



Transport Infrastructure
Development Corporation



SINCLAIR KNIGHT MERZ

SKM

North West Rail Link
Project Application and Preliminary
Environmental Assessment

April 2006



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Glossary and Abbreviations

AEP	Annual Exceedence Probability
AM Peak	Two hour weekday morning peak period (6:30am – 8:30am)
BCR	Benefit Cost Ratio
CEMP	Construction Environmental Management Plan
CWSMP	Construction Water and Soil Management Sub-Plan
DEC	Department of Environment and Conservation
DoP	Department of Planning
Down direction	Direction on rail network away from the City
EA	Environmental Assessment under Part 3A of EP&A Act 1979
ECRL	Epping to Chatswood Rail Line
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
Global Arc Centres	Macquarie Park / North Ryde, Chatswood, St Leonards, North Sydney, the CBD and Airport
LEP	Local Environmental Plan
LGA	Local Government Area
NWRL	North West Rail Link
OEMP	Operational Environmental Management Plan
PCG	Project Control Group
PFM	Planning Focus Meeting
PMF	Probable Maximum Flood
QIC	Queensland Investment Corporation



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Quadruplication	The duplication of an existing twin-track rail line to provide a total of four rail tracks
REP	Regional Environmental Plan
RTA	Roads and Traffic Authority
SEPP	State Environmental Planning Policy
SKM	Sinclair Knight Merz
SWMP	Soil and Water Management Plan
TIDC	Transport Infrastructure Development Corporation
TMP	Traffic Management Plan
TSC Act	<i>Threatened Species Conservation Act 1995</i>
Up direction	Direction on rail network towards the City
WMP	Waste Management Sub-Plan
WTP	Water treatment plant
2002 Alignment	NWRL alignment, as exhibited in the <i>North West Rail Link Overview Report – Connecting Communities</i>
2017 Reference Alignment	Proposed NWRL alignment for Concept Application

Executive Summary

Background

On 9 June 2005, the Government announced it would invest \$8 billion over the next 15 years to develop the Metropolitan Rail Expansion Program (MREP) consisting of three projects:

- North West Rail Link – A new line to Rouse Hill from Cheltenham via Castle Hill with long term plans to extend to Vineyard and the Richmond Line;
- CBD Rail Link – A new tunnel between Central and the North Shore Line at St Leonards including new stations in the CBD and in the lower North Shore, and extra tracks between St Leonards and Chatswood; and
- South West Rail Link – A new line to Leppington from Glenfield Station with long terms plans for a western extension to either Bringelly or Oran Park.

The Government also announced that planning for the section of the NWRL from Cheltenham to Rouse Hill would begin immediately, with the line operational by 2017.

The North West sector of Sydney is one of the major growth areas in the Sydney Metropolitan region. To improve access to employment and educational opportunities for existing and future residents, and to alleviate the growing traffic congestion in this area, the NSW Government proposes to build the North West Rail Link (NWRL), a new heavy rail line linking Epping with the regional centres of Castle Hill and Rouse Hill. The concept is based on a reference case developed by RailCorp (referred to as the 2017 Reference Scheme), which involves an extension of the current RailCorp operations. The NWRL would provide fast connections to the Lower North Shore, the Sydney CBD and the North Ryde / Macquarie area. It would service established residential areas (approximately two thirds of the proposed route traverses developed land) and it would also service future growth areas identified in the Sydney Metropolitan Strategy – *City of Cities – A Plan for Sydney's Future* (DoP, December 2005).

The Proponent

The Transport Infrastructure Development Corporation (TIDC) is a state owned corporation established under the *Transport Administration Act 1988* that develops major transport infrastructure projects on behalf of the NSW Government. The Minister for Transport and the voting shareholders of TIDC have granted consent under Section 18(1) of the *Transport Administration Act 1988* for TIDC to undertake the development of the NWRL. Hence, TIDC is progressing the technical studies and preparation of the Environmental Assessment (EA) for concept approval of the NWRL under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Purpose of This Report

This report has been prepared to support TIDC's project application for the NWRL under Part 3A of the EP&A Act, to assist with the issuing of EA requirements by the Director General of the Department of Planning (DoP) under Section 75F of the EP&A Act. The report also supports an

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application to the Minister for Planning under Section 75M(1) requesting authorisation to proceed with a concept plan for the project.

Project Objectives

The primary objectives of the proposed NWRL are to:

- Provide a direct transport link to and from North West Sydney and the global economic corridor (ie. Macquarie-Lower North Shore-CBD-Airport);
- Connect by rail the major centres of Rouse Hill and Castle Hill, Norwest Business Park, Balmoral Road Release Area and North West Growth Centre;
- Provide rail network congestion relief in the morning peak with transfer of up to 3000 passengers from the Richmond Line and up to 8000 passengers transferring from the Main West Lines; and
- Facilitate transit orientated development, with increased commercial and residential development at each station.

These objectives are consistent with the objectives of the NSW Government's Sydney Metropolitan Strategy *City of Cities – A Plan for Sydney's Future*. One of the objectives of the Metropolitan Strategy is to "... improve transport between Sydney's centres" by extending the rail and bus networks to connect centres. One of the actions identified to achieve this goal is to "... plan, and as appropriate, construct the North West – CBD – South West Rail Links".

Need for the Project

The NWRL is primarily needed to service established urban and commercial areas in Sydney's North West. It would also cater for future growth areas such as the North West Growth Centre, and the Balmoral Road and Rouse Hill Regional Centre Release Areas. The main benefits of the NWRL would include:

- Improved accessibility to a trunk public transport line and provision of an alternative to private car usage;
- Improved accessibility to the 'Global Arc' centres (Macquarie / North Ryde, Chatswood, St Leonards, North Sydney, the CBD and airport) to access employment, educational and cultural facilities;
- Cost and travel time savings;
- Reduced congestion on existing rail lines, in particular the Main West Line and reduced need for investment to increase capacity on the Richmond and Main West Lines, to accommodate travel from the North West;
- Reduced congestion on the road network; and
- Air quality benefits arising from provision of an alternative to private vehicles and consequential vehicle emissions reductions.

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2002 Alignment and Development of the 2017 Reference Scheme

Over the past five years, a number of detailed, engineering, operational and environmental studies have been undertaken to determine the feasibility of the proposed NWRL. These studies were undertaken under the management of a Project Control Group (PCG), which included representatives from DoP, RailCorp, Roads and Traffic Authority (RTA) and Ministry of Transport.

In 2002 the *North West Rail Link Overview Report – Connecting Communities* (Manidis Roberts, 2002) was released and identified a preferred alignment – the 2002 alignment. Comprehensive community consultation was undertaken as part of the exhibition of the *Overview Report*.

In response to issues raised by the Overview Report further studies were undertaken in consultation with key stakeholders including local councils (Hornsby Shire Council, Blacktown City Council and Baulkham Hills Shire Council) and major landholders (e.g QIC, Mulpha Norwest and Bovis Lend Lease). The outcome of these studies and the input from key stakeholders form the basis of the 2017 Reference Scheme.

Project Scope – 2017 Reference Scheme

The scope of the proposal described below is based on the 2017 Reference Scheme.

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

- A 3 km surface quadruplication of the Main North Line between Epping and Beecroft, including station upgrades such as an easy access upgrade at Cheltenham Station and new rail bridge over the M2;
- A 16 km section in tunnel from the Main North Line to north of Norwest Business Park;
- A 4 km surface section from north of Norwest Business Park to Rouse Hill;
- Six new stations (Franklin Road, Castle Hill, Hills Centre, Norwest, Burns Road and Rouse Hill);
- A train stabling facility at Rouse Hill, which would include facilities for cleaning and maintenance of stabled trains; and
- Ancillary tunnel support facilities such as tunnel ventilation, tunnel service facility, transformers, power supply, substations, section huts, signalling and a water treatment plant.

Construction

A number of construction sites would be established. The main work site is likely to be in the Balmoral Road Release Area. Smaller sites would also be required at the stations and in close proximity to the tunnelling operations.

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Operation

Upon opening, train services are anticipated to operate every 5-10 minutes in peak periods and every 15 minutes during off-peak periods. These services would travel to Chatswood and the City via the Epping to Chatswood Rail Line (ECRL) or via the Main North Line through Strathfield. The mix of routes would depend on the progress of the CBD Rail Link.

Potential Modifications to the 2017 Reference Scheme

Potential modifications to the 2017 Reference Scheme that will be subject to further investigations and included within the assessment of environmental issues include:

- Adjustments to the vertical alignment at Rouse Hill, as proposed by the Town Centre Developer (Bovis Lend Lease); and
- An alternative horizontal and vertical alignment option to the west of the proposed Castle Hill Station.

Preliminary Environmental Assessment

The key environmental issues for the proposed NWRL include:

- Noise and vibration;
- Indigenous and non-indigenous heritage;
- Flora and fauna;
- Traffic, transport, parking and access;
- Groundwater / geotechnical;
- Visual impacts and urban design;
- Flooding;
- Construction management (including spoil handling); and
- Social impacts / community involvement.

In general, the scope of the previous environment studies, completed as part of the *Assessment of Environmental Issues Report* (SKM, 2003), is of sufficient standard to inform the EA. This information has been updated for the 2017 Reference Scheme. However, further detailed studies would need to be undertaken as part of the EA.

The key issues are described in detail in **Section 5** and a proposed scope of work for the EA is provided in **Section 6**.

1 INTRODUCTION

1.1 Background

On 9 June 2005, the NSW Government announced that it would invest \$8 billion over the next 15 years to develop the Metropolitan Rail Expansion Program (MREP) consisting of three projects (refer to **Figure 1-1**):

- North West Rail Link – A new line to Rouse Hill from Cheltenham via Castle Hill with long term plans to extend to Vineyard and the Richmond Line;
- CBD Rail Link – A new tunnel between Central and the North Shore Line at St Leonards including new stations in the CBD and in the lower North Shore, and extra tracks between St Leonards and Chatswood; and
- South West Rail Link – A new line to Leppington from Glenfield Station with long terms plans for a western extension to either Bringelly or Oran Park.

The Government also announced that planning for the section of the NWRL from Cheltenham to Rouse Hill would begin immediately, with the line operational by 2017.

The North West sector of Sydney is one of the major growth areas in the Sydney Metropolitan region. To improve access to employment and educational opportunities for existing and future residents, and to alleviate the growing traffic congestion in this area, the NSW Government proposes to build the North West Rail Link (NWRL), a new heavy rail line linking Epping with the regional centres of Castle Hill and Rouse Hill. The concept is based on a reference case developed by RailCorp (referred to as the 2017 Reference Scheme), which involves an extension of the current RailCorp operations. The NWRL would provide fast connections to the Lower North Shore, the Sydney CBD, and Macquarie area / North Ryde. It would service established residential areas (approximately two thirds of the proposed route traverses developed land) and it would also service future growth areas identified in the Sydney Metropolitan Strategy – *City of Cities – A Plan for Sydney's Future* (DoP, Dec 2005).

1.2 The Proponent

The Transport Infrastructure Development Corporation (TIDC) is a state owned corporation established under the *Transport Administration Act 1988* that develops major transport infrastructure projects on behalf of the NSW Government. The Minister for Transport and the voting shareholders of TIDC have granted consent under Section 18(1) of the *Transport Administration Act 1988* for TIDC to undertake the development of the NWRL. Hence, TIDC is progressing the technical studies and preparation of the Environmental Assessment (EA) for concept approval of the NWRL under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).



Figure 1-1: Metropolitan Rail Expansion Program

1.3 Purpose of This Report

This report has been prepared to support TIDC's project application for the NWRL, to assist with the issuing of EA requirements by the Director General of the Department of Planning (DoP) under Section 75F of the EP&A Act. The report identifies key issues associated with the project and also supports an application to the Minister for Planning under Section 75M(1) requesting the authorisation to proceed with a concept plan for the project.

This report has been prepared by Sinclair Knight Merz (SKM) with the assistance of background information supplied by RailCorp and the DoP.

1.4 Project Objectives

The primary objectives of the proposed NWRL are to:

- Provide a direct transport link to and from North West Sydney and the global economic corridor (ie. Macquarie-Lower North Shore-CBD-Airport);
- Connect by rail the major centres of Rouse Hill and Castle Hill, Norwest Business Park, Balmoral Road Release Area and North West Growth Centre;
- Provide rail network congestion relief in the morning peak with transfer of up to 3000 passengers from the Richmond Line and up to 8000 passengers transferring from the Main West Lines; and
- Facilitate transit orientated development, with increased commercial and residential development at each station.

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These objectives are consistent with the objectives of the NSW Government's Sydney Metropolitan Strategy *City of Cities – A Plan for Sydney's Future*. One of the objectives of the Metropolitan Strategy is to "... improve transport between Sydney's centres" by extending the rail and bus networks to connect centres. One of the actions identified to achieve this goal is to "... plan, and as appropriate, construct the North West – CBD – South West Rail Links".

1.5 Previous Studies

1.5.1 Origins of the Proposal

The State Government's commitment to the NWRL was first documented in *Action for Transport 2010*, released in 1998. On the basis of this plan, the former Transport NSW, in conjunction with the former Rail Infrastructure Corporation and State Rail Authority conducted a *Pre-Feasibility Assessment* (Maunsell, 2000) to assess a number of travel modes such as bus transitways, light rail and heavy rail. Their suitability for the corridor, capacity, journey times, service quality, connectivity and patronage were assessed and the following conclusions were drawn:

- The NWRL would be feasible from a technical and engineering point of view;
- It would be likely to have sufficient levels of patronage to warrant construction of a heavy rail link;
- It should be constructed as one integrated project (i.e. between Epping and Rouse Hill); and
- There would be limited time to reserve a surface based heavy rail corridor, given the rate and extent of urban development occurring between Castle Hill and Rouse Hill.

The outcomes of the *Pre-Feasibility Assessment* informed the public release of the Overview Report in 2002 (referred to as 2002 alignment) and subsequent community consultation. The outcomes of this consultation led to further analysis and refinement and contributed to the development of the 2017 Reference Scheme. During the course of this work, alternative modes and routes were assessed.

On the basis of the conclusions reached in the *Pre-Feasibility Assessment* (Maunsell, 2000), further investigations were undertaken to evaluate the feasibility and potential of the project. The key studies undertaken to date include:

- Project Need, Feasibility & Alternatives
 - Land Use and Modal Integration (Maunsell, 2002)
 - Patronage Study (Parsons Brinkerhoff, 2005)
 - Alternatives Study (Booz Allen Hamilton & GHD, 2005)
- Financial and Economic
 - Construction Methodology and Cost (Tenix, 2005)
 - Economic Appraisal (Douglas Economics, 2005)
- Operations & Network
 - Stabling - Assessment of SRA Train Stabling Requirements in the North West Sector (GHD, 2002)
 - Western Extension Pre-Feasibility (GHD, 2003)

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- Operational Requirements Study (Halcrow, 2005)
- Engineering & Technical
 - Concept Engineering Study (Arup, 2002)
 - Balmoral Road – Study of Rail Route Options (Arup, 2003)
 - Geotechnical Investigation (Arup, 2003)
 - Station Concept Design (Hassell, 2005)
 - Rail Infrastructure Study (Arup, 2005)
- Property
 - Land Acquisition Study (Creer & Berkley, 2001)
 - Land Acquisition Programme (Creer & Berkley, 2003)
 - Corridor Preservation Study (HillPDA, 2005)
- Environmental
 - Assessment of Environmental Issues (Sinclair Knight Merz, 2003)

1.5.2 Patronage Study

Parsons Brinkerhoff (2005) undertook a detailed patronage study of a number of alternatives, including the NWRL. The study found that:

- Rail demand is predicted to double, and be well in excess of capacity, along the Richmond Line and parts of the Main West Line by 2021 if the proposed NWRL does not proceed;
- In the absence of the NWRL car travel times from the North West area are expected to increase beyond current levels as demand growth exceeds capacity growth;
- The NWRL would decrease time taken for patrons to access the rail network by up to 30 minutes and the average access distance to a rail station would decrease by about 50% across the study area, from 12km to 6km;
- The NWRL would substantially reduce future loadings on the Richmond and Main West Lines;
- The NWRL would draw patronage from the Main North Line between Hornsby and Epping;
- Loadings on the Epping to Chatswood Rail Line (where there would be spare capacity) would increase by up to 90% in direction of the City and 50% in the opposite direction. These increases would flow into the North Shore Line where an additional 6-7 train loads are predicted across the Harbour Bridge in the two hour morning peak;
- Almost 80% of the system usage of the NWRL in the morning peak would comprise trips that originate at one of the proposed new stations and finish at destinations outside the study area (i.e. on other rail lines). Almost 20% of trips would originate outside the study area and finish in the North West. Less than 5% of trips would start and finish in the study area; and
- The NWRL is forecast to be a heavy use line with around 14,000 passengers in 2021 in the 2hr AM peak (refer to **Figure 1-2**).

