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Transport Infrastructure Development Corporation

North West Rail Link Environmental Assessment

Construction Site Management

October 2006

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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1. Introduction

This report has been prepared as part of the environmental assessment of the proposed North West Rail Link (the proposal). The Transport Infrastructure Development Corporation is the proponent of the proposal, and the environmental assessment is being prepared by GHD, in accordance with the requirements of Part 3A of the *Environmental Planning and Assessment Act 1979*.

This report assesses the impacts of the construction sites. It focuses on the types of activities likely at each site and the potential impacts of these activities. Likely management options are also identified and assessed. It has been prepared to meet the Department of Planning Director General's Requirements for the environmental assessment.

The construction methodologies and the resultant construction sites assessed in this report are those identified in the Parsons Brinkerhoff (2006) *Engineering and Infrastructure Technical Report* and the Evans& Peck *(2006) Constructability and Programme Review*. While it is possible that elements of the construction plan may vary as a result of detailed project design and construction planning, the general construction site strategies and principles outlined in this report can still be applied.

1.1 Project Outline

The proposed North West Rail Link would be the principal trunk public transport line in Sydney's North West. It would connect with the Northern Line between Beecroft and Cheltenham Stations and terminate at Rouse Hill Town Centre. The rail link would be twin track, approximately 23 kilometres in length and would include:

- A 2.5 km surface quadruplication of the Northern Line between north of Epping Station and Beecroft Station (including works at Cheltenham Station);
- A 16 km section in tunnel from the Northern Line to north of Norwest Business Park, including four underground stations (Franklin Road Station, Castle Hill Station, Hills Centre Station and Norwest Station);
- A 4 km surface section from north of Norwest Business Park to Rouse Hill, including two underground stations (Burns Road Station and Rouse Hill Station)
- An interim train stabling facility at Rouse Hill;
- Ancillary tunnel support facilities such as tunnel ventilation, transformers and a water treatment plant(s); and
- Construction work sites, including a large site within the Balmoral Road Release Area.

The location of the proposal is shown in Figure 1-1.

