NSW GOVERNMENT
Department of Planning

MAJOR PROJECT ASSESSMENT:
New Rail Line to North Western Sydney

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

April 2008

Published April 2008
NSW Department of Planning
www.planning.nsw.gov.au

EXECUTIVE SUMMARY

The Transport Infrastructure Development Corporation (the Proponent) has sought concept plan approval for the construction and operation of the western section of the North West Metro, a new electrified passenger train line between Epping and Rouse Hill, independent of existing suburban rail network servicing existing and newly developing areas of north western Sydney including Cherrybrook, Pennant Hills, Castle Hill, the Balmoral Road Release Area at Kellyville, the Rouse Hill Regional Centre and the new North West Growth Centre.

The new rail line as part of the North West Metro would entail considerable benefits to existing residents and expected future growth in existing established suburbs of North Western Sydney, as well as catering for important new land release initiatives at Balmoral Road, Rouse Hill and the new North West Growth Centre, which is planned to accommodate approximately 66,000 new homes. At existing suburbs (including West Pennant Hills, Cherrybrook and Castle Hill), the North West Metro will complement and boost existing public transport services; in particular relieving pressure on the Northern, Western and Richmond rail lines by diverting indirect patronage, which is currently limiting capacity and service delivery in these lines. The delivery of efficient public transport infrastructure in North West Sydney will promote more sustainable modes of transport by providing a viable alterative to cars, with associated personal and wider-social benefits including decreased fuel costs, congestion relief, air quality and greenhouse gas benefits. The North West Metro would furthermore improve accessibility to the major economic hubs of Sydney (both existing and planned) including centres within the 'global arc' as well as to existing centres that have previously not had access to rail (including Top Ryde, Drummoyne, Rozelle, and Pyrmont), thereby diversifying employment and social opportunities outside of the CBD. The North West Metro is consistent with and builds on the strategic landuse and transport policy for Sydney identified in the *Sydney Metropolitan Strategy*; *State Infrastructure Strategy*; *State Plan;* and *Urban Transport Statement*.

Almost 5000 submission were received on the proposal (1,626 on the Environmental Assessment and 3,360 on the Preferred Project Report), with the overwhelming majority raising concerns regarding the first three to four kilometres of alignment between approximately Epping and Cherrybrook stations. Initially objections were raised to the originally proposed surface quadruplication of the existing Main North Line between Epping Station and Beecroft. Following changes to the proposal to accommodate a direct tunnel connection from Epping to Cherrybrook Station, significant opposition was raised to the preferred tunnel alignment chosen in comparison to other potential alignments. Key issues raised regarding the remainder of the proposal (i.e. the alignment west of Cherrybrook Station) included opposition to the preferred tunnel alignment at Norwest Business Park; station design (including bus interchange, park and ride and pedestrian/cycle facilities); impacts of the stabling facility on surrounding landuse; and mitigation and offset of amenity (particularly noise and vibration) and environmental impacts (including flora and fauna, heritage and hydrology).

The Department has assessed the Proponent's Environmental Assessment, Preferred Project Report and Supplementary Submissions Report (including Statement of Commitments), with consideration of the issues raised in public and Government agency submissions on the proposal. The Department is satisfied that the assessment to date provides a robust and representative assessment at a concept plan level of the issues and constraints that would be associated with a large scale rail infrastructure project and provides sufficient information on impacts to enable the design principles and performance standards required to guide subsequent design development as part of the North West Metro, to be identified. The Department is further satisfied that the Proponent has demonstrated that the new rail line can, in principle, be designed to achieve acceptable environmental standards, subject to further design refinement of mitigation measures and design detail. Although some residual impacts may remain (particularly construction related disruptions), these impacts must be balanced by the significant benefits generated by the proposal to existing and future communities. The Department notes that design development as part of the North West metro would provide further opportunity for refinements to design and mitigation to minimise residual impacts. For the above reasons, the Department supports the granting of concept plan approval for the preferred proposal.

The Department has recommended conditions of approval, which define the performance standards that future design development of the proposal would be guided by and identifies comprehensive and stringent further assessment requirements that build on the assessment undertaken to date. These include performance standards for noise and vibration, landuse and transport integration and biodiversity offsets; and further

assessment requirements in relation to traffic and station precinct design, geotechnical and groundwater, hydrology, noise and vibration, flora and fauna and heritage.

In summary, the Department is satisfied that the proposal is on balance justified, in the public interest and can be designed and constructed to meet acceptable environmental and amenity limits subject to the implementation of recommended conditions of approval and the Proponent's Statement of Commitments. Consequently, the Department recommends that the Minister grant concept plan approval for the western section of the North West Metro.

CONTENTS

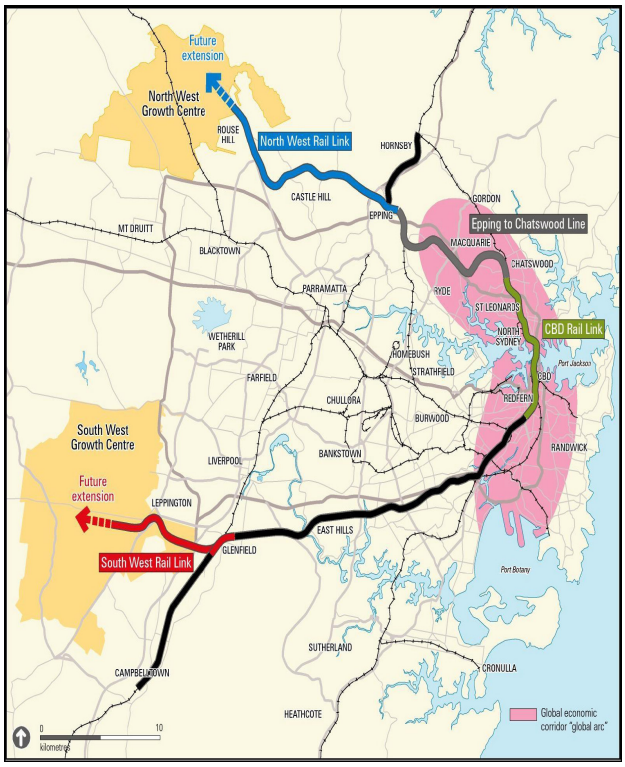
1. BACKGROUND

1.1 Strategic Context

North Western Sydney is forecast to experience strong population growth from now until 2031, in both existing established suburbs and new land release areas. Approximately 15,000 new dwellings are expected in already established areas of north western Sydney by 2013, and approximately 55,000 new dwellings by 2031. In addition, significant new development is planned for greenfield areas beyond existing established suburbs, such as at the Kellyville Release Area (6,000 dwellings), the Rouse Hill Regional Centre (1,500 dwellings) and the new North West Growth Centre (66,000 dwellings). The anticipated growth is expected to outstrip existing public transport capacity, which currently consists mainly of bus networks and indirect rail routes (the Northern, Western and Richmond Lines).

In June 2005, the NSW Government announced plans for a new rail line between Epping and Rouse Hill (known as the **North West Rail Link**) with long-term plans to extend to Vineyard, as part of a broader plan to expand suburban rail services in Sydney, including a new rail line to the South West (South West Rail Link) and capacity improvements to the CBD (CBD Rail Link) (refer Figure 1).

Figure 1: Rail Expansion Program (GHD, November 2006)



The delivery of new rail infrastructure to the North West is recognised as being essential to cater for growing demand in the area and to reduce pressure on existing public transport and road networks. The need for this new infrastructure is identified as a key component of strategic transport and landuse planning for Sydney, including the:

- *City of Cities - A Plan for* Sydney's *Future* (Sydney Metropolitan Strategy, December 2005);
- *State Infrastructure Strategy* (May, 2006);
- *State Plan – A New Direction for NSW* (November 2006); and
- *Urban Transport Statement* (November 2006).

Consistent with strong Government commitment to deliver high quality public transport infrastructure to the North West, planning for a new passenger rail line between Epping and Rouse Hill, off the existing suburban rail network and involving six new Stations at Cherrybrook, Castle Hill, Hills Centre, Norwest, Kellyville and Rouse Hill, has been progressed since early 2006 (to date referred to as the 'North West rail Link').

In March 2008, the NSW Government re-affirmed its commitment to provide high quality and efficient rail infrastructure to meet growing demand by announcing plans for new Metro style services, completely independent of the existing suburban rail network, to service key growth corridors (refer Figure 2). The North West Metro, incorporating the section from Epping to Rouse Hill referred to-date as the North West Rail Link, was announced to be the first of the new Metro style rail links.

The North West Metro would connect Rouse Hill, Kellyville, Norwest, Hills Centre, Castle Hill, Cherrybrook, Epping, Denistone East, Top Ryde, Gladesville, Henley, Drummoyne, Rozelle, and Pyrmont before reaching Wynyard, Martin Place and St James in the CBD (refer Figure 3). The new line is proposed to be underground for the majority of its length (east of Kellyville), travelling under Victoria Road to the City, with easy interchange to existing bus and light rail infrastructure. The Metro style service would deliver efficient and reliable public

transport infrastructure to the North West by offering fast, high frequency and high capacity rail services, consistent with Government strategic transport and landuse policy.

Figure 2: Planned Metro Rail Corridors (SydneyLink Website, March 2008)

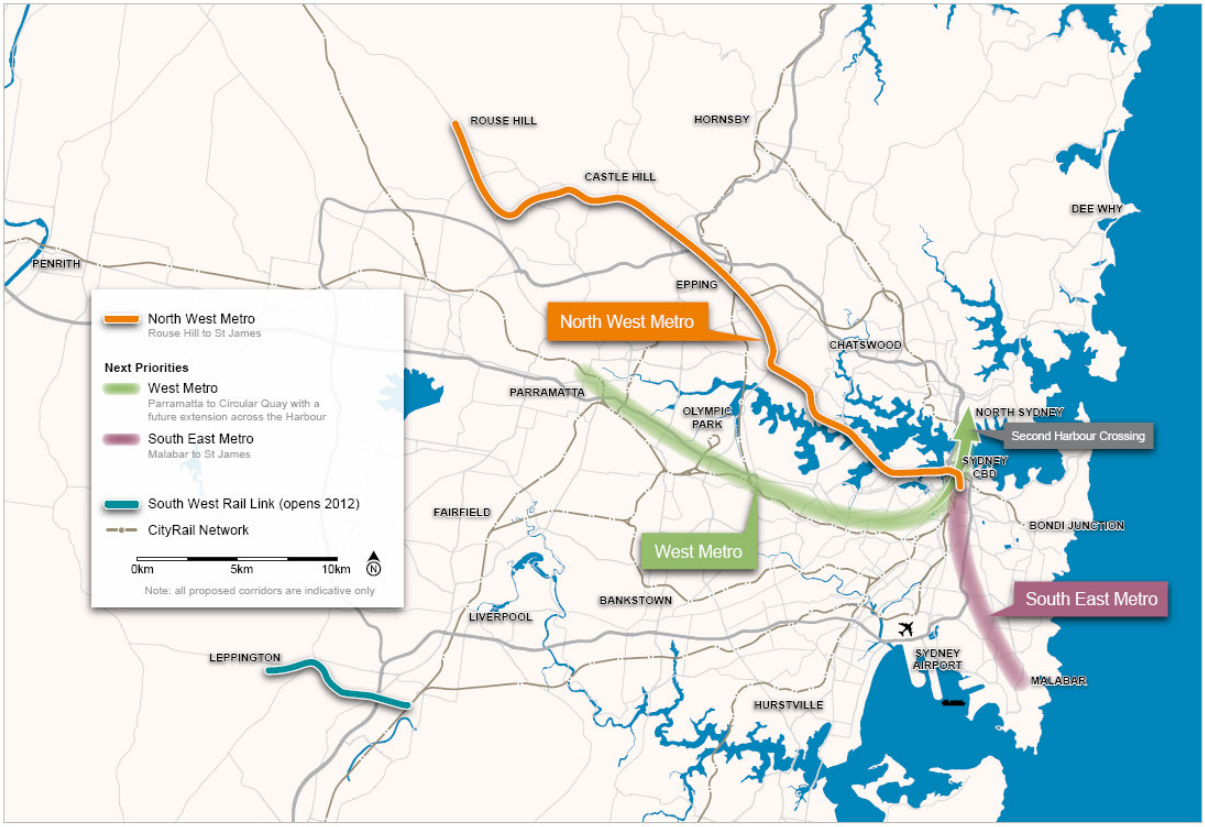
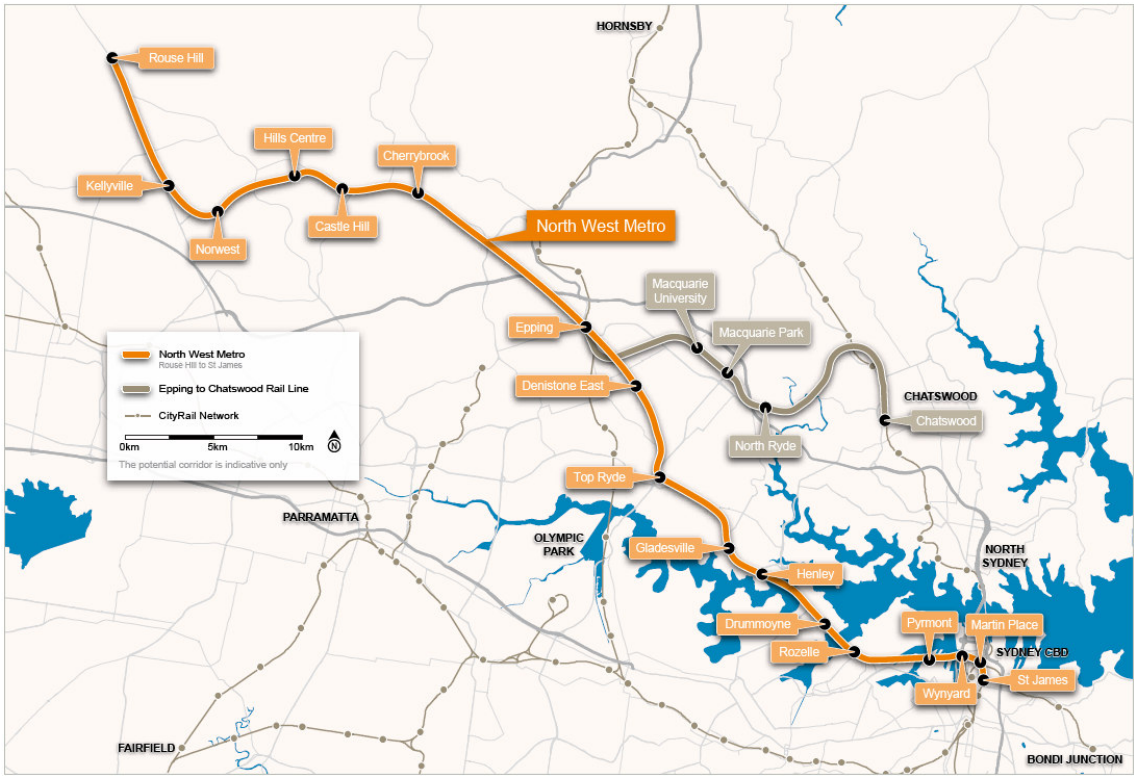


Figure 3: North West Metro (SydneyLink Website, March 2008)



This report comprises the Director-General's assessment of the western section of the new North West Metro line between Epping to Rouse Hill, formerly referred to as the North West Rail Link (NWRL) The eastern half of the new Metro Line (between Epping to St James Station) will be subject to future application and assessment.

1.2 The Proponent

The Transport Infrastructure Development Corporation (TIDC) is a statutory State-owned corporation under the *Transport Administration Act 1988* with the principal function of developing major transport infrastructure projects. TIDC has been charged by the NSW Government progressing planning for the North West Metro and is the Proponent for the western part of the Metro line, the proposal currently under assessment by the Department and the subject to this assessment report.

1.3 Location and Land Use

The western section of the North West Metro (the proposal) would extend from Epping to Rouse Hill via Castle Hill, through the Hornsby, Baulkham Hills, and Blacktown local government areas (LGAs).

The majority of the proposal (approximately 17.6 kilometres) would be in the form of an underground rail tunnel. At this stage it is expected that approximately 15 kilometres would consist of bored tunnel from Epping Station to around the Balmoral Road new release area. The bored tunnel would traverse under the established residential suburbs of Cheltenham, Beecroft, West Pennant Hills, Cherrybrook and Castle Hill and the newly developed or developing residential and commercial areas of Bella Vista and Norwest Business Park. Two short sections of cut and cover tunnel (approximately 2.6 kilometres in total) are expected to traverse the new release areas of Balmoral Road (as yet undeveloped) and the Rouse Hill Regional Centre (currently under development by Landcom).

The remainder of the alignment (approximately 4.4 kilometres) is expected to be at surface, traversing the northern portion of the Balmoral Road Release Area, undeveloped land between the Balmoral Road Release Area and the Rouse Hill Regional Centre, and the yet to be released 'Area 20' precinct of the North West Growth Centre, north of the Rouse Hill Regional Centre. Between the Balmoral Road Release Area and the Rouse Hill Regional Centre, a small section of flood prone land would be crossed by approximately one kilometre of viaduct.

The proposal would include four new underground stations at Franklin Road in Cherrybrook ("Cherrybrook"), at the Castle Hill Town Centre ("Castle Hill"), near the Hills Centre function centre at Castle Hill ("Hills Centre"), and at the Norwest Business Park ("Norwest"). Two surface stations are proposed at the Kellyville Release Area in Kellyville ("Kellyville") and the Rouse Hill Regional Centre ("Rouse Hill"). The proposal would terminate at an interim stabling facility within the Area 20 precinct of the North West Growth Centre.

The North West Growth Centre forms a key part of the NSW Government's land release plan to respond to Sydney's growing population. The Growth Centre comprises approximately 10,000 hectares and includes 16 development precincts, planned to contain approximately 66,000 new homes. The first precincts to be released include Alex Avenue, North Kellyville, Riverstone, Area 20, Colebee and Riverstone West. Area 20 is proposed to include approximately 1,500 residential lots.

A number of major transport infrastructure works are located in proximity to the proposal and would in some cases be crossed by the proposal. These include the M2 Motorway, Beecroft Road, Cumberland Highway/Pennant Hills Road, Castle Hill Road, Old Northern Road, Showground Road, Windsor Road, Old Windsor Road, the Westlink M7 Motorway and the North West Transitway.

Watercourses in the study area comprise various creeks and tributaries including Devlin's Creek, Berowra Creek, Pykes Creek, Castle Hill Creek, Cattai Creek, Elizabeth Macarthur Creek, Strangers Creek and Second Ponds Creek.

