HS Scottish Routes and Service Plans

(HS13 and HS14)

HS13/HS14 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 the present case, however, it **does** have significant impact on one of the routes: the section from Burrelton Junction to Dundee is no longer required (since the purpose of this was purely to enable GC-gauge services to reach Dundee; with the abandonment of GC-gauge, the existing classic route between Perth and Dundee can be incorporated, instead). 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 C lists all specific changes of route, for HS13/HS14.

Two specific new section of route need to be highlighted. The first is the section of HS13 from Edinburgh to Glasgow Airport and on to Dalmuir. There is no way that this new infrastructure can be avoided, since it relieves the heavily-loaded routes between Edinburgh and Glasgow and on to the airport, and the section thence to Dalmuir is a new route anyway. Beyond Glasgow Airport, the section thence to Kilmarnock does not currently exist, but takes over the trackbed of former lines, long closed. Including the original GSW main line between Dalry Junction and Kilmarnock. There will need to be the occasional diversion, where the original route has been, with criminal myopia, built over, but otherwise the alignments are excellent. On HS14, the new sections linking Kinnaird and Bankhead junctions with the classic route to Stirling will be retained, since no practical alternatives exist, (i.e. any alternative would require as much or more effort,) but all the rest uses sections of classic route, upgraded as necessary. One such section, between Stanley Junction, north of Perth, and Craigo Junction, north of Montrose, does not currently exist, but takes ovcr the route and trackbed of the former Great Glen route of the Caledonian Railway. Here again there will need to be the occasional diversion, particularly around the north of Forfar, but there a significantly better alignment is available anyway. The final section of the Great Glen route formerly joined the existing classic alignment at the celebrated Kinnaber Junction, but this is replaced by a significantly faster alignment, to Craigo Junction, The alignments otherwise are excellent.

Because of the significant changes introduced at Mk1A, the latest versions of all the Mk1 plans (v2.3 in the case of HS13/HS14) have been preserved, available in an archive section on the website.

HS13/HS14 Route Mk2

As noted above, with the exception of the new Perth – Dundee section, now no longer required, the Mk1A changes have, in general, little impact on the routes proposed (but great impact on the service plans). Mk1A may thus be viewed as a cut-down version of the original proposals, significantly quicker

and less expensive to implement, but nonetheless delivering a large proportion of the advantages of those proposals.

This is expected to satisfy capacity requirements in the short to medium term. But thinking to the longer term, HS13/HS14 Mk2 is proposed, which reinstates some of those parts of the original plans removed for Mk1A, on a piecemeal basis, as and when the build-up of traffic on Mk1A makes extra capacity desirable. If this were done completely, 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, or even beyond 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.

Other Changes

Entirely apart from the changes consequent on the abandonment of GC gauge, and completely unconnected with them, except in so far as the ideas germinated during the working through of the post-GC changes, a number of other important changes are incorporated in the current version.

The necessity, when calculating estimated running times, of allowing for changes in line speed at locations other than stations, where all services stop, involves separating the inter-station section into sub-sections, (the separation point usually being a junction,) calculating the running time for each individual subsection, and accumulating them to get the inter-station times. This sounds complicated, but in fact is perfectly straightforward, and easily built in to the spreadsheets. The intermediate times are all known, so there's no reason not to display them. Accordingly, the running times spreadsheets now also display *passing times, in italicised red text,* just like that. In the most striking example, the Aberdeen fast services, which stop only at Perth, between Stirling and Aberdeen, also display passing times at Stanley and Craigo junctions, and at Gleneagles, Coupar Angus, Forfar, Bridge of Dun, Laurencekirk and Stonehaven stations. **All** the times displayed, stopping and passing, are **arrival** times (passing times are of course arrival and departure at once); the departure time from the originating station does not actually appear in the display (it's zero, of course). The wait time at an intermediate station is added in to the running time of the **first subsection** of a following multi-sub inter-station section – naturally, since that's where it's incurred. This is very clear from the passing time displays for a multi-sub inter-station section.

All Route and Service Plans articles have thus far given Hourly Cross-Platform (or not) Interchange Patterns, for all relevant stations, with the warning that they are **representative**, i.e. they are not **actual** times; the actual station times depend on coordinating the times between all the interchange points, of the entire network, by implication. I imagine that software exists to do precisely that, developed by the people who plan timetables, but I don't have access to it. However, the topology of the HS14 services is such as to encourage an attempt. Everthing depends on one single hub, Perth. The interchanges there determine the timings of all HS14's services, even those which don't actually travel via Perth (in practice just one: Edinburgh – Aberdeen via Dundee). The wealth of information now available from the journey time estimates makes this possible. The results are the departure times from all stations on journeys approaching Perth, and the arrival times at all stations on journeys departing Perth, all stated to a common

time datum with origin at Perth. Zero time at Perth is the arrival of the first Glasgow – Aberdeen fast service, the other Glasgow – Aberdeen fast service arrives at 30minutes after zero. Arrival and departure times must both be taken into account at Perth, but elsewhere the times are departure approaching Perth and arrival departing Perth, as just noted. All the station stops are of 3 minutes duration (except at Perth, where they are stated explicitly), or of 1 minute, between Perth and Inverness. Perth is the **only** location where interconnections take place between HS14 services. There are interconnections elsewhere, but these are between an HS14 service and a Regional Metro service, which have no impact on HS14's timings. The results are stated in the service plans, but the detailed calculations are given in appendix F. Appendix D gives an idealised track layout for Perth.

This is the first time I have attempted to generate an actual timetable. The results are certainly interesting and valuable, with consequences that will take time to manifest themselves. I shall make further attempts with other HS routes, but suspect it may well turn out to be the case that only HS14 and Perth offer the particular conditions to make this a manageable process manually. Actually developing my own software to do the job would certainly be possible – I spent my entire professional life in IT – but I have now reached the stage of life where I have to take into account my own life expectancy in developing future plans!

The Purpose, Background and Method

This article refers to and should be read in conjunction with my article 'Towards a High Speed **Network**'. That article 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 HS13, the route from Edinburgh to Glasgow, and from Glasgow to Kilmarnock and Ayr, and HS14, the route to Dundee and Aberdeen, sharing the route of HS13 from Edinburgh and Glasgow.

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 gradients for the new alignment between Burrelton Junction and Dundee, and diversions to gain improved alignments approaching Stonehaven and Aberdeen; the gradients involved are stated in every case, but these are pretty trivial. (These are retained for general interest, although the sections concerned are no longer necessarily even in the Mk2 plans.)

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.

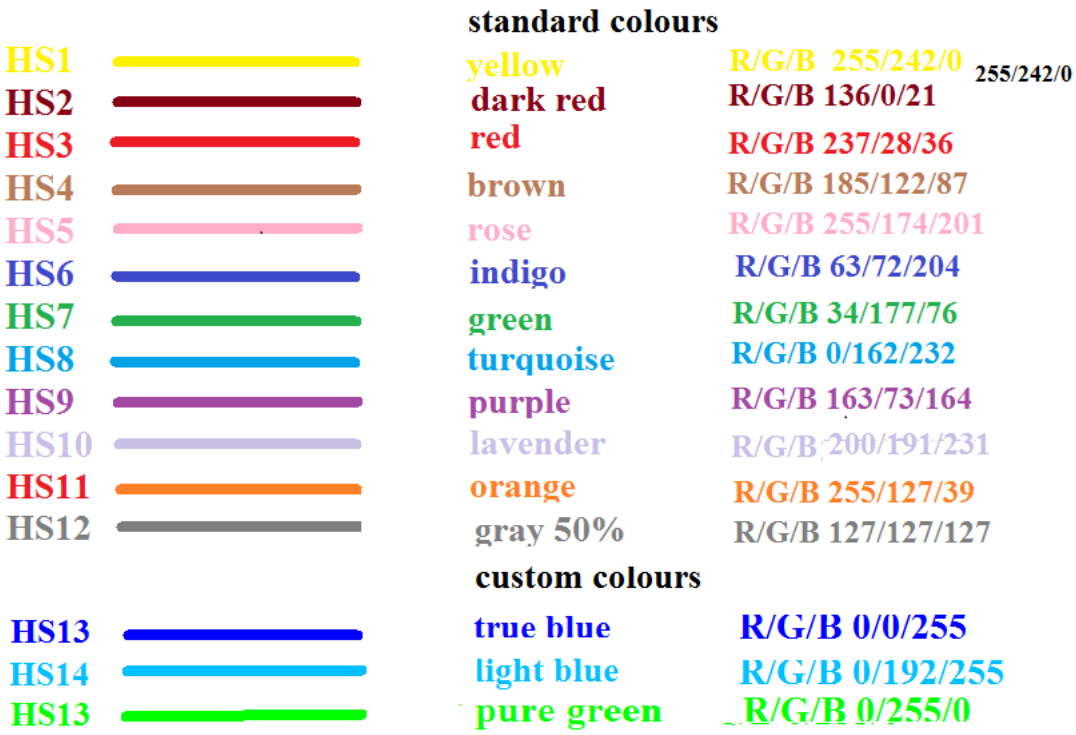
The Maps

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 HS13/HS14, including sections of other routes over which HS13/HS14's services run. These overall maps come at the end of the 'Route' description, and also show HS13/14'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 HS13/HS14.

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.

HS13/HS14 services fall into three categories:

1. Limited Stop: Edinburgh – Glasgow, Edinburgh/Glasgow – Aberdeen, Glasgow – Ayr.
2. Stopping: Edinburgh/Glasgow – Aberdeen services via Perth and via Dundee, serving intermediate locations in Fife, Angus and Kincardineshire, also Inverness services.
3. High Speed Metro: (Edinburgh –) Glasgow – Dalmuir via Glasgow Airport.

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. (Access to the platforms is via 'slip-lines', which diverge from the main line some distance before the station, and rejoin the main line some distance after, allowing stopping services to diverge from the main line at full line speed, and to rejoin it at full line speed, so not impeding non-stopping services. The behaviour is exactly analogous to that at motorway junctions.) At the ends of a multi-destination route, the traffic density on the branches may not be sufficiently high 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 HS13's Kilmarnock and Ayr stations, and HS14's Gleneagles, Coupar Angus, Forfar, Bridge of Dun, Laurencekir and Stonehaven (which are also the only stations with some services not stopping, but in practice it is only at Stonehaven that there is the requirement for overtaking).

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.

Normally, two types of services are contained in the plans, those featuring High Speed trains which travel on HS13/HS14 for at least part of their journey, and those featuring Regional Metro (semi-fast or stopping) 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. This has always been the standard formulation, but refer to the section 'Other Changes', above)

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 the connections between HS services and 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 HS services. The assumptions and approximations made are explained. (Again, refer to the section 'Other Changes, above.)

HS13/HS14 Routes – Introduction and Assumptions

HS13 and HS14 closely follow existing alignments, railway and motorway, for most of the way. But HS14 has an entirely new alignment between Burrelton Junction and Dundee. They reinstate several long closed routes, most importantly the Strathmore line.

HS13/HS14's long-term HS-Classic services begin at Edinburgh Waverley (west-facing bays) or points further east, and Glasgow Queen St. The HS provision is necessarily limited in both cities, because of space restrictions, so is reserved for those services actually needing it. The appendices give details of station layouts. The maximum speed for HS13/HS14 is 300kph, 187.5mph, throughout; the non-stop runs are not long enough to take advantage of a higher speed, and 300kph is adequate, with no detriment to the service provided, and with significant savings in construction costs.

HS13 Route – Junctions

There are various junctions on the route of HS13, 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). Some junctions exist at present, or existed formerly, and have their given names. The names of new junction are, in most cases, my own suggestions.

• Gyle	NT178728	Westbound Regional Metro services from Edinburgh Waverley's terminal platforms, or from points further east, join HS13.
• Kirkliston	NT116744	A spur to the classic line approaching the Forth Bridge (western arm) diverges from HS13.
• Humbie	NT120752	The above spur joins the classic line.
• Kinnaird	NS855849	The eastern arm of HS14 (Edinburgh services) diverges from HS13.
• Bankhead	NS802801	The western arm of HS14 (Glasgow services) diverges from HS13.
• Robroyston	NS630675	Eastbound services from Glasgow Queen St. join HS13.
• Glasgow Airport	NS475662	Dalmuir branch diverges from main line to Kilmarnock and Ayr.
• Brownhill	NS310516	HS13 joins classic route, for cross-platform interchange at Dalry.
• Dalry	NS298480	HS13 diverges from alignment of classic line, after Dalry I'change.

HS14 Route – Junctions

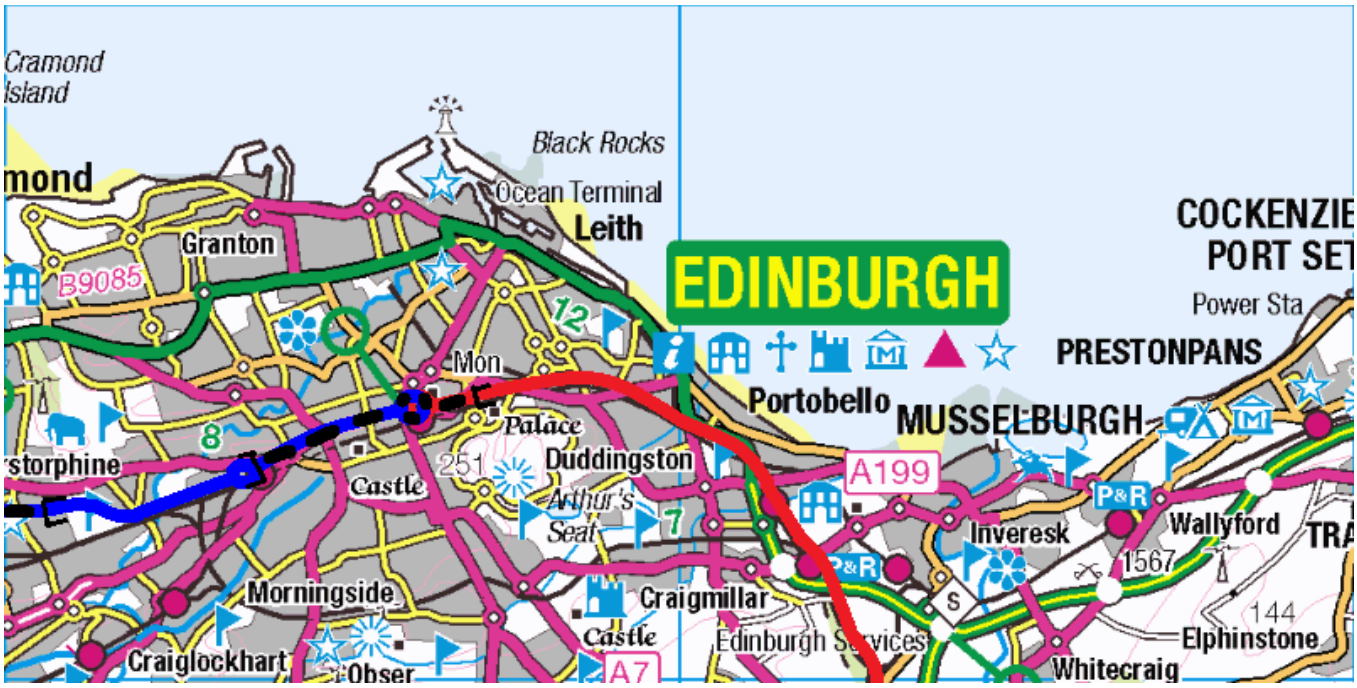
• Alloa	NS852860	The Edinburgh arm of HS14 joins the classic route to Stirling (the location is exactly where the former line to Alloa diverged).
• Bannockburn	NS818904	The Glasgow arms of HS14 join the classic route south of Stirling.
• Dunblane (Mk2 only)	NN784028	HS14 joins the alignment of the classic Strathallan line, taking it over and upgrading it to 225kph.
• Forgandenny (Mk2 only)	NO088196	The direct approach to Perth station (avoiding the tortuous route via Hilton Junction) diverges from the Strathallan line.
• Stanley	NO112337	The Highland Line to Inverness diverges from HS14's Strathmore route.
• Craigo	NO690642	HS14's Strathmore line joins the alignment of the classic line to Aberdeen north of Montrose, taking it over and upgrading it to 225kph.
• Drumlithie (Mk2 only)	NO791808	HS14 diverges from the classic route 7 miles, 11.2km, before Stonehaven station (as a cut-off from a heavily curved section).
• Cowie (MK2 only)	NO880873	HS14 re-joins and re-merges with the classic route, 1¼ miles, 2km, beyond Stonehaven station (having tunnelled beneath it).
• Cove Bay (Mk2 only)	NJ956045	HS14 diverges from the classic route to take a direct line to Aberdeen, avoiding the sharply curved original approach.
• Duthie (Mk2 only)	NJ942044	HS14 re-joins the classic route on the approach to Aberdeen Union station just north of the River Dee.

There are various other links between HS13/HS14 and classic lines, for operational purposes and not intended for regular services, so not relevant in the present context.

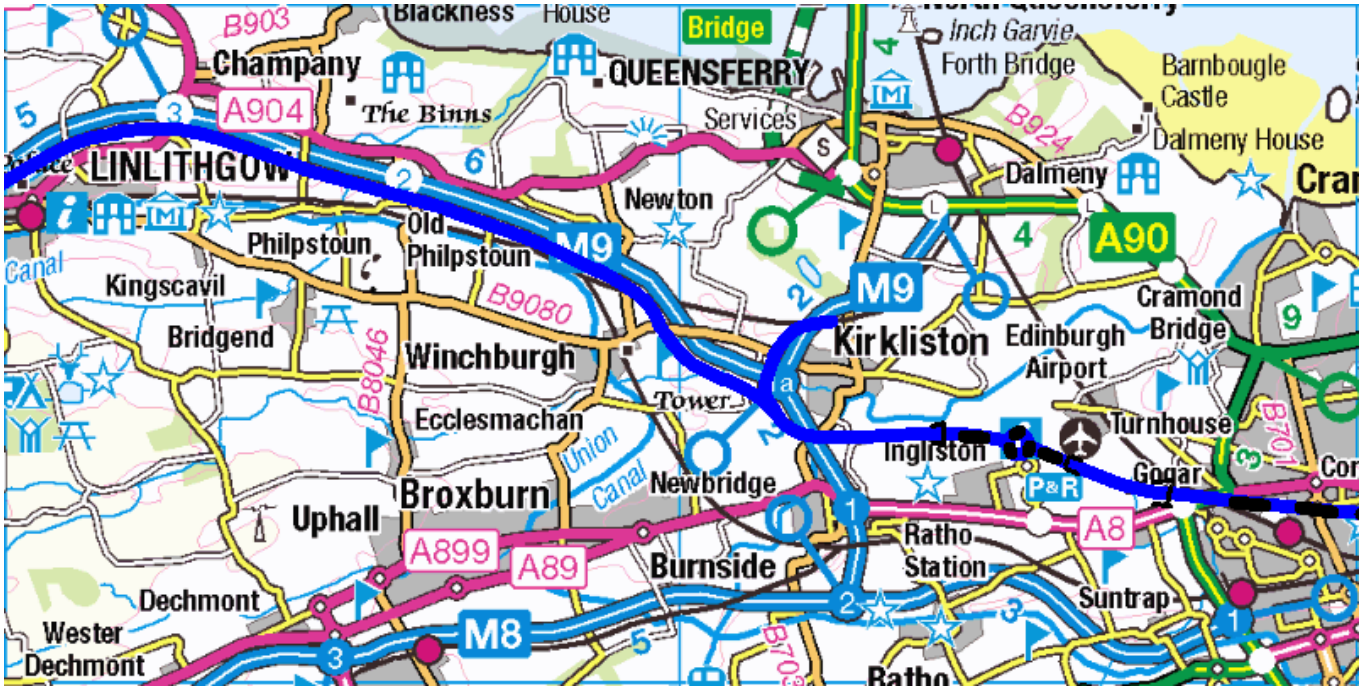
There now follows the definition of the actual route, in several logical sections.

1. *HS13 Edinburgh – Glasgow*

HS13 commences at Edinburgh HS – an extension of Waverley on the north side, underneath Princes St. It continues in tunnel, beneath Princes St. and Shandwick Place, as far as Haymarket, where, just west of the classic station, it emerges from tunnel at NT239732 and the HS platforms immediately follow. It follows the north side of the classic alignment as far as NT220724, where is diverges and takes over the trackbed of the former Corstorphine branch, which, from satellite maps, is still unobstructed. This it follows to near its former terminus, and enters a 1½ mile tunnel at NT207727, re-emerging at NT178728, Gyle Junction, immediately west of the A8, where there is a connection from the classic line, allowing classic-compatible, and local Fife services, to join. It crosses under the Airport, in a 1¼ mile tunnel between NT160732 and NT139739, with a station at NT150736, under the Airport Terminal building.

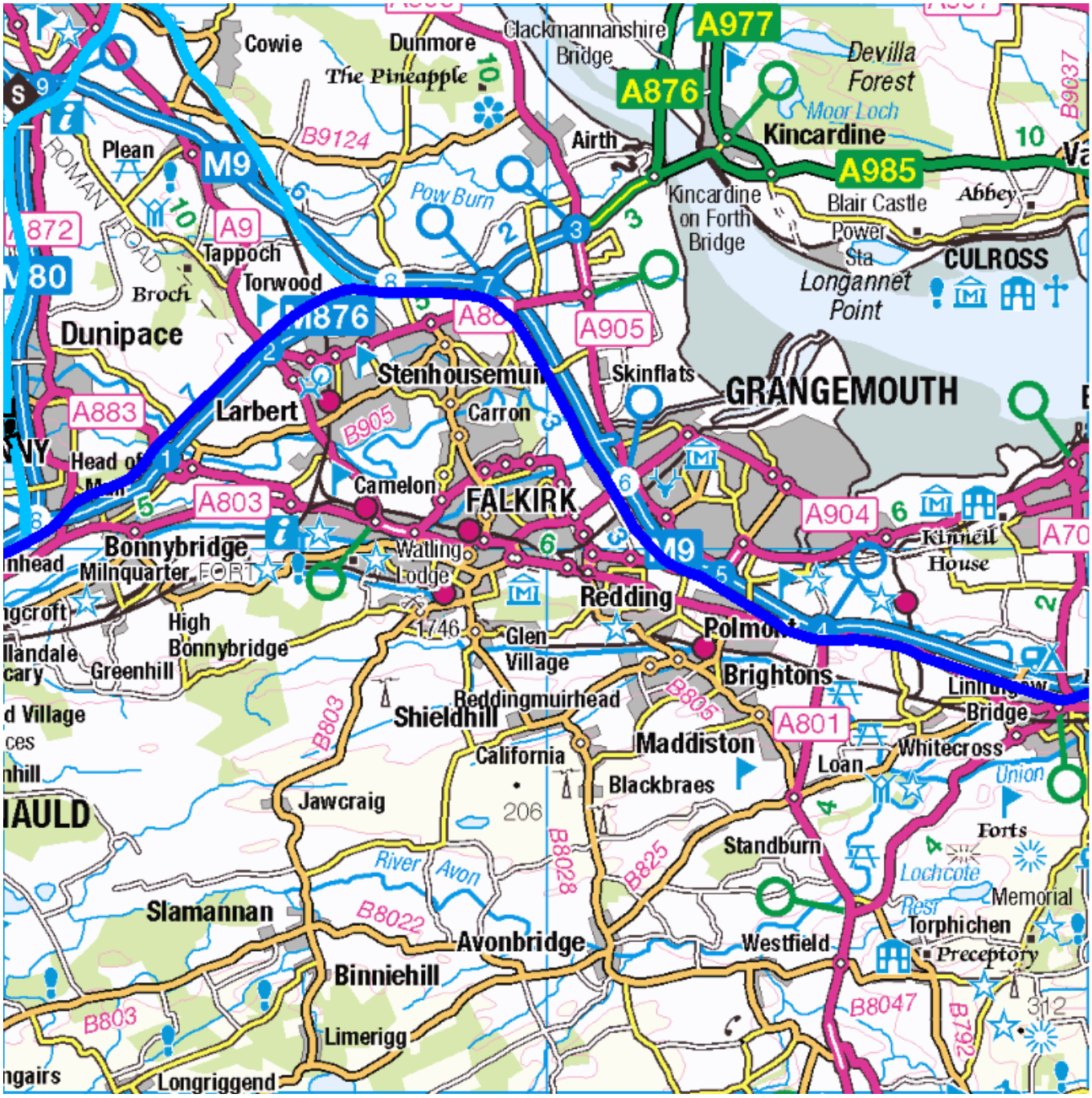


1.1 Musselburgh – Corstorphine Contains Ordnance Survey data © Crown copyright and database right 2013



1.2 South Gyle – Linlithgow Contains Ordnance Survey data © Crown copyright and database right 2013

HS13 proceeds south of the River Almond, to where the M9 crosses the river, where it passes over and joins the west side of the motorway alignment. Shortly afterwards, at Kirkliston Junction, NS116744, a spur diverges and follows the M9 spur from junction 1a, following the north side of this as until it crosses the classic line approaching the Forth Bridge from the west side, where it diverges and joins the classic line at Humbie Junction, NS120752. This is to enable RM services to Fife via the bridge to serve the airport too. HS13 follows the west / south side of the M9 to Kinnaird Junction, at NS855849, where the eastern arm of HS14, to Stirling from Edinburgh, diverges, close by the motorway junction 8, where a similar divergence occurs. HS13, by following the M9 to this point, has thereby crossed over the M876, which diverges from it at junction 8. But from then on, for the next few miles, HS13 follows the north side of the M876, whereas the diverged HS14 continues to follow the west side of the M9. Almost no obstructions are encountered on the section to Kinnaird Junction; one or two warehouses may need to be relocated, but, (according to the satellite maps,) absolutely no housing is threatened.



1.3 Linlithgow Bridge – Denny

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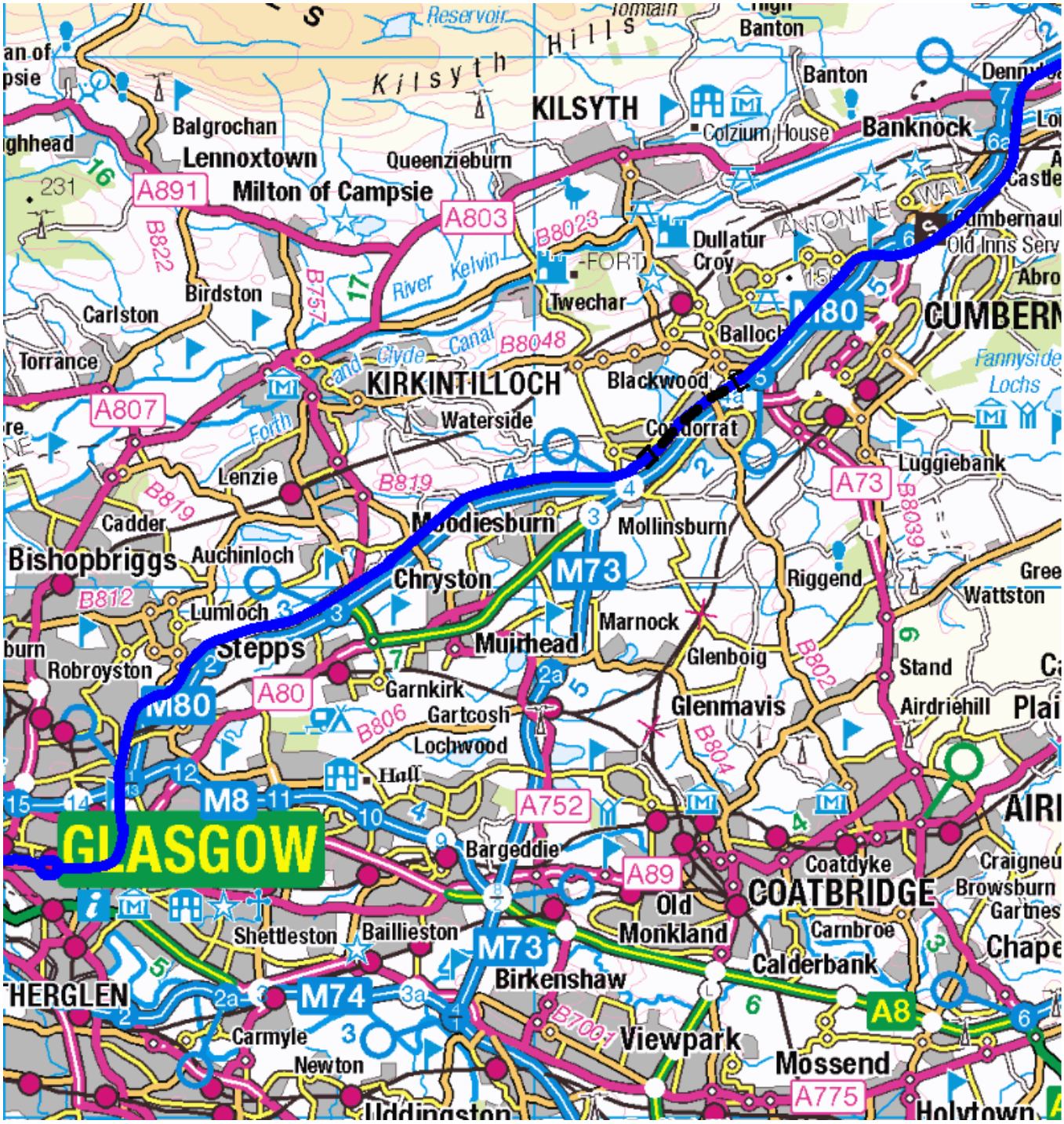
HS13 follows the north side of the M876 for only about 5 miles, before switching back to the south side at Bankhead, NS811804, shortly before Bankhead Junction, NS802801, where the western arm of HS14, from Stirling to Glasgow, crosses the M80 and joins it. This is close to the M80's junction 8, where, in similar fashion, the M876 is joined by the M80. The entire point of HS13's temporary switch is to avoid housing. There is a significant amount of housing in Bonnyfield, close to the south side of the M876, but none whatever on the north side.

HS13 switches to the west / north side of the M80 at NS770767, the Old Inns interchange (junction 6) and stays on this side until the M80's junction 1, where it joins the M8, in its section as the Glasgow Orbital. A 1 mile tunnel is required between NS732734 and NS719721, as buildings crowd in on the motorway on both sides, leaving no room to fit HS13 on the surface, without a lot of demolition.



1.4 Dennyloanhead – Glasgow

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It diverges from the motorways at NS624664, crosses the Glasgow Orbital, heads across Alexandra Park and joins the east side of the alignment of the Springburn branch at Alexandra Parade station. It follows this alignment round to Bellgrove station (crossing over to the south side when the line from Airdrie joins. From the satellite maps, I judge there is sufficient room for 4 tracks on the Springburn branch, if the Springburn branch itself is slewed west / north (i.e. there's room for two more tracks, but it's not all on one side of the present alignment). The HS station at Bellgrove is on the south side and, again, has two islands.

Proceeding beyond Bellgrove, HS13 takes over (upgrading as necessary) the Glasgow Union line, which it follows to NS568639, near Shields Jnction, where it diverges to join the M8 south of the Clyde.

St. Enoch would have been the perfect Glasgow station for HS13. Unfortunately it's now a shopping centre – a very nice one, I'm sure, but not quite in the same league as the Glasgow Terminus of the High Speed lines to Edinburgh, (and on to London,) Aberdeen, Dundee and Ayr. While it's true that shopping centres don't have the same permanence as more dignified buildings, and that the site may well become available for re-redevelopment some time in the future, that's not much help now. My suggested solution for the proper HS station for Glasgow is indeed St. Enoch, but a new St. Enoch, (much smaller, 4 platforms – 2 islands – only,) slightly to the north and east of the shopping centre and incorporating the existing Argyle St. station, thus with interchange to the metro services via Central Low Level – it becomes St. Enoch Low Level! The St. Enoch subway station is also very close, and even Central and Queen St. stations are only a few minutes walk away. St. Enoch's being a terminus isn't a problem, as all services start there.

Bellgrove just isn't good enough for Glasgow's **only** HS station – it's fine in its way, and valuable in any case as providing interchange with the metro services via Queen St. Low Level – it certainly justifies its provision as **a** Glasgow HS station, but not as the only one.

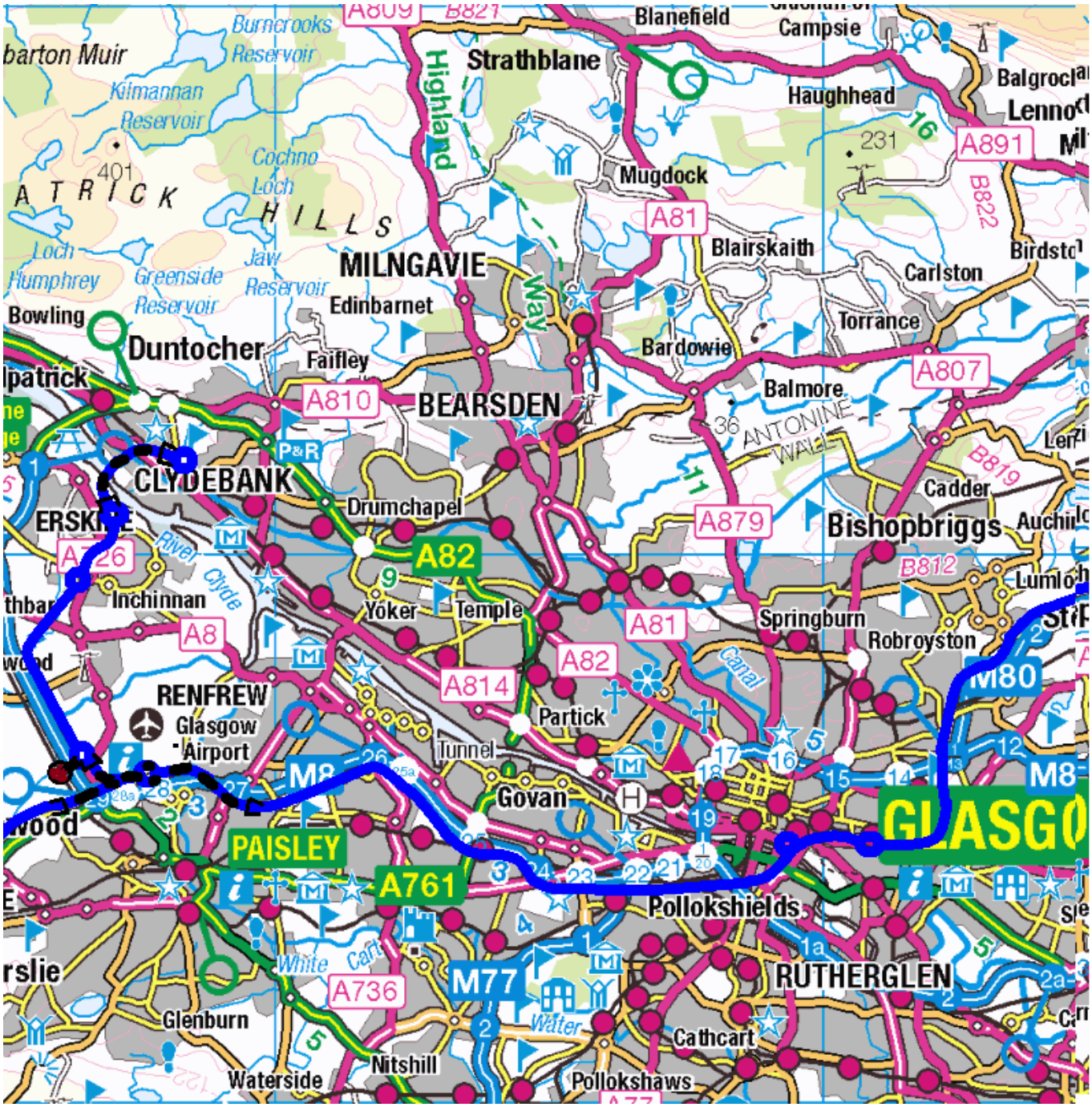
St. Enoch is, admittedly, a solution with problems of its own, but that's inevitable, given the myopic stupidity of our immediate forebears, and the mess they've left us. I'm reminded, as so often, of the perceptive reply of the Irishman asked the way to Dublin: "If I were you, I wouldn't start from here".

Alternatively, the complete redevelopment of St. Enoch, with a full-size station integrated into an even bigger and better shopping centre, (with fantastic travel facilities, easily reachable from all parts of Scotland, and North East England also,) could well be the better long-term solution.

The later maps section, containing (Strategi-based) maps of the overall network and routes, contains a large-scale map of the traverse of Glasgow, which should clarify the above description. Readers are asked to note that this is generated to a larger scale than that at which the data were originally input, so please not to be too censorious of sections of railway line that don't quite meet, or of stations which seem to be located a little to the side of the line they purport to serve. Note also that the motorways (highlighted in purple) have very obviously been drawn as straight-line segments, and these are exactly as supplied by the Ordnance Survey. At the sort of scales this stuff is intended to be viewed, it's smooth enough.

2. *HS13 Glasgow – Glasgow Airport – Dalmuir*

As mentioned previously, HS13 continues from St. Enoch along the widened Glasgow Union line to Shields Junction, and then joins the south side of the M8 at NS55861. (The Glasgow Union is not used for much more than stock movements at the moment, and west from Port Eglinton Junction it is actually lifted, but it is completely unobstructed.) HS13 follows the south side of the motorway alignment until NS495657, just before M8's Junction 27, where it enters a 2 mile tunnel under Glasgow Airport, emerging at NS463660, on the east side of the M8, just after the A726 (Barnsford Rd.) has diverged from the motorway.



2.1 Stepps – Dalmuir

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There are no obstructions in this section, beyond a few warehouses (especially at the start of the section), which are easily relocated. No housing is encountered until the A741 crosses, at junction 27. The airport tunnel is thus commenced a little earlier than would be required on purely infrastructure grounds, to avoid

the housing. The airport station is at NS479662, directly under the terminal. The Airport station is of two island platforms, in the usual way, albeit underground. Immediately to the west of it is Glasgow Airport Junction, at NS475662, say, where the main line continues straight ahead to Ayrshire destinations (see next section) and the Dalmuir branch diverges.

The Dalmuir branch emerges from tunnel at NS463660, and immediately enters Glasgow Airport Parkway station. This is on the east side of the M8, and is accessed from junction 29 of the M8, via the A726. A station is also opened on the classic route to Gourock and Wemyss Bay at NS461660, on the **west** side of the motorway. The two stations are linked by a fully enclosed bridge over the motorway, with escalators and travelators. Access to the station is on the east side, from the A726, then over the bridge for the classic line; there is no direct access on the west side. Both sides of the station have two platforms. The Dalmuir branch is in no sense a HS line, but it is a HS Metro. It finally implements the Glasgow Airport Rail Link project, for both HS and classic lines.

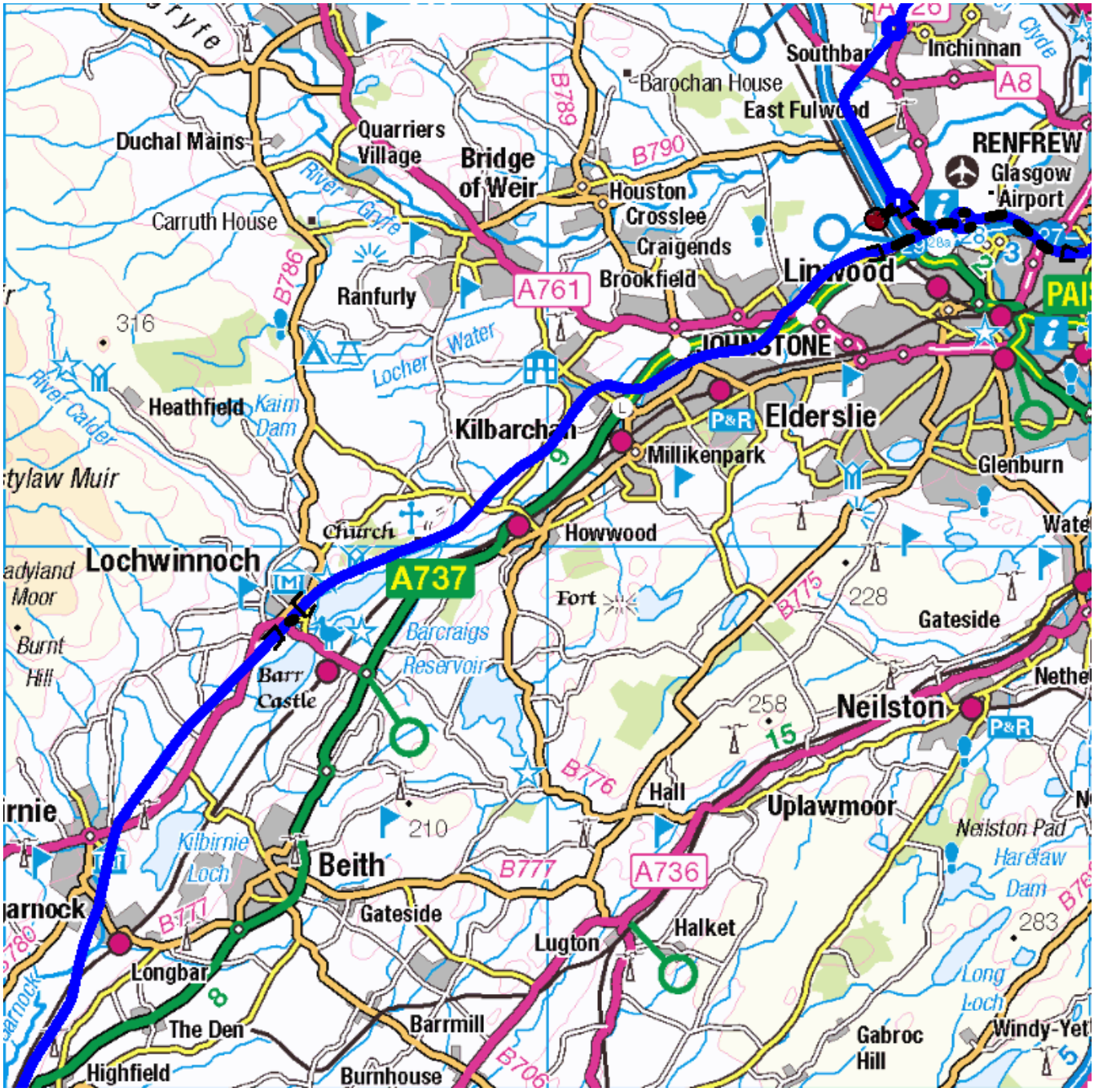
The Dalmuir branch follows the east side of the M8 until NS451680, where it diverges and travels in a straight line to join the west side of the A726 at NS462690, which it follows to the Erskine Parkway South station, at NS465697. It crosses to the east side of the A726 at NS46970703, and shortly afterwards is Erskine Parkway North station, at NS469706. After that it diverges from the A726, and curves round to Dalmuir, entering a tunnel under the Clyde at NS470710 and emerging at NS481717, just before Dalmuir station. The HS platforms (2) are just north west of the classic ones.

