnel exit is 1 in 63, and from there to joining the trackbed south of Yelverton is 1 in 92.

The final section into Plymouth station is far less accommodating – there's no room at all for extra tracks. So it will have to be a 2 mile tunnel from SX517563 to SX479555, with the HS platforms on the north side of the station.



7.3 Postbridge – Walkhampton

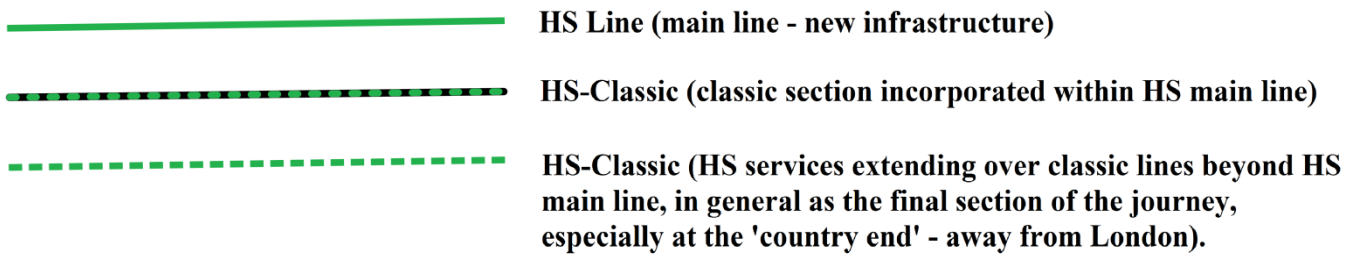


7.4 Yelverton – Plymouth

Stations are provided at Dunsford, Moretonhampstead, Postbridge, Two Bridges (for Princetown) and Yelverton Road, as indicated on the maps. These are **not** served by HS services, but by a local service between Exeter and Plymouth. They all have single platform faces in each direction, on short loops off the main line, to allow HS services to overtake. (I would not normally contemplate a local, stopping service on a HS line! However, this section is, as is often the case at the end of a route, not heavily loaded – 6tph HS – and the new route gives access to locations otherwise quite inaccessible. It should be popular with tourists also, giving easy access to Dartmoor.)

Overall Maps

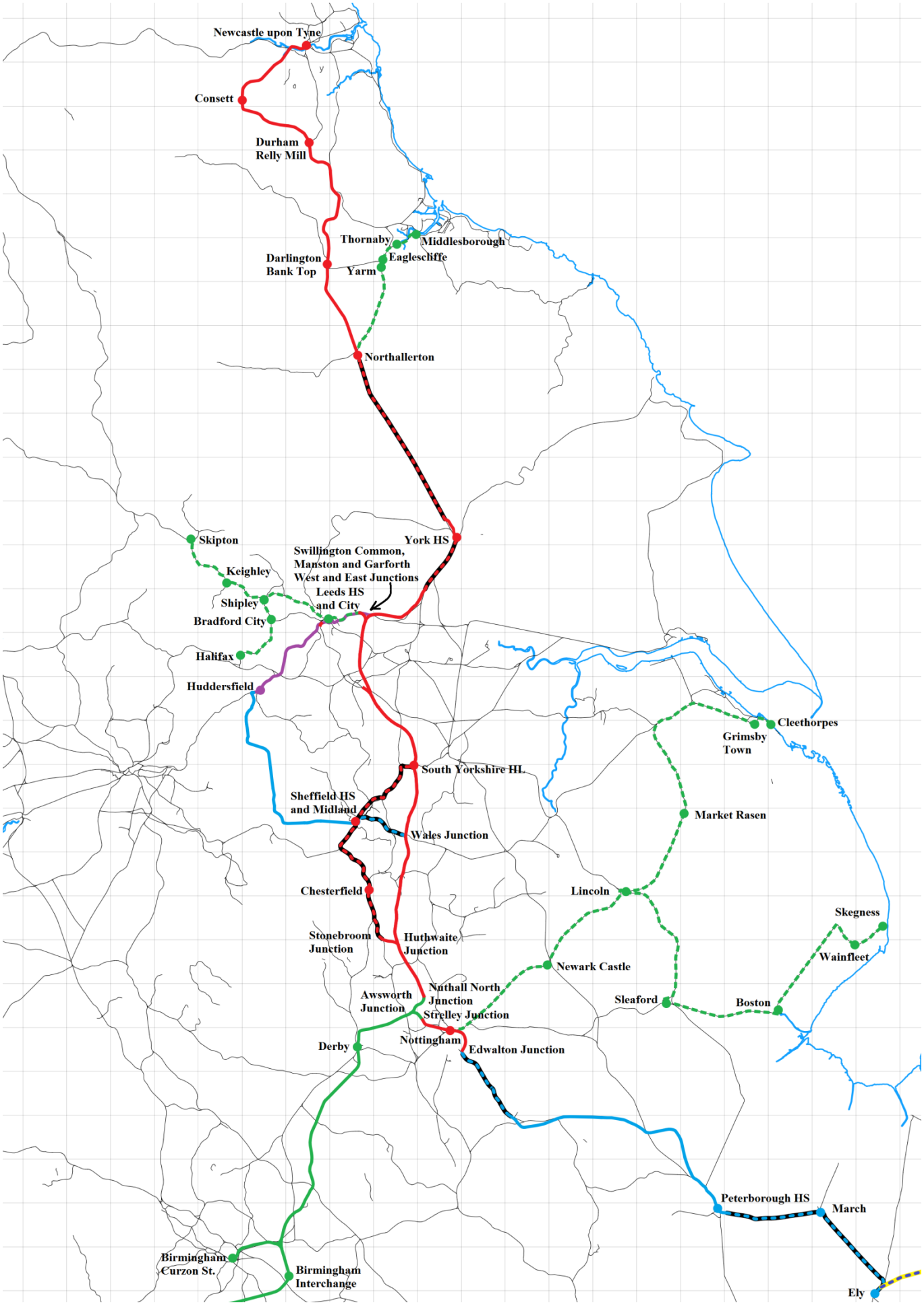
There follow maps of the overall HS7 route (and portions of other associated HS routes used by HS7's services). At Mk1A, those portions of the main lines of HS7 which incorporate sections of classic route, and the sections of HS7's HS-Classic services extending over classic routes beyond the HS7 main lines, are shown as dotted lines, but differently. The following schematic should clarify:

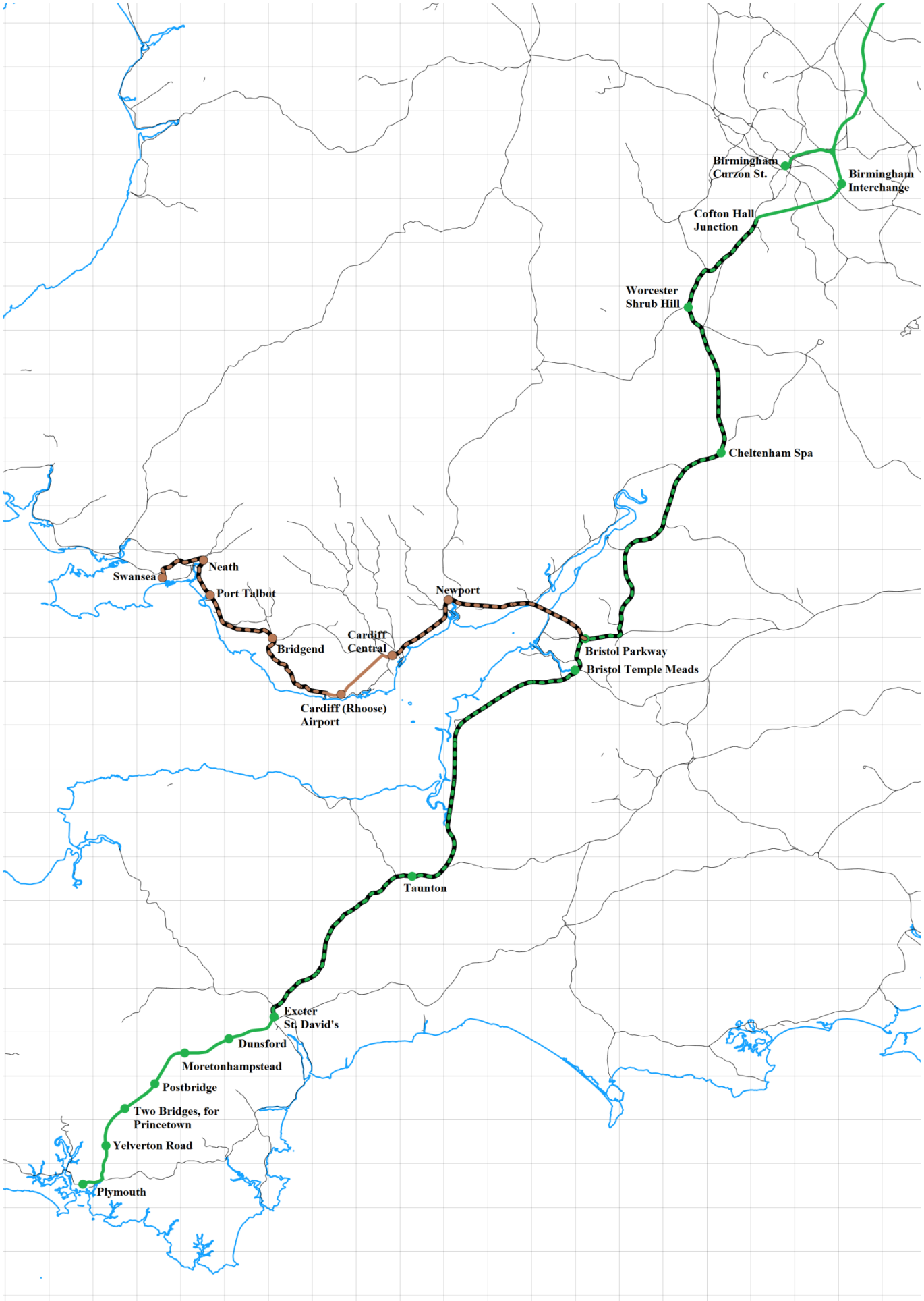


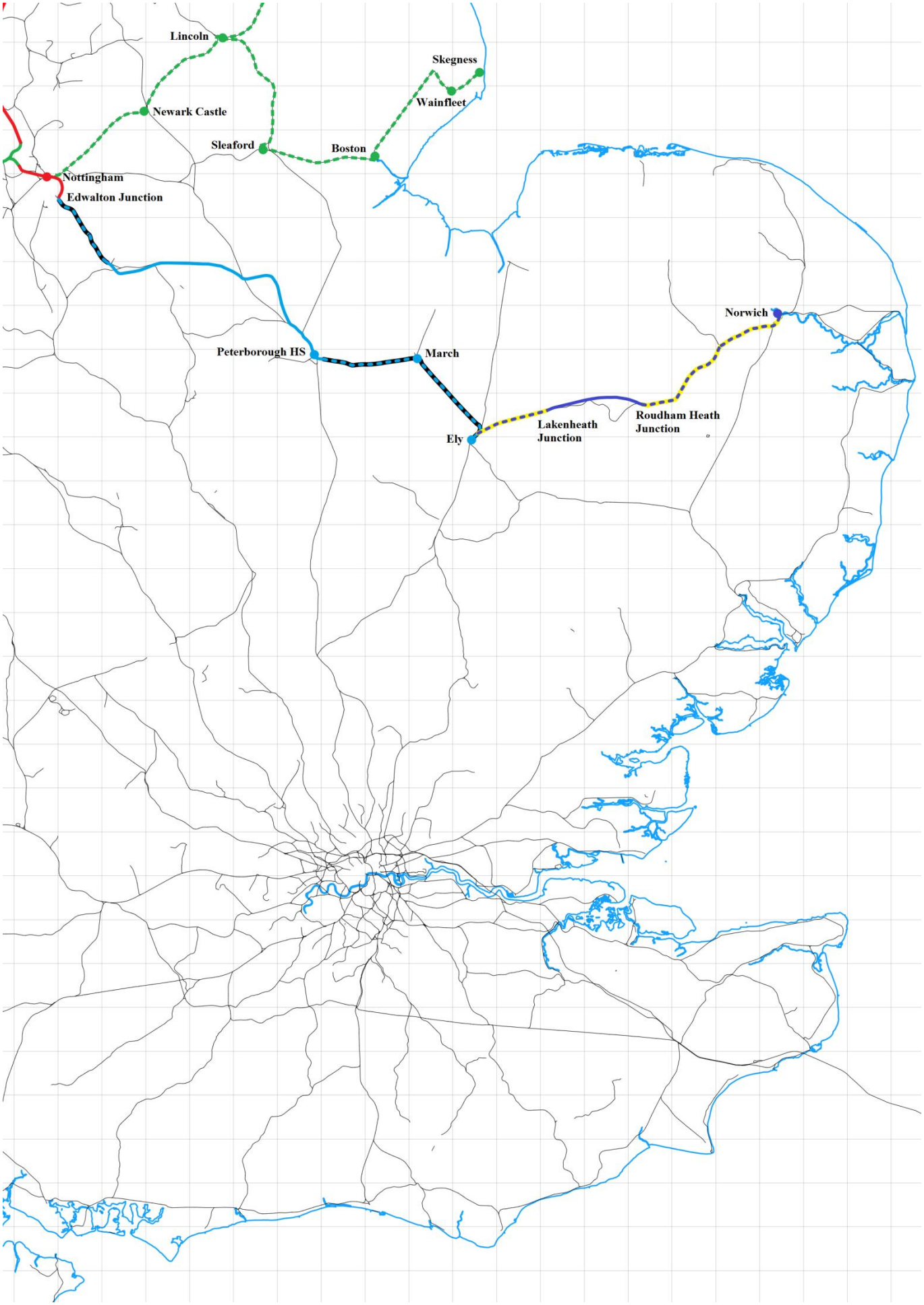
(The remark about the 'country end' is of course irrelevant to HS7. But it does have HS-classic services, to Middlesborough and into Lincolnshire and West Yorkshire, which all have their final section – northbound – on classic routes away from the HS7 main line.)

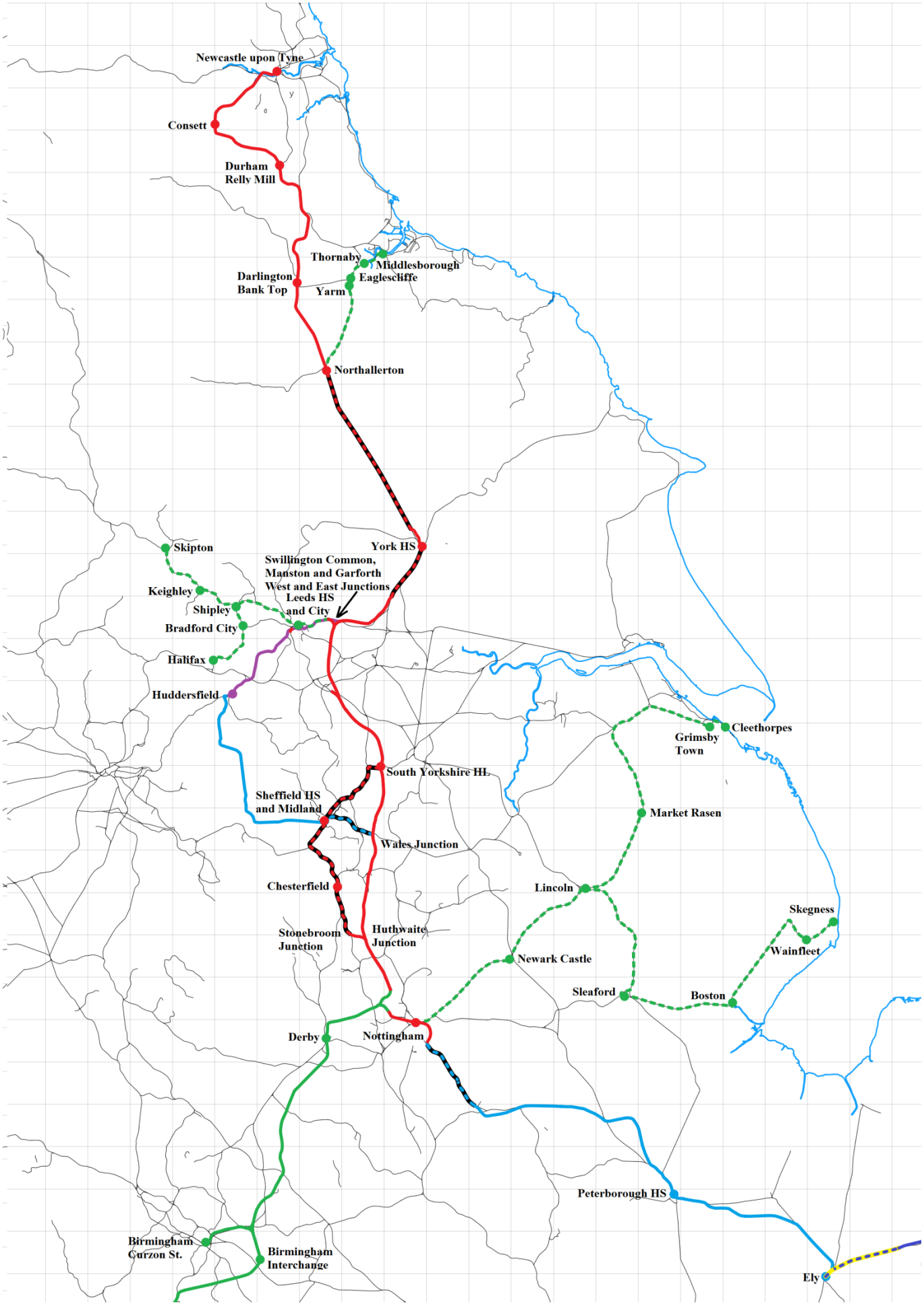
If the full Mk2 is implemented, there will no longer be any sections of classic route incorporated within the HS7 main line; it will all be new infrastructure. Accordingly, the middle of the above line symbols is no longer used. The connections between HS and classic routes will all remain, of course, 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 preceding is true for HS7 Mk2, but some other routes, over sections of which HS7 shares tracks, do persist long-term with classic sections, in the present context, HS3, HS6 and HS8.)

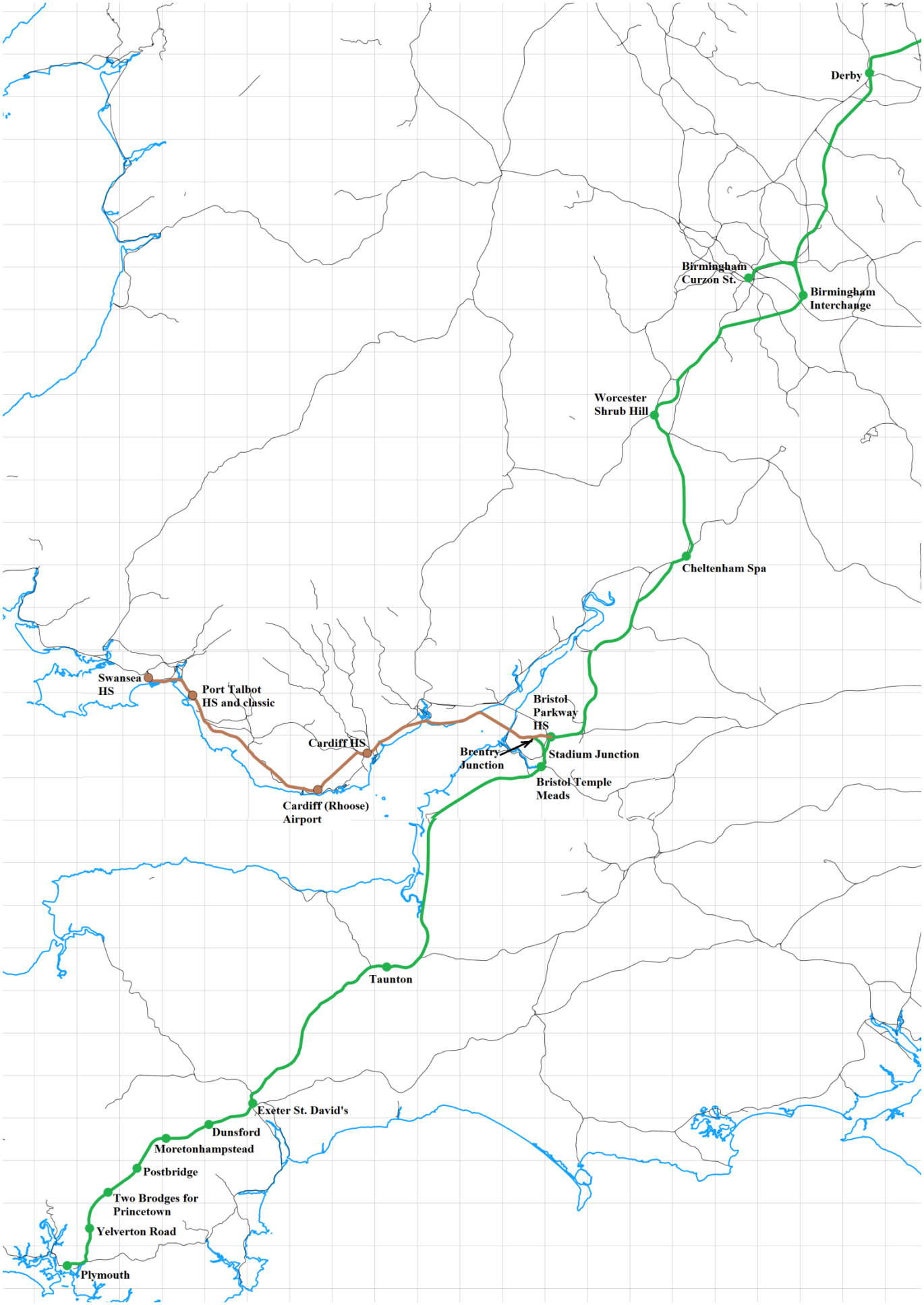
The first three maps show the HS7 routes (north east, south west and east sheets) at Mk1A. They show the alignments changed from Mk1, including sections of classic route incorporated into HS7. These are followed by the full Mk2 versions of the same sheets. Finally the maps of the overall network are 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.

