

CORRIDOR 7: CROSSRAIL TO HOUNSLOW

**A Proposal by the London Borough of Hounslow in Response
to Consultation by Cross London Rail Links Ltd**

October 2004.



1. EXECUTIVE SUMMARY

- 1.1 Consultation and review of Crossrail's 2003 benchmark scheme has resulted in the abandonment of the plan for a branch ("Corridor 6") to Richmond and Kingston via an interchange station at Turnham Green. The latest plans issued by Crossrail involve more than half the trains going no further west than Paddington. This would result in significant unused capacity in the expensive tunnel under Central London, and would be a missed opportunity to support areas of West London that are being redeveloped or could benefit from regeneration.
- 1.2 This paper proposes a new "Corridor 7" branch for Crossrail which would:
- provide enhanced rail services to Hounslow and Brentford
 - be a relatively low-cost addition to the Crossrail project
 - be relatively simple in engineering terms
 - avoid the service reliability risks that Corridor 6 would have suffered from
 - avoid controversial features such as tunnels and property acquisition.
- 1.3 The proposed new branch would run from a junction on the Great Western Main Line at Old Oak Common via the North London Line to South Acton, then on to the Hounslow Loop as far as Hounslow. All existing stations on the branch would be served by four Crossrail trains per hour in each direction, providing new direct connections from Hounslow and Brentford to Paddington, the West End, the City and Docklands.
- 1.4 Existing services on the North London Line and the Hounslow Loop would be maintained at current frequencies.
- 1.5 To demonstrate the feasibility of this proposal, this paper considers in some detail the engineering and operational implications of "Corridor 7".
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Contact:

Chris Calvi-Freeman, Head of Transport, Chief Executive's Directorate, London Borough of Hounslow.
Telephone: 020 8583 5215 Email: chris.calvi-freeman@hounslow.gov.uk

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2. BACKGROUND

- 2.1 Crossrail is a proposed new rail service being developed by Cross London Rail Links Ltd (CLRL), currently a 50/50 joint venture between Transport for London (TfL) and the Strategic Rail Authority (SRA). It will consist of a tunnelled trunk section running east-west under Central London from Paddington to Liverpool Street, connected to eastern and western branches. The project has been planned and re-planned several times over the last 15 years, with a number of different “corridors” being proposed for eastern and western branches.
- 2.2 The “benchmark” scheme, which was presented for public consultation in September 2003, had a central tunnel extending from Paddington to Whitechapel. Eastern branches would run via Stratford to Shenfield in Essex, and via Isle of Dogs to Ebbsfleet in North Kent. In the west, the plan was for branches to Heathrow and to Kingston via Chiswick and Richmond, the latter branch being known as “Corridor 6”.
- 2.3 Corridor 6’s tunnelled route to Chiswick was an expensive proposal, and an independent review by a team headed by Adrian Montague raised concerns about difficulties in sharing tracks with other National Rail services. Following a statement in July 2004 to Parliament by the Secretary of State for Transport, Alistair Darling, CLRL have now dropped the Chiswick/Richmond/Kingston branch from their plans, and have extended the service along the existing main line from Paddington to serve Slough and Maidenhead as well as Heathrow.

3. HOUNSLOW’S INVOLVEMENT IN CROSSRAIL: CORRIDOR 6

- 3.1 Hounslow Council was first invited to comment on the Corridor 6 proposals in February 2003. CLRL had asked for preliminary comments on an entirely new scheme for a branch from Paddington to Gunnersbury, Richmond and Kingston/Norbiton. Two alternative routes were suggested to reach Gunnersbury, a surface route using the existing North London Line through Acton Central and a tunnelled route via a new underground station west of Chiswick Common.
- 3.2 At that stage, it was not clear how thoroughly CLRL had considered possible alternative routes. Hounslow put forward various suggestions which it was felt were of more benefit to the borough, including regeneration opportunities. CLRL decided to proceed with public consultation on Corridor 6, choosing the tunnelled option, but with an interchange station at Turnham Green, as suggested by Hounslow.
- 3.3 Since January 2004, the Council has worked closely with CLRL and residents’ groups to obtain the best possible outcome for our community of a project that would have delivered substantial long-term benefits, although with considerable local disruption for several years during construction. However, as noted above in section 2.3, Corridor 6 has now been dropped from CLRL’s plans.

4. THE CURRENT CROSSRAIL PLAN

- 4.1 The latest plan from CLRL, which is intended to form the basis of the Hybrid Bill to be laid before Parliament in (probably) early 2005, retains the two eastern branches and the central tunnel from the benchmark scheme. The Heathrow service is now expected to complement rather than replace BAA's Heathrow Express non-stop service from Paddington. In addition, Crossrail trains will also proceed further west down the Great Western Main Line to West Drayton, Slough and Maidenhead, serving all stations.

Current Route Diagram



- 4.2 One result of this plan is that there would be an unbalanced service between eastern and western branches. Although the eastern branches will generate a peak level of 24 westbound trains per hour through the central tunnel, the service to the west will be as follows:

- To Heathrow 4 trains per hour
- To Maidenhead 4 trains per hour
- To West Drayton 2 trains per hour (in addition to the Maidenhead trains).

The remaining 14 trains per hour will terminate at Paddington, running empty to sidings near Westbourne Park before returning to Paddington and the east.

- 4.3 There is therefore significant unused Crossrail capacity in West London. This proposal seeks to use some of that spare capacity in order to benefit the residents of West London, to provide a better return on the very heavy cost of the central tunnels, but to do so without excessive additional project cost and risk.

5. CORRIDOR 7 PROPOSAL

- 5.1 Clearly any proposal for a new south-western Crossrail branch needs to avoid the problems that led to the abandonment of Corridor 6. In particular, since the funding of Crossrail is still a major unresolved issue, any new proposal must be relatively low-cost, with a minimum of large-scale civil engineering. It must also avoid the risk of service unreliability through conflict with other services.
- 5.2 The proposal described here is therefore deliberately modest in scale (relative to Corridor 6), but will produce a clear benefit to communities that currently have only limited rail services. The essence of this proposal is that current demand can be satisfied with only comparatively minor changes to the current infrastructure in the short to medium term. With the prospect of significant growth in rail travel, driven by current property development and future regeneration opportunities, more significant improvement of the railway infrastructure may become necessary in the longer term, and this is discussed in section 9.
- 5.3 This “Corridor 7” proposal is for a Crossrail branch from Paddington to Hounslow, via Acton Central, South Acton, Brentford, Syon Lane and Isleworth. The service would consist of four trains per hour in each direction, both peak and off-peak. All trains would call at every station on the branch, and would run to/from central London and one or both of the eastern branches of the Crossrail network.
- 5.4 The route from Paddington would be as follows:
- along the Great Western Main Line (**GWML**) as far as Old Oak Common
 - a new connection to the North London Line (**NLL**) near Acton Wells Junction
 - along the NLL to South Acton
 - along an existing freight link to Brentford (the link would need to be electrified)
 - along the Hounslow Loop to Hounslow.



- 5.5 The Crossrail trains would interleave with existing services on the North London Line (Silverlink Metro) and the Hounslow Loop (South West Trains). A sample timetable has been drawn up (Appendix A) which leaves those services unaffected, and also includes paths for freight trains consistent with current demand. Freight services are discussed separately in section 8.

6. ENGINEERING AND INFRASTRUCTURE ISSUES

6.1 The main engineering changes required for Corridor 7 are as follows:

- revision of layout and probably signalling changes to the existing carriage reception tracks between Paddington and Old Oak Common to allow passenger services to use them
- new electrified connection between the GWML and the NLL at Acton Wells, involving a bridge to carry Old Oak Common Lane over the new line
- upgrade of signalling on the NLL between Acton Wells and South Acton to decrease minimum headways
- electrification and resignalling of freight link (2 km) from South Acton Junction to Old Kew Junction
- doubling of Old Kew Junction (currently single track connection)
- platform lengthening at all stations on the branch
- possible reconstruction of St John's Road bridge at Isleworth
- reconstruction of footbridges at Hounslow and Brentford
- construction of reversing sidings at Hounslow
- repositioning of some signals and crossovers
- possible upgrading of power supplies on the NLL.

It has not been possible at this stage to estimate the costs of these changes, but the work is essentially straightforward.

Following three paragraphs on electrification and platform lengthening, the engineering changes are described in more detail in the rest of section 6, following the course of the line westwards from Paddington. A route diagram is included as Appendix B.

6.2 **Electrification.** It is assumed that Crossrail trains will be dual-voltage, as they will need to be able to draw power either from 25kV AC overhead wires (as already in use to Heathrow and on the Shenfield branch) or from 750V DC third rail (as already in use on the North Kent line through Abbey Wood). Overhead line electrification (OLE) at 25kV AC is already installed between Paddington and Old Oak Common and on the North London Line as far as Acton Central. Third rail at 750V DC is installed from there to South Acton, and also on the Hounslow Loop. The changeover between overhead and third rail would take place while the trains are stationary at Acton Central station, as happens currently on the NLL.

