

8. Construction and operational requirements

8.1 Construction requirements

General requirements for construction of the proposed SWRL are outlined in the *South West Rail Link Project Review Report – Constructability and Programme Review*, prepared by Tenix (2006) and the *South West Rail Link Project Review Report – Engineering and Infrastructure Technical Report*, prepared by Connell Wagner (2006b). Key requirements are summarised in this Section.

The construction methods, activities and program are preliminary only and subject to change as the design and construction method are further developed. At this stage, it is not anticipated that any blasting would be required as part of construction of the project.

8.1.1 General construction approach

The construction of the SWRL would comprise the following main construction phases:

- a preparatory phase to isolate the construction zones or relocate or protect existing services or utilities
- a phase of major civil construction, when earthworks, culverts and bridges would be constructed in four main sections:
 - › Section 1: Glenfield Junction works (Chainages 40.10 to 42.40 kilometres)
 - › Section 2: Main alignment works (Chainages 42.45 to 52.78 kilometres)
 - › Section 3: Train stabling facility works (Chainages 52.78 to 53.28 kilometres)
 - › Section 4: Station works (Glenfield, Edmondson Park and Leppington), within the Chainage sections for Glenfield Junction and the main alignment
- a final phase of testing and commissioning and handover of the SWRL.

As described in Chapter 7, the SWRL project is proposed to be split into two overarching stages – Stage A and Stage B. Stage A is made up of part of the early at Glenfield Junction (Section 1), as described below. The Glenfield Station works in Section 1 and the remaining Sections 2 to 4 comprise Stage B of the project.

Glenfield Junction works

The most complicated construction works for the SWRL would be associated with the ‘tie-in’ of the new SWRL lines at Glenfield with the existing rail configuration, and the upgrading works at Glenfield Station. The works in this area would have extensive interfaces with the operating railway and, as such, careful staging of the construction would be required. As the works in this area would have multiple interfaces with the proposed Southern Sydney Freight Line, Glenfield Station and the East Hills and Main South Lines, approximately 20 short-term (weekend) possessions (rail track closedowns) would be required to complete the works.

The Glenfield Junction works would comprise the following construction stages:

- Stage 1 – Initial layout 2008
- Stage 2 – Possession work at Glenfield North Junction, Glenfield Station and rail corridor, and Glenfield South Junction

- Stage 3 – Non-possession work at Glenfield North Junction
- Stage 4- Possession work at Glenfield North Junction, Glenfield Station and rail corridor, and Glenfield South Junction
- Stage 5 – Non-possession work at Glenfield North Junction, Glenfield Station and rail corridor, and Glenfield South Junction
- Stage 6 – Possession work at Glenfield Station and rail corridor, and Glenfield South Junction
- Stage 7 – Non-possession work at Glenfield Station and rail corridor, and Glenfield South Junction
- Stage 8 – Possession work at Glenfield North Junction, Glenfield Station and rail corridor, and Glenfield South Junction
- Stage 9 – Non-possession work at Glenfield South Junction
- Stage 10 – Non-possession work (general, for commissioning and handover).

Construction Stages 1 to 4 at Glenfield comprise Stage A of the SWRL project and are illustrated in Figures 8-1a to d. Stages 1 to 4 would include construction of:

- safety fences, services investigations and relocations
- Glenfield North Junction flyover works: piling, pile caps, substructure and precast superstructure
- Glenfield South Junction flyover works: piles, pile caps and substructure
- track and crossover works
- earthworks and drainage for the future SSFL track.

The Stage A works would take 24 months to complete and approximately 10 possessions to construct.

The remaining stages would be constructed as part of Stage B of the project. The final Glenfield Junction configuration would be as shown in Figure 7-2b.

The extensive improvement works to Glenfield Junction and Station would require widening of the current railway corridor towards Railway Parade to accommodate the new down platform and track. This corridor extension would require diversion of the existing overhead power transmission lines in this area, and reconfiguration of the existing car parking facilities on Railway Parade and pedestrian accessways to and from Railway Parade (see Chapter 7).

The rail system works at Glenfield Junction would involve removal of existing tracks and turnouts, and modification works to the existing overhead wiring structures during track possessions. New track, overhead wiring and signalling works would also be required. The existing footbridge linking Platforms 1 and 2 and 3 at Glenfield Station could be demolished after the commissioning of the new concourse structure. The new northern flyover, which would carry the Up East Hills Line over the Main South Lines, could be constructed using precast beam-supported viaducts, with a wide concrete deck over the Main South Lines. This would enable more work to be done outside track possessions, with only the critical works during the limited possession times. A similar approach could be applied to construction of the southern flyovers to carry the SWRL over the Main South Lines.