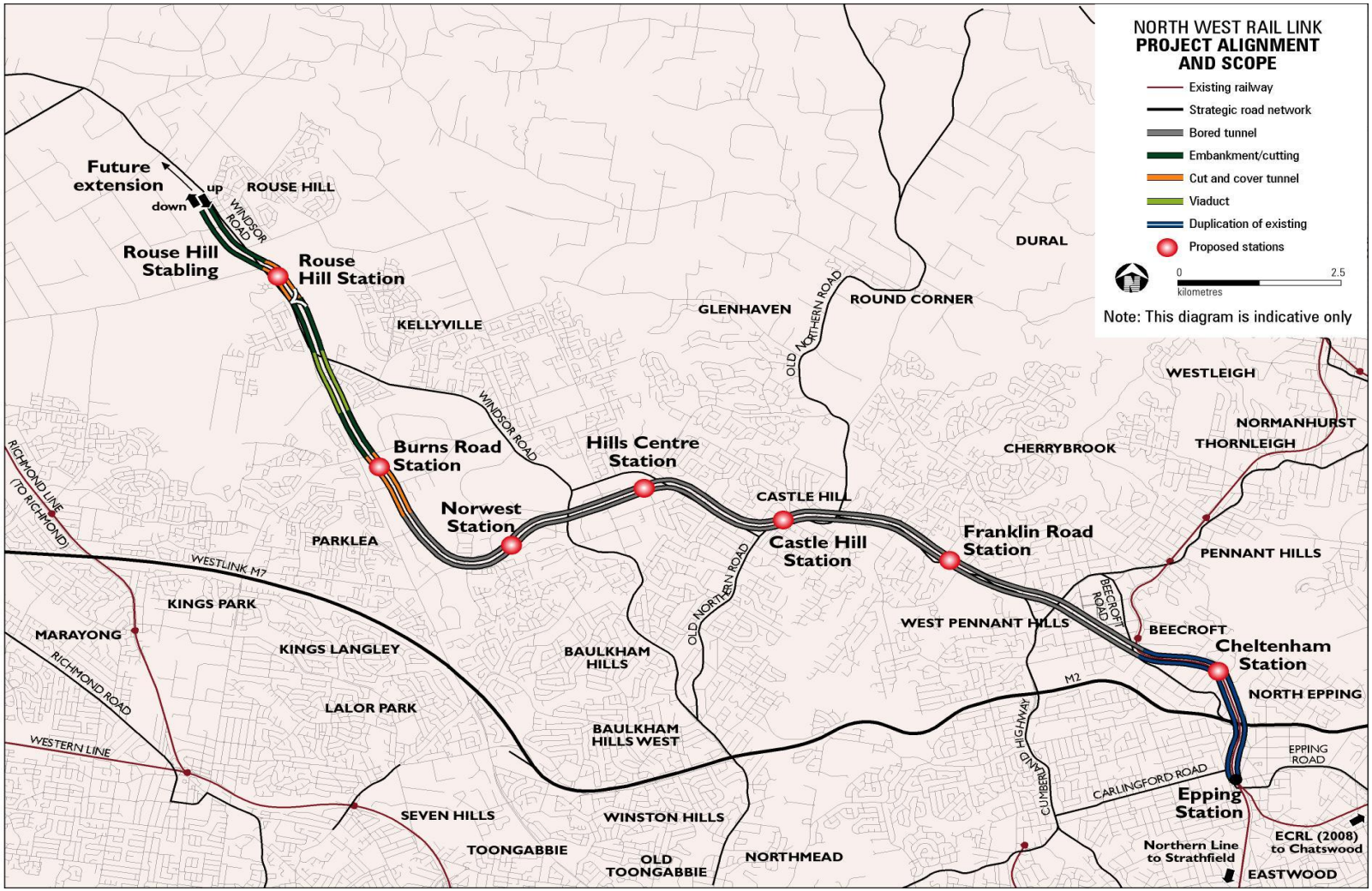


Figure 1 1 NWRL Reference Scheme

1.2 Assumptions for this Assessment

The methods of construction and hence the location, size and facilities at each site are based on information provided in the Parsons Brinkerhoff[1] and Evans & Peck[2] reports in the North West Rail Link Project Review Report and supported by information in the Arup[3] *2004 Engineering Design Study*.

[1] Parsons Brinkerhoff (May 2006) *North West Rail Link Project Review Report: Engineering and Infrastructure Technical Report*, Final Draft, for Transport Infrastructure Development Corporation

[2] Evans & Peck (May 2006) *North West Rail Link Project Review Report: Constructability and Programme Review*, Final Draft, for Transport Infrastructure Development Corporation

[3] Arup (2005) *North West Rail Link: 2004 Engineering Design Study*

2. General Construction Methodologies

The construction of the proposal is divided into three distinct construction methodologies. To determine the likely nature of the construction sites, it is important to firstly determine the likely methods of construction. :

» Construction of the tunnels and underground stations;

» Construction of dive structures and cut and cover tunnel sections including stations; and

» Construction of the surface works.

The following sections describe the anticipated construction methodologies.

2.1.1 Tunnel and Station Construction

The preferred excavation method for tunnels and stations is largely driven by the geology and ground conditions encountered during construction. It is anticipated that for this project the tunnels would be bored by tunnel boring machine (TBM). As a result of the amount of land available at the Balmoral Road portal site, which facilitates TBM operations, the TBMs would advance from the Balmoral Road site. No similar sites appear to be available elsewhere along the tunnel route, which would facilitate alternate tunnelling operations. Road headers and rock breakers would be required for other underground construction activities such as station excavation, TBM access shafts, ventilation tunnels and cross passages. If the geology of the sites is such that rock is too hard to break, then limited blasting may be required.

It is proposed that the stations be largely mined, that is, construction would occur from inside rather than from the surface, although access shafts to the stations would be sunk from the surface.

Whilst the tunnels would not need to be lined in all locations for structural stability, lining the tunnels with concrete is likely to be required to minimise seepage into the tunnel. Lining would be either undertaken using precast concrete segmental units, placed immediately behind the TBM or else by the use of travelling forms after excavation is completed along the length of the tunnel.

Station caverns once excavated and supported would be lined with concrete, largely by use of shotcrete sprayed by specialised shotcreting equipment. Station platforms and concourses would be constructed insitu with concrete or with precast elements.

Station service buildings shall be excavated from the surface down and the various levels would be constructed either insitu or using precast components.

Track slabs and tracks would be constructed at the completion of tunnel excavation and lining works. Following the installation of tracks, tunnel services would be installed.

2.1.2 Dives, Cut and Cover Station Construction

The dives, cut and cover tunnels and stations would be constructed using similar methods namely:

» Clearing of the sites;

» Piling to support the limits of excavation;

» Excavation would be carried out using rock breakers, conventional excavators or a combination of methods depending on the site geology;

» Base slabs would be poured upon the completion of excavation; and

» Roof slabs would be constructed following excavation.

2.1.3 Aboveground Construction

Construction methodologies for at grade and above ground sections of the track would be as follows:

» Clear site;

» Undertake bulk earthworks and drainage to level ground and provide a stable work platform;

» Construct capping layer, lay ballast and tracks, drainage and other services;

» Place concrete foundations for buildings, platforms and bridges;

» Construct platforms and buildings using conventional building methods; and

» Construct bridges / viaducts.