- 6.3 OLE would need to be installed on the new link across Old Oak Common. The link between the NLL at South Acton and the Hounslow Loop at Old Kew Junction is currently used only by freight trains and is not electrified. It would be sensible to use 750V DC third rail technology, as for the lines at each end of the link. A recent report¹ ("the Freight Study Report") produced by Arup for Transport for London draws attention to the supposed weakness of the OLE power supplies on the NLL, and to possible difficulties in electrifying the South Acton to Old Kew Junction line. However, this was in the context of possible upgrading for electric freight locomotives, and the problems are not necessarily applicable to Crossrail usage.
- 6.4 **Platform lengthening.** Crossrail trains will have 10 coaches, but all the stations on the Corridor 7 branch are built for 8-coach (Hounslow Loop) or 3-coach (NLL) trains. In theory, Crossrail trains could call at stations with short platforms by using selective door opening. However, this is not considered appropriate for Crossrail, where the central London stations will have entrances at each end of the platform. It would cause undesirable congestion on platforms and trains if large numbers of passengers had to move position to ensure that they were able to alight at their destination. All platforms on the Corridor 7 branch would therefore need to be lengthened to a minimum of 200 m in order to accept Crossrail's 10-coach trains. In all cases railway land is available for the extensions, though associated works to signalling and other infrastructure may be needed. Details are given later under the individual stations.
- 6.5 **Paddington to Old Oak Common.** Westwards from Paddington, there are currently six tracks as far as Ladbroke Grove, where these are re-formed into four running tracks, Up/Down Main and Relief, and two carriage reception tracks providing a link with the various depots at Old Oak Common. Crossrail currently intend to use tracks 5 and 6 on the northern side of the line as far as Ladbroke Grove, and then use the existing Relief (slow) lines. While it would be possible for Corridor 7 trains to follow the same route as far as Old Oak Common, this would cause some conflict there between westbound Corridor 7 trains and eastbound Crossrail and First Great Western Link trains. To reduce conflicts, it is proposed that Corridor 7 trains should use the carriage reception tracks. These would need a degree of upgrading, mainly to revise the layout, particularly at Ladbroke Grove, and probably the signalling. The tracks are already electrified. The carriage washing plant and servicing platform west of Ladbroke Grove would need to be sited elsewhere, probably on the Old Oak Common site.
- 6.6 **Connection between Great Western Main Line (GWML) and North London Line (NLL).** A connection to the NLL featured in an early version of Corridor 6, as an alternative to the tunnelled route to Turnham Green. CLRL had intended to construct a viaduct rising from the GWML, and passing over the GWML on a new bridge before joining the NLL. This proved to be extremely difficult to position so as not to interfere with the Old Oak Common depots. There are a number of key depot buildings there for First Great Western, Heathrow Express and the freight operator EWS.

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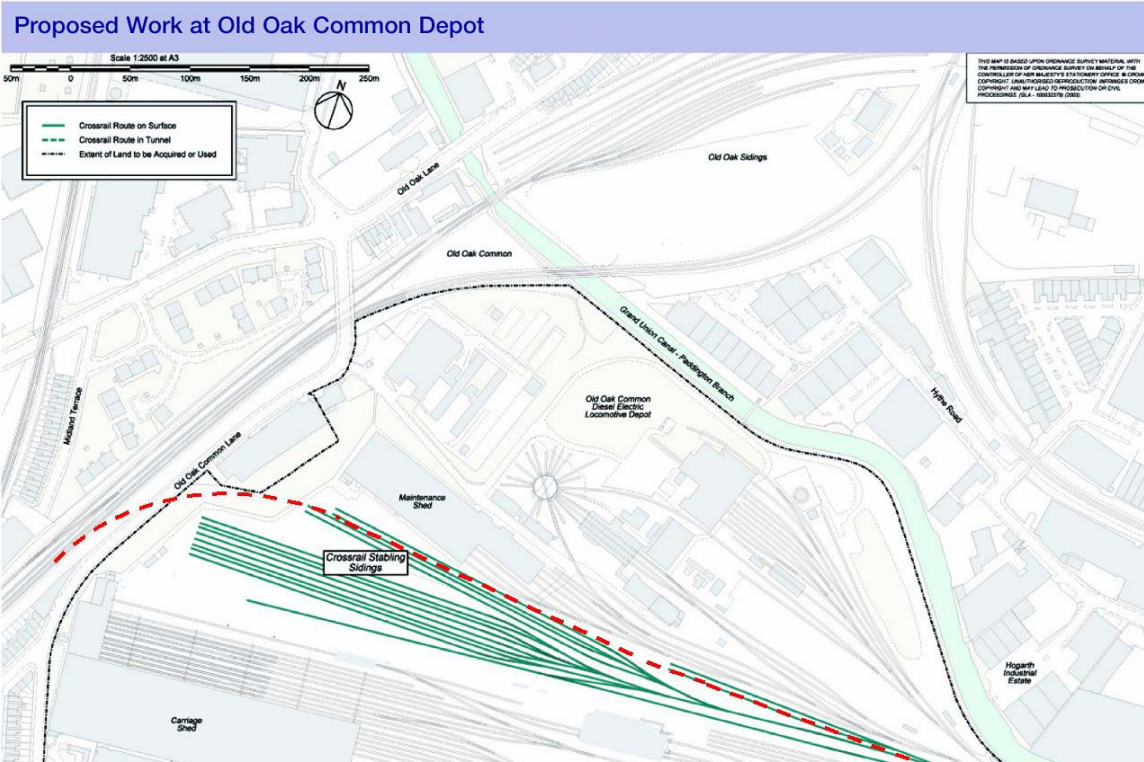
¹ Kew Bridge to Willesden Freight Corridor: Task No. TFL/RT/01135, Task 74a: Freight Capacity Enhancement – Feasibility Study Report, June 2004.

- 6.7 However, the requirements for a branch carrying four trains per hour (tph) in each direction are very different from the 12 tph originally planned for Corridor 6. For Corridor 7, it would be possible to provide a connection through the open area of Old Oak Common yard between the EWS and First Great Western depots. This area consists of open sidings, and appears currently to be used to store redundant or spare coaching stock and locomotives. Crossrail have already earmarked this space for stabling sidings, and some rearrangement of their plans would be needed to accommodate the double-track link and preserve access to other parts of Old Oak Common yard. The new line, like the adjacent Crossrail sidings, would be electrified with 25kV AC overhead wires, the same system as used on both the GWML and NLL.



The area of Old Oak Common yard selected for the link to the NLL, which would leave the GWML under the girder bridge (West London Line) in the right background, and pass under the photographer's position on Old Oak Common Lane. The area would also contain Crossrail sidings. The EWS locomotive depot is on the left; the First Great Western depot is the building on the right.

- 6.8 In order to connect with the NLL, the line would pass underneath Old Oak Common Lane, which is currently on an embankment, with its road surface apparently about 3 m above rail level on the NLL. (The rail level in Old Oak Common yard is somewhat lower.) A bridge to carry the road across the new line would be required, involving raising the road level by 2 to 3 metres. The road may need to be slewed south-east by a few metres to enable the gradient to be accommodated. West of the new bridge, the line would join the NLL at a flat junction with associated signalling.



Map of part of Old Oak Common from the Crossrail website, showing the planned Crossrail sidings (in green) occupying the space between the EWS depot to the north and the First Great Western depot to the south. The North London Line runs SW-NE across the back of Old Oak Common, separated from it by Old Oak Common Lane. The proposed route of the new link to the NLL for Corridor 7 is overlaid as a dashed line (red).



The site of the junction of the new line with the NLL. In this view looking south towards Acton Wells Junction, Old Oak Common Lane is on the left with Old Oak Common yard beyond it. Of the four tracks, the two on the left are the NLL, and the two on the right are the freight connection to the West London Line.