2. PROPOSED DEVELOPMENT

2.1 Project Description

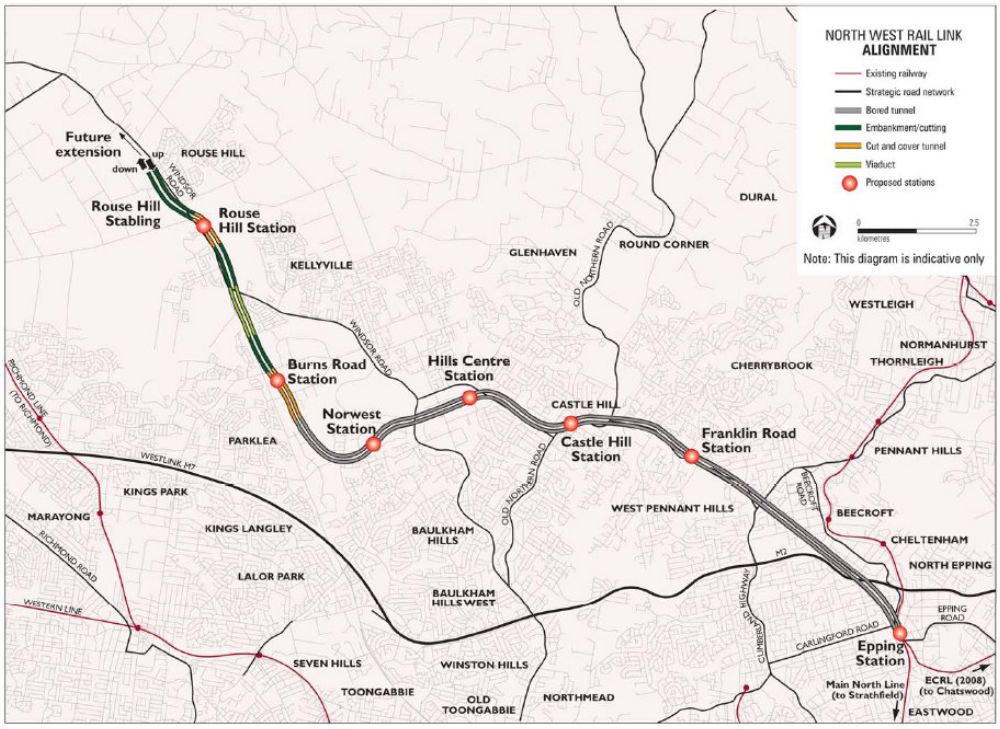
The proposal involves the construction and operation of the western section of the North West Metro (the proposal) formerly referred to as North West Rail Link, as shown in Figure 4, being:

- a new electrified passenger railway (approximately 22 kilometres in length) between Epping and Rouse Hill via Castle Hill within a 40 metre wide corridor (60 metres at stations); and
- associated infrastructure including stations, train stabling, roadways, car parks, bus interchanges, public amenities and intermodal facilities.

The western section of the North West Metro will include at least six new stations. At this stage, four new underground stations are proposed at Cherrybrook (Franklin Road), Castle Hill, Hills Centre and Norwest; and two surface stations at Kellyville (Burns Road) and the Rouse Hill (refer Figure 4). Park and ride facilities are proposed to be provided at Cherrybrook, Hills Centre and Kellyville stations. Interchanges with the North West Transit Way are proposed at Kellyville and Rouse Hill Stations, while connections with local bus services would be provided at the Cherrybrook, Castle Hill and Norwest Stations.

A stabling facility to house trains (when not operational) and for maintenance activities, is at this stage proposed to be located at the Area 20 precinct of the North West Growth Centre, north of Rouse Hill (refer Figure 4). The location of ancillary facilities (including power supply, sectioning huts and signalling structures and tunnel support facilities) are subject to further design development and are proposed to be contained within the defined alignment corridor wherever possible, although this may not be possible at all locations. An extension of the original North West Rail Link, west of Rouse Hill does not comprise part of the proposal.

Figure 4: Overview of the North West Rail Link (GHD, May 2007)



The North West Metro as a whole is proposed to be constructed in two stages with the section from Epping to Hills Centre to be operational by 2015 and the remainder (from Hills Centre to Rouse Hill and from Epping to St James Station) to be operational by 2017. At this stage, up to three major construction sites (at Balmoral Road, Hills Centre and Cherrybrook) are anticipated to be required to construct the western section of the North West Metro, with Hills Centre and Cherrybrook to be used as major tunnel support sites (for launching of tunnel boring machines and removal of tunnel spoil) and Balmoral Road to be used as the main site for surface works. Other constructions sites would include the remaining station locations, the stabling facility, the Rouse Hill viaduct and

at the location of ancillary facilities (once determined). The final scale and location of construction sites would be subject to detailed design.

Interim stabling facilities for the operation of Stage 1 from Epping to Hills Centre (until the main stabling facility commences operation as part of the operation of the entire line) would be provided within the non-operational sections of the bored tunnel west of Hill Centre. Once fully operational, train services are expected to run every few minutes, with interchange available with the existing suburban rail network at Epping, Wynyard, Martin Place and St James.

2.1.1 Changes Since Exhibition of Environmental Assessment

The proposal has undergone several changes since exhibition of the original Concept Plan and Environmental Assessment as summarised in Table 1 below.

Table 1: Proposal Changes since Environmental Assessment Exhibition

Timing	Proposal as Described
Environmental Assessment (Exhibited November 2006-February 2007)	• Quadruplication of the existing Main North rail line from Epping to Beecroft, followed by a bored tunnel to Cherrybrook Station. • Option for a direct tunnel connection between Epping and Cherrybrook Stations identified as subject to further investigation. • Option for an elevated viaduct from Hill Centre to Rouse Hill stations (in place of tunnel, at grade and viaduct alignment), identified as subject to further investigation.
Preferred Project Report (Exhibited June – August 2007)	• Following further investigation, alignment confirmed to be a direct tunnel connection between the Epping terminus of the Epping to Chatswood Rail Link stub tunnels and Cherrybrook Station rather than surface quadruplication, although the preferred tunnel alignment identified is different to the option identified in the Environmental Assessment. • Following further investigation, it is confirmed that the elevated viaduct alignment option between Hill Centre to Rouse Hill does not comprise part of the concept plan, although the one kilometre section of viaduct across the floodplain of Elizabeth MacArthur and Caddies Creek, which formed part of the original concept plan, is retained. • Location of Norwest Station moved approximately 100 metres to the east of the location identified in the Environmental Assessment.
Supplementary Submissions Report (March 2008)	• North West Rail Link now comprises the western section of the new North West Metro, incorporating the following design elements: ▪ the bored tunnel at Epping will no longer connect to the Epping to Chatswood Rail Link stub tunnels but continue on to St James Station on an alignment independent of the existing suburban rail network. This presents opportunities for refinements to the bored tunnel alignment around Epping Station. ▪ Metro style services present opportunity for the utilisation of alternate rolling stock (single deck rather than double deck trains) and therefore the opportunity for refinements to the vertical and horizontal alignment and the scale and location of stations/ stabling requirements.

2.1.2 Project Objectives

The Environmental Assessment outlined the project objectives for the proposal as follows:

- enhance public transport along an established and growing corridor by:
  - linking the North West region and "Global Arc" centres of Sydney (Macquarie Park, Chatswood, St Leonards, North Sydney and the CBD to Sydney Airport and Port Botany);
  - increasing access to the rail network across Sydney; and
  - providing a spine for integrated public transport in North West Sydney.
- provide local focus for employment and population growth patterns by:
  - improving public transport access to centres, including Castle Hill, the Norwest Business Park, and Rouse Hill; and

- facilitating transit-oriented development and reducing urban sprawl.
- improve public transport service quality by:
  - reducing journey times;
  - providing 'all-day' service;
  - increasing passenger comfort and service reliability;
  - provide rail network congestion relief on the Richmond Line and the Western Line including relieving overcrowding on trains;
- support positive changes to travel behaviour by:
  - reducing car dependency; and
  - providing opportunities to walk to rail stations.

The delivery of the rail connection in the style of a Metro is consistent with and would reinforce these objectives.

2.2 Project Need and Justification

Significant population and employment growth is being experienced in north western Sydney. The Metropolitan Strategy predicts that by 2031, the population of this region will be 475,000, three times the 1981 population of 150,000.

The existing capacity of transport infrastructure is considered to be insufficient to meet predicted population and employment growth. The main form of public transport in the region is by bus. Despite major capacity improvements to road infrastructure including the Westlink M7, the Lane Cove Tunnel, Windsor Road and Old Windsor Road, the Proponent has indicated that the existing road network would be put under strain from predicted population growth and associated traffic increases. Consequently, the Proponent expects that peak demand for buses would not be adequately accommodated by the existing arterial road network under existing and predicted levels of motor vehicle traffic.

Strategic assessment into public transport modes for North Western Sydney have indicated that a heavy rail option would have significant advantages over light rail and bus transit-way options on a number of grounds including: flexibility of access to key commuter catchments such as Castle Hill, Rouse Hill and Norwest Business Park; greater opportunity for interchange between different transport modes; greater likelihood of encouraging more sustainable transit-oriented development (particularly in newly developing areas) by providing a viable mass transit option to car use; and greater opportunity for reducing vehicle kilometres travelled by reducing the distances to stations and providing a viable alternative to cars. The North West Transitway, while providing some congestion relief, has a different focus (i.e. providing access to Parramatta and Blacktown) and would not meet the objectives of improving access to the global arc.

Indirect patronage from the North Western Sydney is currently drawn by the Northern, Western and Richmond rail lines, generating congestion and reducing the level of service to commuter catchments that are primarily served by these lines. Without a new rail line, the Proponent has indicated that rail demand is predicted to be well in excess of capacity along the Richmond Line and parts of the Western Line by 2021. Therefore, there will either be significant overcrowding on trains east of Blacktown (on the Western Line) and on the Northern and Richmond Lines, or a move to private motor vehicles as rail commuters become increasingly frustrated with overcrowded trains. The Proponent indicates that the provision of a new rail link would decrease the average distance travelled to a rail station by residents in the North West by approximately 50% and reduce station access times by up to 30 minutes. This would be an important factor in moderating the growth of motor vehicle kilometres travelled in North Western Sydney and the negative externalities associated with high car dependency (including cost of fuel, green house gas and air quality).

The delivery of the proposal in the style of a Metro completely independent of the existing suburban rail network means that service frequency and reliability on the new line would not be constrained by complexities and/ or delays on any other line within the existing rail network. The delivery of reliable, high frequency services would present significant efficiencies in comparison to private vehicle use and encourage the shift to more sustainable forms of transit. Furthermore, by avoiding Town Hall Station and better utilising existing capacity at other City Stations, the North West Metro would achieve the objective of providing additional rail capacity to the CBD for commuters, whilst deferring the need for a second Harbour crossing to generate additional rail capacity on the north side (which would have been necessary under the originally proposed North West Rail Link, which would have provided services to the City via north of the Harbour).

The proposal as part of the full North West Metro would provide existing and future residents of North Western Sydney with high quality access to a diversity of employment and social opportunities within Sydney. As well as providing direct and efficient access to the 'Global Arc' centres of Sydney, the new North West Metro would also provide access to additional centres previously inaccessible by rail, thereby encouraging economic and employment growth in these centres, consistent with the objectives of the Metropolitan Strategy (of diversifying economic opportunities outside of the CBD).

2.2.1 The Department's Position

The proposal as part of the North West Metro is a key infrastructure initiative that would provide an efficient public transport system to meet existing and future demand. By providing a viable alternative to personal car use, the North West Metro would provide significant congestion relief at key arterial road corridors including the Harbour Bridge, Anzac bridge, Victoria Road (and specifically as a result of the western section of the Metro), the M2 Motorway and Old Windsor Road. The proposal would relieve pressure and improve the service delivery of existing rail services (which currently accommodate indirect patronage from the North West), and of existing bus services (through road congestion relief).

The provision of heavy rail has been identified to provide significant advantages in comparison to other public transport modes with respect to maximising connectivity to key commuter catchments and facilitating sustainable transit-oriented development. In particular, the Department supports the delivery of the proposed rail connection in the form of a Metro independent of the existing suburban rail network, considering that this would provide significant advantages in terms of the frequency and reliability of service, which is integral to encouraging the shift to more sustainable forms of transit. The Department considers that the proposal as part of the North West Metro would significantly benefit existing and newly developing areas in North Western Sydney including the North West Growth Centre by:

- providing a viable and efficient transport alternative to car use, with associated personal and wider-social benefits including less fuel costs, congestion relief and air quality benefits; and
- improving access to employment and social opportunities within existing and planned centres, particularly to the 'Global Arc' which is of significant economic importance to Sydney and to other regional centres previously inaccessible by rail.

The proposal as part of the North West Metro remains wholly consistent with and will build on the strategic transport and landuse objectives for Sydney, as identified in the *City of Cities - A Plan for Sydney's Future* (Sydney Metropolitan Strategy, December 2005); *State Infrastructure Strategy* (May, 2006); *State Plan – A New Direction for NSW* (November 2006); and *Urban Transport Statement* (November 2006). Not proceeding with the western half of the North West Metro proposal would mean that existing and new residents in the North West would not be able to enjoy the benefits afforded by the new rail line (i.e. high quality public transport access to a diverse range of employment and social opportunities in Sydney) and would be significantly disadvantaged, economically and socially.

If the new rail line is not built, urban growth in the North West would outstrip existing public transport capacity and result in ongoing negative externalities including disenfranchisement of residents in the North West with economic and social opportunities in the other parts of the City, increased maintenance costs of existing road and rail infrastructure, increased personal financial cost of car dependency, and lower environmental quality (air quality and greenhouse gas impacts) associated increased car dependency.

3. STATUTORY CONTEXT

3.1 Major Project

The proposal, comprising the western half of the North West Metro is subject to assessment under Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP& A Act) by virtue of the Minister's project-specific Order of 7 April 2006 and the general Order of 29 July 2005, which declared development that is an activity for which the Proponent is also the determining authority, and that in the opinion of the Proponent, would (in the absence of the Order) require an environmental impact statement to be obtained under Part 5 of the Act, to be development to which Part 3A of the Act applies.

On 3 July 2006, the Minister for Planning authorised the submission of a concept plan for the proposal, pursuant to Section 75M of the EP& A Act.

3.2 Environmental Planning Instruments

There are no environmental planning instruments that apply to the proposal that substantially govern the carrying out of the development.

The western half of the North West Metro would be located within the local government areas of Hornsby, Baulkham Hills and Blacktown. The proposed route corridor is permissible with consent within the affected land use zonings of all applicable/ relevant local environmental plans.

The location and design of ancillary facilities would be confirmed as part of detailed design. Detailed design review may also identify refinements to alignment, stations and/ or stabling facility design. The Proponent would need to consider the zoning of any additional affected lands as part of further approvals.

3.3 Minster's Approval Power

On 12 July 2006, the Director-General issued Environmental Assessment Requirements for the preparation of a concept plan for the proposal, pursuant to Section 75F of the EP& A Act. The Proponent submitted a concept plan and Environmental Assessment with the Director-General in November 2006. Following review, it was concluded that the Environmental Assessment addressed the Director-General requirements pursuant to Section 75H and 75I(2)(g) of the EP& A Act. A copy of the Environmental Assessment is attached (see Appendix C).

The concept plan and Environmental Assessment were exhibited between 22 November 2006 and 2 February 2007, more than twice the minimum statutory period. The Environmental Assessment was also made publicly available on the Department's website.

Following the exhibition period, the Director-General directed the Proponent to respond to the issues raised in submissions. Based on a review of the submissions and further investigations, the Proponent made changes to the preferred proposal. The Proponent's response to submissions as well as proposed changes to the proposal (including an assessment of new impacts) were incorporated into a Preferred Project Report. The changes to the proposal altered the catchment of receivers traversed by the proposal and as such the Preferred Project Report (along with the original concept plan and Environmental Assessment) was exhibited to allow new receivers chance to comment on the proposal. The Preferred Project Report was initially placed on exhibition from Wednesday 6 June to Monday 9 July 2007 with the exhibition period subsequently extended until Monday 6 August 2007, a total period of 62 days. Exhibition locations were the same as for the exhibition of the Environmental Assessment and concept plan. The Preferred Project Report was also made available on the Department's website.

The exhibition of the Preferred Project Report generated further submissions and the Director-General once again directed the Proponent to respond to the issues raised in submissions. The Proponent undertook further investigations in response to issues raised in submissions and prepared Supplementary Submissions Report to respond to the issues raised. The Submissions Report also takes into account the Government's March 2008 announcement to deliver the proposal as a new Metro style rail line from Rouse Hill to St James Station via Epping, Top Ryde and Drummoyne. As the proposal remains substantially the same as that described in the

Preferred Project Report, the exhibition of the Submissions Report was not considered to be warranted. Notwithstanding the report has been made available to the public on the Department's website.

The Department has met its statutory obligations so that the Minister can make a determination regarding the proposal.

3.4 Objects of the Environmental Planning and Assessment Act 1979

Section 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) details the objects of the legislation. The objects of the Act are:

(a) to encourage:
- *(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment;*
- *(ii) the promotion and co-ordination of the orderly and economic use and development of land;*
- *(iii) the protection, provision and co-ordination of communication and utility services;*
- *(iv) the provision of land for public purposes;*
- *(v) the provision and co-ordination of community services and facilities;*
- *(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats;*
- *(vii) ecologically sustainable development;*
- *(viii) the provision and maintenance of affordable housing; and*

(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State; and

(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.

Of particular relevance to the environmental impact assessment and eventual determination of the subject concept plan application by the Minister, are those objects stipulated under section 5(a). Relevantly, the objects stipulated under (i), (ii), (iv), (vi) and (vii) are significant factors informing determination of the application (noting that the proposal does not raise significant issues relating to matters such as communication and utility services, community services and facilities or affordable housing). With respect to ecologically sustainable development, the EP&A Act adopts the definition in the *Protection of the Environment Administration Act 1991*, including the precautionary principle, the principle of inter-generational equity, the principle of conservation of biological diversity and ecological integrity, and the principle of improved valuation, pricing and incentive mechanisms.

It is important to recognise, that while the EP&A Act requires that the principles of ecologically sustainable development be encouraged, it provides other objects that must equally be included in the decision-making process for the subject proposal. The Department has considered the need to encourage the principles of ecologically sustainable development, in addition to the need for the proper management and conservation of natural resources such as natural areas; the promotion of orderly, economic use and development of land; the protection of the environment including threatened species; and the provision of land for public purposes in Section 5 of this report. The agency and community consultation undertaken as part of the assessment process (see Sections 3 and 4), addresses objects 5(b) and (c) of the Act.

3.5 Nature of the Recommended Approval

The Department recommends concept plan approval for the proposal constituting the western half of the North West Metro, due to the large-scale, long-term and complex nature of the proposal. A concept plan approval allows the key design requirements for the proposal (to achieve set objectives) to be confirmed within a broad assessment footprint, and for the environmental constraints, design parameters, and performance standards that would guide subsequent stages of assessment, to be established.

In the case of the current proposal, which traverses both highly developed and newly developing areas of Sydney it is essential that existing environmental constraints (both biophysical, landuse and amenity) be clearly established so that subsequent design and assessment can be informed by and refined to take these matters into account. This would facilitate better integration of the proposal with existing and planned future landuse during detailed design.

In granting concept plan approval, the Minister has the power under Section 75P of the EP& A Act to determine that no further assessment is required for the proposal or any part of the proposal if he considers that the level of detail provided in the concept plan is sufficient to also support project approval for all or part of the proposal. In such a case, the Minister can grant project approval to all or parts of the proposal, providing the Proponent approval to construct that part of the proposal (or the entire proposal). The Department's assessment (see Section 5) indicates that no aspect of the proposal is sufficiently well defined at this stage to warrant project approval. Significantly, the Department notes that the recent incorporation of the proposal into the new North West Metro is likely to necessitate some review of key design elements, which may result in design refinements to the proposal. Consequently, granting project approval for any part of the proposal is considered to be pre-emptive at this stage.