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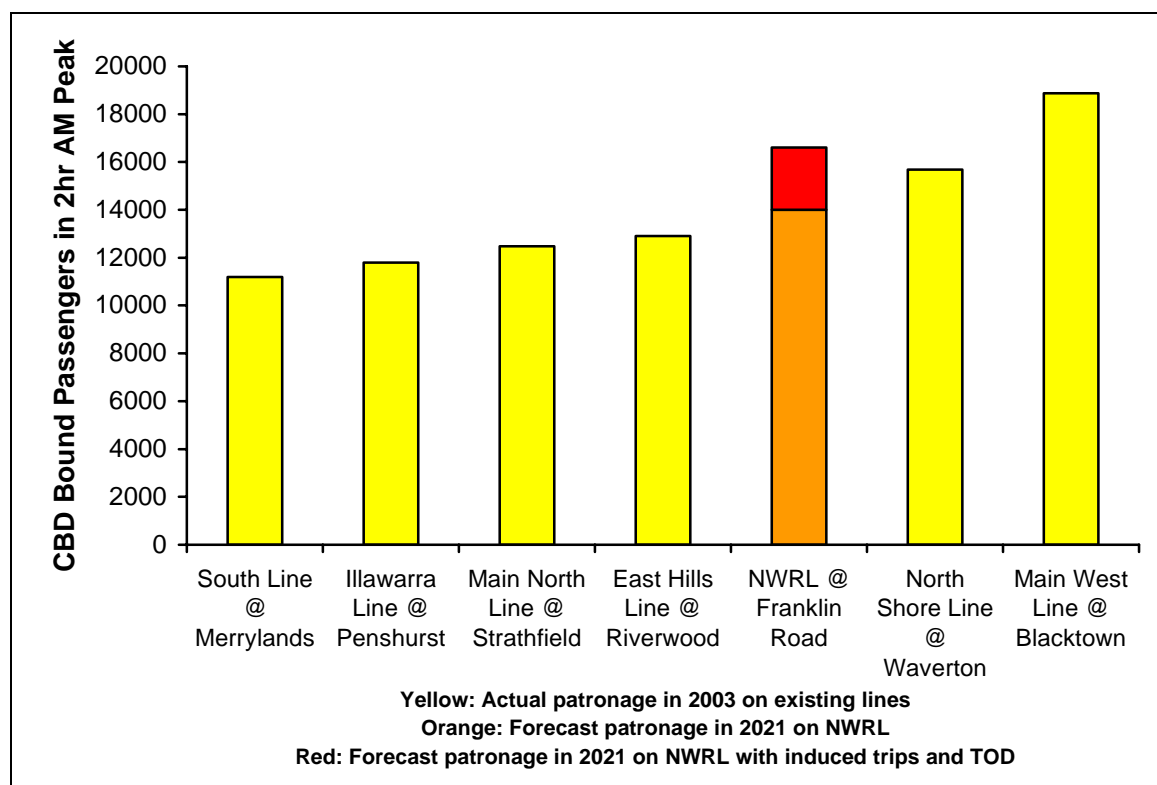


Figure 1-2: Forecast Patronage of the NWRL in 2021

Source: CityRail Compendium (2003) and NWRL Patronage Report (PB, 2005)

1.5.3 Concept Design and Cost Study

Concept engineering design and costings were prepared based on a delivery mechanism similar to the Epping to Chatswood Rail Line. It was previously estimated that the project would have a capital cost of approximately \$2.8 billion (in \$2005) including land acquisition, new rolling stock required and the need for external works. This estimate is currently under review by TIDC.

1.5.4 Environmental Assessment Report

An environmental study, *Assessment of Environmental Issues Report* (SKM, 2003), was prepared to investigate specific issues such as flora and fauna, water quality, hydrology and hydraulics, groundwater, indigenous and non-indigenous heritage, noise and vibration, and landscape and visual characteristics. Information gathered during these studies was used to produce a series of constraints maps to allow an understanding of key constraints in relation to the 2002 alignment.

The report also summarised the key community issues and social constraints identified from submissions on the Overview Report. The environmental and social constraints led to changes to the alignment, resulting in the 2017 Reference Scheme (refer to **Section 1.7**).

1.6 Alternatives Considered

Booz Allen Hamilton & GHD (2005) undertook an alternatives study in which approximately 150 alternatives including various rail alignments and station locations, and different modal options (heavy rail, light rail, transitways), were evaluated. A short list of 20 options was identified and the seven

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highest ranking options were assessed against a set of criteria. The study found that the NWRL is the preferred option because it:

- Optimises economic costs and benefits;
- Provides opportunities for extension and connectivity to the Richmond Line;
- Has strong direct connectivity to the North West;
- Facilitates significant transit orientated development along the corridor;
- Has strong public transport mode share changes;
- Minimises undesirable environmental and social impacts in already developed areas (the heavy rail options would require less acquisition of existing residential properties than light rail or transitway options); and
- Heavy rail options would provide greater travel cost and time savings in comparison to light rail and transitway alternatives.

1.6.1 Modifications to the 2002 Alignment

Since the *Concept Engineering Study* (Arup, 2002) and exhibition of the Overview Report in 2002, modifications to the NWRL 2002 alignment have occurred (refer to **Figure 1-3**). These changes have arisen from the outcomes of the specialist studies and their recommendations and the need to address concerns raised by the community, Baulkham Hills Shire Council and individual developers. The key modifications are:

- The bored tunnel alignment between the Beecroft dive structure and Franklin Road Station – In some locations, the route has been re-aligned by up to 250m;
- The bored tunnel and surface sections of the alignment between Norwest Business Park and Burns Road Station – Approximately 5km of the route has been re-aligned and consequently the western portal has been re-located further west;
- The stabling facility has been moved about 500m to the east, to be adjacent to Windsor Road;
- The NWRL project scope has been expanded to include the quadruplication of the Main North Line from Epping to Beecroft.



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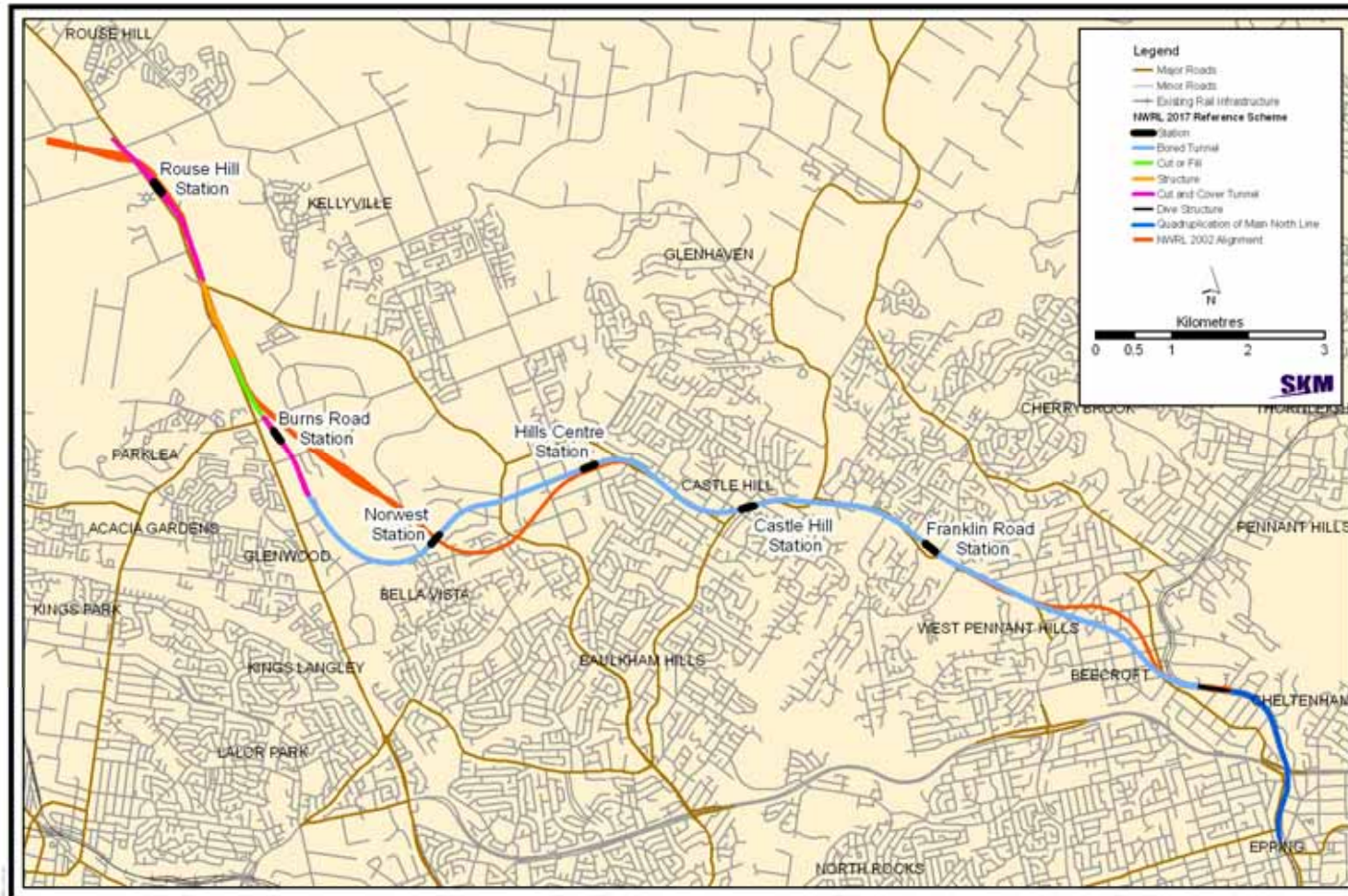


Figure 1-3: The 2017 Reference Scheme and the 2002 Alignment

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Between the Beecroft dive structure and Franklin Road Station, the alignment was modified to simplify and straighten the alignment. In the Balmoral Road Release Area, between Norwest Business Park and Burns Road Station, the alignment was modified to minimise impacts on:

- Cumberland Plain Woodland (an endangered ecological community);
- The northern portion of the future Bella Vista Housing Estate by avoiding the requirement for a large cutting through the development;
- Sensitive landuses at the Hillsong Church (including an auditorium and a proposed television and radio studio); and
- Flooding and environmental risks associated with crossing Elizabeth Macarthur Creek in cutting.

The train stabling facility was re-located to be above the assumed Probable Maximum Flood (PMF) level for Second Ponds Creek and to minimise impacts on Cumberland Plain Woodland.

1.7 Project Scope

The scope of the proposal described below is based on the 2017 Reference Scheme.

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

- A 3 km surface quadruplication of the Main North Line between Epping and Beecroft, including station modifications such as an easy access upgrade at Cheltenham Station and new rail bridge over the M2;
- A 16 km section in tunnel from the Main North Line to north of the Norwest Business Park;
- A 4 km surface section from north of Norwest Business Park to Rouse Hill;
- Six new stations (Franklin Road, Castle Hill, Hills Centre, Norwest, Burns Road and Rouse Hill);
- A train stabling facility at Rouse Hill, which would include facilities for cleaning and maintenance of stabled trains; and
- Ancillary tunnel support facilities such as tunnel ventilation, tunnel service facility, transformers, power supply, substations, section huts, signalling and a water treatment plant.

1.7.1 Construction

A number of construction sites would be established. The main work site is likely to be in the Balmoral Road Release Area. Smaller sites would also be required at the stations and in close proximity to the tunnelling operations.

1.7.2 Operation

Upon opening, train services are anticipated to operate every 5-10 minutes in peak periods and every 15 minutes during off-peak periods. These services would travel to Chatswood and the City via the Epping to Chatswood Rail Link (ECRL) or via the Main North Line through Strathfield. The mix of routes would depend on the progress of the CBD Rail Link.

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1.7.3 Potential Modifications to the 2017 Reference Scheme

Potential modifications to the 2017 Reference Scheme that will be subject to further investigations and included within the assessment of environmental issues include:

- Adjustments to the vertical alignment at Rouse Hill, as proposed by the Town Centre Developer (Bovis Lend Lease); and
- An alternative horizontal and vertical alignment option to the west of the proposed Castle Hill Station.

1.8 Current TIDC Studies

TIDC is currently undertaking a range of studies including:

- Engineering design review to define the project scope and identify the requirement for further studies;
- Property acquisition requirements;
- Independent review of the patronage forecasts; and
- Constructability report that includes the construction methodology, project schedule and cost estimate.

Arising from the initial work being undertaken by TIDC, the need for further studies has been identified and includes:

- Cheltenham Station access arrangements, following quadruplication;
- Park-and-ride requirements / station design;
- NWRL support facilities requirements study;
- Utilities study;
- Scope and design of 3 km quadruplication of the Main North Line from Epping to Beecroft; and
- Turnback arrangements at Rouse Hill.

Details of these studies will be reported on in the EA.

1.9 Consultation

1.9.1 Authority Consultation

A Planning Focus Meeting (PFM) for the proposed NWRL was held on 19th December 2005 at SKM's office in St Leonards. The minutes from the PFM are provided in **Appendix A**.

Representatives from the following organisations attended the PFM:

- DoP;
- RailCorp;
- Department of Environment and Conservation;
- RTA;
- Ministry of Transport;

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- Hornsby Shire Council;
- Blacktown City Council;
- Hawkesbury City Council; and
- Integral Energy.

Baulkham Hills Shire Council was unable to attend the PFM but has been closely involved in the development of the NWRL proposal through the Balmoral Road Release Area. A separate briefing was provided to Baulkham Hills Shire Council officers in January 2006. At the time of the PFM, no works were proposed within the Parramatta Local Government Area (LGA) and as such, a representative from Parramatta City Council did not attend the PFM. The quadruplication of the line between Beecroft and Epping Stations may result works within the Parramatta LGA. Therefore, should works be proposed within Parramatta LGA, a meeting would be held with Parramatta City Council to brief them about the project.

The key issues raised at the PFM were:

- The traffic impacts associated with construction (i.e. haulage routes) and operation (i.e. parking and access arrangements);
- Urban design treatments;
- Potential impacts on heritage items, threatened species and endangered ecological communities;
- Potential impacts on the community (e.g. noise and vibration);
- Co-ordination between government agencies and organisations;
- Consistency of the proposal with new environmental planning instruments;
- Consequences of not proceeding;
- Interaction with M2 to F3 road alignments;
- Impacts on existing utilities infrastructure such as the 132kV Integral Energy transmission line within the Balmoral Rd Release Area; and
- Consistency with, and cumulative impacts from, the different modes of transport in the North West.

1.9.2 Community Consultation

The early planning stages of the project and the 2002 preferred route for the NWRL between Epping and Rouse Hill Town Centre were outlined in the *North West Rail Link Overview Report – Connecting Communities* (Manidis Roberts, 2002). The release of this report in 2002 provided the first opportunity for public comment on the then preferred alignment of the NWRL. The aim of the preliminary consultation was to provide practical information about the proposed rail link and encourage community input into the early planning process.

Some of the positive comments received were:

- The NWRL would be a vital transport link for a growing area of Sydney;
- It would reduce traffic congestion in Sydney's North West;

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- It would also reduce emissions and smog, improving Sydney's air quality;
- The new rail line would be used by the majority of respondents; and
- Property values would rise as a consequence of improved access to public transport.

Key environmental concerns raised by the community included:

- Construction management with respect to noise and vibration, spoil disposal, air quality (dust) and water quality impacts;
- Impacts on threatened species and endangered ecological communities;
- Impacts on indigenous and non-indigenous heritage;
- Visual impacts and landscaping treatments;
- Flooding impacts;
- Property impacts; and
- Impacts on groundwater.

Other concerns related to detailed design elements, such as at stations, and traffic management.

It is acknowledged that the NWRL has the potential to impact residents and businesses both directly (through property acquisition) and indirectly (through amenity issues such as noise, dust and traffic). Opportunities for community involvement in the development of the proposed NWRL have included an established freecall 1800 phone line, a NWRL website and email address, which have been operational since 2002 under the management of DoP, and now TIDC. Throughout this period consultation has continued with Councils.

TIDC is currently developing a consultation strategy to ensure there is effective, ongoing liaison with the community.

1.10 Report Structure

The structure of this report is as follows:

- Section 2 outlines the planning and development process;
- Section 3 outlines the need for the project;
- Section 4 describes the scope of the project;
- Section 5 provides a preliminary assessment of the key issues arising from the project;
- Section 6 outlines the proposed scope of the EA;
- Section 7 outlines the TIDC's Draft Statement of Commitments for the project.

2 PLANNING AND DEVELOPMENT PROCESS

2.1 Strategic Planning Context

2.1.1 Sydney Metropolitan Strategy

In December 2005, the NSW Government released the Sydney Metropolitan Strategy *City of Cities – A Plan for Sydney's Future*. The Strategy forecasts that by 2013, there will be approximately 15,000 new dwellings in existing areas in Sydney's North West and by 2031, another 55,000 dwellings in existing areas (i.e. a total of 70,000 dwellings). This highlights the forecast growth in established urban areas and the need to provide reliable public transport in these areas.

As part of the Strategy, the Government plans to direct new greenfield development to nominated growth centres in North West and South West Sydney. A key component of these new greenfield areas would be to provide access to local jobs, access to safe and reliable public transport, local schools, shops and parks. The North West Growth Centre, located at the northern extent of the NWRL project, will accommodate a further 60,000 new dwellings and over 300 hectares of land for business / employment uses and a further 250 hectares for industrial uses. This is in addition to development that will occur elsewhere in North Western Sydney, such as at Rouse Hill and in the Balmoral Road Release area.

The Government's intention to plan, and as appropriate, construct the NWRL is documented in the Transport component of the Strategy. It also identifies Castle Hill as an existing regional centre and Rouse Hill as a future regional centre (i.e. a major shopping and business centre for the surrounding area with a full scale shopping centre, council offices, office and residential buildings, central community facilities and a minimum of 8,000 jobs). Norwest Business Park is identified in the Strategy as a specialised centre (i.e. an area that contains research or business activities that perform vital economic and employment roles across the metropolitan area).

The Balmoral Road Release Area, which comprises approximately 400 hectares of predominantly rural zoned land within Baulkham Hills Shire, is planned to be re-zoned for residential, commercial and employment development, and for public services and facilities such as open space and schools. It will house approximately 16,000 people and accommodate approximately 6,150 new dwellings.

The Rouse Hill Development Area will be a mixed-use centre, comprising community, residential, retail, commercial, educational and recreational activities. Approximately 150,000m² of mixed retail / commercial space and 2,000 dwellings are proposed in the development area.