3. HS13 Glasgow Airport – Kilmarnock and Ayr

The proposals thus far are unchanged at Mk1A from the originals. The next section is also unchanged, **as far as Kilmarnock**. The Ayr service, at Mk1A, travels along the classic route along the coast, from Dalry Junction to Ayr via Troon.

The main line of HS13 continues from Glasgow Airport Junction, emerging from tunnel at NS465654, on the north side of the A737, immediately to the west of the classic line to Gourock. It switches to the south side of the A737 at NS440640, to avoid housing, and almost immediately (at NS433637) joins and takes over the alignment and trackbed of the currently disused duplicate line to Dalry, via the north west side of the lochs. A new bridge will be required to cross the A737 at NS417630, since the road was opened after the line had closed, and was built straight across it. A ½ mile tunnel is required in Lochwinnoch, between NS357590 and NS353585, to avoid new housing which has encroached on the alignment. With those two exceptions, there are no obstructions on the route to Dalry. HS13 joins the current classic route to Dalry at Brownhill Junction, NS310516. This was a grade-separated junction, with HS13's down line (I presume 'up' in these parts is towards Glasgow?) passing over the classic line. This arrangement is re-implemented, and the line quadrupled over the two miles to Dalry station, and the further ¾ mile to Dalry Junction, (NS298480,) HS13 occupying the outer tracks. Dalry station is rebuilt with two island platforms, providing cross-platform interchange between HS13 and the classic routes to Largs and Ayr via the coast.

At Dalry Junction, HS13 diverges, HS13's up line crossing over above the classic tracks, and takes over the alignment and trackbed of the currently disused line to Kilmarnock. (This was the original G&SW main line, so the alignment is pretty good.) There are no obstructions before Kilmarnock. Kilmarnock station currently has 4 platforms, two north-facing bays (1,2) and two through platforms, 3, which is the one generally used, and 4, rarely used, which is the south face of an island platform, on the north side of

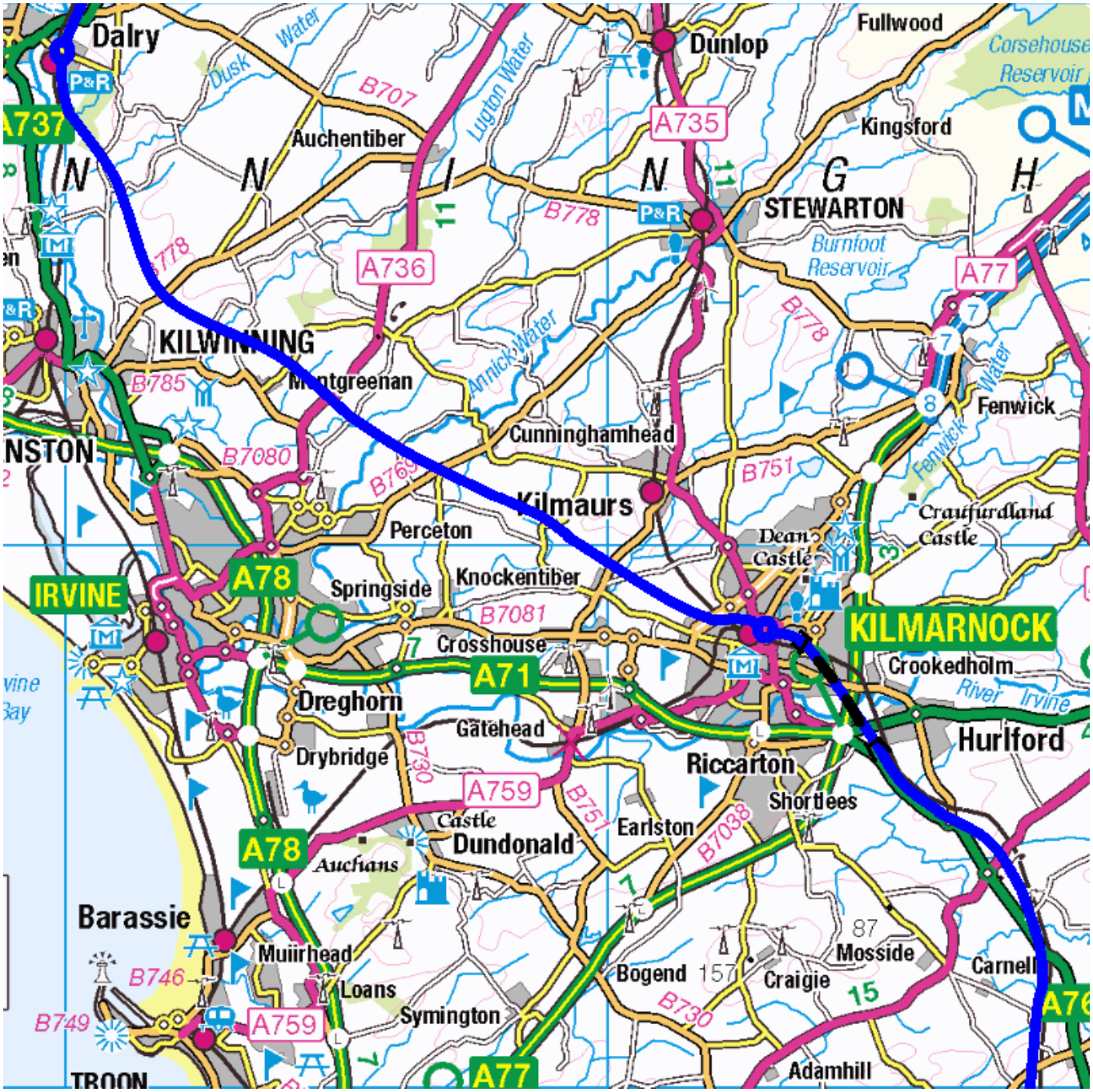


3.1 Glasgow Airport – Highfield Contains Ordnance Survey data © Crown copyright and database right 2013

the station. HS13 takes over this island platform, and rebuilds the north face as platform 5. It crosses over the classic line from Glasgow via Stewarton, and takes over the north side of the station.

As noted at the beginning of this section, the plans are unchanged at Mk1A until Kilmarnock. The reminder, below, describes the situation at Mk2.

HS13 follows the classic alignment for the next few miles until NS479300, initially on the north / east side. A new viaduct is required immediately to the east of the station, but there's plenty of room for it. A 1½ mile tunnel is provided between NS434381 (Key Park Terrace) and NS451362, south of Hurlford, emerging opposite the local distillery, on the south / west side of the alignment. This avoids a built-up area. At NS479300, it diverges on a completely new alignment, joining the north side of the Mauchline – Ayr line at NS464272, via a ¾ mile tunnel between NS476296 and NS475284. HS13 switches to the south side of the alignment at NS441260, to avoid a striking collection of farm buildings (it needs to be on that side at Annbank, a few miles further on, anyway, to avoid housing). A ½ mile tunnel is required at



3.2 Dalry – Kilmarnock

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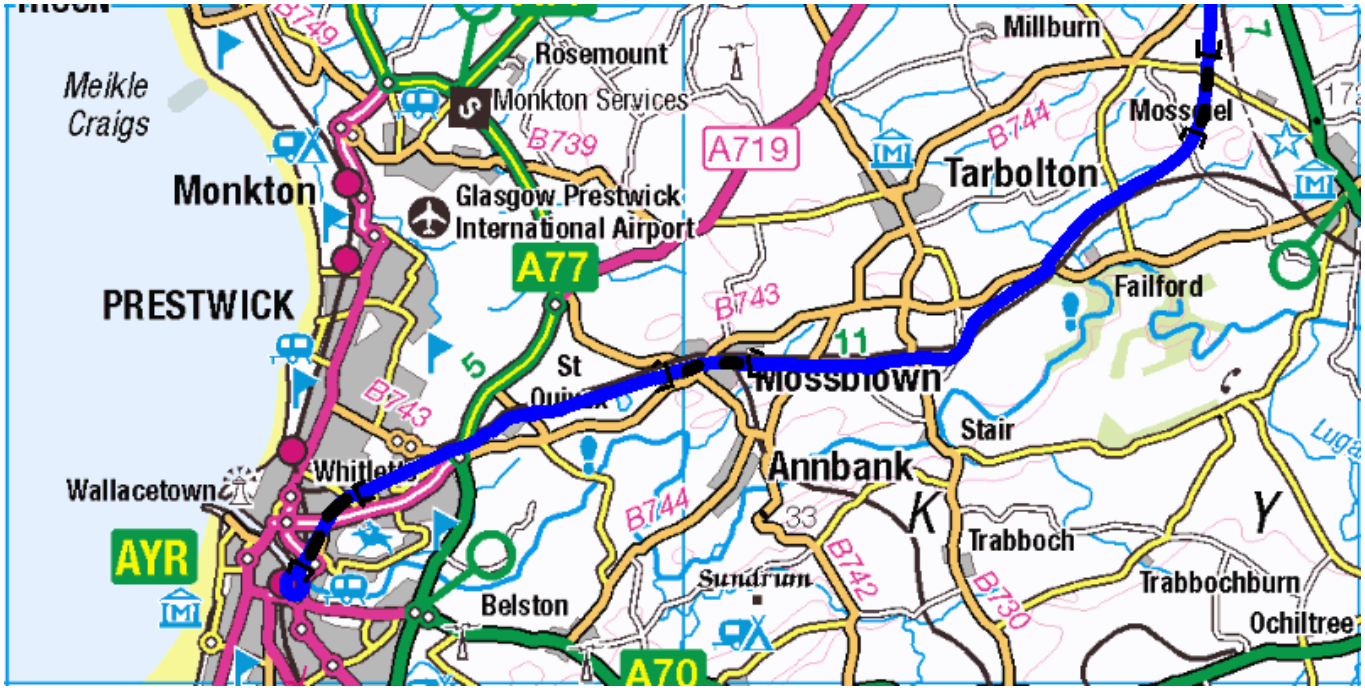
Mossblown, between NS406249 and NS398248, to avoid housing. HS13 continues on the south side of the alignment, almost into the centre of Ayr. The area is mainly warehousing, some of which will need to be relocated. No housing is encountered until NS348229, at which point HS13 enters a 1 mile tunnel, emerging at NS341215, immediately before Ayr station. There is room on the east side of the station (currently a car park) for a single island platform with 2 faces, for HS13.



3.3 Mossgiel – Ayr

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4. HS14 (Edinburgh –) Kinnaird Junction and (Glasgow –) Bankhead Junction – Perth

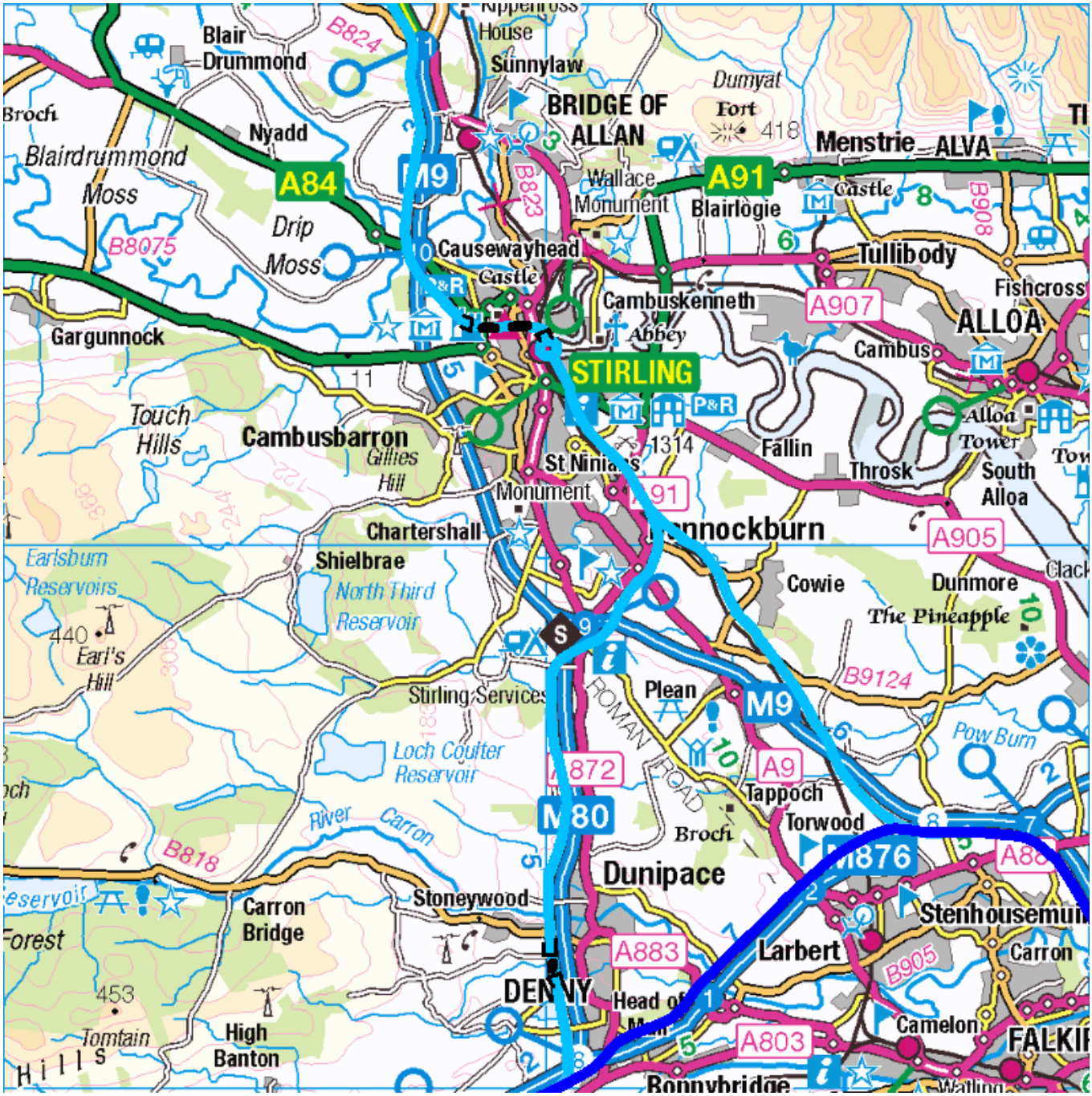
At Mk1A, the connections from Kinnaird and Bankfoot junctions join and merge with the classic route to Stirling at Alloa (NS853860) and Bannockburn (NS818904) junctions, respectively. The following describes the situation at Mk2.

The eastern arm of HS14 diverges from HS13 at Kinnaird Junction, and follows the western side of the M9 for just over 1 mile, then diverges and joins the eastern side of the classic line from Larbert, at NS851862. It then follows the classic line all the way to Stirling station; there are no significant obstructions.

The western arm of HS14 diverges from HS13 at Bankhead Junction, and follows the western side of the M80 until NS804878, just before the M80 merges with the M9. In this section, it requires a ¼ mile tunnel between NS802825 and NS802829 to avoid some housing unusually close to the motorway (pre-existing it, I imagine). From NS804878 it crosses the M80 and follows the A91 round to join the eastern arm of HS14, on the eastern side of the classic alignment, at NS818904, Bannockburn Junction.

There is plenty of room on the east side of Stirling station for HS14's two island platforms. Immediately north of Stirling station, HS14 enters a 1 mile tunnel at NS798938, just before the Forth Place road bridge. It curves to the west and emerges from tunnel at NS785941, just west of the B8051 (Reploch Rd.) It follows the west side of the B8051, which joins the A84 at the next roundabout, until it reaches the M9 again, joining the west side of the motorway at NS775955, just north of junction 10. It follows this until it changes into the A9(T) at the next roundabout, and follows this around the west side of Dunblane until it crosses the classic line to Perth. HS14 leaves the A9(T) and joins the east / south side of the classic alignment at Dunblane Junction, NN784028. No obstructions have been encountered.

(At Mk1A, HS14 remains merged with the classic route all the way to Perth.)



4.1 Falkirk – Bridge of Allan

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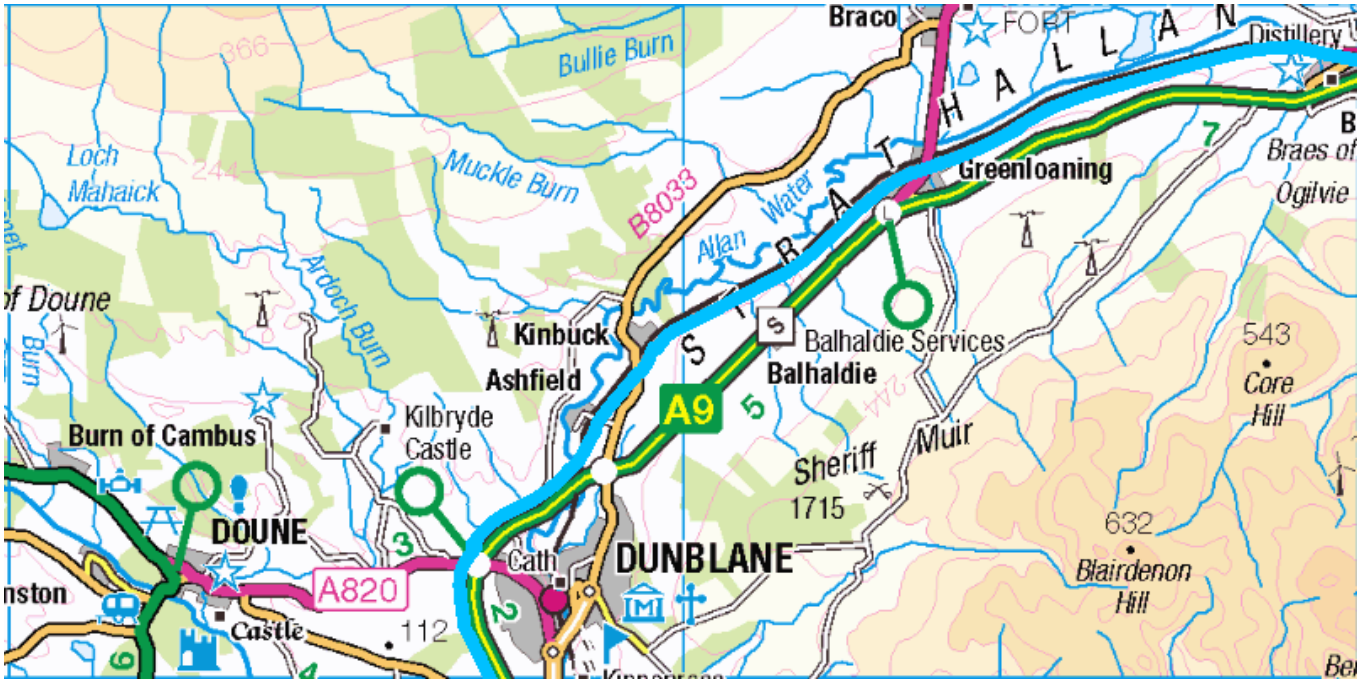
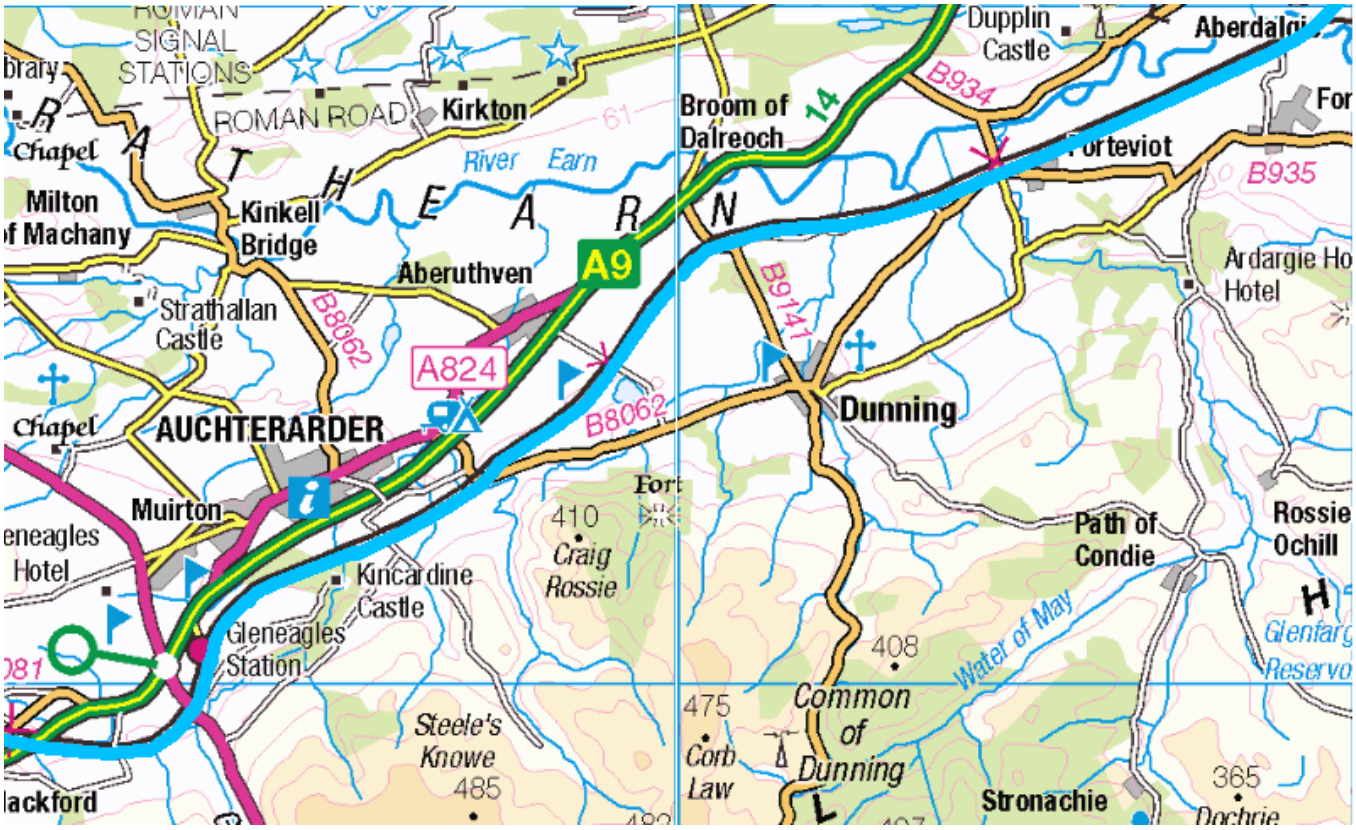
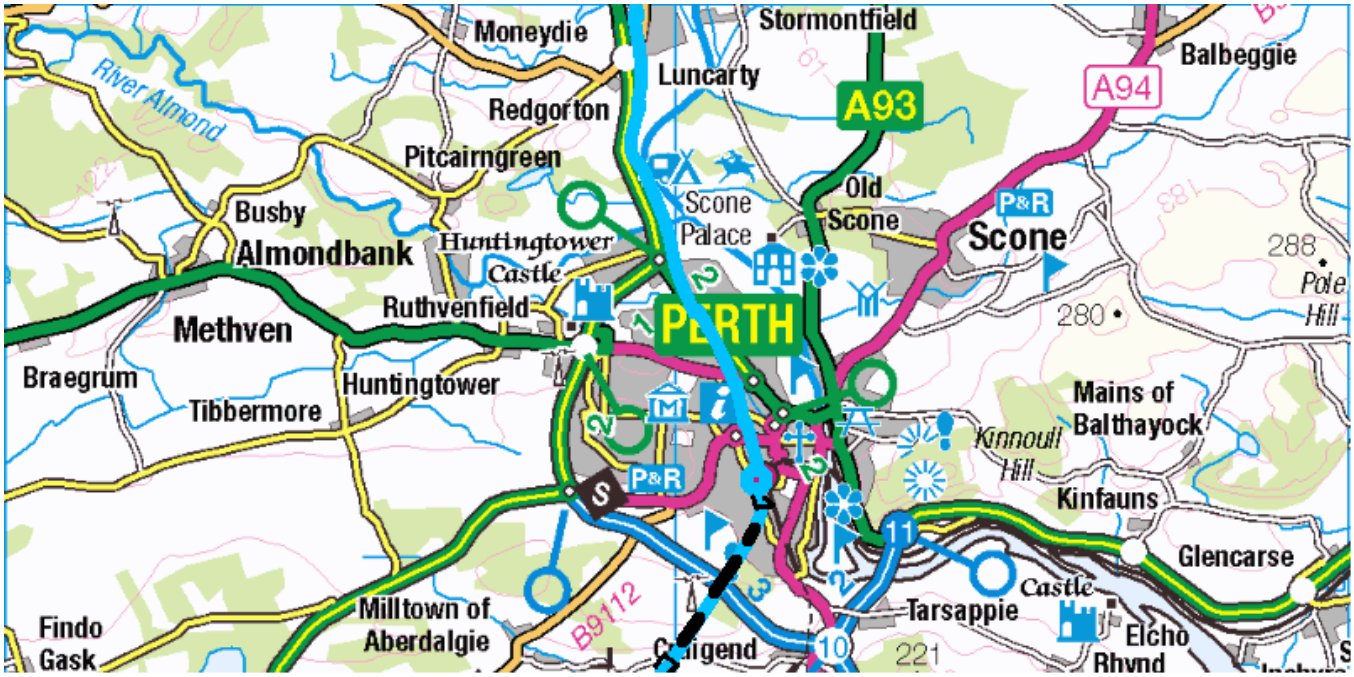
HS14 follows the classic Perth line as far as NO093198, at which point it diverges, crosses the classic line, and heads directly for Perth station. The classic route via Hilton Junction is so hemmed about with buildings as it approaches Perth (all the way north of Moncrieff Tunnel in fact) that there's no possibility of fitting in HS14 on the surface. The only option is a direct approach by tunnelling. HS14 enters a 2 mile tunnel (that's all!) at NN098201 and emerges on the west side of the alignment, just south of Perth station, at NN112228. This is exactly where it wants to be. Perth station currently has 5 through platforms (still!). There were originally 7, and the extra 2 are easily reinstated. Numbers 1 and 2 serve the Dundee line (and Aberdeen), heading directly east. Platforms 3-7 are on the northbound line, serving, since the closure of the Strathmore line in 1967, only the Highland Line trains to Inverness. HS14, reopening the Strathmore line, (and the restored platforms 8 and 9,) will take over four of them, for HS services to Aberdeen. It's really amazing that all this useful infrastructure is still there after nearly 50 years of disuse for most of it. What a contrast to St. Enoch! Thank goodness the worthy citizens of Perth didn't want a new shopping centre! (See appendix D for the proposed layout at Perth.)



4.2 Dunblane – Blackford Contains Ordnance Survey data © Crown copyright and database right 2013



4.3 Blackford – Forgandenny Contains Ordnance Survey data © Crown copyright and database right 2013



4.4/5.1 Craigend – Luncarty

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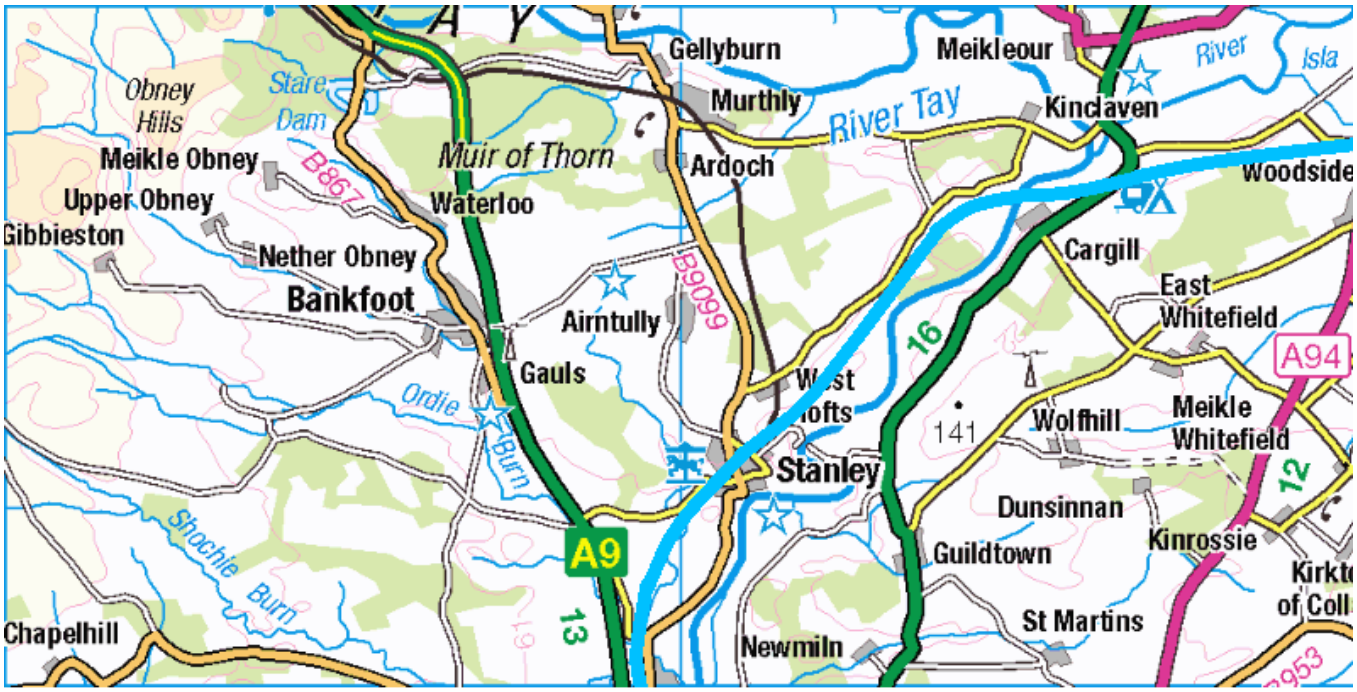
5. *HS14 Perth – Dundee*

This section is left in place, for general interest, but, as explained in appendix C, the new route to Dundee has been cancelled, being no longer needed with the cancelling of GC gauge. Should, in the longer term, extra capacity be required between Perth and Dundee, then this would be the best way to provide it. At Mk1A, Dundee trains use the existing route from Perth. There is no Dundee branch from Burrelton Junction, as described below, not even at Mk2.



5.2 Stanley – Woodside

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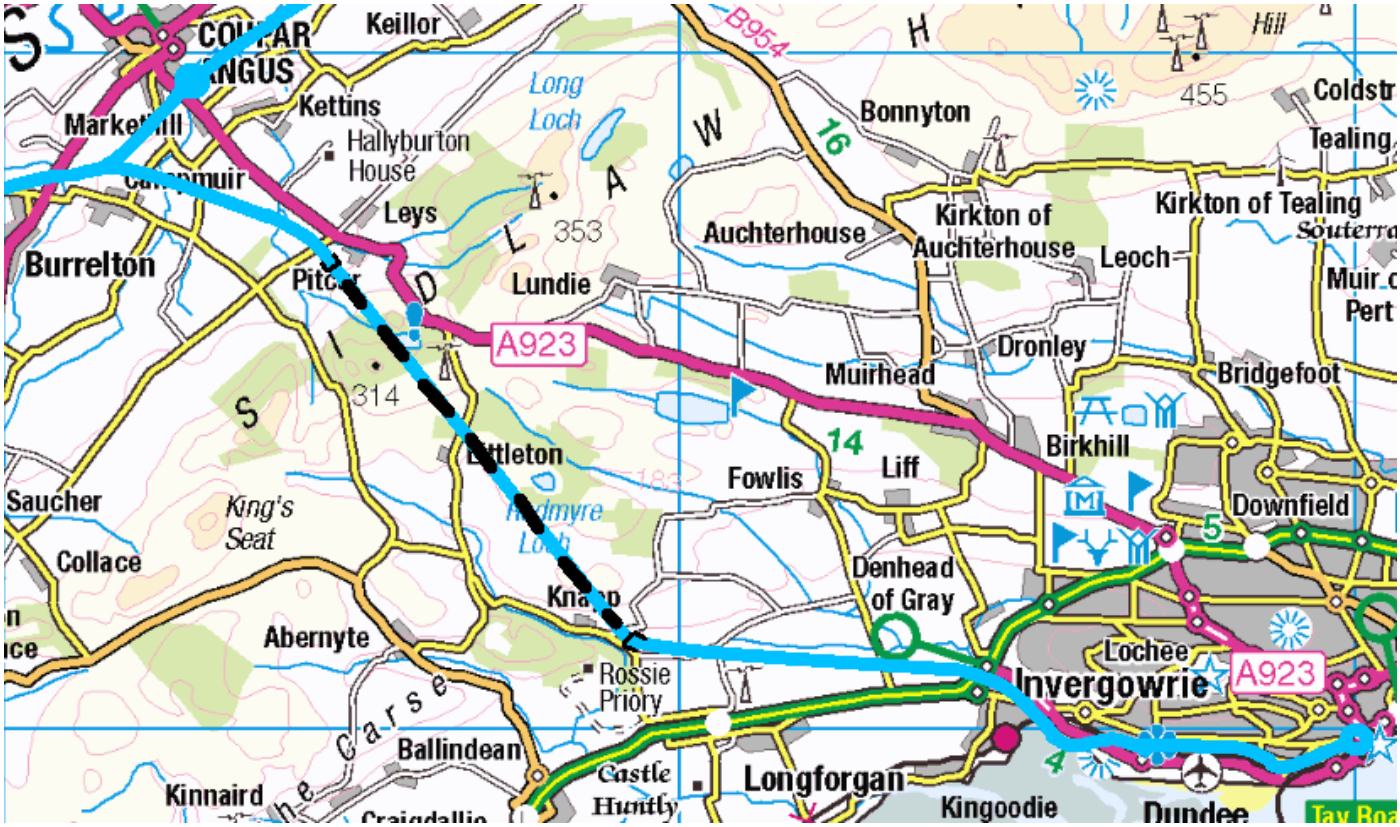
As previously mentioned, north of Perth, HS14 reopens the Strathmore route, as a full HS line. The short surviving section, as far as Stanley Junction, is likewise enhanced (the Highland line trains won't mind).

On the section from Perth to Burrelton Junction, where the Dundee branch diverges, there are no obstructions until Burrelton itself, at NO200379, where some new building has encroached slightly. Accordingly, HS14 diverges from the former alignment at Layston, NO186379, and runs slightly to the north of it, crossing the A94 at NO205380, slightly to the south of where the original (which was curving to the north there) did. At that point is Burrelton Junction.

The Dundee branch is a completely new alignment. It curves to the south to Pitcur, where, (at NO245370,) it enters a 4 mile tunnel, emerging at NO290312, near Knapp. The height of Burrelton Junction is 200ft, and that at the tunnel entrance 300ft, giving, over the intervening 3 miles an ascending gradient of 1 in 160. On emerging from the tunnel the height is 180ft, thus a descending gradient of 1 in 176.

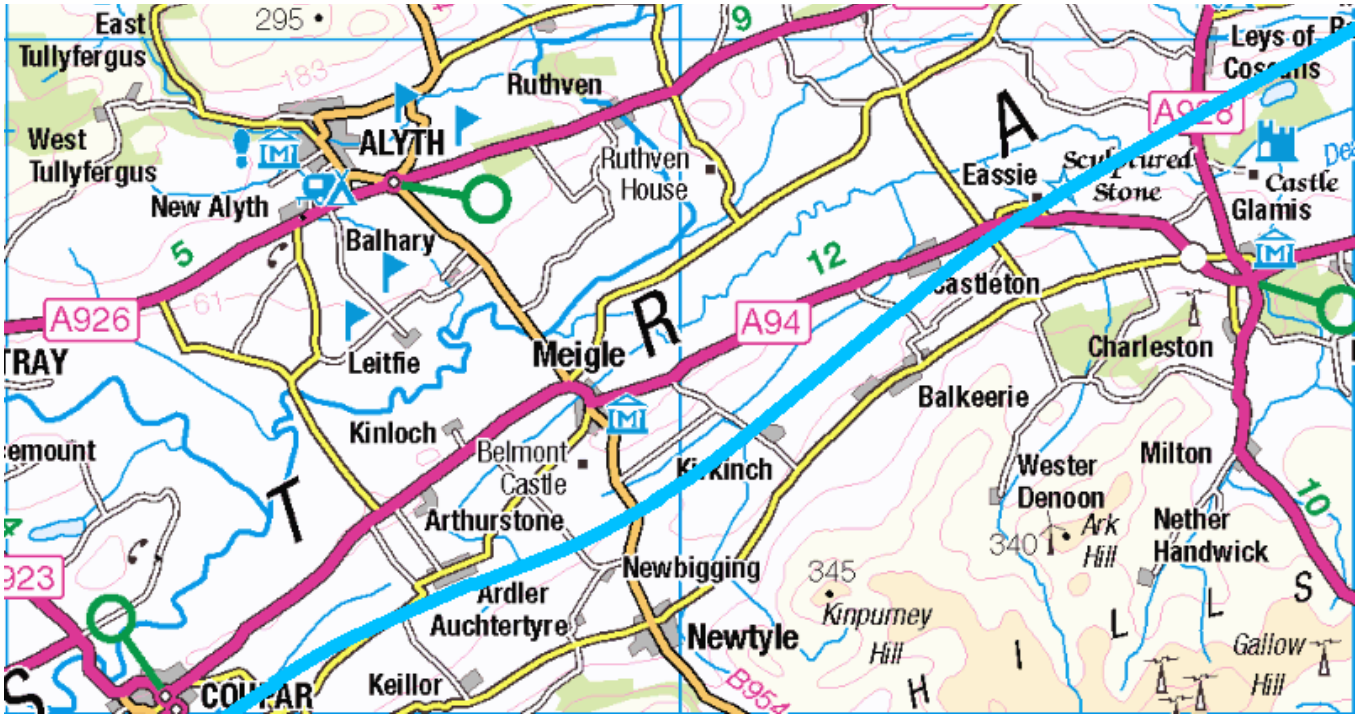


5.3/6.1 Burrelton – Dundee Contains Ordnance Survey data © Crown copyright and database right 2013

HS14 approaches the Dundee ring road at NO346308, then follows the south side of the A85, Riverside Avenue, crossing over the classic line from Perth to Dundee. It diverges from the A85, crosses over the road, and joins the classic alignment at Ninewells Junction, NO362299. There are no obstructions. The station is redeveloped, shifted slightly to the west, where there is considerably more space available. The new station has six platforms in all, two islands, (four platform faces,) and two single platforms on the outside. The islands provide cross platform interchange between HS14 services, in the centre, and Aberdeen services on the outer faces, either classic-compatible (from Glasgow) or Regional Metro (from Edinbugh, via the bridges). The outer, single platforms accommodate a stopping service between Perth and Arbroath. Full details are in the service plans.

6. *HS14 Burrelton Junction – Craigo Junction*

From Burrelton Junction, the new alignment passes around Coupar Angus, about a ½ mile south of the original. It crosses the A923 at NO228392, and a new station for Coupar Angus is provided there. There is some encroachment by new building in Ardler. Accordingly HS14 rejoins the original alignment a little to the east of Ardler, at NO270420. The new alignment, from Layston to east of Ardler (5½ miles) is actually better than the original (it's very slightly straighter – no big deal, but still an improvement).



