

Beyond Crossrail 2

The Thameslink and Crossrail projects are progressing very satisfactorily, and the Crossrail 2 proposals are looking distinctly hopeful. Could a greedy metropolis possibly want more?

Yes.

When we consider the improvements in transport infrastructure, capacity and service that the above developments promise, it is clear that, vast as their benefits truly are, there are other, pressing transport issues which they do not address, other capacity constraints which will remain unrelieved by them. There is thus a continuing need for further new infrastructure. This will not be implemented in the near future, (say the next ten years,) but now is the time to start planning for it.

It's a longstanding defect of the English national character to be reluctant to make any effort at forward planning. (I won't say British, as the Welsh seem slightly better at it and the Scots are certainly unafraid at least to contemplate major change, even if, after serious deliberation, they decided against it – at least for now.) The attitude seems to be that the future is unknowable, any plans we make now are certain to be invalidated as circumstances change, and that we can always muddle through, as we so often have – it'll be all right on the night!

I find this attitude infuriating – self-satisfied and smug. It is perfectly true that any plans made now are likely to need **revision** in the light of changing circumstances and later experience. But planning is cheap; in the first instance, imagination is all it takes, and the ability to think analytically through a chain of consequences. One of the main purposes of planning is to determine the available options and to form an opinion of their pros and cons and thus select a best course, on the information available at that time. By stating why we select a particular option, and what we hope to achieve by it, we have a ready check on its continuing validity.

A very important benefit of planning ahead is that future requirements often impose (not so much restrictions as) guidelines on present actions. Actions taken now without concern for future needs may easily pre-empt and invalidate those future needs, (as is notoriously illustrated by the HS2 Plans!).

But enough of philosophy! What I propose to discuss here is Crossrail 3 and Crossrail 4.

Crossrails Generally

I don't know who originated the term 'crossrail', (no-one seems to know,) but it's a good one. The German term, S-Bahn (Schnellbahn – simply 'fast railway'), means the same thing in practice, but is less expressive, as it lacks the sense of getting **across** the city and out the other side. A crossrail is an urban metro, to full, mainline loading gauge, generally in tunnel beneath the city centre, linking existing suburban services on opposite sides of the city, and providing several intermediate, usually underground, stations at useful destinations within the city. The major economic argument in its favour is that it requires much less infrastructure than the traditional alternative of a terminal station, to provide a given level of capacity (and also needs less trains). That it is vastly more convenient in providing direct access to the sort of destinations passengers actually want to reach, is not an economic argument as such, (although many people try to make it one by the notion that saving a couple of minutes travelling time has a significant monetary value,) but it is by far the most important benefit as far as users are concerned.

Terminal stations in areas of high traffic demand are a **profoundly** bad idea; trains arriving at a terminus, emptying, being serviced in situ, then refilling and forming a service in the reverse direction, make prolonged demands on platform capacity.

As a real-life illustration of this, the HS2 plans for Euston envisage 11 completely new terminal platforms, almost doubling the size of the station and thus the area it occupies – its ‘footprint’ – requiring extensive demolition of surrounding properties. Each of these new platforms will serve precisely two trains per hour, each taking 20 minutes to arrive, empty, be serviced, reload and depart (plus 10 minutes contingency). This is simply crazy. A through platform, with the latest signalling and train control, could handle up to ten times as many. And such a proposal, the ‘Railway Lords’ for Euston Cross, is already on the table. It needs more work, no doubt, but offers what should, rationally thinking, be decisive advantages – a ‘no-brainer’, indeed.

The initial Crossrail, by joining up the suburban services on the GEMML with those of the GWML, physically reduces the number of trains starting from and terminating at Liverpool St. and Paddington terminal stations, and consequently the numbers of passengers joining and alighting there. The trains themselves, and the passengers, haven’t disappeared, indeed there will be many more of them in future, but they will travel directly to useful destinations in the City, Docklands and West End, which presently involve changing to the Underground at the two terminals. The Abbey Wood arm of Crossrail, by providing connections with the Kent Metro services, will provide relief in passenger numbers, if not necessarily in the number of trains, to London Bridge, Cannon St, and Charing Cross. If the further arm of Crossrail, from Old Oak Common to the WCML, is implemented, as it quite obviously should be, to provide a better balance in service numbers at the western end of the route, similar benefits of reduced train and passenger numbers will be felt at Euston, and the passengers will have direct access to the West End, Docklands and City.

Thameslink shares many of these virtues, but was never designed as a crossrail (indeed it may be argued that it was never designed at all). It is, rather, the intelligent adaptation of infrastructure which just happened to be there, in the right place, for quite other, historical reasons. Much of it, in particular the Snow Hill tunnel, had been disused for many years. I remember it as a student, back in the 1960s. It seemed perfectly obvious that here was valuable infrastructure lying disused, because no-one seemed to have the imagination to envisage a cross-London service. (The unwillingness of the BR decision makers of that time even to consider the possibility seemed and still seems quite pathological.) But now its time has come, and it will, when finished, be a very valuable component of London’s transport system. It isn’t a crossrail like the others, (a true crossrail is an urban metro,) but more of a cross-London inter-regional network, linking Bedfordshire and Huntingdonshire with Sussex and parts of Kent (and none the worse for that, of course).

The proposed Crossrail 2 would provide further reduction of trains and passengers at Liverpool St., and, even more importantly, at the UK’s busiest station, Waterloo, which needs it more than anywhere else. It would also serve King’s Cross / St. Pancras and Euston, and while this would not reduce train or passenger counts at those locations, it would provide new capacity and connection possibilities.

But there is one very important location, Victoria, the UK’s second-busiest station, which will see little benefit. It is planned that Crossrail 2 will serve Victoria by a station there. This is certainly welcome, and will provide new capacity and connection possibilities, as at Euston and King’s Cross / St. Pancras. But it will provide no relief in the number of trains using the Victoria terminus, nor in passenger volumes, and this is the critical issue. It is to alleviate Victoria’s capacity problems that I offer my plan for Crossrail 4.

Why 4? Because, as it happens, the name Crossrail 3 is already in use, though the idea could, as yet, hardly be described as even a plan.

Crossrail 3

Crossrail 3 is the name given to the idea (that's all it is) of an automatic tube line, between Euston and Waterloo. That's it.