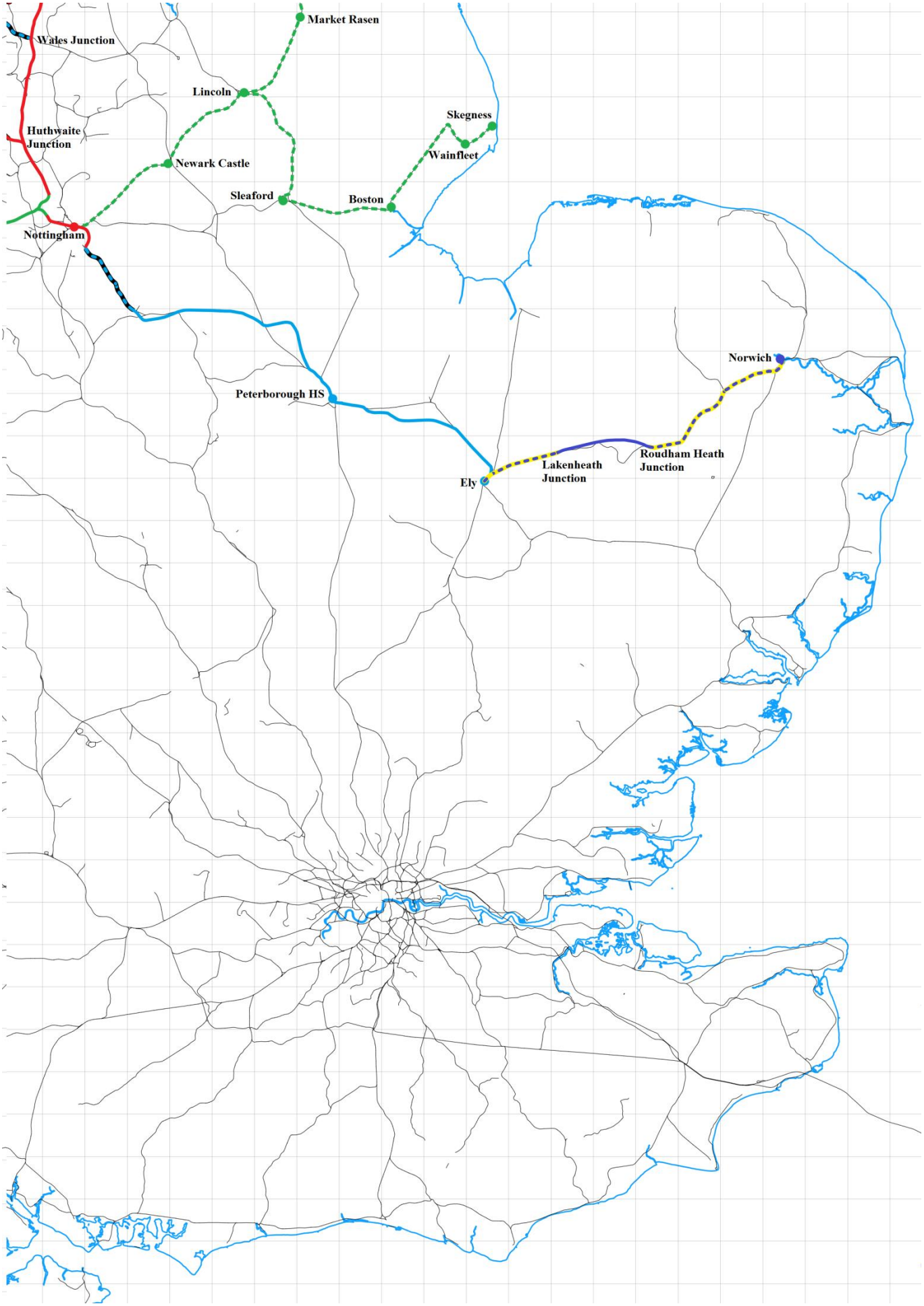


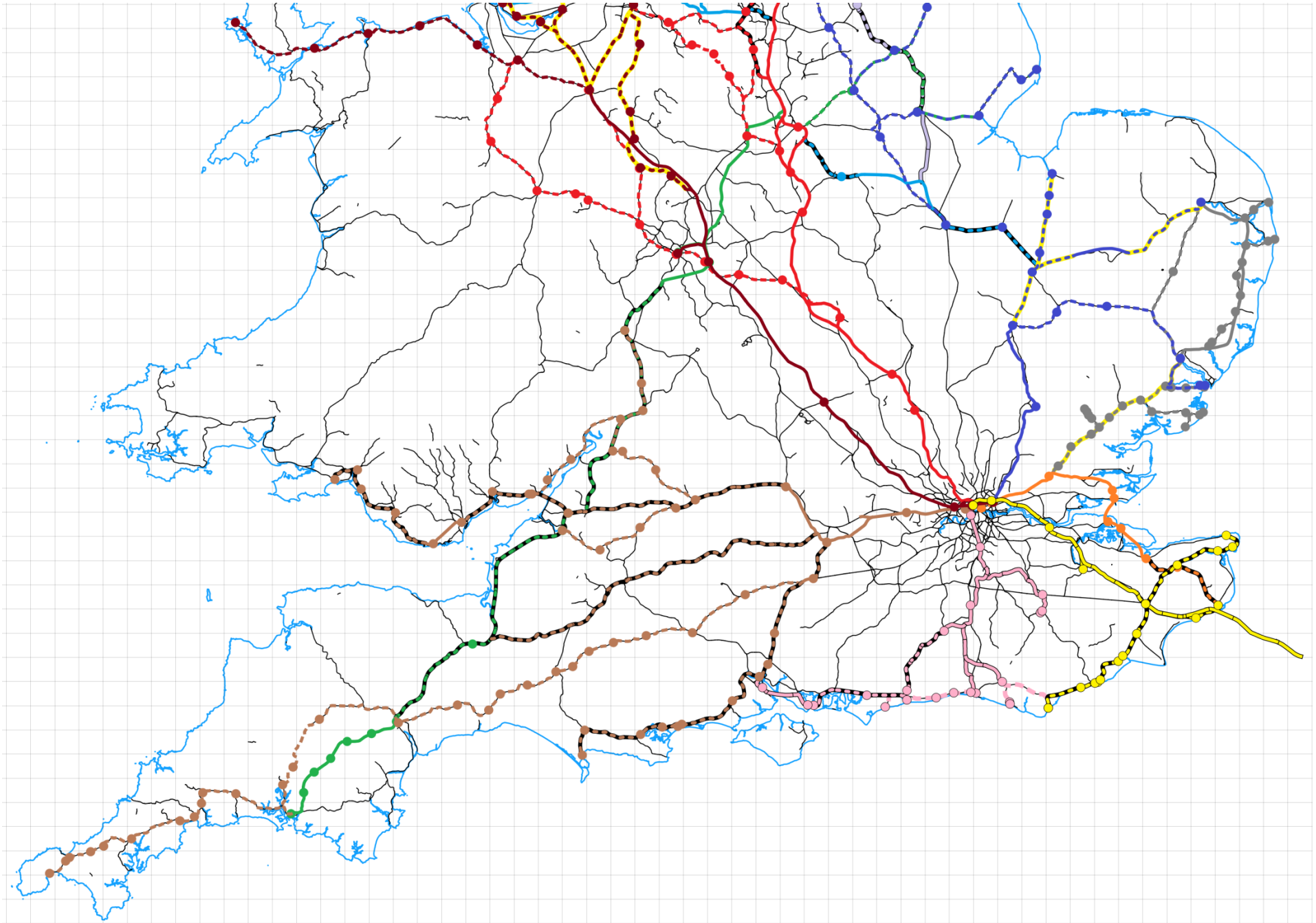




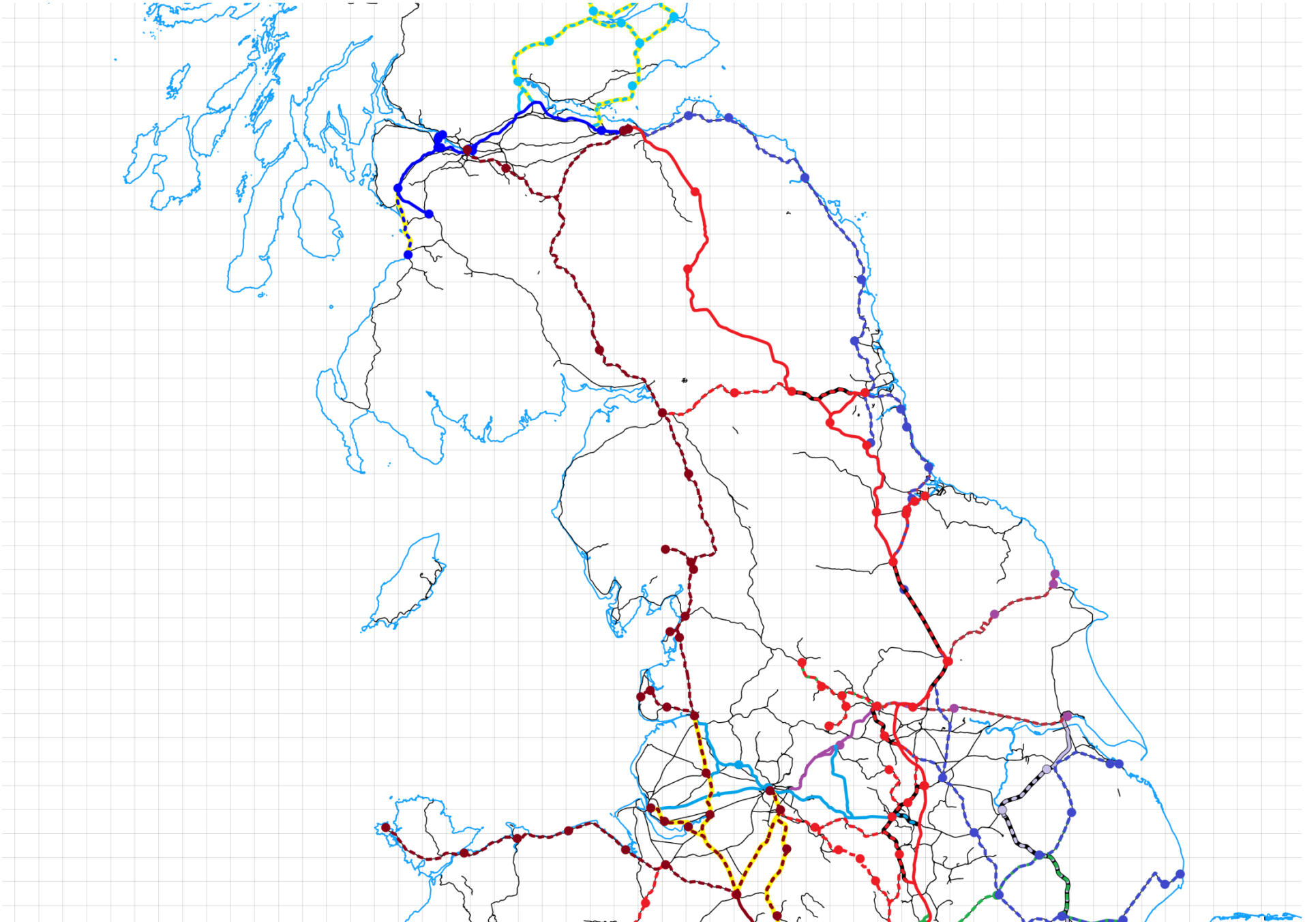


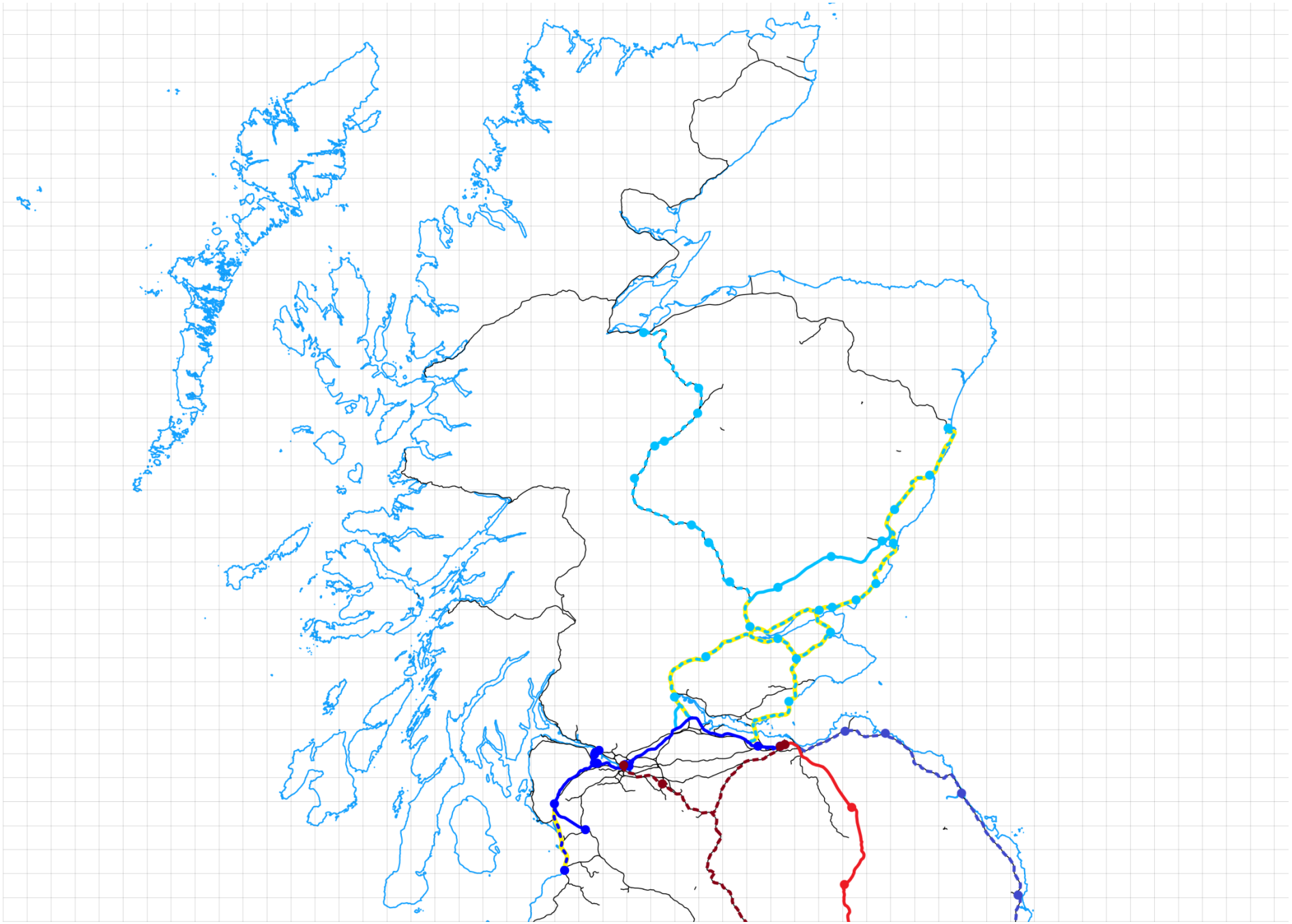


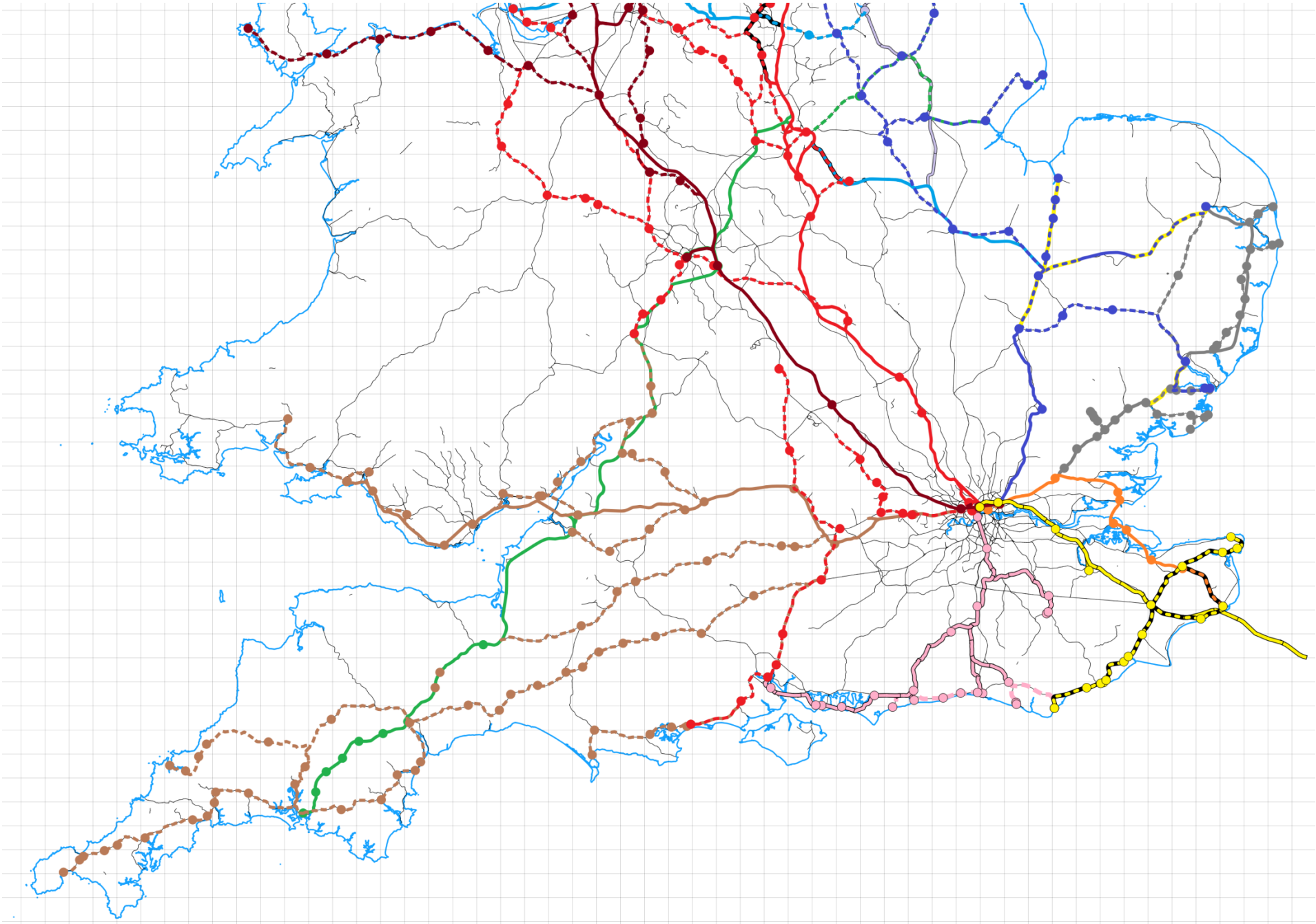


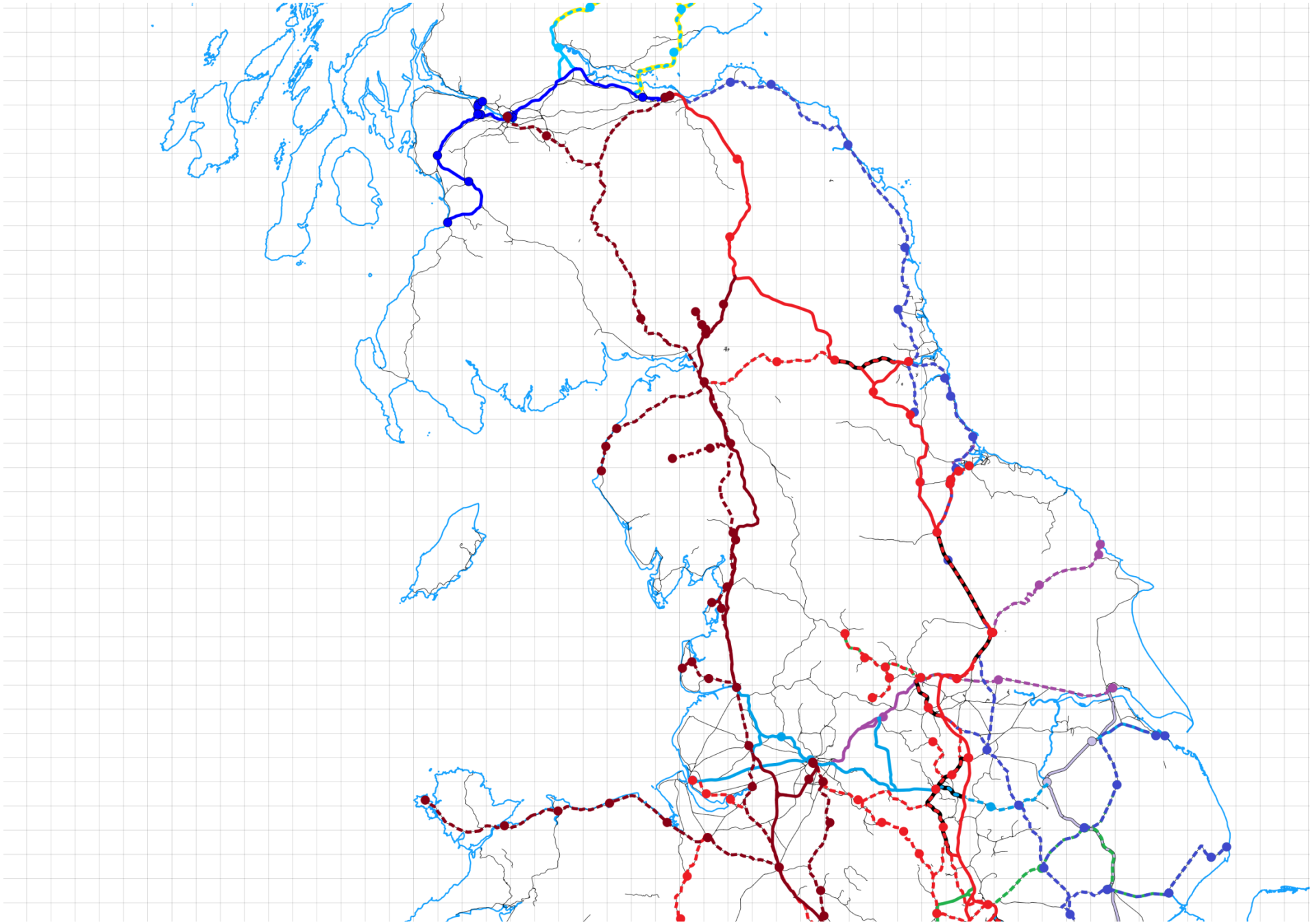


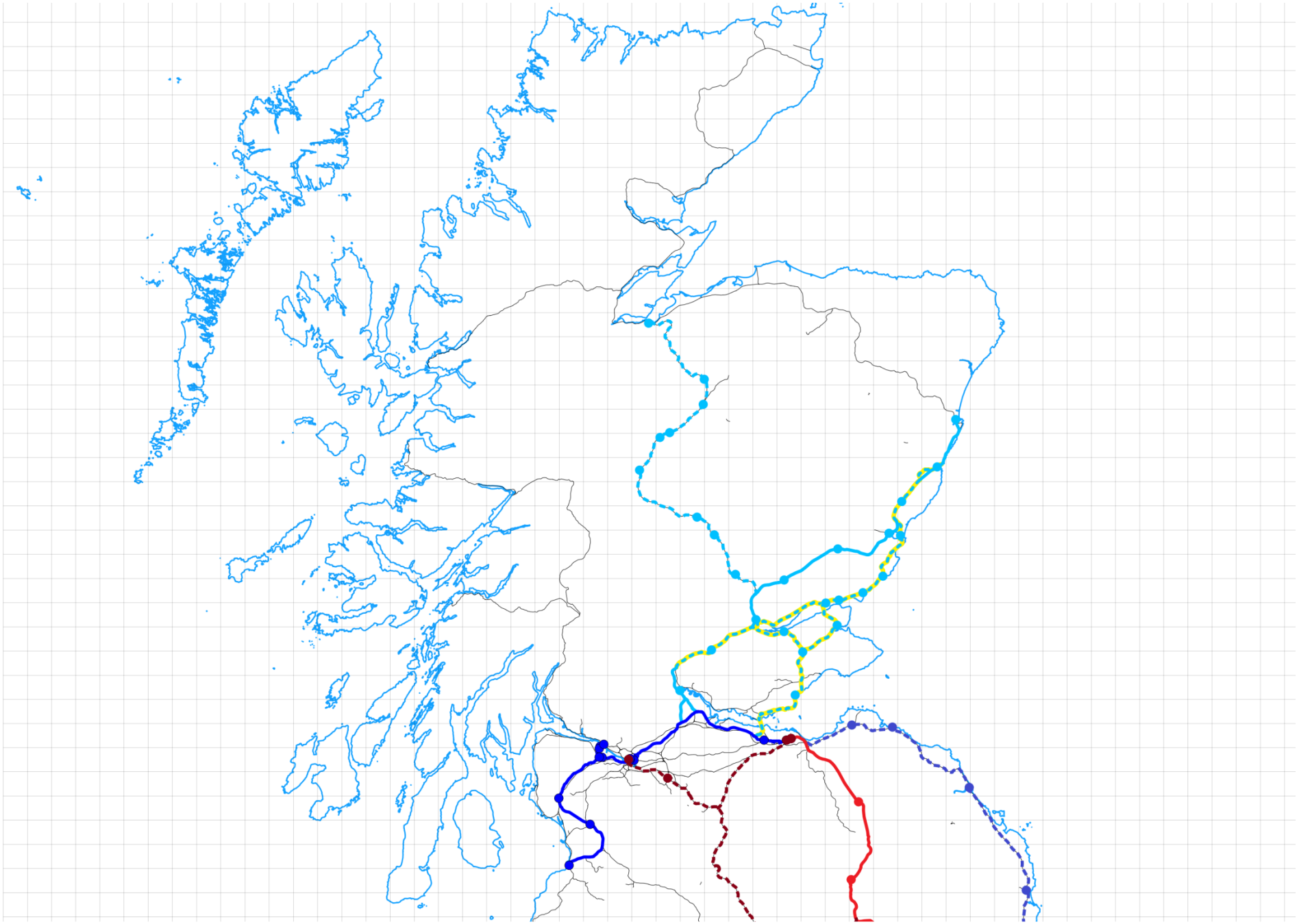
Complete HS Network, South Sheet











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 HS7 itself. This most commonly occurs when a new section of HS7 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 1

[The very first section of HS7, the approaches to Birmingham, comprising everything in the triangle Water Orton North Junction, Birmingham HS (Curzon St.) and Birmingham Interchange, exactly duplicates the equivalent provision for HS2, and is most sensibly built at the same time. This will not actually be used, initially.]

Service Plan 1 comes into effect when:

- HS7 opens from Birmingham Interchange (and thus also from Curzon St., as noted above,) to Cofton Hall Junction. Services extend thence over classic NE/SW tracks to Bristol.
- HS4 opens from Swindon to Aberthaw Junction, just beyond Cardiff Airport, and also from Old Oak Common West to East Junction, thus connecting to the already open route to Euston Cross. (This is HS4 SP2, having previously opened from Paddington to Swindon via Old Oak Common West Junction.)
- HS11 opens from Shenfield to Southend Airport, and also from Manor Park Junction to Stratford HS South Junction, thus connecting to the already open route to Euston Cross. (This is HS11/12 SP2, having previously opened from Liverpool Street to Shenfield via Manor Park Junction.)

(Note also appendix B, on the possible significance of Cardiff Airport.)

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

- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway– Bristol Temple Meads. [Interchange with HS4 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]

- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport. [Interchange with HS4 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]
- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea. [Interchange with HS4 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Bristol Temple Meads]
- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads BT. [Interchange with HS4 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]

In addition to the HS services above, a new NE-SW Regional Metro service is 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 Birmingham HS – Bristol Temple Meads
H Norwich via Diss – Euston Cross – Swansea

07H Birmingham HS – Cardiff Airport
H Southend Airport – Euston Cross – Bristol Temple Meads BT

15H Birmingham HS – Swansea
H Norwich via Diss – Euston Cross – Bristol Temple Meads

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

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

Representative Hourly Cross-Platform Interchange at Worcester Shrub Hill (the HS services have cross-platform interchange and the RM services have longer stops to allow for platform change):

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.

Service Plan 2 imposes the following loadings on HS7:

- Birmingham HS – Water Orton West Junction 8tph
- Water Orton West Junction – Water Orton South Junction 8tph
- Water Orton South Junction – Cofton Hall Junction 8tph
- Cofton Hall Junction – Westerleigh Junction 8tph
- Westerleigh Junction – Bristol Parkway 16tph
- Bristol Parkway – Bristol Temple Meads 8tph

Service Plan 2

This service plan comes into effect when HS7 opens from Bristol Temple Meads to Plymouth. It uses classic Bristol and Exeter tracks as far as Exeter, with new infrastructure thereafter. The service previously terminating at Bristol (not BT) is extended through to Plymouth, and terminates there. The HS4 service previously terminating at Bristol (not BT) is likewise extended through to Plymouth, (but not, at this SP, beyond; the service from Paddington to Penzance via the Berks and Hants route now travels HS between Exeter and Plymouth, and continues until HS4 Mk2). This is HS4 SP3. In addition, HS11 opens from Southend Airport to Faversham (and on, via classic tracks, to Dover). This is HS11/12 SP2A; it changes the origin of some of HS4's services, but makes no change to HS7's loadings.

- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David's – Plymouth. [Interchange with HS4 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]
- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport. [Interchange with HS4 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]
- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea. [Interchange with HS4 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]
- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads BT. [Interchange with HS4 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]
- [HS4 2tph Paddington – Old Oak Common – LHR interchange LL – Reading Parkway LL – Taunton – Exeter St. David's – Plymouth – Liskeard – Bodmin Road – Lostwithiel – Par – St. Austell – Truro – Redruth – Camborne – Hayle – St. Erth – Penzance]
- 2tphH Exeter St. David's – Dunsford – Moretonhampstead – Postbridge – Two Bridges – Yelverton Road – Plymouth (HS7 portion of South Devon Metro)

Representative Hourly Cross-Platform Interchange Pattern at Bristol Parkway:

00H Birmingham HS – Plymouth
H Norwich via Diss – Euston Cross – Swansea

07H Birmingham HS – Cardiff Airport
H Dover Priory– Euston Cross – Bristol Temple Meads BT

15H Birmingham HS – Swansea
H Norwich via Diss – Euston Cross – Plymouth

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

– 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 at Exeter St. David's:

00H Birmingham HS – Plymouth

07H Paddington – Penzance

15H [Norwich via Diss –] Euston Cross – Plymouth
H Exeter – Plymouth (HS Metro)

– repeating at 30, 37 and 45 minutes past. With HS, RM and South Devon Metro (q.v.) services, there will be c.14tph between Exeter St. Davids's and Central stations.

It imposes the following overall loadings on HS7:

- Birmingham HS – Water Orton West Junction 8tph
- Water Orton West Junction – Water Orton South Junction 8tph
- Water Orton South Junction – Westerleigh Junction 8tph
- Westerleigh Junction – Bristol Parkway 16tph
- Bristol Parkway – Bristol Temple Meads 8tph
- Bristol Temple Meads – Cogload Junction 4tph
- Cogload Junction – Exeter St. David's 6tph
- Exeter St. David's – Plymouth 8tph

Service Plan 3

This service plan comes into effect when HS7 opens north of Birmingham, i.e. between Nuthall North Junction and Water Orton North Junction, together with the spur from Strelley Junction to Awsworth Junction. Additionally, HS3 opens between York HS / Leeds HS and Nottingham Midland station (connection to HS7 at Nuthall North Junction and Strelley Junction, and with the classic North Midland route at Denaby Main and Stonebroom Junctions), and HS9 opens between Garforth East Junction and Leeds HS. These are HS3 SP2 and HS8/HS9 SP0A. Initially, this section of HS3 is used only by HS7's services, (HS3 otherwise, at that time, being open only as far as Leicester). The previous services from Birmingham HS to Plymouth and Swansea now start from York and Nottingham respectively, and now travel directly between Water Orton North and South Junctions, i.e. they no longer serve Birmingham HS (but do serve Birmingham Interchange). In addition, new services are introduced between York, Halifax, Skipton, Nottingham (two services, starting from Cleethorpes and Skegness,) and Birmingham HS.

- 2tphH York HS – South Yorkshire HL – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David's – Plymouth. [Interchange with HS4 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea]
- 2tphH Nottingham – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea. [Interchange with HS4 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]
- 2tphH York HS – South Yorkshire HL – Derby – Birmingham HS
- 2tphH Halifax – Bradford Central - Shipley – Leeds City –:
  Skipton – Keighley – Shipley –:
  (joins / splits) – South Yorkshire HL – Sheffield Midland – Chesterfirld – Derby – Birmingham HS.
- 2tphH Cleethorpes – Grimsby Town – Market Rasen – Lincoln – Newark Castle – Nottingham – Derby – Birmingham HS.
- 2tphH Skegness – Wainfleet – Boston – Sleaford – Lincoln – Newark Castle – Nottingham – Derby – Birmingham HS.

Representative Hourly Cross-Platform Interchange at Birmingham Interchange:

00H York – Plymouth
H HS2 Manchester Piccadilly – Euston (via Stoke)

07H HS2 Birmingham HS – Euston Cross [–> Maidstone HS1]
(no connection)

15H Nottingham – Swansea
H HS2 Blackpool / Windermere – Preston – Euston

23H HS2 Birmingham HS – Euston Cross [–> Maidstone HS1]
(no connection)

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