- 6.9 The flat junction and the fairly sharp curve approaching it would not have been suitable for the original 12 trains per hour Corridor 6 plan, but is acceptable for the more modest requirements of Corridor 7. A curve at the minimum Crossrail radius of 300 m can just be fitted in without any property demolition. There is some spare room in the freight lines adjacent to the NLL to enable tracks to be slewed towards the north-west by a few metres in order to increase separation from buildings. Any restriction of speed necessary at this point will not directly affect other trains on the GWML tracks. Currently there are speed limits of 30/35 mph on the NLL at Acton Wells, but this is probably due to track quality and could be raised. The choice of this route is on the assumption that the existing EWS and First Great Western depots must remain, and similarly the small local community nearby should not be impacted, including the houses in Wells House Road and the Hilltop Works of the long-established family business Daniel James Furnishings in Old Oak Common Lane.
- 6.10 **Acton Wells Junction.** This is the complex junction that provides links from the NLL to the GWML, the West London Line and other routes to the north and east. It is a key node of freight services that run to, from or through West London. The impact on freight services using the junction is more fully discussed in section 8. No engineering changes to the junction itself are proposed at present, although it would be desirable to improve the current 30 mph speed limit through the junction on the NLL, which may be possible by routine track renewal works.
- 6.11 **NLL signalling.** The signalling on the NLL from Acton Wells to South Acton may need upgrading. The Freight Study Report (see section 6.3) recommended that “Any scheme for upgrading the [NLL/Kew East] route to accommodate additional traffic will have to address the possible need to upgrade or replace the existing signalling.” More specifically, Network Rail’s “Rules of the Plan” for the 2004 and 2005 timetables specify a minimum headway between eastbound passenger trains between South Acton and Acton Wells of 4.5 minutes. A minimum headway of 3 minutes would be required to enable Crossrail services to be added to this line, and this would imply at least some upgrading of the current signalling.

- 6.12 **Acton Central.** Currently the platforms are long enough for only 3-coach trains. As the eastern end of the station is adjacent to Churchfield Road level crossing, extension would have to be at the western end. According to Network Rail data, extensions of 115 m (westbound) and 125 m (eastbound) are needed, for which there is room on existing unused railway land. It may be necessary to extend the overhead line electrification (OLE) by a similar distance. (Acton Central is the point where the changeover is made from OLE to third rail, and both systems are installed through the station.) The line is on a slight curve here, but it is assumed that although this is contrary to current safety guidelines for new stations, it would be acceptable at an existing station. It should be possible to retain the level crossing, as discussed in section 7.1.



Above: Churchfield Road level crossing prevents platform extensions at the eastern end of Acton Central station.

Below: Room for extensions exists at the western end of the station.



- 6.13 **South Acton.** The current 3-coach platforms need to be extended by about 115 m. This can be achieved at the eastern end using existing unused railway land, though again the line is on a curve here (as it is through the current platforms), and a crossover will need to be moved eastwards. Extension at the western end is not possible because of the adjacent South Acton Junction, where the current freight line to Brentford (the route for Corridor 7) leaves the NLL. In addition to the possible NLL signalling upgrade already discussed, it would be desirable to allow for a 2-minute headway on the westbound approach to South Acton, for reasons explained in Appendix A (section A.2).



Above: South Acton station looking east. Room for platform extension is available. The extensions would come no closer to the houses than the existing platform does.

Below: South Acton Junction at the western end of the station, NLL to Richmond to the left, Corridor 7 line to Brentford and Hounslow to the right.



6.14 **Kew East link.** The next section of line, linking the NLL at South Acton Junction with the Hounslow Loop is currently used only by freight trains and is not electrified. It leaves the NLL at South Acton Junction, passes over Bollo Lane at a level crossing (close to another one on the NLL), and the alignment then extends southwest between Chiswick Business Park and London Underground's Acton Works. At Kew East Junction, situated underneath the Great West Road and M4 elevated section, the link splits into two branches which provide connections with the Hounslow Loop at New Kew Junction (eastwards) and Old Kew Junction (westwards). The latter route is the one chosen for Corridor 7. The alignment of this junction could be adjusted to increase the turnout radius, estimated to be about 325 m at present, to give faster speeds for Crossrail trains. As noted above, the 2 km of line from South Acton Junction to Old Kew Junction will need to be electrified, using 750V DC third rail technology, as for the lines at each end of the link. The signalling will also need upgrading; Kew East Junction still has semaphore signals.



Semaphore signalling at Kew East Junction. The bridges carry the A4 Great West Road and the M4 elevated section. The left-hand branch leads to New Kew Junction and Chiswick; the right-hand branch leads to Old Kew Junction and Brentford.

- 6.15 **Old Kew Junction** currently has a “single lead” connection; i.e. the freight spur becomes a single track before joining the Hounslow Loop. In order to improve service reliability, this should be converted to a normal double-track flat junction.



Above: The westbound approach to Old Kew Junction on the freight link, showing the current single-lead layout.

Below: The view from the west, with the freight link diverging to the left, and the Hounslow Loop to Kew Bridge and Chiswick continuing to the right.



- 6.16 **Brentford.** An unusual feature at Brentford Station is that in the middle of the platforms, the bridge carrying Boston Manor Road restricts the platform width to about 1.6 m for approximately 10 m. The presence of a commercial storage company at the eastern end of the eastbound platform also restricts the platform width there, and this ex-railway land may need to be reacquired if the platforms were extended at their eastern end. The Church Walk footbridge stands in the way of extensions at the western end.



Storage units at eastern end of station.



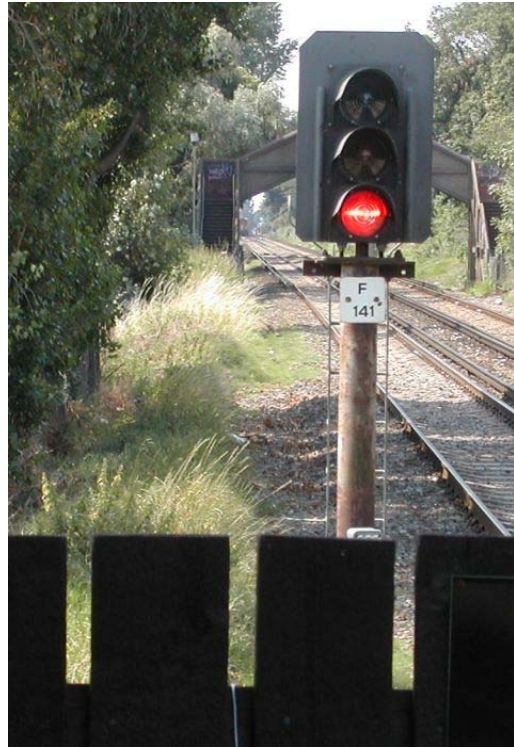
Boston Manor Road bridge.

- 6.17 It is proposed to extend the platforms at their western end by 35 m, and to rebuild the Church Walk footbridge, incorporating a fully-accessible entrance to the station from each side of Church Walk. This would provide a much-needed alternative entrance for passengers from west of Boston Manor Road. It would also reduce the usage of the narrow sections of platform under the road bridge.



Church Walk footbridge close to the western end of the platforms at Brentford.

- 6.18 **Syon Lane.** A road bridge (Syon Lane) prevents any extension at the eastern end. It is therefore proposed to extend the platforms at their western end by 40 m using unused railway land. (Network Rail's belief that trains of 209 m can already fit in the platforms² is mistaken!) The opportunity could be taken to widen the very narrow extensions which exist at that end of the current platforms. Measures to ensure the privacy of dwellings in Rothbury Gardens might be needed.



Westbound platform, western end. Land is readily available for a platform extension, but as at other stations, signals etc. will need to be repositioned.



Eastbound platform, western end, showing the narrow width of the existing extension.

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² Network Rail "Rules of the Plan" – 2004 Timetable, Southern Region.

- 6.19 **Isleworth.** The current platforms just fit between the London Road (A315) and St John's Road (B363) bridges. Platform extensions of about 40 m would therefore need to be built over one of these bridges and on the embankment beyond. This might entail reconstruction of the bridge. It is suggested that the extensions should be built across the St John's Road bridge, as this would lead to less traffic disruption at the time, and the platforms could perhaps be cantilevered off the existing structure. If reconstruction is necessary, it would provide the opportunity to increase the current 4-metre (13 ft 3 in) headroom. The opportunity could also be taken to provide an alternative fully-accessible station entrance from the west side of St Johns Road up to the new platform extensions.



*Above: St John's Road bridge at Isleworth, viewed from the north. The station platforms (on the left) would have to be extended over the bridge.
Below: London Road bridge close to the eastern end of the station.*



- 6.20 **Hounslow.** Both platforms would need extending by about 45 m. This is easiest to achieve at the eastern end, though some reconstruction of the footbridge between Ivy Road and Maswell Park Road would be needed, as there is a pier blocking the proposed westbound platform extension. Currently the western end of the eastbound platform is, as at Brentford, very narrow under the road bridge. A longer extension of 60 m at the other end of the platform would enable this potential hazard to be closed. The crossover east of the station would need to be moved further east.



Above: Site for platform extension at the eastern end of Hounslow station. The footbridge needs partial reconstruction as the pier on the right would obstruct the westbound platform extension. Below: Western end of station showing on the right the narrow platform under the road bridge.



- 6.21 **Reversing sidings, Hounslow.** Crossrail trains terminating at Hounslow need to be moved clear of the through lines to avoid conflict with South West Trains services. It is proposed to construct two electrified sidings immediately west of Hounslow station. For operational convenience, these should be between the two through tracks. There would therefore be a total of four tracks here, and there is sufficient railway land available for this (a total width of at least 20 m is available). Some noise protection measures might be necessary to mitigate increased noise from through trains which would run closer to properties in Whitton Road, Lanigan Drive and Argyle Road than at present.