That's not at all a bad idea, but it does need a bit more detail, so here's what I think it should be like. It's not really a crossrail, certainly not to the emerging standard embodied by Crossrail and Crossrail 2. But it's a nice idea anyway, and would definitely be a useful facility.

I suggest extending it a little, to link opposite sides of the Overground Circle, starting at Gospel Oak, then via Camden Town, Euston, Holborn Kingsway, Aldwych (connection to Temple, similar to Monument for Bank), Waterloo, Elephant and Castle, Peckham Rd. / Camberwell College of Art, and terminating at Peckham Rye. Underground all the way, automatically operated, offering frequencies of at least 30 trains per hour, and even making use of the Aldwych line at last! What's not to like?

Crossrail 4

Crossrail 4 is explicitly planned to provide relief for Victoria station, by taking over a number of South London services, so that these no longer use the Victoria terminus, and linking them to other services in North West London. The immediate problem is the imbalance between the number of services in South London and North West London.

So I propose to take over all the Metropolitan line services north of Baker St. The Metropolitan always was different from the other Underground lines, having more of a main-line personality. I suggest that this proposal allows it finally to achieve its true destiny. The original Metropolitan – the present Hammersmith and City – will continue unchanged, but with somewhat higher capacity and better reliability due to the removal of the flat junction at Baker St.

Transport for London can surely have no objection to the proposal, since the crossrails are all part of their empire anyway, so for them it should merely be an administrative change, assigning the Metropolitan north of Baker St. to a different category.

But first, the plan.

Crossrail 4 has a new, central, core section, in tunnel from Marylebone to Balham, via Bond St. (interchange with Crossrail, Central, Jubilee), Green Park (interchange with Piccadilly, Jubilee, Victoria), Victoria (interchange with Crossrail 2, Victoria, District, Circle), Battersea (interchange with Battersea Park and Queenstown Road, and the new Northern line terminus) and Clapham Junction (interchange with Crossrail 2 again, South West Trains and the Overground).

The central core provides for 12-car trains, though not all routes will, at least initially, be able to take them. The Metropolitan lines in particular are served throughout by 8-car trains.

A new station for the GC lines will be provided at West Hampstead Interchange, enabling connections with Thameslink, the Overground and the Jubilee line. (This is primarily for the benefit of the High Wycombe line, which otherwise would not make any connections with other lines, apart from the Central Line at West / South Ruislip, before Central London.) The Metropolitan would not have platforms there, since space is tight, and it has cross-platform interchange with the Jubilee at Finchley Road in any case.

I envisage rerouting the long distance Chiltern line services back into Paddington, where, with the opening of Crossrail, there will be room for them (and they would also have interchange with Crossrail itself, at Old Oak Common). This is a very important matter, and closely related to Crossrail 4, but since it isn't actually Crossrail 4, discussion of it is redirected to Appendix A.

Marylebone and its approaches would be given over to Crossrail 4. Marylebone would be redeveloped, with four platforms, (two islands,) either on the surface, if possible, with immediate entry to tunnel, before the station buildings, or underground, or even in a cutting. Which is best will depend on the precise configuration of all the other tunnels in the area.

I originally envisaged Crossrail 4 as involving just the GC lines, hence Marylebone, but when it quickly became clear that these offered nowhere near enough trains, only then did the idea of incorporating the Metropolitan occur to me. The Metropolitan of course has its own tunnel between Finchley Road and Baker St., and it would make no sense not to continue using it. So I envisage the Metropolitan using its own tunnel to just north of Baker St., then moving across to join the GC at Marylebone, in the new 4-platform station, the two then sharing the same pair of tunnels to Balham. The optimum location for the connection between Metropolitan and GC lines is at map reference TQ272827, just south of Lodge Road, where both lines are in the open, very close together.

Crossrail 4's central core is designed for a service of 32 trains per hour. These are organised as 8×4tph groups.

Crossrail 4 North of Marylebone

North of Marylebone the routes are:

1. GC Lines (8tph)
 - 4tph Marylebone – West Hampstead Interchange – Harrow-on-the-Hill – Moor Park – Rickmansworth – Chorleywood – Chalfont and Latimer – Amersham – Great Missenden – Wendover – Stoke Mandeville – Aylesbury – Aylesbury Vale Parkway – Quainton Road – Calvert (for HS2 and East-West Rail)
 - 4tph Marylebone – West Hampstead Interchange – Wembley Stadium – Sudbury and Harrow Road – Sudbury Hill – Northolt Park – South Ruislip – West Ruislip – Denham – Denham Golf Club – Gerrard's Cross – Seer Green – Beaconsfield – High Wycombe – West Wycombe – Saunderton – Princes Risborough [with a connection to Chinnor Park and Ride, at peak hours – or even throughout the day, if there's the demand for it]

2. Metropolitan Lines (24tph)

- 8tph Marylebone – Finchley Road – Wembley Park – Harrow-on-the-Hill – Moor Park – Rickmansworth – Chorleywood – Chalfont and Latimer – Amersham / Chesham alternately, 4tph each
- 8tph Marylebone – Finchley Road – Wembley Park – Harrow-on-the-Hill – North Harrow – Pinner – Northwood Hills – Northwood – Moor Park – Croxley – Cassiobridge – Watford Vicarage Road – Watford High St. – Watford Junction
- 8tph Marylebone – Finchley Road – Wembley Park – Preston Road – Northwich Park – Harrow-on-the-Hill – West Harrow – Rayner's Lane – Eastcote – Ruislip Manor – Ruislip – Ickenham – Hillingdon – Uxbridge

3. Watford – Chesham Shuttle:

- 4tph Watford Junction – Watford High St. – Watford Vicarage Rd. – Cassiobridge – Croxley – Rickmansworth – Chorleywood – Chalfont & Latimer – Chesham

Note that the proposed Metropolitan frequencies represent a doubling of the current off-peak service levels to Amersham, Chesham and Watford, but no increase to Uxbridge. There is a current proposal to extend the Central Line from West Ruislip to Uxbridge; I leave this as the enhancement of Uxbridge's services.

I would envisage the GC lines to be the first to be adapted to take 12-car trains, followed by the Metropolitan to Amersham and Chesham, which shares much of the Aylesbury route's infrastructure, then Watford Junction and finally Uxbridge.