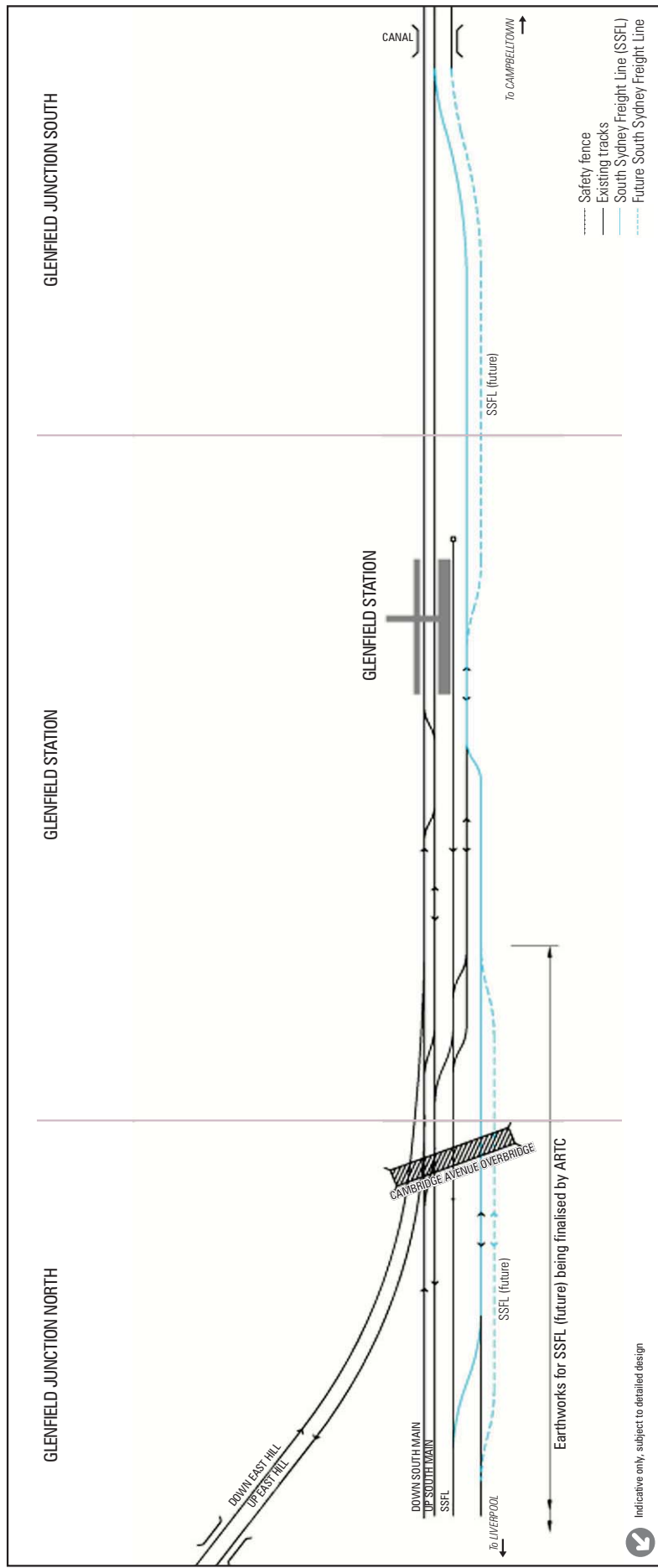
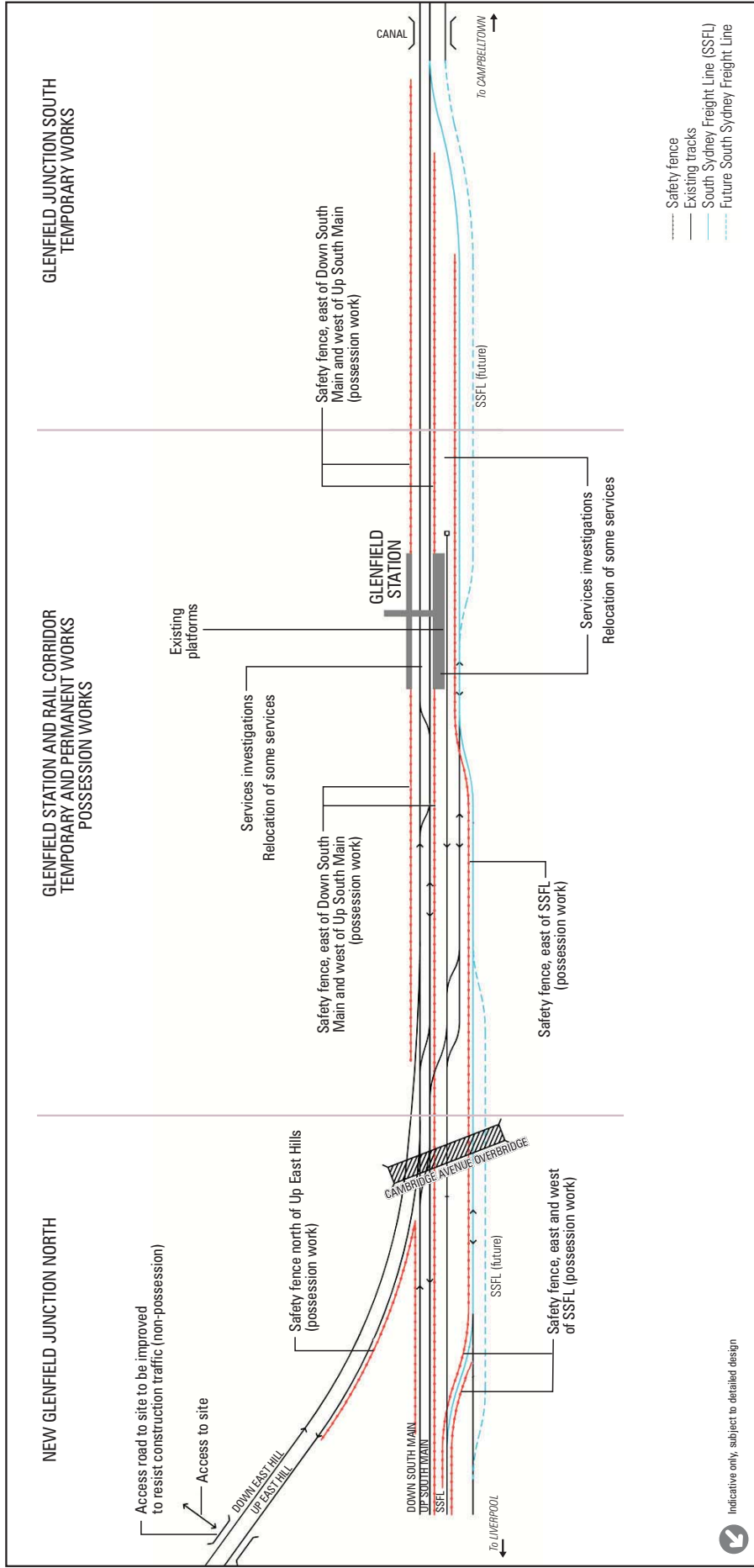


