NSW GOVERNMENT | Planning

MAJOR PROJECT ASSESSMENT
South West Rail Link – Stage B2
Glenfield to Leppington Environmental Assessment



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

October 2010

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October 2010

EXECUTIVE SUMMARY

In December 2004, the NSW Government announced its land release plan for Sydney's South West to respond to Sydney's growing population. The land release was underpinned by commitments to put in place support infrastructure for these new development areas at an early stage of land development. The South West Rail Link (SWRL) comprises a key part of the anticipated urban infrastructure and transport network proposed for the South West Growth Centre, and forms part of the response of the NSW Government to issues of reliability and passenger growth on the metropolitan rail network.

The proposed SWRL is wholly consistent with strategic land use policy for Sydney, and would provide considerable benefits to the South West Growth Centre and Sydney as a whole. The provision of heavy rail has been identified to provide significant advantages in comparison to other public transport modes with respect to maximising connectivity and patronage to public transport, which would be key to facilitating sustainable transit-oriented development in the new release areas.

The proposed SWRL comprises Glenfield Junction works, the construction and operation of the Glenfield Transport Interchange and approximately 11 kilometres of rail track between Glenfield and Leppington in Sydney's south-west region. The SWRL also includes the construction and operation of new stations at Edmondson Park and Leppington, a train stabling facility (TSF) at Rossmore (known as the Leppington TSF), and a flyover structure within the vicinity of Bunbury Curran Creek (the Glenfield Southern Flyover). This flyover would carry the SWRL tracks over the Main South Line and the Southern Sydney Freight Line on the existing rail network.

Following a detailed assessment of the Proponent's Environmental Assessment (EA) and Submissions and Preferred Project Report, and the submissions received during the exhibition period for the project, the Department has identified the project's key impacts as:

- noise and vibration;
- traffic, transport, parking and access;
- flora and fauna;
- visual impact, landscaping and urban design; and
- water quality, hydrology, groundwater and soil salinity.

These issues particularly were reflected within the 71 submissions received from Government agencies, local councils, and the local community during the exhibition of the EA.

Potential impacts have been addressed through the design of this proposal and further design refinements proposed in response to issues raised by the Department and in submissions. There is also a reliance on management and mitigation measures to minimise the impact and disruption to the community and commuters where design solutions are not possible. This is reflected within the recommended conditions of approval and the Proponent's statement of commitments.

Despite the recommended conditions of approval, the Department acknowledges that residual impacts will occur, however the majority of these impacts are confined to the construction phase of the project. The Department accepts that there will be construction impacts as a result of this project but these can be managed to an acceptable level.

Residual operational impacts, particularly noise as a result of operation of the Leppington TSF, potential for flooding, and visual impact may also occur. The Department recognises that potential impacts of the operation of the project need to be considered in the context of the South West Growth Centre, and the broader benefit delivered to the growing population in this area through provision of the rail line and new stations.

Consequently, the Department recommends that the Minister for Planning approve the South West Rail Link – Glenfield to Leppington rail line, subject to the recommended conditions of approval.

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1. BACKGROUND

In December 2004, the NSW Government announced its land release plan for Sydney's South West to respond to Sydney's growing population. The land release was underpinned by commitments to put in place support infrastructure for these new development areas at an early stage of land development. The SWRL comprises a key part of the anticipated urban infrastructure and transport network proposed for the South West Growth Centre.

On 29 August 2007, the then NSW Minister for Planning granted Concept Plan Approval for the SWRL and Project Approval for Stage A of the SWRL under Part 3A of the *Environmental Planning and Assessment Act 1979* (the Act).

The Concept Plan approval defines the SWRL as follows:

'The South West Rail Link, being the construction and operation of a new dual-track electrified rail line, between East Rossmore and Glenfield, comprising:

- Stage A (Glenfield rail corridor) project:
  - the full construction and operation of Glenfield North Flyover (and associated track reconfigurations) independent of Stage B projects, if required;
  - the partial construction of the Glenfield Southern Flyover; and
  - establishment of temporary construction sites.
- Stage B1 (Glenfield Station) project: the construction and operation of the Glenfield station upgrade and associated ancillary infrastructure.
- Stage B2 (remaining works) project(s): the construction and operation of the remainder of the South West Rail Link and associated ancillary infrastructure, including:
  - the remainder of the Southern Flyover;
  - a new dual-track electrified rail line between the existing rail corridor at Glenfield and East Rossmore;
  - two new stations at Edmondson Park and Leppington; and
  - a stabling facility at East Rossmore.'

The Stage A Project Approval authorised the works to be carried out at Glenfield Junction including the construction and operation of Glenfield North Flyover and the partial construction of the Glenfield Southern Flyover subject to conditions.

The Concept Plan Approval covered a high level Concept Plan for the SWRL, which contemplated an ongoing detailed planning phase during which the SWRL would be subject to further detailed design and environmental assessment. The Concept Plan Approval was subject to a number of control measures and further requirements for environmental impact assessment of the Stage B components of the SWRL as follows:

- Stage B1 works – comprising the Glenfield Transport Interchange. The approval determined that this required further assessment under Part 5 of the Act. The assessment was undertaken in 2008 and 2009 in the form of a Review of Environmental Factors, and determined by Transport Infrastructure Development Corporation (now Transport Construction Authority (TCA)) in April 2009. No further planning approvals are required for the Stage B1 works at Glenfield, which have now commenced.
- Stage B2 works – comprising the remaining SWRL corridor. The approval determined that this stage required further assessment under Part 3A of the Act.

The Stage B2 project has been subject to ongoing design development since the Concept Plan Approval. The Stage B2 project as proposed in the EA is considered to be consistent with the scope and intent of the Concept Plan Approval.

2. PROPOSED STAGE B2 DEVELOPMENT

The entire SWRL project extends from the Glenfield Junction Northern Flyover to the Leppington TSF. The key stages and features of the SWRL are shown in Figure 1. A detailed indicative outline of the project is included in the EA (Figures 6-1a to 6-1t) included as Appendix D, which shows the existing rail line, the proposed rail line, the approved rail corridor as per the Concept Plan approval, and the proposed project footprint based on design changes made since the Concept Plan approval.

The SWRL is being delivered as a two stage process, comprising:

- Glenfield Transport Interchange – delivery of all components associated with the Stage A and Stage B1 works, as well as additional early works.
- Glenfield to Leppington Rail Line – delivery of all components associated with the project (defined as Stage B2 works). This stage is the subject of this EA. The Stage B2 component of the project traverses the local government areas of Campbelltown City Council, Camden Council, and Liverpool Council.

The Concept Plan EA established the scope for further design development to better define some elements of the rail infrastructure, and that more detailed designs for the rail alignment and associated infrastructure for Stage B2 would be prepared. Key changes to the Concept Plan design made since the Concept Plan Approval are as follows:

- the relocation of the Glenfield Southern Flyover by approximately 70 metres to the south;
- some changes to the rail corridor alignment;
- the diversion of Quarter Sessions Road to the west to connect with Macquarie Links Drive;
- a number of changes to the road crossings;
- the inclusion of two at-grade car parks at both the Edmondson Park and Leppington stations;
- the inclusion of three electricity substations and one sectioning hut; and
- changes to the location, size and number of construction sites.

2.1 Route alignment

From Glenfield, the rail line would travel in a slight north-westerly direction, crossing beneath the Hume Highway and over Campbelltown Road to the proposed Edmondson Park Station. After the station, the rail line would travel generally westwards, crossing over Camden Valley Way and Cowpasture Road and beneath Rickard Road to the proposed Leppington Station. From the proposed station, the rail line would travel in a westerly direction, crossing beneath Dickson Road and Eastwood Road to the proposed Leppington TSF, as shown in Figure 1.

The project is predominantly located in the railway corridor identified in the Concept Plan EA. Where the proposed corridor retains the horizontal alignment approved in the Concept Plan, it is generally 40 metres wide, with the exception of the proposed railway stations (where it is 60 metres wide for the length of the station and approach), and the proposed TSF (where it is 200 metres wide).

In some places the project footprint would be wider than that approved by the Concept Plan. This widening is due to the need to accommodate embankment works and other ancillary infrastructure, such as access/maintenance roads, substations, transport interchanges and commuter car parks. Overall, the extent of the project footprint beyond the approved corridor is considered minor.

The following crossings are included in the project:

- Glenfield Southern Flyover superstructure – to cross over the existing Main South Line, Southern Sydney Freight Line and Bunbury Curran Creek. The substructure for the Flyover is already approved as part of Stage A of the project.
- Hume Highway underpass – to allow the proposed rail lines to pass under the northbound and southbound carriageways of the Hume Highway, located near Macquarie Links Drive.
- Overbridge structures – to carry Macquarie Links Drive, Ingleburn Gardens overbridge, Rickard Road, Dickson Road, and Eastwood Road over the rail lines.
- Underbridge structures – to carry the rail line over the road network at Campbelltown Road, Camden Valley Way, and combined bridge to cross the Upper Canal and Cowpasture Road.
- Underbridge structures – to carry the rail line over Cabramatta Creek, Kemps Creek, Bonds Creek, and Scalabrini Creek.

Figure 1 – Alignment and Stages of the South West Rail Link

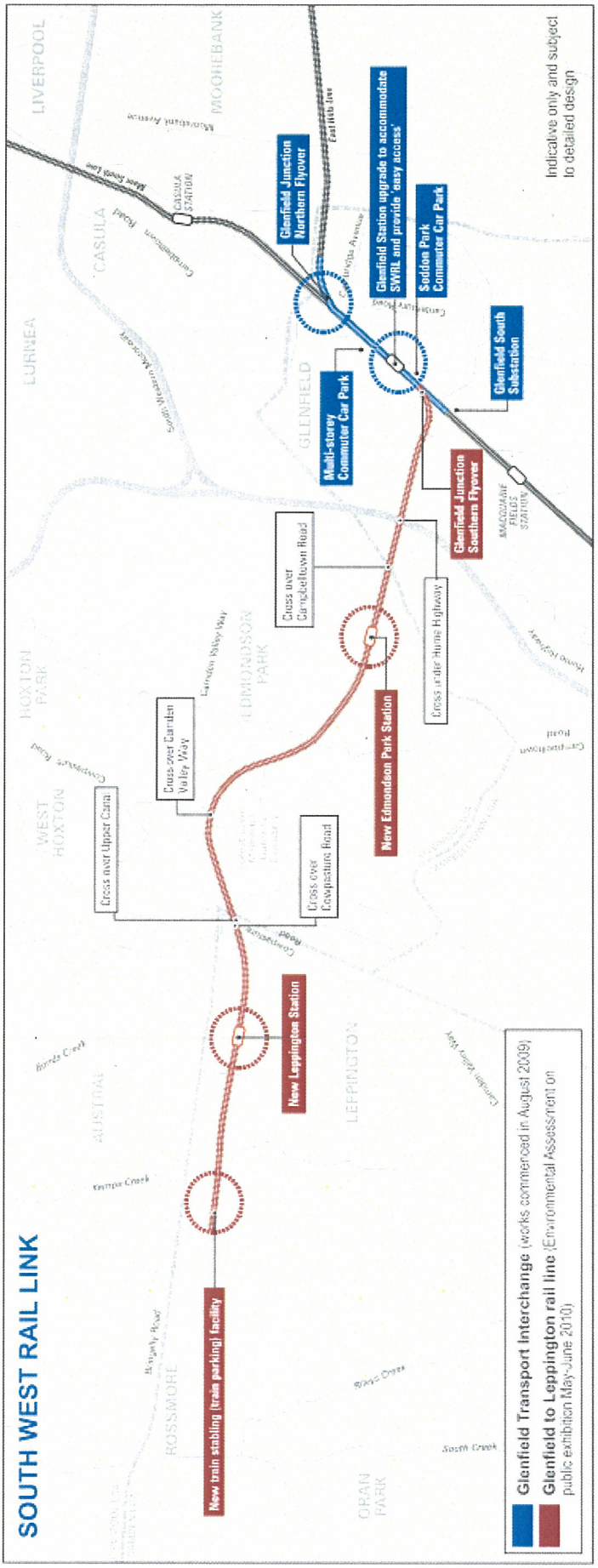


Figure 1-1 Stages of the South West Rail Link

2.2 Stations

Edmondson Park Station

The project includes the construction of a new railway station at Edmondson Park, approximately 3.5 kilometres west of the existing Glenfield Station. The new station would comprise two rail lines, serviced by a single island platform structure and overhead concrete concourse structures, connecting at grade to adjacent proposed roads. The station would also include associated facilities buildings containing ticket booths, staff facilities, passenger toilets, cleaning and maintenance facilities, rail communications room and mechanical ventilation equipment, and a supervisor's booth on the platform level.

Pedestrian access within the station would be provided from the platform to the concourse level via centrally located stairs and one lift. The new station would be built with straight platforms and would comply with the *Disability and Discrimination Act 1992* and easy access standards.

The project would also include a proposed temporary construction access road from Campbelltown road to the proposed Edmondson Park Station (south side). This road would be upgraded as the primary access to the station interchange from the south. Another road would also be provided on the northern side of the station connecting Croatia Avenue.

Interchange facilities proposed for the Edmondson Park Station are described in Table 1 and shown in Figure 2.

Table 1 – Interchange facilities proposed for the new Edmondson Park Station

Interchange facility	Southern side of station	Northern side of station
Bus interchange	Bus zone to accommodate up to four buses.	Bus zone to accommodate up to four buses.
Accessible parking	Two spaces located adjacent to the station entrance. Additional accessible parking spaces would be provided in the car park.	Two spaces located adjacent to the station entrance. Additional accessible parking spaces would be provided in the car park.
Kiss-and-ride	Sufficient space for up to eight waiting kiss-and-ride vehicles.	Sufficient space for up to ten waiting kiss-and-ride vehicles.
Taxi rank	Sufficient space for up to four waiting taxis.	Sufficient space for up to two waiting taxis.
Bicycle parking (racks)	Number of racks would be determined during detailed design in consultation with NSW T&I.	Number of racks would be determined during detailed design in consultation with NSW T&I.
Short term parking	Short term parking spaces would be provided west of the pedestrian crossing.	N/A
At grade commuter car park	Approximately 120 space at grade commuter car park to be provided.	Approximately 280 space at grade commuter car park to be provided.

Figure 2 – Edmondson Park Station Interchange Plan

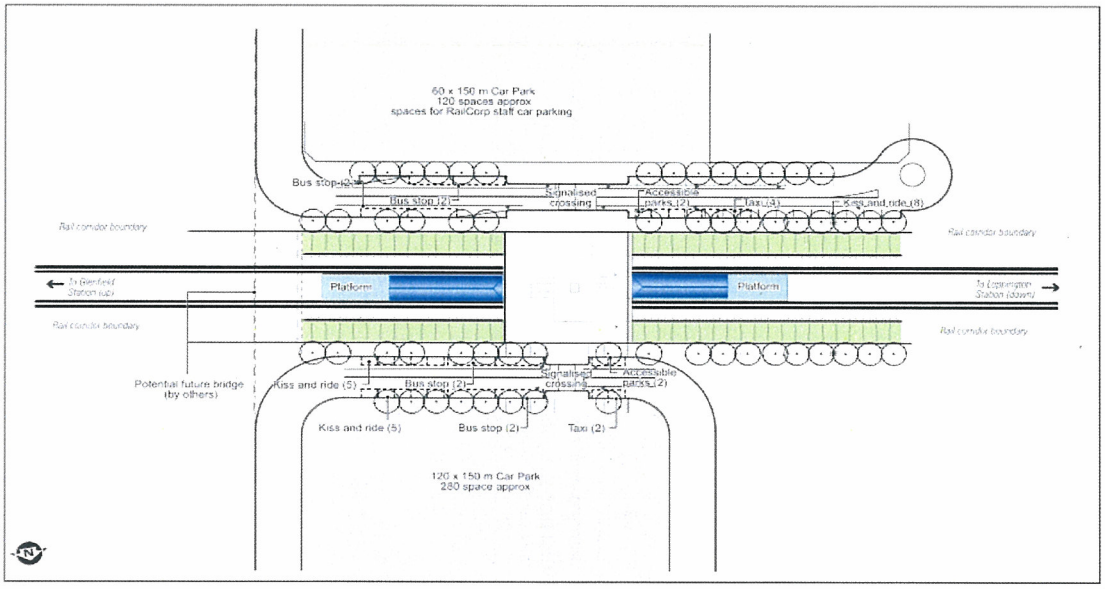


Figure 6-7 Edmondson Park Station Interchange Plan
*Note: Indicative only, subject to detailed design

Leppington Station

The project includes the construction of a new railway station at Leppington, approximately 5.6 kilometres north-west of the proposed Edmondson Park Station. The new station would comprise four rail lines (two sets) serviced by two island platform structures, connecting at grade to adjacent proposed roads. The station would also include an associated facilities building containing ticket booths, staff facilities (including train crew facilities), passenger toilets, cleaning and maintenance facilities, space for a future retail tenancy, rail communications room and mechanical ventilation equipment. A supervisor's booth would be located on each platform.

Pedestrian access between the station and the concourse and each platform would be via two centrally located stairs and a lift. The new station would comply with the *Disability and Discrimination Act 1992*.

The project includes the construction of two new access roads, including medians, on either side of the proposed station. These roads would connect to the existing Rickard Road and wider street network. Signalised pedestrian crossings would be provided on both roads, adjacent to the proposed Leppington Station northern and southern entrances.

Interchange facilities proposed for the Leppington Station are described in Table 2 and shown in Figure 3.