Residential and commercial development in the North West is planned to lead to significant increases in population and employment, with associated increases in travel demand. Development in new release areas will dominate growth. It will be accompanied by in-fill development and, particularly in areas of high land values, re-development of land to new, more intensive uses. Whilst the NWRL is primarily required to service established urban areas in Sydney's North West, it would also service the transport needs of the future growth areas.

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As discussed above, the Government's intention to plan, and as appropriate, construct the NWRL is documented in the Strategy. The NWRL also supports other elements of the Strategy by:

- Providing effective public transport to existing development areas in the North West;
- Providing rail to the two North West regional centres (Rouse Hill and Castle Hill) and a specialised centre at Norwest Business Park;
- Linking the North West to major centres of employment within the 'Global Arc';
- Supporting North West land releases;
- Providing a link to services (eg. health and education); and
- Reducing car dependency and lowering vehicle kilometres travelled.

2.2 NSW Planning Legislation

2.2.1 Part 3A of the EP&A Act

Part 3A of the EP&A Act establishes an assessment and approval regime for major infrastructure projects. Part 3A applies to development that is declared to be a Part 3A project by either a State Environmental Planning Policy or Ministerial Order (Section 75B). The NWRL has been declared to be a project to which Part 3A applies by an order made by the Minister on 7 April 2003.

The assessment and approval process under Part 3A is summarised in **Figure 2-1**.

Concept Plan

Division 3 of Part 3A provides a process for the environmental assessment and approval of concept plans for projects where the Minister has authorised or required a proponent to submit a concept plan under Section 75M of the EP&A Act.

This report has been prepared to support a request that the Minister authorises TIDC to submit a concept plan for the NWRL under Section 75M. The NWRL is a large scale, long-term and complex infrastructure project for which conceptual strategic planning work has already been undertaken. The establishment of a rail corridor through a concept plan approval process will ensure better integration of land use and transport planning in the LGAs affected by the project. Submission of a concept plan will also enable further community involvement in the strategic planning phase and in the refinement of the project. In addition, it will provide the proponent with a greater level of certainty while retaining the necessary flexibility for the refinement of design.

A concept plan is subject to the environmental assessment process prescribed under Part 3A (Section 75N). Once the Minister has authorised or required the submission of a concept plan, the environmental assessment process involves the following key steps:



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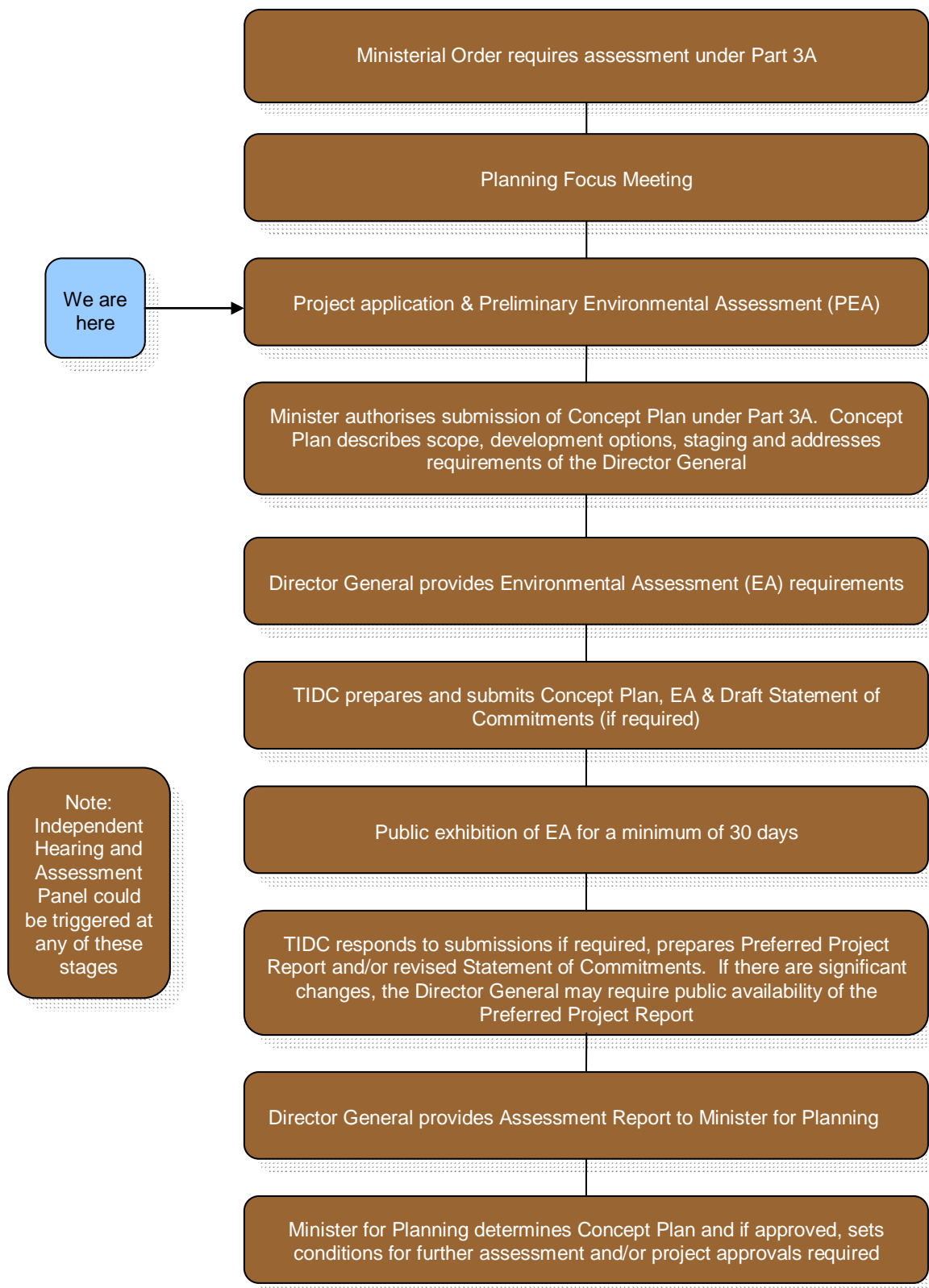


Figure 2-1: Part 3A Planning Process for the NWRL

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- The Director-General will prepare the EA requirements for the project in consultation with other relevant authorities (Section 75F). TIDC will be notified of these requirements which may include a requirement for TIDC to give a Statement of Commitments relating to environmental management and mitigation measures;
- The Minister may constitute an independent hearing and assessment panel to assess any aspect of the project (Section 75G);
- TIDC would then be required to prepare an EA in accordance with the Director-General's requirements (Section 75H(1));
- The EA would be publicly exhibited for at least 30 days. The Director-General would provide copies of submissions and a preferred route report (if required) outlining any changes to the project as a result of the submissions (Section 75H);
- The Director-General would prepare a report to the Minister on the EA for the purpose of the Minister's determination of whether to grant approval to the concept plan (Section 75I);
- The Minister would determine whether to approve or refuse the concept plan.

This report also contains a Preliminary Environmental Assessment upon which the Director-General may prepare EA requirements for the concept plan.

When giving approval for a concept plan, the Minister may make any (or a combination of) the following determinations under Section 75P:

- Further environmental assessment requirements for approval to carry out the project or a particular stage of the project under Part 3A;
- That approval to carry out the project or a particular stage of it is subject to Part 4 or Part 5 of the EP&A Act;
- That no further environmental assessment is required for the project or any particular stage of it (in which case the Minister may approve or disapprove of the carrying out of the project under Part 3A without further application or environmental assessment).

2.2.2 Local Planning Instruments

The proposed NWRL would be located within the Hornsby LGA, Blacktown LGA, Baulkham Hills LGA, and possibly Parramatta LGA, and hence is subject to the provisions of the Hornsby Local Environmental Plan (LEP) 1994, Blacktown LEP 1988, Baulkham Hills LEP 2005 and Parramatta LEP 2001. The proposed NWRL passes through various zones in these LGAs and would be permissible with consent in some zones and permissible without consent in others.

The Ministerial Order of 7 April 2006 making the NWRL proposal subject to Part 3A makes the Minister for Planning the approval authority and depending on how the Minister exercises his discretion under Section 75P, may override the need for consent under Part 4 or approval under Part 5 of the EP&A Act.

Some amendments to planning instruments have been introduced to accommodate the proposed NWRL in the new release areas. Clause 55 of the Baulkham Hills LEP states that "*consent must not be*

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granted to the carrying out of development on land within the Rouse Hill Regional Centre unless the Council has taken into consideration ... the future provision of a rail link to and through the Rouse Hill Regional Centre.”

A Draft LEP for the Balmoral Road Release Area has also been prepared and identifies the proposed rail corridor for re-zoning. The re-zoning accommodates the rail corridor and a new Transit Centre at Burns Road. One of the aims of the Draft LEP is “*to support those residential neighbourhoods and the future population with a range of urban support uses and services including employment areas, transport, public open spaces, commercial, educational and utility services*”. The proposed NWRL would provide a reliable and efficient public transport service for Sydney’s North West and hence, is consistent with this aim. The Draft LEP also introduces a new clause relating to development within

60m of the rail corridor which states that “consent must not be granted to the carrying out of development unless the consent authority is satisfied that the development incorporates appropriate noise attenuation and vibration minimisation measures, and the design and location of the development is such that it will not interfere with the operation of the rail line and associated facilities”.

2.2.3 Regional and State Planning Instruments

A number of Regional Environmental Plans (REPs) and State Environmental Planning Policies (SEPPs) are relevant to the proposal. These include:

- SREP 19 – Rouse Hill Development Area;
- SREP 20 – Hawkesbury-Nepean Catchment (No. 2 – 1997);
- SEPP 11 – Traffic Generating Developments;
- SEPP 19 – Bushland in Urban Areas;
- SEPP 44 – Koala Habitat Protection; and
- Draft SEPP (Sydney Region Growth Centres) 2006.

The Draft SEPP (Sydney Region Growth Centres) 2006 was recently exhibited. It sets out the statutory plans and processes that will apply in the growth centres. One of the aims of the Draft SEPP is to co-ordinate the release of land for urban and employment development in the North West and South West growth centres of the Sydney Region. The Draft SEPP includes revised precinct boundaries and constraints maps showing areas where development is constrained by flooding and/or conservation. The last kilometre of the NWRL to Rouse Hill and the stabling facility are within the boundaries of the Growth Centre.

A further amendment to SEPP 63 - Major Transport Projects is also likely to include the NWRL to preserve the identified rail corridor.

2.2.4 State Legislation

Table 2-1 identifies the licences and approvals that may be required for the construction and operation of the proposed NWRL.

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Table 2-1: Summary of Potential Approval Requirements under NSW Legislation

Provision	Approval Requirement	Required Action	Agency
Protection of the Environment Operations Act, 1997			
Section 48 ¹	Environment Protection Licence for construction	Apply for an EPL.	Department of Environment & Conservation
Water Act, 1912			
Section 10	Approval for extraction of water from a river or lake.	Apply for approval if water is required to be sourced through direct extraction from surface waters.	Department of Natural Resources
Section 116	Approval to sink or enlarge a bore.	Apply for approval if water is required to be sourced through bores.	Department of Natural Resources
Roads Act, 1993			
Section 138 ¹	Consent to erect a structure or carry out a work in, on or over a public road.	Apply for consent	Roads and Traffic Authority
Contaminated Land Management Act, 1997			
State Environmental Planning Policy No. 55	Consent for remediation works (under EP&A Act).	Where remediation of contamination is required as part of the works, consent may be required under SEPP 55. This SEPP could require consent from Council for the remediation works.	Relevant Council

NB. The operation of the NWRL would be covered through required amendments to the existing Environment Protection Licence held by RailCorp.

If approval to carry out the project is granted under Part 3A of the EP&A Act, the following authorisations would not be required:

- A permit under Section 201, 205 or 219 of the *Fisheries Management Act 1994*;
- An approval under Part 4, or an excavation permit under Section 139, of the *Heritage Act 1977*;
- A permit under Section 87 or a consent under Section 90 of the *National Parks and Wildlife Act 1974*;
- An authorisation referred to in Section 12 of the *Native Vegetation Act 2003* (or under any Act to be repealed by that Act) to clear native vegetation;
- A permit under Part 3A of the *Rivers and Foreshores Improvement Act 1948*;
- A water use approval under Section 89, a water management work approval under Section 90 or an activity approval under Section 91 of the *Water Management Act 2000*.

¹ Depending on how the Minister exercises his powers under Section 75P of the EP&A Act, consent under Section 138 of the *Roads Act 1993* and an Environment Protection Licence under the *Protection of the Environment Operations Act 1997* may not be able to be refused if it is necessary for carrying out an approved project and may be required to be substantially consistent with the approval under this Part, as a result of Section 75V of the EP&A Act.

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Whilst authorisations would not be required, TIDC would closely consult with the agencies that administer these Acts to ensure the intent of the Acts are observed.

2.3 Commonwealth Legislation

Potential impacts of the proposed NWRL that may trigger assessment under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) are limited to potential impacts on Commonwealth land and ecological impacts.

There are four sites adjacent to the alignment of the proposed NWRL that are under the control of the Commonwealth. Three of these sites are located in the vicinity of the tunnel section and one site is located in the vicinity of the surface section of the route. These sites would not be affected by the physical works associated with the proposed NWRL.

The flora and fauna assessment completed in 2003 concluded that the proposal is not likely to affect the habitat or prey base of migratory species in the locality. The assessment also concluded that there are unlikely to be significant impacts on nationally threatened species due to the small quantity of habitat likely to be impacted relative to the extent of comparable and better quality habitat throughout the region, and secondly that the site contains only potential foraging habitat and does not cater for breeding life-cycle requirements of these species.

Three nationally threatened ecological communities are in the study corridor, namely Cumberland Plain Woodland, Turpentine-Ironbark Forest in the Sydney Basin Bioregion and Blue Gum High Forest of the Sydney Basin Bioregion. The largest and highest quality areas of Cumberland Plain Woodland were identified at the end of the route to the west of the proposed Rouse Hill stabling yards. A number of other, generally lower quality, portions of this community may be removed as part of the proposal. The Turpentine-Ironbark Forest community is poorly represented within the study area and is located in parkland referred to as the Beecroft Village Green on Beecroft Road. The park is regularly mowed and maintained and it is within the tunnel section of the alignment. The community contains only representative trees and there is no natural shrub or groundcover vegetation and it is unlikely that tunnel construction operations beneath the park would impact on the root structure of the trees. An area of Blue Gum High Forest is located adjacent to the proposed Franklin Road construction site but it would not be directly affected by the proposal. This site contains good quality remnant and regrowth vegetation that is considered worthy of conservation.

As a precautionary measure, a referral to the Environment Minister under the EPBC Act would likely be made.

3 NEED FOR THE PROJECT

The NWRL is primarily needed to service established urban and commercial areas in Sydney's North West. It would also cater for future growth areas such as the North West Growth Centre, and the Balmoral Road and Rouse Hill Regional Centre Release Areas. The main benefits for residents of the North West would include:

- Improved accessibility to a trunk public transport line and provision of an alternative to private car usage;
- Improved accessibility to the 'Global Arc' centres (Macquarie / North Ryde, Chatswood, St Leonards, North Sydney, the CBD and airport) to access employment, educational and cultural facilities;
- Cost and travel time savings;
- Reduced congestion on existing rail lines, in particular the Main Western Line and reduced need for investment to increase capacity on the Richmond and Main West Line to accommodate travel from the North-West;
- Reduced congestion on the road network; and
- Air quality benefits arising from provision of an alternate to private vehicles and consequential vehicle emissions.

3.1 Population and Employment Growth in Sydney's North West

Sydney's North West is in the middle of a 60 year expansion (1970-2030) with significant population and employment growth. As a result, there is already a need for a mass trunk public transit scheme to address car dependency and positively influence travel behaviour.

It is predicted that by 2031, the population of Sydney's North West will be 475,000, three times the 1981 population of 150,000 and Sydney's population will reach 5.35 million. 18% of Sydney's anticipated residential growth is expected to occur in the North West. From 1981 to 2031, employment is expected to have increased by nearly 200% from approximately 120,000 to 345,000, with substantial growth in centres including Castle Hill and Norwest Business Park.

The North West sector of Sydney is an area where there will be ongoing growth in existing residential areas through consolidation and redevelopment. Further development is also likely to occur in the Castle Towers Shopping Centre and Norwest Business Park. Hence, the NWRL would predominantly service established areas. It has been designed such that approximately two thirds of the proposed route traverses already developed land. The western end of the route would service the new growth areas.

Figure 3-1 illustrates the predicted population and employment growth in Sydney's North West.

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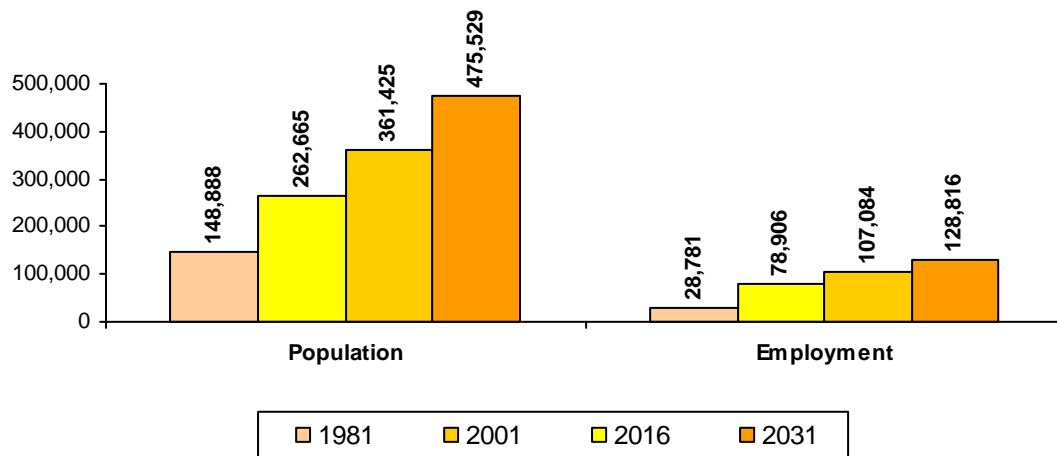


Figure 3-1: Population and Employment Growth in North West Sydney (1981 – 2031)

Source: Department of Planning, 2005

3.2 Travel Demand

It is anticipated that there will be a strong demand for travel from Sydney's North West to the 'Global Arc' centres to access employment, educational and cultural facilities. The strong growth in employment within the North West will also attract work trips into the region. **Figure 3-2** illustrates the predicted employment growth in the 'Global Arc'.