The site of the reversing sidings west of Hounslow station (photo taken from the end of the eastbound platform). The existing lines beyond the crossover would become the sidings, and new tracks would be built on either side to carry through trains to Feltham and Richmond.

7. OPERATIONAL ISSUES

- 7.1 **Level crossings.** One point of potential concern is the presence of level crossings near Acton Central station (Churchfield Road), west of South Acton (Bollo Lane), and east of Isleworth (Wood Lane). Of these the Bollo Lane crossings, one across the Corridor 7 tracks (current freight link) and another nearby across the NLL, are probably the busiest. The Bollo Lane NLL crossing was one reason why CLRL abandoned the surface route for Corridor 6. However, the 4 trains per hour service (in each direction) for Corridor 7 is much less demanding than the 12 tph proposed for Corridor 6.
- 7.2 By comparison, the busiest level crossings in the London area are thought to be those between Barnes and Richmond, including B353 Manor Road and B351 Sheen Road (at Mortlake Station). These currently handle peak frequencies (counting both directions) of up to 19 trains per hour. Vine Road in Barnes has a pair of level crossings which together handle 25 trains per hour, though with less traffic than Bollo Lane.
- 7.3 Observation of the Manor Road crossing during a recent evening peak showed that the crossing gates were closed to road traffic for approximately 50% of the time, but that despite this, the flow of motor vehicles was at a rate of more than 750 per hour. These figures suggest that Bollo Lane, with almost certainly lower numbers of vehicles, should handle the combined total of 16 trains per hour without serious problems.
- 7.4 **Reliability of service.** The Montague report pointed out that the reliability of Crossrail services would be put at risk in the benchmark scheme by possible conflict with other services. An intensive service of 24 tph in the central tunnel can easily be disrupted by a few minutes' delay elsewhere on the network. A major factor in increasing that risk was Corridor 6 and its multiple opportunities for conflict with Silverlink and South West Trains services. There would have been a flat junction at Gunnersbury, and tightly timetabled merging of services there and at Richmond. With a peak Crossrail frequency of 12 tph on Corridor 6, inter-service conflict would have been inevitable. Even though Corridor 7 has three flat junctions, similar problems will be avoided because of the less intensive service of 4 tph, which enables more stringent rules on train separation to be followed in constructing the timetable.
- 7.5 **Sample timetable.** A sample timetable for the Corridor 7 route has been constructed, covering the hours of 06:00 to 23:00 Monday–Friday, and includes Crossrail, Silverlink and South West Trains services. It is based on the existing Silverlink timetable for the NLL and the South West Trains timetable for introduction in December 2004, and the following principles:
- Passenger trains on the same track or whose paths cross at a junction should wherever possible be kept 4 minutes apart.
 - Freight trains which can wait at a holding point off the main line can follow a passenger train after 3 minutes, but otherwise should be kept 4 minutes from any train.
 - The existing timetable for Silverlink should not be altered.
 - The December 2004 timetable for South West Trains should not be altered.
 - The Crossrail service for Corridor 7 should be at regular 15-minute intervals.

In addition, as explained below in section 8, there is a need to maximise the time available at Acton Wells Junction for insertion of freight trains into the timetable.

- 7.6 On both the NLL and the Hounslow Loop, there is a regular 15-minute frequency during the day, with little difference between peak and daytime off-peak service patterns³. This is also the assumption for Crossrail Corridor 7 services. The same basic pattern can therefore be applied throughout the day. However, the Silverlink timetable contains a number of irregularities in the 15-minute service interval, and a change to a 20-minute interval in the evenings, which mean that some variations from the above principles are unavoidable. The timetable would benefit from a more regular Silverlink service, with a 15-minute frequency in the evenings. However, for the purpose of this paper, it has been assumed that such a revision may not be possible. Consequently, a few Silverlink and Crossrail trains have to run a minute or two offset from the regular pattern, and some 3- and 2-minute separations are needed. With the exception of the Acton sector of the NLL (referred to in section 6.11), these closer separations are all within Network Rail limits for the locations concerned.
- 7.7 Detailed timetables, showing how the Crossrail trains would interleave with existing services and avoid junction conflicts, are in Appendix A. The examples below demonstrate the daytime eastbound service, which applies in the interpeak (midday) period, and also, with minor variations, in the peaks.

From Hounslow

Crossrail departures at 07, 22, 37, 52 mins past each hour

Journey times:	to Paddington	22 mins (currently 60 mins) ⁴
	to Tottenham Ct Rd	27 mins (currently 54 mins)
	to Liverpool Street	32 mins (currently 61 mins)
	to Isle of Dogs	39 mins (currently 61 mins to Canary Wharf)

SWT departures at 01, 16, 31, 46 min past each hour to Waterloo (37 mins).⁵

From Brentford

Crossrail departures at 00, 15, 30, 45 mins past each hour

Journey times:	to Paddington	14 min (currently 51 mins)
	to Tottenham Ct Rd	19 min (currently 47 mins)
	to Liverpool Street	24 min (currently 54 mins)
	to Isle of Dogs	31 min (currently 54 mins to Canary Wharf)

SWT departures at 09, 24, 39, 54 mins past each hour to Waterloo (29 mins).⁵

From South Acton - refer next page.

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³ On SWT this regularity is a new feature of the proposed December 2004 timetable, differing in that respect from the May 2004 timetable.

⁴ Current times are averages based on the Transport for London Journey Planner.

⁵ Times as proposed by SWT for December 2004.

From South Acton

Crossrail departures at 03, 18, 33, 48 mins past each hour

Journey times:	to Paddington	11 mins (currently 24 mins) ⁶
	to Tottenham Ct Rd	16 mins (currently 32 mins) ⁶
	to Liverpool Street	21 mins (currently 38 mins) ⁶
	to Isle of Dogs	28 mins
		(currently 44 mins to Canary Wharf) ⁵

Silverlink departures at 07, 22, 37, 52 mins past each hour to Willesden Junction (8 mins) and Stratford (48 mins).

- 7.8 **Evening services.** The current evening service patterns on the Hounslow Loop and NLL cause a problem for any service seeking to run on both lines. SWT will (from December 2004) continue their regular 15-minute frequency until late evening, and then run every 30 minutes. But Silverlink change from a 15-minute to a 20-minute frequency at about 19:00. It is impossible to construct a regular 15-minute Crossrail timetable that fits in with the 20-minute Silverlink timetable, and achieves 4-minute separation. A compromise timetable has therefore been adopted in the evenings, with one-minute timing adjustments to one Crossrail eastbound and two Silverlink westbound services per hour, and with some separations reduced to 2 or 3 minutes. Further details are given in Appendix A.
- 7.9 **Robustness.** As a check on the robustness of the sample timetable, separation times have been calculated for all conflicting movements at the three flat junctions and for all pairs of trains running on the Hounslow Loop and NLL sections. Out of a total of over 900 such separation times, 94% are of 4 minutes or more, 5% are of 3 minutes, and 1% is of 2 minutes. Hence, the Corridor 7 timetable is a great deal more robust than the Corridor 6 one would have been.

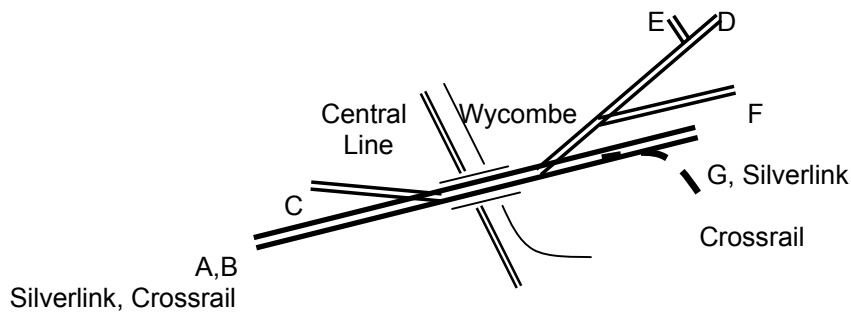
⁶ Current time shown is from Chiswick Park, which is a shorter journey time than from South Acton.