Representative Hourly Cross-Platform Interchange at Birmingham HS (paired by HS7 and HS2):

00H Halifax / Skipton – Birmingham HS
H Birmingham HS – Bristol Temple Meads BT
H HS2 Manchester HS – Birmingham HS (via Stoke)
H HS2 Birmingham HS – Euston Cross [–> Maidstone HS1]

07H Skegness – Birmingham HS
(no connection)

15H York HS – Birmingham HS
H Birmingham HS – Cardiff Airport
H HS2 Glasgow / Edinburgh – Birmingham HS OR Holyhead – Birmingham HS (at 45 mins past)
H HS2 Birmingham HS – Euston Cross [–> Maidstone HS1]

23H Cleethorpes – Birmingham HS
(no connection)

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

Representative Hourly Cross-Platform Interchange at Nottingham:

00H Cleethorpes – Birmingham HS
(no connection)

07H Pancras Cross – York (HS Metro)
R Norwich / Stansted Airport – Morecambe
R St. Pancras – Melton Mowbray – York

15H Skegness – Birmingham HS
(no connection)

23H HS3/HS8 Pancras Cross – Preston (HS Metro)
H HS8/HS7 Norwich – Cardiff

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

Service Plan 3A

This service plan comes into effect when HS3/HS7 opens between Newcastle and York, and the core, transpennine sections of HS8/HS9 open between (Liverpool –) Newton West Junction / Preston and Guide Bridge HS Junction and on to (HS8) Wales Junction and (HS9) Gelderd Rd. North Junction. (This is HS3 SP2A and HS8/HS9 SP1.) Thus:

- 2tphH Newcastle – Consett – Durham (Relly Mill) – Darlington – York HS –:
  Middlesborough – Thornaby – Eaglescliffe – Yarm – Northallerton – York HS –:
  (joins / splits) – South Yorkshire HL – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David's – Plymouth[Interchange with HS4 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea]
- 2tphH HS8 Preston – Bolton – Manchester Victoria (LL) – Manchester HS – Sheffield HS – Nottingham
- 2tphH HS9 Newcastle – Consett – Durham (Relly Mill) – Darlington – York HS –
  Middlesborough – Thornaby – Eaglescliffe – Yarm – Northallerton – York HS –
  (joins / splits) – Leeds HS – Huddersfield – Manchester HS – Manchester Victoria (LL) – Liverpool Lime St.
- 2tphH HS9 Newcastle – Sunderland – Seaham –Hartlepool – Stockton – Eaglescliffe – Yarm – Northallerton – Thirsk – York – Micklefield – Leeds HS – Huddersfield – Manchester HS – Manchester Victoria (LL) – Liverpool Lime St.
- 2tphH HS9 Hull – Selby – Micklefield – Leeds HS – Huddersfield – Manchester HS – Manchester Victoria (LL) – Bolton – Preston
- 2tphH HS9 Scarborough – Seamer – Malton – York – Micklefield – Leeds HS – Huddersfield – Manchester HS – Manchester Victoria (LL) – Bolton – Preston

– the rest unchanged from SP3.

A new Regional Metro service is introduced on the ECML:

- 2tphR Edinburgh – Drem – Dunbar – Berwick-upon-Tweed – Alnmouth – Morpeth – Newcastle – Chester le Street – Durham – Darlington – Northallerton – Thirsk – York

The Tees Valley Metro may or may not have been in service previously:

- 8tphRS Bishop Auckland – Shildon – Newton Aycliffe – Heighington –North Road – Darlington – Dinsdale – Tees-Side Airport – Allen's West – Eaglescliffe – Thornaby – Middlesborough – British Steel (Redcar) – Redcar Central – Redcar East – Marske – Saltburn

Representative Hourly Cross-Platform Interchange Pattern at Newcastle:

00H Newcastle [/ Middlesborough] – Plymouth
R Edinburgh – York
H Newcastle – Liverpool (via Stockton; not cross-platform)

15H Newcastle [/ Middlesborough] – Liverpool
(no interchange)

– repeating at 30 and 45 minutes past

Representative Hourly Cross-Platform Interchange Pattern at Darlington:

00H Newcastle [/ Middlesborough] – Plymouth
RS Saltburn – Middlesborough – Bishop Auckland

15H Newcastle [/ Middlesborough] – Liverpool
RS Saltburn – Middlesborough – Bishop Auckland

– repeating at 30 and 45 minutes past

The several phases of SP3 impose the following loadings on HS7:

• Newcastle	– Paradise Junction	4tph
• Paradise Junction	– Derwent Hill Junction	4tph
• Derwent Hill Junction	– Northallerton	4tph
• Northallerton	– York HS	8tph (*)
• York HS	– Garforth East Junction	6tph
• Garforth East Junction	– Garforth West Junction	2tph
• Garforth West Junction	– Gelderd Road North Junction	8tph (#)
• Gelderd Road North Junction	– Gelderd Road South Junction	0tph
• Gelderd Road South Junction	– Ryhill Junction	0tph
• Garforth East Junction	– Swillington Common Junction	4tph
• Swillington Common Junction	– Ryhill Junction	6tph
• Ryhill Junction	– Denaby Main Junction	6tph
• Denaby Main Junction	– Wales Junction	4tph
• Wales Junction	– Huthwaite Junction	6tph
• Denaby Main Junction	– Old Denaby Junction	2ph
• Old Denaby Junction	– Stonebroom Junction	2tph
• Stonebroom Junction	– Huthwaite Junction	2tph
• Huthwaite Junction	– Nuthall North Junction	8tph
• Nuthall North Junction	– Awsworth Junction	8tph
• Strelley Junction	– Awsworth Junction	6tph
• Awsworth Junction	– Water Orton North Junction	14tph
• Water Orton North Junction	– Water Orton West Junction	10tph
• Water Orton West Junction	– Birmingham HS	14tph
• Water Orton North Junction	– Water Orton South Junction	4tph
• Water Orton West Junction	– Water Orton South Junction	4tph
• Water Orton South Junction	– Cofton Hall Junction	8tph
• Cofton Hall Junction	– Westerleigh Junction	8tph
• Westerleigh Junction	– Bristol Parkway	16tph
• Bristol Parkway	– Bristol Temple Meads BT	4tph
• Bristol Parkway	– Bristol Temple Meads	4tph
• Bristol Temple Meads	– Cogload Junction	4tph
• Cogload Junction	– Exeter St. David’s	6tph
• Exeter St. David’s	– Plymouth	8tph

Note that only HS7 (and HS8) services currently run north of Nuthall North Junction.
(*) The sudden doubling of the loading between Northallerton and York HS is due to the Newcastle and Middlesborough portions running separately over this section.
(#) Three services which have travelled on the classic route(s) via Micklefield join HS9 at Garforth West Junction.

Service Plan 4

HS7 Service Plan 4 is the consequence of changes elsewhere, causing changes in detail to the HS7 services; there are no changes to HS7 per se.

HS3 opens between:

- Edinburgh and Derwent Hill Junction
- Nuthall South junction (where it is joined by the section opened between Leeds / York and Nottingham, noted above,) and Leicester
- Nottingham station and Stanford Junction (completing the Nottingham station loop)
- West Hampstead Junction and Pancras Cross.

This is HS3 SP3. It is an immensely important development, and completes HS3, but has no effect on HS7.

In addition, the section of HS8 between Paddock Junction and Ladybower Junction is opened, (this is HS8/HS9 SP2,) allowing HS7's services (similarly HS3's HS Metro service to York) to be routed between Leeds and Wales Junction via Huddersfield and Sheffield HS, instead of via South Yorkshire. For HS7 this removes 4tph from the section between Garforth East Junction and Wales Junction via South Yorkshire HL, and adds them to the section via Huddersfield and Sheffield. Thus:

- 2tphH Newcastle – Consett – Durham (Relly Mill) – Darlington – York HS –:
  Middlesborough – Thornaby – Eaglescliffe – Yarm – Northallerton – York HS –:
  (joins / splits) – Leeds HS – Huddersfield – Sheffied HS – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David's – Plymouth. [Interchange with HS4 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea]
- 2tphH York HS – Leeds HS – Huddersfield – Sheffield HS – Derby – Birmingham HS.

– other details unchanged from SP3A.

Service Plan 4A

HS7 Service Plan 4A is likewise the consequence of changes elsewhere, causing changes in detail to the HS7 services; there are no changes to HS7 per se.

HS8 opens between Nottingham and Ely, (HS8/HS9 SP2A,) and HS6 opens between Ely and Norwich (HS6 SP2). HS7's service from Nottingham to Swansea now starts from Norwich:

- 2tphH Norwich – Ely (reverse) – Peterborough – Melton Mowbray – Nottingham – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea. [Interchange with HS4 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]

– as does HS8's service from Nottingham to Preston.

Representative Hourly Cross-Platform Interchange Pattern at Bristol Parkway:

00H Newcastle / Middlesborough – Plymouth
H Norwich via Diss – Euston Cross – Swansea

07H Birmingham HS – Cardiff Airport
H Dover Priory – Euston Cross – Bristol Temple Meads BT

15H Norwich – Swansea
H Norwich via Diss – Euston Cross – Plymouth

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

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

Representative Hourly Cross-Platform Interchange at Worcester Shrub Hill:

00H Newcastle – 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 (non-cross-platform) Interchange Pattern at Derby:

00H Newcastle – Plymouth
H Manchester – St. Pancras (HS Metro)

15H Norwich – Swansea
H York – St. Pancras (HS Metro)

– repeating at 30 and 45 minutes past.