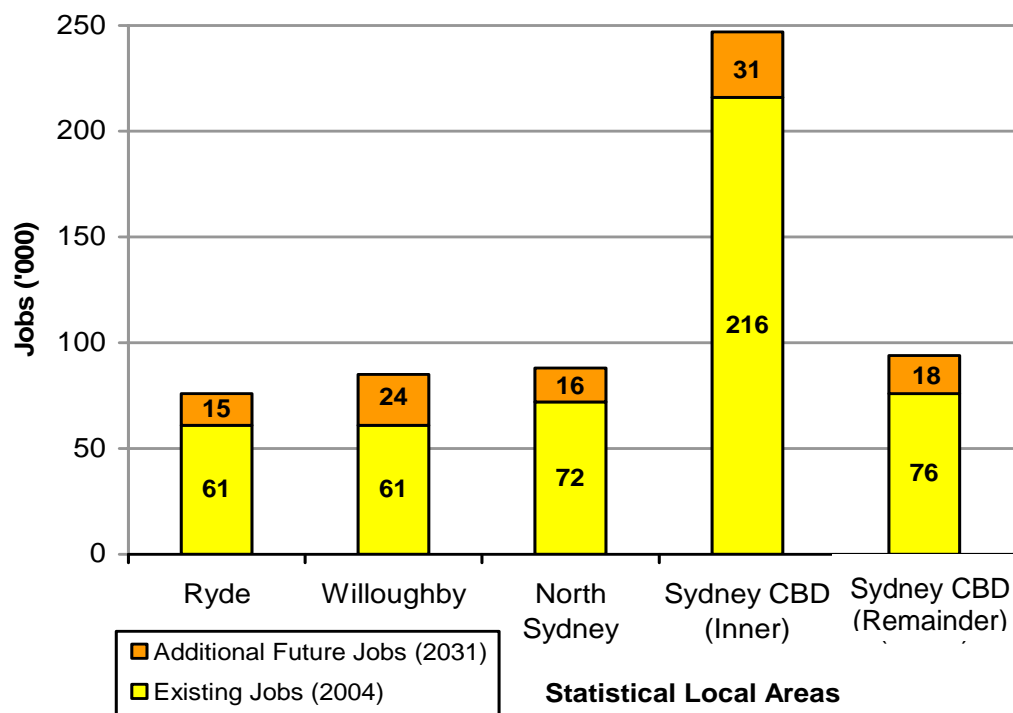


Figure 3-2: Predicted Employment Growth in 'Global Arc'

Source: Transport Population and Data Centre (TPDC, DoP) Employment Forecasts, September 2004

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Employment in the 'Global Arc' (based on the statistical local areas from Ryde to Sydney CBD) is forecast to grow by 21%, from the 486,000 jobs in 2001 to 590,000 jobs in 2031. This growth has consequences for travel demand between North West Sydney and the employment centres to the east. In 2001, 23% of the 116,500 daily trips to work from the North West were to Sydney's 'Global Arc'. In comparison, 15% of trips were to Parramatta and 10% to Blacktown. In 2031, it is forecast that the 'Global Arc' will be the destination for 25% of the 164,000 daily trips to work, whilst Parramatta and Blacktown will both account for 12% of trips (refer to **Figure 3-3**). There is likely to be significant demand for other sorts of trips (i.e. non-work trips).

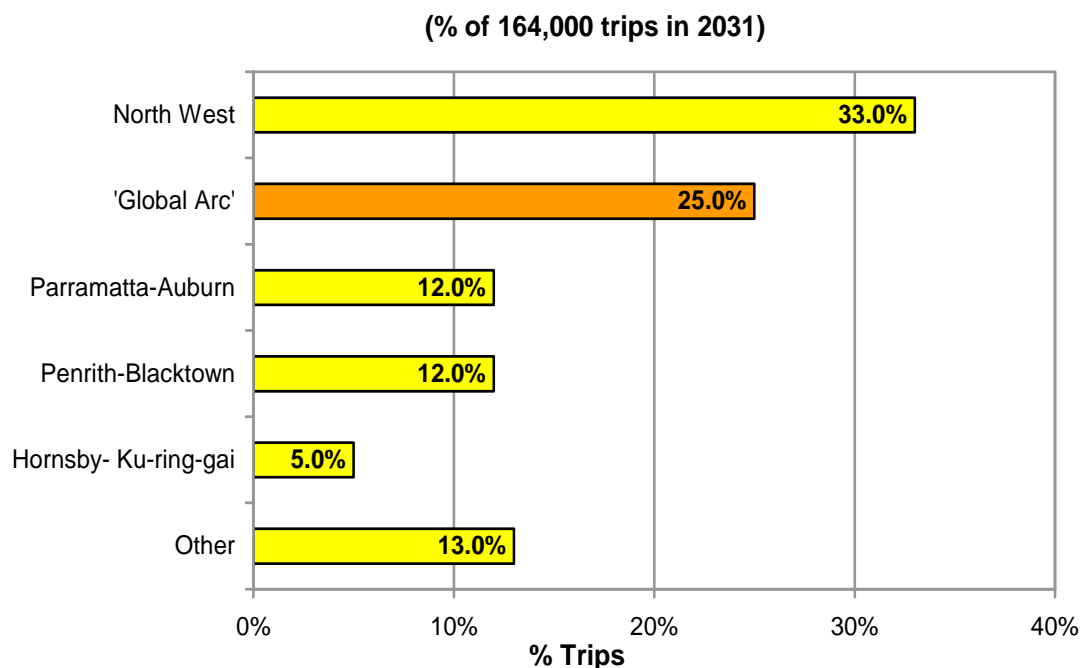


Figure 3-3: Key Destinations in Sydney from the North West

Source: TPDC 2001 JTW

Residents of North West Sydney have the highest levels of car ownership per household in the Sydney metropolitan area. In 2003, only 7% of the total household trips from residents of Sydney's North West were on public transport; less than half that of residents in eastern Sydney. On average, each household in the North West makes 6.8 vehicle driver trips per day with each resident travelling 27 kilometres per day by vehicle. In comparison, households in eastern Sydney make 3.3 trips per day with residents each travelling an average of only 11 kilometres each day. The provision of a new public transport trunk main in the North West is likely to reduce car dependency and hence, the number and length of car journeys.

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3.3 Travel Times

The NWRL will provide considerable savings in travel time, most notably for those travelling between the North West and the northern centres of the ‘Global Arc’, such as Macquarie Park, Chatswood and St Leonards.

Figure 3-4 shows four example journeys by public transport in the morning peak, assuming 2008 train timetable (ECRL operational).

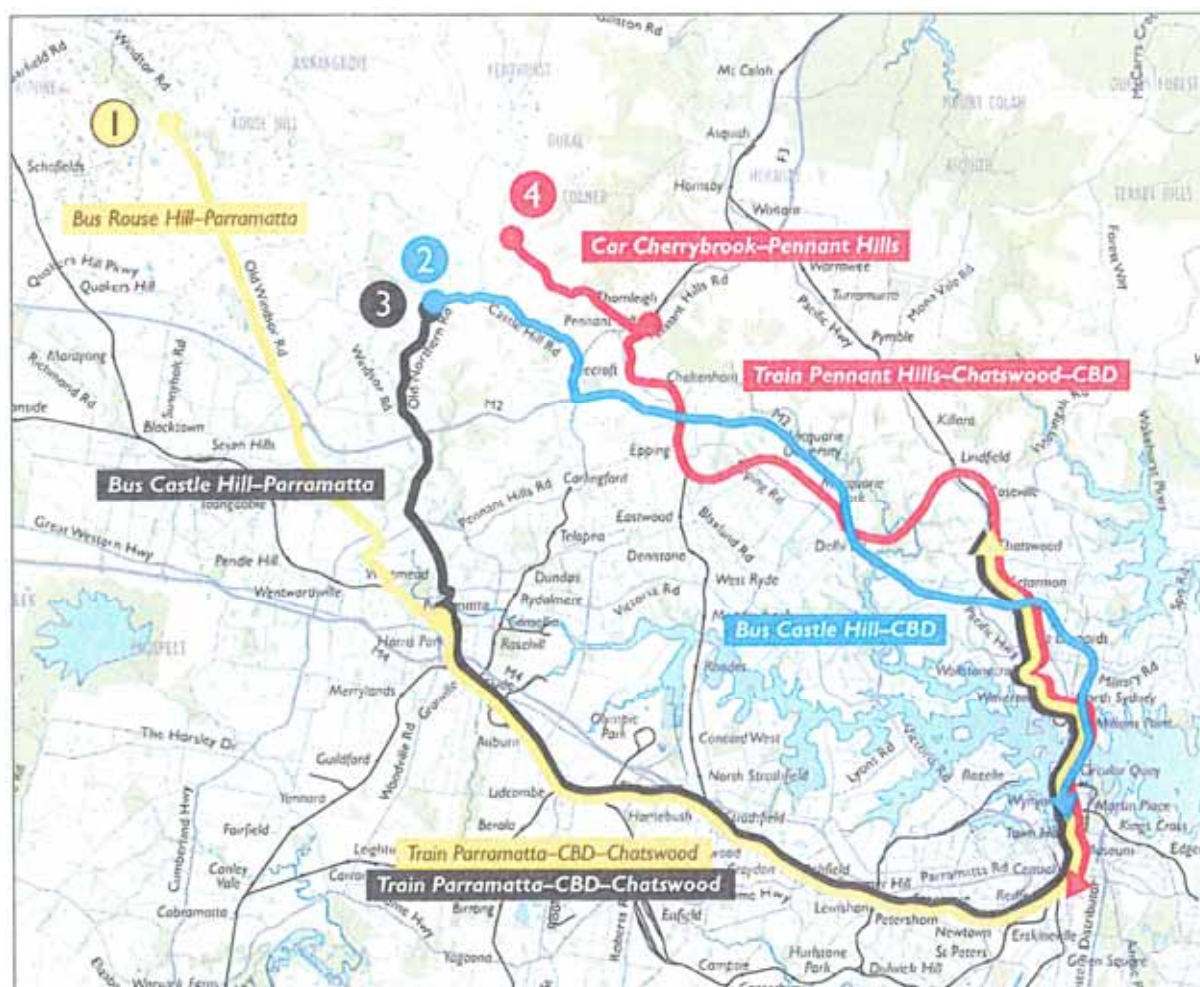


Figure 3-4: Current Travel Scenarios from the North West to Key Centres

In *Example Journey 1*, a commuter travelling via public transport from Rouse Hill to Chatswood in the morning peak would travel by bus to Parramatta and then by train to Chatswood via the CBD. This equates to an estimated travel time of 86 minutes. With the NWRL, this trip would take 39 minutes, that is, a travel time saving of 47 minutes per one-way trip.

In *Example Journey 2*, a commuter travelling from Castle Hill to the CBD via the M2 Motorway on the Westlink CityExpress Bus Service would take 70 minutes. Travel times with the NWRL would be 45 minutes, providing a travel time saving of 25 minutes per one-way trip.

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In *Example Journey 3*, a commuter travelling from Castle Hill to the CBD would travel by bus from Castle Hill to Parramatta and then by train to the CBD. This equates to an estimated travel time of 72 minutes. With the NWRL, this trip would take 45 minutes, providing a travel time saving of 27 minutes.

In *Example Journey 4*, a commuter travelling from Cherrybrook to the CBD would travel by car from Cherrybrook to Pennant Hills and then by train (via the ECRL) to the CBD. This equates to an estimated travel time of 59 minutes. With the NWRL, this trip would take 45 minutes, providing a travel time saving of 14 minutes.

3.4 Access Times

The NWRL would provide people within the North West area with shorter and more convenient access to the rail system, bringing rail within walking distance for many trips and also reducing bus and car access times. These reduced access times, when quantified, accounted for more than two-thirds of overall economic benefit for the NWRL.

As illustrated in the **Figure 3-5**, research undertaken by RailCorp has shown that the rail mode share of work trips in Sydney increases as the distance from residence to station decreases. At a distance of less than three kilometres from a station the mode share increases sharply from less than 10% to as much as 35%.

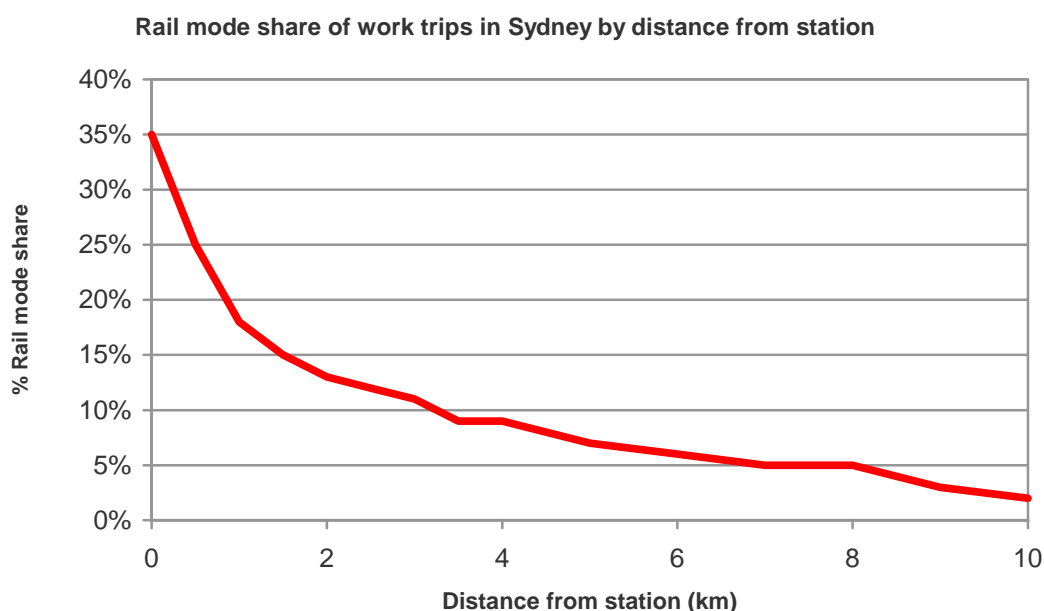


Figure 3-5: Rail Mode Share of Work Trips in Sydney by Distance from Station

Figure 3-6 and **Figure 3-7** illustrate that a significant proportion of residents of the North West (shown with the red line) live outside of the three kilometre zone of the existing rail network. Rail users either catch a bus or drive to stations on the Main North, Richmond or Main West lines. As is

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illustrated in the map with the NWRL, access to the rail network for a significant part of the North West is greatly improved. In 2021, approximately 196,000 residents and 55,000 jobs would be located within 3 kilometres of the six proposed NWRL stations.