2.2 Construction Timing

The timing of the various phases of construction are described in the Evans & Peck (May 2006) *North West Rail Link Project Review Report: Constructability and Programme Review*, Final Draft, for Transport Infrastructure Development Corporation. It is not intended to repeat these construction timings here but it is noted that the duration of construction is expected to be 5 years and 2 months.

3. Construction Sites

The following construction sites have been identified in earlier studies. The amount of work required at each location and the duration of this work would vary significantly as a result of the adopted construction methodology.

» Balmoral Road;

» Franklin Road;

» Epping to Beecroft quadruplication (linear construction zone);

» Cheltenham Station Upgrade;

» Cheltenham Dive Site;

» Ancillary tunnel support site (in the vicinity of Pennant Hills Road);

» Above ground construction areas and viaduct construction (between Burns Road and Rouse Hill);

» Cut and cover works at Rouse Hill and Windsor Road;

» Rouse Hill Station and Cut and Cover Tunnels;

» Rouse Hill Viaduct;

» Rouse Hill Stabling Area;

» Norwest Station Site;

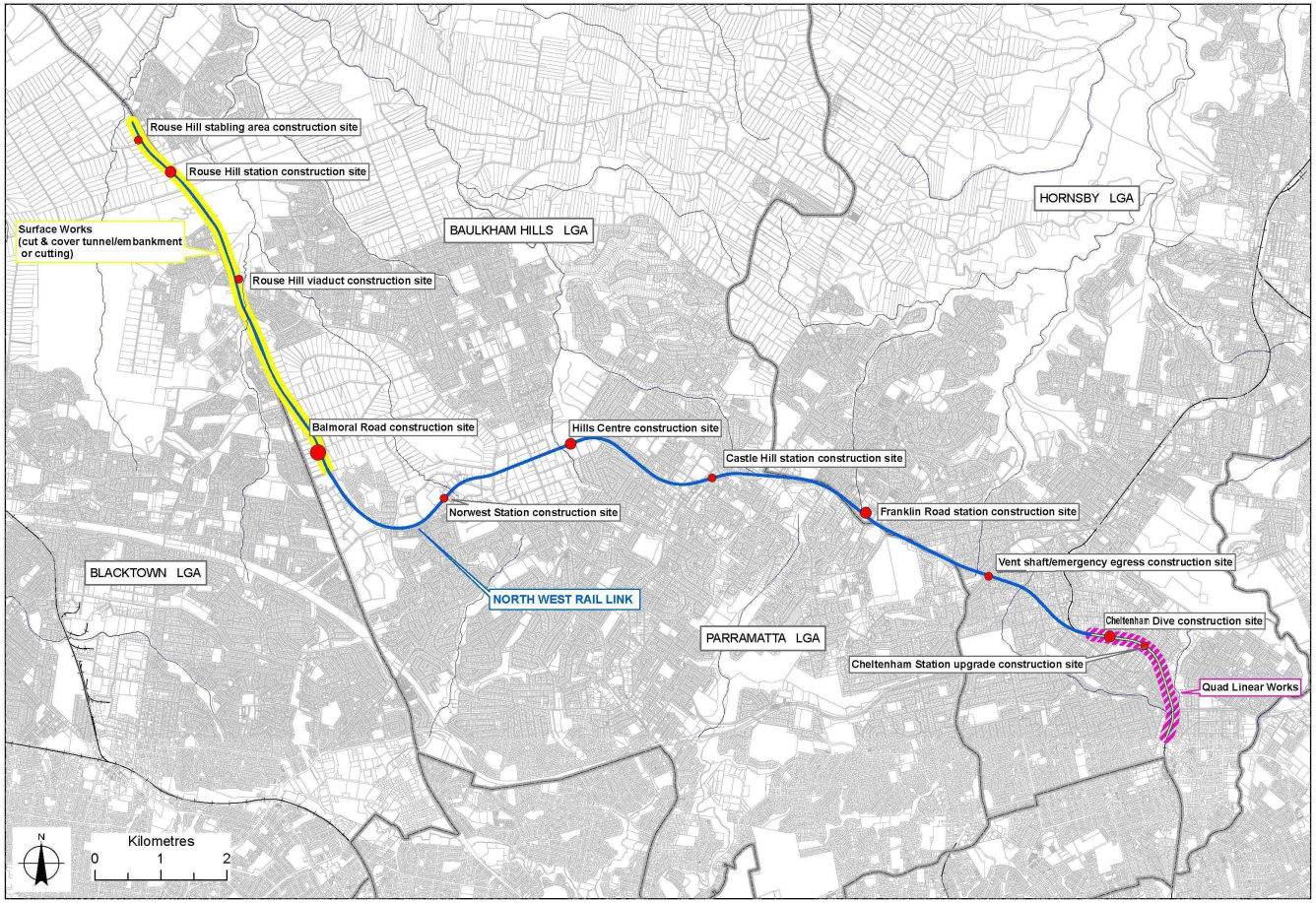
» Castle Hill Station Site and

» Hills Centre Station Site

For location of sites refer to Figure 3.1

The amount of work required at each location and the duration of this work would vary significantly as a result of the adopted construction methodology. Notwithstanding, indicative activities at each construction site are described.