Representative Hourly Cross-Platform Interchange at Nottingham:

00H HS8 Norwich – Preston
H Cleethorpes – Birmingham HS

07H Pancras Cross – York (HS Metro)
R Norwich / Stansted Airport – Morecambe
R St. Pancras – Melton Mowbray – York

15H Skegness – Birmingham HS
(no connection)

23H HS3/HS8 Pancras Cross – Preston (HS Metro)
H HS8/HS7 Norwich – Cardiff

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

Representative Hourly Cross-Platform Interchange Pattern at Darlington:

00H Newcastle [/ Middlesborough] – Plymouth
RS Saltburn – Middlesborough – Bishop Auckland

07H HS3 Newcastle [/ Middlesborough] – Pancras Cross [HS5 –> Newhaven]
RS Saltburn – Middlesborough – Bishop Auckland

15H Newcastle [/ Middlesborough] – Liverpool
RS Saltburn – Middlesborough – Bishop Auckland

23H HS6 Edinburgh – St. Pancras (East)
RS Saltburn – Middlesborough – Bishop Auckland

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

Representative Hourly Cross-Platform Interchange Pattern at Newcastle:

00H Newcastle – Plymouth
R Edinburgh – York
H Newcastle – Liverpool (via Stockton)

07H HS3 Newcastle – Pancras Cross [HS5 –> Newhaven]
(no interchange)

15H Newcastle – Liverpool
H HS6 Edinburgh – St. Pancras (East)

– repeating at 30, 37 and 45 minutes past

The final HS7 loadings (including HS3, HS4, HS8 and HS9 loadings)are:

- Newcastle – Paradise Junction 10tph
- Paradise Junction – Derwent Hill Junction 6tph
- Derwent Hill Junction – Romanby Junction 8tph
- Romanby Junction – York HS 14tph
- York HS – Garforth East Junction 14tph
- Garforth East Junction – Garforth West Junction 10tph
- Garforth West Junction – Gelderd Road North Junction 16tph
- Gelderd Road North Junction – Gelderd Road South Junction 2tph
- Gelderd Road South Junction – Ryhill Junction 2tph
- Garforth East Junction – Swillington Common Junction 4tph
- Swillington Common Junction – Ryhill Junction 8tph
- Ryhill Junction – Denaby Main Junction 10tph
- Denaby Main Junction – Wales Junction 8tph
- Wales Junction – Huthwaite Junction 20tph
- Denaby Main Junction – Old Denaby Junction 2ph
- Old Denaby Junction – Stonebroom Junction 4tph
- Stonebroom Junction – Huthwaite Junction 4tph
- Huthwaite Junction – Nuthall North Junction 24tph
- Nuthall North Junction – Awsworth Junction 6tph
- Strelley Junction – Awsworth Junction 6tph
- Awsworth Junction – Water Orton North Junction 12tph
- Water Orton North Junction – Water Orton West Junction 8tph (§)
- Water Orton West Junction – Birmingham HS 12tph (§)
- Water Orton North Junction – Water Orton South Junction 4tph (§)
- Water Orton West Junction – Water Orton South Junction 4tph (§)
- Water Orton South Junction – Cofton Hall Junction 8tph
- Cofton Hall Junction – Worcester Shrub Hill 8tph
- Worcester Shrub Hill – Standish Junction 10tph
- Standish Junction – Westerleigh Junction 8tph
- Westerleigh Junction – Bristol Parkway 16tph
- Bristol Parkway – Bristol Temple Meads 8`m tph
- Bristol Temple Meads – Cogload Junction 4tph
- Cogload Junction – Exeter St. David's 6tph
- Exeter St. David's – Plymouth 8tph

For the sections north of Nuthall North Junction, the above loadings contain contributions from HS3, HS8 and HS9 (see the relevant Route and Service Plans documents for full details of these).The accompanying article HS7 Mk2 Route Loadings gives the full breakdown of the loadings on each section.

(§) HS7 has its own tracks in the Birmingham area, so these are just HS7 loadings – see appendix F for full details.

Service Plan 4 Summary

It's worth summarising the full set of services at service plan 4, as this represents the final, complete state of these plans, and the services have so far been introduced piecemeal, at the various stages.

HS7:

- 2tphH Newcastle – Consett – Durham (Relly Mill) – Darlington – York HS –:
  Middlesborough – Thornaby – Eaglescliffe – Yarm – Northallerton – York HS –:
  (joins / splits) – Leeds HS – Huddersfield – Sheffield HS – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads – Taunton – Exeter St. David's – Plymouth. [Interchange with HS4 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange – Swindon – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea]
- 2tphH Norwich – Ely (reverse) – Peterborough – Melton Mowbray – Nottingham – Derby – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea. [Interchange with HS4 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]
- 2tphH York HS – Leeds HS – Huddersfield – Sheffield HS – Derby – Birmingham HS.
- 2tphH Halifax – Bradford Central - Shipley – Leeds City –:
  Skipton – Keighley – Shipley – Leeds City –:
  (joins / Splits) – South Yorkshire HL – Sheffield Midland – Chesterfirld – Derby – Birmingham HS.
- 2tphH Cleethorpes – Grimsby Town – Market Rasen – Lincoln – Newark Castle – Nottingham – Derby – Birmingham HS.
- 2tphH Skegness – Wainfleet – Boston – Sleaford – Lincoln – Newark Castle – Nottingham – Derby – Birmingham HS.
- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Bristol Temple Meads BT. [Interchange with HS4 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]
- 2tphH Birmingham HS – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway – Newport – Cardiff Central – Cardiff (Rhoose) Airport. [Interchange with HS4 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]
- 2tphH Exeter St. David's – Dunsford – Moretonhampstead – Postbridge – Two Bridges – Yelverton Road – Plymouth (HS Metro!)

Regional Metro:

- 2tphR York – Micklefield – Leeds City – Wakefield Westgate – Rotherham – South Yorkshire (Meadowhall) – 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 Edinburgh – Drem – Dunbar – Berwick-upon-Tweed – Alnmouth – Morpeth – Newcastle – Chester le Street – Durham – Darlington – Northallerton – Thirsk – York

HS4:

- 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.
- 2tphH Norwich – Diss – Ipswich – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHS Interchange – Swindon – Bristol Parkway – Newport – Cardiff Central – 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 Central – Cardiff (Rhoose) Airport
- 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.
- 2tphH Paddington – Old Oak Common – LHR interchange LL – 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 LL – Reading Parkway LL – Didcot Parkway – Swindon Kemble – Stroud – Stonehouse – Gloucester (splits / joins) –:
  – Lydney – Chepstow – Caldecot – Severn Tunnel Junction – Newport – Cardiff Central - Cardiff (Rhoose) Airport
  – (reverse) – Cheltenham Spa – Ashchursh – Worcester Shrub Hill

Representative Hourly Cross-Platform Interchange Pattern at Bristol Parkway:

00H Newcastle [/ Middlesborough] – Plymouth
H Norwich via Diss – Euston Cross – Swansea

07H Birmingham HS – Cardiff Airport
H Dover Priory – Euston Cross – Bristol Temple Meads BT

15H Norwich – Swansea
H Norwich via Diss – Euston Cross – Plymouth

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

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

Representative Hourly Cross-Platform Interchange at Worcester Shrub Hill:

00H Newcastle – 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 (non-cross-platform) Interchange Pattern at Derby:

00H Newcastle – Plymouth
H Manchester – St. Pancras (HS Metro)

15H Norwich – Swansea
H York – St. Pancras (HS Metro)

– repeating at 30 and 45 minutes past.

Representative Hourly Cross-Platform Interchange at Nottingham:

00H HS8 Norwich – Preston
H Cleethorpes – Birmingham HS

07H Pancras Cross – York (HS Metro)
R Norwich / Stansted Airport – Morecambe
R St. Pancras – Melton Mowbray – York

15H Skegness – Birmingham HS
(no connection)

23H HS3/HS8 Pancras Cross – Preston (HS Metro)
H HS8/HS7 Norwich – Cardiff

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

Representative Hourly Cross-Platform Interchange Pattern at Darlington:

00H Newcastle [/ Middlesborough] – Plymouth
RS Saltburn – Middlesborough – Bishop Auckland

07H HS3 Newcastle [/ Middlesborough] – Pancras Cross [HS5 –> Newhaven]
RS Saltburn – Middlesborough – Bishop Auckland

15H Newcastle [/ Middlesborough] – Liverpool
RS Saltburn – Middlesborough – Bishop Auckland

23H HS6 Edinburgh – St. Pancras (East)
RS Saltburn – Middlesborough – Bishop Auckland

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

Representative Hourly Cross-Platform Interchange Pattern at Newcastle:

00H Newcastle – Plymouth
R Edinburgh – York
H Newcastle – Liverpool (via Stockton)

07H HS3 Newcastle – Pancras Cross [HS5 –> Newhaven]
(no interchange)

15H Newcastle – Liverpool
H HS6 Edinburgh – St. Pancras (East)

– repeating at 30, 37 and 45 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, (thus Darlington – York my estimate 70km, actual 70.4km, Durham Relly Mill – Darlington, my estimate 33km, actual former Relly Mill Junction – Darlington 33.6km,) leads me to believe they are accurate to well within 2%.

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

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

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:

• Newcastle – Consett	20km	(300kph)	
• Newcastle – Paradise Junction	3km	(300kph)	
• Paradise Junction – Derwent Hill Junction	15km	(300kph)	
• Derwent Hill Junction – Consett	2km	(300kph)	
• Consett – Durham Relly Mill	20km	(300kph)	
• Durham Relly Mill – Darlington	33km	(300kph)	
• Darlington – Romanby Junction	24km	(360kph)	
• Romanby Junction – York HS	46km	(225kph)	
• York HS – Ulleskelf Junction	14km	(225kph)	
• Ulleskelf Junction – Garforth East Junction	15km	(360kph)	
• Garforth East Junction – Garforth West Junction	0.82km	(*)	
• Garforth West Junction – Leeds New Lane	10km	(360kph *)	
• Bradford Central – (site of) Forster Square	1km	(*)	(#)
• Leeds City – Manston Junction	8km	(200kph)	
• Manston Junction – Swillington Common Junction	1.94km	(230kph)	
• Swillington Common Jn. – South Yorkshire HL	36km	(360kph)	
• South Yorkshire HL – Rotherham	11km	(160kph)	
• Chesterfield – Stonebroom Junction	10km	(160kph)	
• Stonebroom Junction – Huthwaite Junction	5km	(230kph)	(§)
• Leeds New Lane – Huddersfield	24km	(300kph)	
• Huddersfield – Sheffield HS	51km	(300kph)	
• Huddersfield – Ladybower Junction	34km	(300kph)	
• Ladybower Junction – Sheffield HS	17km	(300kph)	
• Sheffield HS – Waleswood Junction	10.55km	(225kph)	
• Sheffield HS – Woodburn Junction	1.55km	(*)	
• Woodburn Junction – Waleswood Junction	9.0km	(225kph)	
• Waleswood Junction – Wales Junction	0.78km	(230kph)	
• Wales Junction – Huthwaite Junction	25km	(360kph)	
• Huthwaite Junction – Derby	33.7km	(360kph)	
• Huthwaite Junction – Nuthall North Junction	13.5km	(360kph)	
• Nuthall North Junction – Awsworth Junction	4.7km	(*)	
• Awsworth Junction – Derby	15.5km	(*)	
• Nottingham – Derby	26km	(360kph)	
• Nottingham – Strelley Junction	7.0km	(360kph)	
• Strelley Junction – Awsworth Junction	3.5km	(360kph)	
• Derby – Birmingham Curzon St.	63km	(300kph)	

- Derby – Birmingham Interchange 59km (300kph)
- Birmingham Curzon St.– Birmingham Interchange 20km (300kph)
- Birmingham Interchange – Cofton Hall Junction 22km (300kph)
- Cofton Hall Junction – Barnt Green 2km (200kph)
- Cardiff HS – Cardiff (Rhoose) Airport 15km (360kph *)
- Cardiff (Rhoose) Airport – Aberthaw Junction 4km (160kph)
- Exeter St. David's – Plymouth 65km (360kph)
- Nottingham HS – Melton Mowbray 30.1km (225kph)
- Nottingham HS – Edwalton Junction 6.8km (225kph)
- Edwalton Junction – Melton Mowbray 23.3km (225kph)
- Edwalton Junction – Asfordby Junction 19.6km (225kph)
- Asfordby Junction – Melton Mowbray 3.7km (225kph)
- Melton Mowbray – Wymondham East Junction 8km (160kph)
- Wymondham East Junction – Pellett Hall Junction 39km (300kph)
- Wymondham East Junction – Thurlby Junction 27km (300kph)
- Thurlby Junction – Pellett Hall Junction 12km (300kph)
- Pellett Hall Junction – Peterborough 6.3km (225kph)
- Ely – Brandon Junction 18km (225kph)
- Brandon Junction – Roudham Heath Junction 24km (300kph)
- Roudham Heath Junction – Norwich 40km (200kph)
- Nottingham – Peterborough 85km (300kph)

(#) It is assumed that the Bradford Crossrail link has been built. The proposed Bradford Central station is essentially (at least as far as distances are concerned) on the site of the former Exchange station. It replaces both Interchange and Forster Square stations. The distance of the link across Bradford is (slightly less than) 1km. This is of course added to the distance from Forster Square to Shipley, in calculating the Bradford – Shipley journey time.

The above are all distances on HS7/HS3/HS4/HS8's new infrastructure. In addition, they share the following sections of classic routes, whose lengths are known exactly!

- Barnt Green – Worcester Shrub Hill 24.9km (200kph)
- Worcester Shrub Hill – Cheltenham Spa 35.3km (200kph)
- Cheltanham Spa – Standish Junction 20.2km (200kph)
- Standish Junction – Westerleigh Junction 34.5km (200kph)
- Westerleigh Junction – Bristol Parkway 7.4km (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)
- Taunton – Exeter St. David's 49.5km (200kph)
- Taunton – Tiverton Parkway 22.9km (200kph)
- Tiverton Parkway – Cullompton 6.7km (200kph)
- Cullompton – Erxeter St. David's 19.9km (200kph)
- Exeter St. David's – Plymouth 83.7km (200kph)
- Exeter St. David's – Dawlish 19.6km (200kph)

- Dawlish – Teignmouth 4.4km (200kph)
- Teignmouth – Newton Abbot 10.0km (200kph)
- Newton Abbot – Totnes 12.5km (200kph)
- Totnes – Ivybridge 18.5km (200kph)
- Ivybridge – Plymouth 18.7km (200kph)
- 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)
- Middlesborough – Thornaby 5.2km (*)
- Thornaby – Eaglescliffe 4.9km (*)
- Eaglescliffe – Yarm 4.1km (*)
- Yarm – Northallerton 18.5km (225kph)
- Northallerton – York 48.2km (225kph)
- Skipton – Keighley 14.8km (160kph)
- Keighley – Shipley 9.9km (160kph)
- Halifax – Bradford Central 5.2km (*)
- (site of) Forster Square – Shipley 4.4km (160kph)
- Shipley – Leeds City 17.3km (160kph)
- Rotherham – Sheffield Midland 8.4km (160kph)
- Sheffield Midland – Chesterfield 19.7km (160kph)
- Skegness – Wainfleet 8.0km (160kph)
- Wainfleet – Boston 30.1km (160kph)
- Boston – Sleaford 27.1km (160kph)
- Sleaford – Lincoln 10.8km (160kph)
- Cleethorpes – Grimsby Town 5.2km (*)
- Grimsby Town – Market Rasen 46.8km (160kph)
- Market Rasen – Lincoln 23.8km (160kph)
- Lincoln – Newark Castle 26.9km (200kph)
- Newark Castle – Nottingham 27.6km (200kph)
- Peterborough – March 23.9km (225kph)
- March – Ely 25.1km (225kph)

The line speeds are chosen as follows:

- HS7 new infrastructure has a line speed of 360kph (for those sections shared with HS4 or HS3, i.e. Exeter – Plymouth and those sections north of Derby), or 300kph (Derby – Birmingham and on to Cofton Hall Junction)
- (§) The section Stonebroom Junction – Huthwaite Junction is just long enough, at 4km, for acceleration from 160kph to 230kph (at which speed it joins the main line) – this requires 3.5km.
- HS4 new infrastructure has a line speed of 360kph.
- The sections of classic route between Cofton Hall Junction and Bristol Parkway, between Bristol Parkway and Bristol Temple Meads, and between Bristol Temple Meads and Exeter, are merged

into HS7, and upgraded to 200kph. Note that there is a speed limit of 30mph, 48kph, on the NE/SW route at Westerleigh Junction, which is a propinquant junction in both directons.
- The sections of classic route merged into HS4 (GWML west of Bristol Parkway) have line speed of 160kph.
- The sections of classic route between Edwalton Junction and Melton Mowbray is merged into HS8, and upgraded to 225kph. Note that a line speed of 225kph is observed throughout, although Edwalton Junction would be a propinquant junction in both directions, if the line speed were higher (than 230kph).
- 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. (Note that Bradford Central and Shipley are **not** adjacent stations, by just a few metres.)

Acceleration/deceleration distances and times (taken from 'Same Speed Railways' appendices B, D) 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 2300kph 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 Cardiff to Cardiff (Rhoose) Airport (start to stop) is 400 seconds
- Time to travel from Bristol Parkway to Westerleigh Junction, (start to pass, decelerating to 48kph at Westerleigh Junction,) is 258 seconds.
- Time to travel from Westerleigh Junction to Bristol Parkway, (pass, at 48kph, to stop,) is 264 seconds.
- Time to travel from Derby to Nottingham (start to stop) is 527 seconds.
- Time to travel from Derby to Nuthall North Junction (start to pass) is 397 seconds
- The section Sheffield – Huddersfield (start to stop) has a penalty time of 14 seconds added to account for Ladybower Junction. Likewise the section between Wymondham East Junction and Pellett Hall Junction.
- Time to travel from Leeds New Lane to Garforth East Junction (start to pass) is 173 seconds
- Time to travel from Middlesborough to Thornaby, Halifax to Bradford Central and Cleethorpes to Grimsby Town, (all of which are 5.2km, start to stop) is 235 seconds
- Time to travel from Thornaby to Eaglescliffe (start to stop) is 229 seconds
- Time to travel from Eaglescliffe to Yarm (start to stop) is 210 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.

Note however that a wait time of 7 or 8 minutes, rather than 3, is added at York, for the service from Plymouth to Newcastle and Middlesborough, to allow for the splitting / joining of portions there, and a difference of 1 minute in departure / arrival times of the portions. The same applies at Leeds City, for the Birmingham – Halifax / Skipton service. Likewise, a wait time of 5 minutes rather than 3 is added at Ely, to allow for reversal there.

A further refinement to note is that certain sections are given in two or more parts – the section between Worcester Shrub Hill and Birmingham Interchange is split at Cofton Hall Junction, for example, This occurs where there is a change of line speed at the intermediate location. Trains must either decelerate before the intermediate location, if the line speed is lower after that point, or accelerate after it (as in the above example, for northbound services). The calculation for a change of line speed is in fact surprisingly simple, and readily incorporated in the spreadsheet. The only real point of note is that the station wait time is added only once for these cases, since, of course, trains don’t actually stop at the intermediate location(s).

Finally, note that the journey times are given northbound for some services and southbound for others. If one end-point is Birmingham, then that is always taken as the starting point. The two services passing through Birmingham (Interchange) are given northbound. This is purely for convenience and to simplify the display, since services staring at Birmingham have multiple destinations, while the service from Plymouth to the North East actually splits / joins at York, so, again, multiple destinations. (For the Swansea – Norwich service it doesn’t matter, either way.)

1. Plymouth – Newcastle / Middlesborough (15/16 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Plymouth, inc. Station Wait Times
Plymouth - Exeter St. David's	65.0	65.0	15.3	15.3	15.3
Exeter St. David's - Taunton	49.5	114.5	17.3	32.6	35.6
Taunton - Bristol Temple Meads	72.0	186.5	24.1	56.7	62.7
Bristol Temple Meads - Bristol Parkway	9.2	195.7	5.2	61.9	70.9
Bristol Parkway - Westerleigh Junction	7.4	203.1	4.3	66.2	
Westerleigh Junction - Cheltenham Spa	54.7	257.8	18.6	84.8	96.8
Cheltenham Spa - Worcester Shrub Hill	35.3	293.1	13.1	97.9	112.9
Worcester Shrub Hill - Cofton Hall Junction	26.9	342.0	9.6	107.5	
Cofton Hall Junction - Birmingham Interchange	22.0	315.1	6.1	113.6	131.6
Birmingham Interchange - Derby	59.0	401.0	15.5	129.1	150.1
Derby - Nuthall North Junction	20.2	421.2	6.6	135.7	
Nuthall North Junction - Wales Junction	38.5	459.7	7.0	142.7	
Wales Junction - Waleswood Junction	0.8	460.5	0.2	142.9	
Waleswood Junction - Sheffield HS	10.6	471.1	3.9	146.8	170.8
Sheffield HS - Huddersfield	51.0	522.1	14.1	160.9	187.9
Huddersfield - Leeds HS	24.0	546.1	8.5	169.4	199.4
Leeds HS - Garforth East Junction	10.8	556.9	4.6	173.9	
Garforth East Junction - Ulleskelf Junction	15.0	571.9	3.1	177.1	
Ulleskelf Junction - York HS	14.0	585.9	4.8	181.9	214.9
York HS - Romanby Junction	46.0	631.9	14.0	195.9	

Romanby Junction - Darlington Bank Top	24.0	655.9	6.1	201.9	241.9
Darlingham Bank Top - Durham Relly Mill	33.0	688.9	10.3	212.2	255.2
Durham Relly Mill - Consett	20.0	708.9	7.7	219.9	265.9
Consett - Newcastle	20.0	728.9	7.7	227.6	276.6
York HS - Northallerton	48.2	634.1	15.6	197.5	238.5
Northallerton - Yarm	19.4	653.5	8.0	205.4	249.4
Yarm - Eaglescliffe	4.1	657.6	3.5	208.9	255.9
Eaglescliffe - Thornaby	4.8	662.5	3.8	212.7	262.7
Thornaby - Middlesborough	5.2	667.7	3.9	216.6	269.6

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

- Exeter St. David's 53 [15]
- Taunton 84 [36]
- Bristol TM 118 [63]
- Bristol Parkway 134 [71]
- Cheltenham Spa 164 [97]
- Worcester Shrub Hill 210 (1 change) [113]
- Birmingham 206 [132] (current time New St., new time I/chge)
- Derby 254 [150]
- Sheffield 292 [171]
- Huddersfield 355 (1 change) [188]
- Leeds 336 [199] (current time City new time New Lane)
- York 348 (2 ch., London) [215]
- Darlington 382 (2 ch., London) [242]
- Durham 400 (2 ch., London) [255] (current time ECML, new time Relly Mill)
- Consett [266] (there is no current time for Consett!)
- Newcastle 416 (2 ch., London) [277]
- Northallerton 370 (2 ch., London) [238]
- Yarm 430 (4 ch., London) [249]
- Eaglescliffe 419 (2 changes) [256]
- Thornaby 425 (2 ch., London) [263]
- Middlesborough 432 (2 ch., London) [270]