6.2 Coupar Angus – Glamis Contains Ordnance Survey data © Crown copyright and database right 2013

6.3 Mains of Ballindarg – Friockheim Contains Ordnance Survey data © Crown copyright and database right 2013

No further problems are encountered until Forfar, where the alignment has been almost completely obliterated. From NO4005002, HS14 diverges from the original alignment, veering to the north of Padanaram. It crosses the A90 at NO439521, just north of its junction for Forfar. It curves gently round

6.4/7.1 Glasterlaw – Dykelands

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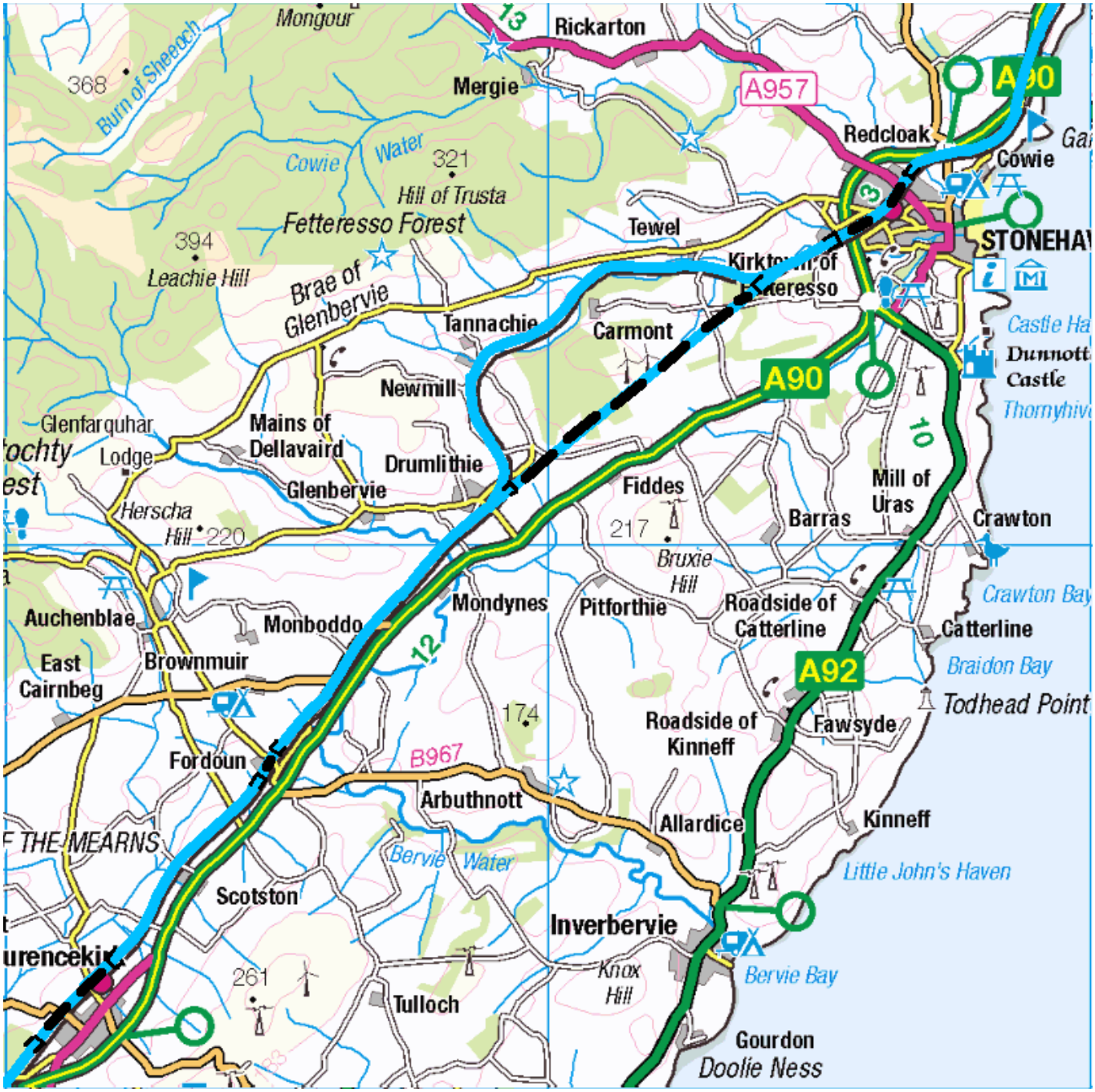
the north of Forfar, crossing the B9128 at NO453520, and a new station for Forfar is provided there, about a ½ mile north of the original and a ¼ mile east. It crosses the original alignment to pass slightly further to the south of Lunanhead, where there has been some encroachment, and rejoins the original at NO480520. This new alignment (5 miles) is very much better than the original, which had a severe kink in reaching the original Forfar station.

There is nothing further of note until Bridge of Dun. The original station is now owned by the Caledonian Railway, which operates the branch to Brechin. HS14 will open a new station, on the north side of the original, and invite the Caledonian to provide a connecting service for Brechin (steam-hauled, if they wish). HS14 does not take over the existing alignment beyond there, but leaves it to the Caledonian for a future extension into Montrose, via Dubton Junction, to be able to provide connections there, too.

Beyond that, Bridge of Dun is a parkway station for the surrounding area, and has extensive parking.

HS14 does not, in fact, restore the original route via the historic Kinnaber Junction, but eliminates the sharp curve into the North Esk valley by a diversion from NO695604 to Craigo Junction, NO690642, where it joins the line from Dundee. There is a 1 mile tunnel between NO699609 and NO697630.

7. HS14 Craigo Junction – Aberdeen

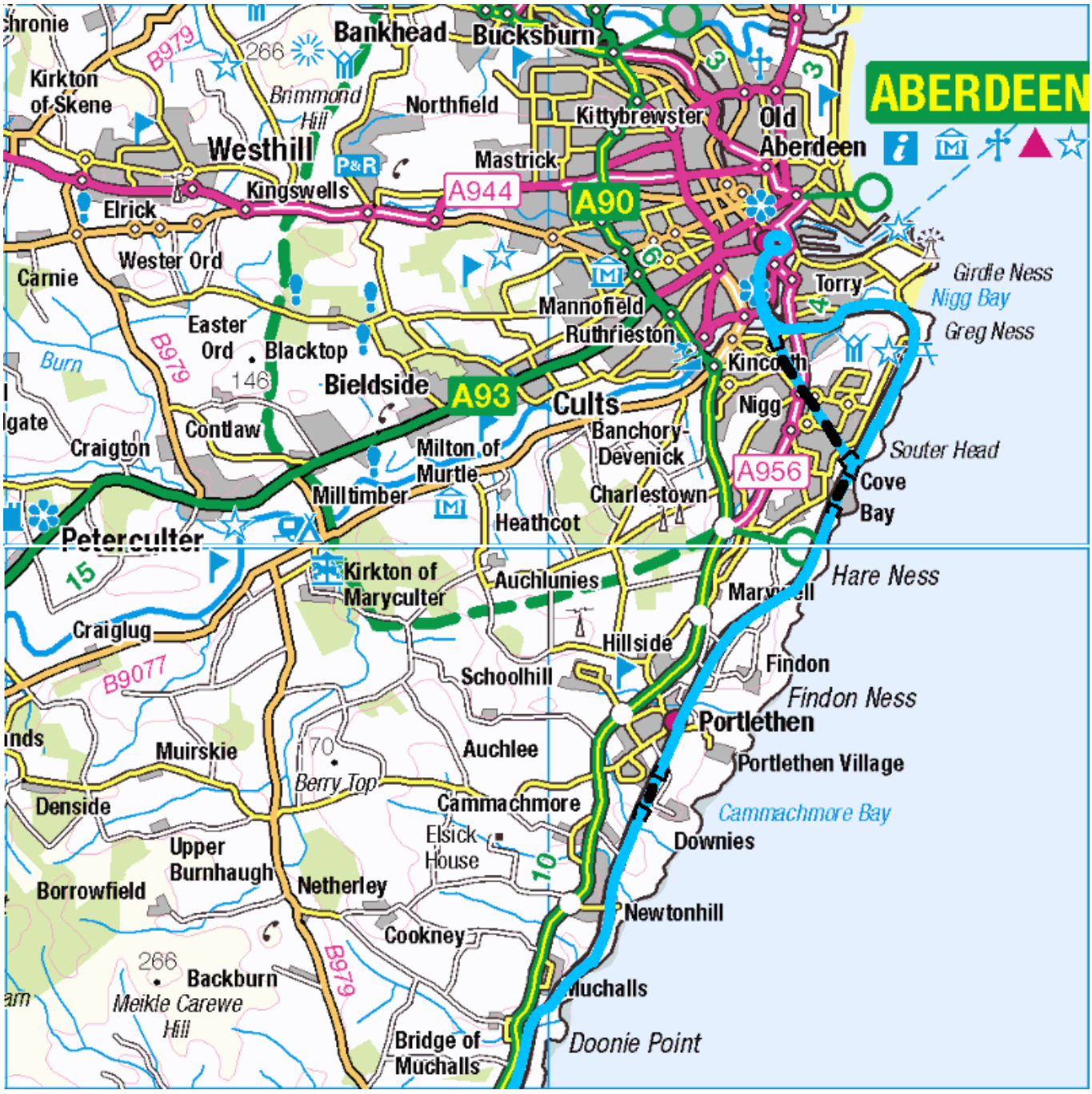


7.2 Laurencekirk – Stonehaven Contains Ordnance Survey data © Crown copyright and database right 2013

At Mk1A, the classic route is merged with HS14, all the way to Aberdeen. At Mk2, there are good grounds for restoring the original plans in the vicinity of Stonehaven, because there it is necessary to provide overtaking facilities. This is possible using the existing infrastructure, with the addition of a platform loop at Stonehaven, but providing new infrastructure here would give much greater resilience. Restoring the new tracks thence to Aberdeen would allow the classic tracks to be taken over by the Aberdeen Metro, to provide new services between Ellon and Stonehaven..

The original proposal was: from Craigo Junction, HS14 follows the classic alignment, initially on the north / west side. There are no obstructions except as noted below:

- A 1½ mile tunnel is required under Laurencekirk, between NO708708 and NO717720.
- A ½ mile tunnel is required under Fordoun, between NO749757 and NO751760.
- Farm buildings (not the farmhouse) encroach at East Mondynes (NO778794) and Newmill (NO788831). These will need to be relocated.
- A 1 mile tunnel is required under Stonehaven, between NO856856 and NO866865.



7.3 Muchalls – Aberdeen

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HS14 switches to the east side of the classic alignment at NO901918, just before Muchalls. In the next several miles, especially at Port Lethen, there is a lot of housing on the west side, but remarkably little on the east.

A ½ mile tunnel is required at Newtonhill, between NO910933 and NO911940.

A ¼ mile tunnel is required at Cove Bay, between NJ953007 and NJ954012.

It is necessary to switch sides again, to the south / west side, finally on the approach to the Dee bridge, on entering Aberdeen, say at NJ950042, as the area between railway and river is completely built up (mainly new developments, by appearance). The approach to Aberdeen Union station is then completely clear.

A couple of cut-offs are desirable, albeit not essential, to avoid strongly curved sections of the classic line (the maps show both these, as well as the original route):

- a 4 mile cut-off between NO791808 and NO840855, on the approach to Stonehaven, on a falling gradient of 1 in 350, in tunnel essentially throughout,
- a 2 mile cut-off between NJ956015, just north of Cove Bay, and NJ942044, just north of the Dee, on the west side of the existing bridge, on a falling gradient of 1 in 50, in tunnel essentially throughout (depending on precisely where it emerges from tunnel, some warehouses may need relocation; the area is an industrial estate). Actually, continuing it in tunnel under the river, would avoid any obstructions, and be a more elegant solution (saving on a bridge, too).

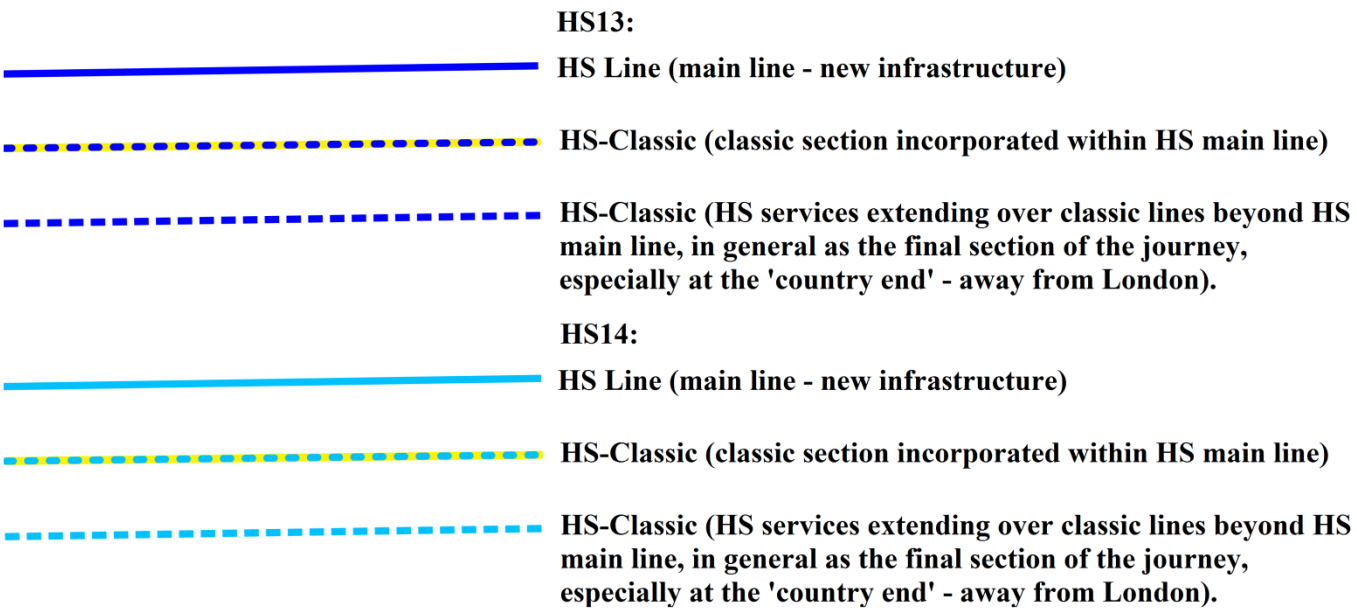
At Mk2, it is proposed to reinstate first of the above diversions, but leave the classic infrastructure in place also. Specifically, new infrastructure is provided between the new Drumlithie Junction, NO791808, at the start of the first cut-off, and Cowie Junction, NO880873, where it re-joins and re-merges with the classic route. Intermediately, it joins the south side of the classic alignment at NO840855, the end of the first cut-off, and tunnels under Stonehaven between NO856856 and NO866865, as noted above. It eases the curve between there and Cowie Junction. The distance is 6⅞ miles, 11km, as compared with 8¼ miles, 13.2km, by the classic route. All in all, this gives a saving of 1⅜ miles, 2.2km, as compared with the classic route. Given that the new section proposed is almost completely straight, it could readily be built for a line speed of 300kph without significant extra cost, though it would initially observe a line speed of 225kph, the same as the classic route either side of it. Note that Drumlithie Junction is located exactly 7 miles, 11.2km, before Stonehaven station, and Cowie Junction 1¼ miles, 2km, after it (distances measured along the classic route, of course). The distance between Drumlithie Junction and Stonehaven is thus well in excess of the deceleration/acceleration distances from line-speed to stationary / to line-speed from stationary (3.9/6.5km respectively for line-speed 225kph).

The point of including this cut-off (and the bypass of Stonehaven station in tunnel) is because Stonehaven is where overtaking facilities are required for northbound Glasgow – Aberdeen fast services to overtake Edinburgh – Aberdeen stopping services (and Edinburgh – Aberdeen fast to overtake Glasgow – Aberdeen stopping). This **can** be done with the existing infrastructure (plus the addition of a northbound platform loop at Stonehaven), but in the longer term, the extra resilience of the above proposal is desirable. (Southbound there's no problem, as everything starts from Aberdeen.)

The second cut-off, between Cove Bay Junction, NJ956045, and Duthie Junction, NJ942044, is not considered worthwhile in isolation; but it makes sense if new infrastructure is continued north from Cowie Junction through to Aberdeen, used by **all** HS services. The classic route between Cowie Junction and Aberdeen would then be given over to the Aberdeen Metro, for a new route between Ellon and Stonehaven. Full details are in the article on The Aberdeen Metro, but a route map is included in appendix G (as is one for the Tayside Metro).

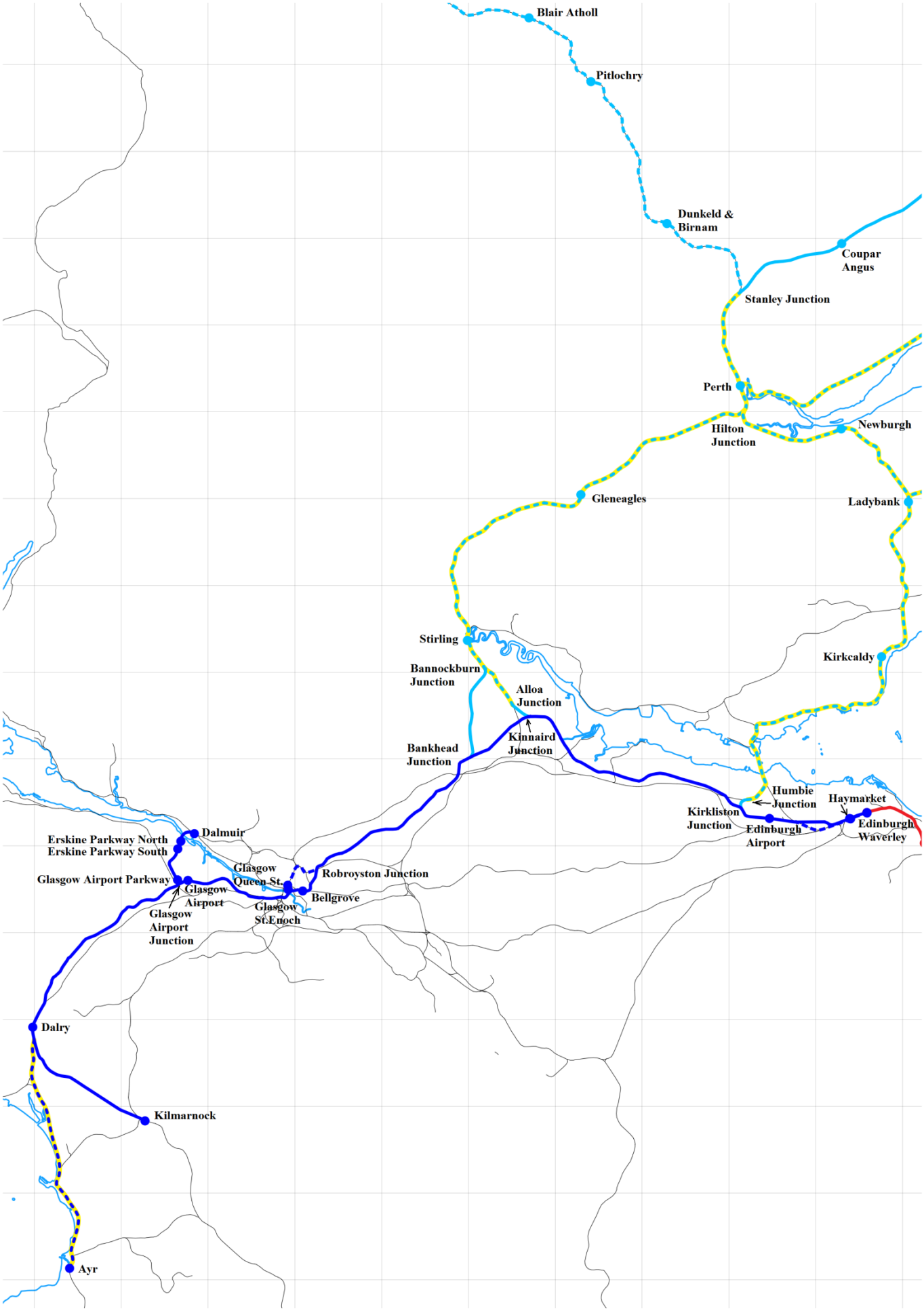
Overall Maps

There follow maps of the overall HS13/HS14 routes (and portions of other associated HS routes used by HS13/HS14's services). Those portions of the main lines of HS13/HS14 which incorporate sections of classic route, and the sections of HS-Classic services extending over classic routes beyond the HS13/HS14 main lines, are shown as dotted lines, but differently. The following schematic should clarify:



If the full Mk2 is implemented, there will no longer be any sections of classic route incorporated within the HS13/HS14 main lines; 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. (However, the preceding is not in fact the case for HS14 Mk2. It is expected that much of the incorporated classic sections of this routes will remain in main line use.)

The first four maps show the HS13/HS14 routes (South West, South East, North West and North East sheets) at Mk1A. They show the alignments changed from Mk1, including sections of classic route incorporated into HS13/HS14. 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 this is the last of the Route and Service Plans article to be updated, so the overall network maps are now fully updated.



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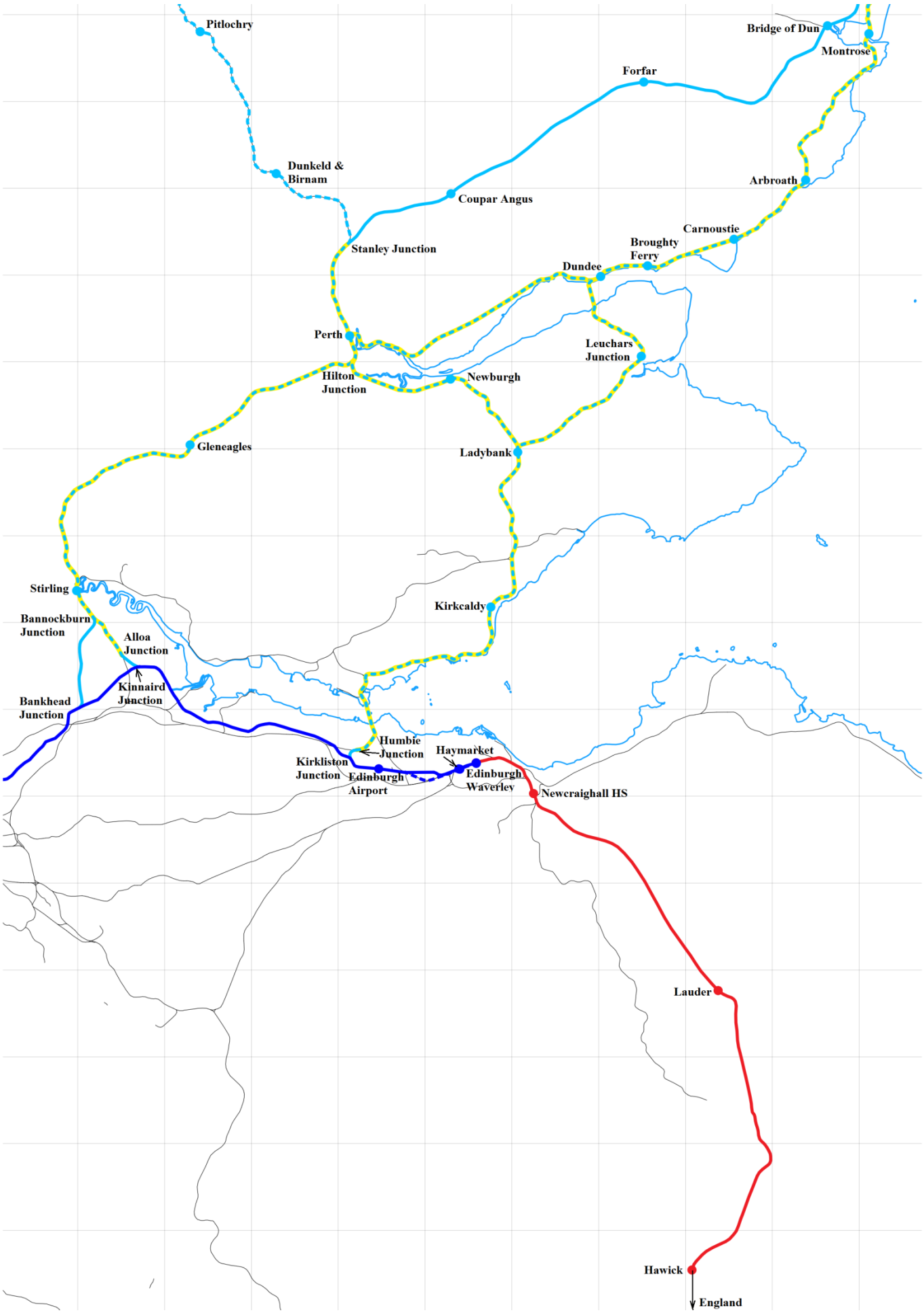

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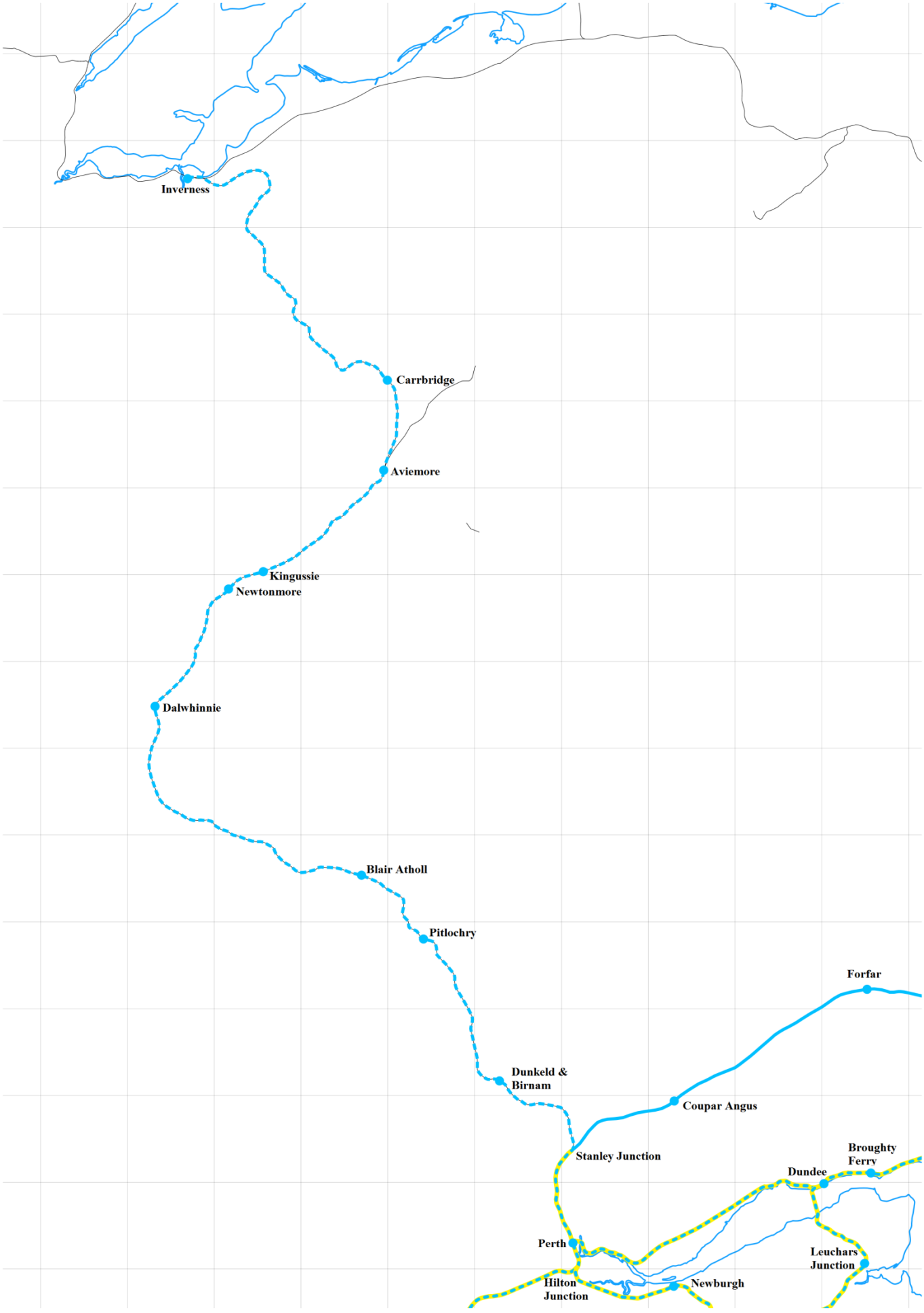

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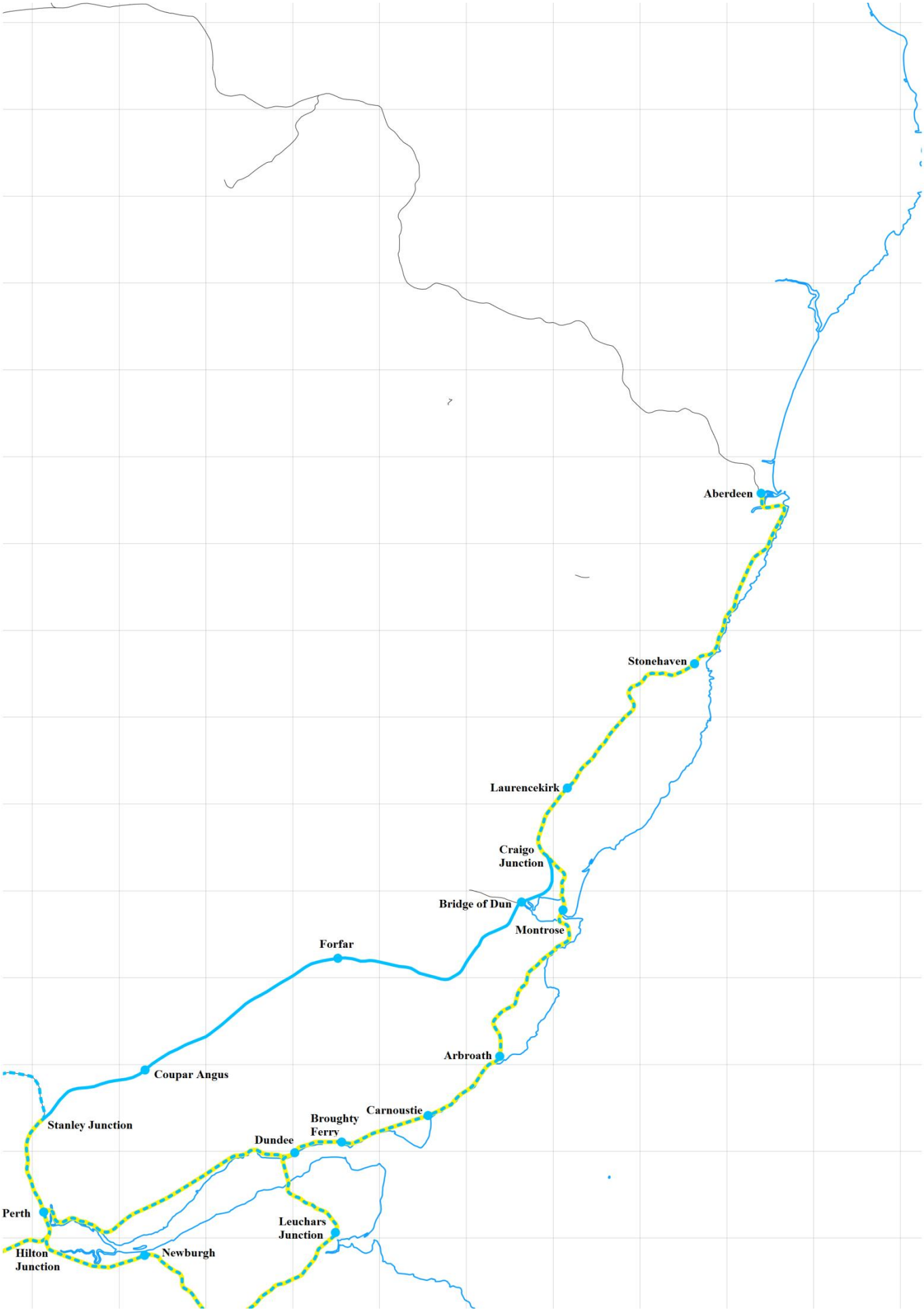

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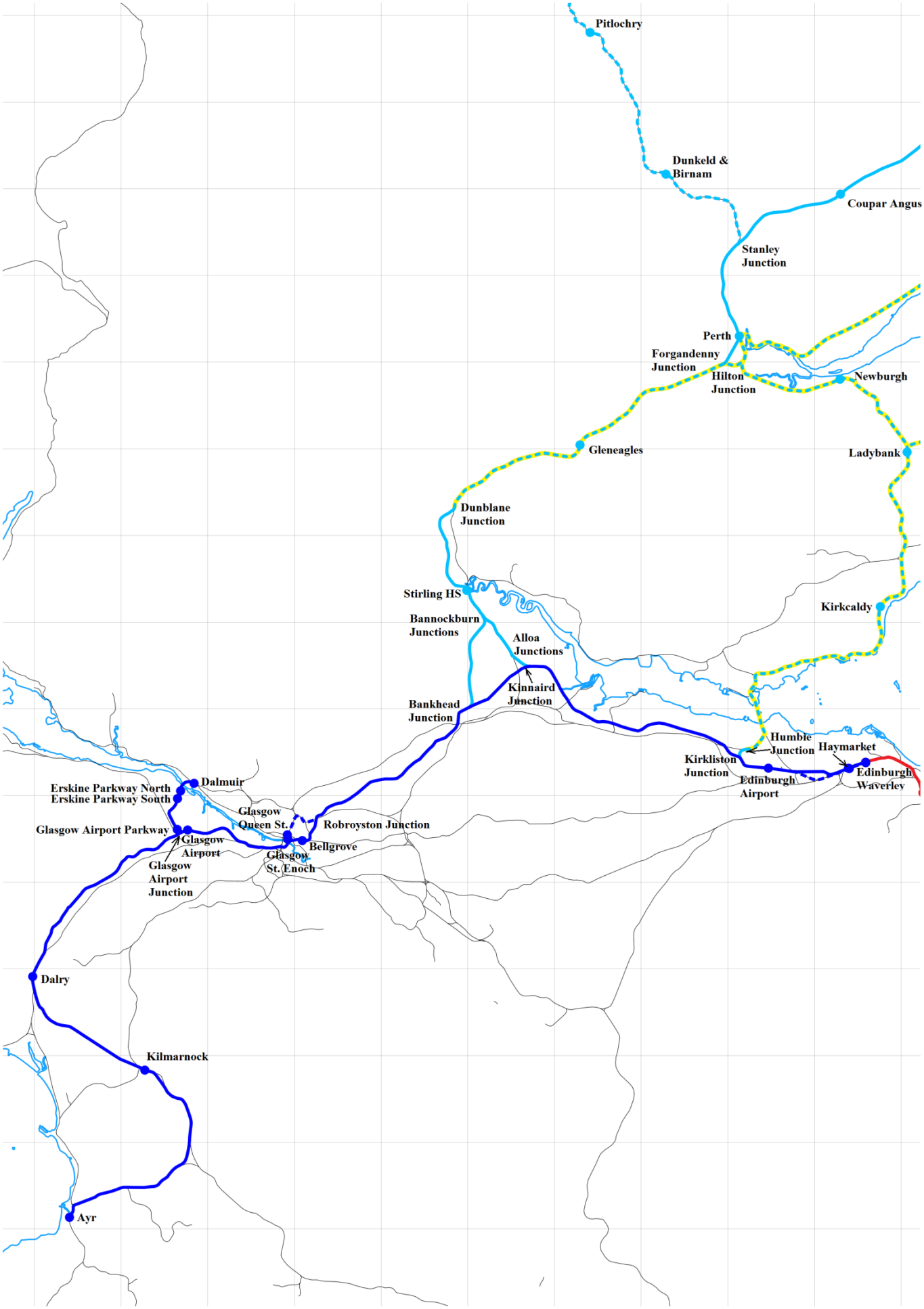

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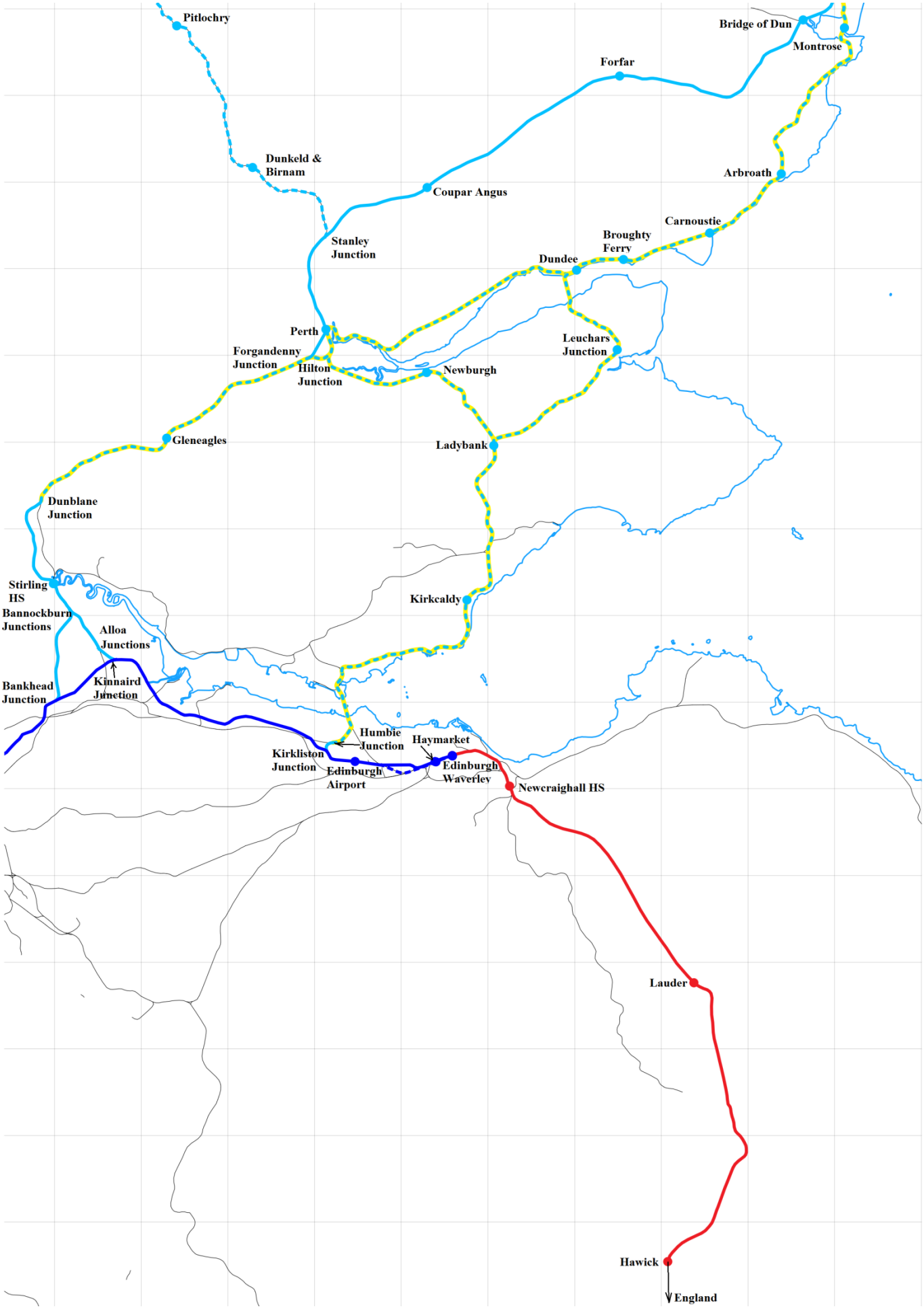