Figure 8.1a Glenfield Junction early works (Stage 1)
(2008 initial layout)

Source: Tenix (2006)



Source: Tetix (2006)

Figure 8-1b Glenfield Junction early works (Stage 2)

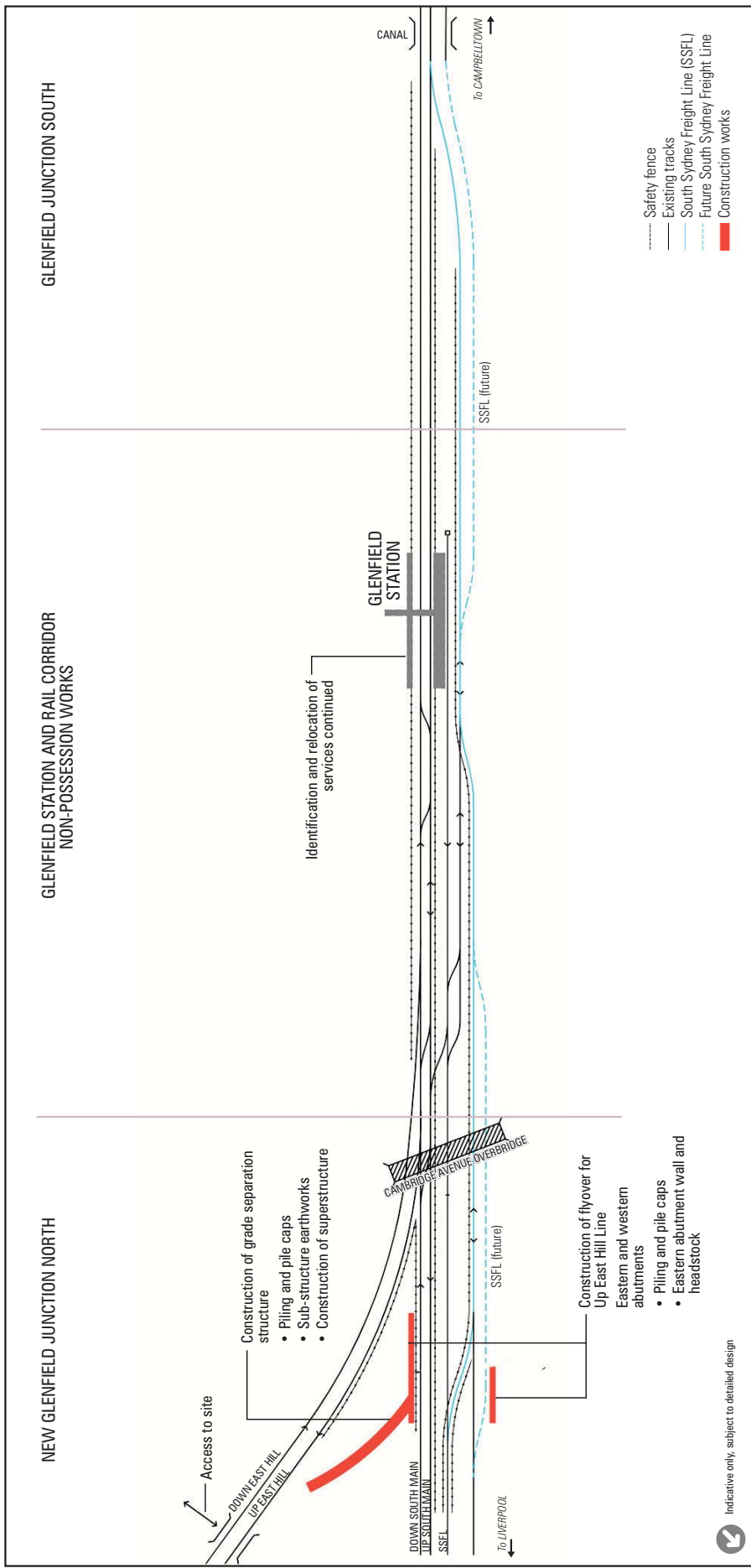
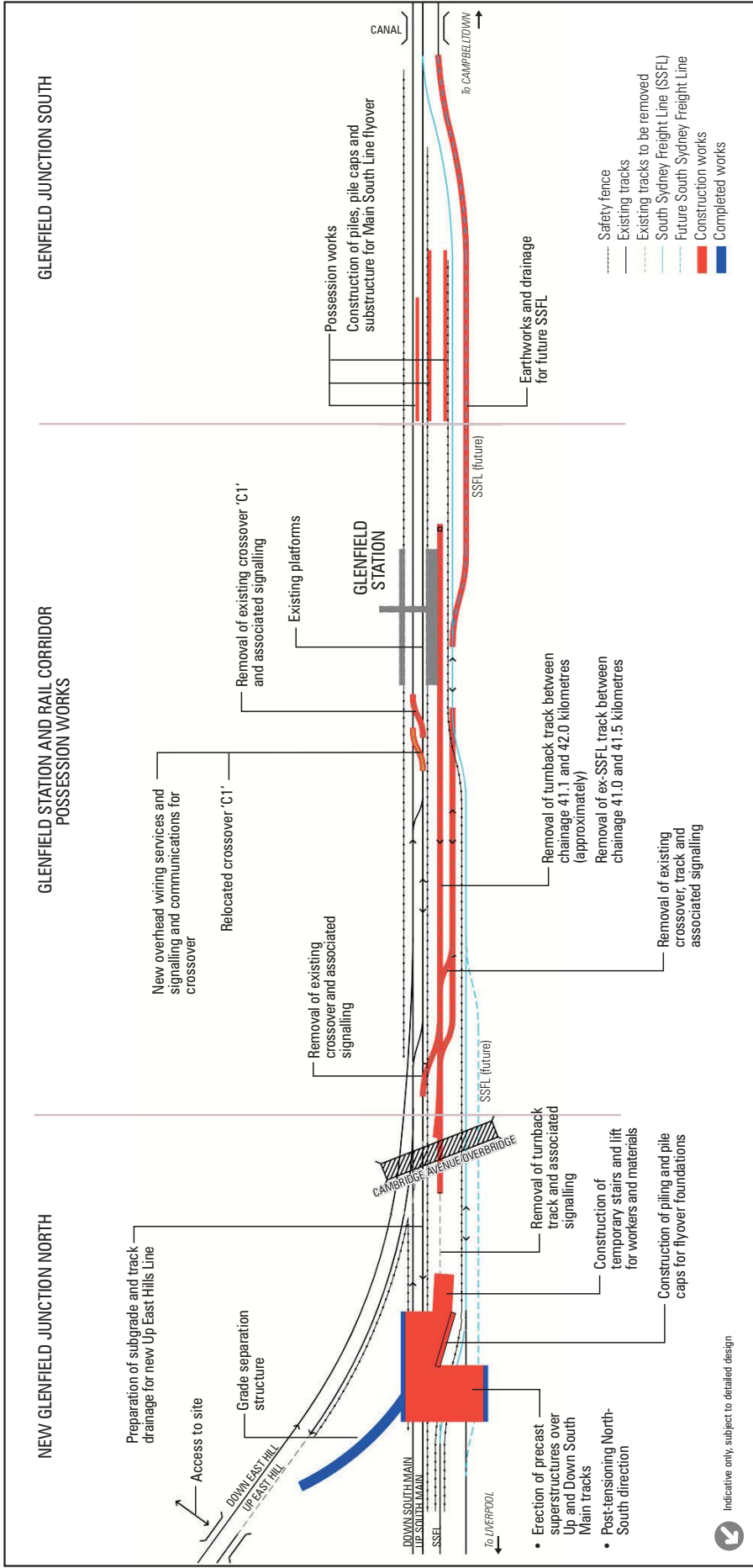