Consequently, the Department recommends that only concept plan approval be granted for the proposal at this stage and that the concept plan approval outline detailed further assessment requirements (in particular performance and design standards) that the Proponent must address in seeking further approvals for the proposal.

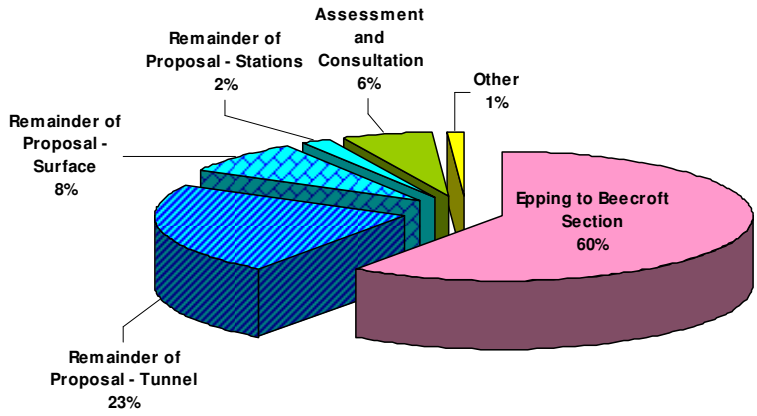
4. CONSULTATION AND ISSUES RAISED

4.1 Submissions on the Environmental Assessment and Concept Plan

A total of 1,626 submissions were received in response to the exhibition of the Environmental Assessment and concept plan. Of these nine were from State government authorities and three from Councils. Of the public submissions, approximately 3% objected to the proposal as a whole, approximately 27% clearly stated support for the proposal, and the remaining 70% did not explicitly state a position, but raised concerns or made comments on various aspects of the proposal including design and the alignment. The public submissions ranged from various versions of form letters to more substantial individual letters. None of the public authorities objected to the proposal; however, raised issues for consideration during assessment.

The issues raised in the public submissions were compiled and categorised to enable the relative importance of key issues to the public to be determined (see Figure 5). The frequency of each issue raised in submissions has been calculated based on its occurrence relative to the total number of issues raised, rather than the fraction of total submissions that raise a particular issue. It should be noted that many submissions raised more than one issue of concern regarding the proposal. The issues raised by public authorities are discussed in Section 4.3.

Figure 5: Issues Raised in Submissions from Exhibition of Environmental Assessment



As shown in Figure 5, of the total public submissions received, the majority (60%) raised concerns specific to the **Epping to Beecroft section** of the proposal (comprising the first 2.5 kilometres of the alignment). The main issues raised regarding this section of the alignment were:

- objection to the surface quadruplication of the Main North Line between Epping and south of Beecroft Station;
- objection to the upgrade of Cheltenham Station proposed as part of the quadruplication;
- environmental impacts associated with the quadruplication;
- support for the tunnel option, which was identified in the Environmental Assessment as being subject to further investigation but not part of the preferred concept plan. This option involved a direct tunnel connection between Epping Station and Cherrybrook Station in place of the surface quadruplication;
- support for a direct tunnel connection between Epping Station and Cherrybrook Station in place of the surface quadruplication, but preference for a different alignment to the option identified in the Environmental Assessment. Instead preference for an alignment that more closely follows existing infrastructure and open space (such as the M2 Motorway, Pennant Hills Road and the Pennant Hills Golf Course) so as to avoid residential areas; and
- support for a tunnel to Cherrybrook Station originating from Carlingford rather than Epping station, in preference to the surface quadruplication of the Main North Line.

Approximately 33% of public submissions raised issues regarding the **remainder of the proposal** (i.e. the proposal west of Beecroft). These submissions focused on:

- issues specific to the tunnel component of the proposal (approximately 23%):

  - object to tunnel alignment traversing above residential properties and other sensitive receivers (such as schools) including concerns regarding depth of cover;
  - preference for an alternative tunnel alignment at Bella Vista / Norwest Business Park, which avoids residential development;
  - concerns regarding property damage from potential construction and operational related vibration and geotechnical (subsidence/collapse)impacts;
  - tunnel construction noise impacts and operational regenerated noise impacts;
  - impact on property values, development potential and compensation;
  - air quality from tunnel vents; and
  - impacts on water resources;
- issues specific to the surface components of the proposal (approximately 8%):
  - objection to the option identified in the Environmental Assessment as being subject to further investigation (but not part of the preferred concept plan), involving an elevated viaduct from Hills Centre to Rouse Hill;
  - objection to the one kilometre section of viaduct proposed as part of the concept plan across Elizabeth Macarthur Floodplain; and
  - environmental impacts associated with surface components including noise and vibration, flora and fauna, heritage, hydrology and visual impacts; and
- station specific issues (approximately 2%):
  - Station location; and
  - Station precinct matters, including traffic and transport and land use integration.

In addition to issues regarding the nature of the proposal itself, approximately 6% of submissions raised general concerns regarding the **planning and consultation process**, specifically:

- requests for extension of the submission period;
- comments regarding the assessment process (including concern that proposal being subject to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) would 'fast track' the assessment process);
- comments regarding community involvement; and
- adequacy of the information provided.

Other matters raised by submissions (approximately 1%) included justification for the proposal (including alternate transport modes, staged delivery and extension of rail in the future), comments on operational matters and queries on design details.

4.2 Submissions on the Preferred Project Report

In response to issues raised in submissions and as a result of further design investigations, the Proponent proposed a number of changes to the proposal to minimise its overall environmental impact. These involved:

- a direct tunnel connection between Epping Station and Cherrybrook Station in place of the surface quadruplication proposed in the exhibited concept plan and Environmental Assessment; and
- the location of Norwest Station approximately 100 metres to the east of the location identified in the concept plan and Environmental Assessment.

A Preferred Project Report was prepared to describe the proposed changes to the proposal and respond to issues raised in submissions on the concept plan and Environmental Assessment. The Preferred Project Report specifically described:

- investigations undertaken on the alignment of the direct tunnel connection between Epping Station and Cherrybrook Station, which included consideration of the option identified in the original concept plan and Environmental Assessment (the blue alignment) and two alternate options (pink and green). On a balance of issues (including track length, grade and curvature; relationship to the Epping to Chatswood Rail Link; constructability; tunnel depth; and maximising the use of public land, such as roads and open space, as requested by public submissions), the Proponent identified the green alignment as its preferred route alignment between Epping Station and Cherrybrook Station (see Section 5.1);
- investigations into the underground alignment at Bella Vista, considering options suggested by public submissions to avoid residential areas. On a balance of issues (including track length, grade and curvature; constructability; tunnel depth; and maximising the use of public land, as requested by public

submissions), the Proponent confirmed that the alignment identified in the concept plan and Environmental Assessment remained the preferred route alignment (see Section 5.1); and

- investigations into the elevated viaduct option from Hills Centre to Rouse Hill identified in the Environmental Assessment. On a balance of issues (including property impacts, impacts to existing infrastructure and land use, heritage impacts, constructability and cost) the Proponent confirmed that the viaduct option does not comprise part of the preferred proposal (see Section 5.1). Notwithstanding the one kilometre section of viaduct across Elizabeth Macarthur floodplain, remains part of the concept plan as identified in the Environmental Assessment.

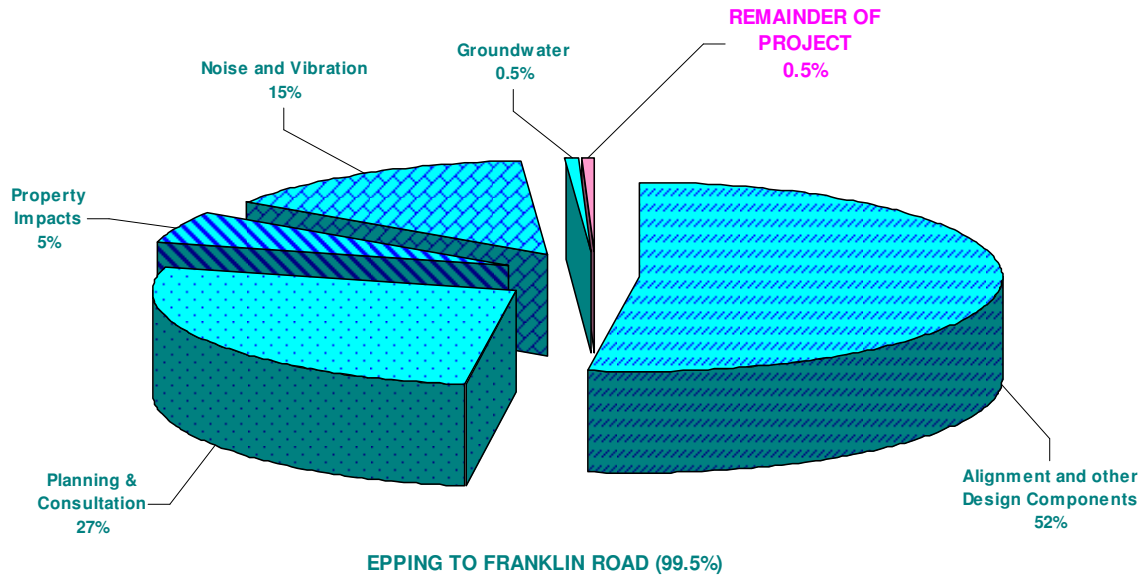
The Preferred Project Report was placed on public exhibition for a further 62 days. Approximately 3,360 new submissions were received in response to the exhibition, of which eight were from State Government authorities and three from Councils. Of the public submissions over 3000 constituted form letters and three were petitions with a total of 133 signatures. Of the public submissions received:

- approximately 0.3% explicitly expressed support for changes made to the proposal, between Epping and Cherrybrook stations, since the Environmental Assessment; and
- approximately 94% raised concerns or specifically objected to changes made to the proposal, between Epping and Cherrybrook stations, since the Environmental Assessment.

The remainder of submissions did not explicitly state a position regarding the changes made to the proposal since the Environmental Assessment (change to alignment between Epping and Cherrybrook Stations or the change to the location of Norwest Station). None of the public authorities objected to the preferred proposal in principle; however, raised issues for consideration during assessment.

As before, the issues raised in the public submissions were compiled and categorised to enable the relative importance of key issues to the public to be determined (see Figure 6). When expressed as the number of times an issue was raised (noting that a single submission could raise more than one issue) the division of issues was marked, with the overwhelming majority of issues raised (99.5%) relating to the **Epping to Cherrybrook** section of the proposal (the first three to four kilometres). This is appropriate given that the major change to the proposal since the exhibition of the original concept plan and Environmental Assessment was in relation to its alignment from Epping to Cherrybrook. In this regard, in contrast to the original Environmental Assessment exhibition, the overwhelming majority of issues raised in relation to planning and consultation matters related to the Epping to Cherrybrook section rather than to the proposal as a whole.

Figure 6: Issues Raised in Submissions from Exhibition of Preferred Project Report



The issues raised regarding the Epping to Cherrybrook section compromised the following:

- the underground alignment (52%):
  - inadequate justification for changing from the surface quadruplication between Epping and Beecroft (the original concept plan) to a direct tunnel connection between Epping and Cherrybrook Stations (3.5%);
  - inadequate justification for choosing the preferred tunnel alignment (green alignment) over other available underground alignment options (14.9%);
  - further consideration is warranted of other underground alignment options (33.1%) including:
    - the blue and pink alignment options investigated in the Preferred Project Report;
    - alternate alignments, which avoid residential areas by more closely following public infrastructure and open spaces, including under the Main North rail line, the M2 Motorway and Pennant Hills Golf Course (the gold and brown alignments);
    - an alignment which originates in Carlingford rather than Epping following Pennant Hills Road to Cherrybrook Station, including specific strategic planning and traffic and transport advantages of such an alignment; and
- the location of tunnel support infrastructure(ventilation and emergency egress building) (0.6%);
- tunnel related environmental impacts (20.5%), including:
  - noise and vibration impacts;
  - property impacts (including damage through vibration and geotechnical subsidence and impacts to property value); and
  - impacts to water resources; and
- Consultation and planning process (27%):
  - inadequate community consultation regarding the changes to the concept plan;
  - requests for extension of the submission period for the Preferred Project Report;
  - the planning and assessment process is flawed (in particular concern was raised that the Proponent's preferred alignment between Epping and Cherrybrook, had not been identified previously in planning documentation for the proposal including the original concept plan); and
  - adequacy of assessment information provided in the Preferred Project Report on the changes to the concept design.

Of the minority of submissions (0.5%) received in relation to the **remainder of the proposal** (i.e. west of Cherrybrook Station), the key issues mirrored the concerns raised in submissions on the original concept plan and Environmental Assessment exhibition in relation to the tunnel, surface and station components of the proposal and other miscellaneous comments regarding operational and design details.

The Proponent undertook further investigations in response to issues raised in submissions on the Preferred Project Report and prepared Supplementary Submissions Report to respond to the issues raised. The Submissions Report also takes into account the Government's March 2008 announcement to deliver the proposal as a new Metro style rail line from Rouse Hill to St James Station via Epping, Top Ryde and Drummoyne. As the proposal remains substantially the same as that described in the Preferred Project Report, the exhibition of the Submissions Report was not considered to be warranted. Notwithstanding the report has been made available to the public on the Department's website.

4.3 Submissions from State and Local Government

The following local and State Government authorities made submissions on the proposal:

- during the concept plan and Environmental Assessment exhibition: the Department of Environment and Climate Change (DECC), the Department of Water and Energy (DWE), the Department of Primary Industries (DPI), the Growth Centres Commission (GCC), Landcom, RailCorp, the Ministry of Transport (MoT), the Roads and Traffic Authority (RTA), the Western Sydney Regional Organisation of Councils (WSROC), Blacktown City Council, Baulkham Hills Shire Council, and Hornsby Shire Council; and
- during the Preferred Project Report exhibition: DECC, DWE, GCC, RailCorp, MoT, RTA, Department of Education and Training (DET), WSROC, Blacktown City Council, Baulkham Hills Shire Council, and Hornsby Shire Council.

The issues raised by these agencies are summarised below:

- DECC – **raised concerns** regarding biodiversity, Aboriginal cultural heritage and noise issues. DECC expects that a detailed ecological assessment will be undertaken for all above-ground works and

construction sites prior to the Proponent applying for project approval, including further consideration of water regime changes on the endangered ecological community Riverflat Eucalyptus Forest on Coastal Floodlands and of disturbed and modified areas where threatened species have been found to exist. In addition, it expects that a detailed assessment of the project would also be undertaken for indigenous heritage including an appropriate level of consultation with the local Aboriginal community. In terms of noise, the DECC recommends that further rigorous assessment be undertaken considering all reasonable and feasible measures to mitigate operational impacts including of ancillary infrastructure.

- DWE – **raised concerns** regarding the shallow tunnel crossing below Devlins Creek and expects that the potential for bed collapse/subsidence, loss of surface water and disturbance of groundwater flow and recharge and effects on riparian vegetation will all be thoroughly investigated. The DWE also raised concerns regarding possible permanent impact to Cattai Creek of cut and cover construction. The DWE has requested that it be consulted on options to minimise impacts for the above creeks.
- DPI - **raised concerns** regarding the potential for surface cracking and loss of water resulting from tunnelling under stream beds.
- GCC – **raised concerns** regarding the location of the proposed interim stabling facility on the proposed future residential land use of the Area 20 Precinct. The GCC suggested that the stabling facility be located at the Box Hill Precinct of the North West Growth Centre because of land availability and more compatible land use (employment/industrial) planned for this location. The GCC also noted that this location would provide an ideal end line station attracting passengers from a wide catchment within the North West Growth Centre.
- Landcom – **supported the proposal**. The following issues were raised:
    - support the delivery of the NWRL being fast tracked, but prefer that the entire proposal up to Rouse Hill be delivered by 2015 rather than only the section from Epping to Hills Centre;
    - require information on the likely delivery dates for the potential future expansion of the rail link to inform precinct planning west of Rouse Hill;
    - preference for the stabling facility to be located further west of Windsor Road so as to increase the buffer zone between the facility and the Northern precinct of the Rouse Hill Regional Centre;
    - request ongoing consultation with Landcom to ensure that ongoing design development of the Rouse Hill station can be integrated with surrounding planned land use and road access provisions;
    - preference for bored tunnelling under the Rouse Hill Regional Centre rather than cut and cover as, the later method is likely to disturbed any landuse developed at the location, prior to the commencement of construction on the rail line, including a bus interchange and roads;
    - further assessment of construction traffic impacts on the Rouse Hill Regional Centre (from cut and cover construction and haulage);
    - ancillary facilities should be contained within the nominated rail/station corridor so as to not affect any additional developable land within the Rouse Hill Regional Centre;
    - ensure that the cut and cover tunnel is designed to withstand appropriate building loads so that development potential above the tunnel is not compromised;
    - consider commencing the cut and cover tunnel south of Sanctuary Drive prior to the commencement of the Rouse Hill Regional Centre, so that no part of the Centre is traversed by rail cutting. Rail cutting would reduce developable land and sever access to Windsor Road from the Southern precinct; and
    - preference for viaduct section to be undergrounded or at grade to minimise visual impacts to the newly developing areas of Newbury/ Stanhope Gardens, west of Windsor Road and Beaumont Hills, east of Windsor Road. If this is not feasible to ensure that appropriate urban design and landscaping is implemented to minimise visual impacts.
- RailCorp – **supported the proposal**, and recommended that the proposal be integrated with surrounding transport and urban development (including appropriate urban design and access provisions) in order for the patronage benefits of the proposal to be maximised. Also supported the integration of reasonability and feasible acoustic control measures and consideration of landuse based mitigation into future design development. Requested continued involvement in future design development.
- MoT – **supported the proposal**. The following comments were raised:
    - requested ongoing consultation with MoT so that the ongoing design development of the proposal maybe integrated with the strategic bus corridor network and investigations into public transport options west of Rouse Hill, being coordinated by MoT;
    - planning for station precincts should not preclude opportunities for future development adjacent to stations;

- ensure that the stations include high quality bus interchange facilities; park and ride facilities consistent with Government parking policy (including consideration of shared parking facilities); and appropriate provisions for pedestrians and cyclists;
- ensure that access provisions at stations comply with Commonwealth disability access standards;
- ensure that station facilities are designed (including location of commuter car parks) so as to minimise amenity, safety and/or operational conflicts between modes of access; and
- further assessment of construction and operation traffic impacts (including at key intersections);