Figure 3.1 Proposed Construction Site Locations

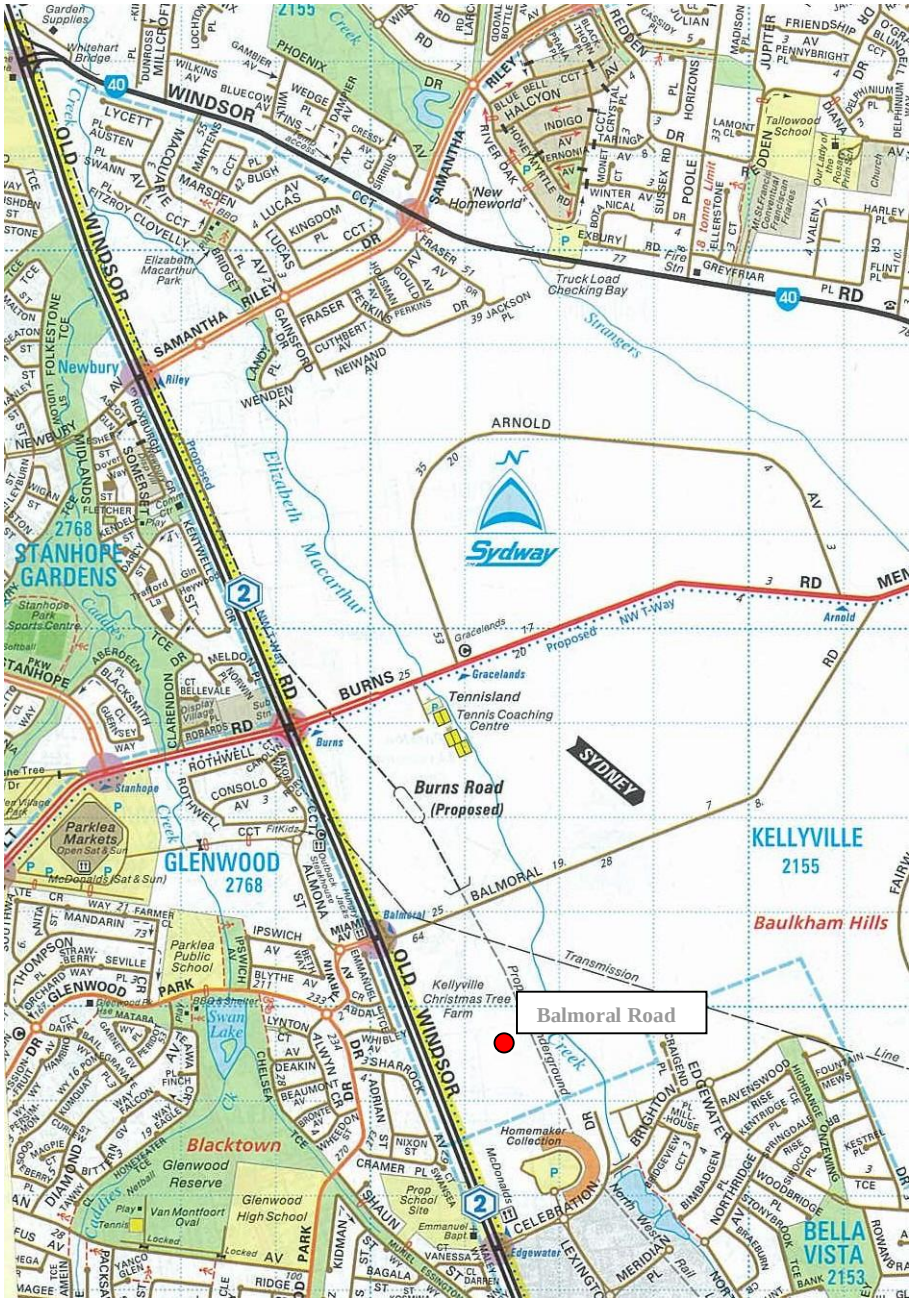


3.1 Balmoral Road Construction Site

Balmoral Road construction site is anticipated to be the major construction site for the project due to the available land at Balmoral Road and due to constraints at any other sites. There are currently no other sites along the tunnel route that are available and which are large enough to support tunnelling operations. In addition all other sites have potential social and environmental impacts. As there are no intermediate tunnelling sites, a significant amount of equipment would need to be stored on the site.