Figure 8-1c Glenfield Junction early works (Stage 3)

Source: Tenix (2006)

Indicative only, subject to detailed design



Source: Tenix (2006)

Figure 8-1d Glenfield Junction early works (Stage 4)

At Glenfield North Junction, the proposed approach ramp and main flyover structure could be constructed 'off-line', and separate from the railway operations; although weekend possessions would be required to erect the precast concrete bridge deck elements.

Access for construction of the main structure would require a level crossing and an underpass across the Southern Sydney Freight Line tracks, to provide for construction and maintenance access. An underpass would be the preferred option, as once the flyover is constructed, both of the Freight Line tracks would be on the western side of the flyover, and one of the tracks could have a long freight train parked on it, which would obstruct construction access. At the Glenfield South Junction, a level crossing of the new southern Sydney Freight Line track would be required to permit access for construction plant (Connell Wagner 2006b).

Main SWRL alignment

The main SWRL alignment works comprise part of the Stage B SWRL works.

The main SWRL alignment works from Chainage 42.45 kilometres to the train stabling facility would be typical of most road/railway greenfield construction works. The most significant structure would be the cut-and-cover tunnel required where the SWRL would cross under the Hume Highway. A 180 metre long roofed dive structure, with an overall length of 580 metres, would be required. The Hume Highway crossing would have the most significant interface with an operating transport environment, which would require careful planning and co-ordination. The Hume Highway could be temporarily diverted onto side tracks to be constructed in the median (one direction at a time) to facilitate construction of the roofed section of the dive structure. Following construction of the first bridge, traffic would be diverted onto the new bridge to allow for construction of the second bridge. Due to the width of the Hume Highway corridor, there would be sufficient room to achieve the necessary road diversions in a small number of stages without reducing road capacity or stopping road traffic. The Highway would be reinstated back to its original condition after completion of this work.

Road underbridges would be required where the railway crosses roads on embankments. Overbridges would be required where the railway crosses roads in cuttings. A flyover road bridge would be required at Eastwood Road, as the SWRL and Eastwood Road would be almost at the same level.

The Campbelltown Road and Camden Valley Way overbridges would be constructed at different times to minimise the risk of unforeseen closure of both roads during the same time period (see Chapter 11). In the event of road closure, a diversion route for traffic between the two roads would be provided. Due to the strategic importance of these roads, ideally, a construction methodology would be developed that would not require road closure. The bridge structures could be constructed in two parts, with traffic diversions put in place to ensure that a reasonable speed limit (say 40 kilometres/hour) is achieved throughout the construction period. Alternatively, consideration may be given to the use of traffic lights and traffic flow in one direction at a time on weekends. The construction methodology and the required temporary alterations to traffic flow would be determined as part of design development in the next stage of the project.

Other road bridge constructions are discussed in Chapter 11.

8.1.2 Construction sites

Figure 8-2 details indicative locations for the proposed construction work sites and temporary access arrangements. As well as work sites for the stations, the train stabling facility, bridges and the dive structure at the Hume Highway, the extensive works proposed at Glenfield Junction would require several more work sites and temporary access. The establishment and use of construction work sites, including the establishment of access tracks, at Glenfield (excluding the one along Railway Parade, which is required for the Station works) and the James Meehan Estate are required to construct Stage A of the SWRL project. These, as well as the remaining work sites are required to construct Stage B.