Table 2 – Interchange facilities proposed for the new Leppington Station

Interchange facility	Southern side of station	Northern side of station
Bus interchange	Bus zone to accommodate up to three buses.	Bus zone to accommodate up to three buses.
Accessible parking	Two spaces located adjacent to the station entrance. Additional accessible parking spaces would be provided in the car park.	Two spaces located adjacent to the station entrance. Additional accessible parking spaces would be provided in the car park.
Kiss-and-ride	Sufficient space for up to six waiting kiss-and-ride vehicles.	Sufficient space for up to four waiting kiss-and-ride vehicles.
Taxi rank	Sufficient space for up to five waiting taxis.	Sufficient space for up to five waiting taxis.
Bicycle parking (racks)	Number of racks would be determined during detailed design in consultation with NSW T&I.	N/A
Short term parking	Short term parking spaces would be provided east and west of the pedestrian crossing.	Short term parking spaces would be provided east of the pedestrian crossing.
At grade commuter car park	Approximately 200 space at grade commuter car park to be provided.	Approximately 650 space at grade commuter car park to be provided.

Figure 3 – Leppington Station Interchange Plan

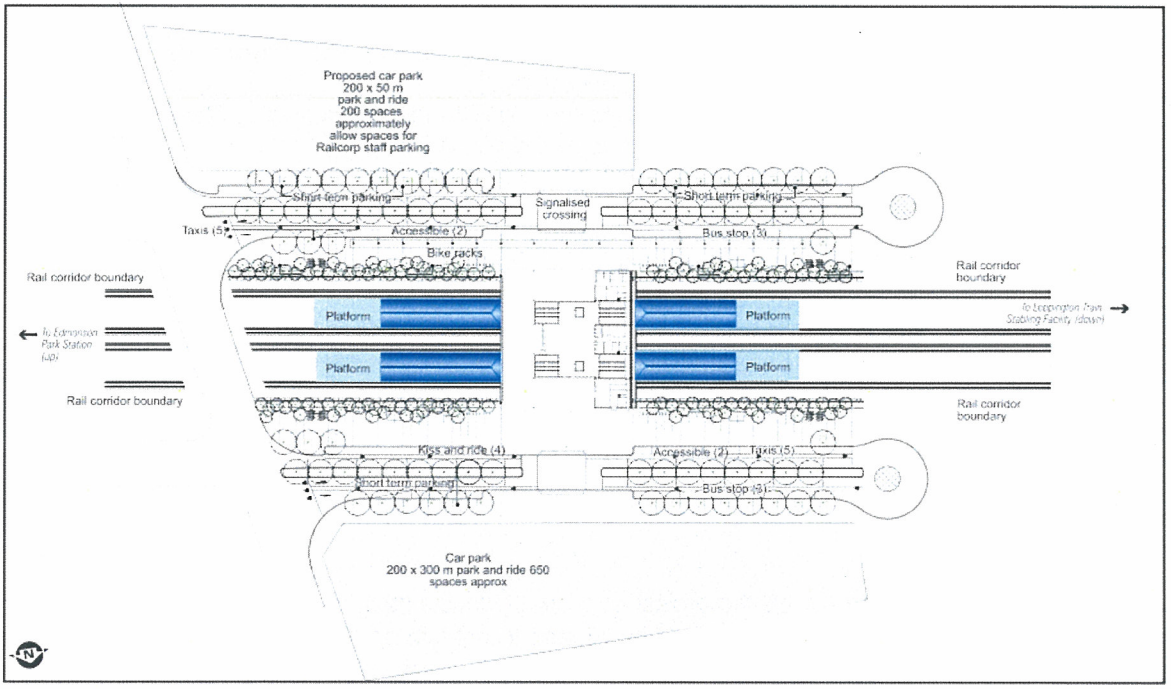


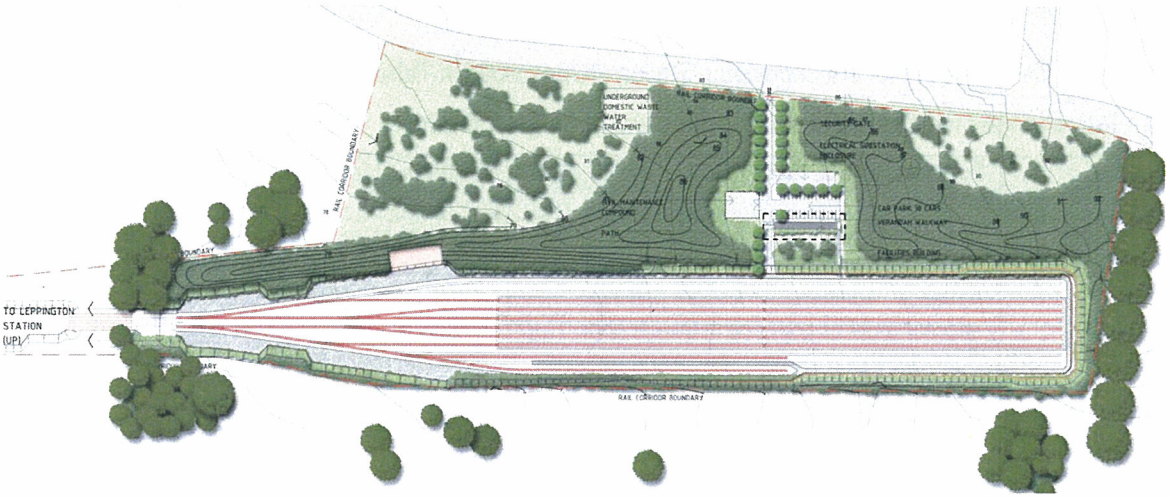
Figure 6-9 Leppington Station Interchange plan
**Note: Indicative only, subject to detailed design*

2.3 Leppington Train Stabling Facility

The project includes the construction of a new TSF, approximately two kilometres west of the proposed Leppington Station. The key components of the new TSF are shown in Figure 4. The facility would comprise an open air train stabling facility, incorporating the following main elements:

- six rail tracks for train stabling, with provision to accommodate ten rail tracks in the long term and two machine sidings to accommodate train maintenance vehicles;
- a staff car park for approximately 60 cars;
- a civil maintenance store, compound and electrical substation;
- an access road from McCann Road and from Bringelly Road;
- appropriate noise mitigation measures which would be subject to the final noise mitigation strategy adopted for the TSF; and
- a wastewater treatment facility to treat water from the train stabling facilities building (until options for connecting to the Sydney Water sewer are available).

Figure 4 – Leppington Train Stabling Facility



2.4 Associated rail infrastructure and services

A number of key electrical works are necessary to supply the project with sufficient operating power. These are summarised in Table 3.

Table 3 – Power supply

Power supply	Works
Bulk power supply	- construction of an Integral Energy substation adjacent to the 132 kilovolt route (south of the rail corridor off Cassidy Street, Denham Court); - construction of a new substation to the north of the rail corridor (west of Camden Valley Way); - construction of a new substation at the Leppington TSF; - construction of four new underground feeder cables; and - installation of two new chamber station supply substations together with Integral Energy backup supply and isolation substation, at the two stations.
Traction power supply	- installation of new feeders and associated feeder cabling at the proposed Glenfield South Substation to connect it to the project; and - construction and installation of a new sectioning hut at Edmondson Park.
Overhead wiring	- installation of a new overhead wiring system, including structures and foundations; - new power feed cables and feeder structures at Edmondson Park, Camden Valley Way and Leppington; and - connection and return of power feed cables from the traction substation at Edmondson Park and Leppington.

2.5 Operation of the project

The rolling stock that would operate on the project consists of double-deck, suburban, electric, multiple-unit vehicles. All existing suburban rolling stock would be allowed to operate on the line. The new rail line would have a maximum design speed of 115 kilometres per hour, with actual train operating speeds being less, determined in accordance with RailCorp's requirements.

RailCorp proposes that passengers would initially be provided with four trains per hour throughout the day, and potentially up to 12 trains per hour in peak periods. More trains would be provided as the population increases and the need for additional services grows.

The proposed Leppington TSF would stable 12 trains upon its opening, which could increase to 20 trains in the future to meet increasing network patronage. The TSF would operate on a 24 hour, 7 day per week basis. All trains would generally exit from 4.30am to 7.30am, however trains may exit outside of these times on occasion.

The Leppington TSF would provide for: overnight and between-peak stabling of train sets; train cleaning; shunting of train sets in preparation for departure or to accommodate arriving train sets; train preparation including test procedures (brake/horn tests); and minor rolling stock repairs.

2.6 Project amendments and preferred project

As a result of the public exhibition process and submissions made on the project, and further design refinements, the Proponent has made a number of amendments to the project to improve constructability and operational effectiveness of the project and to minimise the environmental impact, as summarised in Table 4.

Table 4 – Proposed design changes

Issue	Issue and proposed design change
Edmondson Park Station road crossings	- The Proponent is seeking approval for two bridges to facilitate improved access for pedestrians, vehicles and cyclists, to be located at either end of the station, with a five lane bridge provided to the east and a six lane bridge provided to the west. - The proposed bridges would improve access to and from the station and town centre, and reduce potential vehicle and pedestrian safety issues. - The Proponent would liaise with DoP, Landcom and RailCorp to achieve an interchange and future town centre design that integrates with the Edmondson Park Station.
Forest Lawn Memorial Gardens	- A number of options since exhibition of the EA have been considered, including engineering and landscaping options. - The preferred visual impact mitigation option includes the currently proposed noise wall within the rail corridor and an increase in landscaping relative to that proposed in the EA. A detailed landscape plan for this area would be provided prior to any construction works.
Hume Highway crossing	- An emergency response plan would be developed to address the crossing of the Hume Highway in emergency situations as a result of the construction of the tunnel. - Any physical works resulting from the emergency response plan would be subject to further environmental impact assessment.
Integral Energy substation	- An options assessment has been undertaken to examine alternative locations for the substation. The preferred relocation of the substation would be approximately 40 metres west of the indicative location identified in the EA. This would move the proposed substation further away from the closest residential property in Denham Court. - The design has also been modified since the EA. The current design is square (previously rectangular), with a driveway to Cassidy Street.
Leppington Station car parking	- Since the EA, exhibition design investigations confirmed that to accommodate the 650 spaces to the north of the rail line, additional space or a multi level car park would be required. An additional car parking area is now proposed adjacent to the proposed transport interchange on the northern side of the station and is approximately 300 metres at its furthest point from the northern entrance to Leppington Station.
Changes to the project footprint	- As a result of design development of the EA, an additional 13 sites have been identified as being potentially required for construction and operation of the project. The 13 sites include areas for improved construction access, three new construction compounds/worksites, amendments to two previously proposed construction compounds, new stockpile locations, maintenance access to culverts, relocation of the Integral Energy substation, and additional commuter car parking at Leppington.
Other design changes	- Leppington TSF – there would be demand for stabling of up to 20 eight car sets on opening, rather than the predicted 12 eight car sets. This would not increase the footprint of the facility nor change the results of the EA. - Secondary storage and staff amenities building at Leppington train stabling facility may be required on the northern side of the site. The building would not increase the proposed footprint of the train stabling facility and is not expected to increase the impacts of the facility.

3. PROJECT NEED AND JUSTIFICATION

The project is located largely within the South West Growth Centre of Sydney, an area of land release and significant growth identified in the *Metropolitan Strategy* and the *South West Subregion – Draft Subregional Strategy*.

The south west region of Sydney is a fast growing area, having had a rapidly growing population from 1991 to 2004, with a population of nearly 380,000 in 2001, and this growth is expected to continue. The draft South West Subregional Strategy identifies that over 25 percent of new dwellings and more than 15 per cent of new jobs planned for Sydney over the next 25 years will be within the south west region of Sydney. The target for new dwellings in the south west region is 155,000 by 2031, which includes 100,000 in the South West Growth Centre. This will increase the number of dwellings from 128,570 to 283,570. The target for new jobs is 89,000 by 2031.

Currently, the south-west region has one of the highest rates of private vehicle ownership and use in Sydney. Residents in the south-west of Sydney have the longest commute (on average), and travel longer distances (on average) each weekday than residents in other parts of Sydney. It will be vital, therefore, that transport networks are extended and upgraded to connect the South West Growth Centre to existing centres.

The draft South West Subregional Strategy sets out the strategic transport framework for the South West Growth Centre. The Strategy identified the need for transport linkages consisting of the SWRL and an extension of the Strategic Bus Corridors to serve the South West Growth Centre, focused on the transport interchanges of the SWRL. Figure 5 shows the SWRL in the context of the South West Growth Centre.

The Department, in its assessment of the SWRL Concept Plan, found that the proposal was justified on the following grounds:

- The SWRL would provide considerable benefits to the South West Growth Centre and Sydney as a whole by: encouraging the development of sustainable transit oriented urban communities in south western Sydney; increasing the efficiency of the existing transport system; increasing access to employment and social opportunities within existing and planned centres (particularly to the 'Global Arc', which is of significant importance to Sydney's economy); and reducing negative externalities and costs associated with car dependency including greenhouse gas emissions, road accidents and road maintenance costs.
- The SWRL is wholly consistent with strategic land use policy for Sydney, as identified in the *City of Cities - A Plan for Sydney's Future* (Sydney Metropolitan Strategy, December 2005); *City of Cities - A Plan for Sydney's Future* (South West Subregion – Draft Subregional Strategy, December 2007); *State Plan – A New Direction for NSW* (November 2006); *Urban Transport Statement* (November 2006), and is an integral component of the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*.
- The provision of heavy rail has been identified to provide significant advantages in comparison to other public transport modes with respect to maximising connectivity and patronage to public transport, which would be key to facilitating sustainable transit-oriented development in the new release areas. The heavy rail option was also found to be more economically and financially feasible than other transport modes.

Stage B2 – Glenfield to Leppington Rail Line, would provide new infrastructure to service the South West Growth Centre and the Greater Sydney Metropolitan Area, and supports the NSW Government's aim to provide an integrated and sustainable transport network that can cater for Sydney's forecasted population growth.

The recently released *Metropolitan Transport Plan – Connecting the City of Cities* (February 2010), sets a vision for how the city will be in the future, to effectively link Sydney's land use planning with its transport network. A working, connected and sustainable city is essential to the NSW and Australian economies. The *Metropolitan Transport Plan* will be fully integrated with the Metropolitan Strategy and identifies the following key aims:

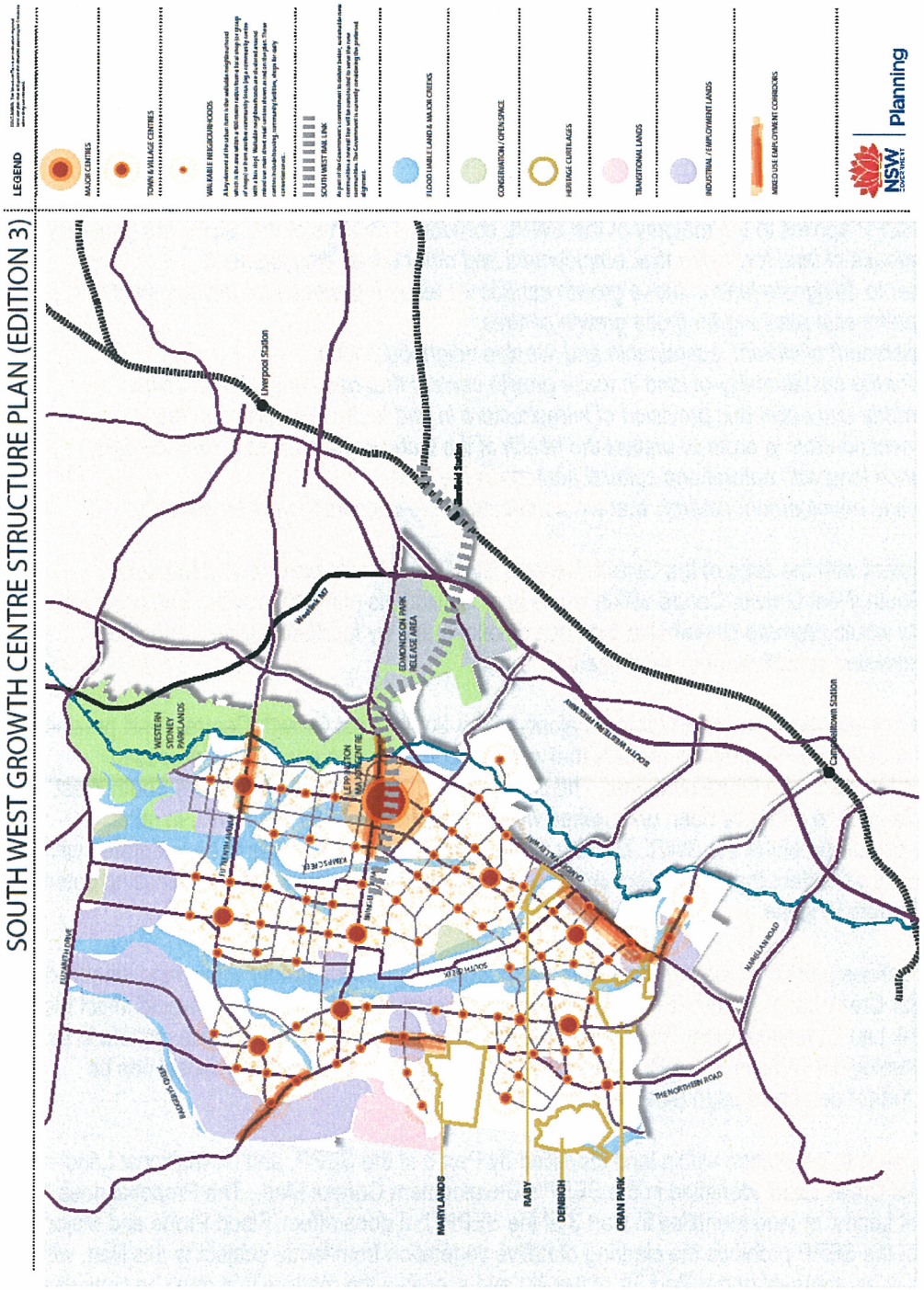
- commuting to work easily and quickly;
- an efficient, integrated and customer focused public transport system;
- transport and services accessible to all members of our community; and
- revitalised neighbourhoods with improved transport hubs.