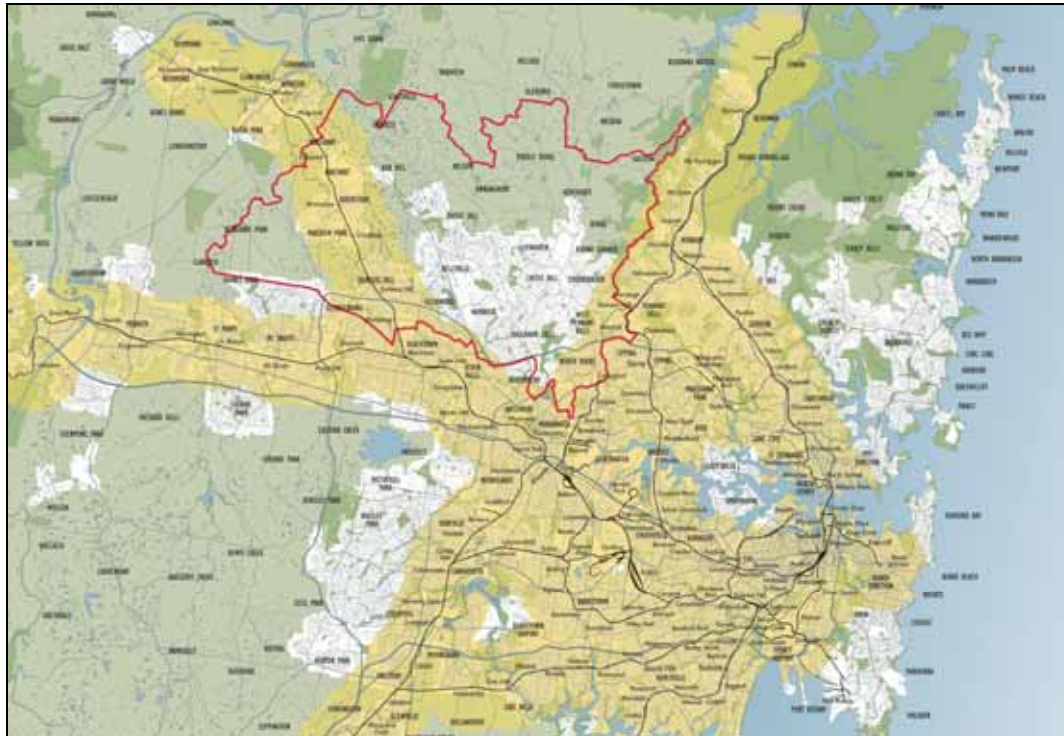


Figure 3-6: Three Kilometre Catchments of Existing Rail Network

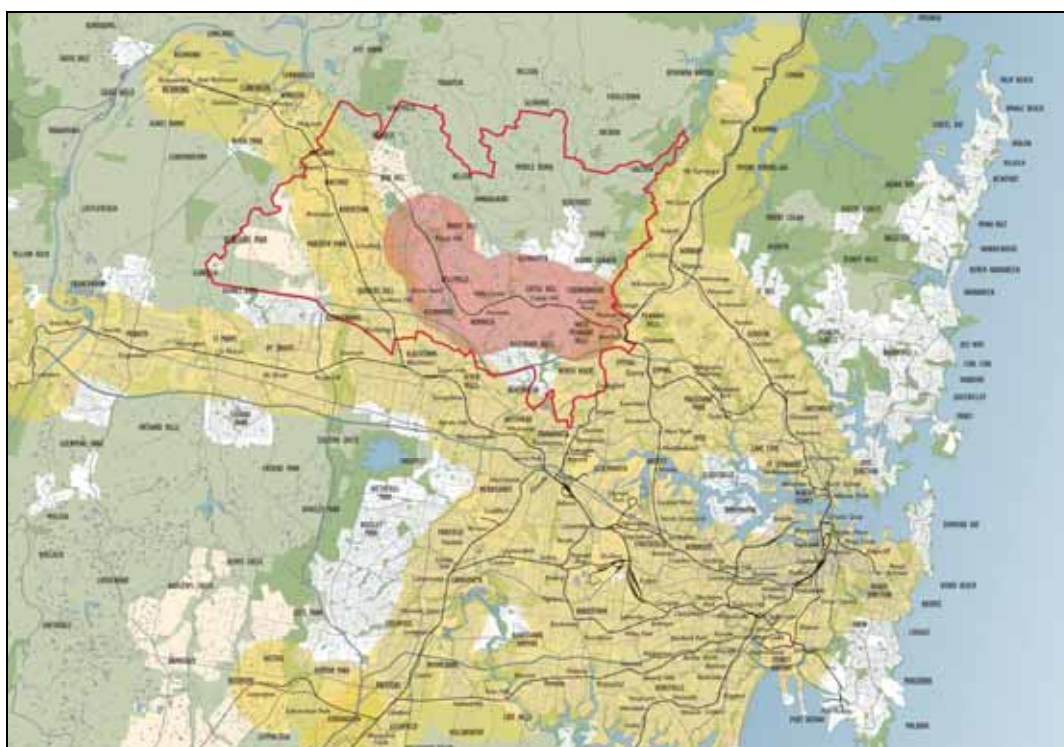


Figure 3-7: Three Kilometre Catchments of Rail Network with NWRL

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The Patronage Study concluded that with the NWRL, the average access distances to a rail station within the study area decreases by about 50% across the North West from about 12 kilometres to 6 kilometres. Accordingly, access times along the NWRL corridor would be substantially reduced by as much as 30 minutes as people are able to walk to stations or use a short bus or car trip.

This would be an important factor in moderating the growth in vehicle kilometres from the North West. The area currently has a large and growing population with limited access to effective public transport. The NWRL would assist in reducing car dependency for existing commuters and also cater for the future urban expansion planned in the Sydney Metropolitan Strategy.

3.5 Existing Transport Network Constraints

The existing transport infrastructure capacity is insufficient to meet the expected growth in North West Sydney. Peak demand from buses, commercial and private vehicles cannot be adequately accommodated and hence, the operation and benefits of the North West Transitway, dedicated bus lanes and intersection priority for buses will be affected. The existing rail network will also be affected by increased growth.

Whilst the proposed North West Transitway will alleviate some congestion, it will focus on providing access to Parramatta and Blacktown CBDs. The Transitway will have separate but complementary roles to the proposed NWRL, which will provide a trunk link to the wider Sydney transport network and direct access to the centres forming the 'Global Arc'.

Whilst the upgrade of Windsor / Old Windsor Road and the Westlink M7 will alleviate some of the traffic congestion, the road network will still be under increasing strain as a result of the growing levels of road traffic if effective mass public transport is not provided to the growing North West sector.

The Main North, Main West and Richmond Lines currently draw indirect patronage from Sydney's North West. Without the proposed NWRL, rail demand will be well in excess of capacity along the Richmond Line and parts of the Main West Line by 2021. Hence, there will be either significant overcrowding on trains east of Blacktown and on the Main North and Richmond Lines, or a move to private motor vehicles as rail commuters become frustrated with the overcrowding.

It is forecast in 2021 that the average train loading in the AM peak period (people to seated capacity) on the Main West Line would be reduced from 171% to 150% and from 106% to 103% on the Main North Line. This needs to be understood in the context of RailCorp's Community Services Obligation Contract with Government that requires that load factors do not exceed 135% of seating capacity and that no passenger should stand for more than 20 minutes except by choice. Without NWRL there would need to be investment on these existing lines to accommodate extra travel demand.

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3.6 Road User Benefits

A substantial proportion of the total benefits associated with the NWRL would be received by road users from road decongestion. Decongestion benefits were forecast to arise from:

- Shorter access trips to nearby rail stations; and
- Diverting trips from car and bus to rail.

The NWRL would also provide a significant benefit to areas in close proximity to the existing Main North Line. Residential areas surrounding stations such as Beecroft, Thornleigh and Pennant Hills currently experience high levels of on-street parking by commuters travelling from areas to the west and north-west of the line. The NWRL would reduce the need for commuters from the North West area to park at Beecroft, Thornleigh and Pennant Hills by providing a direct rail service from many of these areas or by diverting these travellers to stations on the NWRL where appropriate commuter parking facilities would be provided.

The reduced congestion and reduced travel lengths for car access to stations would also have flow-on benefits in the form of reduced air pollution.

4 DESCRIPTION OF THE PROJECT

As stated previously, the alignment of the proposed NWRL that is the subject of this application is referred to as the 2017 Reference Scheme. The project description provided in this chapter is based on this scheme.

The proposed NWRL would be the principal trunk public transport line in Sydney's North West. It would connect with the Main North Line between Beecroft and Cheltenham Stations and terminate at Rouse Hill Town Centre. The rail link would be twin track, approximately 23km in length (from the southern point of the Main North Line quadruplication between Epping and Beecroft) and as stated in **Section 1.7** it would include:

- A 3 km surface quadruplication of the Main North Line between Epping and Beecroft, including station upgrading such as an easy access upgrade at Cheltenham Station and new rail bridge over the M2.
- A 16 km section in tunnel from the Main North Line to west of the Norwest Business Park;
- A 4 km surface section from west of Norwest Business Park to Rouse Hill;
- Six new stations (Franklin Road, Castle Hill, Hills Centre, Norwest, Burns Road and Rouse Hill);
- A train stabling facility at Rouse Hill, which would include facilities for cleaning and maintenance of stabled trains; and
- Ancillary tunnel support facilities such as tunnel ventilation, transformers and a water treatment plant.

Excluding the quadruplication, a 40 metre wide corridor, widening to 60 metres at stations, has been identified for planning purposes.

The current alignment of the NWRL is shown in **Figure 4-1**. More detailed drawings are provided in **Appendix B**.

4.1 Alignment

Important considerations in designing the NWRL were the need to obtain a direct alignment through undulating terrain that is both constructible and minimises potential impacts on developed areas. The eastern part of the study area is already established and would be significantly impacted, particularly in terms of property acquisition, by a surface alignment. The western part of the study area is largely undeveloped and provides opportunities to incorporate the NWRL into land use planning. Due to the cost implications of constructing the new rail line in tunnel, surface sections have been proposed in areas which have yet to be developed.

The current alignment was developed through a structured route selection process that included the refinement of the alignment to its current proposed position. The following factors were considered in this process:

- Appropriate engineering and operational standards, so that future passengers enjoy a high quality, safe and convenient trip, and efficient and cost-effective services are able to be provided;

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- The linkages between existing and planned centres in the North West and selection of a route that maximises its use by people;
- Recognition and minimisation of impacts on existing communities, while taking advantage of the opportunities presented in areas which are currently being planned;
- Maximising appropriate urban development opportunities at key nodes such as Rouse Hill and Norwest Business Park; and
- The environmental impacts likely to arise from the construction and operation of the rail link, such as noise and vibration, ecological impacts (including flora and fauna), water quality and impacts on local character.

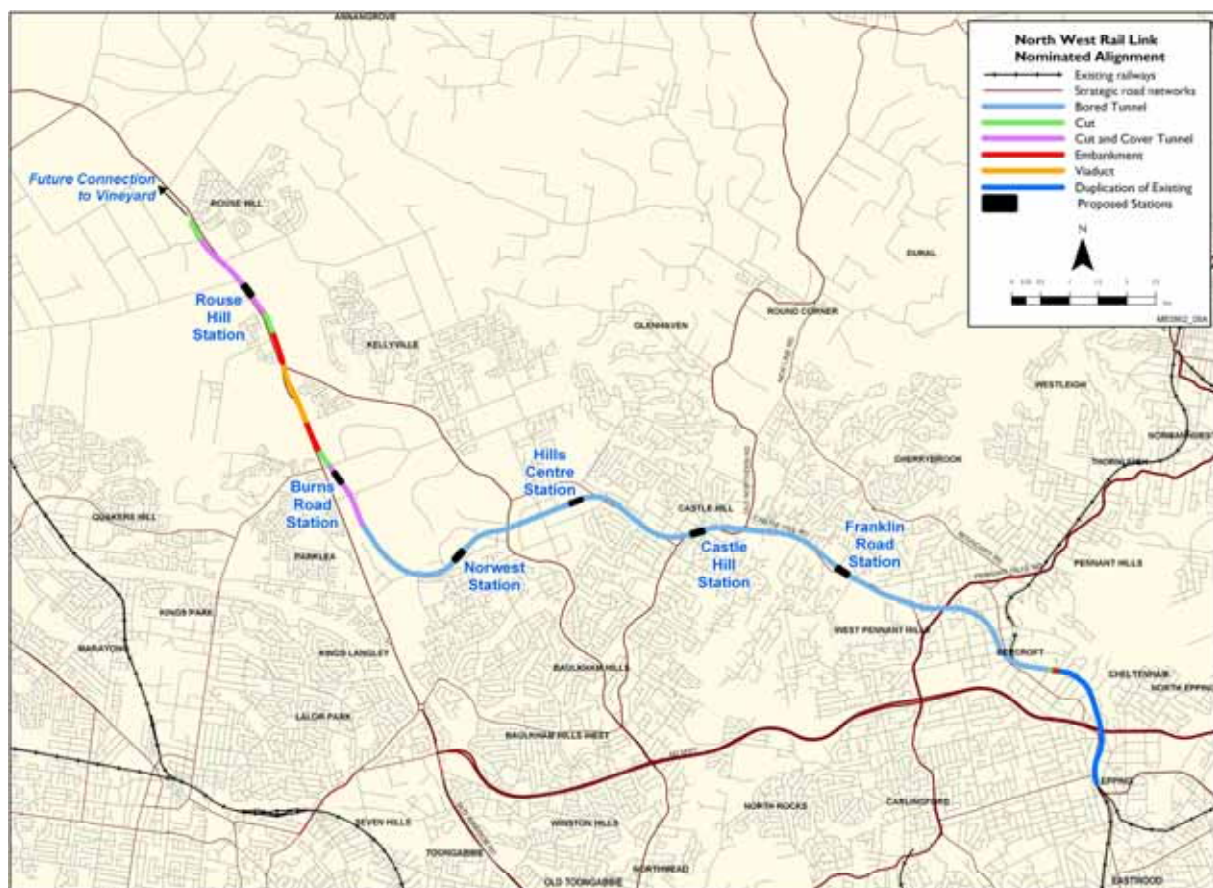


Figure 4-1: Proposed NWRL Alignment

The project commences at Epping with a 3 km surface quadruplication of the Main North Line between Epping and Beecroft (refer to **Figure 4-2**). The quadruplication requires a new rail bridge over the M2 and station upgrades such as an easy access upgrade to Cheltenham Station. The quadruplication works would remain within the rail corridor. TIDC is also investigating alternative horizontal and vertical alignment options to the 2017 Reference Scheme west of the proposed Castle Hill Station, as part of the technical reviews and engineering design development.

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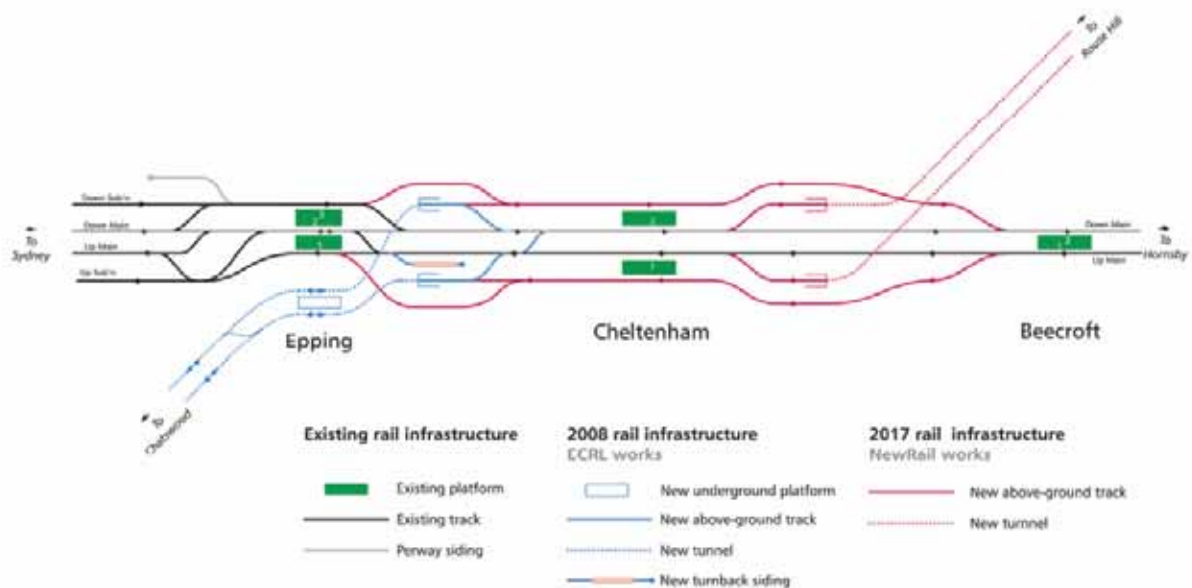


Figure 4-2: Indicative Infrastructure Requirements Between Epping and Beecroft

The NWRL branches off the Main North Line between Cheltenham Station and Beecroft Station. The tunnel portal, which establishes the commencement of the underground section of the railway, would be located within the existing rail corridor, north-east of the tennis courts on The Crescent at Beecroft. The rail link would pass beneath Beecroft Village Green and Devlin's Creek, head west towards Thompson's Corner and then proceed to the first proposed station at Franklin Road, Cherrybrook near the intersection of Franklin Road and Castle Hill Road.

From Franklin Road the preferred route continues underground in a north-westerly direction, generally following the alignment of Castle Hill Road to Castle Hill Station. The new station would be located under the Castle Hill Town Centre at the corner of Old Northern Road and Castle Hill Road. A typical cross section of the tunnel component of the proposal can be seen in **Figure 4-3**.

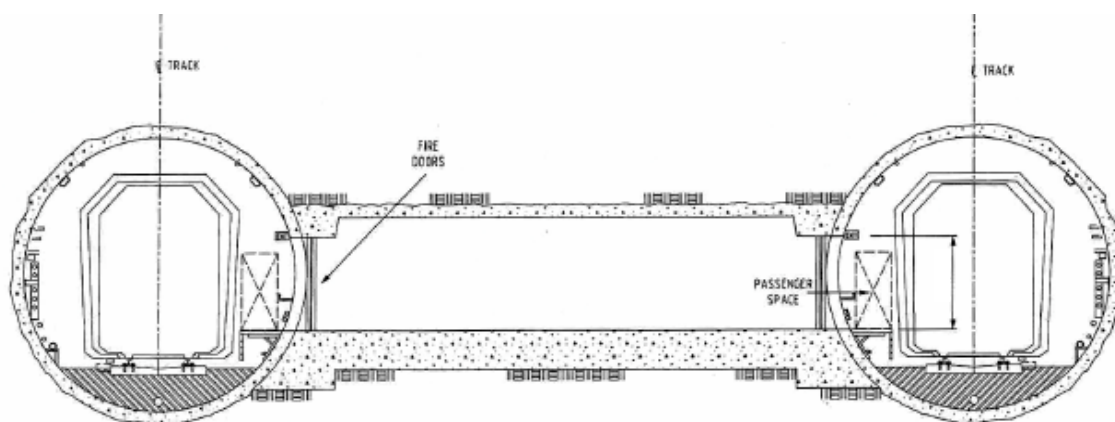


Figure 4-3: Typical Twin Tunnels Cross Passage

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Beyond Castle Hill, the alignment curves beneath the Castle Towers Shopping Centre, then follows the alignment of Showground Road to the proposed Hills Centre Station. The alignment passes beneath Cattai Creek and follows Salisbury Road until the junction with Windsor Road, before continuing under Norwest Boulevard to Norwest Station, close to Norwest Business Park.

From Norwest Station, the alignment continues beneath Norwest Boulevard towards Old Windsor Road before curving to the north to pass beneath Northridge Avenue. The alignment then continues in bored tunnel to a tunnel portal located just to the north of Celebration Drive. From there, the alignment continues in a cut and cover tunnel beneath Balmoral Road to the southern end of Burns Road Station. Subject to further technical review and design development, temporary realignment of Elizabeth Macarthur Creek may be required during construction of the cut and cover tunnel.