Crossrail 4 South of Balham

South of Balham the routes are:

- 4tph Balham – Streatham Hill – West Norwood – Gipsy Hill – Crystal Palace – Norwood Junction – East Croydon – South Croydon – Purley Oaks – Purley – Reedham – Smitham – Woodmansterne – Chipstead – Kingswood – Tadworth – Tattenham Corner
- 4tph Balham – Streatham Hill – West Norwood – Gipsy Hill – Crystal Palace – Norwood Junction – East Croydon – South Croydon – Purley Oaks – Purley – Kenley – Whyteleaf – Whyteleaf South – Caterham
- 4tph Balham – Streatham Hill – West Norwood – Gipsy Hill – Crystal Palace – Sydenham – Forest Hill – Honor Oak Park – Brockley – New Cross Gate – London Bridge
- 4tph Balham – Streatham Hill – West Norwood – Gipsy Hill – Crystal Palace – Birkbeck – Beckenham Junction
- 4tph Balham – Mitcham Eastfields – Mitcham Junction – Hackbridge – Carshalton – Sutton – Belmont – Banstead – Epsom Downs
- 4tph Balham – Mitcham Eastfields – Mitcham Junction – Hackbridge – Carshalton – Sutton – Cheam – Ewell East – Epsom – Ashstead – Leatherhead – Bookham – Effingham Junction
- 4tph Balham – Streatham Common – Norbury – Thornton Heath – Selhurst – West Croydon – Waddon – Wallington – Carshalton Beeches – Sutton

- 4tph Balham – Streatham Common – Norbury – Thornton Heath – Selhurst – East Croydon – South Croydon – Sanderstead – Riddlesdown – Upper Warlingham – Woldingham – Oxted

I would envisage the line to Mitcham Junction and Sutton, and on to Epsom Downs / Effingham Junction to be the first to be adapted for 12-car trains, followed by that to Selhurst, and on to Sutton / Oxted, then that to Crystal Palace and on to Purley and Tattenham Corner / Caterham, finally that from Crystal Palace to London Bridge / Beckenham Junction. (Unsurprisingly, this mirrors the order of the connected services at the northern end.)

Crossrail 4 Services

Combining the north and south groups, the services are:

- 8tph Calvert / Princes Risborough alternately, 4tph each → West Hampstead Interchange – Marylebone → Mitcham Junction → Sutton → Epsom Downs / (Epsom → Effingham Junction) alternately, 4tph each
- 8tph Amersham / Chesham alternately, 4tph each – Chalfont and Latimer → Finchley Road – Marylebone → Selhurst – (West Croydon → Sutton) / (East Croydon → Oxted) alternately, 4tph each
- 8tph Watford Junction → Finchley Road – Marylebone → Crystal Palace → Purley → Tattenham Corner / Caterham alternately, 4tph each
- 8tph Uxbridge → Finchley Road – Marylebone → Crystal Palace → (Sydenham → London Bridge) / Beckenham Junction alternately, 4tph each

As a 15 minute service sequence, passing south through any station on the central core:

1. Watford Junction → Crystal Palace → Purley → Tattenham Corner
2. Amersham – Chalfont and Latimer → Selhurst → Oxted
3. Uxbridge → Crystal Palace → Sydenham → London Bridge
4. Calvert → Mitcham Junction → Sutton → Epsom → Effingham Junction
5. Watford Junction → Crystal Palace → Purley → Caterham
6. Chesham – Chalfont and Latimer → Selhurst → Sutton
7. Uxbridge → Crystal Palace → Beckenham Junction
8. Princes Risborough → Mitcham Junction → Sutton → Epsom Downs

– repeating four times per hour.

The Chesham – Sutton service (#6) should arrive in Sutton shortly before the Calvert – Sutton – Effingham Junction service (#4), to connect into it. This looks reasonable; the Calvert – Effingham Junction service (#4) follows the Chesham – Sutton service (#6 of the previous sequence) through the core some 11/12 minutes later, but Chesham – Sutton is a few miles longer reaching Sutton, and has 4 more stations. (That’s the only worthwhile intra-Crossrail-4 connection that I’ve noticed.)

One further facility, not part of Crossrail 4 itself, but very important to the GC services, is a possible branch of the Heathrow shuttle:

- 2tph Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange (at Langley) – Slough – Maidenhead – Bourne End (connections to and from

Marlow) – High Wycombe – Princes Risborough – Little Kimble – Aylesbury – Aylesbury Vale Parkway – Calvert (for HS2) – Winslow – Bletchley – Milton Keynes

Proposals are already extant for restoring the route from Bourne End to High Wycombe. I think it has much wider potential.