The SWRL from Glenfield to the new Leppington major centre is identified within the *Metropolitan Transport Plan* as an important project and key component of delivering essential transport infrastructure and services to south west Sydney. The SWRL has been identified to:

- connect new growth areas from Glenfield to Leppington, via Edmondson Park, by 2016;
- service the expected 110,000 new homes in the South West Growth Centre and a residential population of 300,000 people;
- have the capacity to deliver thousands of workers to Parramatta, Sydney's second CBD; and
- serve as a significant form of access to 8,000 new jobs in the planned Leppington Major Centre.

For the above reasons the Department considers that Stage B2 of the SWRL is justified on the basis that it is a vital infrastructure project, and in the public's interest. The adverse consequences of not proceeding with the project would be significant in the long term, in terms of the capacity of the rail network and road network congestion, poor level of accessibility between homes and jobs, and potentially unsustainable land release and development.

Figure 5 – South West Growth Centre Structure Plan



4. STATUTORY CONTEXT

4.1 Major Project and Concept Plan

On 9 August 2006, the then Minister for Planning declared the SWRL project to be development to which Part 3A of the Act applies. On 29 August 2007, the then Minister for Planning granted Concept Plan Approval for the SWRL, and Project Approval for Stage A of the SWRL, under Part 3A of the Act.

4.2 Critical Infrastructure Project

On 9 March 2010, the Minister for Planning declared priority developments for the delivery of the *Metropolitan Transport Plan*, to be critical infrastructure under Part 3A of the Act, including development for the purposes of Stage B2 of the SWRL.

4.3 Relevant Environmental Planning Instruments

There are no environmental planning instruments applying to the proposal that substantially govern the carrying out of the development with the exception of *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* (Growth Centres SEPP).

SEPP (Sydney Region Growth Centres) 2006

The Growth Centres SEPP applies to the majority of the SWRL corridor. The aims of this SEPP are generally to:

a) *co-ordinate the release of land for residential, employment and other urban development;*
b) *enable the Minister to designate land in those growth centres as ready for release for development;*
c) *provide for comprehensive planning for those growth centres;*
d) *enable the establishment of vibrant, sustainable and liveable neighbourhoods;*
e) *provide controls for the sustainability of land in those growth centres that has conservation value;*
f) *provide for the orderly and economic provision of infrastructure in and to those growth centres;*
g) *provide development controls in order to protect the health of the waterways in those growth centres;*
h) *protect and enhance land with natural and cultural heritage value; and*
i) *provide land use and development controls that will contribute to the conservation of biodiversity.*

The proposal is consistent with the aims of the Growth Centres SEPP as it would provide vital transport infrastructure to the South West Growth Centre which would help facilitate its planned growth. The provision of this infrastructure early would promote sustainable land use development, by facilitating transit oriented development and maximising complementary land use integration.

Precinct planning has not yet been completed for the majority of the South West Growth Centre. Until precinct planning occurs, Part 4 of the SEPP specifies matters that must be considered to ensure that proposed development is not inconsistent with future land use. The SWRL is an integral component of the South West Growth Centre, and planning to date has been undertaken with the requirements for the SWRL in mind. Specifically, the early establishment of the SWRL corridor would enable planned landuse to be integrated with the rail line. The Department considers that the project would be consistent with the objective of minimising potential conflicts with planned future landuse.

Part 5 of the SEPP identifies additional matters that must be considered for development within land identified as 'Flood Prone and Major Creek Land' by the SEPP's Development Control Map. The proposal would affect Flood Prone and Major Creek Land, identified near Rossmore. The Department has considered these matters in its assessment of the hydrological impacts of the Proposal and considers the impacts of the proposal can be addressed as part of further detailed design (see Section 6.4).

Part 6 of the SEPP applies to vegetation within land identified by Part 3 of the SEPP, and 'Transitional Land' and 'Flood Prone and Major Creek Land' identified in the SEPP's Development Control Map. The Proposal does not affect any 'Transitional Lands' or land identified in Part 3 of the SEPP, but does affect 'Flood Prone and Major Creek Land'. Part 6 of the SEPP prohibits the clearing of native vegetation from lands subject to this Part, without development consent or an approval under Part 3A of the Act and specifies the matters that must be considered. The Department has considered these matters in its assessment of the ecological impacts of the proposal and considers the impacts of the proposal can be appropriately offset by relevant measures (see Section 6.3).

Biodiversity certification of the Growth Centres SEPP

In order to streamline assessment and approval in the growth centres, an order was issued on 11 December 2007 (by the Minister Assisting the Minister for Climate Change, Environment and Water) to confer biodiversity certification on the Growth Centres SEPP.

Biodiversity certification identifies areas within the growth centres as either subject or non-subject. Subject areas are those that are likely to be of lower conservation value, and switches off the need to undertake further significance assessments for threatened species. In these areas, it is considered that development is not likely to significantly affect any threatened species, population or ecological community, or their habitats.

Non-subject areas generally correspond with areas of higher conservation value (such as known locations of threatened species habitat), and flood-prone and transitional land. Offsets are required for biodiversity impacts resulting from the project in non-subject areas (under condition 11 of the certification order). In these areas, the Proponent is directly responsible for the provision of offsets to compensate for any clearing outside the subject areas, which may include:

- the protection of an equal or greater area of existing native vegetation within the Growth Centres; and/or
- the revegetation and/or restoration of an area of land elsewhere in the Growth Centres at a ratio of at least 3:1 (subject to conditions in the Biodiversity Certification Order).

The project would traverse subject and non-subject biodiversity areas, and the Department has considered these matters in its assessment of the ecological impacts of the proposal and considers the impacts of the proposal can be appropriately offset by relevant measures (see Section 6.3).

4.4 Objects of the EP&A Act

Decisions made under the EP&A Act must have regard to the objects of the Act, as set out in Section 5 of the Act. 'The objects of this 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, and*
- *(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, and*
- *(vii) ecologically sustainable development, and*
- *(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.'

The objects stipulated under Section 5 are significant factors informing determination of the application, except for 5(a) (v) and (viii), as the proposal does not raise significant issues relating to community services and facilities or affordable housing.

The Department, in its assessment, has considered the need to encourage the proper management and conservation of natural resources such as natural areas, water resources, towns and villages for the purposes of promoting the social welfare of the community and a better environment; the orderly development of land; the protection of communication and utility services; the provision of land for public purposes and the protection of the environment.

The object stipulated under 5(b) is relevant as the project involves the sharing of responsibility for environmental planning for the provision of key rail infrastructure through an identified growth area (South West Growth Centre). The object stipulated under 5(c) is also relevant to the project as the key issues outlined in the submissions received by the community during the exhibition of the EA have been summarised, and these issues form an important component of the assessment of the project and the Department's consideration provided in Chapter 5.

The EP&A Act adopts the definition of Ecologically Sustainable Development (ESD) found in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ESD requires the effective integration of economic and environmental considerations in decision-making processes and that ESD can be achieved through the implementation of:

(a) *the precautionary principle;*
(b) *inter-generational equity;*
(c) *conservation of biological diversity and ecological integrity; and*
(d) *improved valuation, pricing and incentive mechanisms.*

The principles of ESD have been addressed in the EA prepared by the Proponent for the project. The EA includes detailed studies, in the form of Technical Papers prepared by specialists in the areas of biodiversity, noise and vibration, hydrology, traffic and transport, landscape character and visual amenity, Aboriginal and historic heritage. The results of the abovementioned investigations and specialist studies have been summarised within the main body of the EA to ensure that the principles of ESD have been adequately addressed as part of the assessment of the project. Mitigation and management measures have been committed to by the Proponent and would be implemented as part of the project to ensure that project impacts are minimised to the extent possible. The EA outlines sustainability principles for the project for energy use, greenhouse gas emissions, water, community and stakeholder involvement, biodiversity, recycling/waste minimisation and resources.

On this basis, and the Department's assessment of key issues outlined in Section 6 of this report, the Department is satisfied that the proposal promotes the principles of ESD.

4.5 Minister's Approval Power

The EA was placed on public exhibition from 19 May 2010 until 21 June 2010. Submissions were invited during this period in accordance with Section 75H of the Act. The Department has met all of its legal obligations so that the Minister can make a determination regarding the project. It is also noted that the EA submitted in support of the subject application adequately addressed the Director-General's requirements issued for the project application and that sufficient information has been provided to allow the Minister to make a determination.

4.6 Commonwealth Legislation

Matters of national environmental significance

The biodiversity assessment undertaken for the Concept Plan EA identified potential for a number of threatened species to be located on the site. The additional assessment undertaken for the Stage B2 EA confirmed that the project would impact on Cumberland Plain Woodland, which is listed as a critically endangered ecological community under the *Threatened Species Conservation Act 1995.*

In 2009 a Conservation Agreement was prepared under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the Edmondson Park Precinct. This agreement relates to the development of the Edmondson Park Precinct under the EPBC Act and also the protection and management of environmentally sensitive lands. Impacts on Cumberland Plain Woodland falling within the area covered by the agreement do not require referral to the Commonwealth Minister for the Environment, Protection, Heritage and the Arts under the EPBC Act.

The residual areas of Cumberland Plain Woodland which would be cleared for the project and are not covered by the Edmondson Park Conservation Agreement have been assessed by the Proponent and not considered to constitute a significant impact. As such, referral to the Commonwealth Minister, on the grounds of impact on Cumberland Plain Woodland is not considered to be necessary.

Commonwealth land

The project may also require approval due to impacts on the environment of the Ingleburn Army Camp as Commonwealth land. However, the land is likely to be transferred from Commonwealth to State Government, in which case the project would not require referral to the Minister as a controlled action under the EPBC Act. Should the land not be transferred, referral under the EPBC Act would be required.

5. CONSULTATION AND ISSUES RAISED

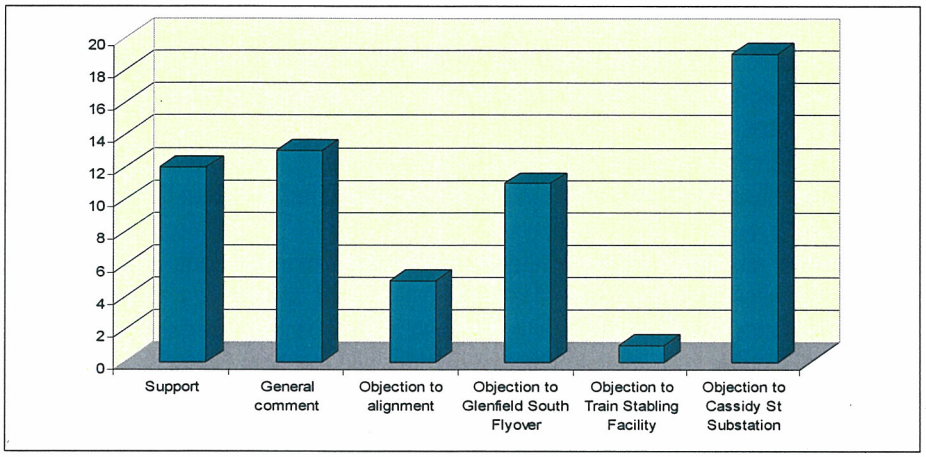
The Department received a total of 71 formal submissions on the project, comprising:

- 61 individual submissions from the public;
- three submissions from local government bodies;
- six submissions from State Government agencies; and
- one submission from a Federal Government agency.

5.1 Submissions from the Public

Of the 61 submissions received from the public, 12 supported the project (20%), 13 raised various concerns with the project, without explicitly stating support or opposition (21%), and 36 objected to a component of the project (59%). No submission objected to the project in its entirety. Key issues raised in public submissions are summarised in Figure 6.

Figure 6 - Key Issues Raised in Public Submissions



Of the 13 submissions which provided general comments, issues raised included concern over construction generated noise, traffic, dust and impacts on privacy. Issues relating to operational impacts from the project were also raised specifically relating to noise mitigation and visual impact, adequacy of cyclist facilities and commuter car parking, station accessibility, local business access and ongoing viability, and the location of the TSF.

Of the 36 submissions which objected to part of the project, the main concerns related to noise and visual impacts, the potential for increased traffic, devaluation of property, and clearing of Cumberland Plain Woodland associated with various components of the project, namely the rail alignment between Glenfield and Leppington, the Glenfield Southern Flyover, the Leppington TSF, and the Cassidy Street Electricity Substation.

Submissions were received from affected residents, affected businesses and the broader public. The majority of these submissions were made by Denham Court residents (41%), raising concerns about impacts associated with the proposed electricity substation at Denham Court. The main issues raised related to the substation being out of character with the area, the potential for lighting impacts and construction related noise and traffic impacts. Suggestions were made to move the substation to the northern side of the rail line and into the Edmondson Park precinct which has yet to be developed. Some Denham Court residents were also concerned about the impact of the project on property values and the impact of the project on the rural lifestyle of the area.

A large number of submissions were made by Glenfield residents (20%), mainly related to the impacts of the Glenfield Southern Flyover. Noise and visual impacts were the main concerns raised with some submissions suggesting that an underpass be provided instead of the proposed flyover.

Submissions by Leppington residents made up 15% of the total public submissions. While most of these submissions indicated overall support for the project, some residents in the vicinity of the TSF raised concern regarding the impact of the project on property values and noise impacts.

5.2 Submissions from Councils

Camden Council

Camden Council provided comments in relation to the following issues:

- the necessity for measures to mitigate acoustic impacts during construction;
- potential solution for mitigating operational noise impacts on existing residents in the vicinity of the train stabling facility, would be land use treatment, including industrial land uses;
- detailed design of the arrangement, functionality and appearance of both the train line and individual stations to be completed and integrated with the existing landscape; and
- to meet the growing demands of the South West Growth Centre, Council urges the government to uphold the timeframe for completion of the SWRL.

Campbelltown City Council

Campbelltown City Council noted the importance of the project for the developing areas of the South West Growth Centre and provided comments relating to the following:

- Management of construction traffic impacts, design of road crossings at Campbelltown Road and near Edmondson Park Station, provision of cycleway / pedestrian access, and the alignment of Quarter Sessions Road.
- Assessment of noise impacts on the potential residential development adjacent to the rail corridor, including further review and protective measures to be incorporated into the design of the project so as not to affect adjoining properties and opportunities for development. Methods of noise attenuation need to be further addressed in detailed construction plans.
- Design considerations associated with the effects of climate change and management of drainage, flooding and stormwater impacts. Alternative treatments for crossings should be considered, and that the full range of storm durations should be modelled.
- Consideration of vegetation clearing and fragmentation impacts, construction management, offsetting, and impact assessment, including the assessment of River-Flat Eucalypt Forest at Bunbury Curran Creek, assessment of impacts on micropheteran bats, operational impacts to fauna species, the detailing of offset provisions, and the development of a buffer zone between the rail corridor and Denham Court.
- Consideration of the visual impact of the project, including the impact on visual amenity and views to/from significant view points during construction and operation.
- Test excavations for Aboriginal heritage should have been undertaken within areas of low and moderate sensitivity in order to confirm the full extent of subsurface archaeological deposits. It is unclear as to whether all of the Aboriginal Stakeholders agreed with the study's recommendations and whether all their concerns have been addressed.
- The EA needs to address all of the non-indigenous heritage items in the vicinity of the proposed works. Appropriate measures for mitigating, minimising and managing impacts are required for Macquarie Field House, Ingleburn Village and the Upper Canal.

Liverpool City Council

Liverpool City Council indicated support for the project, however, raised a number of issues, as follows:

- The need for condition surveys of identified Council roads to be used by construction vehicles, the provision of adequate pedestrian links, and the design and delivery process for passenger access, facilities for bus, taxis, kiss-and-ride and the street network proposed for the Edmondson Park town centre.
- The impact of operational noise on existing and future properties should be reduced. Concerned with the lack of certainty regarding noise mitigation measures at Denham Court and suggested that the substation proposed at Cassidy Street be relocated to the northern side of the railway line.
- The proposed flow diversions and filling of the floodplains to facilitate works at Edmondson Park and Leppington Stations are likely to adversely affect flood behaviour and performance of local drainage systems including loss of current storage within the floodplain. Detailed hydrological and hydraulic analyses should be undertaken at each waterway crossing to assess and mitigate any adverse impact on flooding. All crossings over existing waterways should be designed and constructed to ensure creek flows are maintained at pre-development conditions and that flood behaviour and local drainage are not adversely affected. .
- Further consideration of the visual design of the project including railway stations and specifically the Edmondson Park station, to integrate with the surrounding future land uses.
- The area surrounding Edmondson Park station has significant military history, which will largely be demolished by new urban development in the area. An interpretative display of the heritage of the area should be provided at the station.

5.3 Submissions from State Government Agencies

Sydney Water Corporation (SWC)

SWC provided comment in relation to its existing services and utilities; provision of recycled water; provision of fire fighting water supply; and the process for submitting an application for a servicing compliance certificate. SWC will further assess the impact of individual developments when the Proponent applies for a Section 73 Certificate and at this time it will specify any works that are required to the system.

Landcom

Landcom indicated support for the project and the positive effects it will have in providing much needed transport infrastructure to the South West Growth Centre. Landcom has an interest in land within the Edmondson Park Release area adjacent to the proposed SWRL, and has made comments in relation to the following issues:

- importance of station design, particularly linkages and integration issues, civic presence, safety and incorporation of public art to be considered during the detailed design phase with the key stakeholders;
- provision of commuter car parking to fit with the development of the Edmondson Park town centre;
- design of the Edmondson Park road bridges and connectivity of the release area over the rail line;
- provision of an integrated cycleway network in the vicinity of Edmondson Park station; and
- concern regarding Crossing 6 (tributary of Maxwell's Creek) in the Edmondson Park area, and that any condition imposed on the project must have due regard for the adjoining land use and land configuration.