- RTA – **raised concerns** with the impacts the project may have on the State road network and requested continued involvement in design development. Issues of concern relate to:
  - the proposed cut and cover crossing of Windsor Road is likely to result in unacceptable traffic impacts to Windsor Road. By the time the proposal is constructed the RTA considers that traffic volumes on Windsor Road will preclude using cut and cover techniques to construct the crossing;
  - sections of tunnel may impact on future plans to connect the M2 and F3 Freeways in the vicinity of the M2 Motorway near Kent Street, Epping and Kirkham Street, Beecroft and Pennant Hills Road;
  - further design development and assessment of road access, park and ride, kiss and ride and bus interchange requirements at stations to maximise access and connectivity to the stations and integrate the stations with surrounding landuse and transport development; and
  - traffic management during the construction and operational phases.
- DET – **raised concerns** regarding the potential noise and vibration, dust, safety, access and traffic and haulage impacts of the proposal on educational facilities. In particular, the DET raised concerns regarding potential structural damage to these buildings (including the heritage buildings at particular schools) associated with tunnelling.
- WSROC – **supported the proposal** and strongly advocates the extension of the rail link to Vineyard be fast tracked and constructed as part of the NWRL by 2017. WSROC raised the following matters for consideration:
  - significantly increased construction traffic impacts at Hills Centre, resulting from the site being used as a major tunnel construction site under staged delivery;
  - further design development and assessment of access, park and ride and bus interchange requirements at stations to maximise access and connectivity to the stations and integrate the stations with surrounding landuse and transport development;
  - appropriate urban design to minimise visual impacts of the viaduct and other aspects of the proposal in consultation with Councils and consideration of view impacts to the Rouse Hill Estate;
  - consideration of additional station locations at Samantha Riley Drive and the intersection of Norwest Boulevard and Lexington Avenue;
  - need to integrate the stabling facility with the planned development at the Area 20 Precinct;
  - stringent noise and vibration mitigation measures to minimise impacts of the surface and tunnels sections of the proposal;
  - Castle Hill station should be designed to minimise impacts on the Arthur Whiting Park; and
  - further assessment of impacts (including noise and air quality) of ancillary infrastructure.
- Hornsby Shire Council – **supported the proposal** and supported a direct tunnel connection between Epping and Cherrybrook Stations in preference to a surface quadruplication of the Main North Line. However, Council stated that it could not to commit to a specific tunnel alignment until further assessment of alignment options is undertaken to determine the costs and benefits of various options (particularly with respect to tunnel depth and noise and vibration impacts). Recommended that options suggested by community (gold and red alignments) along with the alternate alignments identified by the Proponent (blue and pink alignments) be given more detailed consideration. Other issues raised:
  - concern regarding the level of community consultation undertaken;
  - the location of the ventilation and emergency egress building should be identified for community comment as part of the concept plan;
  - detailed vibration assessments should be undertaken to determine potential impact to heritage sites listed on Council's heritage register;
  - impacts to remnant Blue Gum High Forest endangered ecological community at the Cherrybrook Station site;
  - disturbances to amenity of low-density residential suburbs (Cheltenham/ Beecroft/ Cherrybrook) during construction (including amenity impacts from tunnelling);
  - high density transit-oriented development around Cherrybrook Station would be inconsistent with the existing and proposed (low-density) garden suburb character of the area as identified in the

Cherrybrook Precinct Development Control Plan and Master Plan and the Hornsby Shire Council Employment Lands Review;
    - air quality impacts during construction and operation (tunnel vents);
    - further assessment of operational and construction traffic and transport impacts at Cherrybrook Station, in particular to address mode of access requirements and impacts on the arterial road network and key intersections; and
    - further assessment of impacts associated with ancillary infrastructure.
- Baulkham Hills Shire Council – **supported the proposal** and strongly advocates the extension of the rail link to Vineyard be fast tracked and constructed as part of the NWRL. Other issues raised:
    - preference for the alignment to be undergrounded rather than on viaduct north of Kellyville Station;
    - support the delivery of the proposal being fast tracked, but prefer that the entire proposal up to Rouse Hill be delivered by 2015 rather than only the section from Epping to Hills Centre;
    - concerns regarding the two staged delivery proposal due to likely construction impacts at Hills Centre from this site being used as a major tunnel construction site. Preference for the entire proposal to be built in one stage, with the Balmoral Road construction site being used as the main tunnelling location, which would be less disruptive;
    - consideration of additional station at Samantha Riley Drive;
    - further assessment of mode-of-access requirements and operational traffic and transport impacts at stations (including park-and ride demand; traffic modelling; bus patronage; and provisions for pedestrians, cyclists, kiss and ride, and taxis);
    - further assessment required regarding: vehicular access arrangements at Cherrybrook station; access provisions between the Castle Hill Station and the Castle Towers shopping centre and the Castle Hill Town Centre; construction access arrangements at Hills Centre and operational access between the station and the Castle Hill industrial precinct; and integration of station precinct plans with planned road upgrades at Kellyville Release Area and Rouse Hill Regional Centre;
    - impacts to Arthur Whiting Park at the Castle Hill station site and impacts to Council buildings and the Showground at the Hills Centre site; and
    - further detailed assessment into noise mitigation requirements and hydrology and flooding impacts.
- Blacktown City Council – **supported the proposal.** Raised the following matters for consideration:
    - the Proponent should work with GCC to ensure that the stabling facility is integrated with land use for the Area 20 precinct, including mitigation (where required) of traffic, noise and vibration impacts;
    - further assessment of traffic and transport impacts and parking and access requirements;
    - further assessment of noise and vibration impacts and mitigation requirements for the stabling facility;
    - further detailed assessment of hydrology and flooding impacts of the catchments of Caddies Creek and Second Ponds Creek considering the 1% Annual Exceedance Probability and Probable Maximum Flood events;
    - concerns regarding the risk of water loss from watercourses due to tunnelling cracking bedrock and the rail tunnel acting as a subsoil drain, lowering the water table and potentially impacting on local vegetation or causing subsidence;
    - operational and construction storm water controls and operational groundwater treatment controls;
    - construction vibration and settlement impacts on existing infrastructure and utilities.

4.4 Department's Consideration

The Department's consideration of issues raised in public and agency submissions is summarised in Table 2.

Table 2: Department's Consideration of Issues Raised in Submissions

Issue		Department's Consideration
Tunnel Related Issues	Alignment options	Sections 5.1.1 and 5.1.2
	Environmental issues: noise and vibration; groundwater and geotechnical; property and infrastructure; and air quality.	Section 5.1.3
Issues Related to Surface Components	Alignment options	Section 5.2.1
	Station locations	Section 5.2.2
	Stabling facility location	Section 5.2.3
	Environmental issues: noise and vibration; traffic, transport and spoil haulage; property and landuse; visual amenity and urban design; flora and fauna; hydrology; heritage; and socio-economic.	Section 5.2.4
Assessment and Consultation	Consultation/ exhibition.	The Department is satisfied that that the community consultation undertaken on the proposal is consistent with that undertaken for other large scale infrastructure projects (including the South West Rail Link) and has met statutory requirements, noting that both exhibition periods were extended to greater than double the statutory period of 30 days (see Section 3.3). The Department considers that the large number of submissions received during both exhibition periods demonstrates that there is wide community knowledge of the proposal (including changes since the original Environmental Assessment). The consultation process implemented has enabled a large degree of community input into the proposal design as evidenced by the changes to the proposal since the original Environmental Assessment. There will be further opportunity for community input during the ongoing detailed design of the proposal and as part of the further approvals. The requirement for consultative design has been incorporated into the recommended conditions of approval.
	Planning and assessment process	The proposal is subject to Part 3A of the EP&A Act. The EP&A Act was amended in August 2005 to include a new Part (Part 3A), to enable the assessment of development requiring the Minister's approval, which was previously considered under either Part 4 or 5 of the Act, under a single Part of the Act. The consideration of proposals under this Part does not change the rigour of the planning and assessment process that the Proponent would otherwise have followed under Part 4 or 5 of the Act. Furthermore, as with assessment under Part 4 or 5 of the Act, Part 3A does not preclude changes being made to the proposal during the assessment process (as has occurred for the proposal) in response to issues of concern identified during that process. The final proposal will be considered on its merits. The Department has assessed the proposal in accordance with the statutory obligations of the EP&A Act, so that the Minister can make a determination regarding the proposal.
	Adequacy of information presented	The Department is satisfied that the information presented in the Proponent's Environmental Assessment, Preferred Project Report and Supplementary Submissions Report, provides sufficient information to enable the assessment of the impacts of the concept plan. The Department's assessment of the proposal is detailed in Section 5.
Other Matters	Proposal justification (including other transport modes)	Section 2.2
	NWRL Extension	The Department notes that the NSW Government's June 2005 announcement of an expansion to Sydney's rail network identified the potential for the rail connection to be extended west to Vineyard should the need arise. The Ministry of Transport has commenced investigations into modal and corridor options available to meet public transport

		objectives west of Rouse Hill. These investigations are as yet at an early stage. Delaying the delivery of the North West Metro, until these plans are developed to sufficient degree to enable their delivery as part of or concurrent with the North West Metro is not considered to be justified, as this would result in unacceptable delays to the delivery of public transport infrastructure to the North West and worsen existing car-dependency levels and associated environmental impacts. The proposal as part of the North West Metro is considered to be justified in itself. Specifically, the western section of the North West Metro is required to address existing public transport demand in developed areas of the North West and should not be delayed until planning for areas to the west of Rouse Hill (aimed at catering for new growth in the North West Growth Centre in line with land release) is resolved. The delivery of the North West Rail Link as part of the North West Metro would not preclude planning for areas to the west of Rouse Hill, as the north West Metro is being developed in consultation with agencies responsible for this transport planning (the Ministry of Transport). Further, the Department has incorporated the requirement for consultative design into the recommended conditions of approval. Any future application for a public transport proposal to the west of Rouse Hill would be assessed separately on its merits.
	Staged delivery	While delivery of the entire western part of the North West Metro (from Epping to Rouse Hill) by 2015, would be ideal, the Department recognises that given the time constraints associated with the design, assessment and delivery of such a complex and large scale proposal, the staged delivery constitutes what can be reasonably achieved within given design and construction constraints. Staged construction would enable the early delivery of a large part of the proposal, allowing large commuter catchments such as Castle Hill, Cherrybrook and West Pennant Hills (which at present have limited access to public transport) early access to the proposal's public transport benefits. It is noted that the delivery of the entire North West Metro (some 38 kilometres) by 2017 represents an already highly accelerated delivery timeframe considering the scale and complexity of the proposal. The Department considers that the benefits of delivering public transport infrastructure earlier would outweigh the additional construction disruptions likely to result from the construction process required to deliver this outcome (i.e. multiple construction sites including several tunnel support locations). The Department considers that regardless of the staged nature of proposal delivery, multiple construction sites (and associated disruptions) would likely be required to avoid unacceptable construction risks, particularly within the bored tunnel. These include spoil conveyor breakdown and flexibility for moving machinery and supplies along the tunnel. Consequently, the Department supports the staged construction process as proposed.
	Other design details and operational matters	The Department is satisfied that other matters have been satisfactorily addressed in the Proponent's Preferred Project Report and Supplementary Submissions Report.

5. ASSESSMENT OF ENVIRONMENTAL IMPACTS

The Department's assessment has focused on matters identified by the Department, public submissions, and agency submissions as key issues associated with the proposal, that being:

- tunnel related issues – alignment, noise and vibration, groundwater and geotechnical and property and infrastructure; and
- surface issues – alignment, station locations, stabling facility location, noise and vibration, traffic and transport, property and landuse, visual amenity and urban design, flora and fauna, hydrology, heritage, and socio-economic.

Other issues are considered to be satisfactorily addressed in the Proponent's Preferred Project Report, Supplementary Submissions Report and Statement of Commitments (SoC).

Whilst the Proponent's assessment largely focuses on the delivery of the proposal as an extension of the existing city rail suburban network, as proposed prior to its incorporation into the new North West Metro, the Department considers that the assessment remains valid at a concept level for the revised proposal, as the assessment remains representative of the issues and constraints that would be associated with a large scale rail infrastructure project (regardless of whether or not it is in the form of a Metro), and provides sufficient information on impacts to determine the design principles and performance standards required to guide subsequent design development and assessment. Whilst it is likely that detailed design review of the proposal (as part of the new Metro line) would result in some refinement to the proposal design, fundamentally, the environmental constraints, design parameters and performance standards that the detailed design of the proposal would need to be guided by (which have come out of the current assessment) would not change.

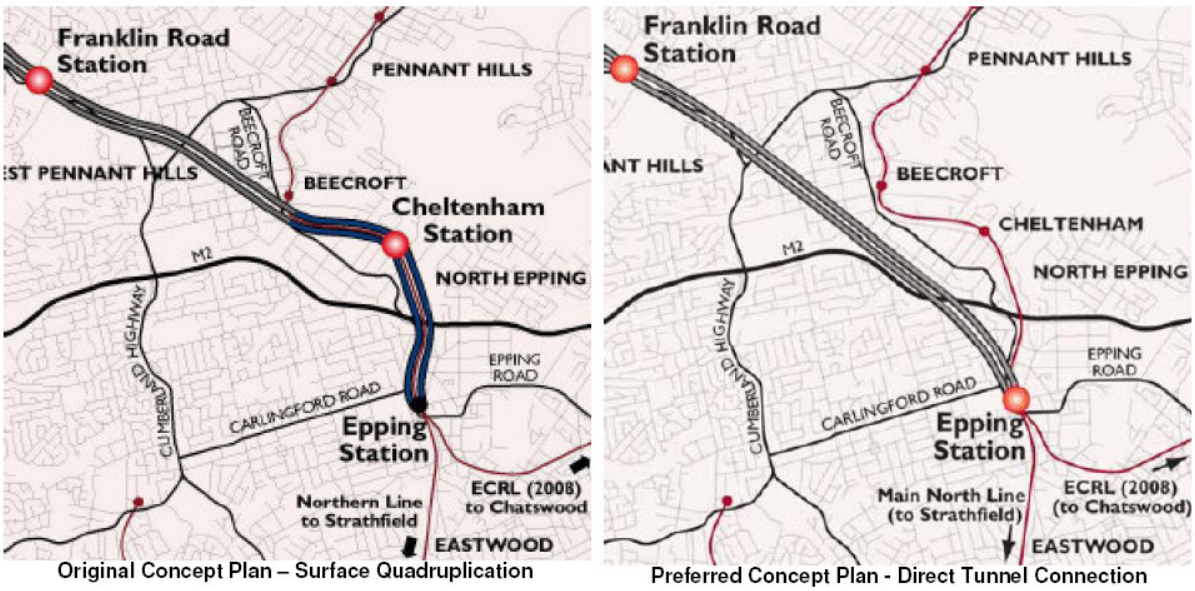
5.1 Tunnel Issues

5.1.1 Alignment Options - Epping to Cherrybrook Section

Issue

The Proponent originally proposed a surface quadruplication of the existing Main North Line between north of Epping and just south of Beecroft station (see Figure 7), followed by a bored tunnel alignment until south of Kellyville Station. The original surface quadruplication would have required a dive structure just north of Epping Station for the proposal to connect with the underground Epping to Chatswood Rail Link (ECRL); a major upgrade of Cheltenham Station to accommodate the new rail line (including the permanent loss of parking space); and a dive structure south of Beecroft Station (affecting community infrastructure such as the Beecroft Village Green and Scout Hall) to facilitate the undergrounding of the proposal as it headed west.

Figure 7: Original and Preferred Alignments between Epping and Cherrybrook Stations (GHD, November 2006 and GHD, May 2007)



The preferred concept plan was subsequently altered (as part of the Preferred Project Report) to include a direct tunnel connection straight from the Epping terminus of the ECRL to Cherrybrook Station in place of the surface quadruplication of the Main North Line and the dive structures at Epping and Beecroft/Cheltenham (the section of bored tunnel west of Cherrybrook station until south of Kellyville Station remains unchanged from the original concept plan) (see Figure 7). Following its incorporation into the new North West Metro, the proposal would remain the same as proposed in the Preferred project Report, except that the tunnel would remain independent of the existing suburban rail network (i.e. the ECRL) and continue to St James Station as part of the new North West Metro.

Submissions

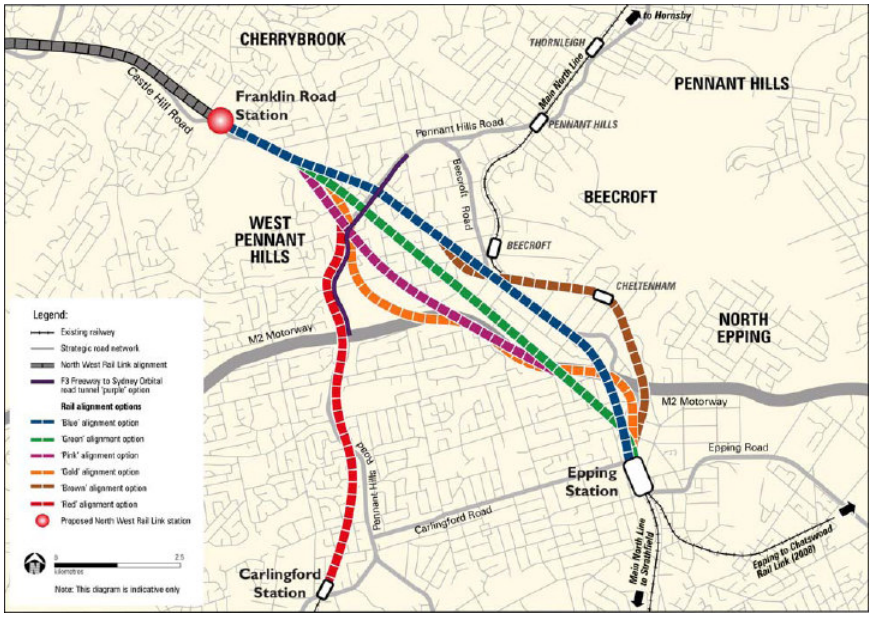
Significant opposition was raised in submissions to the surface duplication of the Main North Line on the grounds of:

- impacts to community infrastructure (such as the Beecroft Village Green and Scout Hall);
- loss of vegetation along the rail corridor and associated ecological and visual disturbance;
- construction and operational noise impacts (resulting form the rail corridor being widened and brought closer to receivers and from additional train movements);
- construction traffic and access disruption particularly to local schools associated with the Cheltenham Station upgrade (including changes to the Cheltenham Road overbridge); and
- the permanent loss of car parking at Cheltenham station.

The impacts associated with the quadruplication were considered by submitters to be generally inconsistent with the quiet, residential and heritage amenity of the suburbs of Beecroft and Cheltenham and the low traffic character of Cheltenham Station. Preference was stated for a direct tunnel connection between Epping and Cherrybrook, either along the alignment identified as an option subject to further investigation in the Environmental Assessment (the blue alignment) or an alignment which more closely followed public infrastructure and open space, to avoid residential areas.

Following investigations into feasible direct tunnel alignments from Epping to Cherrybrook stations, the Proponent released a Preferred Project Report identifying its preferred tunnel alignment (the green alignment). Significant public opposition was raised to the preferred tunnel alignment. Submitters considered further investigation of alternate alignments were warranted including: the original alignment identified in the Environmental Assessment (blue alignment), the alternate alignment investigated in the Preferred Project Report (pink), and other alignments suggested by the community to avoid residential areas (gold/ brown), including one that that travels under the Main North Line (brown) (refer Figure 8). In general, public submissions supported deeper alignments which travelled under public infrastructure (road and rail) and open space rather than below residential areas. In addition, community members considered that there was merit to the proposed rail connection commencing at Carlingford rather than Epping (i.e. the red alignment) (see Figure 8).