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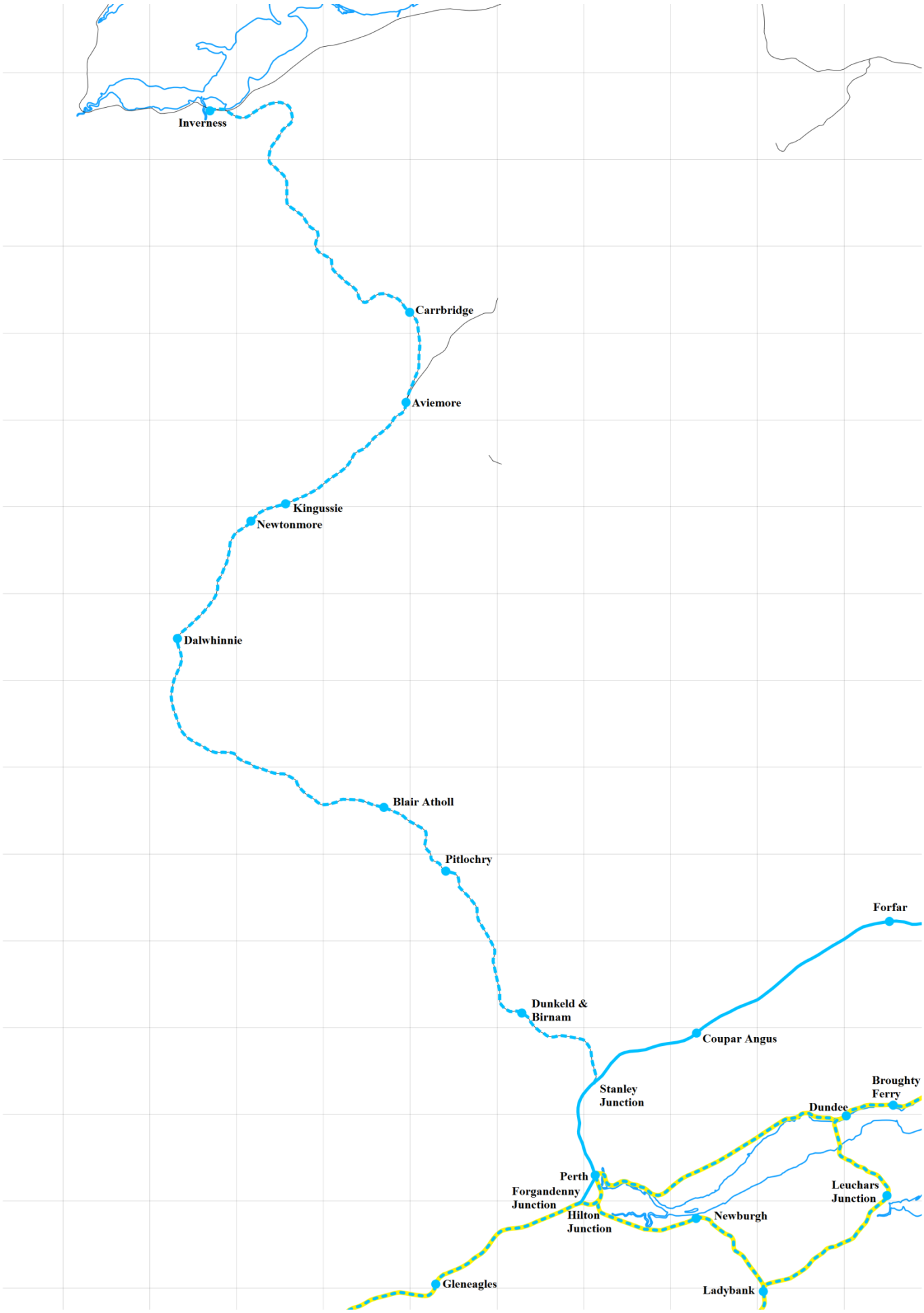

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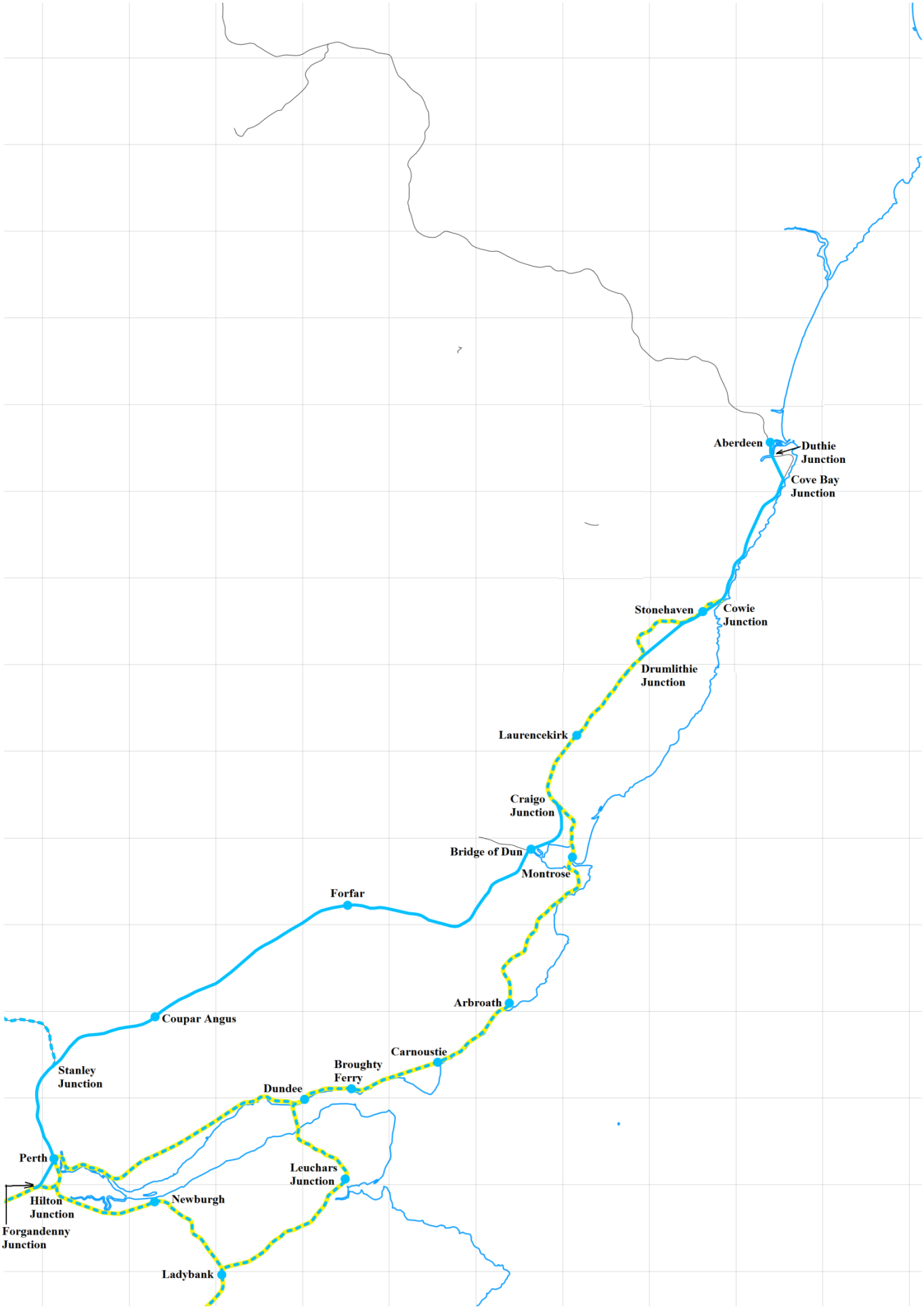

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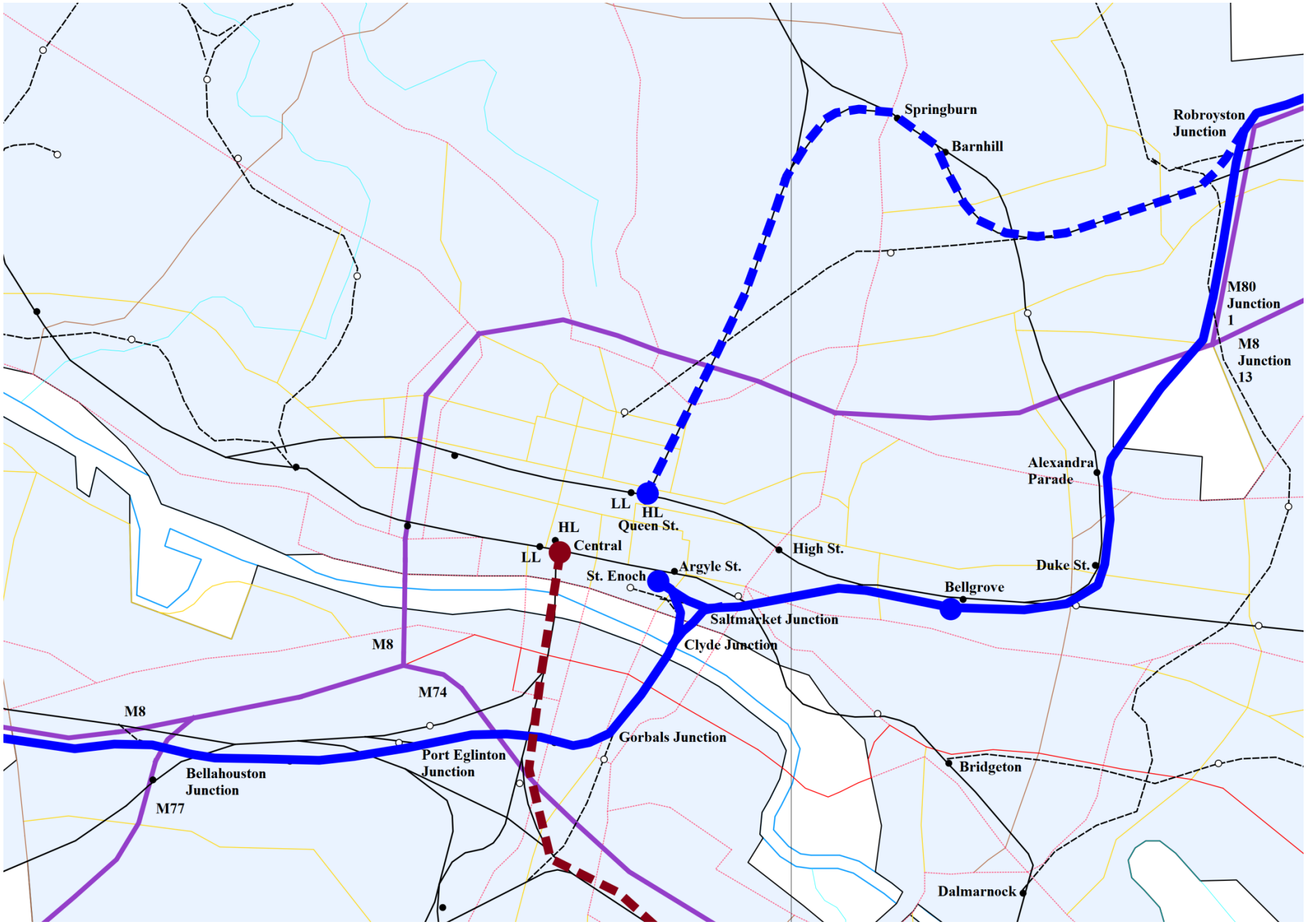

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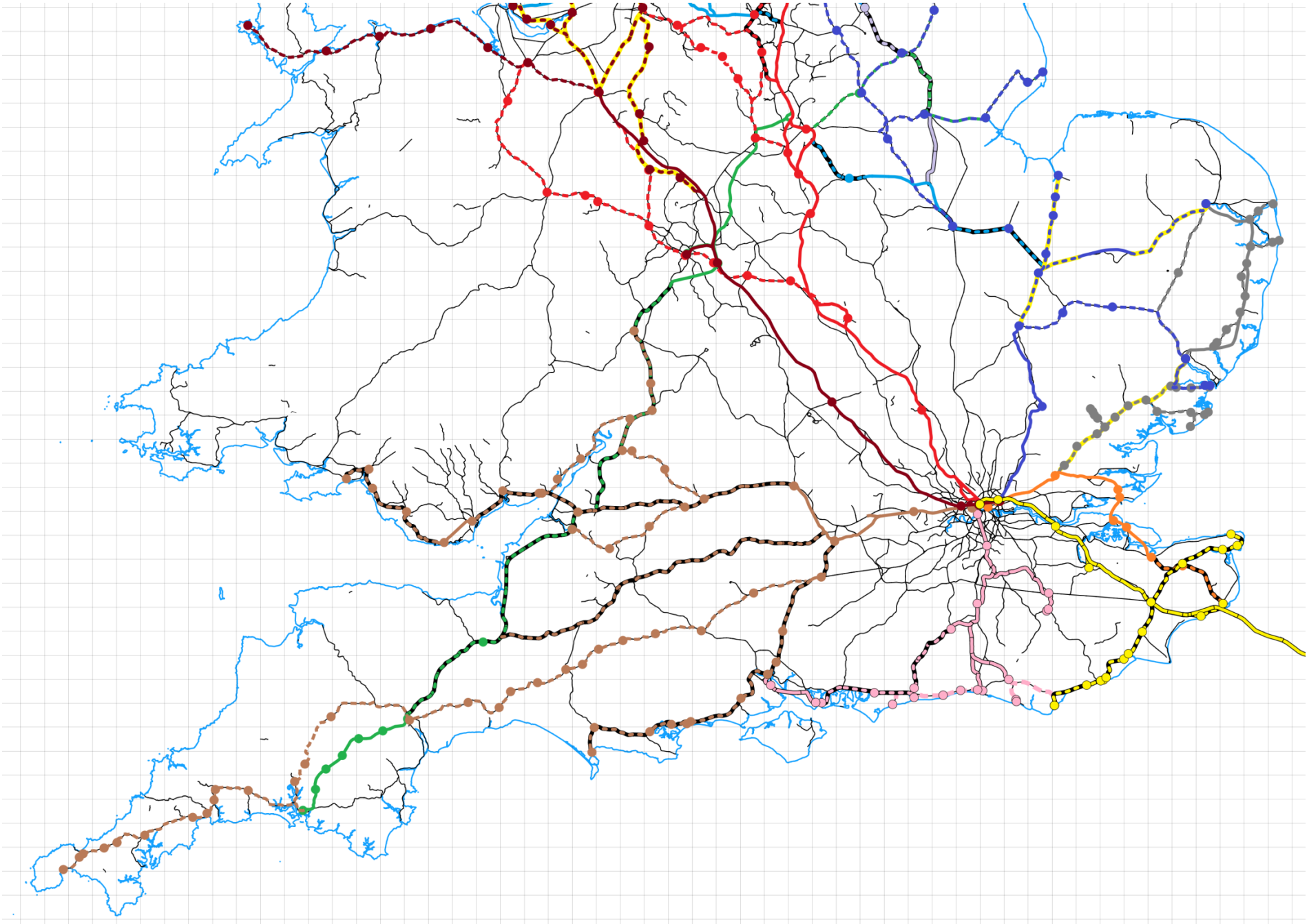

Complete HS Network, South Sheet

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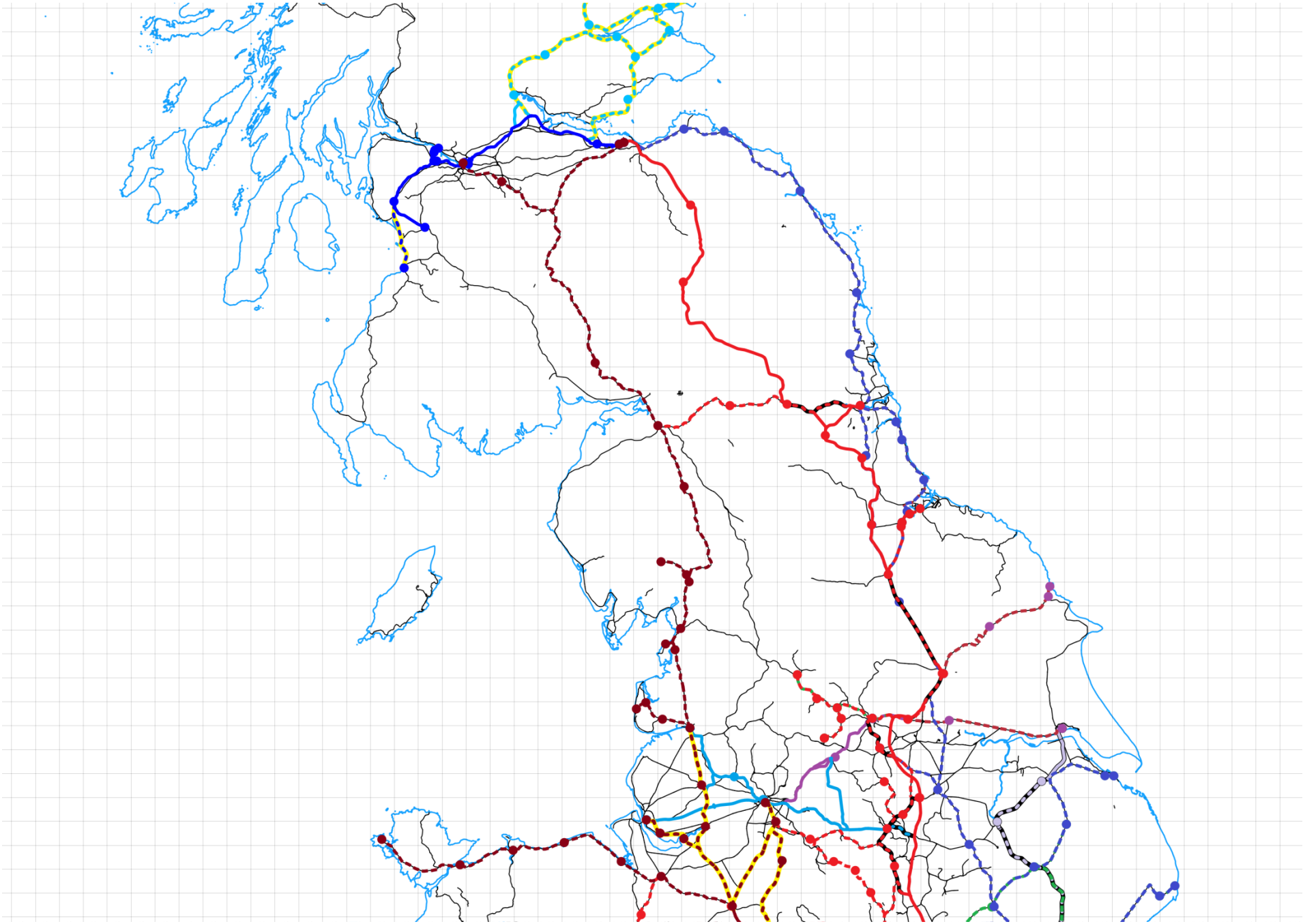

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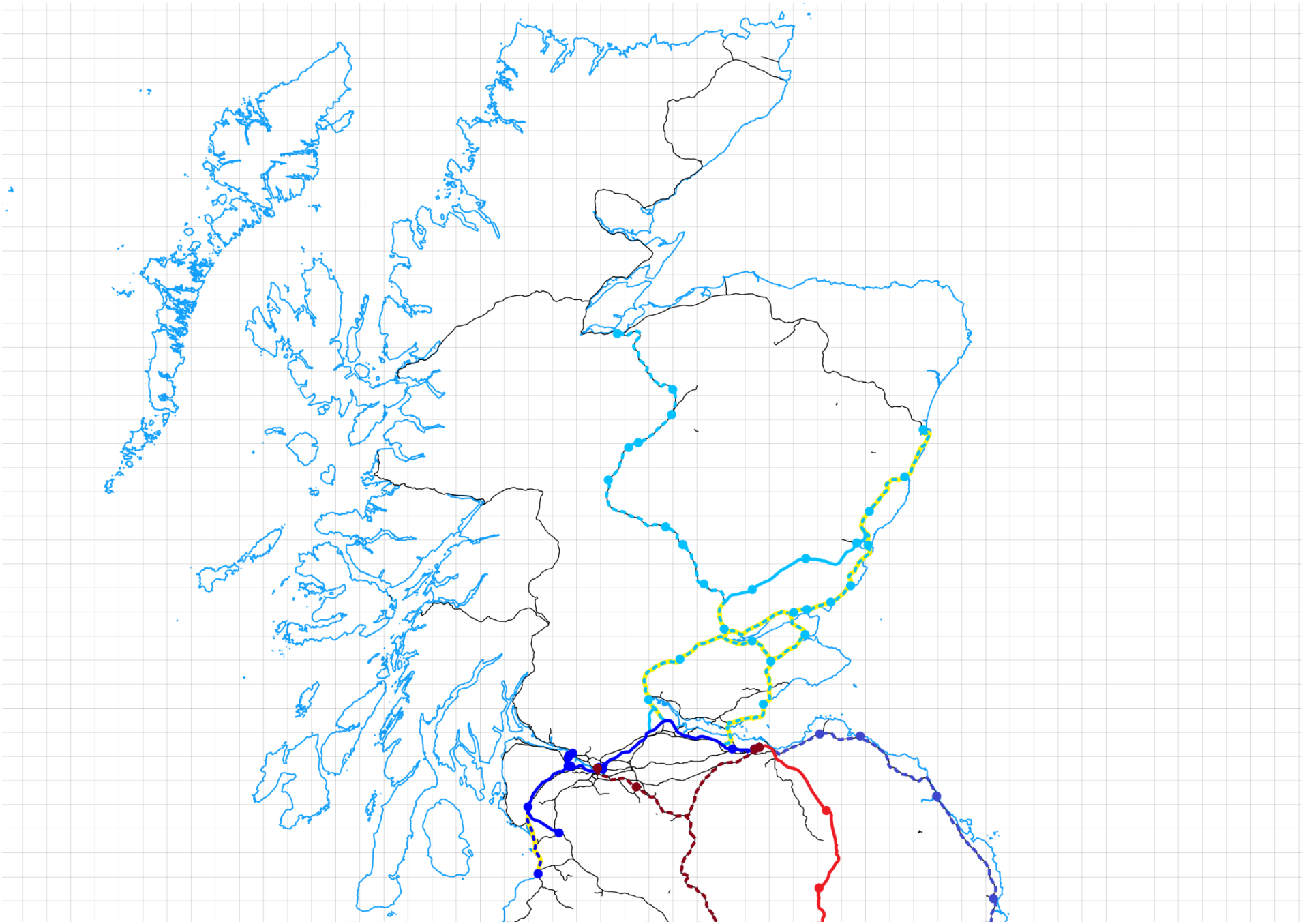

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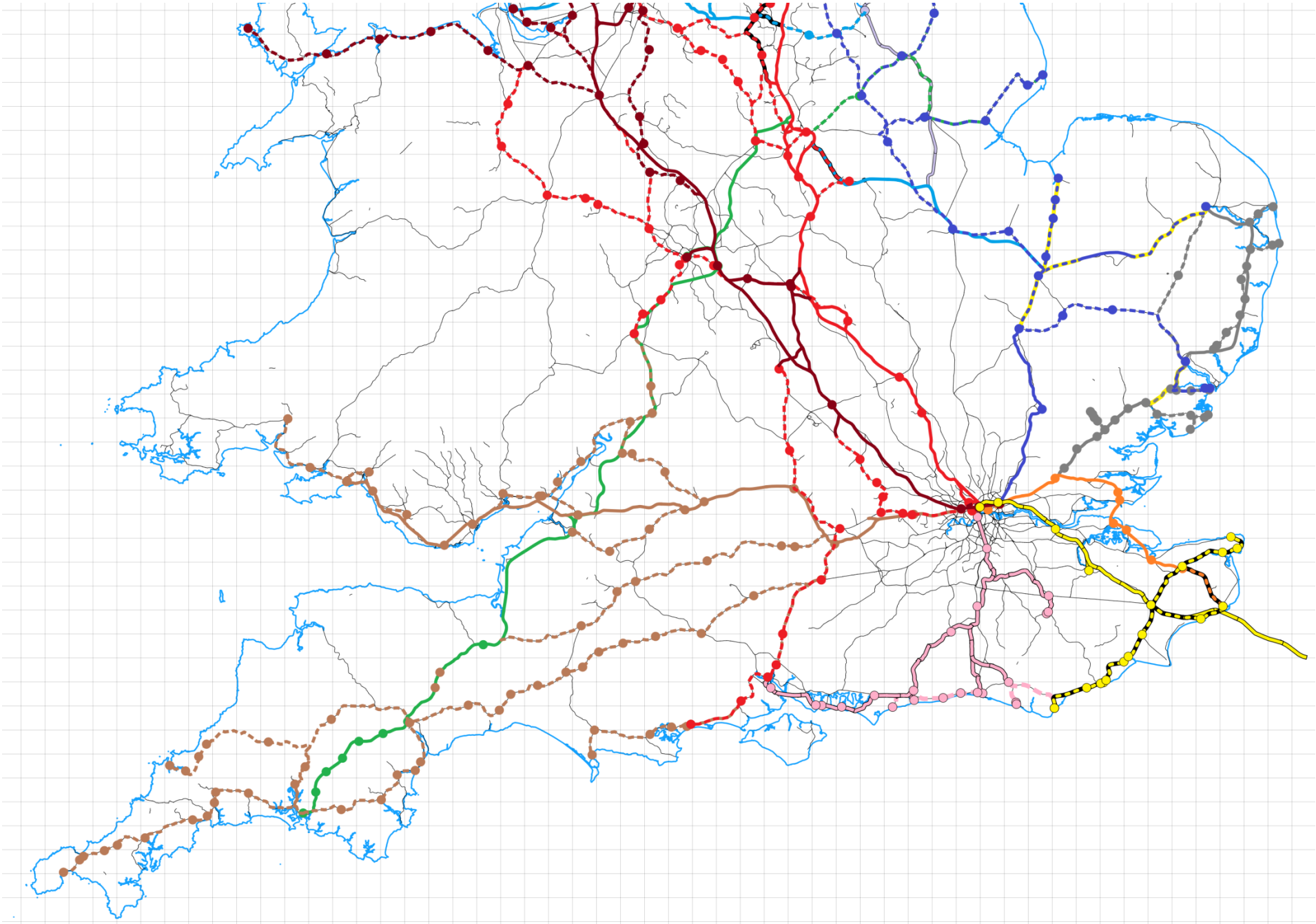

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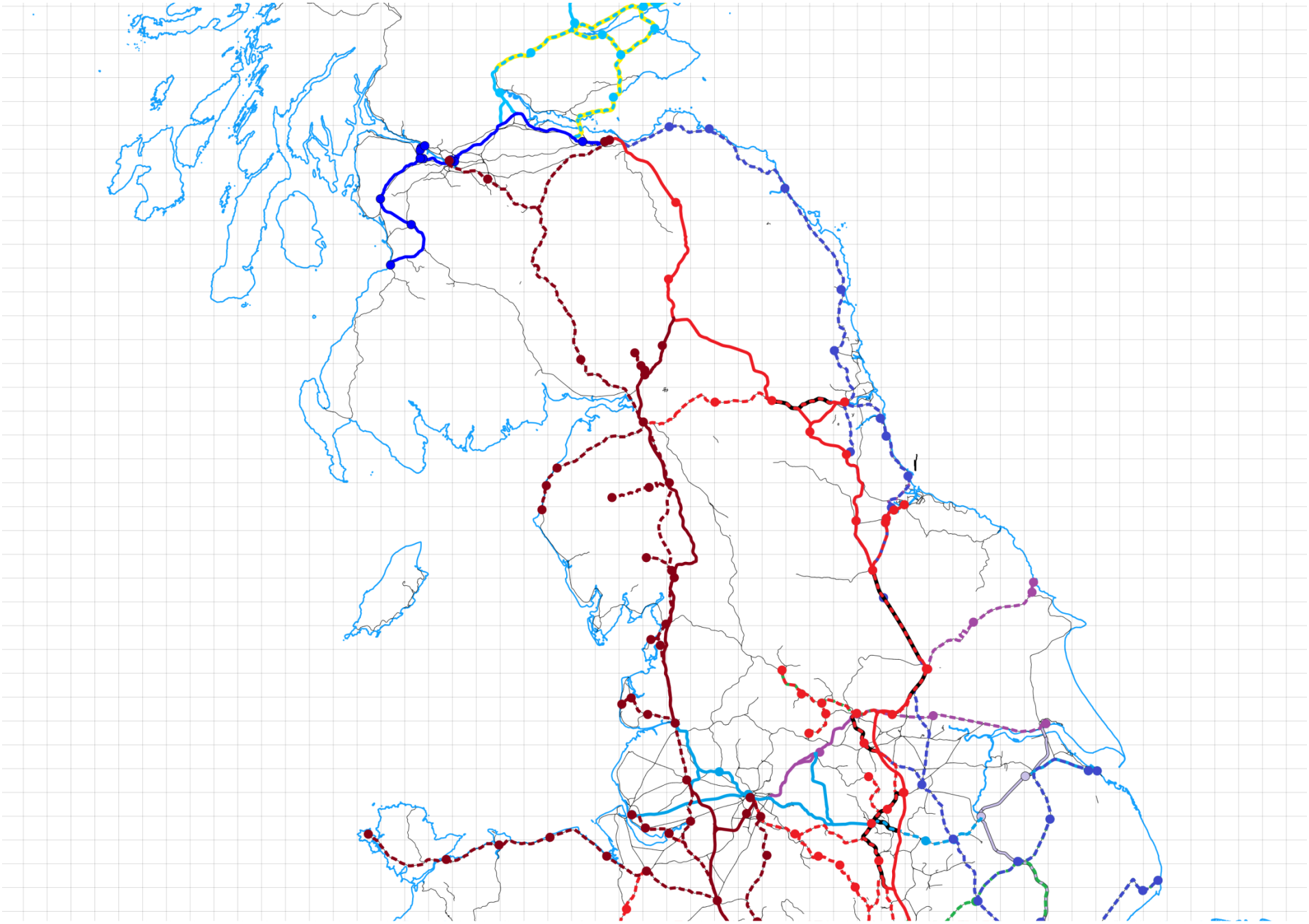

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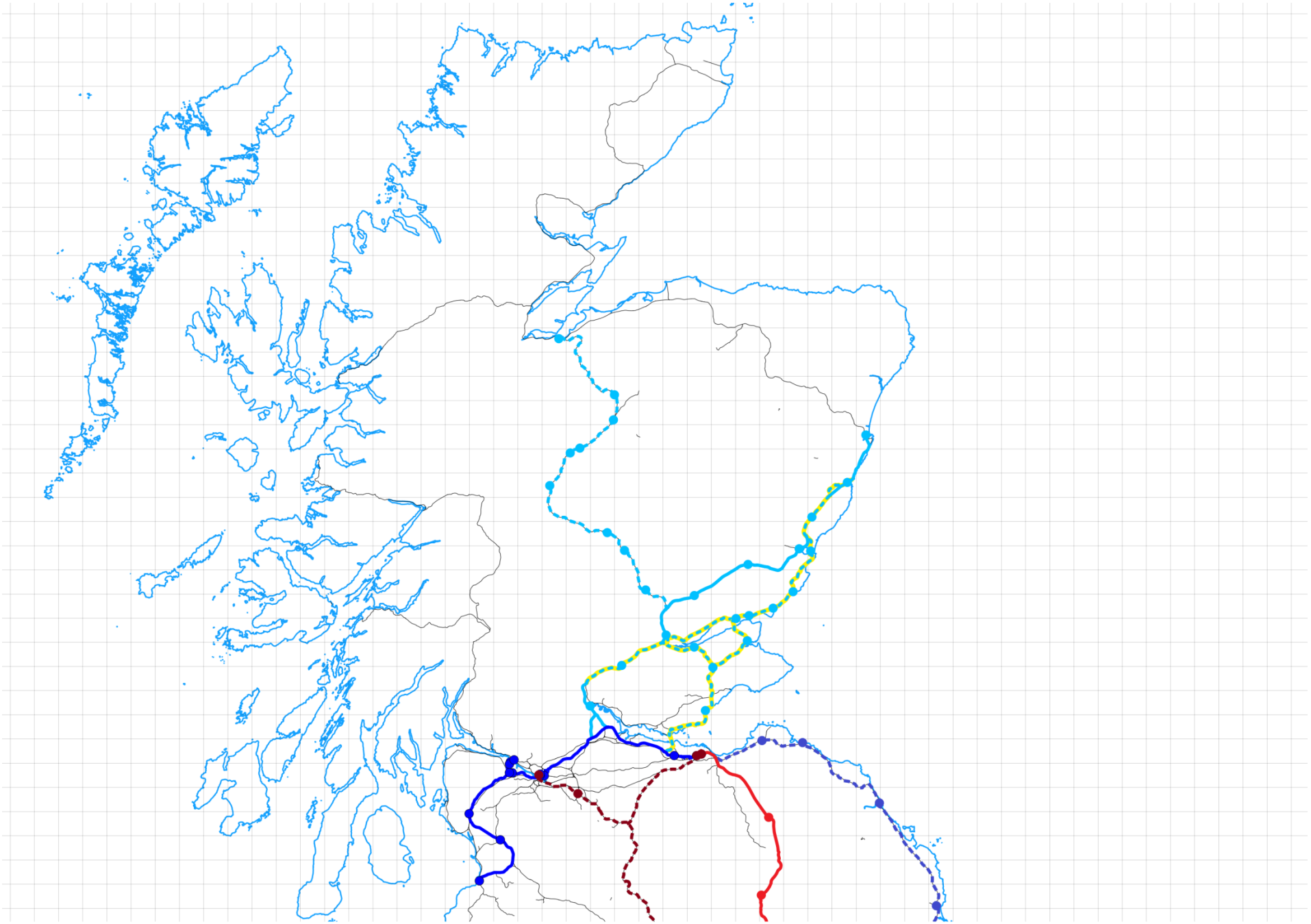

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The Service Plans

A new service plan comes into effect when some significant change takes place which causes a change to the service loadings of one or more sections of HS8 or HS9 themselves. This most commonly occurs when a new section of HS8 or HS9 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.

It is anticipated that Mk1A of the internal Scottish network will be completed before HS3 is extended to Edinburgh. Service Plan 5 deals with the complete recast of services when this happens. The previous service plans detail the incremental addition of new (Mk1A) infrastructure, and the build-up of the internal HS services.

The full plans, even at Mk1A, envisage four tracks between Gyle and Kirkliston junctions, two track pairs, one assigned to HS services and the other to RM. Four island platforms, thus four platform faces in each direction, will be provided at the airport station, the tracks so arranged that each island platform provides for cross-platform interchange between HS and RM services. This infrastructure must be ready for SP5 and the HS3 services. For the earlier stages, two tracks and two island platforms will suffice, with passive provision for the rest.

Service Plan 1

Service Plan 1 comes into effect when HS13 opens between Gyle Junction and Glasgow Bellgrove, then on to Glasgow Airport Parkway station, bypassing the not-yet-available St. Enoch, and travelling directly between Saltmarket and Clyde Junctions. The spur between Kirkliston and Humbie junctions is also provided.

HS provision at Edinburgh Waverley was originally seen as an extension to the north of the station, under Princes St. Appendix A, however, contains a discussion of alternative, and almost certainly preferable ,possibilities. See Appendix B for a similar discussion of Glasgow St. Enoch. I foresee no problems elsewhere in station provision, in particular, Dundee no longer needs to be rebuilt, following abandonment of GC gauge.

The point of the spur between Kirkliston and Humbie junctions is to allow HS and classic, Regional Metro services, from Edinburgh (and points south and east) to serve the airport, before re-joining the (western) approach to the Forth Bridge, and on to destinations in Fife, also Perth, Dundee and Aberdeen.

It is assumed that the Waverley route has been extended at least as far as Hawick.

The first version of the Tayside Metro is also introduced, providing connections between the HS Edinburgh services and St. Andrews and Cupar.

There are no dependencies in this service plan on any other HS route. The following service is introduced:

HS13:

- 8tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Glasgow Bellgrove – Glasgow Airport – Glasgow Airport Parkway

HS14:

- 1tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Kirkcaldy – Leuchars Junction – Dundee Tay Bridge – Arbroath – Montrose – Laurencekirk – Stonehaven – Aberdeen
- 1tphH Glasgow Queen St.- Stirling – Perth – Dundee Tay Bridge – Arbroath – Montrose – Laurencekirk – Stonehaven – Aberdeen
- 1tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Kirkcaldy –Ladybank – Newburgh – Perth – Dunkeld & Birnam – Pitlochry – Blair Atholl – Dalwhinnie – Newtonmore – Kingussie – Aviemore – Carrbridge – Inverness
- 1tphH Glasgow Queen St. – Stirling – Perth – Dunkeld & Birnam – Pitlochry – Blair Atholl – Dalwhinnie – Newtonmore – Kingussie – Aviemore – Carrbridge – Inverness

The associated Regional Metro services are:

- 2tphR Hawick – St. Boswells – Melrose – Tweedbank – Galashield – Edinburgh Waverley – Haymarket – Edinburgh Airport – Dunfermline Town – Glenrothes with Thornton – Markinch – Ladybank – Springfield – Cupar – Leuchars Junction – Dundee
- 2tphR Hawick – St. Boswells – Melrose – Tweedbank – Galashield – Stow – Gorebridge – Newtongrange – Eskbank – Shawfair – Newcraighall – Brunstane – Edinburgh Waverley – Haymarket – Edinburgh Airport – Dunfermline Town – Glenrothes with Thornton – Markinch – Ladybank – Newburgh – Abernethy – Bridge of Earne – Perth
- 2tphR Edinburgh Waverley – Haymarket – Edinburgh Airport – Dunfermline Town (reverse) – Cairneyhill – Torryburn – Culross – Kincardine – Kilbagie – Clackmannan – Alloa – Cambus – Causewayhead – Stirling
- 2tphR Edinburgh Waverley – Haymarket – Edinburgh Park – Linlithgow – Polmont – Falkirk – Grahameston – Falkirk Camelon – Larbert – Stirling
- 2tphRS Newcraighall – Brunstane – Edinburgh Waverley – Haymarket – South Gyle – Edinburgh Airport – Dalmeny – North Queensferry – Inverkeithing – Rosyth – Dunfermline Town – Dunfermline Queen Margaret – Crossgates – Cowdenbeath – Lochgelly – Cardenden – Glenrothes with Thornton – Kirkcaldy – Kinghorn – Burntisland – Aberdour – Dalgety Bay – Inverkeithing –> Edinburgh (Fife Circle, clockwise)

- 2tphRS Newcraighall – Brunstane – Edinburgh Waverley – Haymarket – South Gyle – Edinburgh Airport – Dalmeny – North Queensferry – Inverkeithing – Dalgety Bay – Aberdour – Burntisland – Kinghorn – Kirkcaldy – Glenrothes with Thornton – Cardenden – Lochgelly – Cowdenbeath – Crossgates – Dunfermline Queen Margaret – Dunfermline Town – Rosyth – Inverkeithing –> Edinburgh (Fife Circle, counterclockwise)
- 2tphRS Glasgow Queen St. – Stepps – Gartcosh – Cumbernauld – Larbert – Stirling – Bridge of Allan – Dunblane – Gleneagles – Perth – Invergowrie – Dundee
- 2tphRS Glasgow Queen St. – Stepps – Gartcosh – Cumbernauld – Falkirk Camelon - Falkirh Grahamston – Grangemouth
- 2tphR Glasgow Central – Paisley Gilmout St. – Glasgow Airport Parkway – Bishopton – Port Glasgow – Whinhill – Drumfrochar – Branchton – IBM – Inverkip – Wemyss Bay
- 2tphR Glasgow Central – Paisley Gilmout St. – Glasgow Airport Parkway – Bishopton – Port Glasgow – Greenock Central – Greenock West – Port Matilda – Gourock
- 2tphRS Glasgow Central – Cardonald – Hillingdon East – Hillingdon West – Paisley Gilmout St. – Paisley St. James – Glasgow Airport Parkway – Bishopton – Langbank – Woodhall – Port Glasgow – Bogston – Cartsdyke – Greenock Central – Greenock West – Port Matilda – Gourock

The Tayside Metro services relevant in the present context are:

- 4tphRS Monikie – Wellbank Parkway – Kingennie – Grange Parkway – Barnhill – Broughty Ferry – West Ferry – Craigie and Stannergate – Dundee East – Town Hall – Dundee Tay Bridge (street level) – Esplanade – Wormit West – St. Fort – Leuchars Junction –:
  – Guard Bridge – St. Andrews (2tph)
  – Darsie – Cupar – Springfield – Ladybank (2tph)
- 4tphRS Arbroath – Carnoustie – Golf St. – Barry Links – Monifieth – Balmossie – Broughty Ferry – West Ferry – Craigie and Stannergate – Dundee East – Town Hall – Dundee Tay Bridge (street level) – Magdalen Green – Dundee Airport – Ninewells – Invergowrie – Kingoodie Parkway

Service Plan 1a

Service Plan 1a comes into effect when HS13 opens between Glasgow Airport Parkway and Dalmuir, and Glasgow St. Enoch opens, with connections to Saltmarket and Clyde junctions..

The new St. Enoch will be very much smaller than the original, due to space constraints, with, probably, just 4 platforms (2 islands). See appendix B for more on St. Enoch. `

Of the 8tph from Edinburgh, 4tph will continue on to Dalmuir, avoiding St. Enoch, and the other 4tph will terminate at St. Enoch. There will be a service of 4tph between St. Enoch and Dalmuir, thus:

- 4tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Glasgow Bellgrove – Glasgow St. Enoch
- 4tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Glasgow Bellgrove – Glasgow Airport – Glasgow Airport Parkway – Erskine Parkway South – Erskine Parkway North – Dalmuir

- 4tphH Glasgow St. Enoch – Glasgow Airport – Glasgow Airport Parkway – Erskine Parkway South – Erskine Parkway North – Dalmuir

The associated Regional Metro services are unchanged.