8. IMPACT ON FREIGHT SERVICES

- 8.1 The North London Line, particularly Acton Wells Junction and the eastern part of the line, is a major strategic link in the UK railfreight network. It is therefore important to ensure that any proposal to increase passenger trains on the line takes account of freight requirements. Freight train timetables change frequently as demand comes and goes, which makes the situation difficult to assess. The analysis below is based on information about scheduled freight movements in September 2004 obtained from the publishers of the independent freight services guide, Freightmaster.
- 8.2 **Acton to Hounslow.** On the Corridor 7 route west of Acton Wells junction, there are comparatively few freight services. During the hours of frequent passenger services, assumed to be 06:00 to 23:00, there are currently 5 or 6 freight trains per weekday that run between Acton Wells and Hounslow, and a further 5 to 9 per day between Acton Wells and Kew East (and then to/from New Kew Junction and Chiswick). In addition 3 or 4 freight trains per day run along the Hounslow Loop, but do not use the NLL. All these trains are well spread out during the day, with a slight bunching between 12:50 and 14:40 when up to 6 trains are scheduled to pass the Kew junctions. In the proposed timetable for the Hounslow Loop, in each direction there are four slots per hour of 9 or 10 minutes between passenger trains which would allow for a freight train path. Similarly between Acton Wells and South Acton, there are four slots per hour of 9 or 11 minutes.
- 8.3 One useful feature for freight train operations that would disappear with the introduction of Corridor 7 is the holding area between Old Kew Junction and South Acton Junction. Freight trains can be held here awaiting a suitable slot on either the Hounslow Loop or the NLL before proceeding. With Crossrail trains using this section of line every 15 minutes in each direction, the holding opportunities are more limited. More investigation is needed to assess whether this would be a significant problem. If it is, then a partial solution would be to construct a single-track freight holding loop between Brentford and Old Kew Junction. East of Windmill Road bridge, the bridges in this section all have provision for an extra track, and the land is still available on the north side of the railway except for a short stretch which has become part of a large car park behind Wallis House, the old Beecham building on the Great West Road.
- 8.4 **Acton Wells Junction** is a vital node in the national railfreight network, as it has links in all directions:
- A. to the south-west via the NLL, Old Kew junction and Hounslow
 - B. to the south-east via the NLL, New Kew Junction and Clapham Junction
 - C. to the west via a link to Acton Yard on the GWML
 - D. to the Midlands via Cricklewood, and via a link from that line ...
 - E. to the north-west via Wembley and the West Coast Main Line
 - F. to the south-east via the West London Line (Kensington Olympia)
 - G. to the north-east and east via the NLL.

The layout of the junction is shown in diagrammatic form on the next page.

Acton Wells Junction



As can be seen, the twin-track bridge over the Central Line and the Wycombe line is a major potential bottleneck in this complex junction. Bidirectional signalling is installed for some routes across the junction, which can help to limit the impact on passenger trains.



The bridge on the NLL at Acton Wells, which passes over the Wycombe-Paddington line (on the left) and London Underground's Central Line. View looking east towards Paddington.

- 8.5 There are 70 freight services currently scheduled to pass through Acton Wells Junction on some or all weekdays between 06:00 and 23:00, the period of frequent passenger services. Not all of them run every day; the typical daily maximum during these hours is about 50. Out of the 70 services, 55 of them run between route C and routes D, E, F or G as defined above. Interference with westbound NLL trains is minimised by the provision of bi-directional signalling, enabling trains from route F (and possibly other routes) to use the eastbound track over the bridge in order to reach route C. The remaining 15 services are those on routes A and B which use the NLL to/from Kew, as described in section 8.2.

- 8.6 In drawing up sample timetables for Corridor 7, priority has been given to maximising the slots available for freight traffic through Acton Wells. In the daytime timetable, within each 15-minute period there is an 11-minute slot eastbound, and a 9-minute slot westbound. These combine to provide a 7-minute slot every 15 minutes during which the junction is clear. This is just sufficient to enable a westbound freight train from route D, E or F to traverse the junction, having waited clear of the NLL for the previous passenger train to pass, and to provide 4 minutes separation from the next passenger train. At the same time, some eastbound routes through the junction are available for another freight train. However, if it was possible to adjust the Silverlink timetable to use the passenger train routes more efficiently, there would be more flexibility for freight workings. In the evenings, after Silverlink changes from 4 tph to 3 tph, in every hour there are three slots of 12, 13 and 15 minutes eastbound, and the same intervals westbound. In combination these give two slots of 13 minutes in every hour when the whole junction is clear.
- 8.7 Thus, a freight train, or two freight trains if their paths do not conflict, could in theory be timetabled to pass through the junction every 15 minutes in the daytime, and still preserve the target separation. In practice, however, some spare slots should be left to allow for trains missing their scheduled slots. In the evenings, the longer slots would enable more paths to be allocated. Also, eastbound freight trains can operate independently of westbound trains, and some westbound freight trains can use the bidirectional signalling to avoid conflict with westbound passenger trains. Thus, the freight capacity at Acton Wells could still cope with current demand even with the addition of Crossrail services.
- 8.8 Future expansion of freight services would, however, require an increase of capacity at Acton Wells, with or without Crossrail. As was also proposed by the Freight Study Report, the solution is to build a new bridge alongside the existing one over the Central Line and Wycombe line, to give three or four tracks at this point, which would enable most freight trains to be segregated from NLL and Crossrail passenger trains.

9. FUTURE OPPORTUNITIES

9.1 Crossrail Corridor 7 would support the extensive property developments in the Brentford area, and should also stimulate regeneration in Hounslow and elsewhere (as set out in Appendix C). If, as a result, demand grows substantially, there would be a need for improvements to existing station facilities, possible new stations, and an increase in service frequency and/or longer trains. All these are possible, and the costs might at least partly be covered by Section 106 agreements linked to specific developments. A brief list of possible improvements is as follows:

- Reconstruction of Boston Manor Road bridge at Brentford station to allow full-width platforms under the bridge, if passenger numbers grow to a level where this is necessary.
- Lengthening of all platforms to 245 m. to support 12-coach Crossrail trains, which is possible in all cases using existing railway land. (Crossrail plans to build 245 m station tunnels in central London with the intention of lengthening trains to 12 coaches if justified by passenger numbers.)
- A new station at Lionel Road stadium, the possible new home of Brentford Football Club. Space is very restricted there, but if possible plans for the new stadium should provide space for a station, which would be half way between Brentford and South Acton.
- A new station at Chiswick Business Park. There is space at the back (north side) of Chiswick Business Park for a station there which would relieve the pressure on Gunnersbury and Chiswick Park once the business park is completed. However, this station would be only 600 m from South Acton and 1.1 km from Lionel Road; it is unlikely that all three stations could be justified.
- Extension to Feltham. This is discussed in detail below.
- Diversion of Bollo Lane. If service frequency was increased, the situation at the Bollo Lane crossings might prove intolerable. It might be possible to divert through traffic onto a new road to the west of the Underground lines, and passing over the NLL and Crossrail tracks.
- Grade-separated junctions might be needed eventually to support increased frequencies.

9.2 **Feltham extension.** There is no doubt than an extension of Crossrail Corridor 7 to Feltham would have a number of clear benefits. It would support the regeneration of Feltham town centre which has already started. It would provide a connection to Crossrail from the Wokingham/Bracknell/Staines/Windsor areas, which would reduce crowding on the inner sections of Waterloo-bound services and the corresponding 'down' trains. It might also enable Crossrail to be integrated with the proposed Airtrack services linking South-West London with Heathrow.

- 9.3 However, there are difficult and potentially expensive problems to solve before Crossrail could reach Feltham. The 2-track line through Feltham will, according to SWT's draft timetable for December 2004, carry a total (counting both directions) of 12 trains per hour off-peak and up to 15 tph in the peaks, which means that adding further trains to and from Hounslow via a flat junction (Feltham Junction) would threaten reliability. There is housing close to the junction, including within the triangle formed by the main line and the two exits from the Hounslow Loop, so a grade-separated junction would be very difficult. It might be possible to lay two extra tracks to the north of the existing main line, but further difficulties would then present themselves at Feltham. The existing station platforms would need lengthening by about 30 m, but are constrained by a level crossing at the western end (Bedfont Lane) and a bridge at the eastern end (Hounslow Road). The alternative of a new platform to the east of the current station is also difficult because of the presence of the Feltham Area Signalling Centre on that site.
- 9.4 While a Feltham extension is not ruled out for the future, it is not nearly as straightforward as the proposal for the line to Hounslow, and would need further investigation in the light of other developments such as Airtrack.

APPENDIX A – SAMPLE TIMETABLE FOR CORRIDOR 7

A.1 A Monday-Friday timetable for the period 06:00 to 23:00 has been drawn up with the following aims and assumptions:

- The current Silverlink (NLL) timetable should be unchanged
- The Hounslow loop service should be the South West Trains all-stations service of 4 tph as currently proposed for introduction in December 2004.
- Crossrail services should be a regular 4 tph in each direction, though evening schedules may run at slightly different minutes past each hour from daytime services.
- Crossrail inter-station timings will be the same as Silverlink/SWT, with the exception of Acton Central to South Acton, where 2 minutes of recovery time is included in Silverlink westbound timings, presumably to improve reliability of the connections at Gunnersbury. This allowance is excluded from Crossrail timings.
- Separation of trains on the same track or whose paths conflict at a junction should be at least 4 minutes if possible, and otherwise should be within Network Rail separation limits, as specified in “The Rules of the Plan” for the 2004 and 2005 timetables.