1P. Plymouth – Newcastle / Middlesborough (15/16 stops, with passing times):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Plymouth, inc. Station Wait Times
Plymouth - Exeter St. David's	65.0	65.0	15.3	15.3	15.3
Exeter St. David's - *Cullompton (pass)*	19.9	84.9	7.5	*22.8*	*25.8*
Cullompton (pass) - Tiverton Parkway (pass)	6.7	91.6	2.0	*24.8*	*27.8*
Tiverton Parkway (pass) - Taunton	22.9	114.5	7.8	32.6	35.6
Taunton - *Cogload Junction (pass)*	7.3	121.8	3.7	*36.3*	*42.3*
Cogload Junction (pass) - Bristol Temple Meads	64.7	186.5	20.3	56.7	62.7
Bristol Temple Meads - Bristol Parkway	9.2	195.7	5.2	61.9	70.9
Bristol Parkway - *Westerleigh Jn. (pass)*	7.4	203.1	4.3	*66.2*	*78.2*
Westerleigh Jn. (pas) - Standish Junction (pass)	34.5	237.6	11.6	*77.8*	*89.8*
Standish Junction (pass) - Cheltenham Spa	20.2	257.8	7.0	84.8	96.8
Cheltenham Spa - Worcester Shrub Hill	35.3	293.1	13.1	97.9	112.9
Worcester Shrub Hill - *Cofton Hall Jn. (pass)*	26.9	320.0	9.6	*107.5*	*125.5*
Cofton Hall Jn. (pass) - Birmingham Interchange	22.0	342.0	6.1	113.6	131.6
Birmingham Interchange - Derby	59.0	401.0	15.5	129.1	150.1
Derby - *Awsworth Jn. (pass)*	15.5	416.5	5.5	*134.5*	*158.5*
Awsworth Jn. (pass) - Nuthall North Jn. (pass)	4.7	421.2	1.1	*135.7*	*159.7*
Nuthall North Jn. (pass) - Huthwaite Jn. (pass)	13.5	434.7	2.6	*138.3*	*162.3*
Huthwaite Jn. (pass) - Wales Junction (pass)	25.0	459.7	4.4	*142.7*	*166.7*
Wales Junction (pass) - Waleswood Jn. (pass)	0.8	460.5	0.2	*142.9*	*166.9*

Waleswood Jn. (pass) - Woodurn Jn. (pass)	9.0	469.5	2.5	*145.4*	*169.4*
Woodburn Jn. (pass) - Sheffield HS	1.6	471.0	1.3	146.7	170.7
Sheffield HS - *Ladybower Jn. (pass)*	17.0	488.0	5.8	*152.5*	*179.5*
Ladybower Jn. (pass) - Huddersfield	34.0	522.0	8.3	160.9	187.9
Huddersfield - Leeds HS	24.0	546.0	8.5	169.4	199.4
Leeds HS - *Garforth West Jn. (pass)*	10.0	556.0	4.3	*173.7*	*206.7*
Garforth West Jn. (pass) - Garforth East Jn. (pass)	0.8	556.9	0.2	*173.9*	*206.9*
Garforth East Jn. (pass) - Ulleskelf Junction (pass)	15.0	571.9	3.1	*177.1*	*210.1*
Ulleskelf Junction (pass) - York HS	14.0	585.9	4.8	181.8	214.8
York HS - *Romanby Junction (pass)*	46.0	631.9	14.0	*195.8*	*235.8*
Romanby Junction (pass) - Darlington Bank Top	24.0	655.9	6.1	201.9	241.9
Darlingham Bank Top - Durham Relly Mill	33.0	688.9	10.3	212.2	255.2
Durham Relly Mill - Consett	20.0	708.9	7.7	219.9	265.9
Consett - *Derwent Hill Jn. (pass)*	2.0	710.9	1.9	*221.8*	*270.8*
Derwent Hill Jn. (pass) - Paradise Junction (pass)	15.0	725.9	4.0	*225.8*	*274.8*
Paradise Junction (pass) - Newcastle	3.0	728.9	1.8	227.6	276.6
York HS - Northallerton	48.2	634.1	15.6	197.5	238.5
Northallerton - Yarm	19.4	653.5	8.0	205.4	249.4
Yarm - Eaglescliffe	4.1	657.6	3.5	208.9	255.9
Eaglescliffe - Thornaby	4.8	662.4	3.8	212.7	262.7
Thornaby - Middlesborough	5.2	667.6	3.9	216.6	269.6

2. Swansea – Norwich (15 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Swansea, inc. Station Wait Times
Swansea - Neath	14.2	14.2	7.3	7.3	7.3
Neath - Port Talbot	10.7	24.9	6.0	13.3	16.3
Port Talbot - Bridgend	19.6	44.5	9.3	22.6	28.6
Bridgend - Cardiff Airport	26.0	70.5	11.7	34.3	43.3
Cardiff Airport - Cardiff Central	15.0	85.5	6.7	41.0	53.0
Cardiff Central - Newport	20.5	106.0	9.7	50.7	65.7
Newport - Bristol Parkway	34.7	140.7	15.0	65.7	83.7
Bristol Parkway - Westerleigh Junction	7.4	148.1	4.3	70.0	
Westerleigh Junction - Cheltenham Spa	54.7	202.8	18.6	88.6	109.6
Cheltenham Spa - Worcester Shrub Hill	35.3	238.1	13.1	101.6	125.6
Worcester Shrub Hill - Cofton Hall Junction	26.9	265.0	9.6	111.2	
Cofton Hall Junction - Birmingham Interchange	22.0	287.0	6.1	117.3	144.3
Birmingham Interchange - Derby	59.0	346.0	15.5	132.8	162.8
Derby - Nottingham	26.0	372.0	8.8	141.6	174.6
Nottingham - Melton Mowbray	30.1	402.1	10.8	152.4	188.4
Melton Mowbray - Wymondham East Jn.	8.0	410.1	4.2	156.6	
Wymondham East Jn. - Pellett Hall Junction	39.0	449.1	8.6	165.3	
Petllett Hall Junction - Peterborough	6.3	455.4	2.7	168.0	207.0
Peterborough - March	23.9	479.3	9.2	177.1	219.1
March - Ely (reverse)	25.1	504.4	9.5	186.6	231.6
Ely - Brandon Junction	18.0	522.4	6.5	193.2	
Brandon Junction - Roudham Heath Junction	24.0	546.4	5.1	198.3	
Roudham Heath Junction - Norwich	40.0	586.4	12.9	211.2	261.2

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

- Neath 10 [7]
- Port Talbot 17 [16]
- Bridgend 30 [29]
- Cardiff Airport [43] (there is no current time for Cardiff Airport!)
- Cardiff 53 [53]
- Newport 67 [66]
- Bristol Parkway 91 [84]
- Cheltenham Spa 130 (1 change) [110]
- Worcester Shrub Hill 166 (2 changes) [126]
- Birmingham 174 (1 change) [144] (current fastest to New St., new time to I'chg)
- Derby 224 (2 changex) [163]
- Nottingham 270 (3 changes) [175]
- Melton Mowbray [188]
- Peterborough 257 (2 ch., Loncon) [207]
- March 337 (4 ch., London) [219]
- Ely 319 (4 ch., London) [232]
- Norwich 357 (3 ch., London) [261]

2P. Swansea – Norwich (15 stops, with passing times):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Swansea, inc. Station Wait Times
Swansea - Neath	14.2	14.2	7.3	7.3	7.3
Neath - Port Talbot	10.7	24.9	6.0	13.3	16.3
Port Talbot - Bridgend	19.6	44.5	9.3	22.6	28.6
Bridgend - *Aberthaw Junction (pass)*	22.0	66.5	9.5	*32.1*	*41.1*
Aberthaw Junction (pass) - Cardiff Airport	4.0	70.5	2.2	34.3	43.3
Cardiff Airport - Cardiff Central	15.0	85.5	6.7	41.0	53.0
Cardiff Central - Newport	20.5	106.0	9.7	50.7	65.7
Newport - Bristol Parkway	34.7	140.7	15.0	65.7	83.7
Bristol Parkway - *Westerleigh Jn. (pass)*	7.4	148.1	4.3	*70.0*	*91.0*
Westerleigh Jn. (pass) - Standish Junction (pass)	34.5	182.6	11.6	*81.6*	*102.6*
Standish Junction (pass) - Cheltenham Spa	20.2	202.8	7.0	88.6	109.6

Cheltenham Spa - Worcester Shrub Hill	35.3	238.1	13.1	101.6	125.6
Worcester Shrub Hill - *Cofton Hall Jn. (pass)*	26.9	265.0	9.6	*111.2*	*138.2*
Cofton Hall Jn. (pass) - Birmingham Interchange	22.0	287.0	6.1	117.3	144.3
Birmingham Interchange - Derby	59.0	346.0	15.5	132.8	162.8
Derby - *Awsworth Junction (pass)*	15.5	361.5	5.4	*138.2*	*171.2*
Awsworth Junction (pass) - *Strelley Junction (pass)*	3.5	365.0	0.6	*138.8*	*171.8*
Strelley Junction (pass) - Nottingham	7.0	372.0	2.8	141.6	174.6
Nottingham - *Edwalton Junction (pass)*	6.8	378.8	3.5	*145.2*	*181.2*
Edwalton Junction (pass) - *Asfordby Junction (pass)*	19.6	398.4	5.2	*150.4*	*186.4*
Asfordby Junction (pass) - Melton Mowbray	3.7	402.1	2.0	152.4	188.4
Melton Mowbray - *Wymondham E. Jn. (pass)*	8.0	410.1	4.2	*156.6*	*195.6*
Wymondham E. Jn. (pass) - *Thurlby Junction (pass)*	27.0	437.1	6.0	*162.6*	*201.6*
Thurlby Junction (pass) - *Pellett Hall Jn. (pass)*	12.0	449.1	2.6	*165.3*	*204.3*
Pellett Hall Jn. (pass) - Peterborough	6.3	455.4	2.7	168.0	207.0
Peterborough - March	23.9	479.3	9.2	177.1	219.1
March - Ely (reverse)	25.1	504.4	9.5	186.6	231.6
Ely - *Brandon Junction (pass)*	18.0	522.4	6.5	*193.1*	*243.1*
Brandon Junction (pass) - *Roudham Heath Jn. (pass)*	24.0	546.4	5.1	*198.2*	*248.2*
Roudham Heath Jn. (pass) - Norwich	40.0	586.4	12.9	211.2	261.2

3. Birmingham Curzon St. – Cardiff Airport / Bristol (6/4 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Birmingham, inc. Station Wait Times
Birmingham Curzon St. - Birmingham Interchange	20.0	20.0	7.7	7.7	7.7
Birmingham Interchange - Cofton Hall Junction	22.0	42.0	6.9	14.6	
Cofton Hall Junction - Worcester Shrub Hill	26.9	68.9	9.0	23.6	26.6
Worcester Shrub Hill - Cheltenham Spa	35.3	104.2	13.1	36.6	42.6
Cheltenham Spa - Westerleigh Junction	54.7	158.9	18.5	55.1	
Westerleigh Junction - Bristol Parkway	7.4	166.3	4.4	59.5	68.5
Bristol Parkway - Newport	14.7	181.0	7.5	67.0	79.0
Newport - Cardiff Central	20.5	201.5	9.7	76.7	91.7
Cardiff Central - Cardiff Airport	15.0	216.5	6.7	83.3	101.3
Bristol Parkway - Bristol Temple Meads	9.2	175.5	5.2	64.7	71.5

Current fastest time (minutes) from Birmingham (New St.) [and the above values (Curzon St.)] to:

- Birmingham I'chge [8] (there is no current time for B'ham Interchange!)
- Worcester 49 (1 change) [27]
- Cheltenham 40 [43]
- Bristol Parkway 72 [69]
- Newport 99 [79]
- Cardiff 116 [92]
- Cardiff Airport [101] (there is no current time for Cardiff Airport!)
- Bristol Temple Meads 83 [72]

Note that the current fastest times south of Worcester do **not** include a Worcester stop.

3P. Birmingham Curzon St. – Cardiff Airport / Bristol (6/4 stops, with passing times):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Birmingham, inc. Station Wait Times
Birmingham Curzon St. - Birmingham Interchange	20.0	20.0	7.7	7.7	7.7
Birmingham Interchange - *Cofton Hall Jn. (pass)*	22.0	42.0	6.9	*14.6*	*17.6*
Cofton Hall Jn. (pass) - Worcester Shrub Hill	26.9	68.9	9.0	23.6	26.6
Worcester Shrub Hill - Cheltenham Spa	35.3	104.2	13.1	36.6	42.6
Cheltenham Spa - *Standish Junction (pass)*	20.2	124.4	7.6	*44.2*	*53.2*
Standish Junction (pass) - Westerleigh Jn. (pass)	34.5	158.9	10.9	*55.1*	*64.1*
Westerleigh Jn. (pass) - Bristol Parkway	7.4	166.3	4.4	59.5	68.5
Bristol Parkway - Newport	14.7	181.0	7.5	67.0	79.0
Newport - Cardiff Central	20.5	201.5	9.7	76.7	91.7
Cardiff Central - Cardiff Airport	15.0	216.5	6.7	83.3	101.3
Bristol Parkway - Bristol Temple Meads	9.2	175.5	5.2	64.7	71.5

4. Birmingham Curzon St. – York / Halifax / Skipton (4/8/8 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Birmingham, inc. Station Wait Times
Birmingham Curzon St. - Derby	63.0	63.0	16.3	16.3	16.3
Derby - Nuthall North Junction	20.2	83.2	6.6	22.9	
Nuthall North Junction - Wales Junction	38.5	121.7	7.0	30.0	
Wales Junction - Waleswood Junction	0.8	122.5	0.2	30.2	
Waleswood Junction - Sheffield HS	10.6	133.1	3.9	34.0	37.0
Sheffield HS - Huddersfield	51.0	184.1	14.1	48.2	54.2
Huddersfield - Leeds HS	24.0	208.1	8.5	56.7	65.7
Leeds HS - Garforth East Junction	10.8	218.9	4.6	61.2	
Garforth East Junction - Ulleskelf Junction	15.0	233.9	3.1	64.3	
Ulleskelf Junction - York HS	14.0	247.9	4.8	69.1	81.1
Derby - Nuthall North Junction	20.2	268.1	6.6	22.9	
Nuthall North Junction - Huthwaite Junction	13.5	281.6	2.9	25.8	
Huthwaite Junction - Stonebroom Junction	5.0	286.6	1.3	27.1	
Stonebroom Junction - Chesterfield	10.0	296.6	3.9	31.0	34.0
Chesterfield - Sheffield Midland	19.8	316.4	8.4	39.4	45.4
Sheffield Midland - South Yorkshire HL	19.4	335.8	9.3	48.7	57.7
South Yorkshire HL - Swillington Common Jn.	36.0	371.8	9.0	57.7	
Swillington Common Jn. - Manston Junction	1.9	373.7	0.5	58.2	
Manston Junction - Leeds City	8.0	381.7	3.3	61.5	73.5
Leeds City - Shipley	17.3	399.0	8.5	70.0	89.0
Shipley - Bradford Central	4.9	403.9	3.8	73.8	95.8
Bradford Central - Halifax	12.8	416.7	6.8	80.6	105.6

Leeds City - Shipley	17.3	399.0	8.5	70.0	90.0
Shipley - Keighley	10.0	409.0	5.7	75.7	98.7
Keighley - Skipton	16.4	425.4	8.1	83.9	109.9

Current fastest time (minutes) from Birmingham (New St.) [and the above values (Curzon St.)] to:

- Derby 35 [16]
- Sheffield HS [37]
- Huddersfield 134 (1 change) [54]
- Leeds HS [66]
- York 129 [81]
- Chesterfield 59 [34]
- Sheffield Midland 74 [45]
- South Yorkshire HL [58]
- Leeds City 118 [74]
- Shipley 146 (1 change) [89]
- Bradford 156 (1 change) [96}
- Halifax 163 (2 changes) [106]
- Keighley 157 (1 change) [99]
- Skipton 172 (1 change) [110]

4P. Birmingham Curzon St. – York / Halifax / Skipton (4/8/8 stops, with passing times):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Birmingham, inc. Station Wait Times
Birmingham Curzon St. - Derby	63.0	63.0	16.3	16.3	16.3
Derby - *Awsworth Junction (pass)*	15.5	78.5	5.5	*21.8*	*24.8*
Awsworth Junction (pass) - Nuthall North Jn. (pass)	4.7	83.2	1.1	*22.9*	*25.9*
Nuthall North Jn. (pass) - Huthwaite Jn. (pass)	13.5	92.0	2.6	*25.6*	*28.6*
Huthwaiteh Jn. (pass) - Wales Junction (pass)	25.0	117.0	4.4	*30.0*	*33.0*
Wales Junction (pass) - Waleswood Jn. (pass)	0.8	117.8	0.2	*30.2*	*33.2*
Waleswood Jn. (pass) - Sheffield HS	10.6	128.4	3.9	34.0	37.0
Sheffield HS - *Lasybower Jn. (pass)*	17.0	145.4	5.8	*39.8*	*45.8*
Ladybower Jn. (pass) - Huddersfield	34.0	179.4	8.3	48.2	54.2
Huddersfield - Leeds HS	24.0	203.4	8.5	56.7	65.7
Leeds HS - *Garforth West Jn. (paee)*	10.0	213.4	4.3	*61.0*	*73.0*
Garforth West Jn. (pass) - Garforth East Jn. (pass)	0.8	214.2	0.2	*61.2*	*73.2*
Garforth East Junction - Ulleskelf Junction (pass)	15.0	229.2	3.1	*64.3*	*76.3*
Ulleskelf Junction (pass) - York HS	14.0	243.2	4.8	69.1	81.1
Derby - *Awsworth Junction (pass)*	15.5	258.7	5.5	*21.8*	*24.8*
Awsworth Junction (pass) - Nuthall North Jn. (pass)	4.7	263.4	1.1	*5.5*	*25.9*
Nuthall North Jn. (pass) - Huthwaite Junction (pass)	13.5	276.9	2.9	*24.7*	*28.8*
Huthwaite Junction (pass) - Stonebroom Jn. (pass)	5.0	281.9	1.3	*26.0*	*30.1*
Stonebroom Jn. (pass) - Chesterfield	10.0	291.9	3.9	29.9	34.0
Chesterfield - Sheffield Midland	19.8	311.7	8.4	38.3	45.4

Sheffield Midland - South Yorkshire HL	19.4	331.1	9.3	47.6	57.7
South Yorkshire HL - *Swillington Com. Jn. (pass)*	36.0	367.1	9.0	*56.6*	*69.7*
Swillington Com. Jn. (pass) - Manston Junction (pass)	1.9	369.0	0.5	*57.1*	*70.2*
Manston Junction (pass) - Leeds City	8.0	377.0	3.3	60.4	73.5
Leeds City - Shipley	17.3	394.3	8.5	68.9	89.0
Shipley - Bradford Central	4.9	399.2	3.8	72.7	95.8
Bradford Central - Halifax	12.8	412.0	6.8	79.5	105.6
Leeds City - Shipley	17.3	394.3	8.5	68.9	90.0
Shipley - Keighley	10.0	404.3	5.7	74.6	98.7
Keighley - Skipton	16.4	420.7	8.1	82.7	109.9

5. Birmingham – Cleethorpes / Skegness (6/7 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Birmingham, inc. Station Wait Times
Birmingham Curzon St. - Derby	63.0	63.0	16.3	16.3	16.3
Derby - Nottingham	26.0	89.0	8.8	25.1	28.1
Nottingham - Newark	27.6	116.6	10.7	35.8	41.8
Newark - Lincoln	26.9	143.5	10.5	46.4	55.4
Lincoln - Market Rasen	23.8	167.3	10.9	57.3	73.3
Market Rasen - Grimsby Town	46.8	214.1	19.5	76.8	95.8
Grimsby Town - Cleethorpes	5.2	219.3	3.9	80.7	102.7
Lincoln - Sleaford	10.8	154.3	6.0	52.4	69.4
Sleaford - Boston	27.1	181.4	12.1	64.5	84.5
Boston - Wainfleet	30.1	211.5	13.3	77.8	100.8
Wainfleet - Skegness	8.0	219.5	5.0	82.8	108.8

Current fastest time (minutes) from Birmingham (New St.) [and the above values (Curzon St.)] to:

- Derby 35 [16]
- Nottingham 69 [28]
- Newark Castle 107 (1 change) [42]
- Lincoln 148 (1 change) [55]
- Market Rasen 170 (2 changes) [73]
- Grimsby Town 187 (1 change) [96]
- Cleethorpes 199 (1 change) [103]
- Sleaford 151 (1 change) [69]
- Boston 175 (1 change) [85]
- Wainfleet 200 (1 change) [101]
- Skegness 215 (1 change) [109]

5P. Birmingham – Cleethorpes / Skegness (6/7 stops, with passing times):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Birmingham, inc. Station Wait Times
Birmingham Curzon St. - Derby	63.0	63.0	16.3	16.3	16.3
Derby - *Awsworth Jn. (pass)*	15.5	78.5	5.4	*21.7*	*24.7*
Awsworth Jn. (pass) - Strelley Junction (pass)	3.5	82.0	0.6	*22.3*	*25.3*
Strelley Junction (pass) - Nottingham	7.0	89.0	2.8	25.1	28.1
Nottingham - Newark	27.6	116.6	10.7	35.8	41.8
Newark - Lincoln	26.9	143.5	10.5	46.4	55.4
Lincoln - Market Rasen	23.8	167.3	10.9	57.3	73.3
Market Rasen - Grimsby Town	46.8	214.1	19.5	76.8	95.8
Grimsby Town - Cleethorpes	5.2	219.3	3.9	80.7	102.7
Lincoln - Sleaford	10.8	154.3	6.0	52.4	69.4
Sleaford - Boston	27.1	181.4	12.1	64.5	84.5
Boston - Wainfleet	30.1	211.5	13.3	77.8	100.8
Wainfleet - Skegness	8.0	219.5	5.0	82.8	108.8

Mk1A vs Mk1 Estimated Journey Times

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

Plymouth to:	Current	Mk1	Mk1A
Exeter St. David's	53.0	16.8	15.3
Taunton	84.0	33.1	35.6
Bristol Temple Meads	118.0	54.0	62.7
Bristol Parkway	134.0	61.9	70.9
Cheltenham Spa	164.0	80.8	96.8
Worcester Shrub Hill	210.0	94.5	112.9
Birmingham Interchange	206.0	111.0	131.6
Derby	254.0	129.5	150.1
Sheffield HS	292.0	149.4	170.8
Huddersfield	155.0	167.6	187.9
Leeds HS	336.0	179.1	199.4
York HS	348.0	193.6	214.9
Darlington Bank Top	382.0	212.7	241.9
Durham Relly Mill	400.0	226.0	265.9
Consett		236.7	265.9
Newcastle	416.0	247.8	276.6
Northallerton	370.0		238.5
Yarm	430.0		249.4
Eaglescliffe	419.0		255.9
Thornaby	425.0		262.7
Middlesborough	432.0		269.6
Swansea to:	Current	Mk1	Mk1A
Neath	10.0		7.3
Port Talbot	17.0	6.2	16.3
Bridgend	30.0		28.3
Cardiff Airport		20.7	43.3
Cardiff Central / HS	53.0	30.4	53.0
Newport	67.0		65.7
Bristol Parkway	91.0	45.8	83.7
Cheltenham Spa	130.0	64.7	109.6
Worcester Shrub Hill	166.0	78.4	125.6
Birmingham Interchange	174.0	94.9	144.3
Derby	224.0	113.5	162.8
Nottingham	270.0	125.4	174.6
Peterborough	257.0	149.1	207.0
March	337.0		219.1
Ely	317.0		231.6
Norwich	357.0	180.0	261.2
Birmingham HS to:	Current	Mk1	Mk1A
Birmingham Interchange		7.7	7.7
Worcester Shrub Hill	49.0	24.2	26.6

Cheltenham Spa	40.0	37.9	42.6
Bristol Parkway	72.0	56.9	68.5
Bristol Temple Meads	83.0	64.8	71.5
Newport	99.0		79.0
Cardiff Central / HS	93.0	73.2	91.7
Cardiff Airport			101.3
Birmingham HS to:	Current	Mk1	Mk1A
Derby	35.0	16.3	16.3
Sheffield HS		37.8	37.0
Huddersfield	134.0	56.0	54.2
Leeds HS		67.5	65.7
York HS	129.0	81.9	81.1
Chesterfield	59.0		34.0
Sheffield Midland	74.0		45.4
South Yorkshire HL			57.7
Leeds City	118.0		73.5
Shipley	146.0		89.0
Bradford Central	156.0		95.8
Halifax	163.0		105.6
Keighley	157.0		98.7
Skipton	172.0		109.5

A number of qualifications must be noted.