Representative Hourly Cross-Platform Interchange Pattern at Edinburgh Airport:

00H Edinburgh Waverley – Glasgow St. Enoch
R Edinburgh Waverley – Stirling via Dunfermline

05H Edinburgh Waverley – Aberdeen via Dundee / Inverness via Ladybank (at 35)
RS Edinburgh Waverley – Fife Circle, clockwise

10H Edinburgh Waverley – Dalmuir via Glasgow Airport
R Hawick – Dundee

15H Edinburgh Waverley – Glasgow St. Enoch
(no connection)

20RS Edinburgh Waverley – Fife Circle, counterclockwise
(no connection)

25H Edinburgh Waverley – Dalmuir via Glasgow Airport
R Hawick – Perth

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

Representative Hourly Non-Cross-Platform Interchange Pattern at Falkirk Grahamston:

00RS Edinburgh Waverley – Stirling
RS Glasgow Queen St. – Grangemouth

– repeating at 30 minutes pasrt.

Representative Hourly Non-Cross-Platform Interchange Pattern at Glasgow Airport Parkway:

00H Edinburgh Waverley – Dalmuir
R Glasgow Central – Gourock semi-fast

07H Glasgow St. Enoch – Dalmuir
(no connection)

15H Edinburgh Waverley – Dalmuir
RS Glasgow Central – Gourock stopping

23H Glasgow St. Enoch – Dalmuir
RS Glasgow Central – Wemyss Bay

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

Service plan 1 overall imposes the following loadings on HS13:

- Edinburgh Waverley – Kirkliston Junction 20tph
- Kirkliston Junction – Humbie Junction 12tph
- Kirkliston Junction – Saltmarket Junction 8tph
- Saltmarket Junction – Glasgow St. Enoch 4tph
- Saltmarket Junction – Clyde Junction 4tph
- Glasgow St. Enoch – Clyde Junction 4tph
- Clyde Junction – Dalmuir 8tph

and on HS14:

- Glasgow Queen St. (via Lenzie) – Carmuirs West Junction 2tph
- Glasgow Queen St. (via Cumbernauld) – Carmuirs West Junction 4tph
- Carmuirs West Junction – Larbert Junction 4tph
- Larbert Junction – Stirling 6tph
- Stirling – Perth 4tph
- Perth – Inverness 2tph
- Perth – Dundee 3tph
- Humbie Junction – Inverkeithing 12tph
- Inverkeithing – Thornton South Junction 4tph
- Thornton South Junction – Thornton North Junction 2tph
- Thornton North Junction – Ladybank 6tph
- Ladybank – Perth 3tph
- Ladybank – Leuchars Junction 5tph
- Leuchars Junction – Dundee 7tph
- Ladybank – Dundee 2tph
- Dundee – Aberdeen 2tph

(Tayside Metro services are included between Ladybank / Leuchars Junction and Dundee, but not elsewhere.)

Service Plan 2

Service Plan 2 comes into effect when HS14 opens between Kinnaird Junction and Alloa Junction, and between Bankhead Junction and Bannockburn Junction.

The following new and amended services are introduced on HS14:

- 1tphH Glasgow Queen St. – Stirling – Perth – Dundee – Arbroath – Montrose – Laurencekirk – Stonehaven – Aberdeen (now travels via HS13 between Robroyston and Bankhead junctions)
- 1tphH Glasgow Queen St. – Stirling – Gleneagles – Perth – Dunkeld & Birnam – Pitlochry – Blair Atholl – Dalwhinnie – Newtonmore – Kingussie – Aviemore – Carrbridge – Inverness (now travels via HS13 between Robroyston and Bankhead junctions)
- 1tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Stirling – Perth – Dunkeld & Birnam – Pitlochry – Blair Atholl – Dalwhinnie – Newtonmore – Kingussie – Aviemore – Carrbridge – Inverness (replaces the Edinburgh – Inverness service via Ladybank)
- 1tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Kirkcaldy – Ladybank – Newburgh – Perth (new service, replacing that portion of the Edinburgh – Inverness service now routed via Stirling)
- [The Edinburgh – Aberdeen service is unchanged from SP1.]

The Regional Metro services are unchanged from SP1.

Service plan 2 imposes the following loadings on HS13:

- Edinburgh Waverley – Kirkliston Junction 21tph
- Kirkliston Junction – Humbie Junction 12tph
- Kirkliston Junction – Kinnaird Junction 9tph
- Kinnaird Junction – Bankhead Junction 8tph
- Bankhead Junction – Robroyston Junction 10tph
- Robroyston Junction – Glasgow Queen St. 2tph
- Robroyston Junction – Saltmarket Junction 8tph
- Saltmarket Junction – Glasgow St. Enoch 4tph
- Saltmarket Junction – Clyde Junction 4tph
- Glasgow St. Enoch – Clyde Junction 4tph
- Clyde Junction – Dalmuir 8tph

– and the following loadings on HS14:

- Kinnaird Junction – Alloa Junction 1tph
- Alloa Junction – Bannockburn Junction 5tph
- Bankhead Junction – Bannockburn Junction 2tph
- Bannockburn Junction – Stirling 7tph
- Stirling – Perth 5tph
- Perth – Inverness 2tph
- Perth – Dundee 3tph
- Humbie Junction – Inverkeithing 12tph
- Inverkeithing – Thornton South Junction 4tph
- Thornton South Junction – Thornton North Junction 2tph

- Thornton North Junction – Ladybank 6tph
- Ladybank – Perth 3tph
- Ladybank – Leuchars Junction 5tph
- Leuchars Junction – Dundee 7tph
- Ladybank – Dundee 2tph
- Dundee – Aberdeen 2tph

Service Plan 3

Service Plan 3 comes into effect when HS14 opens between Stanley Junction and Craigo Junction.

The following services are introduced, (new, as noted,) or, otherwise, are unchanged from service plan 2:

- 1tphH Glasgow St. Enoch – Glasgow Bellgrove – Stirling – Perth – Aberdeen ('fast') [New]
- 1tphH Glasgow St. Enoch – Glasgow Bellgrove – Stirling – Gleneagles – Perth – Coupar Angus – Forfar – Bridge of Dun – Laurencekirk – Stonehaven – Aberdeen ('stopping') [New]
- 1tphH Glasgow Queen St. – Stirling – Perth –Dundee – Arbroath – Montrose – Laurencekirk – Stonehaven – Aberdeen ('via Dundee')
- 1tphH Glasgow Queen St. – Stirling – Gleneagles – Perth – Dunkeld & Birnam – Pitlochry – Blair Atholl – Dalwhinnie – Newtonmore – Kingussie – Aviemore – Carrbridge – Inverness
- 1tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Stirling – Perth – Aberdeen ('fast') [New]
- 1tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Stirling – Gleneagles – Perth – Coupar Angus – Forfar – Bridge of Dun – Laurencekirk – Stonehaven – Aberdeen ('stopping') [New]
- 1tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Kirkcaldy – Leuchars Junction – Dundee – Arbroath – Montrose – Laurencekirk – Stonehaven – Aberdeen ('via Dundee')
- 1tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Stirling – Gleneagles – Perth – Dunkeld & Birnam – Pitlochry – Blair Atholl – Dalwhinnie – Newtonmore – Kingussie – Aviemore – Carrbridge – Inverness
- 1tphH Edinburgh Waverley – Haymarket – Edinburgh Airport – Kirkcaldy – Ladybank – Newburgh – Perth

Representative Hourly Cross-Platform Interchange Pattern at Perth:

00H Glasgow St. Enoch – Aberdeen (fast)
H Edinburgh Waverley – Aberdeen (stopping)
R Hawick – Perth (**not** cross-platform)
RS Glasgow Queen St. – Dundee (**not** cross-platform)

15H Glasgow Queen St. – Aberdeen (via Dundee)
H Edinburgh Waverley – Inverness (**not** cross-platform)

30H Edinburgh Waverley – Aberdeen (fast)
H Glasgow St. Enoch – Aberdeen (stopping)
R Hawick – Perth (**not** cross-platform)

45H Glasgow Queen St. – Inverness
H Edinburgh Waverley – Perth (**not** cross-platform)

Representative Hourly Cross-Platform Interchange Pattern at Dundee Tay Bridge:

00H Glasgow Queen St. – Aberdeen
R Hawich – Dundee
RS Glasgow Queen St. – Dundee

30H Edinburgh Waverley – Aberdeen
R Hawich – Dundee
RS Glasgow Queen St. – Dundee

Service plan 3 overall imposes the following loadings on HS13:

- Edinburgh Waverley – Kirkliston Junction 23tph
- Kirkliston Junction – Humbie Junction 12tph
- Kirkliston Junction – Kinnaird Junction 11tph
- Kinnaird Junction – Bankhead Junction 8tph
- Bankhead Junction – Robroyston Junction 12tph
- Robroyston Junction – Glasgow Queen St. 2tph
- Robroyston Junction – Saltmarket Junction 10tph
- Saltmarket Junction – Glasgow St. Enoch 10tph
- Saltmarket Junction – Clyde Junction 4tph
- Glasgow St. Enoch – Clyde Junction 4tph
- Clyde Junction – Dalmuir 8tph

– and the following loadings on HS14:

- Kinnaird Junction – Alloa Junction 3tph
- Alloa Junction – Bannockburn Junction 7tph
- Bankhead Junction – Bannockburn Junction 4tph
- Bannockburn Junction – Stirling 11tph
- Stirling – Perth 9tph
- Perth – Stanley junction 6tph
- Stanley junction – Craigo Junction 4tph
- Perth – Dundee 3tph
- Humbie Junction – Inverkeithing 12tph
- Inverkeithing – Thornton South Junction 4tph
- Thornton South Junction – Thornton North Junction 2tph
- Thornton North Junction – Ladybank 6tph
- Ladybank – Perth 3tph
- Ladybank – Leuchars Junction 5tph
- Leuchars Junction – Dundee 7tph
- Ladybank – Dundee 2tph
- Dundee – Craigo Junction 2tph
- Craigo Junction – Aberdeen 6tph

Service Plan 4

Service Plan 4 comes into effect when HS13 opens between Glasgow Airport Junction and Kilmarnock.

The services of plan 3 are unchanged, and the following service is introduced

- 4tphH Glasgow St. Enoch – Glasgow Airport – Dalry (split / Join) –:
  – Kilmarnock
  – Ayr

The associated Regional Metro services are:

- 2tphR Glasgow Central – Paisley Gilmour St. – Johnstone – Milliken Park – Howwood – Lochwinnoch – Glengarnock – Dalry – Kilwinning – Stevenston – Saltcoats – Ardrossan South Beach – Ardrossan Town – Ardrossan Harbour
- 2tphR Glasgow Central – Paisley Gilmour St. – Dalry – Kilwinning – Ardrossan South Beach – West Kilbride – Fairlie – Largs
- 2tphR Glasgow Central – Paisley Gilmour St. – Johnstone – Milliken Park – Howwood – Lochwinnoch – Glengarnock – Dalry – Kilwinning – Irvine – Barassie – Troon – Prestwick Intl Airport – Prestwick Town – Newton on Ayr – Ayr
- 2tphR Glasgow Central – Paisley Gilmour St. – Dalry – Kilwinning – Irvine –Troon – Prestwick Intl Airport – Prestwick Town – Ayr

Representative Hourly Cross-Platform Interchange Pattern at Dalry:

00H Glasgow St. Enoch – Kilmarnock / Ayr
R Glasgow Central – Ardrossan Harbour

07H Glasgow St. Enoch – Kilmarnock / Ayr
R Glasgow Central – Ayr (semi-fast)

15H Glasgow St. Enoch – Kilmarnock / Ayr
R Glasgow Central – Ayr (all stations)

23H Glasgow St. Enoch – Kilmarnock / Ayr
R Glasgow Central – Largs

Service plan 4 overall imposes the following loadings on HS13:

• Edinburgh Waverley	– Kirkliston Junction	23tph
• Kirkliston Junction	– Humbie Junction	12tph
• Kirkliston Junction	– Kinnaird Junction	11tph
• Kinnaird Junction	– Bankhead Junction	8tph
• Bankhead Junction	– Robroyston Junction	12tph
• Robroyston Junction	– Glasgow Queen St.	2tph
• Robroyston Junction	– Saltmarket Junction	10tph
• Saltmarket Junction	– Glasgow St. Enoch	10tph
• Saltmarket Junction	– Clyde Junction	4tph
• Glasgow St. Enoch	– Clyde Junction	8tph
• Clyde Junction	– Glasgow Airport Junction	12tph

- Glasgow Airport Junction – Dalmuir 8tph
- Glasgow Airport Junction – Kilmarnock / Ayr 4tph

– with no change to the loadings of HS14.

Service Plan 5

Service Plan 5 comes into effect when HS3 opens through to Edinburgh and HS services from the south begin. (This is HS3 SP3A.) Before this can happen, several very important developments (in addition to all those detailed in the first four service plans) must have taken place:

- The long term provision for HS services at both Edinburgh Waverley and Glasgow St. Enoch must have been decided and implemented. (See appendices A and B for necessary background.)
- Provision of terminal platforms at Newcraighall, for both HS and RM services must be complete. (The precise nature of this provision depends on the plans for Waverley – see appendix A – but there will certainly still be the need.)
- Provision of originating locations east of Edinburgh on the ECML must be made; the suggestion is to reopen the former Gullane and Haddington branches. Other proposed origins are North Berwick and Dunbar.
- The HS route from Waverley HS to Kirkliston Junction must be in place; this takes over the trackbed of the former Corstorphine branch, and gives four tracks between Gyle and Kirkliston junctions, and four platform faces in each direction at the airport station, so arranged as to give cross-platform connections between HS and RM services.

At service plan 5 the services are completely recast, so, for clarity, rather than listing the new services / changes from service plan 4, the entire service plan is expounded in its totality.

HS-Classic services from routes other than HS3 which terminate in Edinburgh are included, and also ECML regional metro services.

HS13 Services:

- 2tphH HS3 Eastbourne – Lewes – Gatwick Airport – East Croydon – Victoria (LL) – Pancras Cross – York – Darlington Bank Top – Durham Relly Mill – Consett – Hexham – Hawick – Edinburgh Waverley HS – Haymarket HS – Edinburgh Airport – Glasgow Bellgrove – Glasgow St. Enoch
- 2tphH HS3: Newcastle – Hexham – Hawick – Lauder – Edinburgh Waverley HS – Haymarket HS – Edinburgh Airport – Glasgow Bellgrove – Glasgow St. Enoch
- 4tphH Newcraighall HS – Edinburgh Waverley HS – Haymarket HS – Edinburgh Airport – Glasgow Bellgrove – Glasgow Airport – Glasgow Airport Parkway – Erskine Parkway South – Erskine Parkway North – Dalmuir
- 4tphH Glasgow St. Enoch – Glasgow Airport – Glasgow Airport Parkway – Erskine Parkway South – Erskine Parkway North – Dalmuir
- 4tphH Glasgow St. Enoch – Glasgow Airport – Dalry (splits / joins) –:
  – Kilmarnock
  – Ayr

HS14 Services:

- 2tphH Glasgow St. Enoch – Glasgow Bellgrove – Stirling – Perth – Aberdeen (‘fast’)
- 2tphH Newcraighall HS – Edinburgh Waverley HS – Haymarket HS – Edinburgh Airport – Stirling – Perth – Aberdeen (‘fast’)
- 2tphH Glasgow St. Enoch – Glasgow Bellgrove – Stirling – Gleneagles – Perth – Coupar Angus – Forfar – Bridge of Dun – Laurencekirk – Stonehaven – Aberdeen (‘stopping’)
- 2tphH Newcraighall HS – Edinburgh Waverley HS – Haymarket HS – Edinburgh Airport – Stirling – Gleneagles – Perth – Coupar Angus – Forfar – Bridge of Dun – Laurencekirk – Stonehaven – Aberdeen (‘stopping’)
- 2tphH Glasgow Queen St. – Stirling – Perth – Dundee – Arbroath – Montrose – Laurencekirk – Stonehaven – Aberdeen
- 2tphH Newcraighall HS – Edinburgh Waverley HS – Haymarket HS – Edinburgh Airport – Kirkcaldy – Leuchars Junction – Dundee – Arbroath – Montrose – Laurencekirk – Stonehaven – Aberdeen
- 2tphH Glasgow Queen St. – Stirling – Gleneagles – Perth – Dunkeld & Birnam – Pitlochry – Blair Atholl – Dalwhinnie – Newtonmore – Kingussie – Aviemore – Carrbridge – Inverness
- 2tphH HS3 Hawick – Lauder – Edinburgh Waverley HS – Haymarket HS – Edinburgh Airport – Stirling – Gleneagles – Perth – Dunkeld & Birnam – Pitlochry – Blair Atholl – Dalwhinnie – Newtonmore – Kingussie – Aviemore – Carrbridge – Inverness
- 2tphH Newcraighall HS – Edinburgh Waverley HS – Haymarket HS – Edinburgh Airport – Kirkcaldy – Ladybank – Newburgh – Perth

HS-Classic Services from Routes Other Than HS3:

- 2tphH HS6 London –> York – Darlington – Durham – Newcastle – Berwick – Ed. Waverley
- 2tphH HS2 London Euston –> Carlisle (split/join) – :
  – Motherwell – Glasgow Central
  – Haymarket – Edinburgh Waverley
- 1tphH HS2 Birmingham –> Carlisle – :
  – Haymarket – Edinburgh Waverley
  – Lockerbie – Motherwell – Glasgow Central
- 1tphH HS2 Liverpool –> Carlisle – :
  – Motherwell – Glasgow Central
  – Lockerbie – Haymarket – Edinburgh Waverley

Regional Metro Services:

- 2tphR York – Thirsk – Northallerton – Darlington – Durham – Chester le Street – Newcastle – Morpeth – Alnmouth – Berwick – Dunbar – Drem – Edinburgh Waverley
- 2tphR Hawick – St. Boswells – Melrose – Tweedbank – Galashiels – Edinburgh Waverley – Haymarket – Edinburgh Airport – Dunfermline Town – Glenrothes with Thornton – Markinch – Ladybank – Collessie – Newburgh – Abernethy – Bridge of Earne – Perth
- 2tphR Hawick – St. Boswells – Melrose – Tweedbank – Galashiels – Stow – Gorebridge – Newtongrange – Eskbank – Shawfair – Newcraighall – Brunstane – Edinburgh Waverley – Haymarket – Edinburgh Airport – Dunfermline Town – Glenrothes with Thornton – Markinch – Ladybank – Springfield – Cupar – Leuchars Junction – Dundee

- 2tphRS Newcraighall – Brunstane – Edinburgh Waverley – Haymarket – South Gyle – Edinburgh Airport – Dalmeny – North Queensferry – Inverkeithing – Rosyth – Dunfermline Town – Dunfermline Queen Margaret – Crossgates – Cowdenbeath – Lochgelly – Cardenden – Glenrothes with Thornton – Kirkcaldy – Kinghorn – Burntisland – Aberdour – Dalgety Bay – Inverkeithing –> Edinburgh (Fife Circle, clockwise)
- 2tphRS Newcraighall – Brunstane – Edinburgh Waverley – Haymarket – South Gyle – Edinburgh Airport – Dalmeny – North Queensferry – Inverkeithing – Dalgety Bay – Aberdour – Burntisland – Kinghorn – Kirkcaldy – Glenrothes with Thornton – Cardenden – Lochgelly – Cowdenbeath – Crossgates – Dunfermline Queen Margaret – Dunfermline Town – Rosyth – Inverkeithing –> Edinburgh (Fife Circle, counterclockwise)
- 2tphRS Newcraighall – Brunstane – Edinburgh Waverley – Haymarket – South Gyle – Edinburgh Airport – Dalmeny – North Queensferry – Inverkeithing – Rosyth – Dunfermline Town (reverse) – Cairneyhill – Torryburn – Culross – Kincardine – Kilbagie – Clackmannan – Alloa – Cambus – Causewayhead – Stirling
- 2tphRS Newcraighall – Brunstane – Edinburgh Waverley – Haymarket – Edinburgh Park – Linlithgow – Polmont – Falkirk Grahamston – Falkirk Camelon – Larbert – Stirling – Bridge of Allan – Dunblane – Gleneagles – Perth
- 2tphRS Glasgow Queen St. – Stepps – Gartcosh – Greenfaulds – Cumbernauld – Larbert – Stirling – Bridge of Allan – Dunblane – Gleneagles – Perth – Invergowrie – Dundee
- 2tphRS Glasgow Queen St. – Stepps – Gartcosh – Greenfaulds – Cumbernauld – Falkink Camelon – Falkirk Grahamston – Grangemouth
- 2tphR Glasgow Central – Paisley Gilmout St. – Glasgow Airport Parkway – Bishopton – Port Glasgow – Whinhill – Drumfrochar – Branchton – IBM – Inverkip – Wemyss Bay
- 2tphR Glasgow Central – Paisley Gilmout St. – Glasgow Airport Parkway – Bishopton – Port Glasgow – Greenock Central – Greenock West – Port Matilda – Gourock
- 2tphRS Glasgow Central – Cardonald – Hillingdon East – Hillingdon West – Paisley Gilmout St. – Paisley St. James – Glasgow Airport Parkway – Bishopton – Langbank – Woodhall – Port Glasgow – Bogston – Cartsdyke – Greenock Central – Greenock West – Port Matilda – Gourock
- 2tphR Glasgow Central – Paisley Gilmour St. – Dalry – Kilwinning – Ardrossan South Beach – West Kilbride – Fairlie – Largs
- 2tphRS Glasgow Central – Paisley Gilmour St. – Johnstone – Milliken Park – Howwood – Lochwinnoch – Glengarnock – Dalry – Kilwinning – Stevenston – Saltcoats – Ardrossan South Beach – Ardrossan Town – Ardrossan Harbour
- 2tphR Glasgow Central – Paisley Gilmour St. – Dalry – Kilwinning – Irvine –Troon – Prestwick Intl Airport – Prestwick Town – Ayr
- 2tphRS Glasgow Central – Paisley Gilmour St. – Johnstone – Milliken Park – Howwood – Lochwinnoch – Glengarnock – Dalry – Kilwinning – Irvine – Barassie – Troon – Prestwick Intl Airport – Prestwick Town – Newton on Ayr – Ayr

The Tayside Metro (see the separate article of that name for full details) provides a number of services which are closely interlinked with HS14's services. Specifically:

- 4tphRS Monikie – Wellbank Parkway – Kingennie – Grange Parkway – Barnhill – Broughty Ferry – West Ferry – Craigie and Stannergate – Dundee East – Town Hall – Dundee Tay Bridge (street level) – Esplanade – Wormit West – St. Fort – Leuchars Junction –:

– Guard Bridge – St. Andrews (2tph)
– Darsie – Cupar – Springfield – Ladybank (2tph)

- 4tphRS Arbroath – Carnoustie – Golf St. – Barry Links – Monifieth – Balmossie – Broughty Ferry – West Ferry – Craigie and Stannergate – Dundee East – Town Hall – Dundee Tay Bridge (street level) – Magdalen Green – Dundee Airport – Ninewells – Invergowrie – Kingoodie Parkway

Other services are proposed, but do not have any interface to HS14, Note that the central section, between Dundee East and Dundee Central Junction, involves on-street running, since there is no practical way of accommodating the services through Tay Bridge station. A route map of the Tayside Metro is provided in appendix G of the present article.

Complete Network Timetables:

As a completely new development, the following Hourly Cross-Platform Interchange Patterns are no longer **Representative**, as has been the case for all such until now, but **Absolute**, all stated to the the same time standard. This is possible because all the HS14 service are dependent on the interchange pattern at Perth. The HS13 services, on the other hand, are quite independent of this, and are filled in to conform to HS14's standards. All this is fundamentally determined by the journey time estimates provided later, and the details of the calculations are documented in appendix F, which derives a complete timetable.

The Hourly Cross-Platform Interchange Pattern at Perth is:

Arrive	Depart	
00H	03	Glasgow St. Enoch – Aberdeen fast
59H	04	Newcraighall HS – Edinburgh – Aberdeen stopping
55RS	05	Glasgow Queen St. – Dundee (**not** cross-platform)
07H	10	Glasgow Queen St. – Aberdeen via Dundee
06H	11	Hawick – Edinburgh – Inverness (**not** cross-platform)
15H	18	Newcraighall HS – Edinburgh – Aberdeen fast
14H	19	Glasgow St. Enoch – Aberdeen stopping
10RS	-	Newcraighall – Edinburgh – Perth via Stirling (**not** cross-platform)
23H	26	Glasgow Queen St. – Inverness
21H	-	Newcraighall HS – Edinburgh – Perth via Ladybank (**not** cross-platform)

– similarly at 30, 37, 45 and 53 minutes past. Note how both arrival and departure times must now be taken into account.

Perth is the **only** location at which HS14's services interconnect with each other. Elsewhere, HS14 services connect only with RM services. The following specifications are not interchange patterns, but **departure times**. For clarity, these are expressed as:

- Glasgow St.Enoch / Bellgrove / Queen St. departures with Stirling arrivals
- Edinburgh / Haymarket / Ed. Airport departures with Stirling arrivals

- Stirling / Gleneagles departure with Perth arrivals
- Glasgow / Perth / Edinburgh departures with Dundee arrivals

Hourly Departure Time Patterns at Glasgow, with Stirling arrivals:

Glasgow St. Enoch	G. Bellgrove	G. Queen St.	Stirling arr.	Service
-	-	04	17	Aberdeen via Dundee
01	10	-	18	Aberdeen stopping
12	21	-	-	HS13/HS3 Eastbourne
-	-	15	27	Inverness
23	32	-	43	Aberdeen fast
-	-	34	47	Aberdeen via Dundee
31	40	-	48	Aberdeen stopping
42	51	-	-	HS13/HS3 Newcastle
-	-	45	57	Inverness
53	02	-	13	Aberdeen fast

Hourly Departure Time Patterns from Edinburgh, with Stirling arrivals:

Edinburgh Waverley	Haymarket	Ed. Airport	Stirling arr.	Service
03	08	16	-	HS3/HS13 Eastbourne - Glasgow
05	10	18	-	Aberdeen via Dundee
07	12	20	33	Aberdeen stopping
10	15	23	-	HS13 Newcraighall HS – Dalmuir
14	19	27	40	Inverness
17	22	30	-	Perth via Ladybank
18	23	31	-	HS3/HS13 Newcastle – Glasgow
25	30	38	-	HS13 Newcraighall HS – Dalmuir
29	34	42	55	Aberdeen fast
33	38	46	-	HS3/HS13 Eastbourne - Glasgow
35	40	48	-	Aberdeen via Dundee
37	42	50	03	Aberdeen stopping
40	45	53	-	HS13 Newcraighall HS – Dalmuir
44	49	57	10	Inverness
47	52	00	-	Perth via Ladybank
48	53	01	-	HS3/HS13 Newcastle – Glasgow
55	00	08	-	HS13 Newcraighall HS – Dalmuir
59	04	12	25	Aberdeen fast

Hourly Departure Time Patterns at Stirling and Gleneagles, with Perth arrivals:

Stirling	Gleneagles	Perth (arrive)	Service
-	-	21	Edinburgh – Perth via Ladybank
00	13	23	Glasgow – Inverness
06	19	29	Edinburgh – Aberdeen stopping
13	-	30	Glasgow – Aberdeen fast
13	26	36	Edinburgh – Inverness
20	-	37	Glasgow – Aberdeen via Dundee
21	34	44	Glasgow – Aberdeen stopping
28	-	45	Edinburgh – Aberdeen fast
-	-	51	Edinburgh – Perth via Ladybank
30	43	53	Glasgow – Inverness
36	49	59	Edinburgh – Aberdeen stopping
43	-	00	Glasgow – Aberdeen fast
43	56	06	Edinburgh – Inverness
50	-	07	Glasgow – Aberdeen via Dundee
51	04	14	Glasgow – Aberdeen stopping
58	-	15	Edinburgh – Aberdeen fast

Hourly Departure Time Patterns at Glasgow, Perth and Edinburgh, with Dundee arrivals:

Glasgow Queen St.	Perth	Edinburgh	Dundee (arrive)	Service
04	40	-	52	Glasgow – Aberdeen via Dundee
		05	07	Edinburgh – Aberdeen via Dundee
34	10	-	22	Glasgow – Aberdeen via Dundee
		35	37	Edinburgh – Aberdeen via Dundee

Hourly Departure Time Patterns at Edinburgh, Glasgow, Glasgow Airport and Glasgow Airport Parkway, with Darmuir arrivals:

Edinburgh	G. St. Enoch	G. Airport	GA Parkway	Dalmuir arr.	Service
10	-	53	59	08	Newcraighall HS - Dalmuir
-	53	01	07	16	Glasgow St. Enoch - Dalmuir
25	-	08	14	23	Newcraighall HS - Dalmuir
-	08	16	22	31	Glasgow St. Enoch - Dalmuir
40	-	23	29	38	Newcraighall HS - Dalmuir
-	23	31	37	46	Glasgow St. Enoch - Dalmuir
55	-	38	44	53	Newcraighall HS - Dalmuir
-	38	46	52	01	Glasgow St. Enoch - Dalmuir

Hourly Departure Time Patterns at Glasgow and Dalry, with Kilmarnock arrivals:

Glasgow St.Enoch	Dalry .	Kilmarnock arr.
• 01	21	28
• 16	36	43
• 31	51	58
• 46	06	13

The following HS13 interchange patterns are also given to the same time standard:

Hourly Non-Cross-Platform Interchange Pattern at Glasgow Airport Parkway (departure times):

07H Glasgow St. Enoch – Dalmuir
(no connection)

14H Newcraighall HS – Dalmuir
RS Glasgow Central – Gourock stopping

22H Glasgow St. Enoch – Dalmuir
RS Glasgow Central – Wemyss Bay

29H Newcraighall HS – Dalmuir
R Glasgow Central – Gourock semi-fast

– repeating at 37, 44, 52 and 59 minutes past.

Hourly Cross-Platform Interchange Pattern at Dalry (departure times):

06H Glasgow St. Enoch – Kilmarnock / Ayr
R Glasgow Central – Ardrossan Harbour

21H Glasgow St. Enoch – Kilmarnock / Ayr
R Glasgow Central – Ayr (semi-fast)

36H Glasgow St. Enoch – Kilmarnock / Ayr
R Glasgow Central – Ayr (all stations)

51H Glasgow St. Enoch – Kilmarnock / Ayr
R Glasgow Central – Largs

The following interchange patterns between HS14 and the Tayside Metro are stated in the previous representational way, as timings are not (yet) available:

Representative Hourly Cross-Platform Interchange Pattern at Leuchars Junction:

00H Aberdeen – Edinburgh via Dundee
RS St. Andrews – Monikie

07H Edinburgh – Aberdeen via Dundee
RS Monikie – St. Andrews

15RS Ladybank – Monikie
(no connection)

23RS Monikie – Ladybank
(no connection)

– repeating at 30, 37, 45 and 53 minutes past. The provides a service Edinburgh – St. Andrews and vice versa, with the single, cross-platform (in both directions) change at Leuchars,

Representative Hourly Cross-Platform Interchange Pattern at Ladybank

00H Perth – Edinburgh
RS Monikie – Ladybank

05H Edinburgh – Perth (not cross-platform)
RS Ladybank – Monikie

– repeating at 30 and 35 minutes past. Thus the metro service, arriving first at Ladybank, connects cross-platform into the Perth – Edinburgh service, which arrives and departs immediately after. It then waits at Ladybank to be connected into, (not cross-platform,) by the Edinburgh – Perth service, which it immediately follows in departure back to Dundee. (The services have to be this way round because of the single-track section between Ladybank and Perth.) The main purpose of the Ladybank metro service is to provide a decent service for Cupar, with good connections north and south.

Representative Hourly Cross-Platform Interchange Pattern at Dundee Tay Bridge (HS and R/RS terminating services at platform level, metro at street level):

00H Glasgow – Aberdeen via Dundee
R Hawick – Dundee via Dunfermline
RS St. Andrews – Monikie

15H Edinburgh – Aberdeen via Dundee
RS Glasgow Queen St. – Dundee via Perth
RS Ladybank – Monikie

– repeating at 30 and 45 minutes past.

Representative Hourly Cross-Platform Interchange Pattern at Arbroath (**not** cross-platform westbound):

00H Edinburgh – Aberdeen via Dundee
RS Kingoodie Parkway – Arbroath

15H Glasgow – Aberdeen via Dundee
RS Kingoodie Parkway – Arbroath

– repeating at 30 and 45 minutes past. This gives all the stations between Dundee and Arbroath connections to and from Montrose, Laurencekirk, Stonehaven and Aberdeen, with the single change.

The HS14 interchanges are all tightly interlinked. See appendix F for an explanation of their derivation.

Service plan 5 overall imposes the following loadings on HS13:

• Newcraighall HS		– Gyle Junction	18tph
• Newcraighall		– Edinburgh Waverley	16tph
• Edinburgh Waverley		– Gyle Junction	14tph
• Gyle Junction		– Kirkliston Junction	32tph
• Kirkliston Junction		– Kinnaird Junction	14tph
• Kinnaird Junction		– Bankhead Junction	8tph
• Bankhead Junction		– Robroyston Junction	16tph
• Robroyston Junction		– Glasgow Queen St.	4tph
• Robroyston Junction		– Saltmarket Junction	12tph
• Saltmarket Junction		– Glasgow St. Enoch	8tph
• Saltmarket Junction		– Clyde Junction	4tph
• Glasgow St. Enoch		– Clyde Junction	8tph
• Clyde Junction		– Glasgow Airport Junction	12tph
• Glasgow Airport Junction		– Dalmuir	8tph
• Glasgow Airport Junction		– Kilmarnock	4tph
• Kilmarnock	[Mk2]	– Ayr	4tph

– and the following loadings on HS14:

- Kinnaird Junction [Mk1A] – Alloa Junction 6tph
- Alloa Junction [Mk1A] – Bannockburn Junction 10tph
- Bankhead Junction [Mk1A **an**d Mk2] – Bannockburn Junction 8tph
- Bannockburn Junction [Mk1A] – Stirling 18tph
- Stirling [Mk1A] – Dunblane Junction (site of) 16tph
- Kinnaird Junction [Mk2] – Bannockburn Junction 6tph
- Bannockburn Junction [Mk2] – Dunblane Junction 14tph
- Dunblane Junction [Mk1A **an**d Mk2] – Forgandenny Junction 16tph
- Forgandenny Junction [Mk1A] – Hilton Junction 16tph
- Hilton Junction [Mk1A] – Perth 20tph
- Forgandenny Junction [Mk2] – Perth 14tph
- Forgandenny Junction [Mk2] – Hilton Junction 2tph
- Hilton Junction [Mk2] – Perth 6tph
- Perth – Stanley junction 12tph
- Stanley junction – Craigo Junction 8tph
- Kirkliston Junction – Inverkeithing 18tph
- Inverkeithing (via Kirkcaldy) – Thornton South Junction 8tph
- Thornton South Junction – Thornton North Junction 4tph
- Thornton North Junction – Ladybank 8tph
- Ladybank – Leuchars Junction 6tph
- Leuchars Junction – Dundee Tay Bridge station 8tph
- Perth – Dundee Tay Bridge station 4tph
- Dundee Tay Bridge station – Craigo Junction 4tph
- Craigo Junction – Aberdeen Union station 12tph

It is recognised that the section between Gyle Junction and Kirkliston Junction will have to be quadruple track, paired by direction. In ordinary service, the two centre tracks would be HS (including CCs) and the outer two for classic (RM) services, but crossovers would be provided at both junctions, and possible each side of the airport station also, for operational flexibility. All platforms at the station would of course be variable.

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 Perth – Coupar Angus, my estimate 25km, actual 25km, Coupar Angus – Bridge of Dun, my estimate 50km, actual 50km,) leads me to believe they are pretty accurate!

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 these particular routes, I am considerably more confident of this assumption than on certain other routes (Trans-Pennine, in particular).

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

My estimated distances are:

- Newcraighall HS – Edinburgh Waverley 7.2km (*)
- Edinburgh Waverley – Haymarket HS 2.1km (*)
- Haymarket HS – Edinburgh Airport 9km (*)
- Edinburgh Airport – Kirkliston Junction 4km (300kph)
- Kirkliston Junction – Humbie Junction 2km (230kph)
- Humbie Junction – Forth Bridge south end 4km (225kph)
- Edinburgh Airport – Firth Bridge south end 10km (225kph †)
- Kirkliston Junction – Kinnaird Junction 29km (300kph)
- Kinnaird Junction – Alloa Junction 1km (230kph)
- Edinburgh Airport – Alloa Junction 34km (300kph)
- Alloa Junction – Stirling 9km (225kph)
- Kinnaird Junction – Bankhead Junction 7km (300kph)
- Stirling – Bannockburn Junction 4km (225kph)
- Bannockburn Junction – Bankhead Junction 10km (300kph)
- Bankhead Junction – Robroyston Junction 24.5km (300kph)
- Robroyston Junction – Glasgow Bellgrove 3.5km (225kph)
- Edinburgh Airport – Glasgow Bellgrove 68km (300kph)
- Bannockburn Junction – Glasgow Bellgrove 38km (300kph)
- Robroyston Junction – Glasgow Queen St. HL 5.5km (225kph)
- Bannockburn Junction – Glasgow Queen St. HL 40km (300kph)
- Glasgow Bellgrove – Glasgow St. Enoch 1.8km (*)
- Glasgow St. Enoch – Glasgow Airport 12km (*)
- Glasgow Bellgrove – Glaggow Airport 15km (*)
- Glasgow Airport – Glasgow Airport Parkway 2km (*)
- Glasgow Airport Parkway – Erskine Pkw South 5km (*)
- Erskine Parkway South – Erskine Parkway North 2km (*)

- Erskine Parkway North – Dalmuir 3km (*)
- Glasgow Airport – Dalry 26km (300kph)
- Dalry – Kilmarnock 17.5km (*)
- Stanley Junction – Coupar Angus 14km (300kph)
- Coupar Angus – Forfar 26km (300kph)
- Forfar – Bridge of Dun 26km (300kph)
- Bridge of Dun – Craigo Junction 8km (300kph)
- Ladybank – Newburgh 12km (160kph)
- Newburgh – Perth 17km (160kph)

(†) The section Edinburgh Airport – Forth Bridge south end is treated as having line-speed 225kph throughout – trains will just be able to reach this speed and hold it for a short distance on the section between Kirkliston and Humbie junctions, before having to decelerate again down to the speed limit over the bridge.

The above are all distances on HS13/HS14 new infrastructure. In addition, they share the following sections of classic routes, whose lengths are known exactly! (Refer to Appendix E.)

- Stirling – Gleneagles 27.9km (225kph)
- Gleneagles – Perth 25.2km (225kph)
- Stirling – Perth 53.1km (225kph)
- Perth – Stanley Junction 11.5km (225kph)
- Perth – Dundee 33.6km (225kph)
- Dundee – Arbroath 27.5km (225kph)
- Arbroath – Montrose 22.7km (225kph)
- Montrose – Laurencekirk 16.2km (225kph)
- Craigo Junction – Laurencekirk 8.6km (225kph)
- Laurencekirk – Stonehaven 23.1km (225kph)
- Stonehaven – Aberdeen 26.0km (225kph)
- Forth Bridge south – north end 2.6km (80kph †)
- Forth Bridge north end – Kirkcaldy 7.9km (200kph)
- Kirkcaldy – Ladybank 36.9km (200kph)
- Ladybank – Leuchars Junction 19.0km (200kph)
- Kirkcaldy – Leuchars Junction 55.9km (200kph)
- Leuchars Junction – Tay Bridge south end 9.0km (200kph)
- Tay Bridge south – north end 3.6km (56kph †)
- Tay Bridge north end – Dundee 0.8km (56kph)
- Tay Bridge south end – Dundee 4.4km (56kph)
- Ladybank – Perth 28.6km (160kph)

(†) The existing speed limits are adopted for the bridges: Forth Bridge 50mph/80kph for (all) passenger traffic; Tay Bridge 35mph/56kph for HSTs.

The line speeds are chosen as follows:

- HS13/HS14 new infrastructure has a line speed of 300kph
- The sections of classic route between Alloa Junction and Stanley Junction, and between Perth and Aberdeen via Dundee, are merged into HS14, and upgraded to 225kph.
- The sections of classic route between Humbie Junction and Dundee and Perth, via Ladybank, are merged into HS14, and upgraded to 200kph, except as explicitly noted above,.
- 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. Certain sections of length comparable or even shorter than those so marked are not, in fact between stations, but rather abut onto another section of different line speed. In such cases, the journey times are calculated for the individual sections, and summed for the overall time between stations. The fast Aberdeen service through the Great Glen accelerates to 225kph (140mph) on departing Perth, and holds this speed until Stanley Junction. On passing Stanley Junction it further accelerates to 300kph (187.5mph) and holds this speed until it needs to decelerate back down to 225kph at Craigo Junction. It then holds this speed the rest of the way to Aberdeen. This many sound rather complicated, but in fact is perfectly straightforward to calculate.