A.2 On occasions these aims are incompatible, as follows:

- Between South Acton and Acton Wells eastbound, the Network Rail minimum headway for passenger trains is 4.5 minutes (though curiously 3.5 minutes for freight trains). This will need to be improved to 3 minutes, presumably by upgrading the signalling.
- In the reverse direction (Acton Wells to South Acton), the Network Rail minimum headway is 3 minutes, which is generally adequate, except that the practice by Silverlink of including 2 minutes’ recovery time at South Acton tends to impede a closely following Crossrail train. This problem would be solved by installing additional signals to give a 2-minute minimum headway at South Acton. Alternatively, Silverlink would have to reduce the recovery time allowance for 6 out of their 71 trains to 1 minute or zero, and insert the allowance elsewhere in their timetable.
- Eastbound evening services on Crossrail have to run to a slightly irregular pattern with successive intervals of 14, 15, 15, 16 minutes, starting at 19:37.
- Other variations from the standard regular pattern for Crossrail:
06:21 Paddington westbound is 2 min later than standard
08:47 Paddington westbound is 2 min earlier than standard
18:34 Paddington westbound is 2 min later than standard
06:08, 16:08, 16:23 Hounslow eastbound are 1 min later than standard
- Changes to current Silverlink times:
19:41, 20:41, 21:41, 22:41 South Acton westbound to depart 1 min earlier
20:57, 21:57, 22:57 Acton Central westbound to depart 1 minute later (and similarly at South Acton)

A.3 An analysis of separation times shows that the vast majority are of 4 minutes or greater:

	>=4 mins	3 mins	2 mins
Conflicting movements:			
Acton Wells Junction	121	9	3
South Acton Junction	122	5	4
Old Kew Junction	124	12	0
Eastbound headways:			
NLL (South Acton)	120	11	0
Hounslow Loop	137	0	0
Westbound headways:			
NLL (South Acton)	123	4	6
Hounslow Loop	128	1	0
Total separations measured (=930)	875	42	13
	94%	5%	1%

In addition, although the SWT timetable does not show arrival times at Hounslow, it appears that trains on the Waterloo-Richmond-Hounslow-Brentford-Waterloo service have about 6 minutes recovery time scheduled at Hounslow. If so, they might arrive 3 minutes after the previous Crossrail departure, but with 9 minutes separation thereafter. The 3-minute interval on arrival at Hounslow has not been counted above, as it will not affect subsequent performance of either service.

A.4 In the timetables which follow, junction times are given in addition to station times. The new junction where the link from the GWML meets the NLL is regarded as part of Acton Wells Junction. South Acton Junction, at the western end of South Acton station, is where the NLL and Crossrail (current freight link) diverge. Old Kew Junction is where this link meets the Hounslow Loop, just east of Kew Bridge station. Where a train passes through one of these junctions in a conflicting movement, i.e. crossing a track used by trains in the opposite direction, the time is marked with a letter:

- | | |
|---|----------------------|
| x | Acton Wells Junction |
| y | South Acton Junction |
| z | Old Kew Junction |

Comparison of similarly lettered times on the westbound and eastbound timetables enable separation intervals to be checked. For example, the 08:07 Crossrail westbound departure from Hounslow passes through Acton Wells junction at 08:23, shown as 08x23 on the timetable. The eastbound timetable shows that the nearest conflicting movements by Silverlink trains at Acton Wells are at 08x19 and 08x34, giving separation of 4 and 11 minutes.

- | | | | |
|-----|------------------------|---|---------------------|
| A.5 | Morning Peak timetable |) | See following pages |
| | |) | |
| A.6 | Evening timetable |) | |

Note: A complete timetable for 06:00 to 23:00 is available as a separate document.

A.5 Morning Peak Timetable

EASTBOUND

For notes and key to abbreviations, see next page.

Operator	CR	SS	SW	CR	SS	SW	CR	SS	SW	CR	SS	SW	CR	SS	SW	CR	SS	SW	CR	SS	SW	CR	
Origin		Rich	Felt		Rich	Twic		Rich	Felt		Rich	Twic		Rich	Felt		Rich	Twic		Rich	Felt		
Hounslow	a.	.....	.....	07 16	.....	.....	07 25	.....	.....	07 46	.....	.....	07 55	.....	.....	08 16	.....	.....	08 25	.....	.....	08 46	.....
Hounslow	d.	07 07	.	07 16	07 22	.	07 31	07 37	.	07 46	07 52	.	08 01	08 07	.	08 16	08 22	.	08 31	08 37	.	08 46	08 52
Isleworth	d.	07 10	.....	07 19	07 25	.....	07 34	07 40	.....	07 49	07 55	.....	08 04	08 10	.....	08 19	08 25	.....	08 34	08 40	.....	08 49	08 55
Syon Lane	d.	07 12	.	07 21	07 27	.	07 36	07 42	.	07 51	07 57	.	08 06	08 12	.	08 21	08 27	.	08 36	08 42	.	08 51	08 57
Brentford	d.	07 15	.....	07 24	07 30	.....	07 39	07 45	.....	07 54	08 00	.....	08 09	08 15	.....	08 24	08 30	.....	08 39	08 45	.....	08 54	09 00
Old Kew Junction		07 16	.	07z25	07 31	.	07z40	07 46	.	07z55	08 01	.	08z10	08 16	.	08z25	08 31	.	08z40	08 46	.	08z55	09 01
South Acton Junction		07 17	07y22	.....	07 32	07y36	.....	07 47	07y53	.....	08 02	08y09	.....	08 17	08y21	.....	08 32	08y36	.....	08 47	08y51	.....	09 02
South Acton	d.	07 18	07 23	.	07 33	07 37	.	07 48	07 54	.	08 03	08 10	.	08 18	08 22	.	08 33	08 37	.	08 48	08 52	.	09 03
Acton Central	d.	07 20	07 25	.....	07 35	07 39	.....	07 50	07 56	.....	08 05	08 12	.....	08 20	08 24	.....	08 35	08 39	.....	08 50	08 54	.....	09 05
Acton Wells Junction		07x23	07 28	.	07x38	07 42	.	07x53	07 59	.	08x08	08 15	.	08x23	08 27	.	08x38	08 42	.	08x53	08 57	.	09x08
Waterloo	a.	.....	.....	07 58	.....	.....	08 11	.....	.....	08 28	.....	.....	08 43	.....	.....	08 58	.....	.....	09 13	.....	.....	09 28	.....
Paddington	a.	07 29	.		07 44	.		07 59	.		08 14	.		08 29	.	.	08 44	.	.	08 59	.	.	09 14
Destination		East	Strat		East	Strat		East	Strat		East	Strat		East	Strat		East	Strat		East	Strat		East

Notes

WESTBOUND

Operator	CR	SW	SS	CR	SS	CR	SW	SS	CR	SS	CR	SW	SS	CR	SW	SS	CR	SW	SS	CR	SS	SW	
Origin	East		Strat	East	Strat	East		Strat	East	Strat	East		Strat	East		Strat	East		Strat	East	Strat		
Paddington	d.	07 04	.....	.....	07 19	.....	07 34	.....	.....	07 49	.....	08 04	.....	.....	08 19	.....	.....	08 34	.....	.....	08 47	.....	.....
Waterloo	d.	.	06 52	.	.	.	07 22	.	.	.	.	07 52	.	.	08 10	.	.	08 22	.	.	.	08 40	
Acton Wells Junction		07 10	.....	07x19	07 25	07x34	07 40	.....	07x49	07 55	08x04	08 10	.....	08x19	08 25	.....	08x34	08 40	.....	08x49	08 53	08x56	.....
Acton Central	d.	07 13	.	07 22	07 28	07 37	07 43	.	07 52	07 58	08 07	08 13	.	08 22	08 28	.	08 37	08 43	.	08 52	08 56	08 59	.
South Acton	d.	07 15	.....	07 26	07 30	07 41	07 45	.....	07 56	08 00	08 11	08 15	.....	08 26	08 30	.....	08 41	08 45	.....	08 56	08 58	09 03	.....
South Acton Junction		07y15	.	07 26	07y30	07 41	07y45	.	07 56	08y00	08 11	08y15	.	08 26	08y30	.	08 41	08y45	.	08 56	08y58	09 03	.
Old Kew Junction		07z16	07 21	.....	07z31	.....	07z46	07 51	.....	08z01	.....	08z16	08 21	.....	08z31	08 36	.....	08z46	08 51	.....	08z59	.....	09 06
Brentford	d.	07 18	07 23	.	07 33	.	07 48	07 53	.	08 03	.	08 18	08 23	.	08 33	08 38	.	08 48	08 53	.	09 01	.	09 08
Syon Lane	d.	07 20	07 25	.....	07 35	.....	07 50	07 55	.....	08 05	.....	08 20	08 25	.....	08 35	08 40	.....	08 50	08 55	.....	09 03	.....	09 10
Isleworth	d.	07 22	07 27	.	07 37	.	07 52	07 57	.	08 07	.	08 22	08 27	.	08 37	08 42	.	08 52	08 57	.	09 05	.	09 12
Hounslow	a.	07 25	07 30	.....	07 40	.....	07 55	08 00	.....	08 10	.....	08 25	08 30	.....	08 40	08 45	.....	08 55	09 00	.....	09 08	.....	09 15
Hounslow	d.	.	07 33	.	.	.	.	08 03	.	.	.	.	08 33	.	.	08 48	.	.	09 03	.	.	.	09 18
Destination			Felt	Rich		Rich		Felt	Rich		Rich		Felt	Rich		Twic	Rich		Felt	Rich		Rich	Twic