Industry & Investment (I&I) NSW

I&I NSW provided a co-ordinated response from the Minerals and Energy, Agriculture and Fisheries divisions. I&I NSW (Mineral Resources) expressed concern regarding the lack of acknowledgment of the presence of significant coal resources beneath the project site. The coking coals are considered an important strategic resource and any infrastructure planning should consider their occurrence and plan for future underground mining induced subsidence impacts.

I&I NSW (Fisheries, Aquatic Habitat Protection Unit) raised no objections to the project, provided that the hydrology and surface water measures outlined in the Draft Statement of Commitments and the mitigation measures to reduce erosion, sedimentation and water quality impacts outlined in the EA are reflected in the conditions of approval. Additionally, I&I NSW indicated that the committed flora and fauna mitigation measures be reflected in the conditions of approval together with the inclusion of fish friendly waterway crossings. The design of any fish friendly crossings should be undertaken in consultation with I&I NSW (Fisheries). I&I NSW (Agriculture) advised that the Flora and Fauna Management Plan would need to be consistent with existing state, regional or local weed management plans or strategies.

Department of Environment, Climate Change and Water (DECCW)

Key issues raised in the submission included:

- DECCW supports the approach to address issues of traffic, transport, parking and access under the sustainability principle of maximising access and connectivity, however considers that the promotion of sustainable transport options could be strengthened.
- A Construction Noise and Vibration Management Plan incorporating feasible and reasonable noise mitigation measures should be implemented.
- Considers that due to the expected noise impacts and uncertainty of future land use and background noise levels, the train stabling facility is likely to cause noise impacts to the Rossmore community and the enclosure of the train stabling facility, the implementation of architectural treatments, and strategic land use planning to identify compatible land uses is supported. DECCW also supports the noise sharing approach proposed by the Proponent, but is concerned that an explicit agreement has not been reached between the relevant parties regarding who will be responsible for mitigation of noise as a result of future development.
- Issues regarding flood impacts on people, property, trains and rail infrastructure, potential blockages, hydrological and hydraulic model calibration and hydraulic modelling of crossings.
- Questioned the level of the threatened species assessment undertaken and the provision of biodiversity offsets. Considers there had been minimal consideration of the impacts on the regional corridors in Edmondson Park and the development of a buffer area between the project and Denham Court as a biodiversity area. Additionally, DECCW recommended that any conditions of approval require the design of culverts to incorporate measures to promote fish and fauna passage and riparian connectivity.
- Supports the preparation of an Offset Strategy to be consistent with the Biodiversity Certification Order, but does not agree with the proposed timing of the Offset Strategy to be completed prior to detailed design.

DECCW considers that the biodiversity offset strategy should identify offset sites and include a commitment to the long term security of the offset prior to project determination.

- The management of Aboriginal and cultural heritage, in particular in relation to unidentified objects, redeposition of Aboriginal objects, purpose of test excavations and the proposed methodology and timing of excavations and impacts during project construction.

DECCW indicated that the project is a railway systems activity under Schedule 1 of the *Protection of the Environment Operations Act* (POEO Act) and therefore requires an Environmental Protection Licence.

Sydney Catchment Authority (SCA)

SCA has an interest in the project as it would cross the Upper Canal which is a critical part of the Sydney drinking water supply system. The Upper Canal also has significant heritage value and is listed on the State Heritage Register. The key issues of concern to the SCA on this site include: water quality; structural integrity; access; and heritage. SCA indicated that, provided the detailed design is not substantially changed from that presented in the EA, it is satisfied that its issues have been adequately addressed and mitigation measures identified.

NSW Office of Water (NOW)

NOW provided comment and recommended conditions of approval on the following key issues:

- Watercourse crossings:
  - bank stabilisation to be undertaken to mitigate erosion and sediment control problems into watercourses;
  - any stream bank rehabilitation should comprise soft engineering works where practical;
  - recommended that bridge pylons be located outside the banks of waterways to maximise creek stability and minimise future maintenance costs.
- Sediment basins should be located outside the riparian areas, consistent with the DWE Guidelines (February 2008) for controlled activities.
- There is a need to improve riparian connectivity and function therefore the provision and rehabilitation of minimum riparian areas and minimum bridge spans.

5.4 Submission from the Federal Government

The Department received a submission from the Department of Defence – Defence Support Group. The Department of Defence supports the construction of the SWRL through the Defence site. However, Defence is concerned about the potential for adverse noise impacts on Commonwealth land that holds recognised residential development potential, including associated amenity impacts, reduced development potential and value of lands. The Department of Defence requests that appropriate measures to mitigate noise impact on the Defence site be a condition of approval.

The Department of Defence notes that several Aboriginal artefacts within the Defence site would be destroyed as a result of the project but no reference to any mitigation measures are provided in the EA. The Proponent should confirm the mitigation measures for these sites, including relocation or recording and collection prior to destruction.

6. ASSESSMENT OF ENVIRONMENTAL IMPACTS

6.1 Noise and vibration

The existing noise environment varies along the length of the corridor, but is primarily associated with urban and rural residential activities and the influence of major roads. The current absence of significant commercial or industrial development means that night time noise levels are presently low. However, the existing noise environment will change with the development of the South West Growth Centre, which will increase ambient noise levels and provide an opportunity to manage potential noise impacts through appropriate land use planning and development control.

The assessment carried out for the Concept Plan EA identified a number of key potential impacts for noise and vibration, as summarised in Table 5.

Table 5 – Identified key potential noise and vibration impacts (Concept Plan EA)

Identified key potential impact	Description
Construction noise and vibration impacts	At the majority of locations, the predicted average maximum construction noise levels would exceed the DECCW noise guidelines when plant and equipment are located close to residential and commercial receivers. The highest impacts are predicted to occur where rock breaking or vibratory pile driving may be required. Impacts would be temporary and manageable with standard construction management measures.
Operational noise impacts associated with running of passenger trains	There is the potential for a number of exceedences of noise objectives if mitigation measures are not implemented. Noise reduction could be achieved by using measures such as low level noise barriers/ mounds. Noise impacts could be further reduced through land use planning measures.
Operational noise impacts associated with the train stabling facility	Without mitigation measures, continuous noise emissions would exceed noise criteria at existing nearby residential receivers. Without mitigation, buffers of up to 200m would be required to achieve compliance. Without mitigation, noise from train horn and brake testing during the night would exceed noise criteria. Noise impacts could be managed through a combination of mitigation measures and land use planning.
Operational vibration impacts	Operational vibration levels are not predicted to have adverse impacts at any existing or future residential locations.

Construction Airborne Noise

Issue

The Construction noise impacts have been assessed with consideration of the *Interim Construction Noise Guidelines* (DECC, 2009). For residential receivers, the noise criteria for construction work during standard hours, is a noise management level ($L_{Aeq(15minutes)}$) of Rating Background Level (RBL) + 10dBA, and for construction work outside the standard hours, is a noise management level ($L_{Aeq(15minutes)}$) of RBL + 5dBA.

The majority of works can be carried out during normal construction hours (daytime period), however for safety reasons and to avoid significant traffic disruptions, some activities would need to be undertaken outside normal hours, such as the construction of some road underbridges and overbridges. Work scheduled to coincide with track possessions, and which may therefore require night time construction, is only likely in the vicinity of the Glenfield Southern Flyover.

Noise emissions from the track works are typically most intensive during earthworks and track laying and to a lesser extent, from overhead wiring and signal installation. Noise emissions from the proposed works will move progressively along the rail corridor in stages. Depending on the locations of access points, construction traffic may pass individual receivers for a longer duration.

Table 6 presents a summary of the construction noise management levels for residential receivers in the vicinity of each representative noise monitoring location.

Table 6 – Summary of construction noise management levels ($L_{Aeq(15minute)}$ dBA)

Representative monitoring location	Residential receivers			
	Standard hours	Out of hours		
	Day	Day	Evening	Night
615 Bringelly Rd, Rossmore	53	48	43	35
198 McCann Rd, Rossmore	44	39	38	35
25 Cassidy St, Denham Court	46	41	42	38
135 Croatia Ave, Edmondson Park	48	43	47	42
18 Newtown Rd, Glenfield	51	47	47	42

For short periods of time, exceedences would be likely at the nearest receivers. In most cases, the predicted noise levels would not be sustained. The indicative 'worst case' construction noise levels predicted at the nearest sensitive receivers are detailed in Table 7.

Table 7 – Predicted $L_{Aeq(15minute)}$ construction noise levels – site specific

Construction site / activity	Typical receiver location	Approximate distance to activity (metres)	$L_{Aeq(15minute)}$ noise management level (daytime hours) (dBA)	Predicted $L_{Aeq(15minute)}$ construction noise level (dBA)
Leppington Train Stabling Facility	108 Mark Road	160	44	60
	105 Mark Road	170	44	59
	215 McCann Road	150	44	62
	467 Bringelly road	190	53	59
Eastwood Road overbridge	50 Eastwood Road	120	44	59
	60 Eastwood Road	150	44	64
	40 Eastwood Road	90	44	74
	29 Eastwood Road	150	44	68
Dickson Road overbridge	133 Dickson Road	110	44	71
	146 Dickson Road	100	44	73
Leppington station and Rickard Road overbridge	204 Rickard Road	110	44	67
	206 Rickard Road	120	44	66
	NW Rickard Road	250	44	57
	183 Rickard Road	160	44	62
	Rickard Road (education)	410	45 (internal noise)	41 (internal noise)
Cowpasture road and Sydney Water Supply Canal underbridge	111 Cowpasture Road	60	53	65
	87 Cowpasture Road	160	53	50
Bringelly Road Stockpile	150 Bringelly Road	160	53	50
Camden Valley Way underbridge	45 Tabletop Circuit	190	46	48
	1640 Camden Valley Way (commercial)	170	70	49
Cabramatta Creek underbridge	23 Culverston Avenue	170	46	48
	220 Jardine Drive	140	46	51
Edmondson Park Station	180 Croatia Avenue	270	48	50
	174 Croatia Avenue	260	48	50
	Nearest building within Ingleburn Army Camp	120	48	59
Campbelltown Road underbridge	Nearest Croatia Avenue	600	48	34
	Nearest building within Ingleburn Army Camp	320	48	42
Glenfield Southern	6 Newtown Road	110	51	55

Construction site / activity	Typical receiver location	Approximate distance to activity (metres)	$L_{Aeq(15minute)}$ noise management level (daytime hours) (dBA)	Predicted $L_{Aeq(15minute)}$ construction noise level (dBA)
Flyover	18 Newtown Road	200	51	50
	51 Adrian Street	300	51	46
	Macquarie Links International Golf Course	70	60	59

Due to the close proximity of some residential receivers to the works, the construction noise management levels would be exceeded at many locations along the rail corridor. However, such exceedences are typical of large infrastructure projects, and these exceedences would need to be actively managed through the implementation of noise mitigation measures. The Proponent has identified that mitigation measures would be in accordance with the Proponent's *Construction Noise Strategy* and DECCW's *Interim Construction Noise Guideline*.

Key mitigation measures would include:

- community consultation measures, including notification to affected residents of noisy works;
- site inductions and behavioural practices;
- equipment selection and usage;
- specific construction hours;
- consideration of potential cumulative air-borne noise impacts of other construction projects;
- preparation and implementation of a site specific Construction Noise and Vibration Management Plan;
- use of temporary noise barriers where appropriate;
- noise monitoring carried out periodically to confirm noise levels do not significantly exceed predictions; and
- trucking routes would be via nominated construction access routes and major roads, and queuing would generally not be permitted near residential dwellings.

Consideration

Construction noise impacts are likely to be significant and difficult to minimise to levels that achieve the construction noise objective due to the nature of the construction works required. However, the Department acknowledges that the noisiest activities will not occur for the entire construction period at one location, and that the proposed Construction Noise and Vibration Management Plan would require the implementation of reasonable and feasible mitigation measures to reduce noise emissions as much as possible. This has been further reflected within the recommended conditions of approval, which also include:

- the inclusion in the Construction Noise and Vibration Management Plan, of an Out of Hours Works Protocol for works not otherwise subject to an Environmental Protection Licence (EPL);
- the restriction of construction hours for audible construction work to 7:00 am to 6:00pm Monday to Friday, and 8:00 am to 1:00 pm on Saturdays, with the exception of work that is necessary for emergency or safety reasons, as permitted by the EPL, or as permitted by the Out of Hours Works Protocol;
- the limitation of activities resulting in impulsive or tonal noise emission (such as rock breaking, rock hammering, sheet piling, pile driving) to between 9:00 am to 12:00 pm, Monday to Saturday and 2:00 pm to 5:00 pm Monday to Friday, with respite periods;
- consultation with affected educational institutions to ensure construction works are not undertaken during examination periods unless alternative arrangements are reached with that organisation; and
- the preferred use of bored piles (as opposed to the more intrusive driven piles).

With respect to out-of-hours activities, the Department accepts that night-time and weekend works are unavoidable at the Glenfield Southern Flyover given the limitations of construction activities coexisting with an active railway line, and potentially elsewhere along the rail line due to traffic management and safety reasons. This would generate amenity impacts on neighbouring receivers that must be carefully managed to ensure best practice mitigation measures are proposed and that periods of respite are afforded to the community. Out of hours activities would be subject to an EPL issued by DECCW, and based on past experience, the Department considers that the proposed out-of-hours protocol would provide an effective mechanism that would assist in managing the impacts of any works not covered by the licence.

In relation to construction site compounds, the Department notes the stationary nature of these facilities and the risk they pose in relation to noise impacts on surrounding properties. Accordingly, the Department has recommended a condition requiring that the locations of construction site compounds are identified in the CEMP

and that a risk assessment of each site is undertaken. In addition, for any newly identified compound sites, the Proponent must seek the approval of the Director-General so that the Department can assess the adequacy of proposed noise mitigation measures.

The construction of the project would require construction traffic movements in residential streets, and during activities of high intensity impacts on sensitive receivers located along these local roads are expected. It is also noted that there would be multiple access points to the site and that it is not realistic to prohibit heavy vehicle movements along local roads given the objectives of providing safe access to and from the site and providing the shortest route possible to arterial and collector roads.

Consequently, the Department considers that the temporary amenity impacts associated with construction vehicles can be appropriately addressed through management controls and has recommended a number of conditions of approval that require the Proponent to:

- minimise queuing and idling within residential streets;
- limit (wherever possible) the use of local roads;
- to develop and implement a Construction Vehicle Code of Conduct to manage driver behaviour to minimise the generation of traffic noise (such as use of compression braking, heavy acceleration and vehicle maintenance); and
- schedule construction traffic movement, to the greatest extent practicable, to be outside of AM and PM peak traffic periods outside schools and child care centres.

The Department also notes that a number of Denham Court submissions had concerns regarding construction traffic noise in association with the construction of the substation. The Proponent has advised that while Cassidy Street would be used to access the substation for the delivery of equipment, this additional traffic would be infrequent and is not expected to impact on existing residences. The Department considers that the Proponent's statement of commitments and the Department's recommended conditions would adequately address construction traffic noise impact issues at the substation site.

Construction Ground-borne Noise and Vibration

Issue

The major source of ground-borne noise during the construction phase for this project would result from excavation using rockbreakers, and soil compaction using vibratory rollers. The nearest receivers to these activities are approximately 40 metres and at these locations the predicted regenerated noise levels are expected to be approximately 44dBA to 50dBA. Regenerated noise levels of these magnitudes would exceed the evening and night-time trigger levels of 40dBA and 35dBA respectively. Therefore, at locations close to sensitive receivers, excavation and soil compaction construction activities should be restricted to the daytime period only.

The main source of vibration would occur from the use of heavy rockbreakers and vibratory rollers that may be needed during excavation and compaction works. The sites that may use these vibration intensive plant items would be during corridor earthworks, excavation at each proposed station and during the construction of overbridges.

The recommended distances from vibration intensive plant, to address both potential building damage and human comfort impacts are derived in accordance with DECCW's *Assessing Vibration: a technical guideline* (2006) and British Standards BS 7385: Part 2 – 1993, and British Standard 6472 – 1992.

The following locations were identified where predicted construction works would fall within 30 metres of a sensitive receiver, and may therefore breach the safe working distances:

- at and around Chainage 52.30-52.40 kilometres, on the west side of Eastwood Road;
- at approximate Chainage 49.70-49.80 kilometres, on the west side of Cowpasture Road, which includes the Upper Canal, a listed heritage item; and
- Chainage 44.90-45.60 kilometres, near the Ingleburn Army Camp, also a listed heritage item.

At these locations, vibration mitigation measures are recommended to minimise any impact, including avoiding the use of large hydraulic hammers and vibratory rollers above 13 tonnes in order to remove the potential for any damage, especially to the Upper Canal. In addition, any nearby bridge piling should be done by boring rather than pile driving and size limits for vibratory rollers and rockbreakers would need to be implemented.

Attended vibration testing of the Upper Canal and the Ingleburn Army Camp would be undertaken to confirm the safe working distances at sites within 30 metres of a sensitive receiver. For all other construction work areas it is not expected that any construction activity would be within 40 metres of a sensitive receiver.

Consideration

The Department considers that the Proponent has sufficiently identified high and medium risk activities that are likely to cause discomfort to the surrounding community and/or damage to surrounding buildings, with only three locations at risk of property damage, ie within 30m of works. The Department considers that these risks can be managed with appropriate working methodologies and notes the Proponents' commitment to prepare a Construction Noise and Vibration Management Plan to address these matters. Notwithstanding this, the Department also notes the potential impact to heritage items, particularly the Upper Canal and has recommended a condition for the active management of heritage items to prevent cosmetic damage.