Figure 8: Alternative Tunnel Alignments (TIDC, March 2008)



Department's Consideration

Quadruplication versus Tunnel

The Department is generally supportive of a tunnel rather than surface alignment across existing highly built up areas, as a tunnel option (subject to appropriate design) would involve significantly less disruption and physical disturbance of already developed surface infrastructure to accommodate the new rail line. The Department considers that an appropriately-designed direct tunnel connection between Epping and Cherrybrook stations would have significant advantages over a surface quadruplication of the Main North Line, by being able to avoid surface disturbance which would impact on the character and infrastructure of existing developed suburbs (such as Epping, Cheltenham and Beecroft).

In particular, a direct tunnel connection would remove the need for large scale disturbance of valued community infrastructure at Epping and Beecroft, which would otherwise have been disturbed for dive structures. The direct tunnel connection would also avoid impacts to Cheltenham station including the permanent loss of existing parking levels. The Department notes that a relatively low number of submissions stated definite preference for the quadruplication in place of a tunnel (3.5%). Most submitters did not object to a tunnel option in-principle but required the alignment to be located and designed to minimise impacts to residential areas and other sensitive receivers as far as possible. Tunnel alignments are considered further below.

A direct tunnel would also have capital cost advantages over the quadruplication of the Main North Line (as construction timing would not be dependent on scheduled track possessions of the surface line when power is turned off and trains do not run), and would be easier to maintain (due to the advantages of weather protection of equipment by the tunnel). The complete independence of the tunnel with the Main North Line (and now as part of the North West Metro, independent of the entire suburban rail network including the Epping to Chatswood Rail tunnel) confers additional advantages during construction (with minimal disruption required to the exiting network) and during operation (with increased reliability and reduced timetabling complexity as the new rail line would not require crossover or interface with existing services or be affected by timetabling delays in other lines). Whilst compete independence would confer the disadvantage of not being able to reroute trains onto other lines in the case of an emergency, this must be balanced by the significant benefits conferred by the system and the ability to deal with emergency situations by other mean (e.g. appropriate emergency planing including alternative public transport provisions and the availability of interchange to other modes transport at various stations).

On a balance of potential impacts that may be avoided and construction and operational advantages accrued, the Department is satisfied that a direct tunnel connection would be preferable to the surface quadruplication of the existing Main North Line.

Alternative Tunnel Alignments

The Department acknowledges that significant impacts (e.g. regenerated operational noise impacts and property damage) may yet result to surface receivers if the direct tunnel connection is not appropriately designed, thereby negating the advantages of undergrounding the new rail line to avoid physical disturbance to existing built up areas. Community submissions generally supported tunnel alignments that either avoided residential receivers entirely by traversing under public land or existing infrastructure and/or by being located as deep as possible to avoid impacts to surface receivers. Submitters considered that the number of residential receivers located above a tunnel alignment should form a key factor in alignment selection.

The Department considers that it is important to recognise that the number of receivers located above a tunnel alignment is not necessarily representative of the number of surface receivers that may actually be impacted by that alignment. Notwithstanding, the Department recognises the logic of avoiding the potential for impacts where possible, and supports significant community sentiment for the tunnel to be designed to meet acceptable amenity standards at surface receivers.

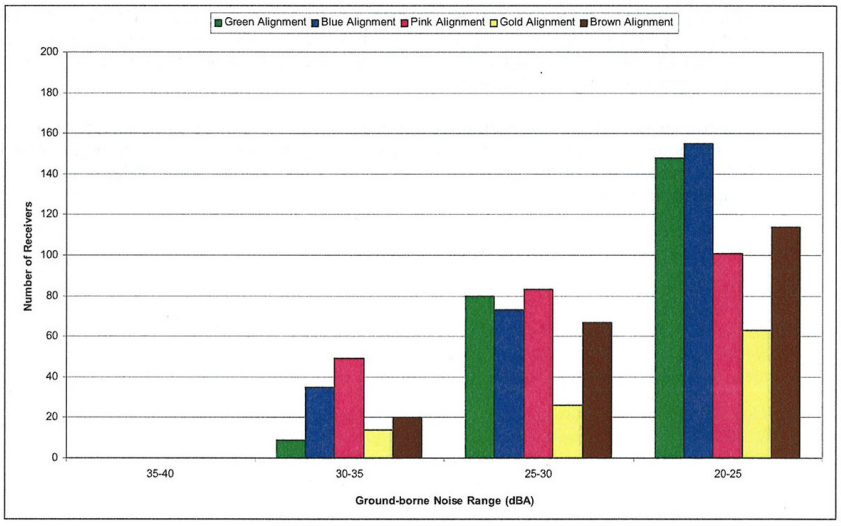
In response to community concerns, the Proponent has investigated the new alignments suggested by the community (gold and brown) and further investigated the alignments already identified (blue, pink and green) based on a range of selection criteria including tunnel length and depth, journey time and ride quality, construction and maintenance costs, the number of dwellings located over the alignment, regenerated noise impacts, spoil generation, energy consumption and encroachment into the Parramatta Rail Link approval corridor.

The Proponent's investigations indicate that the preferred green alignment would traverse under a greater number of residential properties than the other alignment options (apart from the blue alignment) (refer Table 3). Notwithstanding, the Proponent's additional operational noise investigations indicate that with appropriate track design (direct fix and floating slab track type) relevant regenerated noise criteria can be met at residential receivers regardless of the alignment chosen (see Figure 9). Given that regenerated are more stringent than vibration criteria for 'building damage', this means that by meeting regenerated criteria, the proposal would also pose negligible risk of operational vibration related property damage, regardless of the alignment chosen. On this basis, the number of dwellings above an alignment can be discounted as a determining factor for alignment selection.

Table 3: Landuse and Dwellings Per Alignment (from TIDC, March 2008)

Zoning	Gold	Brown	Pink	Green	Blue
Residential	154	237	257	286	384
Business	3	1	23	12	4
Special Use	4	14	8	8	22
Open Space and Recreational	26	10	22	22	20
Total Parcels of Land	*187*	*262*	*310*	*328*	*430*
Dwelling	**Gold**	**Brown**	**Pink**	**Green**	**Blue**
Single Residence	139	221	244	271	355
Medium Density (2-6 dwellings)	4	8	4	4	22
High Density (6+ dwellings)	120	0	64	64	127
Total Dwellings	*263*	*229*	*312*	*339*	*504*

Figure 9: Predicted Generated Noise Levels Along Each Alignment (TIDC, March 2008)



Of other selection factors, it is noted that the preferred green alignment involves the shortest and straightest route and generally has the shortest sections of route which traverse relatively steep gradients.

These factors confer several significant construction and operational advantages over the other alignment options including: lowest capital/ construction costs, shortest construction duration (and associated disruptions), least spoil generation (and associated haulage impacts and disposal requirements), best journey times and rider comfort, lowest maintenance cost (as less curvature reduces the potential for wear and tear) and least energy consumption. In addition, the Proponent's assessment indicates that of the alignment options, only the pink and preferred green alignments are unlikely to encroach on the approved corridor of the Parramatta to Epping Rail Link (thus requiring changes to that project). Notwithstanding, the Department considerers that this should not form a key determining factor given that the detailed design review of the proposal (following its incorporation into the North West Metro) has the potential to result in design refinements to the preferred alignment in vicinity of Epping Station (from the proposal no longer connecting to the Epping to Chatswood Rail Link stub tunnels and as a consequence of the future detailed design of the eastern section of new Metro line).

On balance the Department is satisfied that subject to appropriate mitigation to achieve relevant amenity standards, a generally straighter and shorter length of tunnel alignment between Epping and Cherrybrook Stations (as in other parts of the proposal) would confer significant advantages in terms of cost and quality of ride. Whilst the incorporation of the proposal into the new North West Metro is likely to allow some flexibility in alignment design (due to alternate rolling stock being able to better cope with steeper grades and tighter curves), in general refinements to the alignment cannot be at the cost of efficient operations. The North West Metro, is entirely based on fast and high frequency service and would be particularly disadvantaged by track geometry that

is not conducive to efficient journey times. Furthermore, given the significant upfront capital expenditure associated with the proposal, it is important that the proposal (where possible) be designed along principles that maximise lifecycle efficiencies (including future maintenance costs and energy consumption) so as to minimise ongoing costs in the future.

Consequently, the Department considers that the detailed design review of the alignment as part of the North West Metro should be guided by requirements of maximising cost, life cycle and operational efficiencies through appropriate track geometry, whilst ensuring appropriate mitigation to achieve relevant amenity standards at sensitive receivers. In this regard, the Department has recommended comprehensive and rigorous further assessment requirements to inform the future project application and assessment process in relation to noise and vibration impacts for the tunnel components. Furthermore, to ensure ongoing community input into the proposal design, the Department has recommended conditions of approval requiring the Proponent to progress its detailed design and further assessment in consultation with relevant agencies, Councils, landowners and stakeholders.

Commencement at Carlingford

A large portion of submissions supported the commencement of the proposed rail connection at Carlingford considering that this would promote the growth of centres along the Carlingford line by increasing train services along that line, and provideing increased access to Parramatta and Blacktown. Submitters considered that the Beecroft/ Cheltenham area was already well serviced by road and public transport (the Main North Line and bus services) and that a new rail line would better serve areas around Carlingford, including new station opportunities at North Rocks and Carlingford Court.

The Department does not support an alignment commencing at Carlingford as this would be inconsistent with the strategic transport planning objectives of the Metropolitan Strategy and the proposal itself, of providing fast and direct access between existing and planned growth centres in the North West (including the North West Growth Centre) and key employment hubs in Sydney known as the 'Global Arc', stretching from Macquarie Park through Chatswood, St Leonards, North Sydney and the CBD to Sydney Airport and Port Botany. The current proposal as part of the North West Metro would provide fast access to CBD and to the Epping to Chatswood Rail Link, which offers direct connection to employment hubs north of the Harbour. In contrast, a connection via the Carlingford Line (through the Western Line) would be circuitous and inefficient and would not present a competitive mode of travel between the North West and the Global Arc employment hubs, in comparison to motor vehicles.

Furthermore, it is noted that the Carlingford and Western Lines would not have sufficient capacity to accommodate new services from the proposal (including future growth needs), without significant congestion pressure and decreased level of service on both existing services and proposed new services to the north west, or the requirement for the costly amplification of both the existing corridors. Further, this option would not be consistent with the objectives of the new North West Metro, as it would require connection with the existing suburban rail network and involve a circuitous connection to the city, both of which would be inconsistent with the objectives of Metro of provide fast, reliable and high frequency services.

It is further noted that access to Parramatta is not dependent on the proposed new rail line. These areas are provided for by existing bus provisions, including strategic bus corridors 40 (Castle Hill to Parramatta), 41 (Hornsby to Parramatta via Epping and Carlingford) and 42 (Rouse Hill to Parramatta via Norwest Business Park – the North West Transit Way). Furthermore, it is noted there is an existing approval (the Parramatta Rail Link) for rail connection between Carlingford to Epping in the future should demand dictates. In addition, the North West Metro would provide centres, which (in contrast to centres along the Carlingford Line) have not previously had access to rail, the opportunity for greater connection and economic revitalisation; whilst at the same time diversifying employment opportunities for residents within the North West, consistent with the objectives of the Metropolitan Strategy of increasing employment opportunity outside of the CBD.

In summary, the Department is satisfied that the proposed route of the new rail line from Cherrybrook to Epping (rather than to Carlingford) is justified.

5.1.2 Alignment Options - Bella Vista/ Northwest Business Park Section

Issue

The Proponent's preferred tunnel alignment at Bella Vista/ Northwest Business Park travels west under Norwest Boulevard from Salisbury Road and then north up to Celebration Drive, along the western side of Northbridge

Creek (a man made creek). At this location the alignment traverses under commercial and newly developing residential landuse.

Submissions

A number of submissions objected to the preferred tunnel alignment at this location on the grounds that the alignment would traverse below a large number of residential and/or commercial properties. Submissions suggested a number of alternative alignment options including:

- preference for the alignment identified in early planning documentation for the NWRL (the *North West Rail Link Overview Report*, Transport NSW 2002);
- an alignment traversing from Salisbury Road along the southern boundary of the Castle Hill Golf Course; and
- refinements to the alignment near Northbridge Creek (between Norwest Boulevard and Celebration Drive), to avoid residential areas.

Department's Consideration

The Department understands that design investigations have excluded the alignment identified in early planning from further development due to impacts to sensitive land use at the Hill Song Church (including auditorium and sound studio), flood and environmental risk associated with crossing Elizabeth Macarthur Creek via cutting and the requirement for a large cutting (and associated impacts) through the northern portion of the Bella Vista residential estate. The Salisbury Road/ golf course route is not supported by the Department as it would entirely avoid the main patronage catchment of North West Business Park, and thereby not meet one of the key objectives of the new rail line, being to provide rail access to key employment hubs.

The Proponent's further investigations into feasible alternative alignment routes between Norwest Boulevard and Celebration Drive indicate that the movement of the corridor east or west of Northbridge Creek would displace the footprint of rail corridor under different residential and/ or commercial properties rather than significantly altering the total number of properties under which the proposal would travel. An alignment entirely under Lexington Drive although potentially traversing under fewer residential properties (up to nine fewer), would be longer and require tighter curvature which, as discussed previously would pose significant disadvantages with respect to construction and maintenance costs and journey times, and would potentially jeopardise the success of fast and frequent metro style services.

The Department is, on balance, satisfied that the preferred tunnel alignment identified at this location provides a balanced solution to conflicting impacts and engineering requirements. However, the Department recognises that detailed design review as part of the North West Metro may necessitate refinements to the alignment and has incorporated conditions of approval detailing strict environmental standards and design principles (including in relation to noise and vibration criteria at the tunnel components) which would need to inform the future approval and assessment process. These requirements are aimed at ensuring that the proposal is designed to maximise operational and lifecycle efficiencies whilst minimising unnecessary impacts to surface receivers. The Department has also incorporated recommended conditions of approval requiring the Proponent to progress its detailed design in consultation with relevant agencies, Councils, landowners and stakeholders.

5.1.3 Environmental Issues - Tunnels

Issue

The Proponent has identified that the tunnel section of the proposal could result in the following potential impacts:

- operational and construction noise and vibration impacts to surface receivers (including potential physical damage to surface properties from vibration), and
- geotechnical impacts (including potential physical damage to surface properties through subsidence and settlement, groundwater disturbances, and impacts to surface waterways through cracking and water drawdown).

Submissions

A large number of submitters raised concerns regarding impacts to residential receivers from construction and operational regenerated noise and vibration impacts and damage to properties from vibration and settlement. Submitters also raised concern regarding potential losses to property value as a result of being identified within the tunnel corridor, including compensation for such losses (in addition to compensation from direct physical damage). Other concerns raised in public and agency submissions included: impacts to groundwater and surface

creeks, air quality at tunnel vents and impacts to underground infrastructure including the planned M2 Motorway to F3 Freeway road tunnel

.

Department's Consideration

The Department's consideration of tunnel related environmental impacts is provided in Table 4.

Table 4: Department's Consideration of Tunnel Related Environmental Issues

Issue	Department's Consideration
Noise and Vibration	Operational Impacts Potential operational noise impacts associated with the tunnel components of the proposal would comprise 'regenerated' rather than airborne noise (i.e. vibration from train pass bys in the tunnel being conducted through the ground and expressed as noise inside a dwelling or other sensitive receiver). Since its release in April 2007, regenerated noise has been regulated by the DECC's Interim Guidelines for the Assessment of Noise from Rail Infrastructure Projects (IGANRIP), which specifies internal noise trigger values for residential receivers (day = 40 dBA and night = 35 dBA) and schools, educational institutions and places of workshop (when in use = 40-45 dBA). The Proponent's original Environmental Assessment (released prior to the introduction of the IGANRIP) did not include a quantified assessment of regenerated noise. However, following significant concerns raised in submissions regarding the preferred tunnel alignment between Epping and Cherrybrook Stations, the Proponent undertook further assessment of the regenerated noise impacts associated with the alternative tunnel alignments. As discussed in Section 5.1.1, this assessment indicated that the IGANRIP trigger value of 35 dBA could be met at all affected residential receivers along the preferred route alignment between Epping and Cherrybrook Stations (including at the lowest depth of cover of 20m at Beecroft Road near Epping station), with the application of low vibration track type (direct fix and/ or floating slab). Although the Proponent's revised assessment did not specifically consider the preferred bored tunnel alignment west of Cherrybrook Station, the Department is satisfied that the conclusions of the assessment in relation to acoustic attenuation remain valid for that section of alignment. This is because the tunnel west of Cherrybrook Station (as currently proposed) would traverse similar geological terrain (Ashfield Shale and Hawkesbury Sandstone) and depth of cover as the alignment to the east of Cherrybrook Station, which the Proponent's revised assessment is based on (i.e. the lowest depth of cover above residential areas in this section being approximately 24m at Westwood Way near Norwest station). The cut and cover tunnel sections would comprise much lower depth of cover (7-16.8m), however, are only proposed in as yet undeveloped areas, where opportunity still exists for appropriate land use planning to occur that is compatible with the proposal (e.g. less noise sensitive landuse such as commercial or industrial development). With respect to operational vibration, the Proponent's revised regenerated noise assessment states that given the stringency of the IGANRIP regenerated noise criteria, vibration criteria for human comfort would not be exceeded if the proposal is designed to achieve the IGANRIP values. Similarly, the less stringent 'building damage' vibration criteria would be achieved by meeting the vibration criteria for human comfort. It is noted that the Proponent's regenerated noise and vibration assessment is based on the proposal as an extension of the existing City Rail network, as proposed, prior to its incorporation into the new North West Metro. The delivery of the proposal in the form of a Metro presents the opportunity for different design elements to be incorporated into the proposal, including alternate rolling stock (likely to be shorter and lighter but more frequent) and associated opportunities for refinement to the vertical and horizontal tunnel alignment. Whilst these design elements would likely influence the details of the regenerated noise impacts associated with the proposal, the Department is satisfied that the current assessment remains generally representative of the acoustic outcomes that can be achieved by a Metro proposal, noting that the impacts of a Metro are unlikely to be significantly different form the worst case impacts predicted as part of the current assessment (based on heavier rolling stock at various depths of cover). Notwithstanding, the Department has recommended that the Proponent update its operational noise and vibration assessment for tunnel sections of the proposal as part of the further assessment and approvals process, to confirm the impacts of the proposal following further design development as part of the North West Metro and to determine all reasonable and feasible mitigation measures available to affected receivers, with particular consideration of landuse based mitigation opportunities above the cut and cover sections, in consultation with relevant agencies. In particular, the Department has required the Proponent to update its operational noise assessment to cover the entire tunnel alignment against IGANRIP requirements.