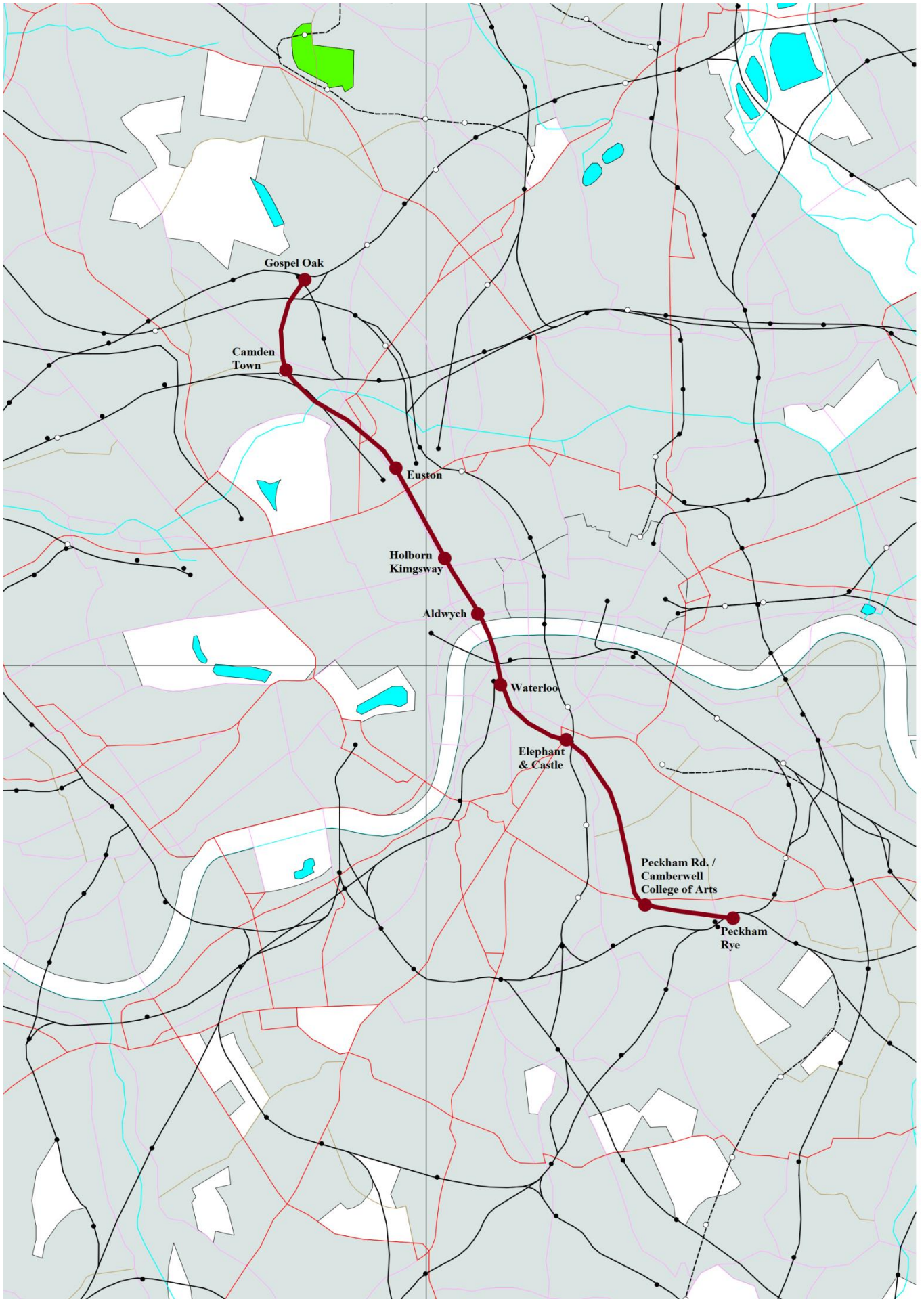
Electrification and Other Metropolitan Notes

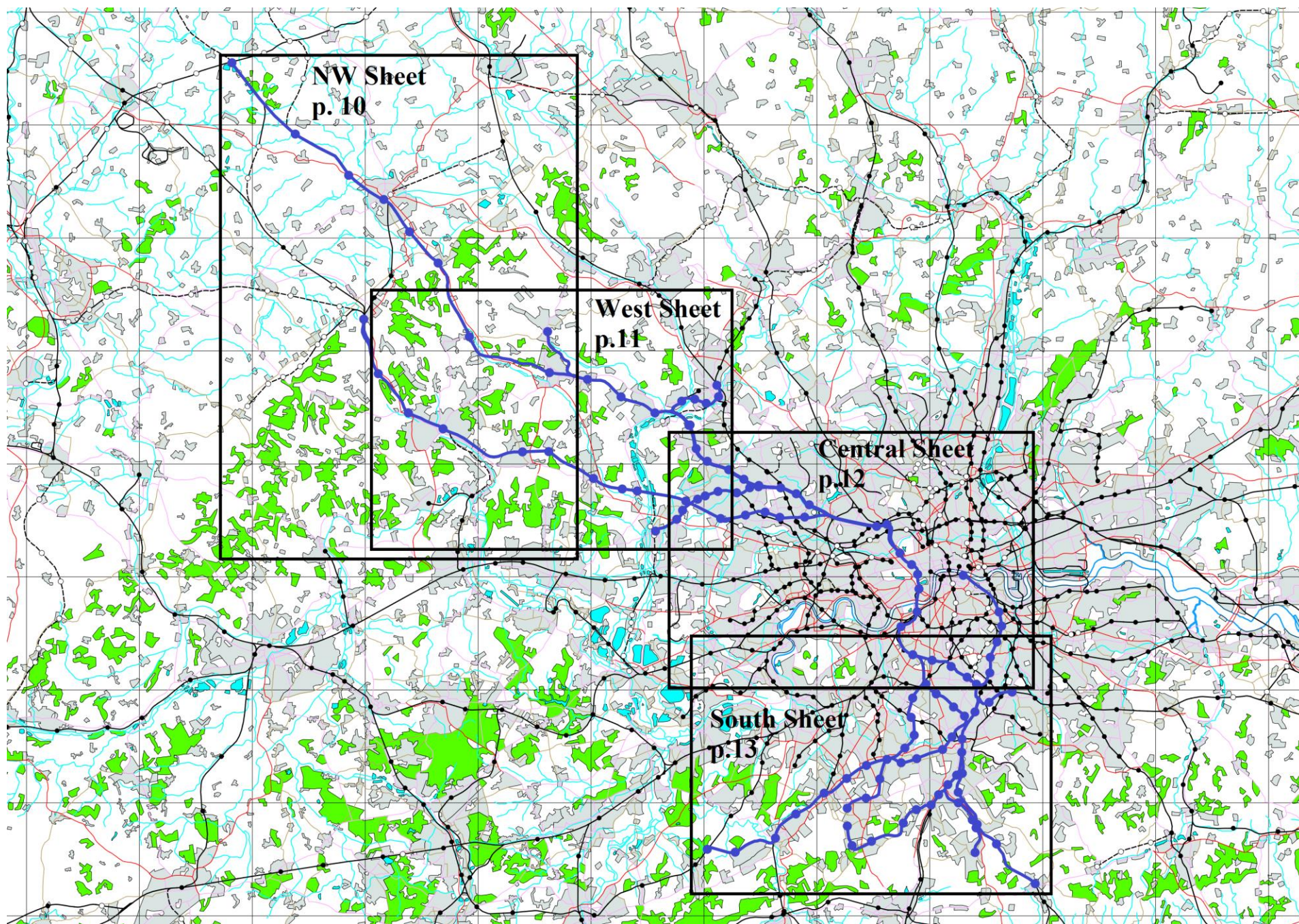
The GC lines would be electrified at the usual 25kV overhead north of Marylebone, then switch to 750V third rail south of that. The new tunnels between Marylebone and Balham would be built large enough for 25kV overhead, with a view to the ultimate conversion of the third rail network.