Notes

[1]

A.6 Evening Timetable

EASTBOUND

Operator	CR	SS	SW	CR	SW	SS	CR	SW	CR	SS	SW	CR
Origin		Rich	Felt		Twic	Rich		Felt		Rich	Twic	
Hounslow	a. ....	.....	20 16	.....	20 25	.....	.....	20 46	.....	.....	20 55	.....
Hounslow	d. 20 06	.	20 16	20 21	20 31	.	20 37	20 46	20 51	.	21 01	21 06
Isleworth	d. 20 09	.....	20 19	20 24	20 34	.....	20 40	20 49	20 54	.....	21 04	21 09
Syon Lane	d. 20 11	.	20 21	20 26	20 36	.	20 42	20 51	20 56	.	21 06	21 11
Brentford	d. 20 14	.....	20 24	20 29	20 39	.....	20 45	20 54	20 59	.....	21 09	21 14
<i>Old Kew Junction</i>	20 15	.	20z25	20 30	20z40	.	20 46	20z55	21 00	.	21z10	21 15
<i>South Acton Junction</i>	20 16	20y24	.....	20 31	.....	20y44	20 47	.....	21 01	21y04	.....	21 16
South Acton	d. 20 17	20 25	.	20 32	.	20 45	20 48	.	21 02	21 05	.	21 17
Acton Central	d. 20 19	20 27	.....	20 34	.....	20 47	20 50	.....	21 04	21 07	.....	21 19
<i>Acton Wells Junction</i>	20x22	20 30	.	20x37	.	20 50	20x53	.	21x07	21 10	.	21x22
Waterloo	a. ....	.....	20 56	.....	21 11	.....	.....	21 26	.....	.....	21 41	.....
Paddington	a. 20 28	.	.	20 43	.	.	20 59	.	21 13	.	.	21 28
Destination	East	Strat		East		Strat	East		East	Strat		East

Notes

[2]

WESTBOUND

Operator	CR	SS	SW	CR	SW	SS	CR	SW	CR	SS	SW	CR
Origin	East	Strat		East		Strat	East		East	Strat		East
Paddington	d. 20 01	.....	.....	20 16	.....	.....	20 31	.....	20 46	.....	.....	21 01
Waterloo	d. .	.	19 52	.	20 07	.	.	20 22	.	.	20 37	.
<i>Acton Wells Junction</i>	20 07	20x14	.....	20 22	.....	20x34	20 37	.....	20 52	20x55	.....	21 07
Acton Central	d. 20 10	20 17	.	20 25	.	20 37	20 40	.	20 55	20 58	.	21 10
South Acton	d. 20 12	20 21	.....	20 27	.....	20 40	20 42	.....	20 57	21 02	.....	21 12
<i>South Acton Junction</i>	20y12	20 21	.	20y27	.	20 40	20y42	.	20y57	21 02	.	21y12
<i>Old Kew Junction</i>	20z13	.....	20 21	20z28	20 36	.....	20z43	20 51	20z58	.....	21 06	21z13
Brentford	d. 20 15	.	20 23	20 30	20 38	.	20 45	20 53	21 00	.	21 08	21 15
Syon Lane	d. 20 17	.....	20 25	20 32	20 40	.....	20 47	20 55	21 02	.....	21 10	21 17
Isleworth	d. 20 19	.	20 27	20 34	20 42	.	20 49	20 57	21 04	.	21 12	21 19
Hounslow	a. 20 22	.....	20 30	20 37	20 45	.....	20 52	21 00	21 07	.....	21 15	21 22
Hounslow	d. .	.	20 33	.	20 48	.	.	21 03	.	.	21 18	.
Destination		Rich	Felt		Twic	Rich		Felt		Rich	Twic	

Notes

[3]

[4]

Notes and abbreviations

a. arrival time
d. departure time
x,y,z see section A.4

Operators: CR Crossrail
SS Silverlink
SW South West Trains

Origins/Destinations:

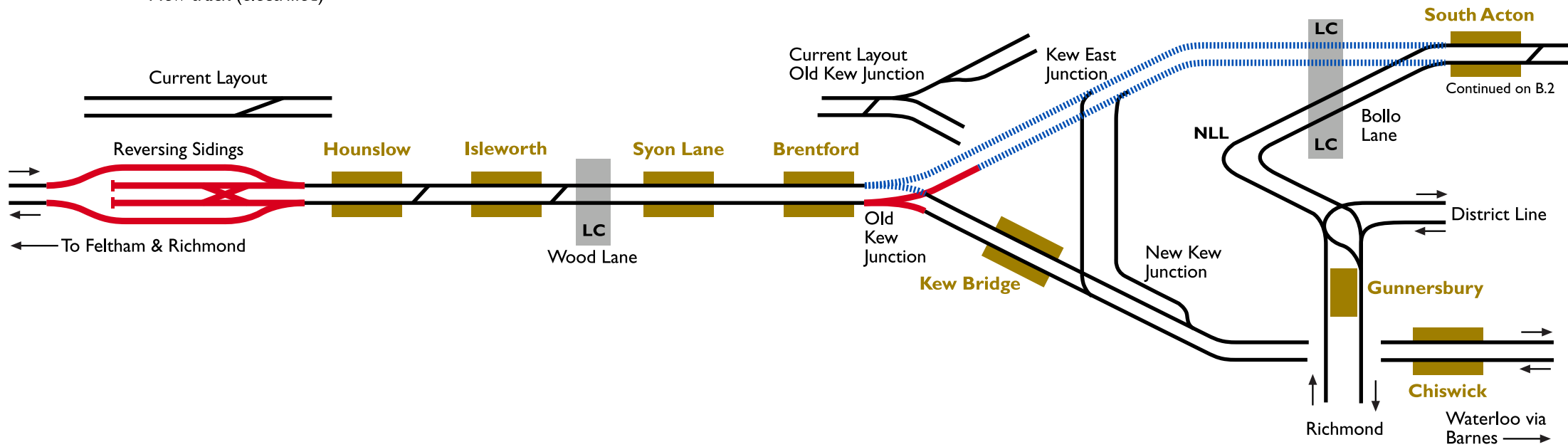
Felt Feltham/Weybridge
East Liverpool Street & East London
Rich Richmond via Gunnersbury
Strat Stratford/North Woolwich
Twic Twickenham/Waterloo

- [1] Additional train in Silverlink schedule causes Crossrail train to be 2 minutes earlier than normal service pattern. See section A.2 re 2-minute headway at South Acton.
- [2] Crossrail train 1 min later than regular pattern to improve NLL headway to 3 min (Network Rail minimum)
- [3] Recovery time at South Acton reduced from 2 min to 1 min to increase separation from following Crossrail train to 2 min. (See section A.2)
- [4] Silverlink train to run 1 min later than current timetable to achieve 2 min separation at Acton Wells junction and to increase NLL headway to 3 min (both are Network Rail minima).