	Construction Impacts Without appropriate management, bored tunnel construction (which is required on a 24 hour basis to ensure the efficient delivery of the proposal) is likely to cause significant regenerated noise impacts at sensitive receivers for short periods of time, with up to 50 dB(A) noise levels expected at tunnel depths less than 25m. Typically the regenerated noise generated by the operation of the tunnel boring machine (TBM) would become perceptible and rise to a maximum over about a week before subsiding once the subject surface receiver has been passed. Depending on the depth of cover and location of sensitive infrastructure (such as heritage items), there is also potential for structural damage to surface and/or underground infrastructure as a result of vibration from the TBM. The Proponent has proposed to manage these issues through standard measures that have been successfully employed during the construction of the Epping to Chatswood Rail tunnel including: • a comprehensive system of public notification to keep the public notified of the progress of the TBM and the noise levels that can be expected, including (where reasonable and feasible) offering of alternative accommodation or similar, for receivers to escape the worst two to three days of noise (i.e. when the TBM is directly under a subject dwelling); and • dilapidation surveys of properties and other structures before and after tunnelling and compensation/ rectification of damage attributed to the proposal. The Department is satisfied that with the implementation of the above mitigation measures the noise and vibration impacts associated with the bored tunnel components of the proposal may be appropriately managed. Notwithstanding, the Department has recommended conditions of approval requiring the Proponent to identify all reasonable and feasible mitigation measures to meet acceptable regenerated noise and vibration goals as part of the further assessment and approvals process. The construction and noise vibration impacts associated with the cut and fill sections of the alignment, which will involve surface construction techniques, are considered further in Section 5.2.4.
Groundwater and Geotechnical	The main geotechnical and groundwater risks associated with tunnelling include: inflows into tunnels lowering regional or local groundwater tables (and associated impacts to groundwater users and groundwater dependent ecological communities); direct cracking and loss of water from surface streams through tunnelling under creek systems (and associated impacts to in-stream and riparian ecology); contamination of watertables and/or associated surface water systems with saline and/or turbid waters during construction and/ or operation; and potential damage to surface infrastructure through land subsidence and settlement. The extent and significance of impacts would depend on the geology traversed (including the extent of fracture and interconnectivity within the rock mass); the depth of cover between the tunnel and surface infrastructure; the location of the water table with respect to the tunnel; the nature of the water table (i.e. seasonal or permanent); and the types of mitigation adopted. The Department notes that detailed geotechnical investigations are yet to be completed for the proposal. However, based on recent experience gained from large-scale tunnelling projects within geological terrain similar to what would be traversed by the proposal (Ashfield Shale and Hawkesbury Sandstone), the Department is satisfied that the geotechnical issues associated with the proposal can be managed through appropriate design and standard mitigation measures including: lining of the tunnel minimise groundwater inflow; the use of shielded tunnel boring machines to manage excavation induced settlement; building dilapidation surveys prior to the commencement of construction; settlement monitoring; and appropriate compensation for any property damage attributed to the proposal. On balance the Department considers that the benefits of tunnelling, with respect to avoiding significant disturbance of highly built up surface areas, would outweigh potential residual impacts from geotechnical issues. To ensure that the proposal is designed to minimise geotechnical and groundwater related impacts as far as possible, the Department has recommended that the following matters form part of the further assessment requirements for the proposal when seeking further approvals: • detailed investigating of existing groundwater conditions, taking into consideration seasonal variation of groundwater levels and quality; • detailed modelling of local and regional drawdown impacts, identifying any groundwater users impacted by the proposal and measures to offset impacts; • detailed construction methodology for tunnelling below creek beds including details of rehabilitation and monitoring to ensure that stream beds are rehabilitated to existing (or better) conditions; • detailed assessment of impacts to groundwater dependent ecological communities and riparian and in-stream habitat including measures to offset impacts; • identification of locations (and associated surface infrastructure) that are likely to be at risk to land subsidence or settlement impacts, and measures to minimise, monitor and offset impacts during construction and operation; and

	• identification of detailed measures to avoid, mitigate, monitor and/ or offset groundwater and surface water quality impacts, including through saline contamination, during construction and operation; and • identification of options for the sustainable use and/or disposal of tunnel inflow (such as landscape irrigation) in consultation with Councils and utility providers.
Property and Infrastructure	Significant concerns were raised in submissions that the identification of a tunnel footprint under or near subject properties would result in a loss to property values, due to perceived negative impacts from noise and vibration and geotechnical matters (settlement and subsidence). Several submitters considered that losses to property value should be compensated in addition to compensation for direct physical damage from vibration and/ or geotechnical impacts. The Department considers that as long as the proposal is designed and constructed to meet strict environmental standards to protect environmental amenity and to avoid physical damage, long-term property values are unlikely to be measurably affected by the tunnel sections of the proposal. Whilst the Proponent would be responsible for compensating for any physical damage caused to property or infrastructure attributed to the proposal, the Department does not support compensation for any changes to property values that is considered to result from the location of the tunnel corridor. This is due to the fact that the property market is affected by number of factors making the impact of a specific proposal on property values difficult to quantify particularly over time. It is likely that factors such as interest rates, the historical values of properties in the area and the economy, would outweigh the influence of an individual proposal on property values in the long term. This is supported by the conclusions of the independent assessment of property values commissioned by the Department on the Parramatta Rail Link (now the Epping to Chatswood Rail Link). The report by Hill PDA Property Consulting Pty Ltd reviewed several existing infrastructure projects including the M5 East Freeway tunnel, Airport Rail Line and Eastern Suburbs Railway, and concluded that the Parramatta Rail Link tunnel was unlikely to significantly affect property prices in the long term. In fact, it was considered that the proposal was likely to have a positive effect on property values in the long term, by increasing accessibility to public transport infrastructure. Notwithstanding the Department acknowledges that negative perceptions of the new rail line may persist until the proposal is built and may affect the property market in the short term (including properties taking longer to sell and vendors accepting reduced prices to obtain a quick sale). The Department considers that the most effective method of combating negative perceptions would be to increase public consultation and liaison on the proposal so that the community including specialist stakeholders such as real estate agents are kept informed on the latest investigations/ studies on the impacts of the proposal. Greater public awareness would aid better understanding of the true impacts of the proposal and help combat the influence of false perceptions on property prices. To maximise community involvement in ongoing detailed design development, the Department has recommended conditions of approval requiring the Proponent to progress its detailed design (to inform the subsequent approval and assessment process) in consultation with relevant agencies, landowners and the community The Proponent's investigations to date have considered potential interactions with existing and planned underground infrastructure (including minimum clearances from the planned M2 Motorway to F3 Freeway road tunnel and the existing M2 Motorway and support structures). The Proponent has committed to undertaking further design development in consultation with relevant agencies, utility providers and landowners to ensure that the proposal is designed with adequate regard to the requirements of existing and planned underground infrastructure including the M2 Motorway to F3 Freeway road tunnel and development requiring underground parking/ basement facilities. The Department supports this measure and has incorporated conditions of approval to reinforce this commitment.
Air Quality	While air quality at tunnel vents was raised as an issue of concern in a number of submissions, the Department does not consider this to be a key assessment issue as the proposal would use electric trains, which do not directly emit nitrogen oxides, carbon monoxides, hydrocarbons, lead or exhaust particles. In contrast, the proposal is likely to improve local and regional air quality (as well as green house gas emission levels) by moderating private vehicle use.

5.2 Surface Component Issues

5.2.1 Alignment

Issue

Approximately 4.4 kilometres of the alignment of the proposal, comprising the western section f the North West Metro would be at surface in either cutting and embankment or viaduct, with an additional 2.6 kilometres (the cut and cover tunnel) requiring surface disturbance during construction only. The Environmental Assessment for the proposal identified an extended viaduct alignment option between Hills Centre and Rouse Hill (see Figure 4) as being subject to further consideration, however the Proponent has since confirmed that this does not form part of the preferred concept plan.

Submissions

Considerable opposition was raised in submissions to any section of the proposal being elevated by viaduct. In addition a number of submissions raised preference for bored tunnelling rather than cut and cover tunnelling to minimise disturbance to surface infrastructure. Preference was also raised for greater undergrounding of the alignment west of Kellyville Station to minimise loss of developable land in newly developing areas and to minimise potential noise, vibration and visual impacts to planned future receivers in these areas.

Department's Consideration

The Department supports the Proponent's approach to alignment design which has sought to minimise impacts to existing built up areas as far as possible by undergrounding the majority of the alignment (80%), including altering the proposal to include a direct tunnel alignment rather than the surface quadruplication of the Main South Line between Epping and Beecroft, notwithstanding the significant additional construction and maintenance costs associated with tunnelling in comparison to at grade alignment. Where surface alignment sections are proposed these are generally limited to newly developing or as yet undeveloped areas, which unlike already existing built up areas have the opportunity to be developed with regard to the requirements and impacts of a new rail line and thereby minimise the potential for land use conflicts. It is noted that the recently gazetted *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) places strong emphasis on controlling development adjacent to existing and/ or identified rail corridors, to minimise the potential for land use conflict in newly developing areas.

To maximise opportunities for land use integration between future land use and the surface components of the proposal the Department has required the Proponent to engage in consultative design development with agencies including Landcom, GCC and Councils. The Department considers that consultative design would maximise the opportunity for mutually beneficial design refinements to be progressed to minimise the potential impacts of the proposal on both existing and future landuse.

Of the length of surface alignment proposed, approximately one kilometre comprises elevated viaduct, traversing across areas of flood prone land around Elizabeth Macarthur Creek. General opposition was raised in submissions to any elevated section of alignment due to potential visual severance impacts. The Department notes that the proposal in large part has been specifically designed to avoid or minimise impacts to social amenity and surface intrusion impacts (through undergrounding), and considers that a short section of viaduct to avoid significant environmental flood risk is an appropriate balance of environmental and social factors. The Department notes that the viaduct section would be located parallel to Old Windsor Road and would be consistent with its existing transport corridor character and landuse at this location, and in this context is unlikely to constitute a significantly intrusive visual feature. The Proponent's has described urban design principles that would be adhered in designing the viaduct to ensure the structure is integrated with the surrounding landscape. The Department supports this approach and has incorporated recommended conditions of approval which reinforce these commitments.

5.2.2 Station Issues

Issue

The Proponent has proposed four new underground stations at Franklin Road in Cherrybrook ("Cherrybrook"); at the Castle Hill town centre under Arthur Whiting Park ("Castle Hill"); near the Castle Hill showground and the Hills Centre function centre at Castle Hill ("Hills Centre"); and under Norwest Boulevard at Norwest Business Park ("Norwest"). Two surface stations are proposed at the Burns Road Release Area in Kellyville ("Kellyville") and at the Rouse Hill Regional Centre ("Rouse Hill"). The location of the new stations have been determined based on a

balance of factors including, patronage potential, connectivity to patronage catchments (including bus servicing patterns and access potential to arterial roads), land availability, engineering feasibility and potential for environmental and landuse amenity impacts.

Submissions

A number of submissions raised concerns about the suitability of the preferred new station locations on the grounds of poor accessibility, insufficient space for park and ride and interchange facilities and potential inconsistencies with surrounding landuse. Several submissions suggested alternate station locations or requested additional stations, particularly around Lexington Avenue at Norwest Business Park and Samantha Riley Drive in Kellyville. Also submissions queried why an additional station could not be located between Epping and Cherrybrook Stations, noting that the length of alignment between these two stations (approximately six kilometres) was inconsistent with other parts of the alignment where new stations are proposed approximately every three kilometres.

Department's Consideration

The Department's recognises that the incorporation of the proposal into the North West Metro would provide opportunities for the utilisation of alternate rolling stock and consequent opportunities for refinements to the alignment and the scale and locations of the stations. Notwithstanding, the Department is satisfied that the Proponent's assessment to date remains representative of the environmental and landuse constraints present at key patronage catchments where stations would be located, and provides a sound basis for further design development. Detailed design review of the North West Metro as part of the next stage of assessment and approval would confirm final station design and location.

Station between Epping and Cherrybrook

The Department understands that investigations to-date based on track geometry and operational requirements of conventional rolling stock have precluded the location of an additional station between Epping and Cherrybrook Stations due to grade constraints. However, the Department recognises that the incorporation of the proposal into the North West Metro provides opportunity for the feasibility of an additional station at this location to be revisited. An additional station has the potential to provide significant advantages to the patronage catchment of Pennant Hills (with respect to distances to station) and relieve commuter pressure at Epping and Cherrybrook Stations (including local traffic congestion and park-and ride pressure at Cherrybrook Station). Consequently, the Department has required the Proponent to consider the feasibility of any additional stations as part of the further assessment and approval requirements for the proposal.

Cherrybrook

Concerns were raised regarding the suitability of the Cherrybrook site (at Franklin Road) on the grounds that landuse intensification at the station precinct would be inconsistent with planned low density residential uses in the vicinity and due to difficulties of vehicular access (i.e. currently limited to left-only access between Franklin and Castle Hill roads). However the Department considers that the Cherrybrook site presents several significant benefits which justify its location as proposed including: very high patronage potential from Cherrybrook and West Pennant Hills (which are currently serviced by limited public transport services); substantial availability of land to address mode-of-access (park and ride) demand; and good potential connectivity to the arterial network (although noting that substantial road works is likely to be required to achieve the required access, including a potential signalised intersection between Castle Hill, Glenhope and Franklin Roads).

Investigations to-date have indicated that alternative locations such as at Thompson Corner would present significant disadvantages including necessitating a very deep station with difficult access and limited land availability for mode of access requirements. Notwithstanding, incorporation of the proposal into the North West Metro may present opportunity for refinements to Cherrybrook Station, which would need to be explored as part of further design development. Design development of Cherrybrook would need to balance the operational flexibilities presented by Metro style delivery with connectivity to target patronage catchments and land availability for mode-of access requirements. The Department has recommended further assessment requirements in this regard.

Castle Hill

Concerns were raised regarding the suitability of the Castle Hill site due to the lack of space for park and ride provisions. The Department notes that local planning for the Castle Hill town centre is moving towards

discouraging vehicular transport in favour of pedestrian movements within the city centre, so as to promote the retail functions of the town centre by improving pedestrian amenity. The presence of park and ride facilities at this location would therefore be inconsistent with these objectives and would not in any case be feasible due to space limitations associated with the highly developed nature of the town centre.

The Department considers that high quality pedestrian access and bus networks provided as part of the proposal would enable Castle Hill to consolidate its planned function as a transit-oriented centre, with a vibrant retail and commercial hub. The Department considers that the park and ride demand is likely to be adequately met through proposed provisions at the nearby Cherrybrook Station; however could be supplemented by progressing the shared use of exiting parking provisions (such as the Castle Towers Shopping Centre). The Department supports a station at the heart of Castle Hill town centre due to its high pedestrian patronage potential (from residential development that rings the town centre), and because it would provide direct public transport access to recreational and employment opportunities at the Castle Hill town centre and associated retail precinct. The Department has recommended conditions of approval requiring the detailed precinct planning for the station to focus on maximising pedestrian access and connectivity between the station and residential development surrounding the town centre and the retail precinct of the town centre (including Castle Towers Shopping Centre) and investigating the feasibility of shared use parking options.

Hills Centre

Concerns were raised regarding the suitability of the Hills Centre site due to existing accessibility constraints and impacts on existing special use (including the showground, the Hills Centre and Baulkham Hills Shire Council buildings) during construction and operation. Carrington Road was suggested as an alternative site for the station, on the grounds that it would enable a more visible station and offer direct traffic access. The Department supports the Hills Centre location, as it provides the important benefits of adequate space for park and ride requirements, and in comparison to an alternative site at Carrington Road would involve significantly less flood risk and construction constraints (including construction away from residential receivers and local traffic intrusion).

The Department considers that as with Cherrybrook, the site has good potential connectivity to the arterial network including to Carrington Road and Showground Road, although work is required (including possible improvements to the intersection between Doran Drive and Carrington Road) to achieve required access outcomes. Impacts to the Showground are considered to be manageable, with any affected buildings to be replaced and construction disruptions minimised through direct access to the site (for haulage and construction vehicles) being provided via Showground Road rather than utilising the existing access via Doran and Carrington Roads, which is used by the showground, the Hills Centre and Council. The location of the station as proposed is also likely to significantly benefit existing landuse, by encouraging patronage to the showground and the Hills Centre and increasing access to employment opportunities at the Council buildings and the Castle Hill industrial estate, to the west of the showground. Furthermore, increased accessibility would present opportunity for land around the station precinct to be developed for higher-end landuse including retail and commercial development, which would revitalise and consolidate the existing specialised recreational function of the site, significantly improving urban amenity at the site.

The Department has recommended conditions of approval requiring the detailed precinct planning for the station to focus on improving road connectivity and connectivity between the station and existing landuse on site (including the industrial site to the west), as well as confirming park-and-ride quantum.

Norwest

Concerns were raised regarding the suitability of a station location at Norwest Boulevard due to the lack of space for park and ride requirements and potential traffic disruptions associated with people accessing the station (in particular from kiss and ride). In addition, there was strong support for an additional station to service the western end of Norwest Business Park. The Department supports the location of the station as proposed as it would be centrally situated within the targeted patronage catchment of Bella Vista/ Norwest Boulevard and within the commercial /retail district, thereby providing direct public transport access to these service industries and consolidating the 'hub' function of the town centre. The Department considers that park and ride demand can be met through proposed provisions at nearby Kellyville and Hills Centre stations and through the development of shared use parking (for example at the nearby Hillsong Church). Subsequent design development as part of the North West Metro also provides opportunity for park and ride provisions to be further considered.

Notwithstanding, the Department acknowledges that for the transport benefits of the station to be fully realised, significant planning would be needed to improve the accessibility of the site to target patronage catchments (including residential landuse in Bella Vista and employment hubs within Norwest Business Park). In this regard, the Department considers that the detailed precinct planning for the station to focus on increasing pedestrian connectivity and access, shuttle bus services between the between key employment sites and the Station and investigating shared parking options; and has incorporated further assessment requirements on this basis.

The Department does not support an additional station near Lexington Avenue to serve the western end of Norwest Business Park, considering the location of stations so close to each other would compromise the patronage benefits and viability of both stations. The Proponent has proposed bus services between the Norwest Business Park and both the Norwest and Kellyville stations maximise access to the new rail link. The Department supports this approach. Notwithstanding, the requirements for additional stations would be confirmed as part of ongoing design development as part of the North West Metro.

Kellyville

A station location at Kellyville was generally supported however submissions emphasised the need for the station to be integrated with the 'Burns Road' Transitway interchange (part of the Parramatta to Rouse Hill Transitway) and the planned landuse for the Balmoral Road Release Area so that impacts to planned future landuse may be minimised and access to the station from within the new development area may be maximised. In addition there was strong support for an additional station at Samantha Riley Drive, with additional park and ride provisions and integration with the 'Riley' transitway interchange currently under construction at that location. The Department supports a new station site at Kellyville as it would cater key patronage catchments within newly developing areas such as Stanhope Gardens, Glenmore Park, Parklea and the Balmoral Road Release Area itself.

Integration with the transitway and with landuse planning for the Balmoral Road Release Area has been identified as key requirements for the proposal. The design for Kellyville Station specifically provides for bus interchange facilities to be integrated with the transitway interchange. It is noted that amendments to *Baulkham Hills Local Environmental Plan in April 2006*, which rezoned rural area within the Balmoral Road Release Area into planned future use has made provision for the new rail line. The Department has recommended conditions of approval requiring the Proponent to engage in consultative design development with Council to ensure that the station precinct design is integrated with landuse planning for the Balmoral Road Release Area.

With respect to an additional station at Samantha Riley Drive, the Department considers that residents near Samantha Riley Drive would be adequately serviced by park and ride facilities at Kellyville station and by connections to both Kellyville and Rouse Hill Stations and notes that an additional station Samantha Riley Drive so close to Kellyville station is likely to compromise the patronage benefits and viability of both stations. Notwithstanding, the requirements for additional stations would be confirmed as part of ongoing design development as part of the North West Metro.