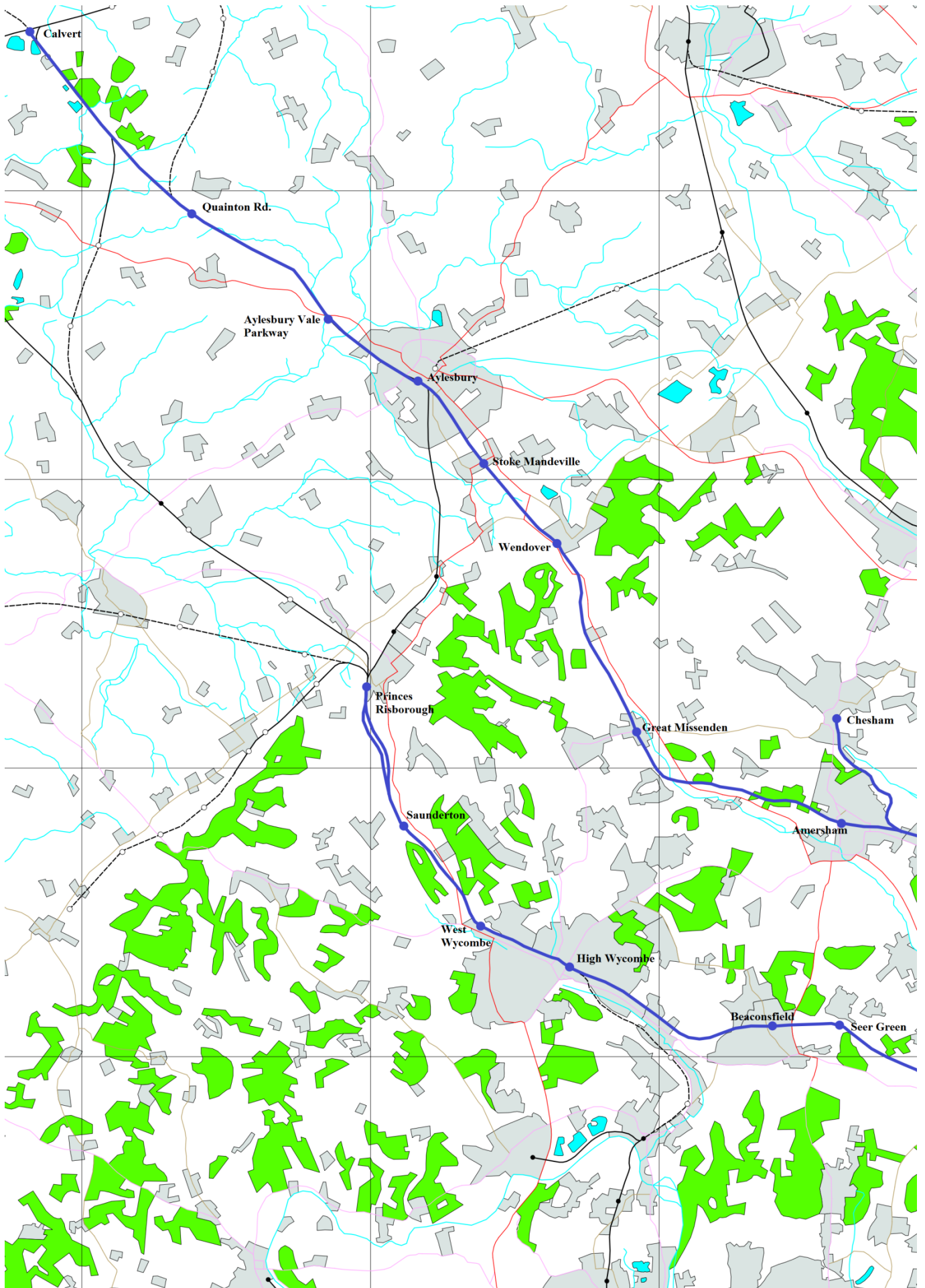
I'm unsure whether it would be necessary to convert the Metropolitan section from 660V fourth rail to 750V third rail. I envisage that the excellent new S8 trains would continue to be used – they'd only be in their teens – but don't know what changes they would require. But these are purely technical questions, to which someone familiar with the subject will quickly give answers.