Operational Noise and Vibration – Rail Corridor

Issue

The project will be predominantly above ground, except where the alignment passes beneath the Hume Highway. The chosen alignment has resulted in several deep cuttings which form effective noise barriers, and a number of high embankments where the track is in an exposed position.

The new track will be used exclusively for electric passenger rolling stock. When the line opens in 2016, it is anticipated that around 30% of rolling stock using the line will be older Suburban K and C-sets, with around 45% being Millennium sets and the balance made up by the new Waratah sets. By 2026, it is anticipated that all K and C-set trains will have been retired from service and replaced by the quieter Waratah sets or other trains, which should have a similar or superior noise profiles to the Millennium sets. No freight operations are planned for the new line. Diesel electric locomotives and diesel powered track machines will, however, use the line occasionally during construction and later for maintenance.

For operational noise impacts, the assessment has been guided by the *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (DECC/DoP, 2007) (IGANRIP), which nominates assessment trigger levels. In this instance, the project is considered to be a 'new railway line' and the project is to be designed and assessed against the applicable noise levels. However, it should be noted that the trigger levels are not criteria. Rather, the Proponent is required to assess and consider reasonable and feasible mitigation measures at locations where the trigger levels are exceeded. The EA is focused on the evening period, being the most affected period and it is noted that noise levels at opening in 2016 are expected to be greater than in 2026 due to the expected rail fleet upgrades.

Due to the prevailing land uses along the corridor, the number of existing receivers that might be affected is relatively low. However, the plans for the South West Growth Centre indicate that in future, many more receivers will be located near the rail corridor. Therefore, the noise assessment has also considered future residential areas identified in Council land use plans and Department of Planning master planning documentation, including the Ingleburn Gardens Estate, Edmondson Park Town Centre and Leppington Town Centre.

In the baseline assessment (incorporating selected earth mounds from excess spoil), the IGANRIP trigger levels are exceeded at distances of up to 120 metres beyond the rail corridor where the track is on an embankment. Properties where the $L_{Aeq(9hour)}$ 55 dBA or the L_{Amax} 80 dBA levels are predicted to be exceeded in the baseline case are located at Culverston Ave and Cassidy Street, Denham Court, as well as Camden Valley Way, Cowpasture Road and Bringelly Road, Leppington. Exceedances are also expected at Ingleburn Gardens Estate, Edmondson Park Town Centre, and Leppington Town Centre.

Options considered to be feasible and reasonable for reducing the impact of operational noise from the SWRL corridor project include:

- source control measures – quieter rolling stock, continuously welded rail and rail dampers;
- acoustic shielding – earth mounds and low height noise barriers;
- setback zones – parks and roads planned to separate sensitive users from the rail corridor;
- appropriate land use – commercial buildings planned along the rail corridor;
- prescribed building design and orientation; and
- dwelling treatments including property fences and upgraded glazing.

To meet IGANRIP trigger levels at the corridor boundary, noise barriers ranging from between one and 5.5 metres in height along the full length of the corridor would be required. The Proponent does not consider this to be reasonable and feasible within the context of the site due to cost, civil-structural limitations, safe access requirements, and the availability of other appropriate source control and land use options to address noise levels. Accordingly, the Proponent has proposed noise barriers to a height of one metre above top of rail level at locations where residential development is confirmed or proposed and where the IGANRIP trigger levels are exceeded in the baseline case at distances of more than 30 metres from the rail corridor. With these measures, trigger level exceedences are predicted at only two existing residences (1692 and 1701 Camden Valley Way, Leppington) for the 2016 case. Noise at all other residential receivers would be below the noise trigger levels.

With the earth mounds and noise barriers, and at locations where the track is at grade or within a cutting, it is anticipated that the IGANRIP noise trigger levels would be achieved at the ground floor of future residential buildings with the provision of a standard height solid fence at the property boundary. However, the noise levels that may be experienced by residents of future developments would be highly dependent on the design and placement of those future developments.

Both the Edmondson Park and Leppington stations will be located in cuttings. This will form an effective noise barrier for noise from station operations such as PA systems. Because of the generally lower train speeds in and around stations, train noise emissions are also significantly lower at stations. As such, noise from station operations has not been examined in detail in the EA. It is noted that RailCorp is in the process of implementing an upgrade of its existing PA systems which would be implemented at the new SWRL stations.

A night-time target limit of 108dB rms has been adopted for ground vibration at residential buildings adjacent to the project. This level is based on a vibration level of 103dB, the recommended night time limit for residential buildings from AS 2670, plus an allowance of 5dB for the transitory nature of the vibration. The modelling undertaken indicates that the proposed operational trigger level of 108dB vibration contour generally falls within the proposed rail corridor and is expected to be met at all existing receivers. There are, however, a few locations where the contour lies no greater than five metres outside of the corridor. The operational vibration levels from the project are expected to comply with the suggested criterion, including at the Upper Canal. In general, vibration impacts on future developments are considered to be unlikely due to the small number of locations at which the 108dB vibration contour falls outside the rail corridor boundary.

Consideration

Whilst the Department acknowledges that some submissions raised concerns over the accuracy of the noise assessment, the Department is satisfied that it has been undertaken in accordance with relevant guidelines and criteria, and notes that further noise modelling would be undertaken during detailed design to confirm predicted noise levels and impacts, which will refine the noise mitigation measures. Notwithstanding, it is noted that with the proposed mitigation measures, noise trigger level exceedences are predicted at only two existing residences (1692 and 1701 Camden Valley Way, Leppington) and that at these properties, further assessment of mitigation measures would be required and that detailed noise mitigation measures would be subject to an Operational Noise and Vibration Review.

A number of submissions raised concern in relation to noise impacts on future residents and land uses adjacent to the rail corridor. On this matter the Department considers that a balanced approach between at source mitigation, strategic land use planning and development design must be undertaken. This approach reflects the ongoing development of the South West Growth Centre and the inherent public and environmental benefits gained through the provision of the project. In this respect, the Department is generally satisfied with the approach taken by the Proponent in the mitigation of noise impacts, which included the identification of existing and known future development and a balanced noise management hierarchy.

The Department also notes that future development is required to consider and mitigate rail noise in accordance with State Environmental Planning Policy (Infrastructure) 2007. Accordingly, the Department has recommended a condition requiring the Proponent to design and operate the rail line components of the project with the objective of not exceeding the airborne and ground-borne noise trigger levels at existing developments, at each stage of the project, as presented in the Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects (DECC and DoP, 2007). For the purpose of this condition, existing development includes all existing development (built and approved) adjacent to the rail corridor, and development (including subdivisions) approved prior to the determination of this project.

The Department is satisfied with the level of vibration assessment undertaken by the Proponent. The Department notes that there are a few locations where the night time target contour lies no greater than five metres outside of the SWRL corridor. However, operational vibration levels are expected to comply with the criteria.

The Proponent would be required to confirm the assessment and any final mitigation measures, based on the detailed design of the project, within the recommended Operational Noise and Vibration Review. This is of particular relevance as retrospective mitigation is difficult and/or impractical, and therefore must be determined and incorporated into the final design.

The Department is satisfied that the proposed measures and noise and vibration mitigation strategy identified by the Proponent and recommended conditions of approval would ensure that noise contributions from the project are minimised. This includes:

- the submission of a review of the operational noise and vibration mitigation measures for the approval of the Director-General prior to the commencement of construction. This would detail what reasonable and feasible noise mitigation measures would be implemented to meet the noise goals and the timing for the implementation of these measures; and
- the undertaking of an operational noise and vibration compliance assessment within three months of commencement of operation of the project, to confirm the noise predictions and performance of the implemented noise mitigation measures, with additional measures to be implemented if necessary.

Operational Noise – Train Stabling Facility and Substations

Issue

The Leppington TSF will cover an area approximately 400 metres long and 60 metres wide in a mix of cutting and embankment. As it is considered to be a fixed facility, it has been assessed in accordance with the *Industrial Noise Policy* (INP). The INP requires the consideration of intrusive, amenity and sleep disturbance criteria, and the criteria defined by the Proponent in Table 8 has been developed on a future background noise scenario based on a low density land use scenario, which is approximately 5dBa higher than the existing background.

Table 8 – Operational Noise Goals for Train Stabling Operations

Period	Intrusiveness $L_{Aeq(15minute)}$ (dBA)	Amenity $L_{Aeq(period)}$ (dBA)	Sleep disturbance L_{Amax} (dBA)
Daytime	50	55	n/a
Night-time	40	40	50-65

The TSF will operate 24 hours a day, seven days a week with significant noise sources being associated with air compressors, brake testing, and horn testing. At opening, the facility will service up to 12 eight car sets, which will include some older stock that stand for longer periods with their electrical systems operating. Newer car sets, including the Millennium and the new Waratah class trains, have sleep and cleaning modes that minimise noise sources. The noise assessment has focused on the full twenty train scenario using newer rolling stock.

The noise assessment has identified that the TSF has the potential to cause annoyance, particularly in the night time period, with the most significant impacts emanating from brake and horn testing. While trains are prepared for service, prior to leaving the stabling facility, additional noise is generated during the testing of horns and brakes. Horns are sounded as a test to verify that it is functioning and to warn personnel of train movements. Noise from these sources are of very short duration, however they are of relatively high level and have the capacity to cause disturbance to potential future sensitive receivers, particularly in the late evening and early morning. Horn testing is predicted to result in a noise level of L_{Amax} 116-146dBA. Further, on arrival at the stabling location, trains would exhaust air from the brake system resulting in a high level noise emission for a short period. The incidence of this type of noise would be greatest after the evening peak hour.

The noise levels are influenced by existing land contours and cuttings and therefore noise emissions are not symmetrical. The following tables define the expected noise levels from general operations and significant noise sources.

Table 9 – Approximate distances affected by noise from stabled trains (excluding horn or brake test noise)

Noise Control	Distance From Source to Meet Noise Goals (Daytime)		Distance From Source to Meet Noise Goals (Night time)	
	Minimum	Maximum	Minimum	Maximum
Unmitigated	50m	155m	50m	160m
6m Barrier	0m	50m	0m	90m

Table 10 – Approximate distances affected by brake test noise (sleep disturbance)

Noise Control	Distance From Source to Meet LAmax of 65dbA		Distance From Source to Meet LAmax of 50dBA	
	Minimum	Maximum	Minimum	Maximum
Unmitigated	30m	120m	140m	315m
6m Barrier	0m	90m	10m	285m

Table 11 – Approximate distances affected by horn test noise (sleep disturbance)

Noise Control	Distance From Source to Meet LAmax of 65dbA		Distance From Source to Meet LAmax of 50dBA	
	Minimum	Maximum	Minimum	Maximum
Unmitigated	670m	800m	2000m	2100m
6m Barrier	220m	770m	970m	2100m
Building Enclosure	80m	510m	490m	1500m

In the context of the future development of the area around the TSF, including residential development, mitigation of the noise from horn testing is clearly necessary. Noise modelling indicates that a perimeter noise barrier extending six metres above the rail level of the TSF would be effective in mitigating noise from the facility, excluding horn noise. Such a barrier would complement the natural barrier effect of the edge of the site cutting. With this barrier configuration, intrusive and amenity criteria can be met (excluding horn and brake test noise) within 90m of the stabling facility, which confines the noise to the land allocated to the facility. As such, the application of perimeter noise barrier is proposed as a feasible and reasonable noise mitigation measure.

In relation to horn and brake noise impacts, the 6m barrier and the enclosure of the TSF would provide a benefit on three sides; however noise would still be projected to the east, including through the open doors of the enclosure. Individual treatments of existing dwellings is an option to mitigate these exceedances. However, this option would not be satisfactory for future development and further investigations of options involving land use planning solutions and/or changes to horn testing procedures is therefore considered to be required.

Three new substations are planned with major noise sources at substations associated with step down transformers and circuit breakers. Transformer noise is sometimes perceived as a continuous low level 100 Hz hum. The project also includes sectioning huts, with major noise source from circuit breakers, which can cause loud impulsive noises, but only when fault conditions cause over-current trips.

The EA has demonstrated that the most stringent noise goal in the INP (35 dBA $L_{Aeq(15minute)}$ for residential areas where existing night-time background noise levels are 30 dBA) are met at a distance of 30 to 50 metres from the substations. Noise criteria are predicted to be met at all existing residential receivers for substations of the capacity modelled. Substation noise would be mitigated to the greatest extent possible during detailed design through the application of design measures within the substation sites.

Consideration

The Department notes that the key sources of concern regarding operational noise emissions from stationary sources include the TSF and the electricity substation at Denham Court. As noted, the TSF has the potential to have significant impacts in relation to horn noise. Following the exhibition of the EA, the Proponent and RailCorp have continued to investigate potential management measures for reducing horn noise impacts. As a result of the investigation, it was determined that operational measures would be pursued as the preferred approach for managing the potential horn noise impacts, including:

- non-tonal audible 'quacker' style warning;
- full horn testing in a cutting west of Leppington Station; and/or

- alternate measures that comply with the Industrial Noise Policy.

RailCorp has advised the Department that it is currently pursuing the above operational procedures, including approval of the New South Wales Government Independent Transport Safety Regulator.

An assessment of these measures identified that in relation to the quacker style warning, that exceedance of INP criteria beyond the boundary of the TSF is limited with one residential receiver exceeding the intrusiveness criteria by 9dBA, and the sleep disturbance screening criteria exceeded at two properties with a maximum exceedance of 8dBA. Noise assessment of the horn testing en route to Leppington identified compliance with the 50dBA sleep disturbance criterion at distances beyond 210m from the rail corridor and exceedance at seven existing residences. Compliance with the higher sleep disturbance criteria of 65dbA is expected at distances beyond 50m from the rail corridor with one existing residential exceedance. The IGANRIP L_{Amax} noise trigger level of 80dBA is exceeded at distances of up to 30m from the rail corridor.

In considering the above assessment, the Department recognises that there is a need to balance environmental and safety issues, but considers that the proposed management measures have the potential to sterilise developable land and impact on the development of the Leppington Town Centre. The assessment of horn testing in the cutting west of Leppington Station demonstrates exceedances from 30m to 210m, dependant on the L_{Amax} criteria adopted. Due to this test process being intrinsically linked with TSF operations, the Department does not consider the IGANRIP criteria to be applicable in this circumstance.

The Department also considers that existing residents should have their existing amenity protected. Accordingly, the Department considers that the Proponent should ensure that for existing receivers and approved development the TSF should meet operational noise goals consistent with the existing background noise levels, including a sleep disturbance criteria of 50 dBA L_{Amax}.

The Department has recommended a condition of approval that the Proponent shall design and operate the TSF to minimise noise impacts to nearby noise sensitive receivers, with potential mitigation measures including:

- noise barriers at a suitable height, consistent with the barrier described in the Environmental Assessment;
- approved RailCorp operational procedures, including the use of quacker style warning signals;
- use of buffer zones and appropriate land use planning; and
- acoustic treatment of nearby dwellings.

In the event that the above mitigation measures are not reasonable and feasible, and do not achieve the noise targets derived for the project, the Proponent would be required to provide an enclosure of the TSF prior to the commencement of operation.

The Department notes the difficult in setting definitive operational noise criteria for the proposal, given the planned development / growth of the South West Growth Centre, and therefore evolving land use of areas adjacent to the corridor, and subsequent uncertainty over the future noise environment. This is a broader policy issue requiring further consideration in terms of the early identification or otherwise, of fixed noise criteria during project assessment and determination.

In the absence of fixed noise criteria for future development surrounding the train stabling facility, the Department has therefore recommended a condition of approval that takes into account of this uncertainty by requiring operational noise targets to be reviewed within 5 years of the date of any approval granted by the Director General for the Operational Noise and Vibration Review and at any subsequent time as required by the Director General. These reviews shall have regard to the status of land use planning, any land use changes and the background noise environment within areas adjacent to the rail corridor at the time of the relevant review.

Operational noise issues related to the electricity substation at Denham Court were raised by public submissions and also Liverpool Council. In response to community feedback, the location of the substation has been relocated approximately 40 metres west, now set back to allow a 40 metre separation distance to the nearest residence. Additional noise modelling based on this preferred location showed that the noise levels resulting from the operation of the substation would comply with the night time INP intrusiveness criteria at all existing residential receivers.

The predicted noise levels generated by the circuit breaker would exceed the upper sleep disturbance noise goal at the nearest residence by up to 7 dBA. The sleep disturbance indicators provided in the ECRTN allows for one or two noise events per night at this level, to not cause impacts to health and wellbeing. The circuit breakers at the substation would meet this criterion as they only operate when fault conditions cause over-current trips. Advice from RailCorp and Integral Energy indicate that this would occur infrequently and therefore the Department is satisfied that noise mitigation for circuit breakers is therefore not required. Notwithstanding, the Department has recommended conditions to prepare an Operational Noise and Vibration Review and undertake noise and vibration compliance monitoring to confirm the predictions of the Review and implement further measures to mitigate any exceedances as required.

6.2 Traffic, transport, parking and access

The Concept Plan EA included an assessment of the traffic, transport, parking and access impacts of the proposed SWRL. The potential demand estimate for various modes to the Edmondson Park and Leppington stations was based on station constraints and opportunity. The key potential impacts identified in the Concept Plan EA are summarised in Table 12.

Table 12 – Identified key potential impacts on traffic, transport, parking and access (Concept Plan EA)

Identified key potential impact	Description
Construction phase impacts on local and regional traffic associated with vehicle movement for earthworks	Additional congestion was expected to be minimal given the current heavy traffic loads experienced on major roads in the South West Growth Centre and wider region.
Construction phase impacts on general traffic, bus services, and pedestrians during construction of over and under bridges at existing road crossings	Impacts were expected to be manageable and not significant with implementation of construction management measures.
Operational severance impacts on movements of pedestrians and cyclists	Opportunities exist to minimise impacts and enhance connections. It was proposed that these would be considered during future design phases.
Significant regional operational benefits for traffic, transport and accessibility	The SWRL is an integral part of the transport network proposed for the South West Growth Centre, as it would: - support transport growth in a high demand corridor; - provide new rail services; - encourage a reduction in the use of private cars; and - encourage use of public transport. The impacts on the surrounding transport network would be minimised, as the mode of access demands and patronage predicted at the proposed stations were considered in the development of the station concepts.