8.1.3 Earthworks and truck movements

The estimated earthworks quantities for the SWRL construction are as follows:

- Stage A:
 - Section 1 - Glenfield Junction works: The southern flyover would require the removal of approximately 600 cubic metres of earthworks over approximately 80 working days. The northern flyover would require the removal approximately 300 cubic metres of earthworks over approximately 40 working days.
- Stage B:
 - Section 1 - The Glenfield Station works would require the excavation and removal of approximately 8,800 cubic metres of topsoil over approximately 50 working days.
 - Section 2 - Main alignment works: Approximately 153,000 cubic metres of earthworks, comprising approximately 113,000 cubic metres of topsoil and 40,000 cubic metres of cut, would be removed from site. This would be made up of the following:
 - Approximately 108,000 cubic metres of material would be removed from the section between Chainages 42.50 and 42.60 kilometres (approximately 290 working days).
 - Approximately 600 cubic metres of material from the Edmondson Park Station works would be removed (approximately 240 working days).
 - Approximately 68,000 cubic metres of earthworks would be required between Chainages 46.50 and 52.78 kilometres (approximately 600 working days).
 - Approximately 800 cubic metres of material associated with construction of Leppington Station would be removed (approximately 240 working days).
 - Section 3 – Train stabling facility: Approximately 41,000 cubic metres of earthworks would be required for the stabling facility, comprising approximately 20,000 cubic metres of fill and 21,000 cubic metres of cut (approximately working 40 days).

Transportation of earthworks to or from the work sites would be undertaken by a mix of 26 tonne trucks and 15 tonne trucks. The estimated haulage vehicle movements to carry these earthworks to and from the construction work sites are detailed in Chapter 11.

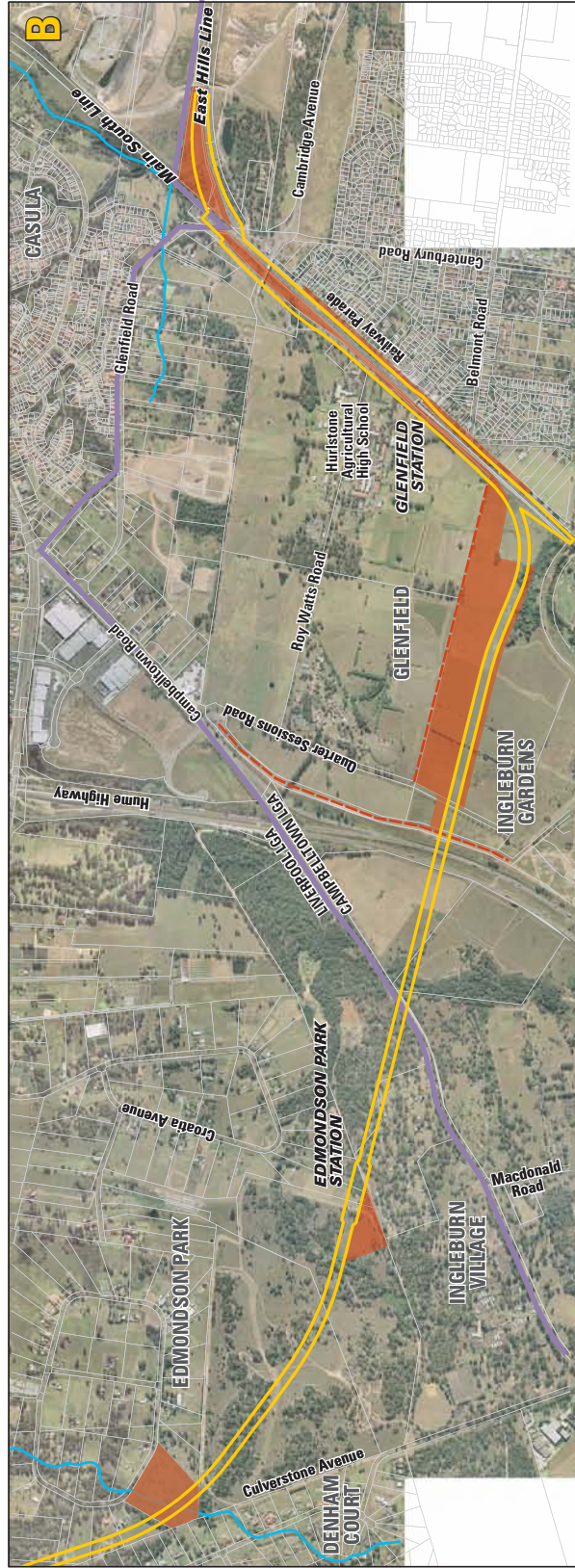
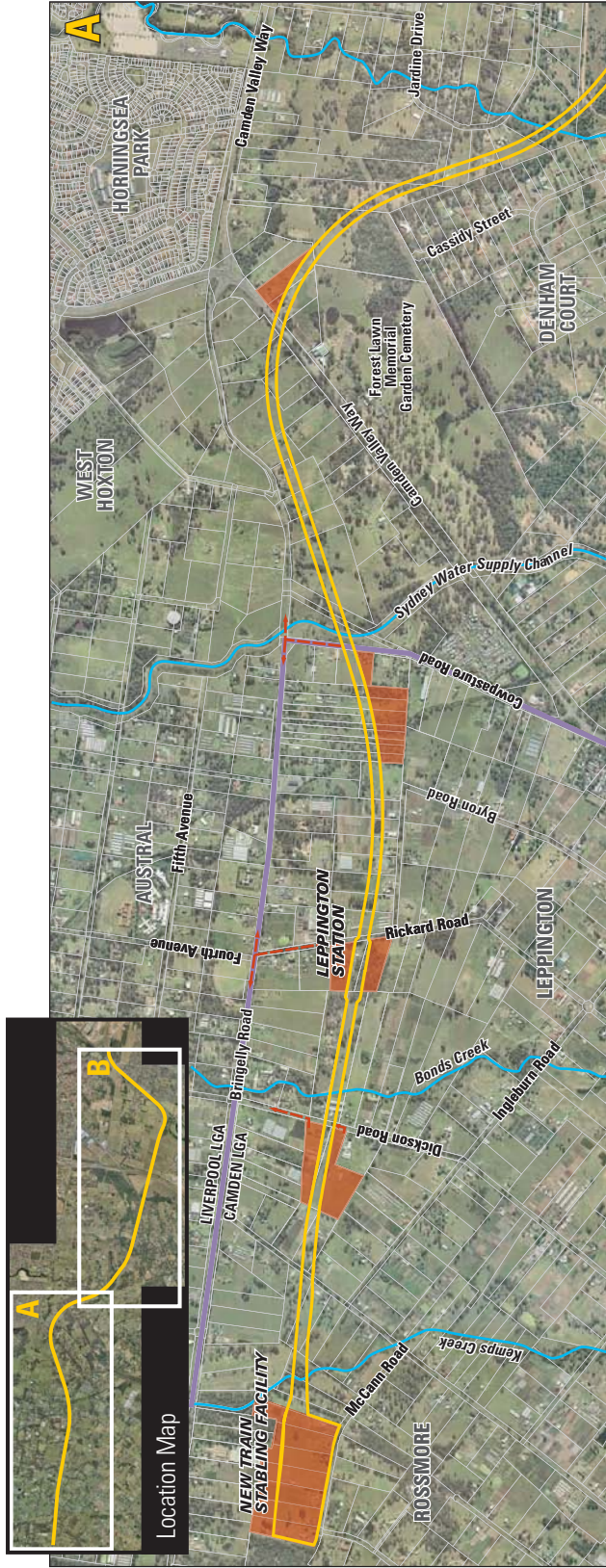