Rouse Hill

A station location at Rouse Hill Regional Centre was supported, however submissions emphasised the need for the station to be integrated with the 'Mungerie Park' transitway interchange at Rouse Hill and with ongoing landuse planning for the regional centre (currently under construction) so that impacts to new landuse may be minimised and access to the station from the regional centre is maximised. The Department supports a new station at Rouse Hill to cater for the new regional centre, which is being specifically developed along sustainable transit-oriented principles, with consideration of the new rail link.

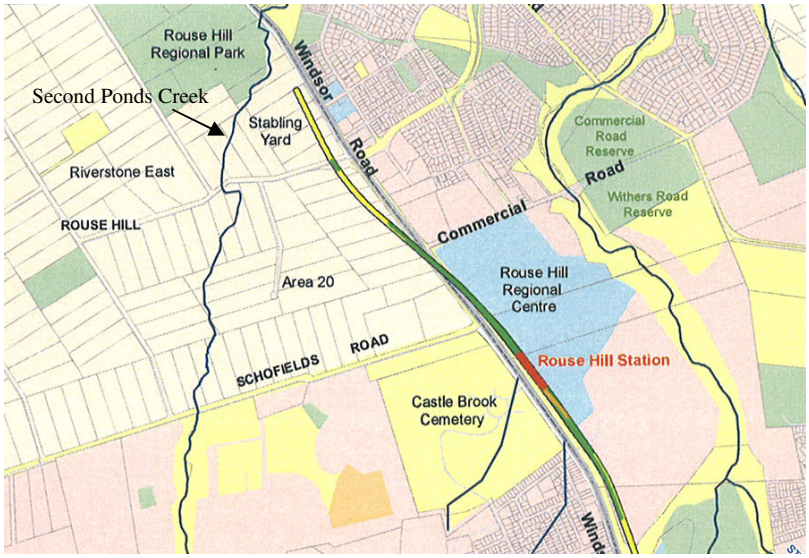
In line with transit-oriented development principles, park-and-ride facilities (which would divert valuable developable land within the town centre) are not proposed at this location. Instead, the new station would provide a high quality bus interchange facility integrated with the Parramatta to Rouse Hill Transitway. The construction of the proposal will require the temporary relocation of the Mungerie Park transitway interchange, whilst the new Rouse Hill Station is completed, following which the interchange will be reconstruction above the new station. The Department has recommended conditions of approval requiring the Proponent to engage in consultative design development with relevant agencies and stakeholders (including the developers of the new regional centre) to ensure that the design of the station precinct is integrated with landuse planning for the Rouse Hill Regional Centre, including to planned road access arrangements and opportunities for pedestrian and cycle linkages, to maximise access and patronage potential to the station.

5.2.3 Stabling Facility

Issue

The Proponent's investigations to-date for stabling provisions have been based on design requirements for conventional rolling stock and operational requirements of the existing suburban network (based on the new rail forming part of the existing network). On this basis, a stabling facility was proposed in cutting on the western side of Windsor Road within the Area 20 precinct of the North West Growth Centre, commencing just north of Commercial Road and terminating just south of the Rouse Hill Regional Park and Second Ponds Creek (see Figure 10).

Figure 10: Stabling Facility Location (GHD, November 2006)



The incorporation of the proposal into the North West Metro presents opportunity for refinement to the scale, nature (i.e. permanent or interim facilities) and location of the stabling facility with consideration to the requirements of alternate rolling stock and the operational requirements of the new Metro line, which would be independent of the existing suburban network.

Whether permanent or interim facilities are provided would also be influenced by investigations into public transport modal options to the west of the Metro line (currently underway). Detailed design review of the North West Metro as part of the next stage of assessment and approval would confirm final stabling design and location.

Submissions

Several submissions raised concerns regarding the location of the stabling facility as currently proposed on the grounds of potential amenity impacts to existing and planned future sensitive receivers both to the east and west of Windsor Road, and the potential loss of developable land at the Area 20 precinct associated with the facility itself and its potential mitigation requirements (e.g. buffer distances to mitigate against noise impacts).

Landcom stated preference for the facility to be located further west of Windsor Road so as to increase the buffer distance to existing and newly developing areas of the Rouse Hill Regional Centre to the east of Windsor Road. The GCC stated preference for the stabling facility to be located at Box Hill on the grounds of land availability, greater compatibility with landuse planning for Box Hill (industrial/ commercial) compared to the landuse planned for Area 20 (residential), and on the basis that the extension of the rail line to Box Hill would provide opportunity for an end line station to be provided at this location to service the North West Growth Centre.

Department's Consideration

The Department notes that the availability of feasible location options at Rouse Hill is constrained by a number of factors, including: existing residential development and the newly developing Rouse Hill Regional Centre on the eastern side of Windsor Road; the Rouse Hill Regional Park; flood risk from Second Ponds Creek; and planned residential development at Area 20 on the western side of Windsor Road. The Department is satisfied that the location (as currently proposed) provides a balanced outcome with consideration of existing surface constraints, noting that:

- in consideration of existing and newly developing residential constrains on the eastern side of Windsor Road, the facility is proposed to be located on the western side of Windsor Road, which is currently largely undeveloped and would enable Windsor Road to act as a buffer between the facility and residences to the east of the road;
- to minimise flora and fauna impacts and flood risk, the facility is proposed to be located south of the Rouse Hill Regional Park and at the southern boundary of the Second Ponds Creek floodplain; and

- to minimise land take and amenity impacts to existing and planned new receivers on the western side of Windsor Road (Area 20), the facility is proposed to be located as close to Windsor Road as possible (so as to be consistent with the existing character and noise and visual amenity of this arterial transport corridor).

The Department is generally satisfied with the location of the stabling facility (as currently proposed) on the western rather than eastern side of Winsor Road noting that this confines impacts to an as yet undeveloped site (Area 20) where opportunity still exists for appropriate landuse planning to accommodate the facility, in contrast to already developing areas (in the Rouse Hill Regional Centre) on the western side of Windsor Road. There is opportunity, for example, for less noise sensitive landuse uses such as commercial and industrial use (instead of residential use) to be developed around the stabling facility to avoid or minimise the requirement for mitigation measures and associated land sterilisation and loss of development potential. It is noted however, that appropriate landuse planning to minimise future landuse impacts would not abrogate the Proponent's responsibilities to ensure that all reasonable and feasible measures are implemented to minimise any residual impacts at planned future receivers, as well as ensuring that appropriate mitigation is implemented at any existing receivers. The Department has recommended conditions of approval requiring the Proponent to work with relevant agencies and stakeholders to integrate the facility with landuse planning for the surrounding area and to investigate reasonable and feasible options for mitigating noise amenity impacts at existing and future receivers as part of the further assessment and approvals process for the proposal.

Although noting potential landuse compatibilities, the Department does not at this stage support a stabling facility (and associated end line station) at Box Hill as suggested by GCC, because such a location may preclude flexibility in determining future modal options to the west of Rouse Hill (which are currently under investigation by the Ministry of Transport). Modal options for areas west of Rouse Hill (including the North West Growth Centre) are currently being investigated and will determine the preferred public transport solution for this area. The Department understands that the Proponent has progressed the design development of the stabling facility to-date, in consultation with the Ministry of Transport and will continue to do so, to ensure that the design of the proposal does not preclude public transport planning flexibility to the west of Rouse Hill.

The location of the stabling facility further west of Winsor Road as proposed by Landcom, is not supported as this has the potential to increase environment flooding risks and increase amenity impacts to future receivers at Area 20. Furthermore, such a location would create severance impacts and spread the footprint of potential amenity disturbance (and associated land sterilisation impacts) rather than confining these impacts along the boundary of Windsor Road, an existing transport corridor. As stated above, the Department has recommended conditions of approval requiring the Proponent to work with relevant agencies and stakeholders to integrate the facility with landuse planning for the surrounding area as part of the further assessment and approvals process for the proposal, to ensure that the amenity impacts of the proposal meet acceptable environmental standards at existing and future receivers.

The Department recognises that the incorporation of the proposal into the North West Metro presents opportunities for refinements to the design and location of the stabling facility. Notwithstanding, the Department remains satisfied that the Proponent's assessment to date remains representative of the types of environmental and landuse constraints that would require resolution as part of the design development of the stabling facility. The Department considers that the assessment to-date (whilst site-specific) provides a sound basis for the identification of the design principles and environmental standards that would need to guide subsequent design development of the stabling facility, which would be just as valid for an alternate location.

5.2.4 Environmental Issues

Issue

Approximately 4.4 kilometres of the western section of the North West Metro would be located on surface alignment in either cutting and embankment or viaduct, with an additional 2.6 kilometres (the cut and cover tunnel), requiring surface disturbance at construction only. In addition to this, surface disturbance would be required at the station locations, stabling facility and locations of ancillary facilities. Impacts resulting from surface components of the project include: noise and vibration; traffic, transport and spoil; property and landuse; flora and fauna; hydrology; heritage and visual amenity impacts.

Submissions

Submissions raised concerns regarding a range of environmental impacts associated with the surface sections of the proposal including: noise and vibration, spoil and haulage, hydrology, flora and fauna, heritage, visual amenity and landuse. Specific concerns regarding the stations included: landuse, traffic and transport and urban design considerations in station precinct development. Concerns regarding the stabling facility centred on potential conflicts with planned future landuse at Area 20, flood risk, noise and vibration and visual impacts. Strong emphasis was laid on the need to determine ancillary facility locations (including tunnel support infrastructures) with the aim of minimising environmental impacts. Concern was also raised regarding the general disruptions to amenity and lifestyle associated with the construction of the proposal.

Department's Consideration

The Department notes significant community concern in relation to the location of ancillary infrastructure, in particular the indicative location suggested for tunnel emergency ventilation and egress facilities approximately midway between Epping and Cherrybrook stations. Significant concern was raised that these facilities would disturb the ecological values of Chilworth Reserve, near Beecroft.

The Department notes that the locations of ancillary infrastructure associated with the proposal (including tunnel support infrastructure) are yet to be determined and will be confirmed as part of detailed design taking into consideration the landuse and environmental constraints on site and operating requirements of the proposal (as part of the new North West Metro). The Proponent would be required to fully assess and where required mitigate and/or offset any additional impacts associated with this infrastructure as part of the further assessment and approvals process for the proposal. The Department has incorporated recommended conditions of approval requiring the proponent to progress the design development of ancillary infrastructure in consultation with relevant government agencies and stakeholders as part of the next stage of assessment and approval.

The Department's consideration of surface related environmental impacts is provided in Table 5.

Table 5: Department's Consideration of Surface Related Environmental Issues

Issue	Department's Consideration
Property and Landuse	As the majority of the proposal would be in tunnel, the direct acquisition impacts of the proposal (including station and stabling yard components) would be minimal. The Proponent indicates that the proposal would require the acquisition of approximately 140 properties, comprising 108 privately owned and 34 Government owned. Adequate compensation was raised as an issue of concern in some submissions. All acquisition would be subject to the *Land Acquisition (Just Compensation) Act 1991*. The Department is satisfied that acquisition undertaken on this basis would ensure just consideration of property values. Several agency and public submissions raised concerns regarding the potential landuse impacts of the proposal during construction and operation including: disruptions to special landuse such as the Hills Centre, showground, Baulkham Hills Shire Council buildings and Arthur Whiting Park in Castle Hill; and conflicts between the design requirements and impacts of the proposal and existing or planned adjoining landuse (including future development potential). Particular concern was raised regarding potential inconsistencies between the proposal and planned landuse at specific station locations and the stabling facility. The Proponent has committed to replacing any showground buildings directly affected by the proposal and to rehabilitate areas of Arthur Whiting park required for construction. The Council depot site is being considered as a potential construction site, however no direct impacts to Council buildings are proposed. As discussed in Section 5.2.1, the Department has recommended conditions of approval requiring the Proponent to engage in consultative design development with relevant agencies, to ensure that the proposal is designed and constructed with due consideration to minimising impacts to adjoining landuse, and to maximise integration of landuse wherever possible. The Department considers that these recommended conditions of approval along with the development controls specified in the new Infrastructure SEPP for development adjoining the rail corridor, would facilitate the orderly and integrated development of landuse adjacent to the proposal. The Department notes that specific concerns have been raised that landuse intensification at Cherrybrook associated with the development of a new station at this location would not be consistent with the existing low-density residential landuse of the area. The Department considers that the very high patronage potential of the site and other significant locational benefits (including space for mode of access requirements) justify its development as a new station. Whilst this would generate some land use intensification in the immediate surroundings of the station (particularly intensification of access arrangements from a local to a more regional hub function), the Department considers that this is necessary to maximise access and patronage to the station

	and thereby facilitate the public transport benefits of the proposal. The Department considers that the landuse changes associated with the station would be limited to the direct proximity of the station precinct and would not compromise the residential character of neighbouring areas. In fact, access to high quality public transport infrastructure is likely to consolidate the residential functions of these areas by increasing the attractiveness these areas to home buyers. At locations such as Hills Centre, the Department notes that landuse development around station precincts (including retail and commercial space) has the potential to significantly benefit local service economies and rejuvenate currently stagnant sites by increasing patronage and usage of the sites. The Department notes concerns raised regarding the potential impacts of the stabling yard on planned residential landuse within the Area 20 precinct of the North West Growth Centre, however does not consider that planned landuse should preclude location of the stabling facility at this location, given that this planning is still at a sufficiently early stage to enable appropriate modification where required to accommodate the facility (i.e. through the development of landuse such as industrial/ commercial which would be less affected by the impacts of the stabling yard). The Department notes that access to good quality public transport as provided by the North West Metro will be key to the eventual success of urban land release areas in the North West (including the North West Growth Centre) and does not consider that land use planning to accommodate the proposed stabling facility (which is integral to the operation of the new rail line) would be inconsistent with the growth objectives for the Growth Centre.
Traffic, Transport and Spoil	<u>Operational</u> Operational traffic and transport changes associated with the proposal are mainly confined to station precincts. The Proponent has identified indicative mode-of-access requirements at stations based on preliminary patronage modelling, land availability, and consistency with surrounding landuse. These comprise: • Cherrybrook Station – up to 960 park and ride spaces; connectivity to the arterial road network (potentially through signalised intersection between Castle Hill, Glenhope and Franklin Roads); access for bus, kiss and ride and taxis; pedestrian and cycle connectivity; • Castle Hill Station –bus interchange; and high quality pedestrian linkages to connect to residential areas surrounding the town centre and to retail areas within the town centre and the Castle Towers shopping centre; • Hills Centre – up to 640 park and ride spaces; connectivity to the arterial road network (including potential improvements to the intersection between Doran Drive and Carrington Road); access for kiss and ride and taxis; and pedestrian linkages, particularly to the Castle Hill Industrial estate; • Norwest - potential for shared use parking with the other landuse such as the Hillsong Church; bus connection to Norwest Business Park; access for bus, kiss and ride and taxis; high quality pedestrian linkages; • Kellyville - up to 640 park and ride spaces; integration with the Parramatta to Rouse Hill transit way and bus connection to Norwest Business Park; and integration with the Balmoral Road Release Area to maximise access to the station by other forms (including kiss and ride, taxis, pedestrian, cycle and good access to the planned road network); • Rouse Hill – nil park and ride spaces; integration with the Parramatta to Rouse Hill transit way; integration with the Rouse Hill Regional Centre to maximise access to the station by forms other than park and ride (including kiss and ride, taxis, pedestrian, cycle and good access to the planned road network) To ensure that the public transport benefits of the proposal are realised through the maximisation of patronage to each new station, the Department has recommended that the Proponent confirm mode-of-access requirements at each station, taking into account site-specific constraints and opportunities as part of the further assessment and approvals process for the proposal. The Department has required that the mode-of-access arrangements provided at each station be guided by Government policy into transport and land use integration (including transit oriented development and increasing accessibility and connectivity through integration with existing and planned landuse / transport development), whilst ensuring equitable access to all modes along the rail line. Concerns have been raised that the new rail line would increase park and ride demand and associated peak traffic congestion at Epping by increasing the attractiveness of Epping as a rail commuter station (as a result of the new services generated by the Metro line and flexibility of access to three separate rail lines – the Main North Line, the Epping to Chatswood Rail Line and the North West Metro). The Proponent has not quantified the potential impact of the new rail line on mode-of-access demand or traffic generation at Epping station and does not propose any changes to the existing mode of access arrangements at Epping. The Department considers that park and ride demand at Epping is likely to be balanced by the re-distribution of commuters (who would otherwise travel to Epping) to new park and ride stations created by the North West