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

- Acceleration from stationary to 360kph, 225mph, takes 16.67km and 333 seconds
- Acceleration from stationary to 300kph, 187.5mph, takes 11.57km and 278 seconds
- Acceleration from stationary to 230kph, 143.8mph, takes 6.80km and 213 seconds
- Acceleration from stationary to 225kph, 140mph, takes 6.51km and 208 seconds
- Acceleration from stationary to 200kph, 125mph, takes 5.14km and 185 seconds
- Acceleration from stationary to 160kph, 100mph, takes 3.29km and 148 seconds
- Deceleration from 360kph to stationary takes 10.00km and 200 seconds
- Deceleration from 300kph to stationary takes 6.945km and 167 seconds
- Deceleration from 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 Newcraighall HS to Edinburgh Waverley HS (start to stop) is 277 seconds
- Time to travel from Edinburgh Waverley HS to Haymarket HS (start to stop) is 150 seconds
- Time to travel from Haymarket HS to Edinburgh Airport (start to stop) is 310 seconds
- Time to travel from Glasgow Bellgrove to Glasgow St. Enoch (start to stop) is 138 seconds
- Time to travel from Glasgow St. Enoch to Glasgow Airport (start to stop) is 358 seconds
- Time to travel from Glasgow Bellgrove to Glasgow Airport (start to stop) is 400 seconds
- Time to travel from Glasgow Airport to Glasgow Airport Parkway (start to stop) is 146 seconds
- Time to travel from Glasgow Airport Pkw to Erskine Parkway South (start to stop) is 231 seconds
- Time to travel from Erskine Parkway South to E P North (start to stop) is 146 seconds
- Time to travel from Erskine Parkway North to Dalmuir (start to stop) is 179 seconds
- Time to travel from Dalry to Kilmarnock (start to stop) is 432 seconds

The procedure in calculating journey times between station stops is to take the appropriate two values of acceleration / deceleration distance, and the two times, as given in initial lines of the above list, and sum them, thus, for a line speed of 360kph, acceleration / deceleration takes 16.67 + 10.00 = 26.67km and 333 + 200 = 533 seconds. The distance value is subtracted from the inter-station distance, and the remaining length is assumed to be travelled at line speed, taking time = distance / speed. This time is then added to the acceleration / deceleration time to obtain the actual journey time between the stations. This is all very laborious (error-prone, too!) to perform manually, so I have developed spreadsheets to do the work and present the results. (Adjacent Station times are added manually.) The various section times are accumulated to obtain the overall journey times. One further refinement: a standard wait time of 3 minutes is assumed at intermediate stations, and this is added into the accumulated time at each stop.

1. Glasgow - Edinburgh / Kilmarnock / Dalmuir (3/2/4 stops):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow St. Enoch - Glasgow Bellgrove	1.8	1.8	2.3	2.3	2.3
Glasgow Bellgrove - Edinburgh Airport	68.0	69.8	17.3	19.6	22.6
Edinburgh Airport - Haymarket HS	9.0	78.8	5.2	24.8	30.8
Haymarket HS - Edinburgh Wav. HS	2.1	80.9	2.5	27.3	36.3
Glasgow St. Enoch - Glasgow Airport	12.0	12.0	4.9	4.9	4.9
Glasgow Airport - Dalry	26.0	38.0	8.9	13.8	16.8
Dalry - Kilmarnock	17.5	55.5	7.2	21.0	27.0
Glasgow Airport - Glasgow Airport Pkwy	2.0	14.0	2.4	10.4	10.4
Glasgow Airport Pkwy - Erskine Pkwy South	5.0	19.0	3.9	14.2	15.2
Erskine Pkwy South - Erskine Pkwy North	2.0	21.0	2.4	16.7	18.7
Erskine Pkwy North - Dalmuir	3.0	24.0	3.0	19.6	22.6

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

- Edinburgh Airport [23]
- Edinburgh Waverley 65 [36]
- Glasgow Airport [5]
- Dalry 74 [17]
- Kilmarnock 67 [27]

1P. Glasgow - Edinburgh / Kilmarnock / Dalmuir (3/2/4 stops; with passing times):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow St. Enoch - Glasgow Bellgrove	1.8	1.8	2.3	2.3	2.3
Glasgow Bellgrove - *Robroyston Jn. (pass)*	3.5	5.3	2.5	*4.8*	*7.8*
Robroyston Jn. (pass) - Bankhead Jn. (pass)	24.5	29.8	5.4	*10.2*	*13.2*
Bankhead Jn. (pass) - Kinnaird Jn. (pass)	7.0	36.8	1.4	*11.6*	*14.6*
Kinnaird Jn. (pass) - Kirkliston Jn. (pass)	29.0	65.8	5.9	*17.5*	*20.5*
Kirkliston Jn. (pass) - Edinburgh Airport	4.0	69.8	2.1	19.6	22.6
Edinburgh Airport - Haymarket HS	9.0	78.8	5.2	24.8	30.8
Haymarket HS - Edinburgh Wav. HS	2.1	80.9	2.5	27.3	36.3
Glasgow St. Enoch - Glasgow Airport	12.0	12.0	4.9	4.9	4.9
Glasgow Airport - Dalry	26.0	38.0	8.9	13.8	16.8
Dalry - Kilmarnock	17.5	55.5	7.2	21.0	27.0
Glasgow Airport - Glasgow Airport Pkwy	2.0	14.0	2.4	10.4	10.4
Glasgow Airport Pkwy - Erskine Pkwy South	5.0	19.0	3.9	14.2	15.2
Erskine Pkwy South - Erskine Pkwy North	2.0	21.0	2.4	16.7	18.7
Erskine Pkwy North - Dalmuir	3.0	24.0	3.0	19.6	22.6

2. Edinburgh - Glasgow / Dalmuir (3/7 stops):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Edinburgh, inc. Station Wait Times
Edinburgh Waverley - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - Glasgow Bellgrove	68.0	79.1	17.3	25.0	31.0
Glasgow Bellgrove - Glasgow St. Enoch	1.8	80.9	2.3	27.3	36.3
Glasgow Bellgrove - Glasgow Airport	15.0	94.1	6.7	31.6	40.6
Glasgow Airport - Glasgow Airport Pkwy	2.0	96.1	2.4	34.1	46.1
Glasgow Airport Pkwy - Erskine Pkwy South	5.0	101.1	3.9	37.9	50.9
Erskine Pkwy South - Erskine Pkwy North	2.0	103.1	2.4	40.4	54.4
Erskine Pkwy North - Dalmuir	3.0	106.1	3.0	43.3	58.3

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

- Glasgow Bellgrove [31]
- Glasgow St. Enoch 41 (Queen St.) [36]
- Glasgow Airport [41]
- Glasgow Airport Parkway [46]
- Erskine Parkway South [51]
- Erskine Parkway North [54]
- Dalmuir [58]

2P. Edinburgh - Glasgow / Dalmuir (3/7 stops; with passing times):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Edinburgh, inc. Station Wait Times
Edinburgh Waverley - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - *Kirkliston Jn. (pass)*	4.0	15.1	2.7	*10.4*	*16.4*
Kirkliston Jn. (pass) - Kinnaird Jn. (pass)	29.0	44.1	6.2	*16.6*	*22.6*
Kinnaird Jn. (pass) - Bankhead Jn. (pass)	7.0	51.1	1.4	*18.0*	*24.0*
Bankhead Jn. (pass) - Robroyston Jn. (pass)	24.5	75.6	5.0	*23.0*	*29.0*
Robroyston Jn. (pass) - Glasgow Bellgrove	3.5	79.1	2.0	25.0	31.0
Glasgow Bellgrove - Glasgow St. Enoch	1.8	80.9	2.3	27.3	36.3
Glasgow Bellgrove - Glasgow Airport	15.0	94.1	6.7	31.6	40.6
Glasgow Airport - Glasgow Airport Pkwy	2.0	96.1	2.4	34.1	46.1
Glasgow Airport Pkwy - Erskine Pkwy South	5.0	101.1	3.9	37.9	50.9
Erskine Pkwy South - Erskine Pkwy North	2.0	103.1	2.4	40.4	54.4
Erskine Pkwy North - Dalmuir	3.0	106.1	3.0	43.3	58.3

3. Glasgow – Aberdeen fast / stopping / via Dundee (3/9/8 stops):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow St. Enoch - Glasgow Bellgrove	1.8	1.8	2.3	2.3	2.3
Glasgow Bellgrove - Bannockburn Junction	38.0	39.8	10.2	12.5	
Bannockburn Junction - Stirling	4.0	43.8	2.1	14.6	17.6
Stirling - Perth	53.1	96.9	16.9	31.6	37.6
Perth - Stanley Junction	11.5	108.4	4.8	36.4	
Stanley Junction - Craigo Junction	74.0	182.4	15.0	51.4	
Craigo Junction - Aberdeen	57.7	240.1	16.4	67.8	76.8
Stirling - Gleneagles	27.9	71.7	10.2	24.9	30.9
Gleneagles - Perth	25.2	96.9	9.5	34.4	43.4
Perth - Stanley Junction	11.5	108.4	4.8	39.2	
Stanley Junction - Coupar Angus	14.0	122.4	4.3	43.5	57.5
Coupar Angus - Forfar	26.0	148.4	8.9	52.4	69.4
Forfar - Bridge of Dun	26.0	174.4	8.9	61.3	81.3
Bridge of Dun - Craigo Junction	8.0	182.4	4.0	65.3	
Craigo Junstion - Laurencekirk	8.6	191.0	3.3	68.6	91.6
Laurencekirk - Stonehaven	23.1	214.1	8.9	77.6	103.6
Stonehaven - Aberdeen	26.0	240.1	9.7	87.3	116.3
Glasgow Queen St. - Bannockburn Junction	40.0	40.0	10.6	10.6	
Bannockburn Junction - Stirling	4.0	44.0	2.1	12.7	12.7
Stirling - Perth	53.1	97.1	16.9	29.7	32.7
Perth - Dundee	33.6	130.7	11.7	41.4	47.4
Dundee - Arbroath	27.5	158.2	10.1	51.5	60.5
Arbroath - Montrose	22.7	180.9	8.8	60.4	72.4
Montrose - Laurencekirk	16.2	197.1	7.1	67.5	82.5
Laurencekirk - Stonehaven	23.1	220.2	8.9	76.4	94.4
Stonehaven - Aberdeen	26.0	246.2	9.7	86.1	107.1

Note: The stopping service to Aberdeen calls` at Gleneagles; the other services to Aberdeen do not.

Current fastest time (minutes) from Glasgow (Queen St.) [and the above values, from St. Enoch] to:

- Stirling 26 [18]
- Gleneagles 41 [31]
- Perth 53 [38]
- Aberdeen [fast] 152 [77]
- Coupar Angus [58]
- Forfar [69]
- Bridge of Dun [81]
- Laurencekirk 121 [92]
- Stonehaven 132 [104]
- Aberdeen [stopping] 152 [116]
- [The following times are from Glasgow Queen St.]
- Stirling 26 [13]
- Perth 53 [33]
- Dundee 76 [47]
- Arbroath 96 [61]
- Montrose 110 [72]
- Laurencekirk 121 [83]
- Stonehaven 132 [94]
- Aberdeen via Dundee 140 [107]

The careful reader may be surprised to notice that Glasgow – Aberdeen (stopping) takes 10 minutes longer than Glasgow – Aberdeen via Dundee, even though the distance is 6km less and both services have the same number of stops between Perth and Aberdeen. This is accounted for by the extra two stops between Glasgow and Perth (Bellgrove and Gleneagles) for the Aberdeen (stopping) service.

Remember that the Aberdeen stopping services have a 5 minute wait at Perth.

3P. Glasgow – Aberdeen fast / stopping / via Dundee (3/9/8 stops; with passing times):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow St. Enoch - Glasgow Bellgrove	1.8	1.8	2.3	2.3	2.3
Glasgow Bellgrove - *Robroyston Jn. (pass)*	3.5	5.3	2.5	*4.8*	*7.8*
Robroyston Jn. (pass) - Bankhead Jn. (pass)	24.5	29.8	5.4	*10.3*	*13.3*
Bankhead Jn. (pass) - Bannockburn Jn. (pass)	10.0	39.8	2.2	*12.5*	*15.5*
Bannockburn Jn. (pass) - Stirling	4.0	43.8	2.1	14.6	17.6
Stirling - *Gleneagles (pass)*	27.9	71.7	9.2	*23.8*	*29.8*
Gleneagles (pass) - Perth	25.2	96.9	7.8	31.6	37.6
Perth - *Stanley Jn. (pass)*	11.5	108.4	4.8	*36.4*	*45.4*
Stanley Jn. (pass) - Coupar Angus (pass)	14.0	122.4	2.9	*39.3*	*48.3*
Coupar Angus (pass) - Forfar (pass)	26.0	148.4	5.2	*44.5*	*53.5*
Forfar (pass) - Bridge of Dun (pass)	26.0	174.4	5.2	*49.7*	*58.7*
Bridge of Dun (pass) - Craigo Junction (pass)	8.0	182.4	1.7	*51.4*	*60.4*
Craigo Junstion (pass) - Laurencekirk (pass)	8.6	191.0	2.3	*53.7*	*62.7*
Laurencekirk (pass)- Stonehaven (pass)	23.1	214.1	6.2	*59.9*	*68.9*
Stonehaven (pass) - Aberdeen	26.0	240.1	8.0	67.8	76.8
Stirling - Gleneagles	27.9	71.7	10.2	24.9	30.9
Gleneagles - Perth	25.2	96.9	9.5	34.4	43.4
Perth - *Stanley Jn. (pass)*	11.5	108.4	4.8	*39.2*	*53.2*
Stanley Jn. (pass) - Coupar Angus	14.0	122.4	4.3	43.5	57.5
Coupar Angus - Forfar	26.0	148.4	8.9	52.4	69.4
Forfar - Bridge of Dun	26.0	174.4	8.9	61.3	81.3
Bridge of Dun - *Craigo Jn. (pass)*	8.0	182.4	4.0	*65.3*	*88.3*
Craigo Jn. (pass) - Laurencekirk	8.6	191.0	3.3	68.6	91.6
Laurencekirk - Stonehaven	23.1	214.1	8.9	77.6	103.6

Stonehaven - Aberdeen	26.0	240.1	9.7	87.3	116.3
Glasgow Queen St. - *Robroyston Jn. (pass)*	5.5	5.5	3.2	3.2	3.2
Robroyston Jn. (pass) - Bankhead Jn. (pass)	24.5	30.0	5.2	8.4	8.4
Bankhead Jn. (pass) - Bannockburn Jn. (pass)	10.0	40.0	2.2	10.6	10.6
Bannockburn Jn. (pass) - Stirling	4.0	44.0	2.1	12.7	12.7
Stirling - *Gleneagles (pass)*	27.9	71.9	9.2	*21.9*	*24.9*
Gleneagles (pass) - Perth	25.2	97.1	7.8	29.7	32.7
Perth - Dundee	33.6	130.7	11.7	41.4	47.4
Dundee - Arbroath	27.5	158.2	10.1	51.5	60.5
Arbroath - Montrose	22.7	180.9	8.8	60.4	72.4
Montrose - Laurencekirk	16.2	197.1	7.1	67.5	82.5
Laurencekirk - Stonehaven	23.1	220.2	8.9	76.4	94.4
Stonehaven - Aberdeen	26.0	246.2	9.7	86.1	107.1

4. Edinburgh – Aberdeen fast / stopping / via Dundee and Edinburgh – Perth via Ladybank (3/9/8/5 stops):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Edinburgh, inc. Station Wait Times
Edinburgh Waverley HS - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - Kinnaird Junction	33.0	44.1	9.0	16.7	
Kinnaird Junction - Alloa Junction	1.0	45.1	0.3	16.9	
Alloa Junction - Stirling	9.0	54.1	3.4	20.4	26.4
Stirling - Perth	53.1	107.2	16.9	37.3	46.3
Perth - Stanley Junction	11.5	118.7	4.8	42.1	
Stanley Junction - Craigo Junction	74.0	192.7	15.0	57.1	
Craigo Junction - Aberdeen	57.7	250.4	16.4	73.6	85.6
Stirling - Gleneagles	27.9	82.0	10.2	30.6	39.6
Gleneagles - Perth	25.2	107.2	9.5	40.1	52.1
Perth - Stanley Junction	11.5	118.7	4.8	44.9	
Stanley Junction - Coupar Angus	14.0	132.7	4.3	49.2	66.2
Coupar Angus - Forfar	26.0	158.7	8.9	58.1	78.1
Forfar - Bridge of Dun	26.0	184.7	8.9	67.0	90.0
Bridge of Dun - Craigo Junction	8.0	192.7	4.0	71.0	
Craigo Junstion - Laurencekirk	8.6	201.3	3.3	74.4	100.4
Laurencekirk - Stonehaven	23.1	224.4	8.9	83.3	112.3
Stonehaven - Aberdeen	26.0	250.4	9.7	93.0	125.0
Edinburgh Airport - Forth Bridge South	10.0	21.1	4.8	12.5	
Forth Bridge South - Forth Bridge North	5.3	26.4	4.0	16.5	
Forth Bridge North - Kirkcaldy	7.9	34.3	4.2	20.7	26.7
Kirkcaldy - Leuchars Junction	55.9	90.2	19.2	40.0	49.0
Leuchars Junction - Tay Bridge South	9.0	99.2	4.7	44.7	

Tay Bridge South - Dundee	4.4	103.6	5.0	49.7	61.7
Dundee - Arbroath	27.5	131.1	10.1	59.8	74.8
Arbroath - Montrose	22.7	153.8	8.8	68.6	86.6
Montrose - Laurencekirk	16.2	170.0	7.1	75.7	96.7
Laurencekirk - Stonehaven	23.1	193.1	8.9	84.6	108.6
Stonehaven - Aberdeen	26.0	219.1	9.7	94.3	121.3
Kirkcaldy - Ladybank	36.9	71.2	13.5	34.3	43.3
Ladybank - Newburgh	12.0	83.2	6.5	40.7	52.7
Newburgh - Perth	17.0	100.2	8.4	49.1	64.1

Note: The stopping service to Aberdeen calls` at Gleneagles; the other services to Aberdeen do not.

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

- Edinburgh Airport [11]
- Stirling 51 [26]
- Gleneagles 66 [40]
- Perth 76 [46]
- Aberdeen 137 [86]
- Coupar Angus [66]
- Forfar [78]
- Bridge of Dun [90]
- Laurencekirk 110 [100]
- Stonehaven 117 [112]
- Aberdeen 137 [124]
- [The following times are direct to Dundee or Perth, via The Bridges]
- Kirkcaldy 36 [27]
- Leuchars Junction 53 [49]
- Dundee 76 [62]
- Arbroath 96 [75]
- Montrose 110 [87]
- Laurencekirk 121 [97]
- Stonehaven 132 [109]
- Aberdeen 152 [121]
- Ladybank 52 [43]
- Newburgh [53]
- Perth [64]

4P. Edinburgh – Aberdeen fast / stopping / via Dundee and Edinburgh – Perth via Ladybank (3/9/8/5 stops; with passing times):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Edinburgh, inc. Station Wait Times
Edinburgh Waverley HS - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - *Kirkliston Jn. (pass)*	4.0	15.1	2.7	*10.4*	*16.4*
Kirkliston Jn, (pass) - Kinnaird Jn. (pass)	29.0	44.1	6.3	*16.7*	*22.7*
Kimmaird Jn. (pass) - Alloa Jn. (pass)	1.0	45.1	0.3	*16.9*	*22.9*
Alloa Jn. (pass) - Bannockburn Jn. (pass)	5.0	50.1	1.3	*18.3*	*24.3*
Bannockburn Jn. (pass) - Stirling	4.0	54.1	2.1	20.4	26.4
Stirling - *Gleneagles (pass)*	27.9	82.0	9.2	*29.5*	*38.5*
Gleneagles (pass) - Perth	25.2	107.2	7.8	37.3	46.3
Perth - *Stanley Jn. (pass)*	11.5	118.7	4.8	*42.1*	*54.1*
Stanley Junction (pass) - Coupar Angus)pass)	14.0	132.7	2.9	*45.0*	*57.0*
Coupar Angus (pass) - Forfar (pass)	26.0	158.7	5.2	*50.2*	*62.2*
Forfar (pass) - Bridge of Dun (pass)	26.0	184.7	5.2	*55.4*	*67.4*
Bridge of Dun (pass) - Craigo Junction (pass)	8.0	192.7	1.7	*57.1*	*69.1*
Craigo Junstion (pass) - Laurencekirk (pass)	8.6	201.3	2.3	*59.4*	*71.4*
Laurencekirk (pass)- Stonehaven (pass)	23.1	224.4	6.2	*65.6*	*77.6*
Stonehaven (pass) - Aberdeen	26.0	250.4	8.0	73.6	85.6
Stirling - Gleneagles	27.9	82.0	10.2	30.6	39.6
Gleneagles - Perth	25.2	107.2	9.5	40.1	52.1
Perth - *Stanley Jn. (pass)*	11.5	118.7	4.8	*44.9*	*61.9*
Stanley Jn. (pass) - Coupar Angus	14.0	132.7	4.3	49.2	66.2
Coupar Angus - Forfar	26.0	158.7	8.9	58.1	78.1
Forfar - Bridge of Dun	26.0	184.7	8.9	67.0	90.0

Bridge of Dun - *Craigo Jn. (pass)*	8.0	192.7	4.0	*71.0*	*97.0*
Craigo Jn. (pass) - Laurencekirk	8.6	201.3	3.3	74.4	100.4
Laurencekirk - Stonehaven	23.1	224.4	8.9	83.3	112.3
Stonehaven - Aberdeen	26.0	250.4	9.7	93.0	125.0
Edinburgh Airport - *Forth Bridge South (pass)*	10.0	21.1	4.8	*12.5*	*18.5*
Forth Bridge South (pass) - *Forth Bridge North (pass)*	5.3	26.4	4.0	*16.5*	*22.5*
Forth Bridge North (pass) - Kirkcaldy	7.9	34.3	4.2	20.7	26.7
Kirkcaldy - Leuchars Junction	55.9	90.2	19.2	40.0	49.0
Leuchars Junction - *Tay Bridge South (pass)*	9.0	99.2	4.7	*44.7*	*56.7*
Tay Bridge South (pass) - Dundee	4.4	103.6	5.0	49.7	61.7
Dundee - Arbroath	27.5	131.1	10.1	59.8	74.8
Arbroath - Montrose	22.7	153.8	8.8	68.6	86.6
Montrose - Laurencekirk	16.2	170.0	7.1	75.7	96.7
Laurencekirk - Stonehaven	23.1	193.1	8.9	84.6	108.6
Stonehaven - Aberdeen	26.0	219.1	9.7	94.3	121.3
Kirkcaldy - Ladybank	36.9	71.2	13.5	34.3	43.3
Ladybank - Newburgh	12.0	83.2	6.5	40.7	52.7
Newburgh - Perth	17.0	100.2	8.4	49.1	64.1

5. Glasgow - Inverness (11 stops):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow Queen St. - Bannockburn Junction	40.0	40.0	10.6	10.6	
Bannockburn Junction - Stirling	4.0	44.0	2.1	12.7	12.7
Stirling - Gleneagles	27.9	71.9	10.2	23.0	26.0
Gleneagles - Perth	25.2	97.1	9.5	32.5	38.5
Perth - Stanley Junction	11.5	108.6	4.9	37.3	
Stanley Junction - Dunkeld & Birnam	13.5	122.1	5.8	43.2	52.2
Dunkeld & Birnam - Pitlochry	20.7	142.8	9.7	52.9	62.9
Pitlochry - Blair Atholl	11.1	153.9	6.1	59.0	70.0
Blar Atholl - Dalwhinnie	36.1	190.0	15.5	74.5	86.5
Dalwhinnie - Newtonmore	6.4	196.4	4.4	78.9	91.9
Newtonmore - Kingussie	6.1	202.5	4.3	83.2	97.2
Kingussie - Aviemore	19.0	221.5	9.1	92.3	107.3
Aviemore - Carrbridge	10.8	232.3	6.0	98.3	114.3
Carrbridge - Inverness	45.0	277.3	18.9	117.2	134.2

Current fastest time (minutes) from Glasgow (Queen St.) [and the above values, also from Queen St.] to:

- Stirling 26 [13]
- Gleneagles 41 [26]
- Perth 53 [39]
- Dunkeld & Birnam 77 [52]
- Pitlochrie 92 [63]
- Blair Atholl 102 [70]
- Dalwhinnie 126 [87]
- Newtonmore 137 [92]
- Kingussie 138 [97]
- Aviemore 150 [107]
- Carrbridge 165 [114]
- Inverness 193 [134]

5P. Glasgow - Inverness (11 stops; with passing times):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow Queen St. - *Robroyston Jn. (pass)*	5.5	5.5	3.2	*3.2*	*3.2*
Robroyston Jn. (pass) - Bankhead Jn. (pass)	24.5	30.0	5.2	*8.4*	*8.4*
Bankhead Jn. (pass) - Bannockburn Jn. (pass)	10.0	40.0	2.2	*10.6*	*10.6*
Bannockburn Jn. (pass) - Stirling	4.0	44.0	2.1	12.7	12.7
Stirling - Gleneagles	27.9	71.9	10.2	23.0	26.0
Gleneagles - Perth	25.2	97.1	9.5	32.5	38.5
Perth - *Stanley Jn. (pass)*	11.5	108.6	4.9	*37.3*	*46.3*
Stanley Jn. (pass) - Dunkeld & Birnam	13.5	122.1	5.8	43.1	52.1
Dunkeld & Birnam - Pitlochry	20.7	142.8	9.7	52.9	62.9
Pitlochry - Blair Atholl	11.1	153.9	6.1	59.0	70.0
Blar Atholl - Dalwhinnie	36.1	190.0	15.5	74.5	86.5
Dalwhinnie - Newtonmore	6.4	196.4	4.4	78.9	91.9
Newtonmore - Kingussie	6.1	202.5	4.3	83.2	97.2
Kingussie - Aviemore	19.0	221.5	9.1	92.3	107.3
Aviemore - Carrbridge	10.8	232.3	6.0	98.3	114.3
Carrbridge - Inverness	45.0	277.3	18.9	117.1	134.1

6. Edinburgh - Inverness (13 stops):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Edinburgh Waverley HS - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - Kinnaird Junction	33.0	44.1	9.0	16.7	
Kinnaird Junction - Alloa Junction	1.0	45.1	0.3	16.9	
Alloa Junction - Stirling	9.0	54.1	3.4	20.4	26.4
Stirling - Gleneagles	27.9	82.0	10.2	30.6	39.6
Gleneagles - Perth	25.2	107.2	9.5	40.1	52.1
Perth - Stanley Junction	11.5	118.7	4.9	45.0	
Stanley Junction (pass) - Dunkeld & Birnam	13.5	132.2	5.8	50.8	65.8
Dunkeld & Birnam - Pitlochry	20.7	152.9	9.7	60.5	76.5
Pitlochry - Blair Atholl	11.1	164.0	6.1	66.6	83.6
Blar Atholl - Dalwhinnie	36.1	200.1	15.5	82.2	100.2
Dalwhinnie - Newtonmore	6.4	206.5	4.4	86.5	105.5
Newtonmore - Kingussie	6.1	212.6	4.3	90.8	110.8
Kingussie - Aviemore	19.0	231.6	9.1	99.9	120.9
Aviemore - Carrbridge	10.8	242.4	6.0	105.9	127.9
Carrbridge - Inverness	45.0	287.4	18.9	124.8	147.8

Current fastest time (minutes) from Glasgow (Queen St.) [and the above values, also from Queen St.] to:

- Stirling 51 [26]
- Gleneagles 66 [40]
- Perth 76 [52]
- Dunkeld & Birnam 93 [66]
- Pitlochrie 106 [77]
- Blair Atholl 116 [84]
- Dalwhinnie 140 [100]
- Newtonmore 153 [106]
- Kingussie 153 [111]
- Aviemore 164 [121]
- Carrbridge 185 [128]
- Inverness 200 [148]

6P. Edinburgh - Inverness (13 stops; with passing times):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Edinburgh Waverley HS - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - *Kirkliston Jn. (pass)*	4.0	15.1	2.7	*10.4*	*16.4*
Kirkliston Jn. (pass) - Kinnaird Jn. (pass)	29.0	44.1	6.3	*16.7*	*22.7*
Kinnaird Jn. (pass) - Alloa Jn. (pass)	1.0	45.1	0.3	*16.9*	*22.9*
Alloa Jn. (pass) - Bannockburn Jn. (pass)	5.0	50.1	1.3	*18.3*	*24.3*
Bannockburn Jn. (pass) - Stirling	4.0	54.1	2.1	20.4	26.4
Stirling - Gleneagles	27.9	82.0	10.2	30.6	39.6
Gleneagles - Perth	25.2	107.2	9.5	40.1	52.1
Perth - *Stanley Jn. (pass)*	11.5	118.7	4.9	45.0	60.0
Stanley Jn. (pass) - Dunkeld & Birnam	13.5	132.2	5.8	50.8	65.8
Dunkeld & Birnam - Pitlochry	20.7	152.9	9.7	60.5	76.5
Pitlochry - Blair Atholl	11.1	164.0	6.1	66.6	83.6
Blar Atholl - Dalwhinnie	36.1	200.1	15.5	82.2	100.2
Dalwhinnie - Newtonmore	6.4	206.5	4.4	86.5	105.5
Newtonmore - Kingussie	6.1	212.6	4.3	90.8	110.8
Kingussie - Aviemore	19.0	231.6	9.1	99.9	120.9
Aviemore - Carrbridge	10.8	242.4	6.0	105.9	127.9
Carrbridge - Inverness	45.0	287.4	18.9	124.8	147.8

HS13 Mk2 Enhancements

The only change to HS13 at Mk2 is the implementation of the new infrastructure between Kilmarnock and Ayr. There are no service changes, (unless and until the extra-highly futuristic proposal for an extension of HS2 to Scotland is implemented,) and the only journey time change is, obviously, to Ayr.

HS14 Mk2 Enhancements

There are five changes to HS14 at Mk2:

- The reinstatement of the new infrastructure between Alloa and Dunblane junctions, and the new HS platforms at Stirling
- The reinstatement of the new infrastructure between Stonehaven and Aberdeen, releasing the existing infrastructure for a new route of the Aberdeen Metro
- Reinstatement of the cut-off between Dunlithie and Cowie junctions, bypassing Stonehaven station (in tunnel underneath it)
- The cut-off between Forgandenny Junction and Perth station, avoiding the tortuous section via Hilton Junction
- Upgrading between Perth and Stanley Junction to the line speed of 300kph, and from Stanley Junction to Dunkeld & Birnam to 230kph.

These result in extra capacity in the first four cases, and slight acceleration in all five. In addition, the cut-off between Drumlithie and Cowie junction, allows for a more robust overtaking configuration at Stonehaven. There are no service changes envisaged at Mk2.

Service Plan 6

Although no service changes are envisaged on HS14 and minimal changes on HS13, there **are** changes on HS2 and HS3. Specifically, the restoration of the remainder of the Waverley route, between Hawick (more specifically Riccarton North Junction) and Carlisle is envisaged, quite independently of HS2's Scottish extension, Full details are contained in the HS2 Route and Service Plans article, SP6, but the items of interest in a Scottish context are:

HS2 Metro:

- 2tphH Whitehaven – Workington – Maryport – Carlisle – Riddings – Newcastleton – Hawick – Lauder – Edinburgh Waverley – Edinburgh Haymarket – Edinburgh Airport – Glasgow Bellgrove – Glasgow St. Enoch
- 2tphH Keswick – Troutbridge for Ullswater – Penrith – Carlisle – Longtown – Riddings – Canonbie – Gilnockie - Langholme

The Whitehaven – Glasgow service shares the service to Lauder with the HS3 service from Newcastle to Glasgow. The Hawick – Edinburgh – Inverness service no longer calls at Lauder.

Assuming that The HS2 Scottish extension is indeed implemented later, this will add the further services:

HS2 UHS:

- 2tphH Eastbourne – Bexhill – St. Leonards Warrior Square – Hastings – Ore – Winchelsea – Rye – Appledare – Ashford – Ebbsfleet – Stratford HS South – Euston Cross – Old Oak Common – Preston – Carlisle – Hawick – Edinburgh Waverley – Edinburgh Airport – Glasgow Bellgrove – Glasgow St. Enoch
- 2tphH Birmingham HS – Crewe – Preston – Carlisle – Hawick – Edinburgh Waverley – Edinburgh Airport – Glasgow Bellgrove – Glasgow St. Enoch
- 2tphH Liverpool Lime St. – Preston – Carlisle – Hawick – Edinburgh Waverley –Edinburgh Airport – Glasgow Bellgrove – Glasgow St. Enoch

First thoughts on the Representative Hourly Cross-platform Interchange Pattern at Hawick:

00H [HS3] Eastbourne – Glasgow

05H [HS2] Birmingham – Glasgow

10H Hawick – Inverness (departs first)
H [HS3] Newcastle – Glasgow (calls Lauder)
R Hawick – Dundee via Ladybank

15H [HS2] Eastbourne – Glasgow

20H [HS2] Liverpool – Glasgow

25H [HS2] Whitehaven – Carlisle – Glasgow (calls Lauder)
R Hawick – Perth via Ladybank

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

Mk2 Journey Time Enhancements

The following distances and line speeds have changed:

• Kilmarnock – Ayr	29km	(300kph)
• Edinburgh Airport – Stirling	43km	(300kph)
• Glasgow Bellgrove – Stirling	42km	(300kph)
• Glasgow Queen St. – Stirling	44km	(300kph)
• Stirling – Gleneagles via Dunblane Jn.	28km	(225kph)
• Gleneagles – Perth via Forgandenny Jn.	22km	(225kph)
• Perth – Stamley Junction	11.5km	(300kph)
• Stanley Junction – Dunkeld & Birnam	13.5km	(230kph)
• Laurencekirk – Drumlithie Junction	12km	(225kph)
• Drumlithie Junction – Cowie Junction	11km	(225kph)
• Cowie Junction – Aberdeen (new infr.)	21km	(225kph)
• Drumlithie Junction – Stonehaven (classic)	11.1km	(225kph)

- Stonehaven – Cowie Junction 2km (225kph)

Note that the distances on the classic route between the new Drumlithie and Cowie junctions, via Stonehaven, are unchanged.

With the 300kph infrastructure now extending to Stirling, Kinnaird Junction becomes a propinquant junction to Stirling, accelerating from Stirling (start – pass 260sec) and decelerating to Stirling (pass – stop 217sec). (Refer to the 'Same Speed Railways' article, specifically the sections 'The Effect of Junctions' and 'Adjacent Junctions' in appendix B, for full details.)

With the section between Perth and Stanley Junction upgraded to 300kph, Stanley Junction becomes a propinquant junction, both accelerating (start to pass 280s) and decelerating (pass to stop 230s), for the Inverness trains only, of course. The section from Stanley Junction to Dunkeld and Birnam is upgraded to 230kph, to allow the Inverness services to take maximum benefit of the propinquant junction.

The standard calculation applied between Perth and Stanley Junction for line speed 225kph, but needs to be checked explicitly for the 300kph case. From the formulae

$s = at^2/2$ and $v=at$

then, when s = 11.5km = 11500m and $a = 0.3m/s^2$, then t=277sec and v= 83m/s = 299kph. Thus, a train starting from Perth and accelerating at $0.3m/s^2$ takes 277 sec to reach Stanley Junction, (start to pass, still accelerating, as it has just failed to reach line speed). The easiest way to calculate the Stanley Junction (pass) to Coupar Angus (pass or stop) time is to calculate the time from Perth to Coupar Angus (pass or stop) and simply subtract the time from Perth to Stanley Junction (pass) – 277sec – from it. This has been done in the spreadsheets. (There is no problem in the reverse direction since, for a deceleration of 0.5 m/s^2, the deceleration distance from 300kph to standstill is 6.9km, well within the distance, and time 267sec. For the present, illustrative purposes, it has not been deemed necessary to do the calculations for both directions, though this could, obviously, easily be done if needed.)

The time for Stonehaven – Cowie Junction (pass) needs to calculated explicitly, because the distance is certainly insufficient to reach line speed. From the formulae

$s = at^2/2$ and $v=at$

then, when s = 2km = 2000m and $a = 0.3m/s^2$, then t=115sec and v= 44.5m/s. Thus, a train starting from Stonehaven and accelerating at $0.3m/s^2$ takes 115 sec to reach Cowie Junction, (start to pass, still accelerating,) at which point is has reached the instantaneous speed of 44.5m/s = 160kph, 100mph. The easiest way to calculate the Cowie Junction (pass) to Aberdeen time is to calculate the time from Stonehaven to Aberdeen and simply subtract the time from Stonehaven to Cowie Junction (pass) – 115sec – from it.

Note that table 2, Edinburgh – Glasgow / Dalmuir is unchanged from Mk1A.

1. Glasgow - Edinburgh / Ayr / Dalmuir (3/3/4 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow St. Enoch - Glasgow Bellgrove	1.8	1.8	2.3	2.3	2.3
Glasgow Bellgrove - Edinburgh Airport	68.0	69.8	17.3	19.6	22.6
Edinburgh Airport - Haymarket HS	9.0	78.8	5.2	24.8	30.8
Haymarket HS - Edinburgh Wav. HS	2.1	80.9	2.5	27.3	36.3
Glasgow St. Enoch - Glasgow Airport	12.0	12.0	4.9	4.9	4.9
Glasgow Airport - Dalry	26.0	38.0	8.9	13.8	16.8
Dalry - Kilmarnock	17.5	55.5	7.2	21.0	27.0
Kilmarnock - Ayr	29.0	84.5	9.5	30.5	39.5
Glasgow Airport - Glasgow Airport Pkwy	2.0	14.0	2.4	7.4	10.4
Glasgow Airport Pkwy - Erskine Pkwy South	5.0	19.0	3.9	11.2	15.2
Erskine Pkwy South - Erskine Pkwy North	2.0	21.0	2.4	13.7	18.7
Erskine Pkwy North - Dalmuir	3.0	24.0	3.0	16.6	22.6

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

- Edinburgh Airport [23]
- Edinburgh Waverley 65 [36]
- Glasgow Airport [5]
- Dalry 74 [17]
- Kilmarnock 67 [27]
- Ayr [40]

There are no changes in passing times.

3. Glasgow – Aberdeen fast / stopping / via Dundee (3/9/8 stops):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow St. Enoch - Glasgow Bellgrove	1.8	1.8	2.3	2.3	2.3
Glasgow Bellgrove - Stirling	42.0	43.8	12.3	14.6	17.6
Stirling - Perth	50.0	93.8	16.1	30.7	36.7
Perth - Craigo Junction	85.5	179.3	19.5	50.2	
Craigo Junction - Aberdeen	52.6	231.9	15.1	65.3	74.3
Stirling - Gleneagles	28.0	71.8	10.2	75.6	30.9
Gleneagles - Perth	22.0	93.8	8.6	84.2	42.5
Perth - Coupar Angus	25.5	119.3	8.8	93.0	56.3
Coupar Angus - Forfar	26.0	145.3	8.9	101.9	68.2
Forfar - Bridge of Dun	26.0	171.3	8.9	110.8	80.1
Bridge of Dun - Craigo Junction	8.0	179.3	4.0	114.8	
Craigo Junstion - Laurencekirk	8.6	187.9	3.3	118.2	90.5
Laurencekirk - Stonehaven (classic route)	23.1	211.0	8.9	127.1	102.4
Stonehaven - Aberdeen	23.0	234.0	8.9	136.0	114.3
Glasgow Queen St. - Stirling	44.0	44.0	12.7	12.7	12.7
Stirling - Perth	50.0	94.0	16.1	28.8	31.8
Perth - Dundee	33.6	127.6	11.7	40.6	46.6
Dundee - Arbroath	27.5	155.1	10.1	50.7	59.7
Arbroath - Montrose	22.7	177.8	8.8	59.5	71.5
Montrose - Laurencekirk	16.2	194.0	7.1	66.6	81.6
Laurencekirk - Stonehaven	23.1	217.1	8.9	75.6	93.6
Stonehaven - Aberdeen	23.0	240.1	8.9	84.5	105.5

Note: The stopping service to Aberdeen calls` at Gleneagles; the other services to Aberdeen do not.