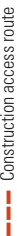

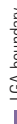


Figure 8-2 Indicative construction worksite locations

 Construction site
 Construction access route
 Proposed SWRL corridor
 LGA boundary

0 10
Kilometres

Source: Based on Tenix 2006

8.1.4 Heavy vehicle haulage routes and work site access

Coupled with a number of local roadways, the regional road network (including Campbelltown Road, Glenfield Road, Camden Valley Way, Bringelly Road and Cowpasture Road) would provide access for haulage vehicles to worksites along the SWRL alignment. These regional roads connect to the Hume Freeway (F5), Westlink M7 and the Hume Highway, which would provide access to the rest of the metropolitan area.

Potential haulage routes for use by heavy vehicles travelling to and from the worksites are detailed in Figure 8-3.

Access to the eastern side of Glenfield Junction (Section 1) would be from Railway Parade, which would connect to Cambridge Avenue/Glenfield Road in the north. On the western side of the Station, an access road would provide a link to Cambridge Avenue/Glenfield Road in the north and the rail corridor would be used to access Campbelltown Road in the west.

From Chainages 42.40 to 46.50 kilometres, two major worksites are proposed either side of the Hume Highway. Both sites would be accessed by local roads linking to Campbelltown Road, which would carry all the haulage trips to and from these two worksites. This section would also incorporate a further worksite for the Edmondson Park Station works (Section 4) and its associated haulage activity.

From Chainages 46.50 to 52.78 kilometres there are four major worksites proposed. These four sites would be linked via local streets to Bringelly Road and/or Camden Valley Way, which would carry haulage trips. This section would also incorporate a further worksite for the Leppington Station works (Section 4) and its associated haulage activity.

The stabling facility section (Section 3) would be accessed by McCann Street, which links to Bringelly Road. Bringelly Road would carry all haulage traffic in an east–west direction, linking to other major roads to the east.

Another haulage road would be provided along the SWRL corridor early in the construction phase in order to reduce the need for heavy vehicles and construction plant to travel on local roads.

Further details on haulage routes are provided in Section 7.1.4 of Technical Paper 1.

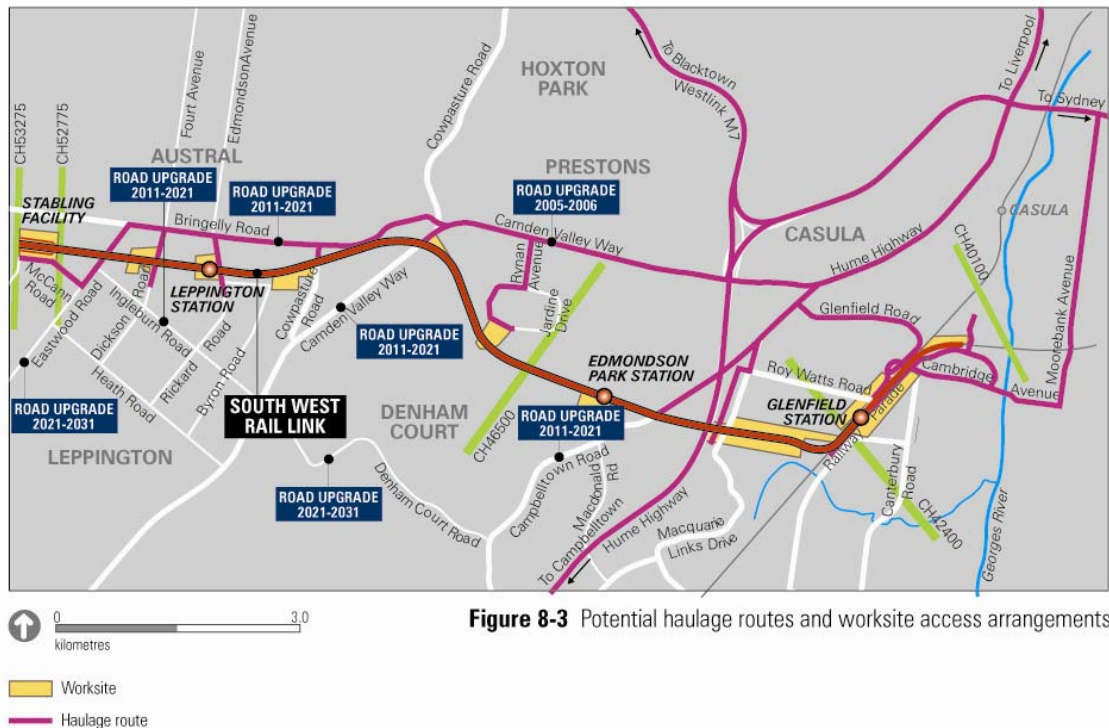
8.1.5 Preliminary program and work hours