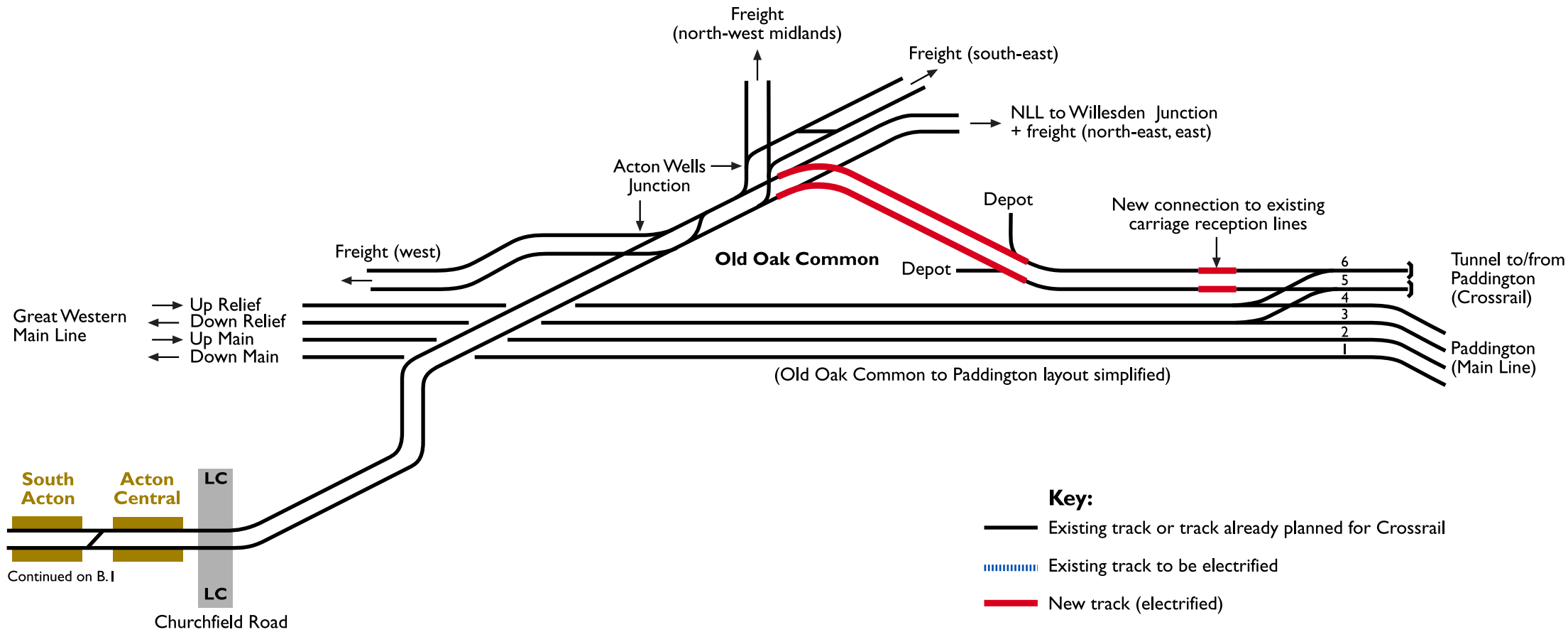
Appendix B.1 Route Diagram

Key:

- Existing track or track already planned for Crossrail
- ⋯ Existing track to be electrified
- New track (electrified)



Appendix B.2 Route Diagram



APPENDIX C – DEMAND AND REGENERATION

C.1 Introduction

This Appendix provides an outline of current and proposed developments along the Crossrail Corridor 7 route.

A number of large sites along the Corridor have been developed in recent years and there are several significant proposed developments that will provide additional demand for rail transport. In addition, there are several major sites where there is potential for further growth in the future.

C.2 Large sites developed/under construction since 2001

Significant developments completed or currently under construction include:

Chiswick

- Chiswick Business Park. This is a major development that has become a significant employment site in the borough (designated as a Key Employment Location), with significant further growth proposed. At 13 hectares, it is the largest commercial development in London since Canary Wharf. Outline planning permission was granted in 1991 for eleven buildings (136,000 sq m of floor space). The master plan for the site currently shows twelve buildings totalling about 180,000 sq m. To date six buildings have been constructed and the next two have been granted approval. The Park will accommodate approximately 8-10,000 employees when fully developed by the end of the decade. The Park is within 200 m of Gunnersbury Station (District Line Richmond Branch and Silverlink NLL) and is also served by Chiswick Park Station (District Line Ealing Branch) (800 m). However, as the “centre of gravity” of the Park shifts northwards as new buildings are completed, South Acton Station (Corridor 7) will be within 700 m for most employees.

Brentford

Recent years have seen major developments on the Great West Road and in Brentford Town Centre. Significant amongst these are:

- The GlaxoSmithKline headquarters (GSK House) at the A4 / Boston Manor Road junction was completed in 2002 and accommodates over 3000 staff. It is just 200 m from Brentford Station (Corridor 7), which was refurbished in 2002/3 utilising SRA funds and an s106 contribution from GSK.
- The Capital West site located on the northern side of the High Street's eastern end, comprises a high-rise housing development (232 units), and hotel (98 bedrooms) completed in 2003. This site is within 500m of Kew Bridge Station (South West Trains) and is approximately 1.4 km from Brentford Station.
- The Ferry Quays site on the south side of the High Street and to the west of the Capital West site, is currently being developed. The site will comprise 400 residential units, 146-bedroom hotel, as well as retail (594 sq m) and restaurant (1,978 sq m) floor space. This development is approximately 800 m from Brentford Station.

- Also under construction is a large mixed-use scheme on the former British Waterways site at Brentford Lock. The proposal includes 364 residential units, a 137-bedroom hotel, and retail/commercial floor space. This site is approximately 800 m from Brentford Station.

Isleworth

- Adjacent to West Middlesex Hospital is a large housing scheme currently under construction and comprising 149 residential units. This site is about 800 m from Syon Lane Station (Corridor 7).

C.3 Proposed developments

Several sites accessible from the proposed route have been granted permission or are subject to legal agreement.

Brentford

- Land south of the High Street in Brentford is proposed for redevelopment. The proposal (approved subject to legal agreement) includes 390 residential units, food store (3,934 sq m), cinema, retail units (4,708 sq m), restaurants, leisure facilities (884 sq m), and offices (2,034 sq m). This extensive site is about 600 m from Brentford Station.
- The Paragon Site, located on the northern side of the junction between the A4 and Boston Manor Road, has outline planning permission for educational facilities (12,049 sq m) for Thames Valley University, retail units (A1/A3 304 sq m), as well as student accommodation (849 study rooms in “clusters”) and key worker housing (221 units). It is 300 m from Brentford Station.

Hounslow

- Key Site One within Hounslow Town Centre is a mixed-use scheme with planning permission granted in 2002 for 484 residential units, hotel, food store (6,435 sq. m), retail units with a total floor space of 13,365 sq m, cinema, health and fitness centre, office floor space (28,956 sq m), as well as commercial floor space, restaurants, and car parking. Construction is expected to commence in early 2005. Key Site One is close to Hounslow Central underground Station (Piccadilly Line) but is also just over 1 km from Hounslow Station (Corridor 7), with a direct bus link.

C.4 Potential future development and regeneration

The Council has recognised the need for and potential to achieve comprehensive regeneration in Brentford and central Hounslow.

- To this end, the Council and West London Business have developed *The Brentford Regeneration Framework*, a strategic framework for delivery of future regeneration projects in Brentford. This is proposed to continue on from regeneration work started under the Single Regeneration Budget Programme, which contributed to supporting existing businesses, creating new jobs, improving housing estates and the environment, reducing crime and providing a greater range of social and leisure facilities.

- Within the Brentford area, there are also a number of sites where there is development pressure. Several large sites adjacent to the Great West Road have permission for large-scale employment development. However, the value of residential development has increased dramatically and as a consequence there has been increasing developer interest for change of use of employment sites and premises to residential and mixed-use schemes. For example, two recently made planning applications on Commerce Road (off London Road) and the Wallis House site (Great West Road at Ealing Road) could result in an additional 2000 residential units and social and commercial facilities. Both these sites are within 1 km of Brentford Station, with direct bus links either existing or possible.
- A planning brief has been prepared for the Lionel Road Goods Yard (E7) adjacent to the proposed route, stating that the site should be developed comprehensively and primarily for industrial purposes. There has also been interest in the site for a new stadium for Brentford Football Club. There is space here for a potential new station, as mentioned in the main report.

C.5 Regenerating the Golden Mile

The “Golden Mile” (A4 Great West Road from Gillette Corner to Chiswick Roundabout) is a thriving employment area and recognised as such in the Draft London Plan. However, while new prestigious developments have taken place over recent years (most notably GSK) and while other sites have planning permission or are the subject of recent planning applications (as noted above), there is still concern with regard to vacant employment sites. Vacant sites and empty buildings invariably have a negative impact, both environmentally and economically, with the risk of the area losing its attractiveness as a business cluster location.

Crossrail Corridor 7, as proposed in this report, would double the frequency of train services between the Hounslow Loop and central London, providing direct links to a huge range of destinations including the central city and the east. This step change in the level and attractiveness of public transport would contribute materially to the current drive to regenerate the Golden Mile. The proposed 15-minute frequency Crossrail service would provide sufficient capacity to support significant new employment facilities, while a new station at Lionel Road would bring Crossrail closer to the eastern end of the Golden Mile and to surrounding residential areas.

C.6 Summary

With a number of large sites under development or proposed for development, there is significant growth projected along or close to the Crossrail 7 corridor. The increase in residential units built or proposed as well as the potential development of employment sites provides the potential for a large catchment of users of Crossrail.