After Burns Road Station, the alignment passes beneath Burns Road and continues in open cut or on slight embankment before proceeding onto a viaduct over Samantha Riley Drive. The alignment continues on the viaduct from Samantha Riley Drive and over the Windsor Road / Old Windsor Road intersection to minimise impacts on the Elizabeth Macarthur / Caddies Creek floodplain. The viaduct would be located adjacent to the route of Old Windsor Road and the Parramatta to Rouse Hill arm of the North West Transitway.

From the overbridge at the intersection of Windsor Road and Old Windsor Road, the alignment transitions from viaduct to cut and cover tunnel and follows Windsor Road and the alignment of the North West Transitway to Rouse Hill Station in the proposed Rouse Hill Town Centre. After Rouse Hill Station, the alignment passes beneath the dual carriageway of Windsor Road in cut and cover tunnel, to a stabling facility located in cutting west of, and roughly parallel to, Windsor Road. Bovis Lend Lease, who are currently developing the Rouse Hill Regional Centre, has informally approached TIDC regarding a potential surface station at Rouse Hill. This may affect the vertical alignment through this section and will be investigated further as part of the design development.

4.2 Stations

The proposed NWRL would include six stations at the following locations:

- Franklin Road Station - next to Castle Hill Road, Cherrybrook;
- Castle Hill Station - in the town centre precinct under Castle Hill Park;
- Hills Centre Station - immediately near the Hills Centre;
- Norwest Station – under Norwest Boulevard in the vicinity of Norwest Marketown;
- Burns Road Station – near the Old Windsor Road, Burns Road and Sunnyholt Road intersection; and
- Rouse Hill Station (previously referred to as Mungerie Park) - at the new town centre.

4.2.1 Franklin Road Station

Franklin Road Station would be an underground station, in the town centre, located to the north of Castle Hill Road, west of Franklin Road and east of Robert Road. This station would service the

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population catchments of Cherrybrook and West Pennant Hills. The station in this area represents an opportunity to provide convenient bus access and potential park-and-ride facilities.

4.2.2 Castle Hill Station

Castle Hill Station would be an underground station, located within the Town Centre beneath Castle Hill Park. Castle Towers Shopping Centre is located immediately to the north-west of the station location. The opportunity exists to provide underground walk-ways for direct access into the shopping centre and the south side of Old Northern Road. Castle Hill Station would be a central hub for feeder bus services including non-transitway local bus services. Bus services using the Blacktown to Castle Hill arm of the North West Transitway are proposed to terminate adjacent to the station. Commuter parking facilities would not be provided at this station.

4.2.3 Hills Centre Station

Hills Centre Station would be an underground station, located between the Hills Centre and the Castle Hill Showground. The station has good access to key surrounding roads and could serve as a potential park-and-ride station. The station could also provide quality pedestrian links to the Castle Hill employment area to the west of the station.

4.2.4 Norwest Station

Norwest Station would be located underground within the Norwest Business Park, adjacent to the existing Hillsong Church complex and retail shopping centre, and would be a short walk from the centre of the Norwest Business Park's commercial development. It is likely that there will be additional bus services in this area. No park-and-ride facilities are proposed at this location. However, there is potential to investigate shared use of parking.

4.2.5 Burns Road Station

Burns Road Station would be located immediately to the south of Burns Road within the Balmoral Road Release Area. A station location is provided for in the Draft LEP for the Balmoral Road Release Area. The station would form a major transport interchange for the NWRL with the bus transitways connecting Blacktown to Castle Hill and Parramatta to Rouse Hill, and it would be located in a deep cutting. Further design work is required at this station to ensure that it integrates effectively with the bus transitways and surrounding landuse. Potential park-and-ride locations are being considered as part of the design at Burns Road.

4.2.6 Rouse Hill Station

Rouse Hill Station would be the most north-westerly station on the NWRL. The 2017 Reference Scheme is for an underground station parallel to Windsor Road, situated within an area that will be the focus of the new Rouse Hill Town Centre being developed by Bovis Lend Lease in partnership with the NSW Government. A Property Development Agreement between the developer and the NSW Government was executed in November 2005 and provides for the NWRL corridor and transit centre within the Rouse Hill Town Centre. Stage 1 of the town centre development is planned for completion

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by early 2008 and it is anticipated that the total project would take approximately 12- 15 years to complete.

Bovis Lend Lease has informally approached TIDC regarding an alternative, surface proposal for the Rouse Hill Station. This could result in modifications to the station design and the vertical alignment of the rail line. The merits of this alternative will be assessed as part of the design development.

4.2.7 Other Potential Stations

The provision of an additional above ground station at the intersection of the recently completed Samantha Riley Drive and Old Windsor Road was investigated as part of the earlier design development. The current proposal does not preclude the future provision of an additional station at this location. However, due to the proximity of this potential station location to the proposed Burns Road Station (less than 800 metres), it is unlikely that it would at this stage, provide sufficient benefits.

4.3 Train Stabling

A train stabling facility, which would be positioned in cut, would be provided to the west of Windsor Road at Rouse Hill on an alignment that could be utilised in any future extension of the proposed NWRL to the Richmond Line. The stabling yard would be located within Area 20 (an area that has been earmarked for future residential development with the North West Growth Centre). The stabling yard would also include facilities for the cleaning and maintenance of stabled trains, and for the use of crews.

A stabling facility in this location is essential to the operations of the NWRL. Trains would be housed at both the stabling facility and Rouse Hill Station overnight. The stabling facility planned for 2017 would initially accommodate up to 6 trains, with Rouse Hill Station accommodating a further 2 trains. This is enough to accommodate the 2020 stabling demand of 8 trains and the design does not preclude future expansion of stabling facilities. It is estimated that future capacity for stabling (2031) to accommodate an extension to Vineyard could be 14 trains. Longer term stabling facility sites would be considered as part of the proposed extension of the NWRL to the Richmond Line.

4.4 Ancillary Tunnel Support Facilities

Additional ancillary facilities associated with the tunnel including tunnel service / maintenance facilities, ventilation at stations, traction power supply, at least one new sub-transmission bulk supply, emergency access and egress at stations and a water treatment plant(s), may also be required (subject to further design work). Tunnel ventilation would be required every 2.5 to 3 kilometres to meet fire controls for use in the event of an emergency. Where practicable, the ventilation would be included as part of the station design. However, opportunities to incorporate the ventilation into industrial precincts may need to be investigated. Transformers for power supply to the tunnel would be required every 2 to 3 kilometres. A water treatment plant(s) would be required to treat tunnel inflow water prior to discharge into nearby creeks. Further details on the location and design of these facilities would be described in the EA.

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4.5 Access and Parking

In 2021, approximately 196,000 residents and 55,000 jobs would be located within 3km of the six proposed stations. However, many potential NWRL passengers would live beyond walking distance of the proposed stations (generally around 800m). These passengers would access the stations by bus or car. Bus services would operate on strategic bus corridors, feeder and local bus routes that run to and from the stations. North-West Transitway bus services which would link Parramatta, Blacktown and Rouse Hill, would also transport passengers to Rouse Hill, Burns Road and Castle Hill Stations. The extent of bus services would depend on the role of the station. The North-West Transitway would be a complementary service to the NWRL and consultation with relevant stakeholders would occur to ensure its integration with NWRL.

The high level of car ownership in Sydney's North West indicates that the majority of rail patrons are likely to access the NWRL stations by car. The forecast break-down of different access modes for the NWRL is presented in **Table 4-1**.

Table 4-1: Access Modes

Mode of Access	NWRL Forecasts (%)	NWRL Demand (2021 AM Peak 2hr Entry)
Walk	28	4,200
Bus	24	3,600
Car	48	7,200
Other	0	
Total	100	15,000

Source: Commuter Parking and Other Mode of Access Requirements (Draft Report) (PB, 2006)

Table 4-1 illustrates the high proportion of passengers that are expected to access the NWRL by car. Hence, car parking facilities (both park-and-ride and kiss-and-ride) would need to be provided in some cases.

New commuter car parking facilities are being considered at Franklin Road, Hills Centre and Burns Road Stations but not at the established or proposed centres, primarily to avoid traffic congestion. There would also be kiss-and-ride points at stations for passengers being dropped off or picked up by car.

Refer to **Section 5.1.4** for further details on potential traffic impacts and management measures.

4.6 Possible Future Expansion

The NWRL may be extended in the future to service new suburbs within the North West Growth Centre. The extended rail link would most likely connect Rouse Hill Station to Vineyard Station on the Richmond Line. The Government's announcement of 9 June 2005 indicated that this extension would be operational by 2020. Whilst the possible extension of the NWRL does not form part of this proposal, the alignment and stabling yards would be designed so as to not preclude any future extension.

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4.7 Operation of the Rail Link

Upon opening in 2017, train services are anticipated to operate every 5-10 minutes in peak periods and every 15 minutes during off-peak periods. These services would travel to Chatswood and the City via the ECRL or via the Main North Line through Strathfield. The mix of routes would depend on the opening of the CBD Rail Link. Further discussion of these issues would be contained in the EA.

4.8 Construction Sites

As discussed in **Section 2.2.1**, a Draft LEP for the Balmoral Road Release Area has been prepared. The draft zoning plan incorporates a large area of land zoned “Railway Corridor”. This land is required for the construction of the transit interchange and cut and cover sections of the tunnel. It is also likely that this land would be used to accommodate the main construction compound for the proposal as it is located near the western portal and has good access to arterial roads. Smaller construction compounds at each station location would be required and other construction sites would also be established. Possible work site locations have been shown on the figures in **Appendix B**. The exact size and location of the work sites is subject to the design review. Construction management has been identified as a key issue for the proposal and is further discussed in **Section 5.1.8**.

5 PRELIMINARY ENVIRONMENTAL ASSESSMENT

The key environmental issues for the proposed NWRL include:

- Noise and vibration;
- Indigenous and non-indigenous heritage;
- Flora and fauna;
- Traffic, transport, parking and access;
- Groundwater / geotechnical;
- Visual impacts and urban design;
- Flooding;
- Construction management (including spoil handling); and
- Social impacts / community involvement.

With the exception of traffic, transport, parking and access, and construction management, specialist studies have already been undertaken for these key issues as part of the *Assessment of Environmental Issues Report* (SKM, 2003). These studies were completed to a standard that would generally be suitable for inclusion in the EA. The studies included a detailed assessment of environmental characteristics in the vicinity of the 2002 NWRL alignment and potential construction and operational impacts on key biophysical and socio-economic parameters (constraints maps are presented in **Appendix B**).

As discussed in **Section 1.7.3**, there have been some modifications to the alignment since the *Assessment of Environmental Issues Report* was prepared. Thus, a detailed assessment of the latest alignment between the dive structure from the Main North Line and Franklin Road Station, Norwest Business Park and Burns Road Station, and the stabling yards has not yet been undertaken. Additionally, the potential impacts arising from the construction sites and the quadruplication of the Main North Line have not yet been assessed in detail.

A summary of the key environmental issues listed above is provided in **Section 5.1**. The intent of the discussion is to demonstrate TIDC's existing understanding of the issues and the need for additional environmental assessment. The potential impacts and management of other issues such as land use, air quality, economic, water quality, waste management and contaminated land, and the reasons they have not been designated as key issues, are discussed in **Section 5.2**.

5.1 Key Environmental Issues

5.1.1 Noise and Vibration

Summary of the Issue

As the proposed NWRL primarily passes through established residential and commercial areas, there is potential for noise and vibration impacts during both construction and operation.

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During construction, noise would be generated from construction sites, groundborne noise sources (noise generated from vibration) such as tunnel boring machines as well as airborne noise sources resulting from surface construction works.

During operation, groundborne noise and vibration would be generated by rail traffic in the tunnel and surface sections of the NWRL. Noise emissions from the stabling yard, primarily associated with maintenance and cleaning activities, would also occur 24 hours a day.

Previous Assessment

A series of baseline noise surveys along the proposed surface route of the 2002 alignment and in the general vicinity of the stations were conducted. The duration of the surveys at each site was nominally seven days.

The predicted upper limits of groundborne noise from the tunnel boring machine are expected to be below 35 dB(A) beyond a nominal 50m offset distance. However, it is anticipated that residents immediately above the tunnel would experience short-term levels of groundborne construction noise well in excess of this level. Typically, groundborne noise levels from construction would only last several days, although the works may be audible at much lower levels for between one to two weeks. Disruption to the use of facilities such as the Hills Centre and Baulkham Hills Council Chambers may also occur for short periods and construction work would need to be timed to reduce impacts.

The vibration levels generated from tunnel construction are not expected to exceed the building damage criteria but may exceed the human comfort criteria.

Airborne noise from the construction of the tunnel portal sites would exceed noise objectives and some impacts would result, including disturbance to residents around the Beecroft portal and businesses near the western portal, including new residences that have been developed in the Balmoral Road Release Area.

Predicted noise levels during station construction would exceed typical construction design objectives at Franklin Road Station and Castle Hill Station. Minor exceedances are also predicted at the Hills Centre Station, Burns Road Station and at Rouse Hill Station assuming development in the area has progressed by the time of construction works.

It is expected that noise emissions will result from rail traffic in the tunnel section and along the surface section of the NWRL. However, operational noise impacts would be mitigated through appropriate management and design measures such as track bed treatments.

Conclusions and Need for Further Assessment

The noise and vibration assessment would need to be updated to reflect the changes to the 2002 horizontal and vertical alignment, particularly in the vicinity of Norwest Business Park, the western tunnel portal, Norwest Station and the stabling yards (including impacts on Area 20) and the quadruplication of the Main North Line. An assessment of construction noise from work sites, particularly the site at the western tunnel portal, an assessment of the operational noise from the

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stabling yards and an assessment of noise impacts arising from the quadruplication of the Main North Line and ventilation facilities would also be required. Additionally, assessment of traffic noise along haulage routes for spoil removal would require assessment. The groundborne noise assessment would need to be updated to reflect the type of track form (eg. the use of a concrete track rather than a ballasted track). Furthermore, if the 2017 Reference Scheme at Rouse Hill is modified to a surface option, then the noise and vibration impacts of the modified section of the alignment would need to be assessed.

The criteria used to assess the noise impacts would be reviewed in consultation with RailCorp and DEC. It is anticipated that the noise and vibration criteria developed would be similar to that used for the ECRL.

Construction and operational noise impacts could generally be mitigated through appropriate management and design measures. Planning controls, such as those described in **Section 2.2.1**, would also be required to ensure future developments in the vicinity of the NWRL incorporate noise attenuation and vibration minimisation measures. TIDC would continue to liaise with relevant Councils and the Growth Centres Commission to discuss any further land use or building design controls that could be implemented.

5.1.2 Indigenous and Non-Indigenous Heritage

Summary of the Issue

There are several indigenous and non-indigenous heritage sites located in close proximity to the proposed alignment. The non-indigenous heritage sites are primarily located at the eastern end of the alignment, whereas the indigenous heritage sites are primarily located at the western end. The potential for impacts on heritage items would generally be confined to the surface sections of the alignment, the tunnel portals, the stations and the stabling yards. However, impacts could also potentially occur along the bored tunnel section where the ancillary tunnel support infrastructure is located.

Previous Assessment

A desktop assessment of the study area and a field survey of the proposed surface route of the 2002 alignment and the station sites were conducted by Mills Archaeological and Heritage Services Pty Ltd in 2003. Representatives from the local Aboriginal groups were involved in the field survey.

One indigenous heritage site has been identified within 50m of the tunnel section, seven indigenous heritage sites are within 50m of the surface section of the alignment (including one potential archaeological deposit) and a further five indigenous heritage sites are located within 50m of the possible construction sites (including two potential archaeological deposits)². These sites are predominantly open camp sites.

² These figures have been re-calculated for the 2017 Reference Scheme, based on the information recorded in the 2003 study.

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Fifty-nine non-indigenous heritage items have been identified within 50m of the proposed NWRL tunnel section² (refer to **Appendix B**). One of these items (Castle Hill School) is listed on the register of the National Estate (see **Figure B5**). Thirteen non-indigenous heritage items are within 50m of the surface section of the alignment. One of these items (Royal Oak Inn (former)) is listed on the State Heritage Register (see **Figure B1**). A further ten non-indigenous heritage items are located within 50m of the possible construction sites. One of these items (a section of the original Windsor Road alignment south from Caddies Creek) is listed on the register of the National Estate (see **Figure B5**).

Conclusions and Need for Further Assessment

The heritage assessment would need to be updated to reflect the changes to the alignment, particularly in the vicinity of Norwest Business Park, the western tunnel portal, stabling yards and the quadruplication of the Main North Line.

A heritage search would be undertaken to identify any newly listed sites or sites which have been destroyed with consent in relation to other developments in the area. Consultation with the relevant Councils and the NSW Heritage Office would also be undertaken. The significance of the sites that are potentially directly affected by the current alignment of the NWRL would be assessed. If any of the indigenous sites are considered to be of high significance, and would be affected by the proposal, further intensive investigations would be conducted in consultation with the relevant Aboriginal groups. Furthermore, prior to construction, appropriate management measures would be developed to ensure sites are salvaged, if necessary.

The preliminary noise and vibration assessment has indicated that vibration levels generated during construction and operation of the tunnel section would be below building damage criteria. However, as a precautionary measure, property condition surveys of heritage structures above the alignment would be undertaken prior to construction.

5.1.3 Flora and Fauna

Summary of the Issue

Approximately 80% of the proposed corridor lies within highly modified environments including those already developed for housing and other urban infrastructure. These areas contain small patches of woodland, cleared and modified landscapes and grasslands with occasional scattered trees. The remaining 20% of the corridor consists of remnant or regrowth native vegetation, although no untouched habitats occur with all areas comprising some degree of disturbance evident from past selective tree clearing and grazing.