Construction traffic impacts

Issue

Construction impacts were assessed using background traffic figures from 2008 traffic count surveys for a number of sample intersections across the overall study area. Traffic growth was then determined between 2008 and 2016. Traffic generation was also determined for haulage trips using the public road network and construction workforce commutes.

Construction traffic generated by the SWRL works would include:

- truck trips to haul earth material on the public road network between the construction stockpiles and to off-site destinations – the number will depend on the construction method adopted within the detailed design as some earthworks trips will be able to use the SWRL alignment to transfer material;
- truck trips to haul rail line and other construction materials from suppliers location to the construction stock piles – approximately 60 trucks for the duration of the project, generating up to ten truck trips per day, generally originating from the Hume Highway; and
- traffic generated by the construction workforce – which will be dependent on the number of construction workers, and location of key construction activities at any one time.

The construction works would be staged to maximise construction vehicles access between adjacent sections of the project. Impacts as a result of construction traffic could include: reduction in amenity for local residents;

temporary road closures; reduced access to properties; and increased heavy vehicle traffic. These impacts would be addressed within a Construction Traffic Management Plan.

The SWRL crosses roads at eight locations, where a temporary road closure and associated detour may be needed during the construction period in order that the railway line can be safely constructed. Management of road closures would need to be detailed within the Construction Traffic Management Plan, and following general principles including that, the duration of the road closure would be minimised. The Department also notes that the project will be tunnelled under the South West Freeway, which can be achieved without the need for any temporary road closures.

The most significantly affected intersection is likely to be Camden Valley Way and Rynan Avenue, which is predicted to have an increased delay and a longest queue length greater than 500 metres. However, these impacts would be ameliorated by already-planned intersection improvements and it is expected that the upgraded intersection undertaken by the RTA would cope adequately with the projected construction traffic.

Consideration

The Department accepts that there will be construction traffic and access impacts as a result of this project and that it is an unavoidable impact of major infrastructure construction.

To manage construction traffic impacts, the Proponent has committed to preparation of a Construction Traffic Management Plan in consultation with local councils and the RTA, and a spoil management strategy to further identify final construction spoil quantities and movements. The Proponent has also committed to maintain access during construction, including maintaining vehicle access to properties. With regards to construction of the electricity substation at Denham Court, Cassidy Street would be used for delivery of some equipment. However, this additional traffic would be infrequent and is not expected to impact on existing residences.

The Department considers that preparation of a Construction Traffic Management Plan would adequately address the impacts resulting from construction activities, and therefore respond to concerns raised by Campbelltown City Council and Liverpool City Council, as well as the Denham Court residents. To ensure that all potential impacts are addressed in the Construction Traffic Management Plan, the Department has recommended a condition of approval which outlines further requirements to detail how construction traffic will be safely managed to minimise impacts on transport networks and on adjoining properties.

Since exhibition of the project, additional assessment was undertaken to consider the physical layout and condition of potentially affected intersections. Key intersections were assessed to determine whether construction truck turning space requirements, lines of site, intersection markings, road layouts, street lighting and road condition surface were adequate to accommodate traffic movements associated with construction traffic. It was determined that a number of minor upgrades may be required depending on the final construction traffic plans. The need for upgrades would be further considered during detailed design in consultation with the RTA and local councils, as part of the development of construction traffic management plans.

The Proponent has also committed to preparing a detailed construction methodology for the crossing of the Hume Highway, Campbelltown Road and Camden Valley Way in consultation with the RTA with the aim of minimising traffic disruptions, including an emergency response plan to address the crossing of the Hume Highway, as required by statement of commitments 29 and 30. In the event that temporary closure of Dickson Road, Rickard Road and/or Eastwood Road is required, an access strategy would be prepared in consultation with Camden Council and relevant property owners to minimise impacts on local traffic access, as required by statement of commitment 40.

Access to Edmondson Park and Leppington stations

Issue

Access to stations is influenced by a range of factors including surrounding urban form, linkages with other transport networks and levels of service. Whilst current land use and transport integration policy supports planning and transport mechanisms that encourage sustainable lower car mode splits, the phasing of development of the South West Growth Centre will result in development initially occurring relatively distant from Leppington station. This will limit the extent to which walking, cycling and kiss-and-ride are used as transport modes of access to Leppington station. Accordingly, park-and-ride will dominate the demand at the station initially. Substantial bus service levels in the South West Growth Centre will also encourage bus as a viable

access mode to both stations, increasing over time. The projected public transport demand for passengers entering each station is shown in Table 13, and access mode splits are shown in Table 14.

Table 13 – Public transport demand projections (commuters into station)

Year	2016		2021		2026		2031		2036	
AM Peak	3.5hr	1hr	3.5hr	1hr	3.5hr	1hr	3.5hr	1hr	3.5hr	1hr
Edmondson Park	1380	690	2400	1200	3060	1530	3160	1580	3280	1640
Leppington	1300	650	2400	1200	4640	2320	6800	3400	8380	4190
Total	2680	1340	4800	2400	7700	3850	9960	4980	11660	5830

Table 14 – Access mode splits for SWRL stations

Access mode	Leppington Station					Edmondson Park Station				
	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036
Cycle	0%	1%	1%	1%	2%	1%	1%	2%	2%	2%
Walk	1%	3%	4%	4%	5%	31%	34%	34%	34%	35%
Bus	31%	37%	45%	45%	50%	25%	26%	26%	26%	26%
Kiss-and-ride	6%	6%	8%	8%	10%	22%	22%	22%	22%	22%
Park-and-ride	62%	53%	42%	42%	33%	21%	17%	16%	16%	15%

Edmondson Park station will function as more of a local access station, serving a smaller catchment and commuters are expected to use more sustainable access modes, including walking and cycling to the station, and getting to the station by bus.

The 2016 interchange configurations for both stations are included in Table 15. Interchange configuration at year of opening would be able to be staged to accommodate increases in the space requirements for access modes.

Table 15 – 2016 interchange configuration

Interchange facility	Leppington station	Edmondson Park station
Bus stops	Six bus stop spaces located close to the station entrance.	Eight bus stop spaces located close to the station entrance.
Kiss-and-ride	Ten kiss-and-ride parking spaces split between the north and south sides of the station.	18 formally identified kiss-and-ride parking spaces in the form of kerbside parking.
Taxi rank	Ten taxi spaces provided.	Two taxi ranks, with spaces for two taxis on the north side and four taxis on the south side.
Cycle facilities	Ten bicycle parking facilities provided, location to be determined in detailed design.	Ten bicycle parking facilities provided, location to be determined in detailed design.
Pedestrian access	To be facilitated by signalised pedestrian crossings at station entrances.	To be facilitated by signalised pedestrian crossings within the interchange.
Park-and-ride	A total of 850 commuter car parking spaces.	400 commuter car parking spaces, with 120 spaces on the south side and 280 spaces on the north side of the station.

Bus services: There will be some 26 bus routes serving Leppington station, with an expected peak hourly flow of 90 buses per hour, with around 70% terminating at Leppington station. Opening year bus facilities for Leppington station can be expected to require accommodation of three bus routes and some 12 buses per hour in peak times. Bus activity at Edmondson Park would be lower with a total of three bus routes and 12 buses per hour in peak times, with all being through routes. The short term bus network would include two bus routes and eight buses per hour at opening. Project bus flows have been taken into account in operational traffic assessments.

Park-and-ride facilities: Tables 14 and 15 clearly demonstrate that demand for parking, particularly at Leppington station, will be high and will need to be managed to limit the potentially negative impacts on development and traffic in the area.

Park-and-ride would need to have a major role as a commuter access mode at Leppington station, while balancing the attractiveness and efficiency of an eventual town centre. Under the proposed SWRL Stage B2 development, the availability of formal park-and-ride spaces would be capped at 850. This supply would be adequate for demands in the year of opening and additional park-and-ride demand could be satisfied informally in the surrounding area. Even with limited supply, the demand for park-and-ride is projected to be over 1,500 vehicles at Leppington station by 2026. The number of formal park-and-ride spaces provided would therefore need to be managed as would overflow parking areas. Limiting the number of spaces is required to restrict demand and encourage a shift to more sustainable modes.

Edmondson Park station would have a high demand for park-and-ride due to its proximity to the highway and the general undersupply of park-and-ride in the area. Provision for high levels of park-and-ride, however, would not be consistent with the master planning principles for the town centre which is aimed at encouraging sustainable modes and a high degree of integration between town centre and station. Parking supply should therefore be limited and appropriate control measures put in place to limit demand for parking and encourage more sustainable modes. Edmondson Park station would therefore have a maximum supply of 400 park-and-ride spaces to provide sufficient provision for park-and-ride commuters from opening of the SWRL to beyond 2021.

Consideration

A key issue raised by agencies and public submissions was that of station design and access provisions, in particular pedestrian and cyclist access. The Proponent has committed to designing the stations with recognition of the context of the scale and character of the existing surrounding areas. The station interchanges have also been designed to encourage safe pedestrian activities. Footpaths would be constructed to link the proposed commuter car parks to the stations. Buses, taxis, and kiss-and-ride drop offs would be placed to minimise road crossings by pedestrians. Statements of commitments have been included to ensure ongoing consultation with key agencies regarding the planned transport provision at the station interchanges, including efficient provision of bus services; final location of commuter car parking, and parking provisions; bicycle storage facilities and pedestrian and cycle access; and integration of the project with future pedestrian and cycle networks.

The Proponent has committed to continual liaison with the Department of Planning, Landcom and RailCorp to achieve an interchange and future town centre design that integrates with Edmondson Park station, as required by statement of commitment 70. The Department has further recommended a condition of approval to undertake a Pedestrian and Cycle Accessibility Study to identify potential pedestrian and cycle crossings to ensure enhanced connectivity, urban function and centre legibility in the South West Growth Centre.

The Department notes that the project would not in itself provide sufficient parking in the longer term. However, short and medium term supply would generally be met, and the Proponent has committed to ongoing consultation with key agencies and councils regarding the provision of parking at the stations. Whilst the Department supports initiatives to encourage the use of public transport, including the provision of parking spaces, it considers that the project in itself is not the sole contributor to parking space demand. This is a consequence of the future development of the South West Growth Centre and therefore the provision of supporting infrastructure and bus service enhancements need to be coordinated through a range of government initiatives. Accordingly, the Department considers that the levels of parking proposed as part of the project to be appropriate.

Landcom requested that the SWRL include an option to construct two road bridges with associated pedestrian and cycles lanes at Edmondson Park station. The Proponent, in the Submissions and Preferred Project Report, undertook an assessment for construction and operation of these bridges, which are now included as part of the project application. The bridges would be located at either end of the station, with a five-lane bridge provided to the east, and a six-lane bridge provided to the west, both including pedestrian and cycleway lanes. The two road bridges would be constructed by the Proponent subject to funding arrangements being confirmed by Landcom.

Operational traffic impacts

Issue

The operational traffic impact assessment focused on key routes to the stations during the AM peak, with this being the expected highest traffic volume period for activities associated with the stations. The assessment also considered the general growth in traffic as the South West Growth Centre is developed, including future road upgrades. The traffic assessment identified that in order for key intersections to maintain an acceptable level of operation, a number of upgrades would be required. Likely road upgrade requirements and timing are as follows:

- By 2016 – Camden Valley Way / Rynan Avenue intersection, and Camden Valley Way / Heath Road intersection upgrades.
- By 2026 – Bringelly Road / Edmondson Avenue / Rickard Avenue intersection, and Camden Valley Way / Ingleburn Road intersection upgrades, and Campbelltown Road / Macdonald Road / new access road and intersections to be built.
- An upgrade of Camden Valley Way / Croatia Ave will also be required.

The traffic impacts on the local roads around the Leppington Rail station are difficult to define in the absence of a developed Masterplan. The future performance of the intersections at Rickard Road / Ingleburn Road, Rickard Road / Heath Road, and Heath Road / Camden Valley Way will require further analysis when the traffic generation and distribution associated with the Master Plans for this area is greater defined.

A permanent road closure of Quarter Sessions Road is proposed where this road crosses the SWRL alignment. To retain network connectivity link roads will be constructed between Quarter Sessions Road and the unsealed Macquarie Links Drive. Macquarie Links Drive would be upgraded as the primary road linking Campbelltown Road with future potential development sites and the existing Macquarie Links Estate development located south of Macquarie Fields House. There is unlikely to be any significant access and safety issues with the proposed road diversion from Quarter Sessions to Macquarie Links Drive, with the new road being designed to ensure minimal impacts to existing and future road safety and access.

Access tracks will be required at various locations along the SWRL alignment to allow for the maintenance of culverts and other structures. The majority of these access tracks will need to connect with the public roads, and be designed in accordance with RTA requirements. However, because the use of these maintenance access tracks will be infrequent, the impacts on traffic are unlikely to be significant.

The SWRL can act as a barrier to pedestrian and cycle movement across the corridor unless adequate pedestrian and cycle crossing points are provided. Conversely, pedestrian and cyclist movement along the corridor could be facilitated by the project. This could be achieved by providing a shared cycle/pedestrian 'rail trail' adjacent to the rail corridor and by accommodating shared cycle/pedestrian facilities on or within bridge and culvert structures. There is also a need for crossing points to provide continuity of open space areas, including the Western Sydney Parklands, Cabramatta Creek and other creek lines, and the Sydney Water Supply Canal, and the opportunity for the SWRL to act as an open space corridor connecting these.

Consideration

The Department notes concerns raised by residents of Denham Court with regards to operational traffic impacts as a result of the electricity substation off Cassidy Street. The Proponent has advised that during operation, maintenance vehicles would need access to the substation, however, maintenance vehicle traffic would be infrequent and of very low volume. The Department is satisfied that the resultant impacts on Cassidy Street would be negligible.

The Department notes concern raised over the access to the approved Ingleburn Gardens school site due to the alignment of the SWRL. The Proponent has advised that the current access arrangements have been temporarily provided by the Ingleburn Gardens Estate Developer. The SWRL includes the provision of a permanent road overbridge to provide access to and from both sides of the rail corridor. The Department is satisfied that this solution will ensure the school will not be disadvantaged once the rail line has been constructed.

Key operational traffic impacts have been identified as predominantly occurring in the vicinity of the Edmondson Park and Leppington stations. The growth in traffic near the stations would largely be a result of the increased use of rail as a transport mode. From a traffic impact perspective, the Proponent has advised that predicted traffic volumes are considered acceptable at Edmondson Park station. A number of intersections in the vicinity of Leppington station would be likely to experience significant delays. However, with likely road upgrades as proposed by 2016 and 2026, the Proponent has advised that these intersections would be viable from a traffic impact perspective. The Proponent has also committed to upgrading the intersection of Macdonald and Campbelltown Road in consultation with the RTA to provide a new road linking with Edmondson Park station.

The Department considers that the SWRL facilitates the movement of people, and is an integral part of the anticipated urban structure and transport network proposed for the South West Growth Centre. The SWRL is not considered to be the predominant generator of traffic within the South West Growth Centre, but would provide a

direct transport link to and from the south-west region of Sydney, while curtailing the growth in road network congestion. In relation to broader road and traffic infrastructure requirements, the Department considers that these will be appropriately managed through the South West Growth Centre process, and is not the direct responsibility of the Proponent.

In relation to road crossings over the rail line, the Department notes the importance of ensuring that rail crossings, in particular regarding the potential widening of Dickson Road and Eastwood Road overbridges and potential rail crossing at Byron Road, are adequately addressed during the detailed design stage of the project, and consistent with the precinct planning work being undertaken for Leppington North. The Department has therefore recommended conditions of approval requiring the Proponent to ensure that the detailed design of the project:

- does not preclude planned road enhancements;
- is prepared in consultation with the relevant road authority and the Department;
- is consistent with the relevant precinct planning; and
- meets relevant road design, engineering and safety guidelines.

Additionally, a specific condition of approval has been recommended to ensure that existing and future road, pedestrian and cycle crossings of the rail corridor are designed and capable of being constructed to be consistent with the transport network determined by the Austral and Leppington North Precinct Plan, subject to funding arrangements being confirmed.

A cycleway along the rail line does not form part of the project as there is insufficient space within the rail corridor. Cycleways would form part of the precinct planning of land within the South West Growth Centre. Nevertheless, the Proponent has committed to integrating the project with future bicycle networks as part of the detailed design following consultation with Department of Planning, Transport NSW, councils, RailCorp, RTA and Landcom, as required by statement of commitment 36. The Department has further included a requirement to identify potential east west corridor connections in the South West Growth Centre and adjoining areas, as part of the Pedestrian and Cycle Accessibility Study. In relation to broader cycleway networks, the Department considers that these will be appropriately managed through the South West Growth Centre process.

6.3 Flora and fauna

Issue

There are a number of threatened populations and species of flora and fauna listed (under NSW legislation) within the locality the project, including:

- two threatened ecological communities, being Cumberland Plain Woodland and River-Flat Eucalypt Forest;
- two threatened populations, being the Endangered *Dillwynia tenuifolia* population at Kemps Creek, and the *Marsdenia viridiflora* subsp. *viridiflora* population in Western Sydney;
- forty one (41) threatened species of plant, with potential habitat for *Acacia pubescens, Pimelea spicata* and *Pultenaea pedunculata,* with none of these species detected by survey and considered unlikely to occur;
- forty eight (48) threatened species of animal, comprising 14 mammals, 25 birds, 2 reptiles, 6 frogs and 1 invertebrate, with seven species recorded or likely to occur, including the Cumberland Land Snail *(Meridolum corneovirens),* Grey-headed Flying fox *(Pteropus poliocephalus),* Yellow-bellied Sheathtail Bat *(Saccolaimus flaviventrus),* Eastern Freetail Bat *(Micronomus norfolkensis),* Eastern Bent wing Bat *(Miniopterus schreibersii oceanensis)*, Great Broad-nosed Bat *(Scoteanax ruepellii),* and Eastern False Pipstrelle *Falsistrellus tasmanieniensis);* and
- two (2) threatened species of fish and one invertebrate are known or predicted to occur, however no suitable habitat was identified for these species.