It is proposed that the TBMs would be launched from Balmoral Road heading east and that as a result the majority of spoil would be removed from the project at this location. In addition, as the four underground stations would be excavated from within, the spoil from these stations would also be removed through the Balmoral Road site. Conveyor belts and spoil handling equipment would need to be sized to convey spoil from all sites concurrently. Concrete lining sections for the tunnel and stations, along with concrete for track slabs, would also be sourced through the Balmoral Road work site.

Figure 3.2 Balmoral Road Construction Site



The following activities are anticipated to occur at the Balmoral Road work site:

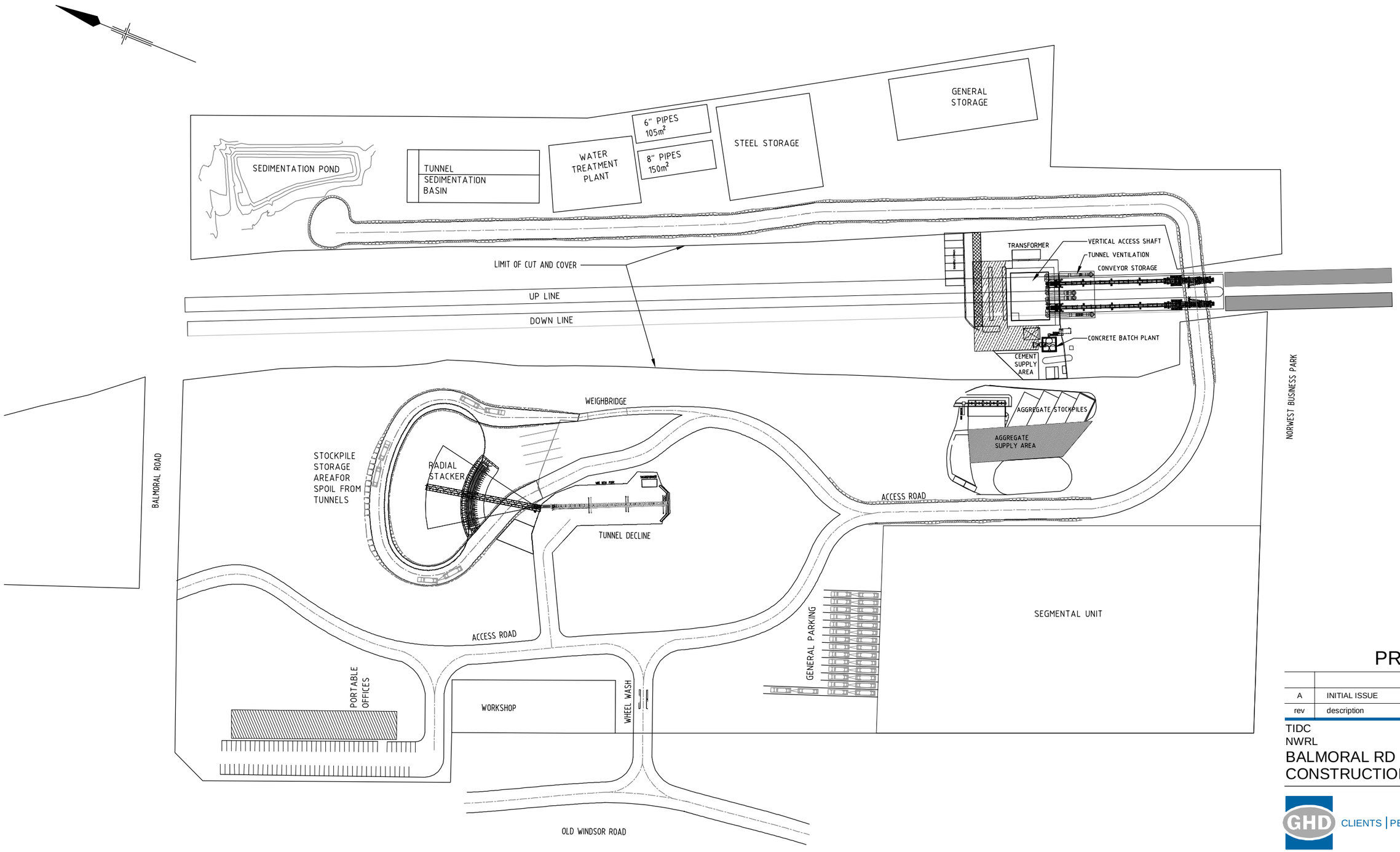
- Site offices, design offices and crib rooms;
- TBM assembly and launch;
- TBM and station spoil extraction, storage and dispatch;
- Tunnel construction water treatment plant;
- Tunnel air ventilation, extraction and scrubbing;
- Road header access;

- Spoil stockpiling and removal;
- Aggregate and cement delivery;
- Concrete batch plant;
- Storage of tunnel construction equipment i.e. vehicles, conveyor belt parts, pipes, ventilation ducts, inverts, rail and cabling;
- Electrical transformers; and
- Truck and vehicle wash.