Previous Assessment

A review of ecological literature, such as the NPWS Wildlife Atlas, was undertaken to identify the documented locations of threatened flora and fauna species within the study locality. Flora and fauna surveys were undertaken in August and September 2002. The surveys focused on areas within and in close proximity to the 2002 rail alignment. During the survey, the ecologists identified the floristics, diversity and structure of the vegetation, and the type and distribution of remnant plant communities. The survey also aimed to identify remnant vegetation classified as endangered ecological

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communities, threatened flora or fauna species, rare or threatened Australian plants or flora species of local, regional or state significance. The fauna survey involved general searches for evidence of species during the day-time and night-time.

The study found that no threatened or significant flora species listed in the schedules of the *Threatened Species Conservation Act 1995* (TSC Act) were identified or are likely to occur in the study corridor. Two threatened fauna species were identified in the study corridor, namely the Black-chinned Honeyeater (eastern sub-species *Melithreptus gularis gularis*) and the Large Bentwing-bat (*Miniopterus schreibersii*). Both these species were located at the northern end of the NWRL west of Rouse Hill Town Centre. Several threatened fauna species could potentially occur within the habitats of the study corridor. These include sedentary species such as the Cumberland Land Snail (*Meridolum corneovirens*) and mobile and widespread species such as insectivorous bats, the Grey-headed Flying-fox (*Pteropus poliocephalus*), Swift Parrot (*Lathamus discolor*) and Regent Honeyeater (*Xanthomyza phrygia*), and woodland birds such as the Brown Treecreeper (*Climacteris picumnus*) and Speckled Warbler (*Chthonicola sagittata*).

Vegetation representative of four endangered ecological communities (EECs) as referred to in Schedule 1 of the TSC Act, were recorded in the study corridor (refer to **Appendix B**). These included:

- Cumberland Plain Woodland;
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;
- Sydney Turpentine-Ironbark Forest; and
- Blue Gum High Forest.

As well as being listed in the TSC Act, Cumberland Plain Woodland, Sydney Turpentine-Ironbark Forest and Blue Gum High Forest are also classified as nationally threatened ecological communities under the EPBC Act.

The surface sections of the alignment would pass through small stands of Cumberland Plain Woodland (approximately 0.8ha) and River-Flat Eucalypt Forest on Coastal Floodplains (approximately 0.1ha). The proposed construction sites at Burns Road Station, within the Balmoral Road Release Area and the stabling yards would also have direct impacts on approximately 1.4ha of Cumberland Plain Woodland and approximately 0.3ha of River-Flat Eucalypt Forest on Coastal Floodplains (see **Figure B3** and **Figure B1**).

In total, the proposed works would impact on:

- 2.2 ha of Cumberland Plain Woodland; and
- 0.4 ha River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.

In general, the majority of the remnant vegetation patches are considered to be of poor quality, small in size, fragmented and degraded by past land uses including weed invasion. However, several of

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these remnants also provide fauna habitat, including both arboreal and terrestrial habitat and provide microhabitat features important for threatened fauna potentially occurring in the study area. The area of Blue Gum High Forest adjacent to but not directly affected by the proposed Franklin Road Station construction site contains good quality remnant and regrowth vegetation and are also considered worthy of conservation.

In accordance with Section 5A of the EP&A Act, eight-part tests were undertaken as part of the previous assessment for the identified and potential threatened fauna species. The conclusions of the eight-part tests for threatened fauna indicated that for the majority of species assessed, the proposed NWRL is unlikely to impose a 'significant impact' on the life-cycle of local populations of the species.

The assessment also found that significant impacts may potentially affect the life-cycle of local populations of the Black-chinned Honeyeater, Speckled Warbler and Cumberland Land Snail. Areas of potentially important habitat for these species were identified at the western end of the corridor along Second Ponds Creek and adjoining areas to the immediate north-west. Whilst the stabling yard has been re-located since this assessment was undertaken, it would still have a minor encroachment on vegetation to the east of Seconds Pond Creek, and hence could potentially affect these species.

Conclusions and Need for Further Assessment

The flora and fauna assessment would need to be updated to reflect the changes to the alignment, particularly in the vicinity of Norwest Business Park, the western tunnel portal, stabling yards and the quadruplication of the Main North Line.

A review of relevant literature and legislation would be undertaken to determine any new listings of threatened species, populations or communities. Additional assessment of the potentially affected threatened species, populations or communities would be undertaken in accordance with the Director-General's requirements..

Consultation with DEC (National Parks and Wildlife Service), the local Councils and the Commonwealth Department of Environment and Heritage would also be undertaken.

5.1.4 Traffic, Transport, Parking and Access

Summary of the Issue

Residents of North West Sydney have the highest levels of car ownership per household in the Sydney metropolitan area. Traffic congestion in Sydney's North West is growing and the situation will deteriorate as the population continues to grow.

During construction, new traffic movements would be generated by construction workers and material / spoil deliveries to and from construction sites. There would also be traffic impacts from construction of road crossings and potential for temporary lane closures eg. at the crossing of Windsor Road.

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During operation, it is anticipated that the proposed NWRL would reduce car dependency and hence ease traffic congestion in Sydney's North West. Some adverse impacts along the local / feeder routes to the new stations may be experienced due to altered / new patterns of NWRL commuter traffic.

Existing Environment and Previous Assessment

Patronage studies have indicated the NWRL would attract existing rail users, who currently access the rail network at stations on the Richmond, Main West and Main North Lines, as well as new rail users. The NWRL patrons would be more likely to walk or drive shorter distances to the new stations, particularly those with designated commuter parking facilities (potentially Franklin Road, Hills Centre and Burns Road Stations) rather than existing stations on the Richmond, Main West and Main North Lines. Consequently, the demand for parking at existing stations may be reduced and the length of car journeys is likely to decrease, thereby reducing road congestion.

Castle Hill, Burns Road and Rouse Hill Station have been identified as major bus interchange locations due to their connectivity with the North West Transitway. Minor bus interchanges would be provided at Franklin Road, the Hills Centre and Norwest Stations to provide connectivity with local bus services.

Commuter parking facilities are likely to be provided at Franklin Road, the Hills Centre and Burns Road Stations. The demand for commuter parking at Franklin Road Station would be high, however, the surrounding land use and road infrastructure may constrain the capacity of parking facilities at this station. Whilst Rouse Hill Station was also considered suitable for park-and-ride, the Rouse Hill Master Plan precludes the development of commuter parking at Rouse Hill Station.

Conclusions and Need for Further Assessment

Assessment of the potential impacts of construction and operational traffic requires further work. A detailed traffic, transport, parking and access assessment, which would identify indicative haulage routes, would be undertaken as part of the EA. The assessment would also review the existing bus network and parking provisions, and it would include an assessment of existing intersection performance. Future intersection performance (both with and without the NWRL) would also be assessed. Previous patronage modelling, modal shift assumptions and proposed park-and-ride facilities would also be reviewed. It would also be integrated with the urban design study to establish effective pedestrian and cycle routes to and from the stations.

As the NWRL is part of a broader transport strategy for Sydney's North West, TIDC would also continue to liaise with the RTA and local Councils to integrate transport connections and maximise accessibility to the various transport modes. TIDC, in conjunction with MoT and RailCorp, will review the existing bus network to identify the need to improve connections to proposed station. The potential impacts on roads during construction and post-construction would also be discussed.

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5.1.5 Groundwater / Geotechnical

Summary of the Issue

The main groundwater issue affecting the feasibility of the NWRL is the possibility that inflows to the tunnel will eventually lower the regional water tables. Other potential groundwater-related problems include the disposal of turbid, saline or contaminated water collected within the tunnel and potential land subsidence resulting from underdrainage of shallow aquifers.

The NWRL is located within the central portion of the Sydney geological basin. The bored tunnel section would pass through Hawkesbury Sandstone and Ashfield Shale. The surface section would be constructed in shallow cuttings and fills in Ashfield Shale.

Sufficient geotechnical investigations would be required prior to the detailed design stage to ensure that there would not be land instability or substantial subsidence and/or damage to properties.

Previous Assessment

Preliminary assessments of groundwater and geotechnical conditions along the corridor of the 2002 alignment have been undertaken. During the geotechnical investigation, test bores were drilled at the station sites and tunnel portal sites to gain preliminary information about the geotechnical foundations.

The assessment found that NWRL station excavations and railway cuttings are expected to be generally above the main water table, but could be subject to small flows from perched water tables, whereas most of the tunnel section would be close to or just below the water table, especially in wet years. Groundwater would therefore drain slowly into the tunnel, although the hydrogeological consequences are expected to be small and confined to a zone a few hundred metres wide on either side of the tunnel. Water collected from the seeps is expected to be minor and no special collection or disposal measures, other than pumping from sumps to a water treatment facility, should be required.

Conclusions and Need for Further Assessment

A water treatment plant (WTP) would be constructed to treat tunnel inflow prior to discharge into creeks. The location of the WTP and the level of treatment required would be outlined in the EA. The potential impacts on receiving water quality and environmental flows needs further assessment.

Key issues to be addressed include the methods of:

- removal of suspended solids;
- pH balancing; and
- removal of high iron levels prior to discharge.

The WTP would require appropriate bunding to ensure that any spill or unintended leakage of treatment chemicals or untreated water could be contained.

Targeted geotechnical studies would be undertaken prior to the detailed design phase to assist with the design of the rail link. Given the location of the rail line, the potential for acid sulphate soils is considered to be minor.

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Construction management measures to mitigate potential geotechnical impacts would be outlined in the Construction EMP.

5.1.6 Flooding

Summary of the Issue

The surface section of the proposed NWRL would traverse the floodplains of Caddies Creek and several of its tributaries including Strangers Creek, Elizabeth Macarthur Creek, unnamed small tributary creeks of Caddies Creek and Second Ponds Creek. The width of the floodplain at each of these crossings varies considerably.

In addition to recognising the impact of the peak flood levels and flows, there are other potential impacts associated with flooding such as flood velocities, scour protection, loss of floodplain storage, on-site stormwater detention, drainage and public safety.

Previous Assessment

The potential impacts of the NWRL (based on the 2002 alignment) on the existing flood regime and drainage patterns have been assessed. The investigation specifically focused on the surface section of the alignment, from the tunnel portal near Norwest Business Park to Rouse Hill. All hydraulic modelling and analyses were undertaken using hydrological data generated by Rouse Hill Infrastructure Consortium, assuming ultimate development conditions within the Caddies Creek catchment (i.e. when the area is fully developed).

The assessment found that the flood extent for the 1% annual exceedence probability (AEP) is between 30-60m at the Strangers Creek, Elizabeth Macarthur Creek and Caddies Creek Tributary 4 crossings. It is around 180m for the confluence of Elizabeth Macarthur Creek, Caddies Creek and Caddies Creek Tributary 5 and Second Ponds Creek. Modelling has also predicted the PMF extent.

Hydraulic modelling and analyses were also undertaken to assess potential flooding impacts at each creek crossing and recommend appropriate waterway crossing structures.

Conclusions and Need for Further Assessment

The proposal would be designed to minimise upstream and downstream flooding effects. The existing model would be updated to reflect the modifications to the alignment and additional urban development. It has already been established that the NWRL would be constructed on viaduct between Samantha Riley Drive and Windsor Road to minimise flooding impacts on Caddies Creek. Confirmation of this would be reported in the EA.

5.1.7 Visual Impacts and Urban Design

Summary of the Issue

The urban form in north-western Sydney is changing rapidly. Housing developments that were constructed to provide a sense of security and community have, in some cases, been found to create barriers to integration and connectivity with other land uses because of their structure and/or alignment with major transport infrastructure. The NWRL is expected to affect the north-west's urban form by

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providing a spine of development, predominantly underground, where the stations will be the key locations of interface between the development and the community.

New transport desire lines would become apparent in communities around the stations. These will input into the type and form of business infill that may occur in areas surrounding stations. The potential to use land use solutions to address issues like noise and visual impacts requires further assessment.

During construction, there would be noticeable changes to the visual environment resulting from the presence of construction equipment, construction sites and stockpiles, for example. During operation, the visual impacts would primarily be confined to the surface sections of the alignment, and in particular, the viaduct over Caddies Creek. Noise mitigation measures and ancillary tunnel facilities also have the potential to have visual impacts.

At this stage, it is proposed that the stations would be located below ground in tunnel or cutting and as such, would not be visually obtrusive, apart from station entrances and other ancillary facilities. The train stabling facility would also be constructed in a cutting. However, it should be noted that Bovis Lend Lease, the developer of Rouse Hill Regional Centre, has discussed with TIDC the possibility of elevating the rail line through the Rouse Hill area and subsequently having a surface station at Rouse Hill. This option is the subject of further assessment by TIDC.

Many of the residential areas that would be serviced by the NWRL have been designed as distinct communities, fenced off from outside areas. These fences constrain access to and from the rail corridor. Measures to create better access that do not result in a safety / security issue will be required to maximise local pedestrian and bicycle connectivity to stations.

Previous Assessment

A landscape and visual assessment of the 2002 alignment has been undertaken. This assessment provided an overview of the potential landscape and visual issues such as:

- Integration – the integration of the rail line into the existing sub-urban and rural fabric;
- Transportation nodes – the relationship between the rail corridor, rail stations, pedestrian movements and other modes of transport infrastructure;
- Heritage - identification of areas of heritage sensitivity, especially in relation to landscape character and scale;
- Existing vegetation – retention and enhancement of existing significant vegetation;
- Safety – ensuring pedestrian safety;
- Visual and acoustic impacts – the reduction of the visual and acoustic impacts of the proposed rail line from the immediate adjacent uses through the strategic placement of woodland trees and screen planting; and
- Landscape management and maintenance – the establishment of a safe and operational visually engaging landscape.

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The assessment indicated that routing of the NWRL adjacent to the developing arterial route of Old Windsor Road / Windsor Road and the proposed Parramatta to Rouse Hill arm of the North West Transitway would form a cohesive transport link to the north-western suburbs. Visual impacts would be low as the rail route would combine with the existing transport corridor. However, the expansion of the transport corridor as a result of the rail line would have a noticeable change within the locality.

The proposed viaduct along a section of the route north of Burns Road and across the Windsor Road / Old Windsor Road intersection would alter the visual landscape in this area and adverse visual impacts would result without appropriate urban design treatments.

Termination of the NWRL at the future Rouse Hill Regional Centre would result in low visual impact within the future proposed development. However, although it is within a deep cutting, the proposed stabling yards could form a high level of visual impact on Area 20, without appropriate planning and development measures to mitigate the impact.

Conclusions and Need for Further Assessment

The NWRL design would need to include an appropriate urban design assessment, and development of landscaping and urban design treatments to enhance connectivity within the surrounding communities. Opportunities for better connectivity and more appropriate adjacent land uses need to be investigated.

An analysis is required of the built form and character of the land in the vicinity of the stations. This needs to be combined with an assessment of movement and accessibility issues, in the context of the landscape through which the NWRL would be located. Urban design issues such as precinct planning (pedestrian and bicycle access and security / safety by design) around the stations, particularly at Franklin Road Station and the Hills Centre Station, also needs further investigation. Walking catchments would need to be identified and urban design concepts developed. Integration with other transport modes and land uses would require assessment and landscape and urban design management measures to be developed.

The visual component of the analysis would focus on treatment at above ground elements including viaducts, stations, noise mitigation measures and ancillary tunnel facilities. The potential alternative for a surface station at Rouse Hill and the additional surface sections and impacts on vertical location of the stabling facility that would result from this alternative would need to be assessed.

5.1.8 Construction (Including Spoil Handling)

Summary of the Issue

Construction activities have the potential to adversely impact on the community and the environment. The main issues would arise from the operations at construction sites and the transportation of spoil. Some construction sites would only operate during normal construction hours. However, other sites, such as those associated with tunnelling activities, may operate 24 hours a day.

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Previous Assessment

Approximately 85% of the excavated material is expected to be removed from the project and disposed of elsewhere. Where there is good access to the arterial road network, haulage by road is the preferred option for spoil transportation. Preliminary estimates indicated that the total peak volume of trucks on the road is likely to be 270 trucks per day during the bulk earthworks phase of tunnelling, which equates to 540 movements per day. The bulk of this is removing tunnel spoil.

Conclusions and Need for Further Assessment

Construction impacts have the potential to be significant for this project. Noise, dust, water and biological impacts associated with construction sites require assessment. Sites associated with tunnel activities are expected to operate 24 hours a day.

Transport impacts of spoil removal require further assessment, both in terms of direct impacts associated with road and/or rail transport and the indirect impacts of emplacement of the large quantities of material. The potential opportunities for spoil re-use also require further assessment, in terms of potential re-use sites and volumes.

5.1.9 Social Impacts / Community Involvement

Summary of the Issue

The NWRL would be located in close proximity to established residential areas, future urban release areas, Norwest Business Park and numerous community facilities and services, such as the Hillsong Church, Baulkham Hills Shire Council chambers and Castle Towers Shopping Centre. Hence, construction activities may adversely affect local residents and businesses due to increased noise, dust and traffic, and changes to visual amenity and access. Some property acquisition would also be required to accommodate the rail link and associated facilities, and the surface section of the rail link could potentially result in severance issues.

However, Sydney's North West is one of the major growth areas in the Sydney Metropolitan Region. It is anticipated that access to employment and educational opportunities for existing and future residents of Sydney's North West will be limited if the proposed NWRL is not constructed. Therefore, the operation of the proposed NWRL would also have positive impacts. It would allow for population growth in Sydney's North West through the provision of an efficient public transport link to other services in the Sydney metropolitan region. It would also reduce car dependency and overcrowding on existing rail lines.

Previous Assessment

As described in **Section 1.9.2**, an *Overview Report* (Manidis Roberts, 2002) was released for community comment in 2002. The environmental issues raised by the community were responded to in the *Assessment of Environmental Issues Report* (SKM, 2003) and the design issues will be considered in the subsequent stages of the project's development.