The flora and fauna assessment undertaken for the Concept Plan EA included desk-based searches of databases and historical records, as well as a field survey of the project area. Key potential impacts identified are summarised in Table 16.

Table 16 – Identified key potential flora and fauna impacts (Concept Plan EA)

Identified key potential impact	Description
Potential impacts on threatened biodiversity or their likely habitat	Includes impacts on Cumberland Plain Woodland, River-Flat Eucalypt Forest on Coastal Floodplains, Cumberland Plain Land Snail and potential habitat for *Pimelea spicata.*

Identified key potential impact	Description
Requirement for biodiversity offsets	Biodiversity certification of the State Environmental Planning Policy (*Sydney Regional Growth Centres) 2006* would influence the assessment of impacts and requirements for biodiversity offsets within the South West Growth Centre. Biodiversity offsets are likely to be required for impacts on flora and fauna in non-subject areas within the South West Growth Centre under the State approval process.

The project is predominantly located in the South West Growth Centre, which is subject to *State Environmental Planning Policy (Sydney Regional Growth Centres) 2006*. Biodiversity certification, under the *Threatened Species Conservation Act, 1995,* was conferred on this planning instrument on 11 December 2007.

The biodiversity assessment completed for this EA has been undertaken to address the relevant state and Commonwealth statutory requirements in relation to the assessment of biodiversity and the matters outlined in the Proponent's statement of commitment's and Concept Plan Approval. The assessment found that the refined alignment of the SWRL corridor would result in clearing of a greater total area of remnant vegetation.

Clearing of native vegetation and removal of key fauna habitat elements would be the major direct impact of the project on biodiversity. Table 17 lists the loss of vegetation communities and impacts to threatened ecological communities as a result of the project, and Table 18 lists the loss of fauna habitats and threatened species habitat as a result of the project.

Habitat fragmentation would occur during construction and operation of the project. However, the additional fragmentation resulting from the proposal would be unlikely to have a significant impact on the viability of species that occur within most of the fragments. Edge effects would be created along the boundaries of the project with a change in edge affected areas increasing the germination and establishment of weeds, particularly as a result of construction activities. Areas that would be subject to new edge effects would be the larger woodland remnants in Edmondson Park, including approximately 10 ha of Cumberland Plain Woodland and one ha of Alluvial Woodland. Other potential impacts include direct mortality to plants and less mobile animals during construction, alterations of the natural flow regimes of watercourses and changed hydrology, noise and other human disturbance, collision, and barrier effects. However, these impacts are considered relatively minor within the context of the existing environment and can be managed with appropriate mitigation and management measures.

Table 17 – Loss of vegetation and threatened ecological communities

	Extent of area (ha)				
Vegetation community	**Non-subject areas**	**Subject areas**	**Total extent of impact**	**Equivalent habitat within 1km**	**Edmondson Park**
Construction Footprint	**21.97**	**80.26**	**102.23**		**25.58**
Vegetation community					
Shale Plains Woodland	3.41	21.16	**24.57**	484.5 (5%)	13.89
Shale Hills Woodland	0.67	0.65	**1.32**	121.1 (1%)	0.23
Alluvial Woodland	1.77	3.04	**4.81**	119.1 (4%)	1.91
Native dominated derived grassland	0.24	2.8	**3.04**	-	3.04
Total vegetation cleared	6.09	27.65	33.74	724.7 (5%)	20.98
Threatened ecological communities					
Cumberland Plain Woodland (TSC Act)	4.32	24.61	**28.93**	605.6 (5%)	NA
Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest (EPBC Act)	NA	NA	**6.35**	175.9 (4%)	**5.46**
River-Flat Eucalypt Forest on Coastal Floodplains (TSC Act)	1.77	3.04	**4.81**	119.1 (4%)	NA

Table 18 – Loss of fauna and threatened species habitat

Attribute	Extent (ha)			
	Non-subject areas	Subject areas	Total extent of impact	Equivalent habitat within 1km
Fauna habitat type				
Woodlands	4.08	21.81	25.89	610.3 (4%)
Derived grasslands	0.24	2.8	3.04	-
Riparian and other aquatic habitat	1.77	3.04	4.81	119.1 (4%)
TOTAL	6.09	27.65	28.9	
Habitat of Threatened species of animal				
Cumberland Land Snail Habitat	1.0	8.5	9.5	-
Grey-headed Flying fox habitat	5.85	21.85	30.7	729.4 (4%)
Microbat habitat	5.85	24.85	30.7	729.4 (4%)

Consistent with the requirements of the Concept Plan and in consideration of the South West Growth Centre biodiversity certification, significant assessments were undertaken in non subject areas. These assessments did not identify any significant impacts to threatened biodiversity. However, offsets determined in accordance with the biodiversity certification order would be required to improve or maintain biodiversity outcomes.

Detailed flora and fauna mitigation measures would be developed and presented as part of a Flora and Fauna Management Plan relating to the construction and operation of the project. This would include:

- limiting vegetation clearing and protection of environmentally sensitive areas;
- the implementation of clearing protocols and the employment of a trained ecologist; and
- revegetation and a weed control plan, and the implementation of fish friendly water way crossings.

Due to the biodiversity certification, the Proponent is required to offset impacted habitat for 'non subject' areas within the South West Growth Centre and for areas outside the South West Growth Centre. Accordingly, the Proponent has committed to providing an offset package that will include identification of the residual impacts of the proposal that are being offset, lands and/or actions that can be used to offset the impacts, the long term maintenance and management requirements for offsets, and a monitoring program to assess the effectiveness of the offset package.

Consideration

The Department notes agencies' issues regarding the level of threatened species assessment carried out for the project, which were based on the presumption that this should follow the requirements of the *Draft Guidelines for Threatened Species Assessment* (DEC). The Department has clarified with DECCW and the Proponent that the conditions of the Concept Plan Approval granted for the SWRL specify the applicable environmental assessment requirements for the project. These are to: describe the ecological impacts of the project; describe measures to offset impacts; describe how the effectiveness of the offset measures would be monitored; and describe the maintenance responsibilities and timing of implementation of offset measures.

The Department recognises that the project has the potential to result in adverse impacts upon flora and fauna habitat, and riparian zones. The Department considers that potential impacts on biodiversity as a result of construction and operation of the project, can be addressed through the detailed Flora and Fauna Management Sub Plan as required by statement of commitment 48. Additionally, to ensure that all potential impacts are addressed in the Flora and Fauna Management Sub Plan, the Department has recommended a condition of approval which outlines further requirements to detail how construction impacts on terrestrial and aquatic ecology will be minimised and managed. The Proponent is also required to limit the clearing of native vegetation to the greatest extent practicable, and utilise native vegetation for planting along the rail corridor.

The NoW provided specific commentary on watercourse crossings and the need to improve riparian connectivity and function, the provision and rehabilitation of minimum riparian areas, and minimum bridge spans. The

Proponent has identified that more detailed assessment regarding riparian zones would be required during the detailed design phase of the project, including identification of measures for bank stabilisation and rehabilitation, identification of improvements to riparian connectivity and intended function, further detailed design of the Glenfield Southern Flyover in relation to the riparian area adjacent to Bunbury Curran Creek, and further detailed design of Scalabrini Creek crossing.

The Department considers that waterway crossings, drainage structures, and the rehabilitation of adjoining areas is a key focus during design and construction to ensure that physical impacts to ecological values and riparian connectivity is minimised, and has recommended a condition of approval to prepare and implement a Riparian Corridor Assessment Report in consultation with the NoW.

Refinement of the project has resulted in a slight increase in the area of vegetation to be cleared in non-subject areas from 5 ha to 6.09 ha. This includes additional clearing at Denham Court. In response to community concerns regarding noise and construction impact issues, a preferred site for the relocation of the proposed Cassidy Street electricity substation has been determined, moving the substation an additional 40 metres from existing residences. This will result in the clearance of an additional 0.07 ha of Cumberland Plain Woodland, however this additional clearing is not likely to constitute a significant impact on biodiversity.

A Biodiversity Offset Strategy for the project is currently being developed by the Proponent in consultation with the Department of Planning and DECCW, in accordance the Biodiversity Certification Order under the *State Environmental Planning Policy (Growth Centres) 2006*, and has been committed to by the Proponent through statement of commitment 51. Offsets provided for clearing of non-subject areas will be in accordance with Condition 11 of the Biodiversity Offset Order. Offsets for areas in subject areas and outside the growth centre will also be included.

The Department considers that biodiversity offsets are the key component in ensuring management of the loss of vegetation as a result of the project, and has recommended conditions to ensure completion of the Biodiversity Offset Strategy prior to commencement of any construction work that would result in the disturbance of any existing native vegetation, and completion of the Biodiversity Offset Package prior to significant construction other than the southern flyover.

6.4 Visual impact, landscaping and urban design

Issue

The area traversed by the South West Rail Link is rural residential in nature and has a rolling topography resulting in relatively small visual catchments. The project is also in the vicinity of a range of existing bushland areas including the Western Sydney Regional Parklands. Notwithstanding, as the impacted area is primarily within the South West Growth Centre, the land use and its existing visual elements will progressively change as the area develops. The Concept Plan identified a number of key potential impacts, as listed in Table 19.

Table 19 – Identified key potential visual impacts (Concept Plan EA)

Identified key potential impact	Description
Temporary visual impacts	Surrounding residents and nearby roads may be temporarily impacted when construction work sites are in use.
Direct and indirect impacts on visual amenity	The rail corridor has the potential to be a visually dominant feature in the landscape. Impacts would be reduced in the long term as the area is developed.
Light spill impacts	The operation of lighting at the stabling facility and stations may affect nearby properties.

The construction of the project will cause temporary adverse visual amenity impacts for surrounding land uses, rail commuters (with respect of works within the vicinity of the Glenfield Junction) and occupants of vehicles using nearby roads due to vegetation clearing, earthworks, construction compounds, access roads and the like. Construction of significant engineering elements such as the Glenfield Southern Flyover, road underbridges and bridged waterway crossings are also anticipated to be highly visible construction activities. Impacts would be greatest at locations where residential / sensitive receivers have an unscreened view of the construction sites resulting in a temporary reduction in visual amenity. Light spill from construction sites may also affect the visual amenity of adjacent land uses. To minimise these impacts the Proponent would implement a Landscape and

Rehabilitation Sub-plan. This would include undertaking planting prior to rail construction, where these works would not interfere with construction activities, to allow maximum time for the establishment of the new plantings.

Since the initial Concept Plan assessment, the project design, including urban and landscape design, has evolved, with visual impacts from the project in its operational form primarily associated with significant engineering works where the visual effect and sensitivity of the project is generally considered to be high. This includes the following:

- Glenfield Southern Flyover and embankment;
- new stations and associated transport infrastructure at Edmondson Park and Leppington;
- new underbridges;
- Leppington Train Stabling Facility;
- rail corridor impacts, including overhead wiring and any retaining walls, substations, noise walls (or other structural mitigation measures), embankments and rail tracks; and
- a new Integral Energy Substation at Denham Court.

As noted the land use and visual attributes of the area will change as the growth centre develops and this needs to be taken into account when assessing the visual impact of the project. Key developments include:

- Edmondson Park – residential and associated open space;
- Leppington Town Centre – residential and town centre;
- Ingleburn Gardens – residential and aged care; and
- Western Sydney Parklands – large recreation zone through western Sydney.

The Proponent's proposed approach to address visual impacts is to revegetate relatively lower embankment grades with Cumberland Plain species to provide a visual buffer to sensitive locations whilst providing glimpses of the railway within a landscape setting, so as not to keep the corridor visually hidden. The project corridor provides the opportunity to create over 30 hectares of revegetation and landscape treatments and a series of characteristic landscapes would be created throughout the corridor. Landscape strategies have been developed as a response to the existing landscape framework and the future land use proposals, with views to be opened at key locations and within proposed town centres.

The urban design of the rail line would be guided by the following principles:

- Bridge structures – Bridges would have a simple symmetry and aesthetic with smooth, clean lines, and proportions responding to the context of individual localities. Bridge approaches, embankments, noise walls and abutments would be treated as part of the bridge design, providing an integrated design outcome.
- Retaining walls – the use of retaining walls would be minimised, unobtrusive, simple, refined and would not include unnecessary embellishments. All retaining walls would fully integrate with surrounding structures and landscapes and would be screened by vegetation where possible and capped to form smooth continuous profiles without abrupt changes in level.
- Noise mitigation – Large noise walls would be avoided where possible, with earth mounding, low barriers, implemented to reduce visual impacts. In areas where noise walls are required, they would be appropriately landscaped to reduce any visual impacts.

The stations would be designed in accordance with the Proponent's *Sustainable Design Guidelines* (2009) and would act as a strong focus for the town centres, with design incorporating the following design elements:

- public domain design: links to local neighbourhoods and open spaces; integration with adjacent developments; urban character; and use of appropriate plant species, sizes and densities; and
- station design: consistency of architectural expression; innovative design and technology responses to achieve environmental goals; rational architectural forms, special arrangements and material selection; and the making of public places which are accessible, robust and provide public amenity and safety.

The Leppington train stabling facility is located in an area of relatively flat rural residential landscape. Initially the visual impact of the facilities would be substantial due to the rural nature of the site. However, the design includes substantial screening and the area and land use will change over a period of time.

An Integral Energy sub station is proposed to be located north of Denham Court, adjacent to an existing transmission easement. The footprint of the substation is proposed to be 90m x 50m, and approximately 10m at maximum height. It would be located within dense existing vegetation. Additional planting of endemic vegetation to the surrounds would be required to minimise the visual impact to residents of Denham Court. Two traction

substations are located along the project, having a proposed footprint of 50m x 20m with a 1 storey building. These are located in the vicinity of Camden Valley Way and adjacent to the Leppington train stabling facility. These are located in open and rural landscape character zones.

Consideration

The visual amenity impacts associated with the construction of the project will be temporary in nature and will be reduced in the medium to long term through various mitigation measures, and through the revegetation / rehabilitation of the work areas to their pre-construction state or better. The Department considers that the Proponent's commitment to visually screen construction compounds and access roads which are visible from surrounding areas is suitable until plantings are established.

The Department recognises that the visual impact of the operation of the rail line would be highly variable, and dependant on location and the available vistas to and from the railway line, stations and ancillary facilities. The proposed Glenfield Southern Flyover, road and water crossing bridges, the new stations and Leppington Train Stabling Facility, the substation at Denham Court, and the embankment at the Forest Lawn Memorial Gardens Cemetery, have the potential to impact on adjoining properties and neighbouring communities, particularly at locations where receivers have an unscreened view of the structures. However, the Department recognises that potential visual impacts of the project need to be considered in the context of the South West Growth Centre, including the Edmondson Park and Leppington town centres, and the broader benefit delivered to the community by provision of the rail line and new stations.

The Proponent's design solution for the corridor, including for bridge structures, retaining walls, and noise mitigation would assist in mitigating visual impacts, including solutions to minimise the bulk and scale of the structures as well as minimising opportunities for graffiti. In this regard, the Department is satisfied with the corridor landscaping, and notes the objective to create a variety of landscape characteristics, including plantings to screen infrastructure in some areas, and allowing views out of the rail corridor at key locations. With regard to the Glenfield Southern Flyover, the Department notes that project approval exists for different components of the Flyover and that it is consistent with the Concept Plan.

The design of stations and their integration into the existing and proposed broader urban environment is an important element of the project and for the wider success of the South West Growth Centre. In this respect the Department notes and agrees with the Proponent's objectives for the detailed design of stations and transport interchanges, including:

- developing stations as the principal transport and community facilities within the locality;
- stations (and other components) designed to reflect the character of the existing area;
- improvement and establishment of movement networks, inviting pedestrian environments, including links across the corridor and the provision of easy access facilities; and
- the prioritisation of public transport and other non-car based travel for railway station connections to adjoining areas.

In response to community feedback, the location of the Denham Court substation has been set back to allow a 40 metre separation distance to the nearest residence. The location of the substation within a dense stand of existing vegetation would provide initial screening and reduce its potential visual impact. This, combined with planting of additional vegetation along the southern boundary of the substation, would create an adequate and substantial visual buffer.

The Forest Lawn Memorial Gardens Cemetery approached the Proponent directly regarding potential visual impacts on the Gardens. The Proponent subsequently addressed the importance and cultural sensitivity of the north-west corner of the Cemetery in the Submissions and Preferred Project Report, and the design now includes increased landscape screening. The Proponent has committed to develop a landscape planting strategy for the Cemetery in consultation with the operators. The Department is generally satisfied with the design outcomes for these matters and has recommended that landscaping for the Cemetery be further developed and implemented as part of the approval.

In consultation with Transport NSW and the RTA, the Department has also recommended conditions of approval regarding the road crossings at Campbelltown Road, Camden Valley Way and Cowpasture Road, which outline urban design criteria for the bridges.

Overall, the Department is generally satisfied that the Proponent has provided a suitable framework to guide the final project design and to minimise the visual intrusiveness of the project as much as possible. The Department recognises that further work would need to be undertaken by the Proponent before the final design can be determined, including consultation with the community and local councils. To ensure that station designs reflect best practice and are prepared in consultation with key agencies council's and the local community, the Department recommends the preparation of a comprehensive Urban Design and Corridor Landscape Plan. This will include final design plans for train station precincts and other built elements, including retaining walls, embankments, the Southern Flyover, waterway and road crossings, the train stabling facility and substations, as well as final landscaping arrangements and maintenance regimes.