Preliminary program

The Stage A early works at Glenfield would take approximately 24 months and 10 possessions to construct. The construction duration of the full project (Stages A and B, including commissioning) is estimated at approximately 41.5 months (close to 3.5 years).

The Glenfield Junction works are the critical determinant for the project duration, as these works would require approximately 20 track possessions (ten during Stage A and ten during Stage B). Opportunities to shorten the program length would need to focus on ways to amend the configuration design to reduce the need for possessions.

The bulk of the SWRL would be new work and would not need to be staged, apart from construction sequencing where the SWRL would cross the existing road network (see Hume Highway works above). However, the works to tie the SWRL into the existing rail system at Glenfield would be complicated, requiring detailed staging.



Possessions

The approximately 20 short-term weekend rail track possessions (ten possessions in Stage A and ten in Stage B) required to construct the works at Glenfield Junction would each last two days and would shut down the whole Junction, allowing work to be carried out on both the Main South and the East Hill Lines simultaneously. Possessions are based on RailCorp’s planned configuration and possession calendar. At this stage, no additional possessions have been identified beyond those within RailCorp’s existing possessions calendar.

Working hours

Other than the works within the existing rail corridor at Glenfield Junction and some works at road crossings, the SWRL would be generally be constructed during standard working hours of 7am to 6pm Monday to Friday and 8am to 1pm on Saturdays. However, construction within the rail corridor during possessions and construction of road crossings outside of peak periods may necessitate works outside of these hours. Should this be required, advance notification of affected residents and businesses would be undertaken and all works would be carried out in accordance with licence arrangements.

During weekend track possessions, works at Glenfield would be undertaken out of standard construction hours. Each possession would last from midnight on Friday to midnight on Sunday, meaning that rail track possession works would occur over approximately 60 nights.

8.2 Operational requirements

8.2.1 Rail operations plan

Initially, at commencement of the SWRL operations, it is anticipated that four trains per hour would depart from Leppington for the Sydney CBD via the East Hills Line. In addition to the Sydney CBD services via the East Hills Line, four train services per hour would be provided from Leppington to the city via Liverpool and Granville. These trains are intended to act as feeder trains, relieving congestion on the existing network as the population in the area grows. The SWRL would provide congestion relief on the existing East Hills Line (i.e. it would increase the capacity on the Line from the south-west by allowing additional services to operate to the City from Leppington). Services from Leppington to the Sydney CBD via the East Hills Line would increase as demand increases.

The travel time from Leppington to Glenfield would be approximately 8 minutes, with a further 50 minutes (approximately) from Glenfield into the Sydney CBD via Revesby (Connell Wagner 2006c).

The integration of the SWRL services with the existing and planned CityRail network is shown in Figure 8-4.

Whilst the SWRL is proposed to be delivered relatively early in the development of the South West Growth Centre, it would occur at a time when the existing eight trains per hour to the City during the AM peak period would be under extreme loading pressure out of Glenfield and Holsworthy. It is anticipated that 10 trains per hour would be required from Macarthur/Campbelltown during the peak hour in 2011 following completion of the planned East Hills Line quadruplication between Kingsgrove and Revesby.

The SWRL would provide congestion relief on the existing East Hills Line. That is, the SWRL would increase the capacity on the Line from the south-west, by allowing additional services to operate to the City from Leppington. The Campbelltown Line can currently cope with 12 trains per hour in the Up direction in the peak, comprising eight trains to the City and four trains via Liverpool.

Services originating from Campbelltown/Macarthur would stop all stations to Glenfield and then Revesby, Sydenham and Redfern (unless via Airport), and Central. These services would continue in the future through the proposed CBD Rail Link to Chatswood and Epping. Services originating at Leppington would stop all stations to Revesby via Glenfield, then Sydenham and Redfern (unless via Airport), and Central. These services would continue through the new CBD Rail Link to Chatswood and Epping.

South of Glenfield, it is proposed that express services to the City via East Hills would interact with Cumberland Line services. On this route, up to four Cumberland Line trains would operate per hour from Campbelltown to Blacktown via Parramatta. Services from Leppington to the City via East Hills would interact with South via Granville services between Leppington and Glenfield.

The base case provides for the SWRL in 2012 as an addition to the existing Macarthur to City services, using additional 900-seat, double-deck electric trains with a comfortable standing load of 300 people. In 2017, SWRL services would be combined with existing Macarthur to City and Hornsby–Epping–Chatswood to City services to form the new operating sector.