At Mk1, the times were given for Newcastle to Plymouth and Norwich to Swansea. Whereas it would not be expected that the times would vary greatly in opposite directions, nonetheless, a few minutes leeway should be allowed. (The reason for the change is that the Plymouth – North East services now serve Middlesborough as well as Newcastle, and the presentation northbound is more compact, tidier and easier to follow. Swansea – Norwich simply followed suit.) The services starting from Birmingham are presented identically at Mk1 and Mk1A.

There was no service Birmingham – West Yorkshire at Mk1.

The route between Wales Junction and York is significantly different between Mk1 and Mk1A. Distances therefore differ.

And of course at Mk1A, significant sections of classic route are incorporated. Mk1A times are thus significantly slower almost everywhere than those of Mk1, but still very impressive compared with current timings. This last is particularly striking for cross-country routes, as all of HS7 is, as compared with routes having one end in London.

HS7 Mk2 Enhancements

The HS7 Mk2 enhancements are twofold:

Restoration of the new infrastructure between Cofton Hall Junction and Bristol Parkway HS (including the new, HS, station at Bristol Parkway). Cofton Hall Junction remains in situ, for operational flexibility, but is not used in normal service.) There is also restoration of the new infrastructure between Bristol Temple Meads and Exeter St. David's. Between Cofton Hall Junction and Bristol Parkway, (indeed, between Derby and Bristol Parkway,) the line speed is 300kph. Between Bristol and Exeter, (which is shared with HS4,) the line speed is 360kph.

The is also the entirely new proposal of a chord between Stadium (HS7) and Brentry (HS4) junctions, to allow a service between Swansea and Plymouth, without reversal at Bristol Parkway.

Except in the vicinity of Worcester, Gloucester and Weston-Super-Mare, the restored infrastructure closely follows the classic routes.

There is one further infrastructure change, though not affecting HS7 itself: the new section of HS8 between Edwalton Junction and Ely, avoiding Melton Mowbray and March, is opened; this has line speed 300kph.

Service Plan 5

This service plan assumes that Mk2 has been implemented in full, as also has that for HS4 (SP6). It is very similar to SP4, with the following significant changes:

- The South to West chord, between Stadium and Brentry junctions, is opened, enabling traffic between the West Country and South Wales, without reversal at Bristol Parkway.
- New services are introduced between Liverpool and Plymouth, between Holyhead and Swansea, and between Swansea and Plymouth.

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 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
- 2tphH Liverpool Lime St. – Liverpool South Parkway – Runcorn – Crewe – Birmingham Interchange – Worcester Shrub Hill – Cheltenham Spa – Bristol Parkway HS – Bristol Temple Meads HS – Taunton – Exeter St. David's – Plymouth `
- 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 Swansea – Port Talbot – Cardiff (Rhoose) Airpoet – Cardiff HS – Bristol Temple Meads HS – Taunton – Exeter St. David's – Plymouth
- 2tphH York HS – Leeds HS – Huddersfield – Sheffield HS – Derby – Birmingham HS.
- 2tphH Halifax – Bradford Central – Shipley – Leeds City –:
  Skipton – Keighley – Shipley – Leeds City –:
  (joins / Splits) – South Yorkshire HL – Sheffield Midland – Chesterfirld – Derby – Birmingham HS.
- 2tphH Cleethorpes – Grimsby Town – Market Rasen – Lincoln – Newark Castle – Nottingham – Derby – Birmingham HS.
- 2tphH Skegness – Wainfleet – Boston – Sleaford – Lincoln – Newark Castle – Nottingham – Derby – Birmingham HS.
- 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
- 2tphH Exeter St. David's – Dunsford – Moretonhampstead – Postbridge – Two Bridges (for Princetown) – Yelverton Road – Plymouth. (This is effectively a HS addition to the South Devom Metro.)

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 Edinburgh – Drem – Dunbar – Berwick-upon-Tweed – Alnmouth – Morpeth – Newcastle – Chester le Street – Durham – Darlington – Northallerton – Thirsk – York
- 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

Several of the above services are included merely because they impose a loading on the section Cardiff General – Cardiff 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

HS4:

- 2tphH Norwich – Beccles – Ipswich HS – Colchester – Chelmsford – Shenfield HS – Stratford HS South – Euston Cross – Old Oak Common – LHR Interchange –Bristol Parkway HS – Cardiff HS – Cardiff (Rhoose) Airport – Port Talbot – 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 – Bristol Temple Meads BT.
- 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
- 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 Central – Cardiff (Rhoose) Airport

- 2tphH Paddington – Old Oak Common = LHR Interchange – Reading Parkway LL – Swindon – Bristol Parkway (classic) – Newport – Cardiff – Cardiff (Rhoose) Airport – Bridgend – Port Talbot – Neath – Swansea (reverse) – Llanelli – Carmarthen
- 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 Central – Cardiff (Rhoose) Airport
  – (reverse) Cheltenham Spa – Ashchursh – Worcester Shrub Hill

Representative Hourly Cross-Platform Interchange at Bristol Parkway HS:

00H Newcastle / Middlesborough – (joins / splits York HS) – Plymouth
H Norwich via Beccles – Euston Cross – Swansea

05H Birmingham HS – Cardiff Airport
H Dover Priory – Euston Cross – Bristol Temple Meads BT

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 – Birmingham – Swansea
H Norwich via Diss – Euston Cross – Plymouth – Penzance / Padstow

20H Birmingham HS – Bristol Temple Meads BT
H Dover Priory – Euston Cross – Cardiff Airport

25H Holyhead – Swansea (connects into Newcastle/Middlesborough – Plymouth etc. at 30 min past)
(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:

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	*Norwich via Beccles – Euston Cross – Swansea*	*NON-STOP*
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	*Norwich via Diss – Euston Cross – Penzance / Padstow*	*NON-STOP*
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:

00H Paddington – Plymouth
R Paddington – Weymouth

– repeating at 30 minutes past.

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 – Plymounth, 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 final HS7 loadings (including HS3, HS4, HS8 and HS9 loadings) are:

- Newcastle – Paradise Junction 12tph
- Paradise Junction – Derwent Hill Junction 8tph
- Derwent Hill Junction – Romanby Junction 10tph
- Romanby Junction – York HS 18tph
- York HS – Garforth East Junction 16tph
- Garforth East Junction – Garforth West Junction 10tph
- Garforth West Junction – Gelderd Road North Junction 16tph
- Gelderd Road North Junction – Gelderd Road South Junction 2tph
- Gelderd Road South Junction – Ryhill Junction 2tph
- Garforth East Junction – Swillington Common Junction 6tph
- Swillington Common Junction – Ryhill Junction 10tph
- Ryhill Junction – Denaby Main Junction 12tph
- Denaby Main Junction – Wales Junction 10tph
- Wales Junction – Huthwaite Junction 24tph
- Denaby Main Junction – Old Denaby Junction 2ph
- Old Denaby Junction – Wincobank Junction 4tph
- Wincobank Junction – Sheffield Midland 6tph
- Sheffield Midland – Huthwaite Junction 4tph
- Huthwaite Junction – Nuthall North Junction 28tph
- Nuthall North Junction – Awsworth Junction 6tph
- Strelley Junction – Awsworth Junction 6tph
- Awsworth Junction – Water Orton North Junction 12tph
- Water Orton North Junction – Water Orton West Junction 8tph
- Water Orton West Junction – Birmingham HS 12tph
- Water Orton West Junction – Water Orton South Junction 4tph

- Water Orton North Junction – Water Orton South Junction 8tph
- Water Orton South Junction – Bristol Parkway HS 12tph
- Bristol Parkway HS – Stadium Junction 10tph
- Brentry Junction – Stadium Junction 2tph
- Stadium Junction – Bristol Temple Meads 12tph
- Bristol Temple Meads – Exeter St. David's 8tph
- Exeter St. David's – Plymouth 10tph
- Bristol Parkway – Brentry Junction 10tph
- Brentry Junction – Cardiff HS 12tph
- Cardiff (HS and Central) – Cardiff Airport 24tph
- Cardiff Airport – Ewenny South Junction 14tph
- Ewenny South Junction - Swansea 8tph

For the sections north of Nuthall North Junction, the above loadings contain contributions from HS3, HS8 and HS9 (see the relevant Route and Service Plans documents for full details of these).

Estimated Journey Times

Because of the new infrastructure, some distances have changed from Mk1A. These new estimated distances (between stations) are:

- Birminham Interchange – Worcester Shrub Hill 49km (300kph)
- Worcester Shrub Hill – Cheltenham Spa 35km (300kph)
- Cheltenham Spa – Bristol Parkway HS 61km (300kph)
- Cheltenham Spa – Coalpit Heath Junction 53.6km (300kph) (#)
- Coalpit Heath Junction – Bristol Parkway HS 7.4km (300kph) (#)
- Bristol Parkway HS – Cardiff HS 48km (360kph)
- Cardiff HS – Cardiff (Rhoose) Airport 15km (360kph *)
- Cardiff (Rhoose) Airport – Port Talbot Parkway 39km (360kph)
- Cardiff (Rhoose) Airport – Aberthaw Junction 4km (360kph)
- Aberthaw Junction – Ewenny South Junction 16km (360kph)
- Ewenny South Junction – Port Talbot Parkway 19km (360kph)
- Port Talbot Parkway – Swansea 13km (360kph *)
- Cardiff HS – Bristol Temple Meads (direct) 53km (360kph)
- Cardiff HS – Brentry Junction 44km (360kph)
- Brentry Junction – Bristol Temple Meads 9km (360kph *)
- Brentry Junction – Stadium Junction) 7.8km (360kph)
- Bristol Parkway HS – Bristol Temple Meads 8km (*)
- Bristol Parkway HS – Stadium Junction 6.8km (360kph)
- Stadium Junction – St. Philip's Junctionj 0.2km (360kph)
- St. Philip's Junction – Bristol Temple Meads 1.0km (360kph)
- Bristol Temple Meads HS – Taunton 71km (360kph)
- Taunton – Exeter St. David's 48km (360kph)
- Exeter St. David's – Plymouth 65km (360kph)
- Nottingham HS – Peterborough (avoiding Melton) 83.8km (300kph)
- Nottingham HS – Edwalton Junction 6.8km (300kph ##)
- Edwalton Junction – Peterborough 77km (300kph)
- Edwalton Junction – Asfordby Junction 19.6km (300kph)
- Asfordby Junction – Wymondham East Junction 12.1km (300kph)
- Wymondham East Junction – Thurlby Junction 27km (300kph)
- Thurlby Junction – Pellett Hall Junction 12km (300kph)
- Pellett Hall Junction – Peterborouygh HS 6.3km (300kph)
- Peterborough – Ely via Wimblington 46km (300kph)

(#) Since Coalpit Heath is a **route**, but not a **track** junction, its **precise** location is somewhat arbitrary. It is therefore **defined** to be at the same distance east of Bristol Parkway HS, as Westerleigh Junction is of Bristol Parkway (Classic). No deceleration is required to pass Coalpit Heath Junction, however..

(##) At Mk1A, a line speed of 225kph applied between Nottingham and Melton Mowbray, although the line speed (HS3) was 360kph as far as Edwalton Junction. At Mk2, with new infrastructure on HS8, the speed is 300kph throughout between Nottingham and Ely, avoiding Melton Mowbray and March. With this line speed, Edwalton becomes a propinquant junction, but, strictly, only converging (towards

Nottingham), and the time to travel between Edwalton Junction (pass) and Nottinghsm (stop) is 174 seconds. (Actually, in the other, diverging, direction Edwalton Junction is at the exact minimum for an accelerating, diverging propinquant junction and the time to travel from Nottingham HS to Edwalton Junction, 6.8km start to pass, is 213 seconds.)

In addition, with new services to Liverpool and Holyhead introduced, the following section of HS2 is involved (estimated distance):

- Crewe – Birmingham Interchange 90km (360kph)

and the following sections of classic route (with precise distances – refer to HS2 Route and Service Plans article):

- Holyhead – Bangor 39.6km (160kph)
- Bangor – Llandudno Junction 25.0km (160kph)
- Llandudno Junction – Rhyl 23.1km (160kph)
- Rhyl – Flint 28.2km (200kph)
- Flint – Chester 20.0km (200kph)
- Chester – Crewe 34.0km (200kph)
- Liverpool Lime St. – Liverpool South Parkway 9.2km (160kph)
- Liverpool South Parkway – Runcorn 12.0 (225kph)
- Runcorn – Crewe 36.2km (225kph)

(*) Cardif HS – Cardiff Airport, Port Talbot Parkway –Swansea and Bristol Parkway – Bristol Tample Meads are Adjacent Stations, and Brentry is a propinquant junction in both directions. The times taken to travel between them are:

- Time to travel from Cardiff to Rhoose Airport (start to stop) is 400 seconds
- Time to travel from Port Talbot to Swansea (start to stop) is 372 seconds
- Time to travel from Bristol Parkway to Bristol Temple Meads (start to stop) is 292 seconds
- Time to travel from Bristol Temple Meads to Brentry Junction, (start to pass, decelerating to 230kph at Brentry Junction,) is 246 seconds.
- Time to travel from Brentry Junction to Bristol Temple Meads, (pass, at 230kph, to stop,) is 205 seconds.
- Time to travel from Nottingham to Edwalton Junction, (start to pass, (notionally) decelerating to 230kph at Edwalton Junction,) is 213 seconds.
- Time to travel from Edwalton Junction to Nottingham, (pass, at 230kph, to stop,) is 174 seconds.

Mk2/1. Plymouth – Swansea / Liverpool / Newcastle / Middlesborough (6/10/15/16 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Plymouth, inc. Station Wait Times
Plymouth - Exeter St. David's	65.0	65.0	15.3	15.3	15.3
Exeter St. David's - Taunton	48.0	113.0	12.4	27.7	30.7
Taunton - Bristol Temple Meads	71.0	184.0	16.3	44.0	50.0
Bristol Temple Meads - Brentry Junction	9.0	193.0	4.1	48.1	
Brentry Junction - Cardiff HS	44.0	237.0	11.8	59.9	68.9
Cardiff HS - Cardiff Airport	15.0	252.0	6.7	66.6	78.6
Cardiff Airport - Port Talbot Parkway	39.0	291.0	10.9	73.2	88.2
Port Talbot Parkway - Swansea HS	13.0	304.0	6.2	79.4	97.4
Bristol Temple Meads - Bristol Parkway HS	8.0	192.0	4.9	48.9	57.9
Bristol Parkway HS - Cheltenham Spa	61.0	253.0	15.9	64.8	76.8
Cheltenham Spa - Worcester Shrub Hill	35.0	288.0	10.7	75.5	90.5
Worcester Shrub Hill - Birmingham Interchange	49.0	337.0	13.5	89.0	107.0
Birmingham Interchange - Crewe	90.0	427.0	19.4	108.4	129.4
Crewe - Runcorn	36.2	463.2	12.4	120.9	144.9
Runcorn - Liverpool South Parkway	12.0	475.2	6.0	126.8	153.8
Liverpool South Parkway - Liverpool Lime St,	9.2	484.4	5.4	132.3	162.3
Birmingham Interchange - Derby	59.0	396.0	15.5	104.5	125.5
Derby - Nuthall North Junction	20.2	416.2	6.6	111.1	
Nuthall North Junction - Wales Junction	38.5	454.7	7.0	118.1	

Wales Junction - Waleswood Junction	0.8	455.5	0.2	118.3	
Waleswood Junction - Sheffield HS	10.6	466.1	3.9	122.2	146.2
Sheffield HS - Huddersfield	51.0	517.1	14.1	136.3	163.3
Huddersfield - Leeds HS	24.0	541.1	8.5	144.8	174.8
Leeds HS - Garforth East Junction	10.8	551.9	4.6	149.4	
Garforth East Junction - Ulleskelf Junction	15.0	566.9	3.1	152.5	
Ulleskelf Junction - York HS	14.0	580.9	4.8	157.3	190.3
York HS - Romanby Junction	46.0	626.9	14.0	171.3	
Romanby Junction - Darlington Bank Top	24.0	650.9	6.1	177.3	217.3
Darlingham Bank Top - Durham Relly Mill	33.0	683.9	10.3	187.6	230.6
Durham Relly Mill - Consett	20.0	703.9	7.7	195.3	241.3
Consett - Newcastle	20.0	723.9	7.7	203.0	252.0
York HS - Northallerton	48.2	629.1	15.6	172.9	213.9
Northallerton - Yarm	19.4	648.5	8.0	180.9	224.9
Yarm - Eaglescliffe	4.1	652.6	3.5	184.3	231.3
Eaglescliffe - Thornaby	4.9	657.5	3.8	188.1	238.1
Thornaby - Middlesborough	5.2	662.7	3.9	192.0	245.0

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

- Exeter St. David's 53 [15]
- Taunton 84 [31]
- Bristol TM 118 [50]
- Cardiff HS 198 (1 change) [69]
- Cardiff Airport [79] (there is no current time for Cardiff Airport)
- Port Talbot Parkway 216 (1 change) [88]
- Swansea HS 257 (1 change) [97]
- Bristol Parkway 134 [58]
- Cheltenham Spa 164 [77]
- Worcester Shrub Hill 210 (1 change) [91]
- Birmingham 206 [107] (current time New St., new time I/chge)
- Crewe 281 (1 change) [129]
- Runcorn 301 (1 change) [145]

- Liverpool S. Pkwy 310 (1 change) [154]
- Liverpool Lime St. 320 (1 change) [162]
- Sheffield 292 [146]
- Huddersfield 355 (1 change) [163]
- Leeds 336 [175] (current time City new time New Lane)
- York 348 (2 ch., London) [190]
- Darlington 382 (2 ch., London) [217]
- Durham 400 (2 ch., London) [231] (current time ECML, new time Relly Mill)
- Consett [241] (there is no current time for Consett!)
- Newcastle 416 (2 ch., London) [252]
- Northallerton 370 (2 ch., London) [214]
- Yarm 430 (4 ch., London) [225]
- Eaglescliffe 419 (2 changes) [231]
- Thornaby 425 (2 ch., London) [238]
- Middlesborough 432 (2 ch., London) [245]

Mk2/1P. Plymouth – Swansea / Liverpool / Newcastle / Middlesborough (6/10/15/16 stops, with passing times):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Plymouth, inc. Station Wait Times
Plymouth - Exeter St. David's	65.0	65.0	15.3	15.3	15.3
Exeter St. David's - Taunton	48.0	113.0	12.4	27.7	30.7
Taunton - Bristol Temple Meads	71.0	184.0	16.3	44.0	50.0
Bristol Temple Meads - *St. Philip's Junction (pass)*	1.0	185.0	1.4	*45.4*	*54.4*
St. Philip's Junction (pass) - Stadium Junction (pass)	0.2	185.2	0.1	*45.5*	*54.5*
Stadium Junction (pass) - Brentry Junction (pss)	7.8	193.0	2.6	*48.1*	*57.1*
Brentry Junction (pass) - Cardiff HS	44.0	237.0	11.8	59.9	68.9
Cardiff HS - Cardiff Airport	15.0	252.0	6.7	66.6	78.6
Cardiff Airport - Port Talbot Parkway	39.0	291.0	10.9	73.2	88.2
Port Talbot Parkway - Swansea HS	13.0	304.0	6.2	79.4	97.4

Stadium Junction (pass) - Bristol Parkway HS	6.8	192.0	3.4	48.9	57.9
Bristol Parkway HS - *Coalpit Heath Jn.)pass)*	7.4	199.4	3.7	*52.6*	*64.6*
Coalpit Heath Jn. (pass) - Cheltenham Spa	53.6	253.0	12.2	64.8	76.8
Cheltenham Spa - Worcester Shrub Hill	35.0	288.0	10.7	75.5	90.5
Worcester Shrub Hill - Birmingham Interchange	49.0	337.0	13.5	89.0	107.0
Birmingham Interchange - Crewe	90.0	427.0	19.4	108.4	129.4
Crewe - Runcorn	36.2	463.2	12.4	120.9	144.9
Runcorn - Liverpool South Parkway	12.0	475.2	6.0	126.8	153.8
Liverpool South Parkway - Liverpool Lime St,	9.2	484.4	5.4	132.3	162.3
Birmingham Interchange - Derby	59.0	396.0	15.5	104.5	125.5
Derby - *Awsworth Jn. (pass)*	15.5	411.5	5.5	*110.0*	*134.0*
Awsworth Jn. (pass) - Nuthall North Jn. (pass)	4.7	416.2	1.1	*111.1*	*135.1*
Nuthall North Jn. (pass) - Huthwaite Jn. (pass)	13.5	429.7	2.6	*113.7*	*137.7*
Huthwaite Jn. (pass) - Wales Junction (pass)	25.0	454.7	4.4	*118.1*	*142.1*
Wales Junction (pass) - Waleswood Jn. (pass)	0.8	455.5	0.2	*118.3*	*142.3*
Waleswood Jn. (pass) - Woodurn Jn. (pass)	9.0	464.5	2.5	*120.8*	*144.8*
Woodburn Jn. (pass) - Sheffield HS	1.6	466.0	1.3	122.2	146.2
Sheffield HS - *Ladybower Jn. (pass)*	17.0	483.0	5.8	*127.9*	*154.9*
Ladybower Jn. (pass) - Huddersfield	34.0	517.0	8.3	136.3	163.3
Huddersfield - Leeds HS	24.0	541.0	8.5	144.8	174.8
Leeds HS - *Garforth West Jn. (pass)*	10.0	551.0	4.3	*149.1*	*182.1*
Garforth West Jn. (pass) - Garforth East Jn. (pass)	0.8	551.9	0.2	*149.3*	*182.3*
Garforth East Jn. (pass) - Ulleskelf Junction (pass)	15.0	566.9	3.1	*152.5*	*185.5*