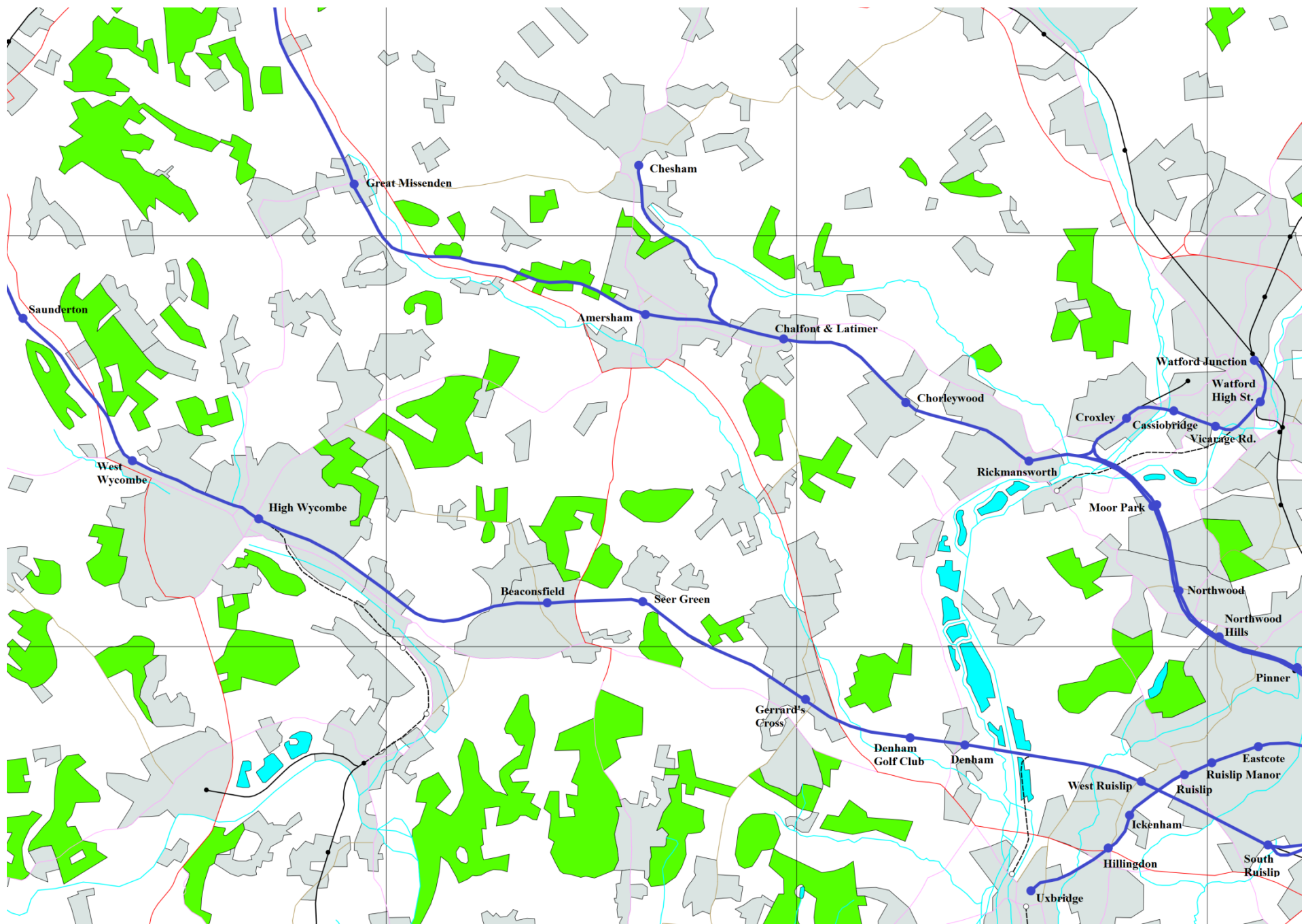
Baker St. Metropolitan station would become redundant, apart from the original H&C and Circle Line platforms. I suggest that it become the London Underground Museum (obviously closely allied with the London Transport museum in Covent Garden). As noted, the optimum location for the connection between Metropolitan and GC lines is at map reference TQ272827, just south of Lodge Road, where both lines are in the open and close together. Below that the Metropolitan line enters tunnel at TQ274825, by Lorne Close, where there looks to be the remains of a station – St. John's Wood Met? – which, restored to its original appearance, would form an ideal terminus for running vintage electric trains to (probably not steam, for lack of space) through the tunnel from Baker St. A rail connection to Baker St. would be maintained here, for stock movements as required, and maybe even the occasional railtour.

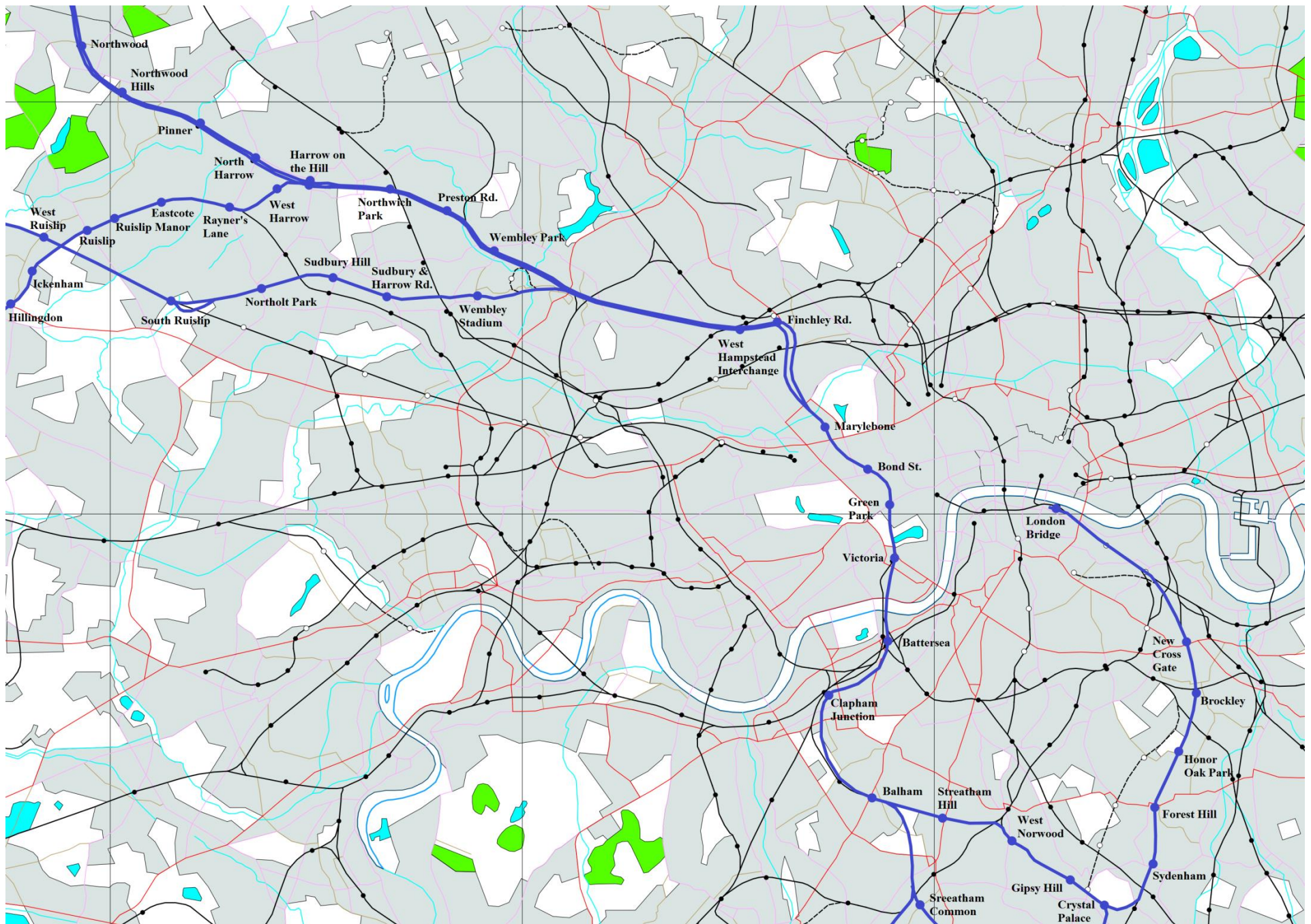
Together with Madame Tussaud's and the Sherlock Holmes Experience, the London Underground Museum would make the Baker St. area (even more of) a major tourist destination (with superb transport facilities, of course). There used to be (maybe there still is) an LT staff restaurant in the station building. (I remember eating there, back in the 60s; I had a friend who worked for LT.) This could become a further period attraction.