It is also likely that if space were available on site then a precast segmental lining facility would also be established on the site. Should space not be available then a storage area on site would be required to store sufficient units so that construction could continue uninterrupted with deliveries limited to normal working hours.

Sketch SK001 shows the anticipated site layout, including a precast segmental lining facility.

Figure 3.3 Balmoral Road Construction Site Boundaries



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PRELIMINARY

rev	description	app'd	date
A	INITIAL ISSUE		

TIDC
NWRL

BALMORAL RD CONSTRUCTION SITE LAYOUT

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10 Bond Street, Sydney NSW 2000 Australia
T 61 2 9239 7100 F 61 2 9239 7199
E sydmail@ghd.com.au W www.ghd.com.au

scale	1:500 for A1	job no.	21-14856-03
date	Aug 2006	rev no.	A

approved SK001

Plot Date: 29 August, 2006 - 5:16 PM Cad File No: G:\Projects\21\14856\CADD\Drawings\ 211485603.dwg

3.1.1 Hours of Operation

Tunnelling is expected to occur 24 hours a day and as a result it is likely that some of the activities at the site would continue 24 hours a day. Activities expected to occur around the clock would include:

» Spoil removal from the tunnel. Spoil would be conveyed out of the tunnel 24 hours a day to stockpile areas using conveyors and stackers. Removal of the spoil from the site by road is only expected to occur during normal working hours;

» Tunnel water treatment. The water treatment plant would operate 24 hours a day as water cannot be stored in the tunnels without affecting the construction program. The period of plant operations would depend upon how much water is produced in the tunnel. The plant would be designed and located to minimise noise;

» Tunnel ventilation – Tunnel ventilation would be in operation 24 hours a day. As a result some noise would be generated on site by the air scrubber machines located near the tunnel portals;

» Concrete Batch Plant – Concrete would be required in the tunnel and stations 24 hours a day so the concrete batch plant is likely to be operational at all hours. The delivery of cement and aggregate would only occur during normal operational hours. Associated with the batch plant would be concrete agitator truck operations into and out of the tunnel;

» Retrieval of stored equipment – It may be required at times to take stored equipment from storage areas at the construction compound into the tunnels; and

» Deliveries of over size loads to the site may need to occur late at night depending upon RTA requirements.

3.2 Underground Station Sites

Whilst the majority of the station construction works would be undertaken from underground (with access and spoil removal from Balmoral Road) there would still need to be works undertaken aboveground at the various station sites. The following works are anticipated at each station site:

» Site sheds, offices and crib rooms;

» Piling to support excavations;

» Excavation of access shafts (for lifts, stairs and escalators);

» Excavation of service shafts;

» Tunnel ventilation (intermediate ventilation points required due to the length of tunnel)

» Lining of shafts;

» Construction of slabs;

» Installation of and connection to services; and

» Surface works i.e. paths, roofs and awnings, landscaping, carparks and road changes.

Station-specific construction issues are noted in Table 3.2

Table 3.2 Construction Issues

Station	Construction issues
Franklin Road Station site	Potentially, the entire area around the Station would be cleared of vegetation. However, trees around the boundary would be kept to screen the site (unless directly obstructing access or critical construction activities). Activities undertaken at this location include construction of the Station (the station cavern is likely to be mined from below, with access and ventilations shafts excavated from the surface).
Castle Hill Station site	The construction site would utilise areas of Arthur Whitling Park. Site boundaries would be clarified and tailored during future design work to maintain pedestrian access and protect important features/structure of the Park. Construction would be managed to minimise impacts on Park events. Affected areas of the Park would be restored in consultation with Council, local community and other stakeholders.
Hills Centre Station site	The construction site would utilise an area to the south west of the Showground currently occupied by Showground buildings, which would be relocated. Potential use of the Council Depot site would be considered in consultation with Baulkham Hills Council. Street trees would be removed. However, trees around boundary would be kept to screen site if practicable. It is likely that cut and cover construction would be required across Cattai Creek, which would result in vegetation removal within a corridor of approximately 50m and temporary coffer dams within the creek.
Norwest Station site	A surface site would be required adjacent to Norwest Boulevard. Traffic impacts would be experienced in the vicinity of this site.
Rouse Hill Station	Construction would occur within the future Rouse Hill Town Centre and require considerable construction planning for works within an operating and growing town centre.