Ulleskelf Junction (pass) - York HS	14.0	580.9	4.8	157.2	190.2
York HS - *Romanby Junction (pass)*	46.0	626.9	14.0	*171.2*	*211.2*
Romanby Junction (pass) - Darlington Bank Top	24.0	650.9	6.1	177.3	217.3
Darlingham Bank Top - Durham Relly Mill	33.0	683.9	10.3	187.6	230.6
Durham Relly Mill - Consett	20.0	703.9	7.7	195.3	241.3
Consett - *Derwent Hill Jn. (pass)*	2.0	705.9	1.9	*197.2*	*246.2*
Derwent Hill Jn. (pass) - Paradise Junction (pass)	15.0	720.9	4.0	*201.2*	*250.2*
Paradise Junction (pass) - Newcastle	3.0	723.9	1.8	203.0	252.0
York HS - Northallerton	48.2	629.1	15.6	172.9	213.9
Northallerton - Yarm	19.4	648.5	8.0	180.8	224.8
Yarm - Eaglescliffe	4.1	652.6	3.5	184.3	231.3
Eaglescliffe - Thornaby	4.9	657.5	3.8	188.1	238.1
Thornaby - Middlesborough	5.2	662.7	3.9	192.0	245.0

Mk2/2. Swansea – Plymouth / Holyhead / Norwich (6/13/14 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Swansea, inc. Station Wait Times
Swansea HS - Port Talbot Parkway	13.0	13.0	6.2	6.2	6.2
Port Talbot Parkway - Cardiff Airport	39.0	52.0	10.9	17.1	20.1
Cardiff Airport - Cardiff HS	15.0	67.0	6.7	23.8	29.8
Cardiff HS - Brentry Junction	44.0	111.0	10.3	34.1	
Brentry Junction - Bristol Temple Meads HS	9.0	120.0	3.4	37.6	46.6
Bristol Temple Meads HS - Taunton	71.0	191.0	16.3	53.8	65.8
Taunton - Exeter St. David's	48.0	239.0	12.4	66.3	81.3
Exeter St. David's - Plymouth	65.0	304.0	15.3	81.6	99.6
Cardiff HS - Bristol Parkway HS	34.7	101.7	10.2	34.0	43.0
Bristol Temple Meads HS - Cheltenham Spa	61.0	162.7	15.9	49.9	61.9
Cheltenham Spa - Worcester Shrub Hill	35.0	197.7	10.7	60.6	75.6
Worcester Shrub Hill - Birmingham Interchange	49.0	246.7	13.5	74.2	92.2
Birmingham Interchange - Crewe	90.0	336.7	19.4	93.6	114.6
Crewe - Chester	34.0	370.7	12.7	106.3	130.3
Chester - Flint	20.0	390.7	8.5	114.7	141.7
Flint - Rhyl	28.2	418.9	10.9	125.7	155.7
Rhyl - Llandudno Junction	23.1	442.0	10.6	136.3	169.3
Llandudno Junction - Bangor	25.0	467.0	11.4	147.6	183.6
Bango - Holyhead	39.6	506.6	16.8	164.5	203.5
Birmingham Interchange - Derby	59.0	305.7	15.5	89.7	110.7
Derby - Nottingham	26.0	331.7	8.8	98.4	122.4
Nottingham - Peterborough	83.8	415.5	20.5	118.9	145.9
Peterborough - Ely (reverse)	25.1	440.6	8.7	127.6	157.6
Ely - Brandon Junction	18.0	458.6	6.5	134.2	

Brandon Junction - Roudham Heath Junction	24.0	482.6	5.1	139.3	
Roudham Heath Junction - Norwich	40.0	522.6	12.9	152.2	187.2

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

- Port Talbot 17 [6]
- Cardiff Airport [17] (there is no current time for Cardiff Airport!)
- Cardiff 53 [27]
- Bristol TM 109 (1 change) [47]
- Taunton 109 (1 change) [66]
- Exeter St. David's 109 (1 change) [81]
- Plymouth 109 (1 change) **[**100]
- Bristol Parkway 91 [37]
- Cheltenham Spa 130 (1 change) [56]
- Worcester Shrub Hill 166 (2 changes) [69]
- Birmingham 174 (1 change) [82] (current fastest to New St., new time to I'chg)
- Crewe 212 [115]
- Chester 240 [130]
- Flint 263 (1 change) [142]
- Rhyl 284 (1 change) [156]
- Llandudno Junction 298 (1 change) [169]
- Bangor 314 (1 change) [184]
- Holyhead 348 (1 change) [204]
- Derby 224 (2 changex) [111]
- Nottingham 270 (3 changes) [122]
- Peterborough 257 (2 ch., Loncon) [146]
- Ely 319 (4 ch., London) [158]
- Norwich 357 (3 ch., London) [187]

Mk2/2P. Swansea – Plymouth / Holyhead / Norwich (6/13/14 stops, with passing times):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Swansea, inc. Station Wait Times
Swansea HS - Port Talbot Parkway	13.0	13.0	6.2	6.2	6.2
Port Talbot Parkway - *Ewenny South Jn. (pass)*	19.0	32.0	5.9	*12.1*	*15.1*
Ewenny South Jn. (pass) - Aberthaw Junction (pass)	16.0	48.0	2.7	*14.8*	*17.8*
Aberthaw Junction (pass) - Cardiff Airport	4.0	52.0	2.3	17.1	20.1
Cardiff Airport - Cardiff HS	15.0	47.0	6.7	18.8	29.8
Cardiff HS - *Brentry Junction (pass)*	44.0	91.0	10.3	*29.1*	*43.1*
Brentry Junction (pass) - Bristol Temple Meads HS	9.0	100.0	3.4	32.6	46.6
Bristol Temple Meads HS - Taunton	71.0	171.0	16.3	48.8	65.8
Taunton - Exeter St. David's	48.0	219.0	12.4	61.3	81.3
Exeter St. David's - Plymouth	65.0	284.0	15.3	76.6	99.6
Cardiff HS - Bristol Parkway HS	34.7	81.7	10.2	29.0	43.0
Btistol Parkway HS - *Coalpit Heath Jn. (pass)*	7.4	89.1	3.7	*32.7*	*49.7*
Coalpit Heath Jn. (pass) - Cheltenham Spa	53.6	142.7	12.2	44.9	61.9
Cheltenham Spa - Worcester Shrub Hill	35.0	177.7	10.7	55.6	75.6
Worcester Shrub Hill - Birmingham Interchange	49.0	226.7	13.5	69.2	92.2
Birmingham Interchange - Crewe	90.0	316.7	19.4	88.6	114.6
Crewe - Chester	34.0	350.7	12.7	101.3	130.3
Chester - Flint	20.0	370.7	8.5	109.7	141.7
Flint - Rhyl	28.2	398.9	10.9	120.7	155.7
Rhyl - Llandudno Junction	23.1	422.0	10.6	131.3	169.3
Llandudno Junction - Bangor	25.0	447.0	11.4	142.6	183.6

Bango - Holyhead	39.6	486.6	16.8	159.5	203.5
Birmingham Interchange - Derby	59.0	285.7	15.5	84.7	110.7
Derby - *Awsworth Junction (pass)*	15.5	301.2	5.4	*90.0*	*119.0*
Awsworth Junction (pass) - Strelley Junction (pass)	3.5	304.7	0.6	*90.6*	*119.6*
Strelley Junction (pass) - Nottingham	7.0	311.7	2.8	93.4	122.4
Nottingham - *Edwalton Junction (pass)*	6.8	318.5	3.6	*97.0*	*129.0*
Edwalton Junction (pass) - Asfordby Junction (pass)	19.6	338.1	4.0	*101.0*	*133.0*
Asfordby Junction (pass) - Wymondham E. Jn. (pass)	12.1	350.2	2.4	*103.5*	*135.5*
Wymondham E. Jn. (pass) - Thurlby Junction (pass)	27.0	377.2	5.4	*108.9*	*140.9*
Thurlby Junction (pass) - Pellett Hall Jn. (pass)	12.0	389.2	2.4	*111.3*	*143.3*
Pellett Hall Jn. (pass) - Peterborough	6.3	395.5	2.6	113.9	145.9
Peterborough - Ely (reverse)	25.1	343.6	8.7	105.7	157.6
Ely - *Brandon Jn. (pass)*	18.0	361.6	6.5	*112.2*	*169.2*
Brandon Junction (pass) - Roudham Heath Jn. (pass)	24.0	385.6	5.1	*117.3*	*174.3*
Roudham Heath Jn. (pass) - Norwich	40.0	425.6	12.9	130.3	187.2

Mk2/3. Birmingham Curzon St. – Cardiff Airport / Bristol (5/4 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Birmingham, inc. Station Wait Times
Birmingham Curzon St. - Birmingham Interchange	20.0	20.0	7.7	7.7	7.7
Birmingham Interchange - Worcester Shrub Hill	40.0	60.0	11.7	19.4	22.4
Worcester Shrub Hill - Cheltenham Spa	35.0	95.0	10.7	30.1	36.1
Cheltenham Spa - Coalpit Heath Junction	53.6	148.6	13.0	43.1	
Coalpit Heath Junction - Bristol Parkway HS	7.4	156.0	2.9	46.0	55.0
Bristol Parkway HS - Cardiff HS	48.0	204.0	12.4	58.5	70.5
Cardiff HS - Cardiff Airport	15.0	219.0	6.7	65.1	80.1
Bristol Parkway HS - Bristol Temple Meads BT	8.0	164.0	4.9	50.9	62.9

Current fastest time (minutes) from Birmingham (New St.) [and the above values (Curzon St.)] to:

- Birmingham I'chge [8] (there is no current time for B'ham Interchange!)
- Worcester 49 (1 change) [22]
- Cheltenham 40 [36]
- Bristol Parkway HS 72 [55]
- Cardiff 116 [71]
- Cardiff Airport [80] (there is no current time for Cardiff Airport!)
- Bristol Temple Meads 83 [63]

Note that the current fastest times south of Worcester do **not** include a Worcester stop.

On this section, there are no intermediate passing times of interest, at Mk2.

There are no changes to the timings of northbound services from Birmingham Curzon St.

Mk2 vs Mk1A and Mk1 Estimated Journey Times

It is worth summarising the journey time estimates at Mk2 with Mk1A and the original Mk1 results.

Plymouth to:	Current	Mk1	Mk1A	Mk2
Exeter St. David's	53.0	16.8	15.3	15.3
Taunton	84.0	33.1	35.6	30.7
Bristol Temple Meads	118.0	54.0	62.7	50.0
Bristol Parkway	134.0	61.9	70.9	57.9
Cheltenham Spa	164.0	80.8	96.8	76.8
Worcester Shrub Hill	210.0	94.5	112.9	90.5
Birmingham Interchange	206.0	111.0	131.6	107.0
Derby	254.0	129.5	150.1	125.5
Sheffield HS	292.0	149.4	170.8	146.2
Huddersfield	155.0	167.6	187.9	163.3
Leeds HS	336.0	179.1	199.4	174.8
York HS	348.0	193.6	214.9	100.3
Darlington Bank Top	382.0	212.7	241.9	217.3
Durham Relly Mill	400.0	226.0	265.9	230.6
Consett		236.7	265.9	241.3
Newcastle	416.0	247.8	276.6	252.0
Northallerton	370.0		238.5	213.9
Yarm	430.0		249.4	224.9
Eaglescliffe	419.0		255.9	231.3
Thornaby	425.0		262.7	238.1
Middlesborough	432.0		269.6	245.0
Swansea to:	Current	Mk1	Mk1A	Mk2.0
Neath	10.0		7.3	
Port Talbot	17.0	6.2	16.3	6.2
Bridgend	30.0		28.3	
Cardiff Airport		20.7	43.3	20.1
Cardiff Central / HS	53.0	30.4	53.0	29.8
Newport	67.0		65.7	
Bristol Parkway	91.0	45.8	83.7	43.0
Cheltenham Spa	130.0	64.7	109.6	61.9
Worcester Shrub Hill	166.0	78.4	125.6	75.6
Birmingham Interchange	174.0	94.9	144.3	92.2
Derby	224.0	113.5	162.8	110.7
Nottingham	270.0	125.4	174.6	122.4
Peterborough	257.0	149.1	207.0	145.9
March	337.0		219.1	
Ely	317.0		231.6	157.6
Norwich	357.0	180.0	261.2	187.2
Birmingham HS to:	Current	Mk1	Mk1A	Mk2.0
Birmingham Interchange		7.7	7.7	7.7
Worcester Shrub Hill	49.0	24.2	26.6	22.4

Cheltenham Spa	40.0	37.9	42.6	36.1
Bristol Parkway	72.0	56.9	68.5	55.0
Bristol Temple Meads	83.0	64.8	71.5	62.9
Newport	99.0		79.0	
Cardiff Central / HS	93.0	73.2	91.7	70.5
Cardiff Airport			101.3	80.1
Birmingham HS to:	Current	Mk1	Mk1A	Mk2.0
Derby	35.0	16.3	16.3	16.3
Sheffield HS		37.8	37.0	37.0
Huddersfield	134.0	56.0	54.2	54.2
Leeds HS		67.5	65.7	65.7
York HS	129.0	81.9	81.1	81.1
Chesterfield	59.0		34.0	34.0
Sheffield Midland	74.0		45.4	45.4
South Yorkshire HL			57.7	57.7
Leeds City	118.0		73.5	73.5
Shipley	146.0		89.0	89.0
Bradford Central	156.0		95.8	95.8
Halifax	163.0		105.6	105.6
Keighley	157.0		98.7	98.7
Skipton	172.0		109.5	109.5

As noted earlier, fastest Mk2 times northbound from Birmingham are unchanged from Mk1A.

Appendix A – Trans-Dartmoor Express

It may seem at first sight heroically imaginative (i.e. lunatic) to propose a railway straight across the middle of Dartmoor. The first thing, therefore, is to demonstrate that it is perfectly feasible, in engineering terms.

I've considered various routes, and selected the following one:

Location	Grid Ref. (where needed)	Altitude (ft)	Altitude Difference (ft)	Crow Distance (miles)	Average Gradient 1 in :
Exeter St. David's		0	-	-	-
Dunsford		250	250	7	148
Moretonhampstead		600	350	4.5	68
Shapley	SX683848	1000	400	4.5	59
Postbridge	SX650803	1150	150	4	141
Two Bridges	SX609750	1125	25	4	845
(Above) Ward Bridge	SX548715	750	375	4.5	63
Yelverton		632	128	3	124
Laira		0	632	7	58

In HS terms, these are very reasonable gradients, not even steep. (Accepted maxima for HS lines are in the range 2.5% – 4%; the above come nowhere near these.) The sections between Shapley and Postbridge, and Two Bridges and the location above Ward Bridge are entirely in tunnel (ground level above being 3-400 ft higher).

Given that the loading between Exeter and Plymouth is only 8tph, I think it would be entirely reasonable to run a local service of 2tph between these, calling at Dunsford, Moretonhampstead, Postbridge, Two Bridges (with a bus connection to Princetown), and Yelverton Road. This would leave Exeter immediately after the Newcastle – Plymouth service, arriving in Plymouth just before the Norwich via Diss – Plymouth –> Cornwall service (if the timings are practicable, of course).

(This has now been incorporated, and the loadings updated accordingly.)

Appendix B – 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 HS7.

The traffic through Rhoose would clearly be very greatly increased, and require a much enhanced service from HS7/HS4. Thus the airport station would be the standard HS 2-island affair, with a turnback facility for services from the east. The relevant HS7 services would serve the airport from the beginning, SP1. At Mk2, an HS7/HS4 south to west connection would be provided just north of Bristol, to enable an HS service from Plymouth to reach Swansea:

(These ideas have now been incorporated, and the Service Plans and loadings updated accordingly.)

Appendix C – The Coventry Variant of HS2

The Coventry Variant of HS2 (HS2-CV) is described in the HS2 Route and Service Plans article. Effectively it is an additional section of HS2 diverging from the existing route at Brackley and rejoining it at Berkswell, passing through Rugby and Coventry, allowing those cities also to be served.

As far as HS7 is concerned, this has no effect whatever on its services.

The section of HS2 between Berkswell and Streethay Junctions is quadruple track, (partly 6 track, indeed,) with the HS2-CV lines on the outside. It is recognised that, with service levels of 8tph on both HS7 and HS2-CV, they could very readily share tracks over this section, (specifically between Birmingham Interchange and Water Orton South Junction, where HS7 shares a common alignment).

The detailed layout is inevitably rather complicated. It is given, for completeness, in Appendix F.

Appendix D – Upgrade rather than New-Build between ` Swindon and Bristol Parkway

(This reproduces appendix H of the HS4 Route and Service Plans article. It is directly relevant to HS7 also.)

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 infrastrutructure 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.

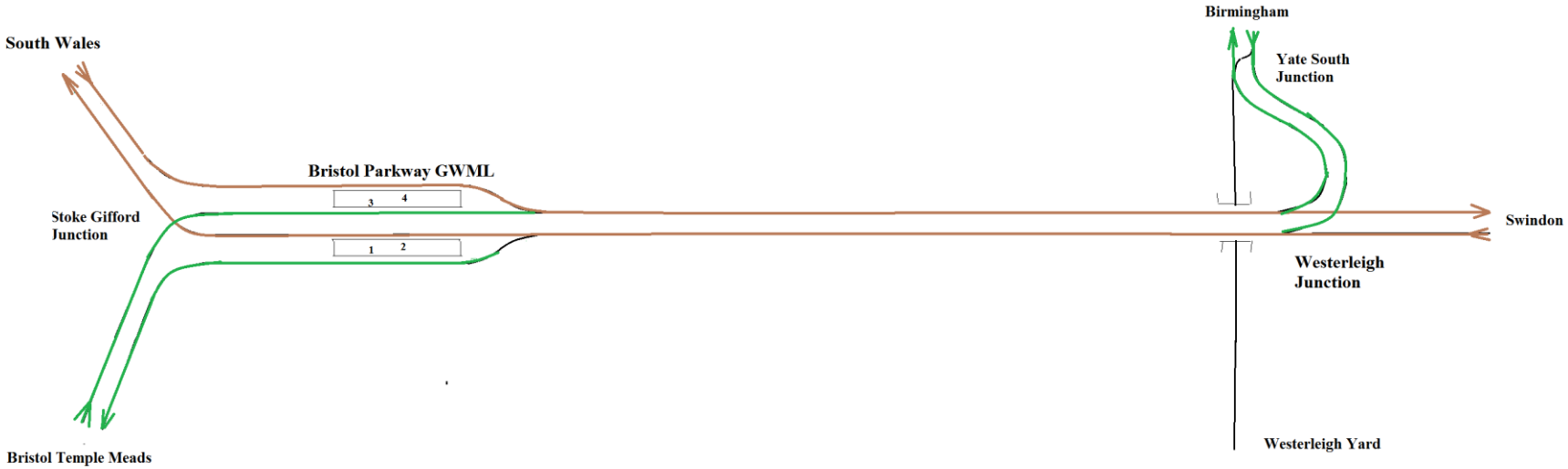
I don't know what the level of freight on this section is likely to be, but suggest giving freight free access through the night hours, when there is no HS traffic. (The usual objection to freight on a HS line is that the line is likely to have gradients unfeasibly severe for freight. This obviously 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 HS7/HS4 Mk1A

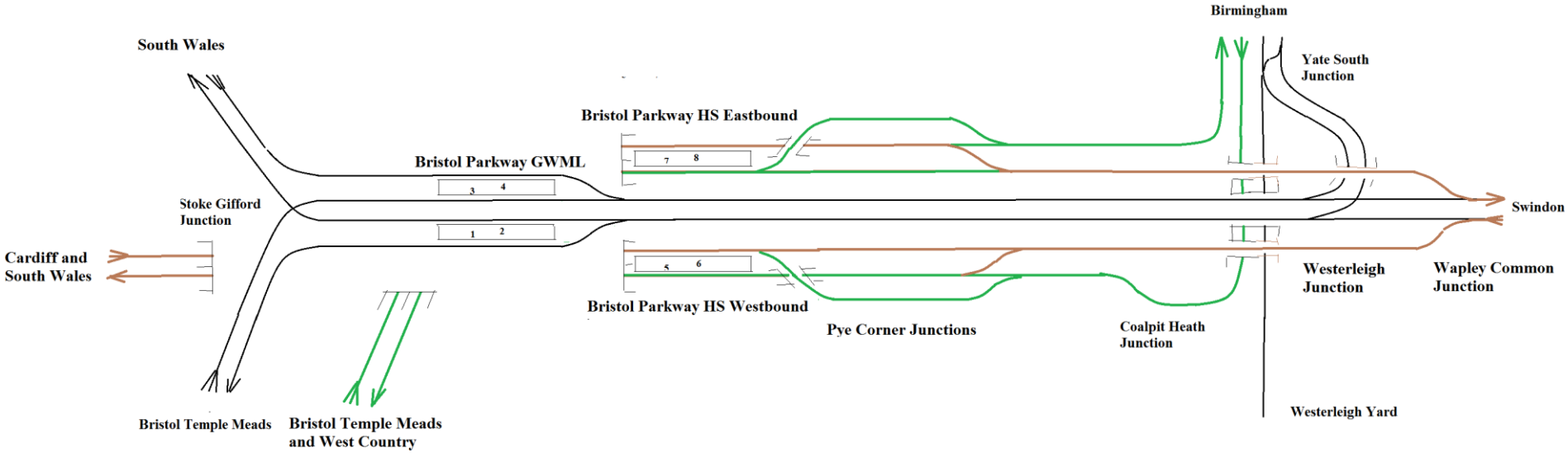


This is essentially the existing track layout, (assuming that the fourth platform has finally been added!). The only changes are immediately west of Bristol Parkway, where four tracks are extended right up to the junctions, keeping South Wales and West Country services entirely separate, so that a train 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