Current fastest time (minutes) from Glasgow (Queen St.) [and the above values, from St. Enoch] to:

- Stirling 26 [18]
- Perth [fast] 53 [37]
- Aberdeen [fast] 152 [74]
- [The following times are for the Aberdeen (stopping) service]

- Gleneagles 41 [31]
- Perth 53 [43]
- Coupar Angus [56]
- Forfar [68]
- Bridge of Dun [80]
- Laurencekirk 121 [90]
- Stonehaven 132 [102]
- Aberdeen 152 [114]
- [The following times are from Glasgow Queen St.]
- Stirling 26 [13]
- Perth 53 [32]
- Dundee 76 [47]
- Arbroath 96 [60]
- Montrose 110 [72]
- Laurencekirk 121 [82]
- Stonehaven 132 [94]
- Aberdeen via Dundee 140 [106]

3P. Glasgow – Aberdeen fast / stopping / via Dundee (3/9/8 stops; with passing times):

Section	Distance (km)	Cumulative Distance (km)	Start - Stop Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow St. Enoch - Glasgow Bellgrove	1.8	1.8	2.3	2.3	2.3
Glasgow Bellgrove - *Robroyston Jn. (pass)*	3.5	5.3	2.5	*4.8*	*7.8*
Robroyston Jn. (pass) - Bankhead Jn. (pass)	24.5	29.8	5.4	*10.3*	*13.3*
Bankhead Jn. (pass) - Bannockburn Jn. (pass)	10.0	39.8	2.2	*12.5*	*15.5*
Bannockburn Jn. (pass) - Stirling	4.0	43.8	2.1	14.6	17.6
Stirling - *Gleneagles (pass)*	28.0	71.8	9.2	*23.8*	*29.8*
Gleneagles (pass) - Perth	22.0	93.8	6.9	30.7	36.7
Perth - *Stanley Jn. (pass)*	11.5	105.3	4.6	*35.4*	*44.4*
Stanley Junction (pass) - Coupar Angus)pass)	14.0	119.3	2.8	*38.2*	*47.2*
Coupar Angus (pass) - Forfar (pass)	26.0	145.3	5.2	*43.4*	*52.4*
Forfar (pass) - Bridge of Dun (pass)	26.0	171.3	5.2	*48.6*	*57.6*
Bridge of Dun (pass) - Craigo Junction (pass)	8.0	179.3	1.7	*50.2*	*59.2*
Craigo Junstion (pass) - Laurencekirk (pass)	8.6	187.9	2.3	*52.5*	*61.5*
Laurencekirk (pass)- Drumlithie Jn. (pass)	12.0	199.9	3.2	*55.7*	*64.7*
Drumlithie Jn. (pass) - Cowie Junction (pass)	11.0	210.9	2.9	*58.7*	*67.7*
Cowie Junction (pass) - Aberdeen	21.0	231.9	6.6	65.3	74.3
Stirling - Gleneagles	28.0	71.8	10.2	24.9	30.9
Gleneagles - Perth	22.0	93.8	8.6	33.5	42.5
Perth - *Stanley Jn. (pass)*	11.5	105.3	4.6	*38.1*	*52.1*
Stanley Junction (pass) - Coupar Angus	14.0	119.3	4.2	42.3	56.3
Coupar Angus - Forfar	26.0	145.3	8.9	51.2	68.2
Forfar - Bridge of Dun	26.0	171.3	8.9	60.1	80.1
Bridge of Dun - *Craigo Junction (pass)*	8.0	179.3	4.0	*64.1*	*87.1*

Craigo Junstion (pass) - Laurencekirk	8.6	187.9	3.3	67.5	90.5
Laurencekirk - *Drumlithie Jn. (pass)*	12.0	199.9	4.9	*72.4*	*98.4*
Drumlithie Jn. (pass) - Stonehaven (classic route)	11.2	211.1	4.0	76.4	102.4
Stonehaven - *Cowie Junction (pass)*	2.0	213.1	1.9	*78.3*	*107.3*
Cowie Junction (pass) - Aberdeen	21.0	234.1	7.0	85.3	114.3
Glasgow Queen St. - *Robroyston Jn. (pass)*	5.5	5.5	3.2	3.2	3.2
Robroyston Jn. (pass) - *Bankhead Jn. (pass)*	24.5	30.0	5.2	8.4	8.4
Bankhead Jn. (pass) - *Bannockburn Jn. (pass)*	10.0	40.0	2.2	10.6	10.6
Bannockburn Jn. (pass) - Stirling	4.0	44.0	2.1	12.7	12.7
Stirling - *Gleneagles (pass)*	28.0	72.0	9.2	*21.9*	*24.9*
Gleneagles (pass) - Perth	22.0	94.0	6.9	28.8	31.8
Perth - Dundee	33.6	127.6	11.7	40.6	46.6
Dundee - Arbroath	27.5	155.1	10.1	50.7	59.7
Arbroath - Montrose	22.7	177.8	8.8	59.5	71.5
Montrose - Laurencekirk	16.2	194.0	7.1	66.6	81.6
Laurencekirk - *Drumlithie Jn. (pass)*	12.0	206.0	4.9	*71.6*	*89.6*
Drumlithie Jn. (pass) - Stonehaven (classic route)	11.2	217.2	4.0	75.6	93.6
Stonehaven - *Cowie Junction (pass)*	2.0	219.2	1.5	*77.1*	*98.1*
Cowie Junction (pass) - Aberdeen	21.0	240.2	7.4	84.5	105.5

4. Edinburgh – Aberdeen fast / stopping / via Dundee and Edinburgh – Perth via Ladybank (3/9/8/5 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Edinburgh, inc. Station Wait Times
Edinburgh Waverley HS - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - Kinnaird Junction	33.0	44.1	9.0	16.7	
Kimmaird Junction - Stirling	10.0	54.1	3.6	20.3	26.3
Stirling - Perth	50.0	104.1	16.1	36.4	45.4
Perth - Craigo Junction	85.5	189.6	19.5	55.9	
Craigo Junction - Aberdeen	52.6	242.2	15.1	71.0	83.0
Stirling - Gleneagles	28.0	82.1	10.2	30.5	39.5
Gleneagles - Perth	22.0	104.1	8.6	39.2	51.2
Perth - Coupar Angus	25.5	129.6	8.8	48.0	65.0
Coupar Angus - Forfar	26.0	155.6	8.9	56.9	76.9
Forfar - Bridge of Dun	26.0	181.6	8.9	65.8	88.8
Bridge of Dun - Craigo Junction	8.0	189.6	4.0	69.8	
Craigo Junstion - Laurencekirk	8.6	198.2	3.3	73.1	99.1
Laurencekirk - Stonehaven (classic route)	23.1	221.3	8.9	82.0	111.0
Stonehaven - Aberdeen	23.0	244.3	8.9	91.0	123.0
Edinburgh Airport - Forth Bridge South	10.0	21.1	4.8	12.5	
Forth Bridge South - Forth Bridge North	5.3	26.4	4.0	16.5	
Forth Bridge North - Kirkcaldy	7.9	34.3	4.2	20.7	26.7
Kirkcaldy - Leuchars Junction	55.9	90.2	19.2	40.0	49.0
Leuchars Junction - Tay Bridge South	9.0	99.2	4.7	44.7	
Tay Bridge South - Dundee	4.4	103.6	5.0	49.7	61.7
Dundee - Arbroath	27.5	131.1	10.1	59.8	74.8
Arbroath - Montrose	22.7	153.8	8.8	68.6	86.6

Montrose - Laurencekirk	16.2	170.0	7.1	75.7	96.7
Laurencekirk - Stonehaven (classic route)	23.1	193.1	8.9	84.6	108.6
Stonehaven - Aberdeen	23.0	216.1	8.9	93.5	120.5
Kirkcaldy - Ladybank	36.9	71.2	13.5	34.3	43.3
Ladybank - Newburgh	12.0	83.2	6.5	40.7	52.7
Newburgh - Perth	17.0	100.2	8.4	49.1	64.1

Note: The stopping service to Aberdeen calls` at Gleneagles; the other services to Aberdeen do not.

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

- Edinburgh Airport [11]
- Stirling 51 [27]
- [The following times are for the Aberdeen (fast) service]
- Perth 76 [46]
- Aberdeen 137 [83]
- [The following times are for the Aberdeen (stopping) service]
- Gleneagles 66 [40]
- Perth 76 [52]
- Coupar Angus [65]
- Forfar [77]
- Bridge of Dun [89]
- Laurencekirk 110 [99]
- Stonehaven 117 [111]
- Aberdeen 137 [123]
- [The following times are direct to Dundee or Perth, via The Bridges]
- Kirkcaldy 36 [27]
- Leuchars Junction 53 [49]
- Dundee 76 [62]
- Arbroath 96 [75]
- Montrose 110 [87]
- Laurencekirk 121 [97]
- Stonehaven 132 [109]
- Aberdeen 152 [121]
- Ladybank 52 [40]
- Newburgh [50]
- Perth 76 [64]

4P. Edinburgh – Aberdeen fast / stopping / via Dundee and Edinburgh – Perth via Ladybank (3/9/8/5 stops; with passing times):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Edinburgh, inc. Station Wait Times
Edinburgh Waverley HS - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - *Kirkliston Jn. (pass)*	4.0	15.1	2.7	*10.4*	*16.4*
Kirkliston Jn. (pass) - Kinnaird Jn. (pass)	29.0	44.1	6.3	*16.7*	*22.7*
Kinnaird Jn. (pass) - Bannockburn Jn. (pass)	6.0	50.1	1.5	*18.2*	*24.2*
Bannockburn Jn. (pass) - Stirling	4.0	54.1	2.1	20.3	26.3
Stirling - *Gleneagles (pass)*	28.0	82.1	9.2	*29.5*	*38.5*
Gleneagles (pass) - Perth	22.0	104.1	6.9	36.4	45.4
Perth - *Stanley Jn. (pass)*	11.5	115.6	4.6	*41.0*	*53.0*
Stanley Jn. (pass) - Coupar Angus)pass)	14.0	129.6	2.8	*43.8*	*55.8*
Coupar Angus (pass) - Forfar (pass)	26.0	155.6	5.2	*49.0*	*61.0*
Forfar (pass) - Bridge of Dun (pass)	26.0	181.6	5.2	*54.2*	*66.2*
Bridge of Dun (pass) - Craigo Junction (pass)	8.0	189.6	1.7	*55.9*	*67.9*
Craigo Junstion (pass) - Laurencekirk (pass)	8.6	198.2	2.3	*58.2*	*70.2*
Laurencekirk (pass)- Drumlithie Junction (pass)	12.0	210.2	3.2	*61.4*	*73.4*
Drumlithie Junction (pass) - Cowie Junction (pass)	11.0	221.2	2.9	*64.3*	*76.3*
Cowie Junction (pass) - Aberdeen	21.0	242.2	6.6	71.0	83.0
Stirling - Gleneagles	28.0	82.1	10.2	30.5	39.5
Gleneagles - Perth	22.0	104.1	8.6	39.2	51.2
Perth - *Stanley Jn. (pass)*	11.5	115.6	4.6	*43.8*	*60.8*
Stanley Jn. (pass) - Coupar Angus	14.0	129.6	4.2	48.0	65.0
Coupar Angus - Forfar	26.0	155.6	8.9	56.9	76.9

Forfar - Bridge of Dun	26.0	181.6	8.9	65.8	88.8
Bridge of Dun - *Craigo Junction (pass)*	8.0	189.6	4.0	*69.8*	*95.8*
Craigo Junstion (pass) - Laurencekirk	8.6	198.2	3.3	73.1	99.1
Laurencekirk - *Drumlithie Jn. (pass)*	12.0	210.2	4.9	*78.0*	*107.0*
Drumlithie Jn. (pass) - Stonehaven (classic route)	11.1	221.3	4.0	82.0	111.0
Stonehaven - *Cowie Junction (pass)*	2.0	223.3	1.9	*84.0*	*116.0*
Cowie Junction (pass) - Aberdeen	21.0	244.3	7.0	91.0	123.0
Edinburgh Airport - *Kirkliston Jn. (pass)*	4.0	15.1	2.7	*10.4*	*16.4*
Kirkliston Jn. (pass) - *Humbie Jn. (pass)*	2.0	17.1	0.6	*11.0*	*17.0*
Humbie Jn. (pass) - *Forth Bridge South (pass)*	4.0	21.1	1.5	*12.5*	*18.5*
Forth Bridge South (pass) - *Forth Bridge North (pass)*	5.3	26.4	4.0	*16.5*	*22.5*
Forth Bridge North (pass) - Kirkcaldy	7.9	34.3	4.2	20.7	26.7
Kirkcaldy - Leuchars Junction	55.9	90.2	19.2	40.0	49.0
Leuchars Junction - *Tay Bridge South (pass)*	9.0	99.2	4.7	*44.7*	*56.7*
Tay Bridge South (pass) - Dundee	4.4	103.6	5.0	49.7	61.7
Dundee - Arbroath	27.5	131.1	10.1	59.8	74.8
Arbroath - Montrose	22.7	153.8	8.8	68.6	86.6
Montrose - Laurencekirk	16.2	170.0	7.1	75.7	96.7
Laurencekirk - *Drumlithie Jn. (pass)*	12.0	182.0	4.9	*80.6*	*104.6*
Drumlithie Jn. (pass) - Stonehaven (classic route)	11.1	193.1	4.0	84.6	108.6
Stonehaven - *Cowie Junction (pass)*	2.0	195.1	1.9	*86.6*	*113.6*
Cowie Junction (pass) - Aberdeen	21.0	216.1	7.0	93.5	120.5
Kirkcaldy - Ladybank	36.9	71.2	13.5	34.3	43.3
Ladybank - Newburgh	12.0	83.2	6.5	40.7	52.7
Newburgh - Perth	17.0	100.2	8.4	49.1	64.1

5. Glasgow - Inverness (11 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow Queen St. - Stirling	44.0	44.0	12.7	12.7	12.7
Stirling - Gleneagles	28.0	72.0	10.2	23.0	26.0
Gleneagles - Perth	22.0	94.0	8.6	31.6	37.6
Perth - Stanley Junction	11.5	105.5	4.7	36.3	
Stanley Junction - Dunkeld & Birnam	13.5	119.0	4.6	40.9	49.9
Dunkeld & Birnam - Pitlochry	20.7	139.7	9.7	50.7	60.7
Pitlochry - Blair Atholl	11.1	150.8	6.1	56.8	67.8
Blar Atholl - Dalwhinnie	36.1	186.9	15.5	72.3	84.3
Dalwhinnie - Newtonmore	6.4	193.3	4.4	76.7	89.7
Newtonmore - Kingussie	6.1	199.4	4.3	81.0	95.0
Kingussie - Aviemore	19.0	218.4	9.1	90.1	105.1
Aviemore - Carrbridge	10.8	229.2	6.0	96.1	112.1
Carrbridge - Inverness	45.0	274.2	18.9	114.9	131.9

Current fastest time (minutes) from Glasgow (Queen St.) [and the above values, also from Queen St.] to:

- Stirling 26 [13]
- Gleneagles 41 [26]
- Perth 53 [38]
- Dunkeld & Birnam 77 [50]
- Pitlochrie 92 [61]
- Blair Atholl 102 [68]
- Dalwhinnie 126 [84]
- Newtonmore 137 [90]
- Kingussie 138 [95]
- Aviemore 150 [105]
- Carrbridge 165 [112]
- Inverness 193 [132]

5P. Glasgow - Inverness (11 stops; with passing times):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow Queen St. - *Robroyston Jn. (pass)*	5.5	5.5	3.2	*3.2*	*3.2*
Robroyston Jn. (pass) - Bankhead Jn. (pass)	24.5	30.0	5.2	*8.4*	*8.4*
Bankhead Jn. (pass) - Bannockburn Jn. (pass)	10.0	40.0	2.2	*10.6*	*10.6*
Bannockburn Jn. (pass) - Stirling	4.0	44.0	2.1	12.7	12.7
Stirling - Gleneagles	28.0	32.0	10.2	23.0	26.0
Gleneagles - Perth	22.0	54.0	8.6	31.6	37.6
Perth - *Stanley Junction (pass)*	11.5	65.5	4.7	*36.3*	*45.3*
Stanley Junction (pass) - Dunkeld & Birnam	13.5	79.0	4.6	40.9	49.9
Dunkeld & Birnam - Pitlochry	20.7	99.7	9.7	50.6	60.6
Pitlochry - Blair Atholl	11.1	110.8	6.1	56.7	67.7
Blar Atholl - Dalwhinnie	36.1	146.9	15.5	72.3	84.3
Dalwhinnie - Newtonmore	6.4	153.3	4.4	76.6	89.6
Newtonmore - Kingussie	6.1	159.4	4.3	80.9	94.9
Kingussie - Aviemore	19.0	178.4	9.1	90.0	105.0
Aviemore - Carrbridge	10.8	189.2	6.0	96.0	112.0
Carrbridge - Inverness	45.0	234.2	18.9	114.9	131.9

6. Edinburgh - Inverness (13 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Edinburgh Waverley HS - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - Kinnaird Junction	33.0	44.1	9.0	16.7	
Kimmaird Junction - Stirling	10.0	54.1	3.6	20.3	26.3
Stirling - Gleneagles	28.0	82.1	10.2	30.5	39.5
Gleneagles - Perth	22.0	104.1	8.6	39.2	51.2
Perth - Stanley Junction	11.5	115.6	4.7	43.8	
Stanley Junction - Dunkeld & Birnam	13.5	129.1	4.6	48.4	63.4
Dunkeld & Birnam - Pitlochry	20.7	149.8	9.7	58.2	74.2
Pitlochry - Blair Atholl	11.1	160.9	6.1	64.3	81.3
Blar Atholl - Dalwhinnie	36.1	197.0	15.5	79.8	97.8
Dalwhinnie - Newtonmore	6.4	203.4	4.4	84.2	103.2
Newtonmore - Kingussie	6.1	209.5	4.3	88.4	108.4
Kingussie - Aviemore	19.0	228.5	9.1	97.5	118.5
Aviemore - Carrbridge	10.8	239.3	6.0	103.6	125.6
Carrbridge - Inverness	45.0	284.3	18.9	122.4	145.4

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

- Stirling 51 [26]
- Gleneagles 66 [40]
- Perth 76 [51]
- Dunkeld & Birnam 93 [63]
- Pitlochrie 106 [74]
- Blair Atholl 116 [81]
- Dalwhinnie 140 [98]
- Newtonmore 153 [103]
- Kingussie 153 [108]
- Aviemore 164 [119]

- Carrbridge 185 [126]
- Inverness 200 [145]

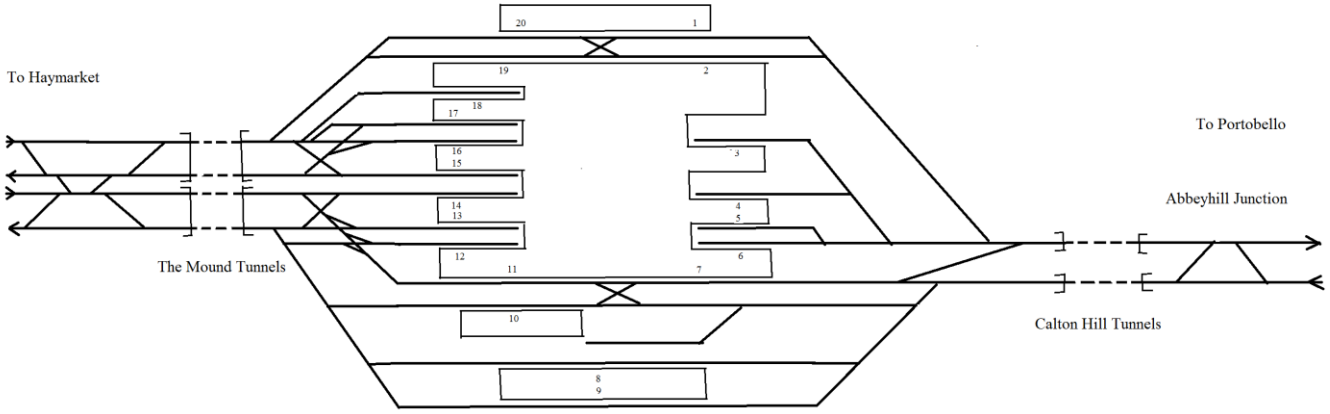
6P. Edinburgh - Inverness (13 stops: with passing times):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Edinburgh Waverley HS - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - *Kirkliston Jn. (pass)*	4.0	15.1	2.7	*10.4*	*16.4*
Kirkliston Jn. (pass) - Kinnaird Jn. (pass)	29.0	44.1	6.3	*16.7*	*22.7*
Kinnaird Jn. (pass) - Bannockburn Jn. (pass)	6.0	50.1	1.5	*18.2*	*24.2*
Bannockburn Jn. (pass) - Stirling	4.0	54.1	2.1	20.3	26.3
Stirling - Gleneagles	28.0	82.1	10.2	30.5	39.5
Gleneagles - Perth	22.0	104.1	8.6	39.2	51.2
Perth - *Stanley Jn. (pass)*	11.5	115.6	4.7	*43.8*	*58.8*
Stanley Jn. (pass) - Dunkeld & Birnam	13.5	129.1	4.6	48.4	63.4
Dunkeld & Birnam - Pitlochry	20.7	149.8	9.7	58.2	74.2
Pitlochry - Blair Atholl	11.1	160.9	6.1	64.3	81.3
Blar Atholl - Dalwhinnie	36.1	197.0	15.5	79.8	97.8
Dalwhinnie - Newtonmore	6.4	203.4	4.4	84.2	103.2
Newtonmore - Kingussie	6.1	209.5	4.3	88.4	108.4
Kingussie - Aviemore	19.0	228.5	9.1	97.5	118.5
Aviemore - Carrbridge	10.8	239.3	6.0	103.6	125.6
Carrbridge - Inverness	45.0	284.3	18.9	122.4	145.4

Appendix A – Edinburgh Waverley HS

Initial thoughts, (when working on the design of HS3, where the main point of interest was in reaching Edinburgh, rather than on what it found when it got there,) were to have the Waverley HS station (2 islands, 4 platform faces) on the north side of the existing station, underneath Princes St., then continuing in tunnel under Princes St. and Shandwick Place to Haymarket and on to Glasgow (though no plans were developed west of Waverley, at that time). It may still be decided that this represents the best solution, (I can't see **any** location other than at Waverley having **anything** to commend it,) but it does deserve rather more serious thought.

This, to the best of my understanding, is the current layout at Waverley. The diagram is strictly topographical, seeking only to show the connections; no distance or orientation information should be inferred from it. It is a really horrid mess. However, the platform numbering scheme, while unusual, does have its own, pawky logic.



Edinburgh HS station, at service plan 5, must support the following services:

- 2tphH (HS3) [Eastbourne –]London – Glasgow
- 2tphH (HS3) Newcastle – Glasgow
- 4tphH Newcraighall HS – Dalmuir
- 2tphH Newcraighall HS – Aberdeen fast
- 2tphH Newcraighall HS – Aberdeen stopping
- 2tphH Newcraighall HS – Aberdeen via Dundee
- 2tphH Hawick – Inverness
- 2tphH Newcraighall HS – Perth via Ladybank

Edinburgh Waverley classic, at service plan 5, must support the following services:

- 2tphH HS6 London – Edinburgh
- 1tphH HS2 Birmingham – Edinburgh
- 1tphH HS2 Liverpool – Edinburgh
- 2tphR York – Edinburgh
- 2tphR Hawick – Perth via Dunfermline and Ladybank
- 2tphR Hawick – Dundee via Dunfermline and Ladybank

- 2tphRS Newcraighall – Stirling via Dunfermline
- 2tphRS Newcraighall – Stirling via Larbert
- 4tphRS Newcraighall – Fife Circle (clockwise)
- 4tphRS Newcraighall – Fife Circle (counterclockwise)

In addition, consulting current timetables, there are the following services, independent of the current considerations, but still needing to be accommodated at Waverley:

- 2tphR Edinburgh – Glasgow via Falkirk High (stopping pattern 1)
- 2tphR Edinburgh – Glasgow via Falkirk High (stopping pattern 2)
- 2tphRS Edinburgh – Helensburgh via Bathgate, all stations
- 2tphR Edinburgh – Milngavie via Bathgate, semi-fast
- 1tphRS Edinburgh – Glasgow via Shotts, all stations
- 1tphR Edinburgh – Glasgow via Shotts, semi-fast
- 1tphRS Edinburgh – North Berwick, all stations
- 1tphR Edinburgh – Dunbar stopping only at Musselburgh

I think it will readily be conceded that there is no way that the HS services can be accommodated in the existing Waverley. A service of 18tph needs a minimum of two platforms (in each direction); even then each train must be processed within 7 minutes – which is tight, but certainly manageable, since they're all through trains; nothing starts from or terminates there. The airport station, handling an additional 14tph regional metro trains, needs another two platforms in each direction. These must be arranged so that cross-platform interchange, at both the islands in each direction, is between HS and RM trains.

Since the existing station cannot accommodate the extra services, there are two possibilities:

- A new HS station on the north side, under Princes St.; the original idea.
- Redevelopment of Waverley, keeping the existing roof, (the only architectural feature worth preserving,) but scrapping all the buildings on the large, central island platform, and redeveloping the area as through platforms exclusively. I reckon the space should comfortably accommodate 14 through platforms, as 7 islands. They wouldn't need to be quite as long as the existing platforms, space for a 12-car train, 300m say, should be sufficient.

In theory, of course, a new station could be built elsewhere, but I think this a thoroughly retrograde solution, and so offer no suggestions.

HS services would not start from or terminate at Waverley. They would start either from London (actually from Eastbourne), Newcastle or Hawick, or from the HS terminal station at Newcraighall. The longer-distance Regional Metro services, would also start from Hawick via the reopened classic Waverley route, or from an ECML location such as Dunbar. Local services to Fife would begin at the classic Newcraighall station, as they do at present, extended as necessary with a few terminal platforms (since the through platforms would be used by the Waverley route trains). Other local services would begin at existing or new/restored locations east of Edinburgh, such as North Berwick, Haddington and Gullane. So here is the suggested overall service plan for the redeveloped Waverley:

- 2tphH HS3 [Eastbourne –] London – Glasgow
- 2tphH HS3 Newcastle – Glasgow
- 4tphH Newcraighall HS – Dalmuir

- 2tphH Newcraighall HS – Aberdeen fast
- 2tphH Newcraighall HS – Aberdeen stopping
- 2tphH Newcraighall HS – Aberdeen via Dundee
- 2tphH Hawick – Inverness
- 2tphH Newcraighall HS – Perth via Ladybank

This last service could advantageously incorporate the Dunbar – Musselburgh – Edinburgh service, doubling its frequency; there are, after all, plenty of services from Newcraighall HS. This change would necessitate it taking the classic tracks from Waverley to Gyle Junction, but that's no great problem.

– the HS services.

- 2tphH HS6 London – Edinburgh
- 1tphH HS2 Birmingham – Edinburgh
- 1tphH HS2 Liverpool – Edinburgh
- 2tphR York – Edinburgh

– HS and RM services from England terminating at Edinburgh

- 2tphR Hawick – Perth via Dunfermline and Ladybank
- 2tphR Hawick – Dundee via Dunfermline and Ladybank
- 2tphRS Newcraighall – Stirling via Dunfermline
- 2tphRS Newcraighall – Stirling via Larbert
- 4tphRS Newcraighall – Fife Circle (clockwise)
- 4tphRS Newcraighall – Fife Circle (counterclockwise)
- 2tphR North Berwick – Glasgow via Falkirk (stopping pattern 1)
- 2tphR North Berwick – Glasgow via Falkirk (stopping pattern 2)
- 2tphR Haddington – Milngavie via Bathgate semi fast
- 2tphRS Haddington – Helenburgh via Bathgate stopping
- 2tphR Gullane – Glasgow Central via Shotts semi fast
- 2tphRS Gullane – Glasgow Central via Shotts, stopping

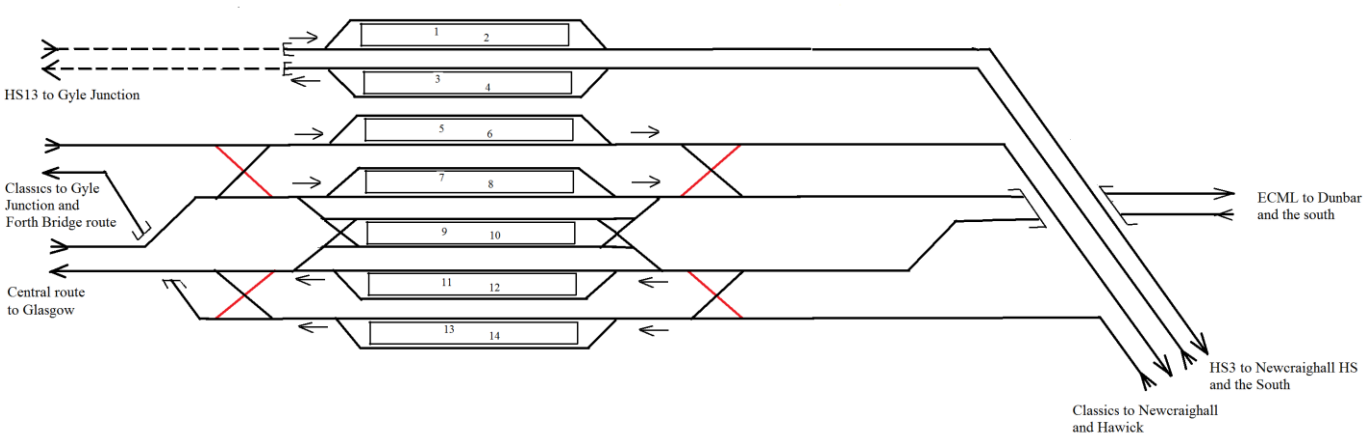
– the RM semi-fast and stopping services.

Assuming the 14 through platforms are numbered starting from 1 at the top, the platform usage is:

- 1&2 HS eastbound
- 3&4 HS westbound
- 5&6 HS2 from B'ham and Liverpool (*)
  Perth – Hawick
  Dundee – Hawick
  Fife Circle clockwise – Newcraighall
  Fife Circle counterclockwise – Newcraighall
  Stirling – Newcraighall via Alloa
  Stirling – Newcraighall via Larbert
  Perth – Dunbar
  — to Waverley route (* to Millerhill)
- 7&8 Glasgow – North Berwick via Falkirk (1)
  Glasgow – North Berwick via Falkirk (2)

	Helenburgh – Haddington stopping	to ECML
	Milngavie – Haddington semi-fast	
	Glasgow – Gullane via Shotts stopping	
	Glasgow – Gullane via Shotts semi-fast	
• 9	HS6 to London, RM to York, Cross-Country	to ECML
• 10	HS6 from London, RM from York, Cross-Country	to Central route
• 11&12	North Berwick – Glasgow via Falkirk (1)	
	North Berwick – Glasgow via Falkirk (2)	
	Haddington – Helensburgh stopping	to Central route
	Haddington – Milngavie semi-fast	(* from Millerhill)
	Gullane – Glasgow Central stopping	
	Gullane – Glasgow Central semi-fast	
• 13&14	HS2 to Birmingham and Liverpool (*)	
	Hawick – Aberdeen	
	Hawick – Dundee	
	Dunbar – Perth	to Forth Bridge route
	Newcraighall – Fife Circle clockwise	
	Newcraighall – Fife Circle conterclockwise	
	Newcraighall – Stirling via Alloa	
	Newcraighall – Stirling via Larbert	to Central route

The revised layout is:



The classic part of the layout it essentially the crossover of two routes – Waverley route to the Forth Bridge and ECML to Central routes to Glasgow – with minimal exchange of services between them (but plenty of exchange of passengers). There is a slight exchange of services between ECML/Central and Waverley/Forth Bridge, via the Forth Bridge platforms, (specifically Dunbar – Perth and Newcraighall – Stirling via Larbert,) but none at all, in normal service, between them via the Central platforms. In the two pairs of scissors crossovers on each side, the connections shown in red are for operational flexibility, but are not used in normal operation.

This layout, in normal usage, eliminates all conflicting movements. Platforms 5&6 and 13&14 are for services between the Waverley route and Fife and points north, via the Forth Bridge. The Forth Bridge lines join HS13 at Gyle Junction, and cross-platform interchange is provided at the airport station, always between HS13 and classic services. The Forth Bridge services, HS14 and RM, then diverge from HS13 at

Kirkliston Junction and rejoin the Forth Bridge route (western arm) at Humbie Junction. Platforms 7&8 and 11&12 are for services between the ECML and the Central route, (all of them to/from Glasgow, by one of three routes). Platforms 9&10 are for the long distance HS and RM services from the ECML, terminating at Edinburgh and also for Cross-Country services. Such trains are not serviced at the platforms, but continue onto the Central route, to the servicing facility. These platforms allow for each-way working – again, for operational flexibility, not required in normal operation. The terminating HS2 classic-compatible services from Birmingham and Liverpool (marked * in the platform usage table) of course approach Edinburgh from the west, but are routed into the Forth Bridge platforms, in order to travel through to Millerhill, on the Waverley route, for servicing.

Cross platform interchange is provided at all island platforms. On the Forth Bridge route platforms, the convention, similar to that at the airport, is for interchange between a faster and slower service, between semi-fast and stopping. No such pattern applies to the Central route platforms.

Representative Hourly Cross-Platform Interchange Pattern for platforms 11&12:

00R North Berwick – Glasgow Queen St. via Falkirk High (stopping pattern 1)
RS Haddington – Helensburgh

07R Gullane – Glasgow Central via Shotts, semi-fast
(no connection)

15R North Berwick – Glasgow Queen St. via Falkirk High (stopping pattern 2)
R Haddington – Milngavie, semi-fast

23RS Gullane – Glasgow Central via Shotts, all stations
(no connection)

Representative Hourly Cross-Platform Interchange Pattern for platforms 13&14:

00R Hawick – Perth
RS Newcraighall – Fife Circle counter-clockwise

07R Hawick – Dundee
RS Newcraighall – Stirling via Alloa

15H HS2 service to Birmingham or Liverpool (* originating from Millerhill)
RS Newcraighall – Fife Circle clockwise

23H Dunbar – Perth via Ladybank
RS Newcraighall – Stirling via Larbert

On the HS platforms 1&2 there is no planned interchange; the two platforms are needed to lengthen the available wait time to 7½ minutes, which is not needed by the Dalmuir metro, but is for the long distance trains.

Appendix B – Glasgow St. Enoch

Glasgow St. Enoch is envisaged as a 2 island, 4 platform station. There's unlikely to be room for any more. Is has only HS services, all, obviously, starting at St. Enoch:

- 2tph London
- 2tph Newcastle
- 2tph Aberdeen fast
- 2tph Aberdeen stopping
- 2tph Aberdeen via Dundee

– from the northern two platforms

- 4tph Kilmarnock / Ayr
- 4tph Dalmuir

– from the southern two platforms.

These give available times per train of 12 minutes for the northern two faces and 15 minutes for the southern two. Clearly the trains cannot be serviced and prepared for the next journey at the platforms.

This is not a problem for the Kilmarnock / Ayr and Dalmuir trains, as their journeys are not long, and they can adequately be serviced as required at Kilmarnock / Ayr or Dalmuir; all that's required at St. Enoch is to collect the rubbish the passengers will have left behind, and the train is then ready for its next departure.

But the trains to England and to northern Scotland will need to be serviced in Glasgow prior to their next departure, and for this there must be an out-of-station servicing facility to which they can be sent. (I don't know Glasgow sufficiently well to suggest a suitable location for such a facility. But, consulting satellite maps, the area south of the Clyde around where Shields Rd. crosses HS13 looks quite promising.)

The above assumes the limited proposal for St. Enoch. If the better long-term solution, of a complete redevelopment of the St. Enoch Centre, incorporating a full-size station, were adopted, there would be no capacity problems whatever. In particular, there would be plenty of time and space to service the trains and prepare them for the next journey, at the platforms.

Appendix C – Route Changes at Mk1A and Mk2

The changes to HS13 are minor at Mk1A: the section from Kilmarnock to Ayr is postponed (to Mk2, when it is restored,) and Ayr services use the classic line from Dalry Junction, via Troon (reverting to the original design at Mk2). Over all other sections, there is no practical incorporation of classic route, since either none is available in the right location, (as applies between Edinburgh Waverley and Alexandra Palace, between Shields Junction and Johnstone, via Glasgow Airport, and between Glasgow Airport and Dalmuir,) or HS11 has already taken over and upgraded existing track (as between High Street Junction and Shields Junction , taking over and widening as necessary the Glasgow Union line, currently little used,) or the trackbed of former railways currently closed and lifted (as between Johnstone and Brownhills Junction via Lochwinnoch, and between Dalry Junction and Kilmarnock, the original GSW main line). No changes are envisaged on the incorporated section of classic track to Ayr, since its use is intended to be only temporary.

The changes in HS14, on the other hand, are fundamental and, (it is envisaged,) in most cases permanent. The most significant of many changes is the complete removal of the line between Burrelton Junction and Dundee, with the relocation and redevelopment of Tay Bridge station.. The only reason a new section of HS line was proposed there was because of the impracticability of upgrading the tortuous eastern exit from Perth to GC gauge. Now that GC gauge has been cancelled, there is no reason not to incorporate the classic route between Perth and Dundee since, apart from the first five miles or so, to Tothill, the alignments are good, and the line can be upgraded to 225kph/140mph. There is also no need for a new station in Dundee, since there is no longer the requirement to terminate the (no longer GC gauge) HS services there, and they can, instead, continue on to Aberdeen.

At Mk1A, most of the new HS infrastructure of HS14 is postponed to Mk2. The major exception is the route of the Caledonian Great Glen main line, between Stanley Junction, north of Perth, and Craigo Junction , where it joins the Aberdeen line, north of Montrose. Craigo is a relocation of the former, celebrated Kinnaber Junction, on a much improved alignment. This is new (i.e. renewed) infrastructure, built for a 300kph line speed. Additionally, the short sections between Bankhead and Bannockburn junctions, and Kinnaird and Alloa junctions, where the links from HS11, from Glasgow and Edinburgh respectively, join the classic route to Stirling, are new infrastructure. The classic route between Alloa Junction and Stirling, followed by the Strathallan line to Perth, are incorporated in HS14 and upgraded to 225kph/140mph line speed, (likewise the continuation north of Perth, to Stanley Junction).

The Bridges route, between Humbie Junction (where links from HS11 and the classic tracks via Edinburgh Airport join the western approach to the Forth Bridge, allowing Fife services to call at the Airport,) and Dundee, and also between Ladybank and Perth, is also incorporated into HS14, and upgraded to 200kph, 125mph, line speed, insofar as this is practicable. The only reason this route was not formally incorporated into HS14 in the original plans was because of the impracticability, (quite likely impossibility, on the bridges,) of upgrading it to GC gauge, Now that this is no longer necessary, it can take its rightful place among the premier routes. (It is, however, expected that the existing speed restrictions across the bridges – 80kph/50mph for the Forth Bridge and 56kph/35mph for the Tay Bridge – will have to be maintained.)

The classic route from Dundee to Aberdeen via Montrose is likewise incorporated into HS14, and upgraded to 225kph/140mph line speed.

The Highland line, north of Stanley Junction is doubled where necessary, and accelerated to a 100mph line speed. (At the very least, the previous double-track section, currently singled, between the former Culloden Moor and Daviot stations, some 4 miles, 6.5km, should be restored. The rest is all actually – very to my surprise – still in place.)

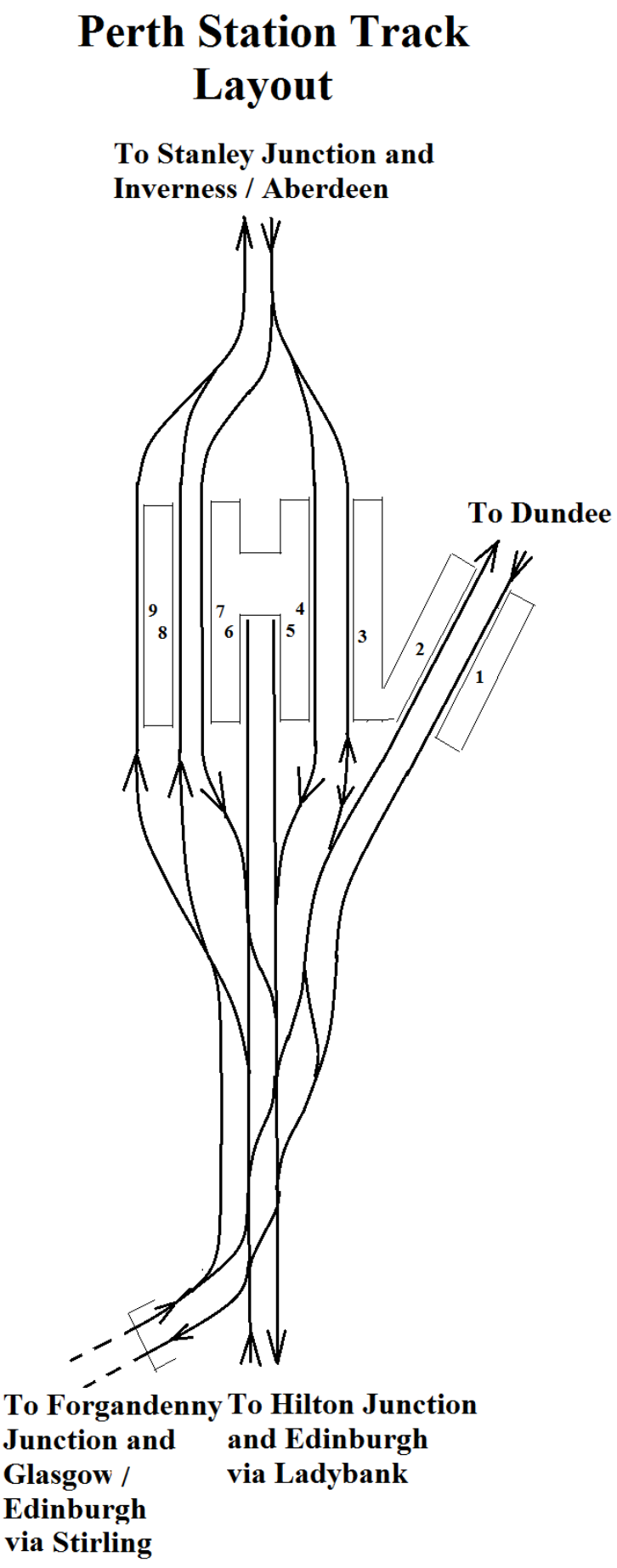
Not much changes on HS14 at Mk2. New infrastructure is built between Alloa Junction and Stirling, together with a new HS station there, and then north of Stirling, on a new alignment, to join the Strathallan line at Dunblane Junction, as in the original plans. The direct link between Forgandenny Juntion and Perth, avoiding the tortuous approach via Hilton Junction, is likewise reinstated.