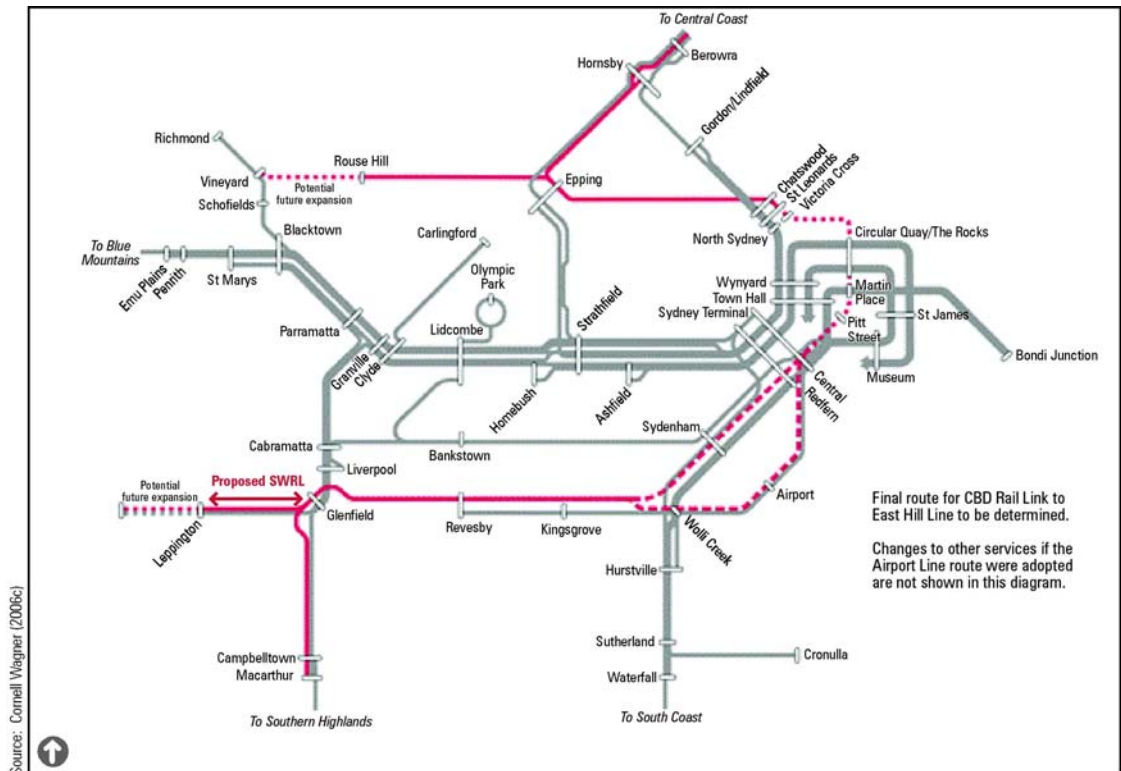


Figure 8-4 Location of SWRL on the future CityRail rail network

- Existing network
- Planned network
- Potential future route

It is estimated that the SWRL would require approximately 12 to 13 trains in service, comprising 10 to 11 trains to operate additional services from Leppington via the East Hills Line, and two trains to extend Main South Line services from Glenfield to Leppington. These 12 to 13 trains would be likely to include two trains that would be redeployed from Macarthur/Campbelltown services to SWRL services (Connell Wagner 2006c).

8.2.2 Train speeds

Trains are likely to travel at between 80 and 125 kilometres per hour between stations on the SWRL.

8.2.3 Station operations

The two island platforms at the new Leppington Station are designed to manage two sets of quarter hourly terminating services from the CBD via Revesby and the CBD via Granville. Two platforms would be devoted to each service.

8.2.4 Pedestrian movements and mode of access

Pedestrian movements and mode of access requirements at each of the Stations are described in Chapter 11. Safety and security measures would be implemented to ensure the safety of station passengers, including fencing of the corridor, closed circuit television surveillance, etc.

8.2.5 Stabling facility operations

It is anticipated that by 2012, a total of 12 trains would need to be stabled at Leppington, with up to 16 trains stabled by 2031. Future demand is likely to increase this to a total of 20 trains in the longer term. The facility may be used by 10 car sets in the long term.

The facility would provide for the following functions:

- internal train cleaning of all trains overnight (This would be a manual cleaning process using buckets, mops and hand cleaning techniques with small quantities of water and chemicals.)
- bottom preparation inspections of trains performed by train crew (includes visual and safety checks of pipes, brakes, etc.)
- train wash facility
- test procedures (brake/horn tests)
- minor maintenance performed by mobile maintenance teams
- external cleaning of graffiti as required (by coating the affected area with a chemical agent and washing it off with water).

Wastewater from internal cleaning operations would be disposed of via sinks connected to a piped wastewater system. Other rubbish from inside the trains would be collected in bins and disposed of off-site.

The facility would be open 24 hours a day.

8.2.6 Pedestrian and cyclist access

Good pedestrian and cycle linkages would be provided to all three stations on the SWRL, in accordance with a Level of Service 'C' as defined in *Pedestrian Planning and Design* (Fruin 1987), which is the standard adopted by RailCorp. The details of these linkages would be confirmed as the station concepts are developed in more detail and integrated with the precinct planning around the Edmondson Park and Leppington Stations.

Bicycle facilities would be provided at all three stations on the SWRL. Details of this would be confirmed during the future design work for the stations.

All three stations on the SWRL would incorporate pedestrian access across the SWRL corridor. Easy access would be provided in accordance with the Commonwealth Government's *Disability Standards for Accessible Public Transport Guidelines 2004* (No.2).

Chapter 11 and Technical Paper 1 assess opportunities for pedestrian and cycle access along and across the SWRL corridor.

8.2.7 Maintenance

The SWRL would be maintained by RailCorp in accordance with its existing operational and maintenance procedures. Periodic maintenance would be required for the track, trains and station facilities and associated equipment, and would involve both road and rail vehicles.

The SWRL would be designed to ensure that RailCorp maintenance requirements can be accommodated (e.g. width of corridor, access gates, and opportunities for high rail access). Maintenance access would be required at Glenfield North Junction and at other locations along the corridor, the locations of which are yet to be determined.



PART D ENVIRONMENTAL ASSESSMENT