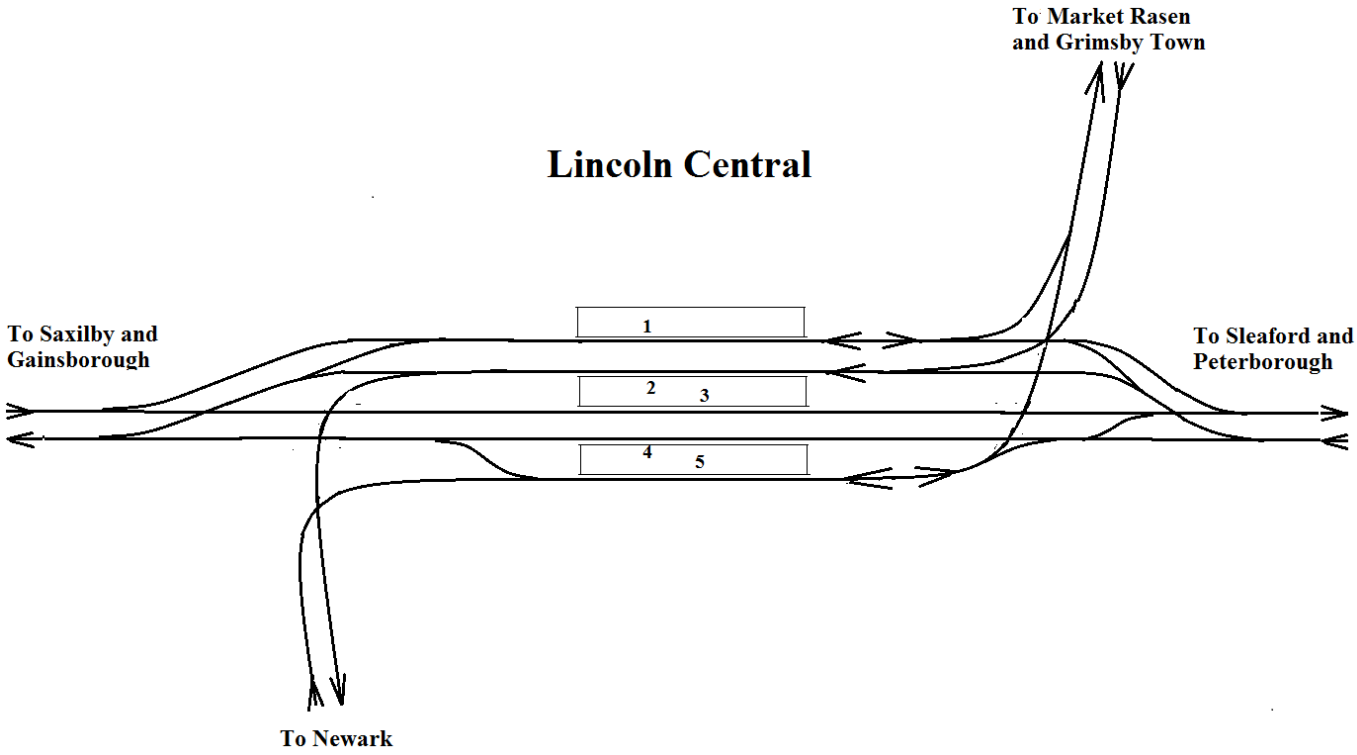
at HS7/HS4 Mk2



All the track ar 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 then. 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.

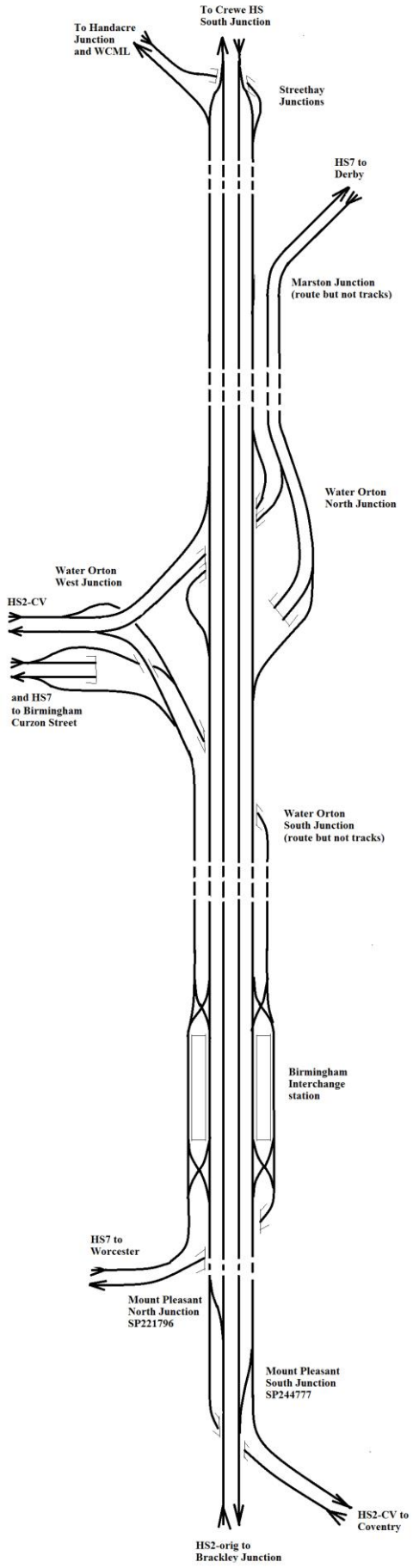
Appendix E – Lincoln Central Track Layout



This looks more complicated than it is. All the junctions are flat junctions – no need for flyovers. The services with cross-platform interchange at Lincoln approach and depart in opposite directions, thus the HS10 services to Hull approach platform 4 from the east and the HS7 services to Cleethorpes and Skegness approach platform 5 from the west, and vice versa at platforms 3 and 2 respectively. They therefore never get in each other's way. Clearly, **both** interchanges cannot take place **simultaneously**, or there **would** be conflicting movements.

There will certainly be several other crossovers, for operational convenience. The above shows only those required to support the contraflow arrangement.

Appendix F – Mount Pleasant to Streethay Junction



HS2-CV rejoins the route, but not the tracks, of HS2-orig at Mount Pleasant Junction, near Berkswell. Services on HS2-orig which stop at Birmingham Interchange, are, however able to switch to HS2-CV at Mount Pleasant North Junction, or join HS2-orig from HS2-CV at Mount Pleasant South Junction. By great good fortune, Mount Pleasant South Junction is just before the routes diverge (going south). HS2-CV occupies the outer two tracks of a 4-track, parallel arrangement. The 4-track section continues all the way to Streethay Junction, but over much of this section, where HS7 is also involved, there are effectively six tracks.

HS7 and HS2-CV have separate tracks, but with several connections between them. HS7 joins the route immediately south of Birmingham Interchange station. There are six tracks thence to Water Orton South Junction. There are scissors crossovers immediately south and north of Birmingham Interchange. Those to the south are for operational convenience, and not used in normal service, services switching between the outer pairs of tracks north of the station. The convention is that HS7 services use the two outermost platform faces, and HS2-CV the inner two. Services switch between tracks immediately north of the station, the arrangement being that services to and from Birmingham Curzon Street use the outermost of the six tracks, and those to and from Water Orton North Junction the inner tracks of the outer pairs.

There are four tracks between Water Orton West Junction and Curzon Street, arranged as alternating pairs, the north pair for HS2 services and the south pair for HS7. Northbound HS7 services from Curzon Street do not make connection with HS2, but pass beneath the HS2 tracks and diverge from the alignment at Marston Junction (a route but not a track junction). There are connections at Water Orton North Junction from the HS2 to the HS7 tracks, to enable the HS7 services not calling at Curzon Street to regain the HS7 route.

There are several track junctions at Streethay. The HS2-CV tracks finally merge with those of HS2-orig, for services to the North West via Crewe. But, immediately before that, there is a connection between the HS2-CV tracks and the WCML at Handsacre Junction. This is used only by the CC service from Euston to Manchester via Stoke. Note that there is no connection from the HS-orig tracks to Handsacre Junction.

Appendix G – Route Changes at Mk1A

There following fundamental changes of plan at Mk1A are shared with HS3:

1. HS2 Ltd.'s plans for a considerably improved alignment in South Yorkshire have been adopted, with refinements as necessary, in particular the new connection to the classic route into Leeds City, from the east (diverging from HS3 at the new Swillington Common Junction).

2. Abandoning GC gauge, so that all new infrastructure is built to standard UK gauge. As a consequence of this, certain appropriate sections of classic route are merged into HS routes, with upgrading as necessary for higher speeds (140, 125 or 100mph).

The individual changes are:

- New link Huthwaite Junction – Stonebroom Junction on the Erewash Valley route.
- Incorporation of classic route into HS3, upgraded as practicable to 100mph line speed, from Stonebroom Junction via Chesterfield, Sheffield Midland and Rotherham to South Yorkshire LL station. South Yorkshire is a 2-level station, the HL on HS3's main line and the LL on the classic Sheffield – Doncaster route. The LL station has a bay platform on the north side, where the South Yorkshire portion of the service from Pancras Cross terminates; the other portion terminates in Barnsley. There is a connection from Old Denaby Junction, on the classic route, to Denaby Main Junction, on HS3, immediately south of South Yorkshire HL station. This allows the HS7 service from Birmingham HS to Leeds and Halifax/Skipton (see below) to travel via Sheffield and re-join HS3 at South Yorkshire.
- A new link from Ryhill Junction on HS3 to Crofton Junction on the classic route from Doncaster to Leeds, allows the HS Pancras Cross – York via Leeds service to call at Wakefield Westgate. It then follows the classic route, upgraded to line speed 100mph, to Gelderd Road South Junction, where it diverges to join HS9 at Gelderd Road North Junction, then serving Leeds New Lane station.
- A new connection diverges from HS3 at Swillington Common Junction, and joins the classic route to Leeds City at Manston Junction. Services from Pancras Cross and Birmingham take this route, splitting / joining at Leeds City into / from Halifax and Skipton portions. The Halifax portion travels via Shipley (they both do, but using different platforms there,) and the new cross-city link at Bradford, serving the new, central, Bradford Central station.
- HS3 merges with the fast tracks of the ECML at Poppleton Junction (immediately after the ECML become 4-track just north of York), and shares that (upgraded to 140mph line speed) until Romanby Junction, where it diverges and assumes its former alignment on to Darlington and points north.
- All the HS Newcastle services (from London, Plymouth, Liverpool and Bournemouth West) now include a Middlesborough portion, splitting / joining at York.
- The section of classic route between Northallerton and Yarm is likewise upgraded to line speed 140mph. Beyond Yarm, the line speed is irrelevant sine Yarm and the remaining three stations are too close together to allow any reasonable line speed to be reached.

The other changes are simply stated:

HS7 joins and merges with the classic NE/SW route at Cofton Hall Junction, just north of Barnt Green, sharing infrastructure thence to Exeter St. David's. See also Appendix I, for Bristol Parkway details.

Appendix H – Distance Table for NE/SW Route and Others.

Distance Table for NE/SW Route and Others.		
Middlesborough to:	miles:chains	km
Thornaby	3:17	5.2
Eaglescliffe	..6:22	10.1
Yarm	8:67	14.2
Northallerton	20:24	32.7
York	50:20	80.9
Leeds City to:	miles:chains	km
Shipley	10:61	17.3
Keighley	16:74	27.2
Skipton	26:09	42.0
Bradford Forster Square	13:38	21.7
Halifax to:	miles:chains	km
Bradford Exchange	3:17	5.2
Chesterfield to:	miles:chains	km
Sheffield Midland	12:20	19.7
Rotherham	17:54	28.4
Barnt Green to:	miles:chains	km
Worcester Shrub Hill	15:39	24.9
Cheltenham Spa	37:35	60.2
Standish Junction	49:76	80.4
Westerleigh Junction	71:35	114.9
Bristol Parkway	76:03	122.3
Bristol Temple Meads	82:72	133.4
Taunton	127:53	205.4
Exeter St. David's	158:33	254.9
Nottingham to:	miles:chains	km
Newark Castle	17:14	27.6
Lincoln	33:70	54.5
Market Rasen	48:52	78.3
Grimsby Town	77:59	125.1
Cleethorpes	80:79	130.3
Sleaford	55:14	88.8
Boston	72:01	115.9
Wainfleet	90:68	146.2
Skegness	95:67	154.2
Peterborough to:	miles:chains	km
March	14:70	23.9
Ely	30:36	49.0

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). In contrast to many other exercises of this type, the

distances were all relatively easy (most of them very easy) to derive. But it was still a sufficiently tedious process to make it worth preserving the results, so that I don't ever have to do it again.

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.

Mk2/1. Plymouth – Swansea / Liverpool / Newcastle / Middlesborough (6/10/15/16 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Plymouth, inc. Station Wait Times
Plymouth - Exeter St. David's	65.0	65.0	20.1	20.1	20.1
Exeter St. David's - Taunton	48.0	113.0	15.6	35.7	38.7
Taunton - Bristol Temple Meads	71.0	184.0	21.7	57.4	63.4
Bristol Temple Meads - Cardiff HS	53.0	237.0	16.9	74.3	83.3
Cardiff HS - Cardiff Airport	15.0	252.0	6.7	81.0	93.0
Cardiff Airport - Port Talbot Parkway	39.0	291.0	13.2	94.2	102.6

Port Talbot Parkway - Swansea HS	13.0	304.0	6.2	100.4	111.9
Bristol Temple Meads - Bristol Parkway HS	8.0	192.0	4.9	62.3	71.3
Bristol Parkway HS - Cheltenham Spa	61.0	253.0	19.0	81.3	93.3
Cheltenham Spa - Worcester Shrub Hill	35.0	288.0	12.1	93.4	108.4
Worcester Shrub Hill - Birmingham Interchange	49.0	337.0	15.8	109.3	127.3
Birmingham Interchange - Crewe	90.0	427.0	26.8	136.0	157.0
Crewe - Runcorn	36.2	463.2	12.4	148.5	172.5
Runcorn - Liverpool South Parkway	12.0	475.2	6.0	154.5	181.5
Liverpool South Parkway - Liverpool Lime St,	9.2	484.4	5.4	159.9	189.9
Birmingham Interchange - Derby	59.0	396.0	18.5	127.8	148.8
Derby - Sheffield HS	70.1	466.1	21.5	149.2	173.2
Sheffield HS - Huddersfield	51.0	517.1	16.4	165.6	192.6
Huddersfield - Leeds HS	24.0	541.1	9.2	174.8	204.8
Leeds HS - York HS	39.8	580.9	13.4	188.2	221.2
York HS - Darlington Bank Top	70.0	650.9	21.4	209.6	245.6
Darlingham Bank Top - Durham Relly Mill	33.0	683.9	11.6	221.2	260.2
Durham Relly Mill - Consett	20.0	703.9	8.1	229.3	271.3
Consett - Newcastle	20.0	723.9	8.1	237.4	282.4
York HS - Northallerton	48.2	629.1	15.6	203.8	239.8
Northallerton - Yarm	19.4	648.5	8.0	211.8	250.8
Yarm - Eaglescliffe	4.1	652.6	3.5	215.3	257.3
Eaglescliffe - Thornaby	4.9	657.5	3.8	219.0	264.0
Thornaby - Middlesborough	5.2	662.7	3.9	222.9	270.9

Current fastest time (minutes) from Plymouth [and the Mk2 times] {and the above values} to:

- Exeter St. David's 53 [15] {20}
- Taunton 84 [31] {39}
- Bristol TM 118 [50] {62}
- Cardiff HS 198 (1 change) [69] {83}
- Cardiff Airport [79] {93}
- Port Talbot Parkway 216 (1 change) [88] {103}
- Swansea HS 257 (1 change) [97] {112}
- Bristol Parkway 134 [58] {71}
- Cheltenham Spa 164 [77] {93}
- Worcester Shrub Hill 210 (1 change) [91] {108}
- Birmingham 206 (New St,) [107] (Ichg) {127}
- Crewe 281 (1 change) [129] {157}
- Runcorn 301 (1 change) [145] {173}
- Liverpool S. Pkwy 310 (1 change) [154] {181}
- Liverpool Lime St. 320 (1 change) [162] {190]
- Sheffield 292 [146] {149}
- Huddersfield 355 (1 change) [163] {193}
- Leeds 336 (City) [175] {205}
- York 348 (2 ch., London) [190] {221}
- Darlington 382 (2 ch., London) [217] {246}
- Durham 400 (2 ch., London) [231] {260}
- Consett [241] {271}
- Newcastle 416 (2 ch., London) [252] {282}
- Northallerton 370 (2 ch., London) [214] {239}
- Yarm 430 (4 ch., London) [225] {251}
- Eaglescliffe 419 (2 changes) [231] {257}
- Thornaby 425 (2 ch., London) [238] {264]
- Middlesborough 432 (2 ch., London) [245] {271}

2. Swansea – Plymouth / Holyhead / Norwich (6/13/14 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Swansea, inc. Station Wait Times
Swansea HS - Port Talbot Parkway	13.0	13.0	6.2	6.2	6.2
Port Talbot Parkway - Cardiff Airport	39.0	52.0	13.2	19.4	22.4
Cardiff Airport - Cardiff HS	15.0	67.0	6.7	26.0	32.0
Cardiff HS - Bristol Temple Meads	53.0	120.0	16.9	43.0	52.0
Bristol Temple Meads HS - Taunton	71.0	191.0	21.7	64.7	76.7
Taunton - Exeter St. David's	48.0	239.0	15.6	80.2	95.2
Exeter St. David's - Plymouth	65.0	304.0	20.1	100.4	118.4
Cardiff HS - Bristol Parkway HS	34.7	101.7	12.0	38.1	47.1
Bristol Parkway HS - Cheltenham Spa	61.0	162.7	19.0	57.1	69.1
Cheltenham Spa - Worcester Shrub Hill	35.0	197.7	12.1	69.2	84.2
Worcester Shrub Hill - Birmingham Interchange	49.0	246.7	15.8	85.1	103.1
Birmingham Interchange - Crewe	90.0	336.7	26.8	111.9	132.9
Crewe - Chester	34.0	370.7	11.8	123.7	147.7
Chester - Flint	20.0	390.7	8.1	131.8	158.8
Flint - Rhyl	28.2	418.9	10.3	142.1	172.1
Rhyl - Llandudno Junction	23.1	442.0	8.9	151.0	184.0
Llandudno Junction - Bangor	25.0	467.0	9.4	160.5	196.5
Bango - Holyhead	39.6	506.6	13.3	173.8	212.8
Birmingham Interchange - Derby	59.0	305.7	18.5	103.6	124.6
Derby - Nottingham	26.0	331.7	9.7	113.3	137.3
Nottingham - Peterborough	83.8	415.5	25.1	138.4	165.4
Peterborough - Ely (reverse)	25.1	440.6	9.5	147.9	177.9
Ely - Brandon Junction	18.0	458.6	6.5	154.4	
Brandon Junction - Roudham Heath Junction	24.0	482.6	9.2	163.6	

Roudham Heath Junction - Norwich	40.0	522.6	12.9	176.5	211.5

Current fastest time (minutes) from Swansea [and the Mk2 times] [and the above values] to:

- Port Talbot 17 [6] [6}
- Cardiff Airport [17] {20}
- Cardiff 53 [27] {30}
- Bristol TM 109 (1 change) [47] {47}
- Taunton 109 (1 change) [66] {77}
- Exeter St. David's 109 (1 change) [81] {95}
- Plymouth 109 (1 change) **[**100] {118}
- Bristol Parkway 91 [37] {47}
- Cheltenham Spa 130 (1 change) [56] {69}
- Worcester Shrub Hill 166 (2 changes) [69] {84}
- Birmingham 174 (1 change) (New [82] (I'chg) {103}
- Crewe 212 St.) [115] {133}
- Chester 240 [130] {148}
- Flint 263 (1 change) [142] {159}
- Rhyl 284 (1 change) [156] {172}
- Llandudno Junction 298 (1 change) [169] {184}
- Bangor 314 (1 change) [184] {197}
- Holyhead 348 (1 change) [204] {213}
- Derby 224 (2 changex) [111] {125}
- Nottingham 270 (3 changes) [122] {137}
- Peterborough 257 (2 ch., Loncon) [146] {165}
- Ely 319 (4 ch., London) [158] {178}
- Norwich 357 (3 ch., London) [187] {212}

3. Birmingham Curzon St. – Cardiff Airport / Bristol (5/4 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Birmingham, inc. Station Wait Times
Birmingham Curzon St. - Birmingham Interchange	20.0	20.0	7.7	7.7	7.7
Birmingham Interchange - Worcester Shrub Hill	40.0	60.0	11.7	19.4	22.4
Worcester Shrub Hill - Cheltenham Spa	35.0	95.0	10.7	30.1	36.1
Cheltenham Spa - Bristol Parkway HS	61.0	156.0	15.9	46.0	55.0
Bristol Parkway HS - Cardiff HS	48.0	204.0	13.3	59.3	71.3
Cardiff HS - Cardiff Airport	15.0	219.0	6.7	66.0	81.0
Bristol Parkway HS - Bristol Temple Meads BT	8.0	164.0	4.9	50.9	62.9

Current fastest time (minutes) from Birmingham (New St.) [and the Mk2 times (Curzon St.)] {and the above values} to:

- Birmingham I'chge [8] {8}
- Worcester 49 (1 change) [22] {25}
- Cheltenham 40 [36] {40}
- Bristol Parkway HS 72 [55] {62}
- Cardiff 116 [71] {80}
- Cardiff Airport [80] {90}
- Bristol Temple Meads 83 [63] {70}

Note that the current fastest times south of Worcester do **not** include a Worcester stop.

On this section, there are no intermediate passing times of interest, at Mk2.

There are no changes to the timings of northbound services from Birmingham Curzon St.