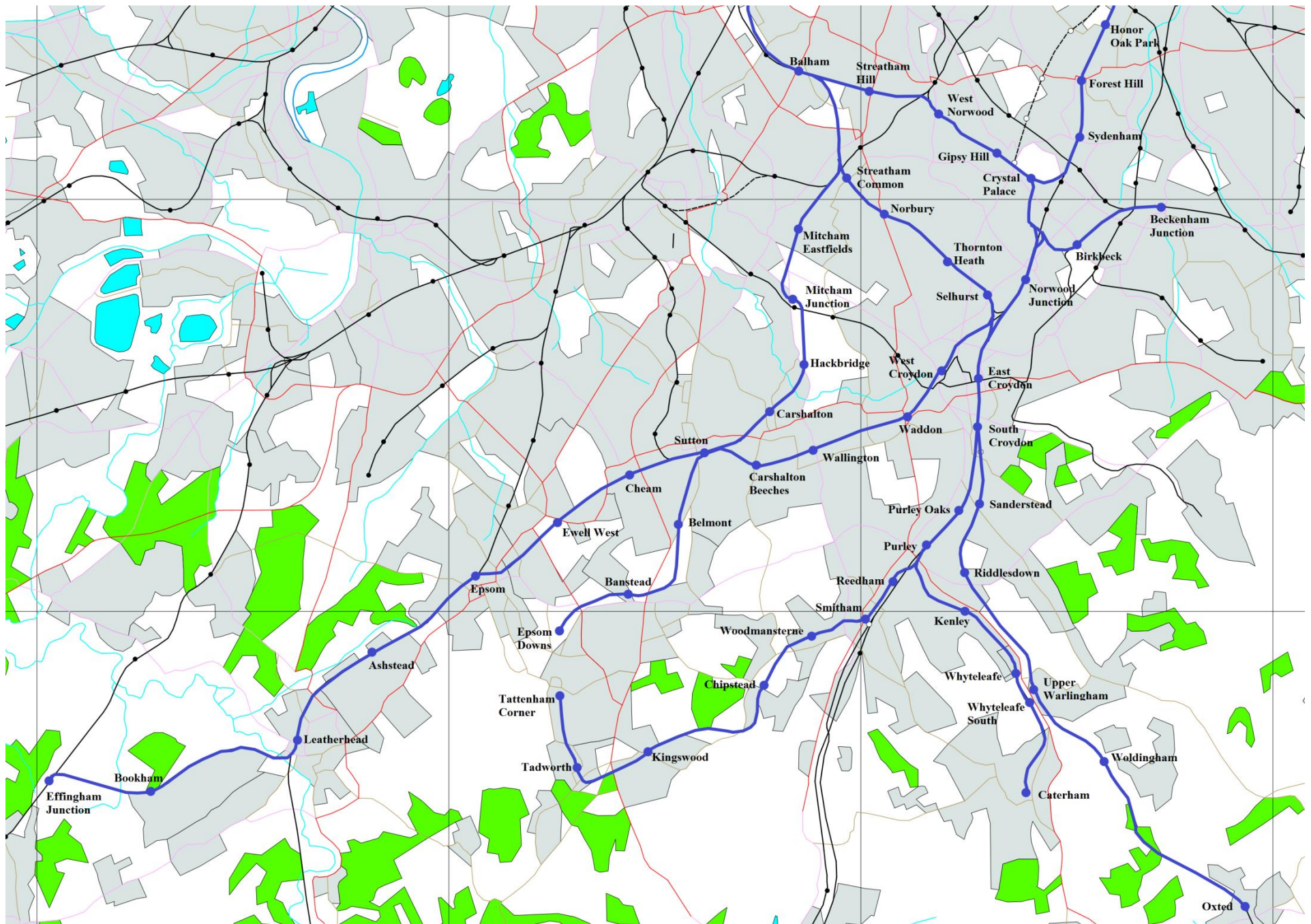




Crossrail 4 Central Sheet

Beyond Crossrail 2 v3.0

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Appendix A – Chiltern Line Services

As noted in the main body of the article, the long distance, (i.e. beyond Princes Risborough,) Chiltern Line services will return to Paddington, thus benefitting from the fast, straight route from Northolt Junction to Old Oak Common, and interchange with Crossrail there. The move back to Paddington is, in fact, essential, to avoid the serious capacity problems which would otherwise occur on the 2-track section between Northolt Junction and Marylebone, and at Marylebone itself. As I explain at some length in my article ‘Crossrail Service Plans’, if a non-stop service must share a 2-track railway with a 4tph stopping service, (of broadly similar speed when it’s moving,) then an overtaking facility is needed for it at least at every 4th station (roughly – it’s only a rule of thumb). A better estimate can be made if one has available, or can derive, a service pattern from the timings of current services (this is not necessarily as straightforward as it sounds, since the existing service may not be in the form of the pattern actually wanted). As it is, I have derived timings from the current Chiltern timetable, and built a timetable from them (see later). I can thus say that we shall need overtaking facilities at the minimum at Princes Risborough, High Wycombe, Gerrard’s Cross and South Ruislip. So let’s make a virtue out of a necessity, and provide cross-platform interchange at all these stations with Crossrail 4.

The current off-peak pattern of GWML suburban services is:

- 2tph Paddington – Greenford, all stations
- 2tph Paddington – Heathrow T4, Heathrow Connect
- 2tph Paddington – Reading
- 2tph Paddington – Reading – Oxford

The first three of these will be taken over completely by Crossrail, as will that part of the fourth, east of Reading. There will still be a Paddington – Reading – Oxford service, but it will be part of the Heathrow Shuttle – see the article on ‘GWML Service Plans’. Thus, with the opening of Crossrail, 6 station slots per hour will become free at Paddington, 4 of which will be taken over by Chiltern Line services. There can only be 4tph long distance services on the Chiltern Line, at regular 15 minute intervals, because of the need to share the line between Princes Risborough and Northolt Junction with the 4tph stopping services of Crossrail 4.