The section between Perth and Stanley Junction is upgraded at Mk2 to 300kph, although only the last 5km would need any change – the initial 6.5km are needed to accelerate to 225kph. (In the reverse direction, the decelerating distance from 225kph is 4km.)

The cutoff between Drumlithie and Cowie junctions, avoiding the strongly curved section approaching Stonehaven station, and the station itself, is reinstated, as are the new tracks between Cowie Junction and Aberdeen, including the new, direct approach to Aberdeen from Cove Bay. The main justification for this is to improve the resilience of the overtaking arrangements at Stonehaven of the services to Aberdeen: Glasgow – Aberdeen (fast) overtakes Edinburgh – Aberdeen (stopping) and Edinburgh – Aberdeen (fast) overtakes Glasgow – Aberdeen (stopping). (Refer to Appendix F for full details.) An additional benefit is to allow the Aberdeen Metro to take over the classic tracks between Aberdeen and Stonehaven for a new service. (Refer to Appendix G for a network plan of the Aberdeen Metro.)

A completely new proposal, for a Tayside Metro, has been prompted by the re-writing of the present article, to account for the cancellation of GC-gauge and the consequent upgrading of the Edinburgh – Dundee route via the Bridges. The Tayside Metro provides for a HS service between Edinburgh and St. Andrews via a cross-platform connection at Leuchars Junction between the HS14 Edinburgh – Aberdeen via Dundee and metro Monikie – St. Andrews services, and vice versa. It also provides for a HS service between Edinburgh and Cupar, via a connection at Ladybank between the HS14 Edinburgh – Perth via Ladybank and metro Ladybank – Monikie services, and vice versa (with cross-platform connection at Ladybank in the southbound direction). (Refer to Appendix G for a network plan of the Tayside Metro.)

Appendix D – Perth Station Layout



To Victorian Scottish railwaymen, at least to those associated with the Caledonian Railway, Perth was 'the Crewe of Scotland'. (The North British had other ideas of course.) With the reopening, to high speed standards, of the Great Glen route, the present proposals should restore much of Perth's former glory.

With the exception of the new approach to Perth from Forgandenny Junction, proposed for Mk2 of the plans, no wholly new infrastructure is necessary, merely restoring the former platforms 8 and 9. (The track at platform 8 is still in place, as is the rather ruinous platform itself.) Platforms 1-7 are all still in place, though platforms 1 and 2 are disproportionately busy, with all Glasgow – Aberdeen traffic currently routed via Dundee.

Platforms 8/9 provide for cross-platform interchange between northbound fast and stopping Aberdeen services, Glasgow – Aberdeen fast and Edinburgh – Aberdeen stopping, and vice versa. (Platforms 4 and 7 provide the same facilities for the southbound services.) The Glasgow – Aberdeen via Dundee service, using platform 2, makes a non-cross-platform connection with the (Hawick –) Edinburgh – Inverness service (via Stirling) at platform 8 or 9. (The corresponding Edinburgh – Aberdeen via Dundee service travels directly to Dundee via the bridges, of course.) The semi-fast service from Edinburgh to Perth via Ladybank, terminating in (the reversible) platform 3, connects into the Glasgow – Inverness service, at platform 8 or 9.

The bay platforms 5 and 6 are used by the all-stations service from Edinburgh to Perth. The equivalent Perth service from Glasgow continues through to Dundee and terminates there.

Appendix E – Distance Table for Scotland

Distance Table for HS13/HS14		
Edinburgh Waverley to:	miles:chains	km
Forth Bridge south end	9:47	15.4
Forth Bridge north end	11:13	18.0
Kirkcaldy	25:70	41.6
Ladybank	39:04	62.8
Leuchars Junction	50:68	81.8
Tay Bridge south end	56:37	90.8
Tay Bridge north end	58:55	94.4
Dundee	59:14	95.2
Perth, via Ladybank	56:64	91.4
Dundee to:	miles:chains	km
Arbroath	17:07	27.5
Montrose	31:17	50.2
Craigo	35:72	57.8
Laurencekirk	41:21	66.4
Stonehaven	55:51	89.5
Aberdeen	71:63	115.5
Perth	20:72	33.6
Glasgow Queen St. to:	miles:chains	km
Stirling	29:46	47.6
Gleneagles	46:72	75.5
Forgandenny	58:61	94.5
Perth	62:47	100.7
Stanley Junction	69:57	112.2
Stanley Junction to:	miles:chains	km
Dunkeld & Birnam	8:32	13.5
Pitlochry	21:22	34.2
Blair Atholl	28:10	45.3
Dalwhinnie	51:48	81.4
Newtonmore	61:63	97.8
Kingussie	64:44	103.9
Aviemore	76:32	122.9
Carrbridge	83:10	133.7
Inverness	111:04	178.7

The source of these data is ‘Track Atlas of Mainland Britain’ (TRACKmaps 2009). The values are given in miles and chains (80 chains = 1 mile). In contrast to most other exercises of this type, the Scottish distances were fairly straightforward to derive – except around Dundee, where the distances eastwards, towards Arbroath, have their datum at Dundee East, and those westwards, towards Perth, at Dundee West, both stations long gone (East having been made redundant when the Tay Bridge opened!). That took a bit of working out! It was certainly a sufficiently tedious process to make it worth preserving the results, so that I don’t ever have to do it again.

Appendix F – HS14 Interchange Timings

HS14's services have the dual origins of Glasgow and Edinburgh, (actual Edinburgh origin either Newcraighall HS or Hawick,) and these are intimately inter-linked. The fundamental interchange location is Perth, (the 'Crewe of Scotland', as mentioned in appendix D,) where the Hourly Cross-Platform Interchange Pattern is:

Arrive	Depart	
00H	03	Glasgow St. Enoch – Aberdeen fast
59H	04	Newcraighall HS – Edinburgh – Aberdeen stopping
55RS	05	Glasgow Queen St. – Dundee (**not** cross-platform)
07H	10	Glasgow Queen St. – Aberdeen via Dundee
06H	11	Hawick – Edinburgh – Inverness (**not** cross-platform)
15H	18	Newcraighall HS – Edinburgh – Aberdeen fast
14H	19	Glasgow St. Enoch – Aberdeen stopping
10RS	-	Newcraighall – Edinburgh – Perth (**not** cross-platform)
23H	26	Glasgow Queen St. – Inverness
21H	-	Newcraighall HS – Edinburgh – Perth (**not** cross-platform)

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

The fundamental points of the pattern are:

- Glasgow – Aberdeen fast connects with Edinburgh – Aberdeen stopping at 00/30, and Edinburgh – Aberdeen fast connects with Glasgow – Aberdeen stopping at 15/45. This gives the Great Glen intermediate stations Coupar Angus, Forfar and Bridge of Dun 4tph from both Glasgow and Edinburgh, (and also from Gleneagles,) directly for one and with a change at Perth for the other (directly from Gleneagles). Incidentally it also gives passengers from Gleneagles (on the Aberdeen stopping service) the opportunity to switch to the fast service at Perth for all four services.
- Glasgow – Aberdeen via Dundee connects Edinburgh – Inverness at 07/37. The Edinburgh – Aberdeen via Dundee service proceeds directly to Dundee via The Bridges, but the Glasgow – Inverness service at 23/53 is connected into at Perth by the Edinburgh – Perth via Ladybank service. The Highland line to Inverness thus has 4tph directly from Stirling, Gleneagles and Perth, and also from Glasgow and Edinburgh, but alternately with a change at Perth. Passengers from Gleneagles have a connection to the stations between Perth and Aberdeen via Dundee at 07/37.
- Note that we have to take into account exact arrival **and departure** times at Perth, for the current exercise. (The journey time spreadsheets only list arrival times, for all stations except the originating station – naturally, that's what they're for. Wait times at intermediate stations are indeed taken into account, but the appropriate station wait time is added into the time for the section immediately following, either to the next station or to some intermediate location, generally a junction, where a change of line speed occurs.)

The following inter-station journey times (minutes) must be taken into account:

- Glasgow – Perth:
  - (Aberdeen fast) 37 (from St. Enoch)
  - (Aberdeen via Dundee) 33 (from Queen St., i.e. with one fewer stop)
  - (Aberdeen stopping) 43 (from St. Enoch, stopping at Gleneagles)
  - (Inverness) 38 (from Queen St., stopping at Gleneagles)
- Edinburgh Waverley – Perth:
  - (Aberdeen fast) 46
  - (Aberdn stopping / Inv'ness) 52 (both stop at Gleneagles)
  - (Perth via Ladybank) 64
- Edinburgh Airport – Perth:
  - (Aberdeen fast) 33
  - (Aberdn stopping / Inv'ness) 39 (both stop at Gleneagles)
  - (Perth via Ladybank) 51
- Stirling – Perth:
  - (Aberdeen fast / via Dundee) 17
  - (Aberdn stopping / Inv'ness) 23
- Srirling – Gleneagles 10
- Gleneagles – Perth 10
- Perth – Dundee 12
- Perth – Laurencekirk via Forfar 43
  via Dundee 47 (remember that this includes 3mins wait in Dundee!)
- Edinburgh – Dundee via Leuchars 62
- Dundee – Laurencekirk 32
- Edinburgh – Laurencekirk 97 (remember that this includes 3mins wait in Dundee!)

Accordingly, 00/30 | 15/45 arrival at Perth by Aberdeen fast implies departures at the above number of minutes before that from the relevant origins, thus at:

- Glasgow St. Enoch 23/53 | (08/38)
- Edinburgh Waverley (14/44) | 29/59
- Edinburgh Airport (01/31) | 16/46
- Stirling 13/43 | 28/58

Note that, in the above and the following sets of results, those bracketed are not actually used. Thus the actual departures from Glasgow are at 23 and 53, whereas those from Edinburgh Waverley are at 29 and 59. But at Stirling, all four times **are** actually used, since the Glasgow and Edinburgh services both stop at Stirling.

Likewise, 59/29 | 14/44 arrival at Perth by Aberdeen stopping implies departures:

- Glasgow St. Enoch (16/46) | 01/31
- Edinburgh Waverley 07/37 | (22/52)
- Edinburgh Airport 20/50 | (05/35)
- Stirling 06/36 | 21/51
- Gleneagles 19/49 | 04/34

Whereas 07/37 | 23/53 arrival at Perth by Aberdeen via Dundee services implies departures:

- Glasgow Queen St. 04/34 | (20/50)
- Stirling 20/50 | (05/35)

Likewise 06/36 | 23/53 arrival at Perth by Inverness services, also 05/25 | 21/51 Edinburgh – Perth via Ladybank, implies departures:

- Glasgow Queen St. (28/58) | 15/45 (Inverness)
- Stirling (13/43) | 00/30 (Inverness)
- Edinburgh Waverley 14/44 | (01/31) (Inverness)
- Edinburgh Airport 27/57 | (14/44) (Inverness)
- Edinburgh Waverley (01/31) | 17/47 (Perth)
- Edinburgh Airport (24/44) | 00/30 (Perth)

In calculating arrival times at Laurencekirk, we must take different starting times from Perth. Since 00030 etc. are taken, above, as arrival times at Perth, 3 minutes must be added, to these to allow for the wait at Perth, in getting the departure times.

Perth departures: Laurencekirk arrivals:

- 04/34 17/47 (Edinburgh – Aberdeen stopping)
- 19/49 02/32 (Glasgow – Aberdeen stopping)
- 10/40 57/27 (Glasgow – Aberdeen via Dundee)

Perth departures: Dundee arrivals:

- 10/40 22/52 (Glasgow – Aberdeen via Dundee)

Edinburgh departures: Dundee arrivals:

- 05/35 07/37 (Edinburgh – Aberdeen via Dundee)

Hence Edinburgh departures: Laurencekirk arrivals:

- 05/35 (Waverley) 42/12 (Edinburgh – Aberdeen via Dundee)
- 18/48 (Airport) 42/12

The result of these calculations is that Aberdeen stopping services arrive at Laurencekirk at:
02/17/32/47 and that Aberdeen via Dundee services arrive at Laurencekirk at:
12/27/42/57. Thus these two groups of services each provides an even-interval service every 15 minutes to Laurencekirk, Stonehaven and Aberdeen, but unfortunately not at a uniform interval of 7.5 minutes overall, but rather 10/5/10/5/10/5/10/5.

So, from the initial interchange pattern at Perth, we have derived the following departures, all to the Perth time standard:

Edinburgh Waverley	Haymarket	Ed. Airport	Stirling arr.	Service
05	10	18	-	Aberdeen via Dundee
07	12	20	33	Aberdeen stopping

• 14	19	27	40	Inverness
• 17	22	30	-	Perth via Ladybank
• 29	34	42	55	Aberdeen fast
• 35	40	48	-	Aberdeen via Dundee
• 37	42	50	03	Aberdeen stopping
• 44	49	57	10	Inverness
• 47	52	00	-	Perth via Ladybank
• 59	04	12	25	Aberdeen fast

Glasgow St. Enoch	G. Bellgrove	G. Queen St.	Stirling arr.	Service
• -	-	04	17	Aberdeen via Dundee
• 01	10	-	18	Aberdeen stopping
• -	-	15	27	Inverness
• 23	32	-	43	Aberdeen fast
• -	-	34	47	Aberdeen via Dundee
• 31	40	-	48	Aberdeen stopping
• -	-	45	57	Inverness
• 53	02	-	13	Aberdeen fast

Stirling	Gleneagles	Perth (arrive)	Service
• -	-	21	Edinburgh – Perth via Ladybank
• 00	13	23	Glasgow – Inverness
• 06	19	29	Edinburgh – Aberdeen stopping
• 13	-	30	Glasgow – Aberdeen fast
• 13	26	36	Edinburgh – Inverness
• 20	-	37	Glasgow – Aberdeen via Dundee
• 21	34	44	Glasgow – Aberdeen stopping
• 28	-	45	Edinburgh – Aberdeen fast
• -	-	51	Edinburgh – Perth via Ladybank
• 30	43	53	Glasgow – Inverness
• 36	49	59	Edinburgh – Aberdeen stopping
• 43	-	00	Glasgow – Aberdeen fast
• 43	56	06	Edinburgh – Inverness
• 50	-	07	Glasgow – Aberdeen via Dundee
• 51	04	14	Glasgow – Aberdeen stopping
• 58	-	15	Edinburgh – Aberdeen fast

Glasgow Queen St.	Perth	Edinburgh	Dundee (arrive)	Service
• 04	40	-	52	Glasgow – Aberdeen via Dundee
•		05	07	Edinburgh – Aberdeen via Dundee
• 34	10	-	22	Glasgow – Aberdeen via Dundee
•		35	37	Edinburgh – Aberdeen via Dundee

The above are the complete data. However, it is probably easier to digest if presented in the form of a timetable. The times given are all departure times, unless specified otherwise. Complete times are given for all services arriving in Perth between 11:59 and 12:28 inclusive. For the Edinburgh – Aberdeen via Dundee, which doesn't call at Perth, the selected train are that which fits into the same timescale between Laruencekirk and Aberdeen.

Glas St. Enoch		11:23						11:31				
Glas Bellgrove		11:32						11:40				
Gla Queen St.					11:34						11:45	
Ed. Waverley	11:07			11:14			11:17		11:29			11:35
Haymarket	11:12			11:20			11:22		11:34			11:40
Ed. Airport	11:20			11:27			11:30		11:42			11:48
Kirkcaldy							11:46					12:05
Ladybank							12:03					
Newburgh							12:12					
Stirling	11:36	11:43		11:43	11:50			11:51	11:58		12:00	
Gleneagles	11:49			11:56				12:04			12:13	
Perth arr.	11:59	12:00	➔	12:06	12:07	➔	12:21	12:14	12:15	➔	12:23	
Perth dep.	➔	12:03	12:04	➔	12:10	12:11		➔	12:18	12:19	12:26	
Coupar Angus		*12:11*	12:16						*12:26*	12:31		
Forfar		*12:16*	12:28						*12:31*	12:43		
Bridge of Dun		*12:21*	12:40						*12:36*	12:55		
Leuchars Jn.												12:27
Dundee					12:25							12:40
Arbroath					12:38							12:53
Montrose					12:50							13:05
Laurencekirk		*12:25*	12:50		13:00				*12:40*	13:05		13:15
Stonehaven		*12:31*	13:02		13:12				*12:46*	13:17		13:27
Aberdeen arr.		12:39	13:12		13:22				12:54	13:27		13:37
Dunkeld & B.						12:23					12:38	
Pitlochry						12:33					12:48	
Blair Atholl						12:41					12:56	
Dalwhinnie						12:57					13:12	
Newtonmore						13:02					13:17	
Kingussie						13:08					13:23	
Aviemore						13:18					13:33	
Carrbridge						13:26					13:41	
Inverness arr.						13:44					13:59	

This is complete, according to the original configuration – all services arriving at Perth between 11:59 and 12:28. However, we need to consider the full hour between Laurencekirk and Aberdeen. The symbols are: GF/GS/GD = Glasgow – Aberdeen Fast/Stopping/via Dundee and EF/ES/ED mean the same from Edinburgh. The times are:

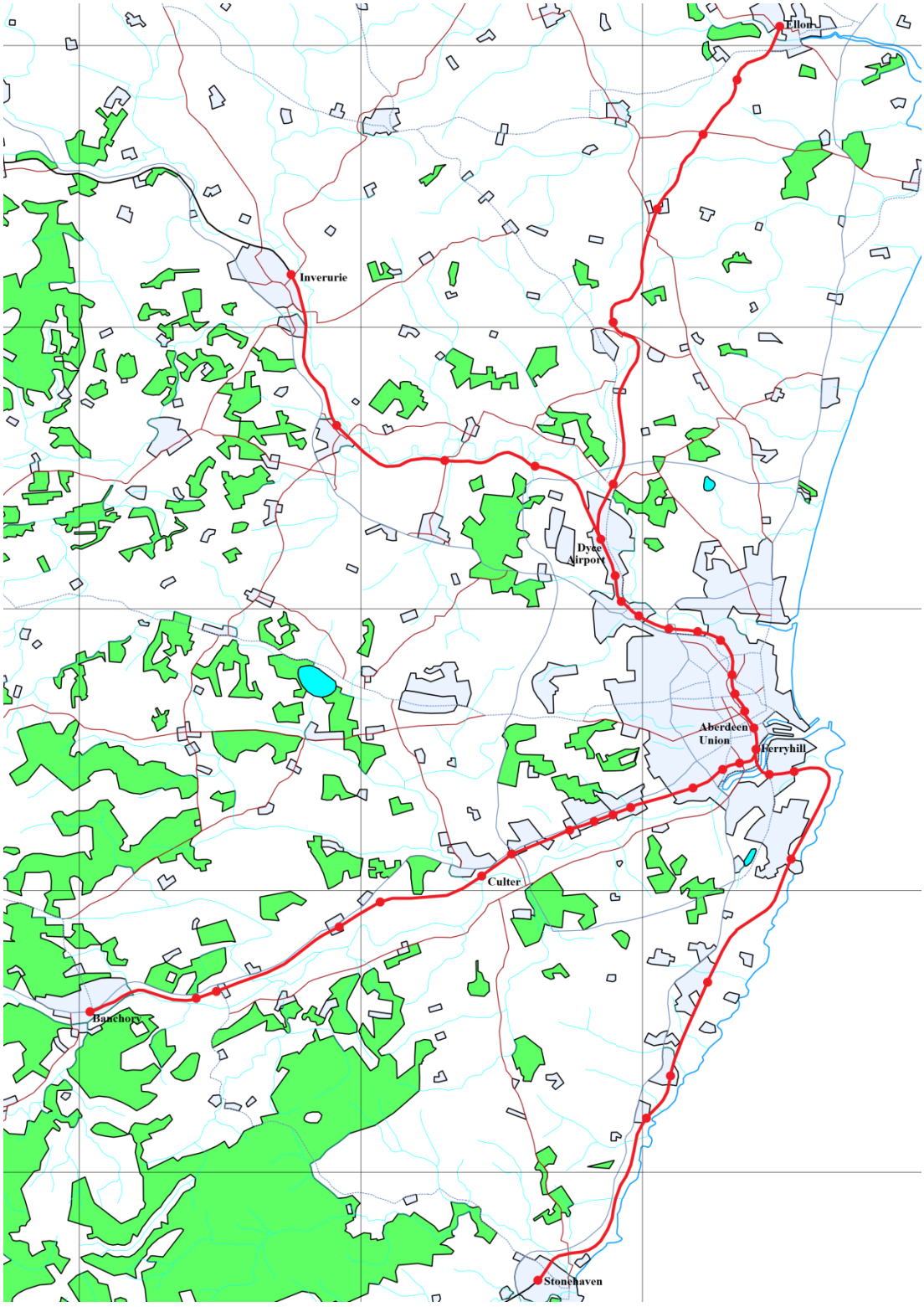
	GD	GS	*EF*	ED	ES	*GF*	GD	GS	*EF*	ED	ES	*GF*
Laurence dep.	00	05	*10*	15	20	*25*	30	35	*40*	45	50	*55*
Stonehvn dep.	12	17 ←	*16*	27	32 ←	*31*	42	47 ←	*46*	57	62 ←	*61*
Aberdeen arr.	22	27	24	37	42	39	52	57	54	67	72	69

For once, everything has come out exactly right, by pure chance. Glasgow Fast overtakes Edinburgh Stopping and Edinburgh Fast overtakes Glasgow Stopping at Stonehaven. The stopping service comes to a stand in the platform line at Stonehaven 2 minutes before the fast service overtakes it on the through line, and departs Stonehaven 1 minute later. Note also that the fast service arrives in Aberdeen 3 minutes before the Stopper, and 2 minutes after the preceding service via Dundee. Perfect!

The above times are all for Mk1A. The Mk2 times are identical in pattern, but with variations of a minute or two at the Aberdeen end.

Appendix G – the Aberdeen and Tayside Metros

Mk2 of the Aberdeen Metro takes over the classic route to Stonehaven, this having been released by Mk2 of HS14. Other than providing connections at Stonehaven, it has no intimate linkage with HS14. The Tayside Metro, on the other hand, is intimately linked to HS14, providing timetabled connections for St. Andrews and Cupar, and all stations between Invergowrie and Arbroath.



APPENDIX G Aberdeen Metro

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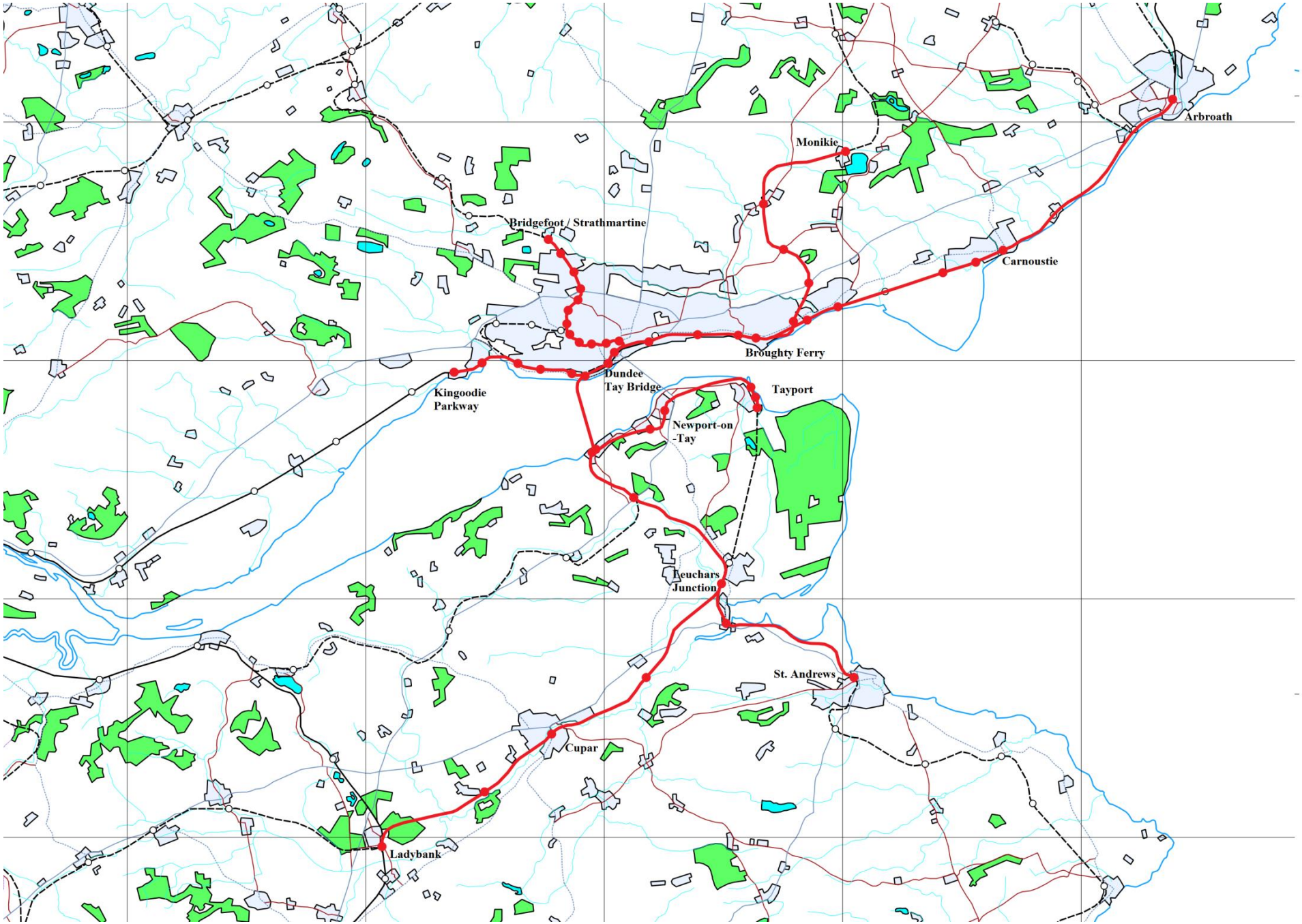

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Appendix Q – Journey Times for Line Speed 225kph, 140mph

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.

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

1. Glasgow - Edinburgh / Ayr / Dalmuir (3/3/4 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow St. Enoch - Glasgow Bellgrove	1.8	1.8	2.3	2.3	2.3
Glasgow Bellgrove - Edinburgh Airport	68.0	69.8	20.9	23.2	26.2
Edinburgh Airport - Haymarket HS	9.0	78.8	5.2	28.4	34.4
Haymarket HS - Edinburgh Wav. HS	2.1	80.9	2.5	30.9	39.9
Glasgow St. Enoch - Glasgow Airport	12.0	12.0	6.0	6.0	6.0
Glasgow Airport - Dalry	26.0	38.0	9.7	15.7	18.7
Dalry - Kilmarnock	17.5	55.5	7.4	23.1	29.1
Kilmarnock - Ayr	29.0	84.5	10.5	33.6	42.6
Glasgow Airport - Glasgow Airport Pkwy	2.0	14.0	2.4	8.4	11.4
Glasgow Airport Pkwy - Erskine Pkwy South	5.0	19.0	3.9	12.3	16.3
Erskine Pkwy South - Erskine Pkwy North	2.0	21.0	2.4	14.7	19.7
Erskine Pkwy North - Dalmuir	3.0	24.0	3.0	17.7	23.7

Current fastest time (minutes) from Glasgow [and the 300kph values] {and the above 225kph values} to:

- Edinburgh Airport [23] {26}
- Edinburgh Waverley 65 [36] {40}
- Glasgow Airport [5] {6}
- Dalry 74 [17] {19}
- Kilmarnock 67 [27] {29}
- Ayr [40] {43}

There are no changes in passing times.

2. Edinburgh - Glasgow / Dalmuir (3/7 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Edinburgh, inc. Station Wait Times
Edinburgh Waverley - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - Glasgow Bellgrove	68.0	79.1	20.9	28.6	34.6
Glasgow Bellgrove - Glasgow St. Enoch	1.8	80.9	2.3	30.9	39.9
Glasgow Bellgrove - Glasgow Airport	15.0	94.1	6.8	35.4	44.4
Glasgow Airport - Glasgow Airport Pkwy	2.0	96.1	2.4	37.8	49.8
Glasgow Airport Pkwy - Erskine Pkwy South	5.0	101.1	3.9	41.6	54.6
Erskine Pkwy South - Erskine Pkwy North	2.0	103.1	2.4	44.1	58.1
Erskine Pkwy North - Dalmuir	3.0	106.1	3.0	47.1	62.1

Current fastest time (minutes) from Edinburgh [and the 300kph values] {and the above 225kph values} to:

- Glasgow Bellgrove [31] {35}
- Glasgow St. Enoch 41 (Queen St.) [36] {40}
- Glasgow Airport [41] {44}
- Glasgow Airport Parkway [46] {50}
- Erskine Parkway South [51] {55}
- Erskine Parkway North [54] {58}
- Dalmuir [58] {62}

3. Glasgow – Aberdeen fast / stopping / via Dundee (3/9/8 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow St. Enoch - Glasgow Bellgrove	1.8	1.8	2.3	2.3	2.3
Glasgow Bellgrove - Stirling	42.0	43.8	14.0	16.3	19.3
Stirling - Perth	50.0	93.8	16.1	32.4	38.4
Perth - Craigo Junction	85.5	179.3	24.5	56.9	
Craigo Junction - Aberdeen	52.6	231.9	15.1	72.0	81.0
Stirling - Gleneagles	28.0	71.8	10.2	82.2	32.5
Gleneagles - Perth	22.0	93.8	8.6	90.9	44.2
Perth - Coupar Angus	25.5	119.3	9.6	100.5	58.7
Coupar Angus - Forfar	26.0	145.3	9.7	110.2	71.5
Forfar - Bridge of Dun	26.0	171.3	9.7	119.9	84.2
Bridge of Dun - Craigo Junction	8.0	179.3	3.9	123.8	
Craigo Junstion - Laurencekirk	8.6	187.9	3.3	127.1	94.4
Laurencekirk - Stonehaven (classic route)	23.1	211.0	8.9	136.0	106.3
Stonehaven - Aberdeen	23.0	234.0	8.9	144.9	118.2
Glasgow Queen St. - Stirling	44.0	44.0	14.5	14.5	14.5
Stirling - Perth	50.0	94.0	16.1	30.6	33.6
Perth - Dundee	33.6	127.6	11.7	42.4	48.4
Dundee - Arbroath	27.5	155.1	10.1	52.5	61.5
Arbroath - Montrose	22.7	177.8	8.8	61.3	73.3
Montrose - Laurencekirk	16.2	194.0	7.1	68.4	83.4
Laurencekirk - Stonehaven	23.1	217.1	8.9	77.3	95.3
Stonehaven - Aberdeen	23.0	240.1	8.9	86.2	107.2

Note: The stopping service to Aberdeen calls` at Gleneagles; the other services to Aberdeen do not.

Current fastest time (minutes) from Glasgow (Queen St.) [and the 300kph values, from St. Enoch or Queen St. as appropriate] {and the above,225kph values} to:

- Stirling 26 [18] {19}
- Perth [fast] 53 [37] {38}
- Aberdeen [fast] 152 [74] {81}

- [The following times are for the Aberdeen (stopping) service]
- Gleneagles 41 [31] {33}
- Perth 53 [43] {44}
- Coupar Angus [56] {59}
- Forfar [68] {72}
- Bridge of Dun [80] {84}
- Laurencekirk 121 [90] {94}
- Stonehaven 132 [102] {106}
- Aberdeen 152 [114] {118}
- [The following times are from Glasgow Queen St.]
- Stirling 26 [13] {15}
- Perth 53 [32] {34}
- Dundee 76 [47] {48}
- Arbroath 96 [60] {62}
- Montrose 110 [72] {73}
- Laurencekirk 121 [82] {83}
- Stonehaven 132 [94] {95}
- Aberdeen via Dundee 140 [106] {107}

4. Edinburgh – Aberdeen fast / stopping / via Dundee and Edinburgh – Perth via Ladybank (3/9/8/5 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Edinburgh, inc. Station Wait Times
Edinburgh Waverley HS - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - Kinnaird Junction	33.0	44.1	11.6	19.2	
Kimmaird Junction - Stirling	10.0	54.1	3.6	22.9	28.9
Stirling - Perth	50.0	104.1	16.1	39.0	48.0
Perth - Craigo Junction	85.5	189.6	24.5	63.5	
Craigo Junction - Aberdeen	52.6	242.2	15.1	78.6	90.6
Stirling - Gleneagles	28.0	82.1	10.2	33.1	42.1
Gleneagles - Perth	22.0	104.1	8.6	41.8	53.8
Perth - Coupar Angus	25.5	129.6	9.6	51.3	68.3
Coupar Angus - Forfar	26.0	155.6	9.7	61.0	81.0
Forfar - Bridge of Dun	26.0	181.6	9.7	70.8	93.8
Bridge of Dun - Craigo Junction	8.0	189.6	3.9	74.6	
Craigo Junstion - Laurencekirk	8.6	198.2	3.3	78.0	104.0
Laurencekirk - Stonehaven (classic route)	23.1	221.3	8.9	86.9	115.9
Stonehaven - Aberdeen	23.0	244.3	8.9	95.8	127.8
Edinburgh Airport - Forth Bridge South	10.0	21.1	4.8	12.5	
Forth Bridge South - Forth Bridge North	5.3	26.4	4.0	16.5	
Forth Bridge North - Kirkcaldy	7.9	34.3	4.2	20.7	26.7
Kirkcaldy - Leuchars Junction	55.9	90.2	19.2	40.0	49.0
Leuchars Junction - Tay Bridge South	9.0	99.2	4.7	44.7	
Tay Bridge South - Dundee	4.4	103.6	5.0	49.7	61.7
Dundee - Arbroath	27.5	131.1	10.1	59.8	74.8
Arbroath - Montrose	22.7	153.8	8.8	68.6	86.6

Montrose - Laurencekirk	16.2	170.0	7.1	75.7	96.7
Laurencekirk - Stonehaven (classic route)	23.1	193.1	8.9	84.6	108.6
Stonehaven - Aberdeen	23.0	216.1	8.9	93.5	120.5
Kirkcaldy - Ladybank	36.9	71.2	13.5	34.3	43.3
Ladybank - Newburgh	12.0	83.2	6.5	40.7	52.7
Newburgh - Perth	17.0	100.2	8.4	49.1	64.1

Note: The stopping service to Aberdeen calls` at Gleneagles; the other services to Aberdeen do not.

Current fastest time (minutes) from Edinburgh Waverley [and the 300kph values] {and the above 225kph values} to:

- Edinburgh Airport [11] {11}
- Stirling 51 [27] {29}
- [The following times are for the Aberdeen (fast) service]
- Perth 76 [46] {48}
- Aberdeen 137 [83] {91}
- [The following times are for the Aberdeen (stopping) service]
- Gleneagles 66 [40] {42}
- Perth 76 [52] {54}
- Coupar Angus [65] {68}
- Forfar [77] {81}
- Bridge of Dun [89] {94}
- Laurencekirk 110 [99] {104}
- Stonehaven 117 [111] {116}
- Aberdeen 137 [123] {128}
- [The following times are direct to Dundee or Perth, via The Bridges]
- Kirkcaldy 36 [27] {27}
- Leuchars Junction 53 [49] {49}
- Dundee 76 [62] {62}
- Arbroath 96 [75] {75}
- Montrose 110 [87] {87}
- Laurencekirk 121 [97] {97}
- Stonehaven 132 [109] {109}
- Aberdeen 152 [121] {121}
- Ladybank 52 [43] {43}
- Newburgh [53] {53}
- Perth 76 [64] {64}

The times via Dundee are unchanged, since there are no 300kph sections on that route.

5. Glasgow - Inverness (11 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Glasgow Queen St. - Stirling	44.0	44.0	14.5	14.5	14.5
Stirling - Gleneagles	28.0	72.0	10.2	24.8	27.8
Gleneagles - Perth	22.0	94.0	8.6	33.4	39.4
Perth - Stanley Junction	11.5	105.5	4.8	38.2	
Stanley Junction - Dunkeld & Birnam	13.5	119.0	4.6	42.8	51.8
Dunkeld & Birnam - Pitlochry	20.7	139.7	9.7	52.6	62.6
Pitlochry - Blair Atholl	11.1	150.8	6.1	58.7	69.7
Blar Atholl - Dalwhinnie	36.1	186.9	15.5	74.2	86.2
Dalwhinnie - Newtonmore	6.4	193.3	4.4	78.6	91.6
Newtonmore - Kingussie	6.1	199.4	4.3	82.9	96.9
Kingussie - Aviemore	19.0	218.4	9.1	92.0	107.0
Aviemore - Carrbridge	10.8	229.2	6.0	98.0	114.0
Carrbridge - Inverness	45.0	274.2	18.9	116.8	133.8

Current fastest time (minutes) from Glasgow (Queen St.) [and the 300kph values, also from Queen St.] {and the above 225kph values, still from Queen St.] to:

- Stirling 26 [13] {15}
- Gleneagles 41 [26] {28}
- Perth 53 [38] {39}
- Dunkeld & Birnam 77 [50] {52}
- Pitlochrie 92 [61] {63}
- Blair Atholl 102 [68] {70}
- Dalwhinnie 126 [84] {86}
- Newtonmore 137 [90] {92}
- Kingussie 138 [95] {97}
- Aviemore 150 [105] {107}
- Carrbridge 165 [112] {114}
- Inverness 193 [132] {134}

6. Edinburgh - Inverness (13 stops):

Section	Distance (km)	Cumulative Distance (km)	Section Time (minutes)	Cumulative Journey Time (minutes)	Elapsed Time from Glasgow, inc. Station Wait Times
Edinburgh Waverley HS - Haymarket HS	2.1	2.1	2.5	2.5	2.5
Haymarket HS - Edinburgh Airport	9.0	11.1	5.2	7.7	10.7
Edinburgh Airport - Kinnaird Junction	33.0	44.1	10.5	18.2	
Kimmaird Junction - Stirling	10.0	54.1	3.7	21.9	27.9
Stirling - Gleneagles	28.0	82.1	10.2	32.2	41.2
Gleneagles - Perth	22.0	104.1	8.6	40.8	52.8
Perth - Stanley Junction	11.5	115.6	4.8	45.6	
Stanley Junction - Dunkeld & Birnam	13.5	129.1	4.6	50.2	65.2
Dunkeld & Birnam - Pitlochry	20.7	149.8	9.7	60.0	76.0
Pitlochry - Blair Atholl	11.1	160.9	6.1	66.1	83.1
Blar Atholl - Dalwhinnie	36.1	197.0	15.5	81.6	99.6
Dalwhinnie - Newtonmore	6.4	203.4	4.4	86.0	105.0
Newtonmore - Kingussie	6.1	209.5	4.3	90.3	110.3
Kingussie - Aviemore	19.0	228.5	9.1	99.4	120.4
Aviemore - Carrbridge	10.8	239.3	6.0	105.4	127.4
Carrbridge - Inverness	45.0	284.3	18.9	124.2	147.2

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

- Stirling 51 [26] {28}
- Gleneagles 66 [40] {41}
- Perth 76 [51] {53}
- Dunkeld & Birnam 93 [63] {66}
- Pitlochrie 106 [74] {76}
- Blair Atholl 116 [81] {83}
- Dalwhinnie 140 [98] {100}
- Newtonmore 153 [103] {105}
- Kingussie 153 [108] {110}
- Aviemore 164 [119] {120}

- Carrbridge 185 [126] {127}
- Inverness 200 [145] {147}