The work activities at the station sites are anticipated to only occur during normal working hours with the exception of the ventilation systems, which would be required to operate 24 hours per day.

3.2.1 Ancillary tunnel support site (in the vicinity of Pennant Hills Road)

Construction of a vent shaft and emergency egress between the Cheltenham and Franklin Road Station would be required. This site would be located adjacent/above the tunnel in the vicinity of Pennant Hills Road. A location would be determined during detailed design. A location with significant extant vegetation or in close proximity to sensitive land uses would not be selected.

3.3 Dive Structures and Cut and Cover Tunnel Sections

3.3.1 Cheltenham Dive Site

The following activities are expected to occur at the Cheltenham dive site:

» Site sheds and crib rooms;

» Site clearing;

» Piling to support excavations;

» Excavation of dives;

» Construction of slabs along base of dives and tunnels;

» Lining of dive walls;

» Construction of roof slabs;

» Laying of rails and track slabs;

» Installation of services including overhead wiring;

» Construction of stormwater diversions to keep water out of dives; and

» Landscaping;

At the Cheltenham dive site, the tunnel boring machines would be disassembled and removed from the tunnel.

Property within the rail corridor would be required on the east side of Beecroft Road for permanent works and a work site associated with the tunnel dive structures. Cut and cover construction would occur adjacent to The Crescent resulting in demolition of the existing Scout Hall building. The scout facilities would be relocated or replaced.

At this stage of design it is envisaged that some temporary work during construction such as an access road, staff/worker accommodation and the storage of plant may encroach outside of the rail corridor into the road corridor of The Crescent and/or into Beecroft Village Green. This could result in removal of mature trees within the Beecroft Village Green. The extent of this possible encroachment would be clarified during future design work and would be planned to maintain access along The Crescent, protect the Tennis Courts and minimise impacts on the Beecroft Village Green.

3.3.2 Cut and Cover works at Rouse Hill and Windsor Road

Construction sites would be located on either side of Windsor Road. Traffic impacts would be experienced during road diversions for the cut and cover construction across Windsor Road.

3.4 Aboveground Sections of the Route

3.4.1 Above ground construction areas and viaduct construction (between Burns Road and Rouse Hill)

The above ground sections of the route (between Burns Road and Rouse Hill) would require the establishment of linear construction sites that would each stretch fro several kilometres, including either side of Windsor Road where it intersects with Old Windsor Road.

The expected construction activities are as follows:

» Establishment of a central site compound containing site offices, crib rooms and equipment storage areas;

» Site clearing;

» Bulk earthworks;

» Piling for viaduct footings;

» Construction of viaduct piers;

» Delivery to site and placement of viaduct segments;

» Laying of track and ballast;

» Construction of new overhead wiring for the new tracks;

» Installation of signalling systems;

» Landscaping

The construction site for the length of the viaduct would be of up to 50 metres wide. Potentially, vegetation removal would be required entirely within this 50-metre corridor, however this would be subject to detailed assessment.

3.4.2 Epping to Beecroft quadruplication (linear construction zone)

The above ground quadruplication between Epping and the Cheltenham Dive would require the establishment of linear construction zone that would stretch for approximately 3km. Much of the construction for the quadruplication would need to be undertaken during track possessions (that is, when the operating rail is shut down).

The expected construction activities are as follows:

» Establishment of a central site compound containing site offices, crib rooms and equipment storage areas;

» Clearing of the corridor;

» Widening of cuttings;

» Construction of retaining walls to support widening of the corridor as required;

» Earthworks to widen the existing track formation;

» Laying of track;

» Construction of new overhead wiring for the additional tracks;

- Construction of a new bridge over the M2 Motorway;
- Construction of new platforms, buildings and elevated walkway at Cheltenham station.
- Modifications to existing signalling system; and
- Landscaping.

Construction access is discussed in the North West Rail Link Environmental Assessment; Traffic, Transport, Parking and Access Report, specifically section 6.

3.4.3 Cheltenham Station Upgrade

Works to upgrade Cheltenham Station would occur concurrently with the quadruplication of the Northern Line. During construction passenger access would be maintained at all times except during track possessions. The associated station buildings would be removed and replaced with temporary facilities whilst the new facilities are built.

The existing two side platforms would be converted into a pair of island platforms (although the station would continue to operate with two passenger platforms). An overbridge would be constructed.