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Conclusions and Need for Further Assessment

As part of the EA, a social impact assessment would be undertaken to consider the potential impacts of the 2017 Reference Scheme on the community. Issues such as severance resulting from the physical presence of the rail corridor, property acquisition, access to the stations, road closures and amenity impacts during construction would be addressed. Measures to reduce adverse impacts and promote positive impacts would be identified in the EA and appropriate management plans developed for the proposal (e.g. the Air Quality Management Sub-Plan, Noise and Vibration Management Sub-Plan and Traffic Management Plan). A profile of affected stakeholder and communities, which takes into account the population projections for Sydney's North West, would also be prepared.

TIDC is currently developing a consultation strategy to ensure there is effective, ongoing liaison with the community. The feedback from the consultation activities would be evaluated as part of the social impact assessment.

Urban design and land use integration issues which would also impact on the community, such as the provision of adequate access to the NWRL via local bus services, the North West Transitway, commuter parking facilities and pedestrian overpasses / underpasses across main roads e.g. Old Windsor Road would be addressed as part of further urban design investigations.

The extent and timing of property acquisition required for the NWRL also needs further consideration. Any acquisition of land would be undertaken in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.



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5.2 Other Environmental Issues

The following table summarises other environmental issues associated with the proposed NWRL and provides an indication of why the mitigation measures proposed are sufficient to obviate the need for further investigations in the EA.

Existing Environment	Potential Impacts	Management and Mitigation Measures
Land Use		
<p>Sydney's North West is one of the major growth areas in the Sydney Metropolitan Region.</p> <p>The route of the proposed NWRL would primarily be located within land zoned for residential, business and special uses purposes.</p>	<p>Prior to construction, land would need to be acquired along the corridor for the proposed rail link and associated facilities, such as construction compounds.</p> <p>During operation, the NWRL would have a positive impact on land use as the provision of an efficient public transport system would enhance the development potential of North West Sydney. In-fill development in the established areas as well as new development in the identified growth areas, regional centres and specialised centres would be encouraged, thereby reducing further urban sprawl.</p>	<p>The quadruplication of the Main North Line would be undertaken within the existing rail reserve.</p> <p>The NSW Government has taken steps to preserve the corridor for the proposed rail link through discussions with the relevant Councils. To further minimise land use and property acquisition impacts, the proposed rail link has predominantly been designed to be in tunnel. The 4km surface section is located in less established areas and local planning instruments are being amended, as required, to accommodate the rail link.</p> <p>Overall, the adverse impacts on land use are expected to be minimal.</p>
Air Quality		
<p>Existing air quality in Sydney's North West is typical of developed residential and commercial areas.</p> <p>Increased dependency on car travel in the area would result in a reduction in air quality in the North West region.</p>	<p>During construction, the main potential air quality impacts would be dust generated during excavation earthworks and emissions from diesel powered equipment and vehicles transporting materials to and from the site. The extent of the impact would depend on the level of activity being undertaken at the site and the prevailing weather conditions. As 14km of the proposed rail link would be constructed in tunnel, dust impacts would primarily be confined to the north-western portion of the route.</p> <p>During operation, the proposal is likely to have a positive impact on air quality as the rail link is expected to result in a moderation of the increase in vehicle kilometres travelled.</p>	<p>Mitigation measures to control dust and plant emissions would be outlined in an Air Quality Management Sub-Plan as part of a CEMP.</p> <p>Due to the developed nature of the existing environment, dust and emissions from plant are not likely to result in any detectable reduction in air quality within the surrounding area. Hence, a detailed assessment of adverse air quality issues is not considered necessary as part of the EA.</p>



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Existing Environment	Potential Impacts	Management and Mitigation Measures
Economic		
Sydney's North West is one of the major growth areas in the Sydney Metropolitan Region. An economically viable public transport truck main is required to service this area.	The construction works would provide a short-term financial benefit to the community, with some of the labour and resources sourced directly from the region.	An economic analysis of the proposed NWRL and alternative options has been previously undertaken to determine the economic viability of the proposal and is currently being updated by TIDC.
Water Quality		
The proposed NWRL is located within four catchments, including Berowra Creek, Lane Cove River, Upper Parramatta River, and Cattai Creek. Generally surface water quality in the creeks within these catchments is poor with high levels of nutrients and sediments being common, and concentrations often exceeding guidelines for the protection of relevant environmental values.	Pollutants could be introduced to waterways during both construction and operation of the proposed NWRL. During construction, potential impacts include the risk of high sediment loads in downstream waterways arising from erosion, chemical spills and the disposal of water from the tunnel. During operation, water quality may be affected by surface runoff which could contain pollutants.	Measures to protect water quality would be outlined in the CEMP. Furthermore, a Construction Water and Soil Management Sub-Plan (CWSMP) that is consistent with the principles and practices outlined in the Department of Housing's (1998) Managing Urban Stormwater: Soils and Construction would be prepared during the detailed design phase of the project. The CWSMP would address all areas where significant disturbance of land or stockpiling of soils is likely to occur.
Waste		
The proposal would generate a number of waste streams and utilise a variety of materials during the construction phase.	During construction, general building waste such as timber, masonry, scrap metal, packaging materials and plastics would be generated. In addition, a small quantity of waste (sewage and domestic rubbish) would be generated from the construction compound. During operation, waste products would be limited to those associated with maintenance and repair requirements.	A Waste Management Sub-Plan (WMP) which would incorporate the principles of avoid, re-use and recycle would be developed for the construction phase of the proposal. The WMP would detail any procedures for the management of construction wastes from the site. This would be part of the CEMP. Any hazardous material would be stored, handled and transported in accordance with relevant legislation and guidelines.



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Existing Environment	Potential Impacts	Management and Mitigation Measures
Contaminated Land		
As the proposed rail link would be constructed in a disturbed environment, there may be contaminated land issue.	During construction, contaminated soil may be encountered and disturbed.	An assessment of potential contamination risks would be undertaken prior to construction. Procedures for the management of contaminated material would be outlined in the CEMP.

6 PROPOSED SCOPE OF ENVIRONMENTAL ASSESSMENT

As discussed in **Section 5**, there are a number of issues that are critical to the proposal that would be assessed in more detail in the EA. It is proposed that the EA only assesses the following key issues as all other issues are able to be managed through the detailed design stage and with the application of best practice measures:

- Noise and vibration;
- Indigenous and non-indigenous heritage;
- Flora and fauna;
- Traffic, transport, parking and access;
- Groundwater / geotechnical;
- Flooding;
- Visual impacts and urban design;
- Construction management (including spoil management); and
- Social impacts / community involvement.

The majority of these studies have already been completed as part of the *Assessment of Environment Issues Report* (SKM, 2003). However, further refinement of these studies would be required to address the modifications to the alignment that have occurred and impacts of the construction sites.



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Table 6-1: Proposed Scope of the EA

Key Issue	Scope of the EA	Environmental Studies not required for Concept Approval
Noise and Vibration		
Potential noise and vibration impacts during construction and operation	<ul style="list-style-type: none"> Assess construction noise and vibration impacts in the vicinity of the modified alignment and the quadruplication of the Main North Line. Assess noise impacts from construction sites. Assess noise from construction / spoil removal traffic. Work with RailCorp and DEC to establish appropriate criteria for construction and operational regenerated and airborne noise. Document the potential impacts and mitigation measures in the EA. Assess operational noise and vibration impacts in the vicinity of the modified alignment and the quadruplication of the Main North Line (assuming ECRL noise criteria). Assess the noise impacts from the operation of the stabling yard (assuming ECRL noise criteria). Assess construction and operational noise and vibration impacts in the vicinity of Rouse Hill if the 2017 Reference Scheme is modified (assuming ECRL noise criteria). 	<ul style="list-style-type: none"> Update the groundborne noise assessment to reflect the use of concrete track rather than ballasted track.
Heritage		
Potential impacts on indigenous heritage	<ul style="list-style-type: none"> Liaise with the relevant Aboriginal groups. Search heritage registers to identify any new sites of indigenous significance. Undertake targeted indigenous heritage surveys in the vicinity of the modified alignment with representatives from the Aboriginal community. Document the potential impacts and mitigation measures in the EA. 	<ul style="list-style-type: none"> Undertake further detailed assessments as required (i.e. subsurface investigations) Continued liaison with relevant Aboriginal groups.
Potential impacts on non-indigenous heritage	<ul style="list-style-type: none"> Liaise with the relevant Councils and the NSW Heritage Office. Search heritage registers to identify any new sites of non-indigenous significance. Undertake targeted non-indigenous heritage surveys in the vicinity of the modified alignment. Document the potential impacts and mitigation measures in the EA. 	
Flora and Fauna		
Potential impacts on species, populations & communities currently listed as threatened under the	<ul style="list-style-type: none"> Search relevant literature, including NPWS wildlife atlas to determine whether there have been any additions since the 2003 studies. Liaise with DEC (NPWS), Councils and Commonwealth Department of Environment and Heritage. Undertake targeted flora and fauna surveys to identify the threatened 	



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Key Issue	Scope of the EA	Environmental Studies not required for Concept Approval
TSC Act or EPBC Act	<p>species and populations/ communities likely to be affected by the modified alignment and along the quadruplication of the Main North Line.</p> <ul style="list-style-type: none"> Assess the significance of the proposal on threatened species and populations/ communities likely to be affected by the preferred route. Document the potential impacts and mitigation measures in the EA. 	
Traffic, Transport, Parking and Access		
Potential traffic and transport impacts during construction and operation	<ul style="list-style-type: none"> Liaise with Council RTA, MoT, RailCorp and bus service providers. Consider proposed transport links and parking provisions. Assess existing intersection performance. Assess future intersection and road network performance (both with and without the NWRL). Review previous patronage modelling and modal shift assumptions. Assess the potential impacts of construction traffic on the surrounding road network. Assess the potential impacts which may arise from the haulage of spoil and identify indicative haulage routes (either via the road or rail network). Provide an overview of local traffic impacts e.g. station access. Document the potential impacts and mitigation measures in the EA. 	<ul style="list-style-type: none"> Undertake detailed design Local Area Traffic Management (LATM) schemes at the stations.
Groundwater / Geotechnical		
Potential impacts on groundwater during construction and operation	<ul style="list-style-type: none"> Document the potential impacts and mitigation measures in the EA. Identify the location of the water treatment plant (WTP) that would be constructed to treat tunnel inflow prior to discharge into creeks. 	<ul style="list-style-type: none"> Assess the potential impacts on receiving water quality and environmental flows. Undertake targeted geotechnical investigations.
Flooding		
Provide higher level of confidence in flooding impacts and proposed structures	<ul style="list-style-type: none"> Liaise with relevant Councils and Department of Natural Resources Undertake a flood assessment for the alignment in the vicinity of the portal to the north of Norwest Business Park and the stabling yards. Document the potential impacts and mitigation measures in the EA. 	
Visual Impacts and Urban Design		
Visual / urban design impacts on residents with views of the NWRL	<ul style="list-style-type: none"> Undertake preliminary master planning around stations to establish core local and regional urban and landscape design principles. Consider urban planning issues – safer by design, pedestrian and cycle access. Identify major land uses surrounding the stations and develop 	<ul style="list-style-type: none"> Undertake detailed urban design for station and surrounding interchange area.



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Key Issue	Scope of the EA	Environmental Studies not required for Concept Approval
	<p>measures to enhance connectivity between land uses and the stations.</p> <ul style="list-style-type: none"> Identify walking catchments and desire lines to and from stations and prepare contextual plans for each station. Identify opportunities for changes to land use around stations to complement the NWRL and associated stations. Assess visual impacts, particularly at the stations and surface sections of the corridor. Undertake a review of land use zonings / activities in the vicinity of the proposed corridor in association with local councils and DoP. Prepare analysis drawings for the surface sections of the route with views and vistas, design opportunities and constraints, land use character and open space networks. 	
Construction Management		
Disposal of spoil	<ul style="list-style-type: none"> Document the estimated volume of spoil that would be generated by the proposal and appropriate management measures in the EA, including potential opportunities for re-use. Identify indicative haulage routes (either via the road or rail network). Identify spoil sites. 	
Impacts from construction sites	<ul style="list-style-type: none"> Identify the scope and location of construction sites. Document the potential impacts and mitigation measures in the EA. 	
Social Impacts / Community Involvement		
Liaison with the community	<ul style="list-style-type: none"> Prepare a consultation strategy to identify avenues for community involvement in the subsequent phases of the project. Undertake community consultation during the preparation of the EA. Assess the impacts of the NWRL on the community, including potential severance issues. Identify social constraints. Document the potential impacts and mitigation measures in the EA. 	<ul style="list-style-type: none"> Undertake more extensive consultation associated with the exhibition of the EA. Develop a property acquisition plan.

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7 DRAFT STATEMENT OF COMMITMENTS

Under Section 75F of the EP&A Act, the Director-General may request the EA include a Statement of the Commitments that the proponent is prepared to make for environmental management and mitigation measures on the site. A Draft Statement of Commitments, as a starting point to the EA, has been presented in **Table 7-1**.

■ **Table 7-1: Draft Statement of Commitments**

Key Issue	Outline of Commitments / Mitigation Measures
Project Management	
Construction management	Prepare a Construction Environmental Management Plan (CEMP) prior to the commencement of construction works, which outlines the operating conditions and temporary environmental protection measures to mitigate the impact of construction activities. The CEMP would also include the conditions of any licences issued by government authorities. As part of the CEMP, prepare Route Alignment Sheets and Construction Method Statements to identify key environmental constraints and enable effective management of key construction activities or sites.
Operational management	Integrate project specific environmental performance measures, environmental management responsibilities, maintenance and monitoring requirements and mitigation measures into existing RailCorp management documents and practices.
Noise and Vibration	
Potential noise and vibration impacts	<p>Prepare a Noise and Vibration Management Sub-Plan and Noise Impact Statement prior to construction, which outlines appropriate management and mitigation measures during construction.</p> <p>Undertake noise and vibration modelling and monitoring, particularly adjacent to the new western portal location during the detailed design phase.</p> <p>Undertake further assessment of the need for, and impacts of, night-time construction works during the detailed design phase.</p> <p>Develop feasible and reasonable mitigation measures to minimise potential noise impacts at sensitive receiver locations around the stations.</p> <p>Apply best practice construction methods to minimise noise in accordance with DEC noise guidelines during construction of the project.</p> <p>Develop regenerated and operational noise management measures.</p> <p>Establish a Communications Plan to liaise with potentially affected residents and businesses.</p>
Heritage	
Potential impacts on indigenous heritage	<p>Continue to liaise with the relevant Aboriginal groups.</p> <p>Prepare an Indigenous Heritage Management Sub-Plan prior to construction, which outlines appropriate management and mitigation measures.</p>
Potential impacts on non-indigenous heritage	<p>Continue to liaise with the relevant Councils.</p> <p>Prepare a Non-Indigenous Heritage Management Sub-Plan prior to construction, which outlines appropriate management and mitigation measures.</p>
Flora and Fauna	
Potential impacts on species, populations & communities currently listed as threatened under the TSC Act or EPBC Act	Prepare a Flora and Fauna Management Sub-Plan prior to construction, which outlines appropriate management and mitigation measures.



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Key Issue	Outline of Commitments / Mitigation Measures
Traffic, Transport, Parking and Access	
Potential traffic and transport impacts	Prepare a Traffic Management Plan prior to construction, which outlines appropriate management and mitigation measures. Refine concept design where necessary to address access arrangements.
Groundwater / Geotechnical	
Potential impacts on groundwater	Prepare a Groundwater Management Sub-Plan prior to construction, which outlines appropriate management and mitigation measures.
Flooding	
Potential impact on flooding	Undertake a more detailed flood assessment during detailed design to confirm flooding impacts and locate and size drainage structures.
Visual Impacts and Urban Design	
Visual / urban design impacts on residents with views of the NWRL	Prepare detailed urban design / landscaping plans.
Construction Management	
Disposal of spoil	Prepare a Traffic Management Plan prior to construction, which outlines appropriate management and mitigation measures for the transportation of spoil. Prepare a Waste Management Plan prior to construction, which outlines procedures for spoil re-use and disposal.
Social Impacts / Community Involvement	
Liaison with the community	Implement the Communications Plan to identify avenues for community involvement in the subsequent phases of the project. Continue to monitor and respond to community issues. Actively promote the benefits of the NWRL. Liaise with potentially affected residents and businesses during the construction stage to advise them of the duration and type of construction activities. Develop a property acquisition plan.
Land Use	
New development / subdivision in vicinity of the NWRL	Liaise with relevant Councils about new development approvals and future land use. Request Council require noise and vibration and electrolysis sensitive development to be designed in recognition of the proposal.
Air Quality	
Potential air quality impacts	Prepare an Air Quality Management Sub-Plan prior to construction, which outlines appropriate management and mitigation measures. Undertake an assessment of the positive air quality impacts which are likely to result from the proposal. Establish a Communications Plan to liaise with potentially affected residents and businesses.
Economic	
Potential economic impacts	Update the economic analysis of the proposed NWRL to determine the economic viability of the proposal.



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Key Issue	Outline of Commitments / Mitigation Measures
Water Quality	
Potential water quality impacts	Prepare a Construction Water and Soil Management Sub-Plan (CWSMP) that is consistent with the principles and practices outlined in the Department of Housing's (1998) Managing Urban Stormwater: Soils and Construction during the detailed design phase of the project. The CWSMP would address all areas where significant disturbance of land or stockpiling of soils is likely to occur.
Waste	
Potential waste management issues	Prepare a Waste Management Sub-Plan which incorporates the principles of avoid, re-use and recycle.
Contaminated Land	
Potential contamination issues	Undertake targeted contamination investigations.



Appendix A PFM Minutes

Appendix B Alignment