The current Chiltern Line long distance services are:

- 1tph Marylebone – Banbury – Leamington Spa – Warwick Parkway – Solihull – Birmingham Moor St.
- 1tph Marylebone – High Wycombe – Bicester North – Banbury – Leamington Spa – Warwick Parkway – Dorridge – Solihull – Birmingham Moor St. – Birmingham Snow Hill
- 1tph Marylebone – Gerrard’s Cross – Beaconsfield – High Wycombe – Princes Risborough – Haddenham and Thame Parkway – Bicester North
- 1tph Marylebone – High Wycombe – Princes Risborough – Haddenham and Thame Parkway – Bicester North, then various, on a 3-hour cycle:
 1. Terminates at Bicester North
 2. Continues to King’s Sutton and Banbury
 3. Continues to Banbury, Leamington, Warwick, Hatton, then all stations to Stratford on Avon

I take this as an indication of the services that should be provided, rather than as a prescription. These services must in future serve a very important function in conjunction with Crossrail 4. All of them must stop at all of the overtaking / interchange stations, i.e. South Ruislip, Gerrard's Cross, High Wycombe and Princes Risborough, and provide cross-platform connections into and out of Crossrail 4 (actually, not at High Wycombe – the interchange there is different – see below).

The service plan for the Chiltern Line services is thus:

- 2tph Paddington – Old Oak Common – South Ruislip – Gerrard's Cross – High Wycombe – Princes Risborough – Banbury – Leamington Spa – Warwick Parkway – Warwick – Dorridge – Solihull – Birmingham Moor St. – Birmingham Snow Hill – Smethwick Galton Bridge – Stourbridge Junction – Kidderminster
- 2tph Paddington – Old Oak Common – South Ruislip – Gerrard's Cross – High Wycombe – Princes Risborough – Haddenham and Thame Parkway – Bicester Town – Islip – Oxford Parkway – Oxford

– alternately, at regular 15 minute intervals. A suggested add-on, from Princes Risborough:

- 2tph Princes Risborough – Haddenham and Thame Parkway – Bicester North – King's Sutton – Banbury – Leamington Spa – Warwick – Hatton – Claverdon – Bearley – Wilmcote – Stratford-on-Avon Parkway – Stratford-on-Avon

– connected into by the Kidderminster service (which is why that doesn't need to serve Haddenham and Thame Parkway and Bicester North.

There is also the putative Heathrow Shuttle service, mentioned previously:

- 2tph Paddington – Old Oak Common – LHR Terminals 1,2,3 – LHR Terminal 5 – LHR Interchange (at Langley) – Slough – Maidenhead – Bourne End (connections to and from Marlow) – High Wycombe – Princes Risborough – Monks Risborough – Little Kimble – Aylesbury – Aylesbury Vale Parkway – Calvert (for HS2) – Winslow – Bletchley – Milton Keynes

Admirers of the current Chiltern Lines franchise may object to its new and impressive Birmingham service not being perpetuated. But by the earliest date that these proposals could in practice be implemented, HS2 should be in operation, at least as far as Birmingham, and the classic lines to Birmingham (this applies to the LNW route also) will be running Regional Metro type services, which the above are.

The following timings have been extracted/derived from the current Chiltern Line timetable:

	Stopping	Fast
South Ruislip	00:00	00:00
West Ruislip	00:07	
Denham	00:12	
Denham Golf Club	00:15	
Gerrard's Cross	00:21	00:08
Seer Green	00:25	
Beaconsfield	00:28	
High Wycombe	00:35	00:18

Saunderton 00:42
Princes Risborough 00:51 00:27

– and a schedule of the desired form built using them:

		B/K	C4	Ox	LHRS	C4	B/K	C4	Ox	LHRS	C4
South Ruislip	arr	-01:59	-01:59	00:14		00:14	00:29	00:29	00:44		00:44
	dep	00:00	00:01	00:15		00:16	00:30	00:31	00:45		00:46
West Ruislip			00:08			00:23		00:38			00:53
Denham			00:13			00:28		00:43			00:58
Denham Golf Club			00:16			00:31		00:46			01:01
Gerrard's Cross	arr	00:07	00:22	00:22		00:37	00:37	00:52	00:52		01:07
			=====			=====		=====			=====
	dep	00:08	00:09	00:23		00:24	00:38	00:39	00:53		00:54
Seer Green			00:13			00:28		00:43			00:58
Beaconsfield			00:16			00:31		00:46			01:01
High Wycombe	arr	00:17	00:22	00:32	00:31	00:37	00:47	00:52	01:02	01:01	01:07
	dep	00:18	00:23	00:33	00:34	00:38	00:48	00:53	01:03	01:04	01:08
Saunderton			00:30			00:45		01:00			
Princes Risborough	a.	00:26	00:39	00:41	00:43	00:54	00:56	01:09	01:11	01:11	01:24
			=====			=====		=====			=====
	d.	00:27		00:42	00:44		00:57		01:12	01:12	

Key: C4 Crossrail 4
===== Service continues in next Crossrail 4 column (at Gerrard's Cross) or terminates (at Princes Risborough)
B/K Chiltern Line Birmingham and Kidderminster
Ox Chiltern Line Oxford via Bicester
LHRS Heathrow Shuttle Maidenhead – High Wycombe – Aylesbury – Milton Keynes

Note that the Crossrail 4 service needs interchange/overtaking points at South Ruislip and Gerrard's Cross only, not at High Wycombe, and that there are 3 stopping stations between South Ruislip and Gerrard's Cross, but 4 between there and Princes Risborough. The interchange at High Wycombe is between the Chiltern Line Oxford service and the Heathrow shuttle service to Milton Keynes; this can't take place at Princes Risborough as the Crossrail 4 service terminates there, and connects into both services separately. Also at Princes Risborough is the 2tph service to Stratford on Avon, which starts from there, and is connected into by the Birmingham / Kidderminster service.