The majority of commuter carparking would be removed during construction. Commuter parking would be replaced as discussed in the North West Rail Link Environmental Assessment; Traffic, Transport, Parking and Access Report, specifically section 6.2.8.

3.4.4 Rouse Hill Stabling Area

Acquired properties (rural residential) would be utilised as a construction site to the west of the proposed stabling facility. This would result in removal of scattered trees, which are representative of Cumberland Plain Woodland, other isolated paddock trees and vegetation associated with farm dams. However, the site would not encroach into vegetation within the Regional Parkland to the north. Cut and cover construction would be required across Rouse Road.

4. Impacts of Construction Sites

Construction sites can have the following impacts:

» Noise – Construction noise and noise associated with construction support activities.

» Air Quality – In particular dust as a result of spoil management.

» Water Quality – Tunnel water is expected to be relatively salty and would contain iron and other minerals, which means that it cannot be readily discharged to nearby watercourses without treatment. In addition, the volumes of tunnel seepage water would be too large and would contain too much iron to dispose to sewer.

» Water Quality – Runoff from compound. By their very nature the construction compounds are dirty and any runoff if untreated is likely to convey sediment and pollutants off site;

» Traffic – There would be a substantial number of traffic movements required to some of the construction sites for the delivery and removal of construction materials and spoil. Refer to Traffic Reports for details;

» Light – At some sites activities are expected to occur 24 hours a day. Lighting required to facilitate these activities may impact on surrounding land users.

5. Mitigation Measures

The following section identifies various mitigation measures that are anticipated to be undertaken to reduce the impacts identified in Section 4 of this report.

5.1 Noise

Aboveground works would generally be limited to the following hours of operations (normal hours):

» Monday – Friday 7.00am to 6.00pm;

» Saturday 7.00am to 1.00pm; and

» Sunday and Public Holidays – no work.

Underground operations are expected to occur 24 hours a day. As a result, at the compounds were tunnelling occurs (Balmoral Road and the station sites), above ground operations may be required at all hours. Restrictions on operations would ensure that noisy operations are not allowed except in exceptional circumstances. Operations that would be restricted are:

» Spoil removal from site (stockpiling from conveyors would be allowed) would only be allowed in normal hours;

» Deliveries to site (except for oversized items) would only be allowed in normal hours;

» Piling and open excavation would only be allowed in normal hours;

» Finally at some sites where noise is an issue during excavation, work may be only allowed if the work can meet relevant noise objectives.

Noise generating equipment that would be operating 24 hours, such as ventilation equipment would be located as far from residential property as possible and would be installed with baffles and noise walls so that at the site boundaries the noise levels meet the applicable DEC guidelines.

5.2 Water Quality

The following measures would apply on the various sites:

» The Contractor would be required to establish all work sites so that they have the latest best management practises for erosion and sediment controls. The larger sites such as Balmoral Road and Franklin Road would have sediment basins that are designed to capture all runoff from the site so that no sediment is allowed to leave the site. The sites shall be laid out to prevent clean runoff water becoming polluted by diverting clean water from potentially polluted areas.

» Fuel and chemical storages shall be bounded to prevent the escape of chemicals and fuel. All equipment shall be required to refuel in bunded areas.

» All tunnel construction water would be required to discharge through a water treatment plant. Large water treatment plants are expected to be located at Balmoral Road and Franklin Road. These plants would be designed to discharge water in accordance with the relevant guidelines in force at the time of construction.

5.3 Air Quality

It is expected that dust generation would be a potential problem particularly in areas where spoil and aggregate is stockpiled. The Contractor would be required to institute a program of spraying to control dust. The water to be used for spraying would be sourced from erosion control ponds or sensors would automatically control recycled water supplies and the application of water so that dust suppression can occur around the clock.

5.4 Lighting

Lighting at the construction sites would be designed to stop light spillage to adjacent properties.

6. References

Arup (2001) *North West Rail Link: Rail Infrastructure Study*, for Rail Infrastructure Corporation, Arup

Arup (2005) *North West Rail Link: 2004 Engineering Design Study,* for RailCorp, Arup

Evans & Peck (2006) *North West Rail Link Project Review Report: Constructability and Programme Review*, Draft, for Transport Infrastructure Development Corporation, Evans & Peck

Parsons Brinkerhoff (2006) *North West Rail Link Project Review Report: Engineering and Infrastructure Technical Report*, Draft, for Transport Infrastructure Development Corporation, Parsons Brinkerhoff

GHD Pty Ltd ABN 39 008 488 373

10 Bond Street Sydney NSW 2000
T: 2 9239 7100 F: 2 9239 7199 E: sydmail@ghd.com.au

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Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
	A Garrick	A Horton		J Ardas		19/10/06