	Metro and the soon to be operational Epping to Chatswood Rail Link. Indeed, peak traffic conditions in the local area are likely to improve due to the new stations created as part of the proposal reducing average travel distances to stations and peak travel no longer been concentrated on one station. Notwithstanding, the Department considers that the Proponent should review patronage and mode-of-access forecasts for Epping as part of the further approvals and assessment process taking into consideration the expected redistribution of commuter demand once the ECRL becomes operational, to determine whether the new rail line would significantly change park and ride demand at Epping and what (if any) measures are required to mitigate these impacts. The Department has incorporated requirements in this regard into its recommended conditions of approval for the proposal. Construction With respect to construction, the spoil haulage and other construction vehicle requirements of the proposal have the potential to disrupt existing peak traffic flow and intersection performance, particularly in the vicinity of the tunnel work sites where the majority of haulage movements (up to 79 trips per hour) would be generated (although it is noted that night haulage would not permitted even from the 24-hour construction sites). Without appropriate construction planning, impacts may be substantial at particular locations as a result of cumulative impacts from simultaneous construction at several sites and the duration of proposed construction (six months to two years). In addition, considerable traffic disruption (including road closures) may result at locations where the new rail line is proposed to cross major roads through cut and cover tunnel or by bridge (including Kellyville, Samantha Riley Drive, and Windsor Road). In particular, the RTA has raised concerns that the level of traffic disruption likely to result from cut and cover construction across Windsor Road, would preclude this construction methodology from being used. The Department has required the Proponent to undertake detailed construction traffic planning for each construction site as part of the further assessment and approvals process, including: • identification of haulage routes and times, and traffic modelling of affected local and arterial roads to determine peak congestion impacts and intersection performance, taking into account cumulative impacts from other construction sites; and • identification of all reasonable and feasible construction options at road crossings to avoid and/ or minimise traffic disruptions; and • identification of road and or lane closure requirements and associated alternative travel arrangements. The Department is satisfied that with the implementation of construction planning as detailed above the construction traffic impacts of the proposal can be satisfactorily managed commensurate with construction traffic arrangements for other large scale construction projects in Sydney.
Noise and Vibration	Operational Impacts As the majority of the proposal would be in tunnel, operational airborne noise impacts are not expected to impact on a large number of receivers. The surface sections of track would generally be limited to newly developing areas, which have the opportunity to be developed with regard to the requirements of a new rail line to minimise the potential for land use conflicts (e.g. the development of complementary/ less noise sensitive landuse adjoining the rail line). The Proponent indicates that noise mitigation in the form of barriers would be required at most locations (apart from some cuttings) to ensure that noise generated by the surface sections of track meets acceptable operational noise goals at existing and future sensitive receivers. The Proponent's vibration assessment indicates that the surface sections of alignment can meet acceptable vibration dose criteria for human comfort (and therefore criteria for building damage). The Department has recommended that the Proponent update its operational noise and vibration assessment for surface sections of track as part of the further assessment and approvals process, to confirm the impacts of the proposal following further design development (including identification of ancillary facilities) and to determine all reasonable and feasible mitigation measures available to affected receivers, with particular consideration to landuse based mitigation opportunities, in consultation with relevant agencies. In particular, the Department has required the Proponent to update its operational noise assessment to address current best practice rail noise goals identified in the *Interim Guidelines for the Assessment of Noise from Rail Infrastructure Proposals* (DECC, April 2007), which was released following the preparation of the Proponent's Environmental Assessment. With respect to the stabling facility, the Proponent's assessment indicates that significant mitigation (including noise barriers and buffer distances) would be required to achieve acceptable noise standards at sensitive receivers. To ensure that land adjoining the stabling facility is not unnecessarily sterilised for acoustic mitigation, the Proponent has strongly supported the integration of planned future land use with the facility (i.e. development of complementary landuse such as commercial/ industrial in preference to noise sensitive residential use). The as yet undeveloped status of Area 20 provides opportunity for landuse based mitigation measures to be explored at this site. The Department is satisfied that at source mitigation (including

	consideration of full enclosure of the facility) coupled with appropriate landuse integration would enable acceptable noise outcomes to be achieved at surrounding receivers. To ensure the stabling facility is designed to address acceptable noise standards at existing and planned future receivers, the Department has recommended conditions of approval requiring the Proponent to investigate all reasonable and feasible mitigation options (including landuse based mitigation, in consultation with relevant Government agencies and Councils), to form part of the further assessment and approvals process for the proposal. <u>Construction Impacts</u> Airborne construction noise impacts would be generated from the construction of all surface elements of the proposal (including the cut and cover tunnel section, which would involve surface construction techniques) and associated construction traffic/ spoil haulage. The Proponent's assessment indicates that there is the potential for substantial construction noise and/ or vibration impacts from specific activities (e.g. pile driving) and at specific locations, such as the tunnel works sites (Hills Centre, Cherrybrook and Balmoral Road), where tunnel boring would necessitate 24 hour construction. At these locations significant shielding is likely to be required to ensure acceptable noise levels (especially at night time) at sensitive receivers. The Department has recommended conditions of approval requiring the Proponent to identify all reasonable and feasible mitigation measures to meet acceptable noise and vibration goals (including for construction traffic and spoil haulage).
Flora and Fauna	The landscape traversed by the western section of the North West Metro generally comprises more vegetated areas to the east of Castle Hill (which would be traversed by tunnel) and less vegetated areas to the west, where pockets of remnant vegetation occur mainly along creek lines. Due to the highly developed nature of the majority of the proposal footprint, a large proportion of the proposal would traverse residential backyards/ lawns. As the majority of the proposal would be in tunnel, direct disturbance of remnant vegetation and habitat would be minimal. The proposal would impact the following endangered ecological communities (EEC): • 0.3 hectares of Sydney Turpentine-Ironbark Forest; • one hectare of River-Flat Eucalyptus Forest on Coastal Floodplains; and • 20.1 hectares of Cumberland Plain Woodland (comprising 1.6 hectares of intact stands and 18.5 hectares of scattered trees). Modifications to the proposal since exhibition have resulted in a 50% reduction in the total area of Sydney Turpentine-Ironbark Forest EEC required to be removed. The Blue Gum High Forest EEC remnant in the vicinity of the Cherrybrook Station is not proposed to be disturbed. The proposal would terminate just south of and would not disturb the Rouse Hill Regional Park, which is classified as 'Public Recreation – Regional' land under *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* (Growth Centres SEPP). However, the stabling facility may require the clearance of some vegetation within land classified as 'Flood Prone Major Creek Land' under the Growth Centres SEEP. Potential habitat for several threatened flora and fauna species is considered likely to occur within the proposal corridor, including habitat for the Cumberland Plain Snail which occurs within the proposed Balmoral Road construction compound area. The only threatened species recorded during ecological surveys were the Cumberland Plain Snails within the Rouse Hill Regional Park just north of the terminus of the proposal, which is not proposed to be disturbed. No areas of 'potential Koala habitat' as defined in *Environmental Planning Policy No. 44 – Koala Habitat Protection*, were identified on site. A small portion of the proposal (the land within the North West Growth Centre, with the exception of land classified as 'Flood Prone Major Creek Land') is subject to offsets under the Growth Centres Commission biodiversity certification process, recently granted approval by the Department of Environment and Climate Change. With the exception of land offset by the GCC's biodiversity certification proposes, the Proponent would need to ensure that the biodiversity impacts of the proposal are appropriately offset, consistent with the principles of neutral or beneficial outcome. The Department is satisfied that the proposal has been designed to minimise impacts to flora and fauna of conservation significance as far as possible, including maximising the area of underground alignment and mostly affecting scattered trees rather than intact remnants. The Department considers that the proposal would not have a significant impact on biodiversity as long as the detailed design refinements (including of ancillary facilities) are developed to minimise impacts to flora and fauna, and affected areas are adequately offset to ensure no net loss of biodiversity values. To ensure that this is the case the Department has required that the following matters form part of the further assessment and approvals process for the proposal: • confirmation of the biodiversity impacts associated with the proposal following design development as part of the North West Metro (including with consideration to ancillary facility locations and impacts to

	groundwater dependent species and riparian and instream ecology); and • identification of offsets consistent with the no-net loss principles provided in the GCC's biodiversity certification proposes, which represents current best practice approach to the offset of broad scale impacts. Part 6 of the Growth Centres SEPP specifies matters for consideration by a consent authority, if vegetation is proposed to be cleared within land classified as Flood Prone Major Creek Land. These include whether there is no reasonable alternative to the clearing, that as little as possible would be disturbed, and that cleared vegetation is reinstated. The Department is satisfied that proposal has been designed to minimise biodiversity impacts as far as possible (where essential and unavoidable) and that residual impacts can be offset. The Department notes that that the proposal would provide essential infrastructure that would underpin the success of land release areas in the North West including the North West Growth Centre. Based on the above, the Department is satisfied that the proposal is consistent with the objectives of the Growth Centres SEEP.
Hydrology	The proposal will require certain surface components to be located within/ or across floodplains comprising: a viaduct across the floodplain of Caddies Creek, between Kellyville and Rouse Hill Stations; Rouse Hill Station within the floodplain of tributary 3 of Caddies Creek; and the stabling facility close to the floodplain of Second Ponds Creek. The main construction impact would be the management of inundation risk associated with construction in the vicinity of creeks or within floodplains. Appropriate drainage design would be required to ensure that the surface features do not pose a flood hazard to existing or planned future landuse through changes to operational hydrology (including floodplain storage and flow disruptions). At the stabling facility appropriate drainage design would also be required to manage operational inundation risks at the cutting. The proposal would also require cut and cover construction across creeks and/ or floodplains at the following locations: Cattai Creek near Hills Centre Station; tributaries 3 and 4 of Caddies Creek near Rouse Hill Station; and the floodplain of Elizabeth Macarthur Creek, south of Kellyville Station. Cut and cover construction across waterways has the potential to cause direct disturbance of instream hydrology and ecology including loss of water from cracking of stream beds. In addition, flood inundation risk during construction would need to be managed at all cut and cover construction sites in the vicinity of creeks or within floodplains. Operational changes to flood behaviour and/ or stream function and health would depend on the adequacy of topography reinstatement across the floodplain and the rehabilitation and restoration of creek lines. The Department is satisfied that the proposal as a whole has been designed to minimise operational disruption to existing hydrology by maximising the extent of tunnel alignment (including undergrounding of several stations) and the provision of viaduct rather than at grade alignment across the Caddies Creek Floodplain (to minimise barrier effect to flood waters). Notwithstanding, the Department notes that the surface facilities proposed to be located within or close to floodplains (the viaduct, Rouse Hill Station and the stabling facility) would need to be designed to ensure appropriate drainage of floodwaters so as to not pose flood hazard to surrounding landuse. The Proponent has indicated that the viaduct can be designed to address a 1% annual exceedance probability, however, noted that design development to date had not considered Probable Maximum Flood events. The *Floodplain Development Manual (2005)* states that with few exceptions flood design criteria based on the Probable Maximum Flood are neither feasible nor socially or economically justifiable, however, recommends that the full range of flood levels (up to and including the Probable Maximum Flood) be considered, so that case-appropriate flood design criteria may be determined based on site-specific flood risk, economic and social parameters. The Department considers that design development on this basis would enable case-appropriate design criteria to be achieved at different surface components of the proposal balanced against site-specific flood risk factors including impacts to future development potential and the flood sensitivity of existing and planned adjacent landuse. The Department has recommended conditions of approval requiring the Proponent to develop flood design criteria for those surface components of the project to be located in floodplain (including ancillary infrastructure) in accordance with the *Floodplain Development Manual (2005)*, as part of the further assessment and approvals process for the proposal. The Department notes that the proposed cut and cover construction within floodplain (without direct disturbance of waterways) is unlikely to pose significant risk to operational hydrology as long as the topography is appropriately reinstated. However, the Department considers that the proposed cut and cover crossings of waterways are likely to pose the most significant potential for environmental risks and would need to be carefully managed to avoid permanent impacts to creek hydrology and ecology. In this regard, the Department has recommended stringent further assessment requirements to form part of the further assessment and approvals process for the proposal, including: • identification of all reasonable and feasible construction options at Cattai Creek and Tributaries 3 and 4 to minimises the potential cracking of stream beds and the extent of disturbances to stream hydrology and ecology; • detailed assessment of the ecological impacts resulting from direct creek disturbance and associated

	modifications to flow regimes, including measures to ameliorate, rehabilitate and offset impacts; and • detailed rehabilitation and monitoring program to restore creeks affected by cut and cover construction back to original or better conditions. In addition to the above, all construction work sites within floodplain or close to waterways would require careful management to minimise the inundation risk of works sites. At some sites this may require the temporary diversion of creek lines around construction works. The Department has required that further detailed construction planning form part of the further assessment and approvals process for the proposal, including identification of measures to restore, rehabilitate and monitor creek diversions back to original or better conditions. The final section of alignment (including the stabling facility) would be located just south of Second Ponds Creek, which is defined as Flood Prone or Major Creek Land (FPMCL) under the Growth Centres SEEP. Part 5 of the Growth Centres SEPP requires a consent authority to consider flood related issues where FPMCL would be affected, including whether a proposal would: increase flood affectation or flow distribution and velocities to surrounding development; allow safe occupation of flood prone land; detrimentally affect surrounding development; or result in unsustainable social and economic costs due to flooding. The Department is satisfied that with the implementation of the Department's recommended conditions of approval, the surface hydrology impacts of the proposal can be managed, consistent with the requirements of the Growth Centres SEPP.
Heritage	<u>Indigenous Heritage</u> The Department is satisfied that the proposal would have minimal impacts to areas of archaeological potential due to the mainly bored tunnel alignment of the proposal, which would generally be too deep to affect any archaeological deposits. The proposal would affect 13 sites of low to moderate significance, with one less site being affected as a result of modifications made to the proposal since exhibition of the Environmental Assessment. Given the highly developed nature of the majority of the proposed rail connection route, no areas of high archaeological potential have been identified. The Proponent has committed to undertaking detailed assessment, in consultation with indigenous stakeholders and the DECC, to determine appropriate measures for minimising, managing and offsetting impacts, consistent with established protocols and guidelines including specific methodology developed for the Growth Centres by the GCC and DECC. The Department is satisfied that this approach would enable appropriate consideration and management of indigenous heritage values, consistent with the wishes of indigenous stakeholders and has incorporated recommended conditions of approval in this regard to guide the future assessment and approvals process for the proposal. <u>European Heritage</u> As with indigenous heritage, the Department is satisfied that the proposal would have minimal impacts to European heritage values due to the mainly bored tunnel alignment of the proposal, which would generally be too deep to affect any archaeological deposits or to cause significant impacts through vibration (see Section 5.1.3). The proposal has the potential to directly impact on six unlisted items at the following locations: • Cherrybrook Station (2) – the site of original buildings (now non-standing); • Hills Centre Station (2) – the site of original buildings (now non-standing); • between Kellyville Station and Windsor Road (1) – archaeological site; and • between Windsor Road and Rouse Hill Station (1) – comprising the site of the (now non-standing) Swan Inn listed in the RTA's section 170 register In addition, the proposal has the potential to affect the vistas of two items listed in the *Baulkham Hills Local Environmental Plan* (the Glenhope property near Castle Hill Road and Mungerie House between Windsor Road and Rouse Hill Station) and two State listed items (Bella Visa homestead in the vicinity of Norwest station and Rouse Hill House in the vicinity of the stabling facility). Due to modifications to the proposal since exhibition of the Environmental Assessment, the proposal will no longer impacts upon items listed in the *Hornsby Local Environmental Plan* (heritage listed vegetation at Beecroft.) Furthermore, the proposal would not affect land identified as 'cultural heritage landscape area' (the Rouse Hill estate) in *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*. The Department is satisfied that the proposal would not significantly affect heritage values, with impacts being almost entirely confined to a small number of unlisted items. Furthermore, the Department does not consider that proposal would have significant view impacts on heritage items, as the new rail line would either be developed within an already urbanised catchment or within a planned development area and therefore would be consistent with an existing and/ or planned highly urbanised view catchment. The Proponent has committed to undertaking further investigations of the impacted sites (including view analyses of affected vistas) as part of the further assessment and approval process for the proposal to determine site specific measures to avoid, minimise or mitigate impacts, where warranted. The Department is satisfied that this approach would enable appropriate consideration and management of European heritage values, and has incorporated recommended

	conditions of approval in this regard to reinforce this commitment.
Visual Amenity and Urban Design	Submissions raised concerns regarding potential visual severance impacts from surface sections of the alignment (such as the viaduct), and visual intrusion from specific surface features including surface stations precincts, the stabling facility and ancillary infrastructure such as noise barriers, mounds and tunnel support structures. The Department is satisfied that the visual impacts of the proposal as a whole would be minimal, given that the majority of the alignment would be underground. Specific design measures including the undergrounding of the majority of stations and the location of the viaduct and stabling facility adjacent to existing arterial roads to integrate these structures with the character and function of existing transport corridors; would further serve to minimise intrusive visual impacts. The Department is satisfied that with the implementation of appropriate urban design measures, the proposal can be successfully integrated with surrounding landuse so as to not result in significant visual impacts. The Department notes that in some cases the proposal would improve or enhance existing amenity by revitalising stagnant landuse (e.g. the Hills Centre Station site). The Proponent has committed to implementing a range of urban design measures in this regard, including: • station precinct design that is consistent with the context, character and image of existing and planned landuse (as appropriate) at affected locations; • station precinct design which maximises connectivity and minimises the barrier effect of the station structure itself (including the partial or full undergrounding of station facilities); • ensuring that the design of potentially intrusive elements such as the viaduct and the stabling facility are simple, integrated with the surrounding landuse and finished to a high quality; • consideration of heritage view impacts and visual severance from noise walls in detailed design; • consideration of Crime Prevention Through Environmental Design (CPTED) principles and light spill mitigation as part of urban design; • consideration of visual severance and CPTED principles in the design and location of noise walls; and • consultative urban design with community members and relevant agencies including opportunities for public art. The Department is satisfied with this approach and has recommended conditions of approval to ensure that that these measures are implemented as proposed, as part of the further assessment and approvals process for the proposal.
Socio-economic	Submissions raised concerns regarding the general disruptions to amenity and lifestyle, including disruptions to businesses likely to result from the construction of the proposal. The Department notes that some disruption is inevitable with all new development and that these impacts must be balanced with the significant social benefits of the proposal. Notwithstanding, the Department notes that the Proponent would be required to implement all reasonable and feasible mitigation measures to minimise amenity impacts during construction including with respect to noise and vibration, visual and traffic impacts (see above), and to design and construct the proposal in consultation with relevant agencies and landowners to minimise disruption of existing landuse (including adjoining businesses).
Other	Other environmental impacts including dust, soil and water and waste are considered to be manageable through the implementation of standard construction and operational mitigation measures. These issues are considered to be adequately addressed by the Proponent's Statement of Commitments.

6. CONCLUSIONS AND RECOMMENDATIONS

The Department accepts that the North West Metro would entail considerable benefits to existing residents and expected future growth in existing established suburbs of North Western Sydney, as well as cater for important new land release initiatives at Balmoral Road, Rouse Hill and the new North West Growth Centre, which is planned to accommodate approximately 66,000 new homes. At existing suburbs (including West Pennant Hills, Cherrybrook and Castle Hill), the North West Metro will complement and boost existing public transport services, in particular relieving pressure on the Northern, Western and Richmond rail lines by diverting indirect patronage, which is currently limiting capacity and service delivery in these lines. The delivery of efficient public transport infrastructure in North West Sydney will promote more sustainable modes of transport by providing a viable alterative to cars, with associated personal and wider-social benefits including decreased fuel costs, congestion relief, air quality and greenhouse gas benefits. The North West Metro would furthermore improve accessibility to the major economic hubs of Sydney (both existing and planned) including centres within the 'global arc' as well as to existing centres that have previously not had access to rail (including Top Ryde, Drummoyne, Rozelle, and Pyrmont), thereby diversifying employment and social opportunities outside of the CBD. The North West Metro is consistent with and builds on the strategic landuse and transport policy for Sydney identified in the *Sydney Metropolitan Strategy*; *State Infrastructure Strategy*; *State Plan;* and *Urban Transport Statement*.

The Department has assessed the Proponent's Environmental Assessment, Preferred Project Report and Supplementary Submissions Report (including Statement of Commitments), with consideration to the issues raised in public and government agency submissions on the proposal. The Department is satisfied that the assessment to date provides a robust and representative assessment at a concept plan level of the issues and constraints that would be associated with a large scale rail infrastructure project and provides sufficient information on impacts to enable the design principles and performance standards that should to guide subsequent design development as part of the North West Metro, to be identified. The Department is further satisfied that the Proponent has demonstrated that the new rail line can, in-principle, be designed to achieve acceptable environmental standards, subject to further design refinement of mitigation measures and design detail.

The Department has recommended conditions of approval, which defines the performance standards that future design development of the proposal would be guided by, and which identify comprehensive and stringent further assessment requirements that build on the assessment undertaken to date. These include performance standards on noise and vibration, landuse and transport integration and biodiversity offsets; and further assessment requirements in relation to traffic and station precinct design, geotechnical and groundwater, hydrology, noise and vibration, flora and fauna and heritage.

In summary, the Department is satisfied that the proposal is on balance justified, in the public interest and can be designed and constructed to meet acceptable environmental and amenity limits subject to the implementation of recommended conditions of approval and the Proponent's Statement of Commitments. Consequently, the Department recommends that the Minister grant concept plan approval for the western section of the North West Metro.

APPENDIX A – RECOMMENDED CONDITIONS OF APPROVAL

APPENDIX B – STATEMENT OF COMMITMENTS

APPENDIX C – SUPPLEMENTARY SUBMISSIONS REPORT

APPENDIX D – PREFERRED PROJECT REPORT

APPENDIX E – ENVIRONMENTAL ASSESSMENT