6.5 Water quality, hydrology, groundwater and soil salinity

Water quality

Issue

The sedimentation, erosion and water quality impacts assessment undertaken as part of the Concept Plan EA noted that the erosion of topsoil, exposure of buried structures, reduction of air and water quality, sedimentation of creeks and rivers, and increased turbidity in creeks and rivers could occur during construction of the proposed SWRL.

The Stage B2 EA confirmed that the construction phase of the project represents the period of greatest erosion and sedimentation potential. Erosion and sedimentation from disturbed areas during construction would be controlled in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom 2004). For each component of work, an Erosion and Sediment Control Plan or a Soil and Water Management Plan would be prepared and incorporated into the Construction Environmental Management Plan (CEMP). The CEMP would include a monitoring program to assess the water quality upstream and downstream of the SWRL both during and after construction.

A key aspect of water quality during construction would be the use of sediment basins at appropriate locations within the project, to minimise the dispersion of sediments into downstream watercourses. A number of sediment basins would be established adjacent to the project alignment. The exact location and sizing of sediment ponds would be finalised by the construction contractor prior to construction.

The operation of the project represents a significant change in land use, with a resultant change in the type and quantity of pollutants generated. There is potential for erosion and sedimentation from cuttings and embankments, scouring downstream of waterway crossings and run-off generated pollutants such as oils, greases and gross matter. Discharges containing pollutants from the new stations, car parks, interchanges and the train stabling facility could also potentially impact the water quality of the downstream creeks.

The potential for scour, erosion and pollutant generation would be controlled through the adoption of appropriate water quality measures in accordance with all statutory and environmental protection requirements, including the *Edmondson Park Precinct DCP* and the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC 2000). Where practical, water quality measures would be incorporated into the design of the drainage system, or where not practical or inadequate for the expected pollutant loadings then end source solutions would also be implemented.

Wastewater from internal cleaning operations at the train stabling facility would be collected via sinks connected to a piped wastewater system. At the time of opening, the Leppington TSF would not be sewered and, therefore, would need a wastewater treatment facility to tanker wastewater away for treatment off-site. Once the area has been sewered, it is anticipated that there would be options for connecting the train stabling facility to the Sydney Water sewer under a trade waste licence. The details of wastewater treatment facilities and processes would be developed during detailed design.

Consideration

Construction of this nature in the vicinity of a water course needs to be appropriately managed to prevent sedimentation and runoff inadvertently being transported into nearby watercourses. The Department notes that there is a range of standard and tested management mechanisms available to ensure that watercourse systems are not impacted. The Department is satisfied that the Proponent's statement of commitment 79, to implement erosion and sediment control measures consistent with the measures outlined in *Managing Urban Stormwater:*

Soils and Construction (Landcom 2006), and statement of commitment 82 outlining the requirements for sediment basins during construction, would adequately address these issues.

In relation to operational water quality impacts, the Department notes that the project has the potential to increase pollutants entering the stormwater system and that the volume of pollutants attributable to the project would be minor in comparison to that resulting from the South West Growth Centre. The Proponent would be required to comply with section 120 of the *Protection of the Environment Operations Act 1997*, which prohibits the pollution of waters.

Hydrology

Issue

The hydrology assessment undertaken as part of the Concept Plan EA identified that the potential flooding impacts of the SWRL would have minor impacts on existing property, and that these could be managed through appropriate design and the incorporation of mitigation measures.

The key potential hydrologic impacts of the project during operation, as identified in the Concept Plan EA, are summarised in Table 20.

Table 20 – Identified key potential hydrologic impacts (Concept Plan EA)

Identified key potential impact	Description
Direct hydraulic impacts of the project at each waterway crossing	- changes to flood behaviour - changes to the local drainage - flood impacts on properties and infrastructure.

Significant growth and urbanisation is expected to occur in the near future as part of the South West Growth Centre. This level of development is likely to result in changes to flood behaviour caused by increased runoff due to urbanisation, changes to peak flow due to compensatory detention, and confinement of the floodplains. For the purposes of the Stage B2 EA, the base or pre-SWRL development scenario considered that the South West Growth Centre catchments upstream and downstream of the SWRL had been developed consistent with current planning documentation. This has generally resulted in higher peak flow estimates than those determined in the Concept Plan.

The hydrological assessment considered a range of relevant factors and guidelines, including those associated with:

- floodplain management requirements, including the adoption of a 1%AEP, areas of flood risk (Edmondson Park), over flow locations, upstream flood levels, imperviousness, water way blockage, and climate change;
- fish and fauna passage and riparian corridor condition; and
- construction impacts including temporary and permanent crossings, site compounds and water quality.

Preliminary sizings for crossings and catchments diversions within the rail corridor were developed so that flood impacts were generally negligible and manageable for events up to and including the 1 in 100 year storm event. The hydraulic modelling results (for an unblocked waterway crossing) indicate that for flood events up to and including the 1 in 100 year event, adverse flood level impacts upstream of the waterway crossings would be localised and generally contained within the rail corridor and that impacts on adjacent land could be addressed in the design of inlet treatments and surface drains. Flood modelling indicated that a number of waterway crossings would be sensitive to debris blockage, which could increase flood levels experienced upstream of the SWRL and create adverse impacts due to overflows. Therefore, consideration needs to be given to management of potential waterway blockage, particularly at high risk crossings.

Climate change impacts could potentially increase the likelihood of flows in excess of the design standard. Locations where climate change impacts have been identified as a potential risk are also locations where there is a risk should blockage of the culverts occur. At these locations the risk and impacts of blockage are significantly greater than those due to climate change, and additional culvert capacity has been provided at critical locations to allow for blockage which would accommodate increased flood risk due to climate change.

While the 1 in 100 year design flood standard was adopted for the design of waterway crossings, floods in excess of this event could occur. Detailed assessment of flood risks for events in excess of the design standard was warranted at Edmondson Park Station and surrounds, as well as Crossing 3 which has the potential to impact on Campbelltown Road. Edmondson Park Station is proposed to be located in a cutting that adjoins a low point in the SWRL alignment, and as a result there is the possibility for overflows from nearby crossings to impact the station. Results from the flood modelling indicated that flows in excess of the 1 in 100 year event and/or overflows due to culvert blockage would result in overtopping of adjacent crossings, and result in flow travelling along the rail corridor.

The assessment indicated that flooding in excess of the 1 in 200 year event could potentially affect the operation of trains and cause damage to rail infrastructure at these locations. Flood modelling for the probable maximum flood (PMF) indicated that flooding would inundate the station platform and travel along the rail line at a depth of approximately 1m above track level. Flooding of the station platform would be relatively shallow with depths typically less than 50mm. Flood risk to rail staff and commuters at Edmondson Park Station are considered to be manageable for flood events up to the PMF. Once the station design is completed more detailed modelling of flood events in excess of the design standard is recommended to be undertaken to define mitigation measures, including preparation of a Flood Risk Management Plan. With respect to Campbelltown Road, flows into the rail corridor could be managed through appropriate bunding and debris control.

Increases in flood levels as a result of climate change may also impact on the rail line itself, potentially increasing required track levels. The most significant location where there could potentially be a risk from climate change (and culvert blockage) is at Edmondson Park Station. Overflows would be contained to the drainage line and access road and should not impact on the rail line, provided that a Flood Risk Management Plan is prepared for Edmondson Park Station.

Consideration

The Department notes the issues raised by agencies and Councils regarding the hydrology assessment undertaken for the project. The Proponent has identified that more detailed hydraulic assessment would be required during the detailed design phase of the project, including:

- the opportunity to reduce batter footprint to be confirmed;
- planting proposals to be reviewed so that any flooding risks can be identified and controlled;
- monitor and address relevant changes to design standards;
- further improvements to model stability and further analysis to investigate impacts under events greater than the 100 year ARI design storm;
- review any plans for raising Campbelltown Road and the consequences to clearance for the underbridge; and
- liaise with relevant agencies and councils regarding potential flood impacts.

The Department is satisfied that the assessment can be further refined during the detailed design process to address agencies and Councils concerns. The Department also notes that the Proponent has committed to:

- preparing a Flood Risk Management Plan;
- consult with Campbelltown City Council on the design of Crossing 1;
- design drainage in the vicinity of the Sydney Water Canal to the satisfaction of the Sydney Catchment Authority;
- provide diversion drains to manage flood impacts;
- evaluate the reliability and security of available flood evacuation routes and other flood emergency measures; and
- finalise flood mitigation measures finalised during detailed design.

The Department considers that the project can be designed in a manner which would not exacerbate the flooding characteristics of the surrounding area, and has recommended a condition of approval requiring the Proponent to undertake a Flood Management Study in consultation with the Department, DECCW, Landcom and relevant Councils during detailed design of the project and prior to construction. The Flood Management Study will facilitate a holistic approach to detailed hydrological assessment and stormwater management, which reflects the development of the South West Growth Centre and adjoining areas. The Department considers that construction of the project can be managed through the Proponent's detailed Flood Risk Management Plan as required by statement of commitment 42.

Groundwater and soil salinity

Issue

Desktop assessment undertaken for the Concept Plan determined the following:

- saline soil/groundwater conditions would be expected to be encountered at crossings of major creeks or in large cuttings;
- given the low permeability of bedrock along the SWRL route, minimal saline groundwater would be expected in most cuttings; and
- creek and floodplain crossings would generally be on fill or structure, so no saline groundwater interaction would be expected.

Potential salinity impacts on the operation of the project include:

- degradation of steel and concrete foundation structures over the operational life of the project; and
- wider environmental impacts (ie vegetation damage, death and salinisation of waterways) as a result of the project, through mobilisation of previously stable saline groundwater occurrences.

Further investigations would be required during detailed design to minimise the potential impact on groundwater as a result of excavation below natural ground levels. In order to minimise groundwater and sub-surface hydrology impacts during construction and throughout the operation of the project, a number of mitigation measures would be implemented.

Consideration

A Groundwater Management Plan would be required to outline the local groundwater conditions, dewatering methodology, water disposal options, monitoring and protection measures to satisfy conditions imposed by the NoW and Councils. The Groundwater Management Plan would address impacts to the local hydrological regime during and after construction.

The Proponent has committed to undertaking detailed geotechnical investigations to assess groundwater levels and groundwater and soil quality to identify risks to the durability and stability of subsurface structures associated with perched groundwater, high groundwater levels, saline groundwater and saline soils.

To protect watercourses from the potential interception of saline groundwater, the Proponent's statement of commitment 81 requires undertaking a salinity assessment in accordance with the Growth Centres Development code and the Western Sydney Regional Organisation of Councils *Western Sydney Salinity Code of Practice* (2002), with any recommendations integrated into a Salinity Management Plan and incorporated into the CEMP.

The Department considers that the Proponent's geotechnical investigations and salinity assessment, together with the Department's recommended condition of approval that requires the Proponent to prepare a Groundwater and Soil Salinity Report detailing the outcomes of the geotechnical investigations, will be adequate to determine the presence, extent and severity of soil salinity, and impacts to groundwater resources and hydrology.

6.6 Other environmental issues

Indigenous Heritage

Issues

Seventeen Aboriginal sites were identified as being potentially affected by the SWRL Concept Plan. A full Aboriginal archaeological and cultural heritage assessment was undertaken for the purpose of this EA, which found 13 Aboriginal heritages sites during field surveys of the study area, including four previously recorded sites and nine new sites. Of the sites identified during the Concept Plan and EA assessment, eight sites were identified as located within the likely impact zone of the project, and therefore directly affected during the construction phase of the project. The majority of these sites are stone artefact scatters of types common in the local region.

Twelve areas of archaeological sensitivity would also be directly affected during the construction phase of the project, three of which are considered as having high sensitivity, around Edmondson Park station and near Cabramatta Creek. These areas would require mitigation of impact in the form of archaeological excavation prior to construction.

Past land use activities, land clearing, and market gardening agriculture, are key factors which have substantially disturbed the integrity of sub-surface deposits within the construction corridor. Consequently, there is a low likelihood for these sites to contain undisturbed in situ archaeological deposits.

Notwithstanding this, areas of high archaeological research potential and moderate scientific significance were identified at sites located in an elevated area between second order creeks and areas of relatively minor level of disturbance. Four sites in particular are considered to have high research potential and when taken in context with surrounding sites, they can be considered as a complex of sites with the potential to reveal a continuity of use of the landscape in the area between Cabramatta and Maxwells Creeks.

Local Aboriginal communities were consulted throughout the process and it was noted that while all recorded heritage sites contain intrinsic cultural significance, there are no further specific cultural significances attached to the identified sites.

The construction works associated with the project including excavation, levelling, filling and associated infrastructure development, would cause disturbance of a number of sites, and associated sub-surface archaeological deposits may be destroyed. The EA has subsequently identified a range of management/mitigation measures, developed in consultation with Aboriginal community representatives, based upon the cumulative impacts of the development and regional rarity and representativeness of the sites. These measures include test excavations, surface collection, and continued consultation with the Aboriginal communities regarding the relocation of artefacts.

Consideration

Since exhibition of the EA, a program of test excavations has been undertaken in some areas of medium and high archaeological sensitivity. Representatives from each of the eight Aboriginal stakeholder organisations that were registered and participated in the Aboriginal heritage assessment for the EA were invited to participate in the test excavations. The excavated archaeological material is currently being analysed to formulate interpretations about the Aboriginal site use, antiquity and settlement patterns of the area and to determine the scope of any archaeological salvage excavations to be undertaken prior to the construction of the project.

Preliminary analysis of the results of the test excavations suggests that there is potential for significant Aboriginal archaeological deposits to be present in the identified areas of high archaeological sensitivity in the SWRL corridor, particularly in association with creeks and swamp areas, and that additional investigation is likely to be required. The details of any further heritage investigations would be developed during detailed design once the full archaeological analysis has been completed. The Department considers that archaeological test excavations are required at specified sites, and results should be used to develop the methodology for any required further test or salvage excavations. Accordingly, the Department recommends conditions of approval requiring the Proponent to include in the Aboriginal Heritage Management Plan, Aboriginal heritage assessment management and methodology for further archaeological subsurface excavation and resultant salvage work.

With regards to issues raised by the Department of Defence regarding artefacts within their land, the Proponent has advised that these sites are included in a program of archaeological test excavation designed to systematically sample the various landforms of the area and obtain a representative sample of artefacts across the landscape. The proposed archaeological excavation of these areas would allow appropriate assessment of their archaeological significance, and archaeological salvage excavation of the sites may be recommended following an analysis of the results.

The Department notes that Campbelltown City Council considers that test excavations should be undertaken within areas of low and moderate sensitivity in order to confirm the full extent of subsurface archaeological deposits at these sites and hence whether these sites have been categorised correctly. Archaeological test excavations have been proposed for areas of moderate sensitivity, however are not considered necessary for areas of low sensitivity as these areas are highly disturbed, have been previously excavated, and have been assessed under DECCW significance guidelines and Heritage Branch significance criteria to have low or moderate scientific significance.

The Department notes that Campbelltown City Council questioned whether all Aboriginal stakeholders agreed with the assessment's recommendation and whether their concerns have been addressed. The Proponent has confirmed that Aboriginal stakeholders were consulted in the preparation of the Aboriginal Heritage Assessment

and feedback has been incorporated into the study, with general support of the results and recommendations presented. The Department is therefore satisfied that the Aboriginal Heritage Assessment for the project has been undertaken consistent with the DECCW's guidelines and that the recommendations have been agreed to by the relevant Aboriginal stakeholders.

DECCW have identified that a number of objects should be collected and deposited at the Australian Museum. The Department has recommended a condition of approval that requires the Proponent to manage artefacts found during salvage in consultation with Aboriginal stakeholders and the Australian Museum.

The Department considers that the Proponent has undertaken an acceptable level of assessment of the likely impacts of the project on Aboriginal heritage. The Department notes that impacts of the project would predominately be on stone artefact scatter of types common in the region which would most likely represent incidental, background Aboriginal activity within the region. It is also noted that of the sites identified in the Aboriginal Heritage Assessment, most are located in highly disturbed environments caused by erosion and vehicle use and therefore the likelihood of uncovering undisturbed *in situ* archaeological deposits is unlikely.

The Proponent has committed to an outcome which aims to ensure that future design development and assessment minimises impacts on Aboriginal heritage, and that proposed management measures are consistent with established protocols and guidelines. The Proponent will develop a Heritage Management Plan, and an Aboriginal Interpretation Plan in consultation with the Aboriginal community and local councils as required by statement of commitments 52 and 53.

The Department considers that the Proponent's statement of commitments, and the Department's recommended conditions of approval are adequate for managing impact to Aboriginal heritage items and areas during construction and operation of the project.

Non-Indigenous Heritage

Issues

Key potential impacts identified in the Concept Plan EA include direct and indirect impacts on items and areas of historic heritage significance. The EA assessment identified that the project passes through a landscape that has heritage value associated with its ability to demonstrate the changing pattern of land use since European settlement, which is also reflected in adjacent identified heritage items. The project would potentially affect the heritage items listed in Table 21.

Table 21 – Historic heritage items potentially affected by the project and their historic themes

Historic heritage items	Historic theme	Significance
Hurlstone Agricultural High School – original school building	Educating – Education	Local (Campbelltown Local Environmental Plan (LEP) 2002)
Macquarie Field House	Developing local, regional and national economies – Agriculture and Pastoralism	State Heritage Register (SHR)
(Sydney Water Supply) Upper Canal System (Prospect Reservoir)		State Heritage Register (SHR)
Row of Bunya Pines		Local (Liverpool City Council LEP 2008)
Cowpasture Road	Building settlements, towns and cities – Transport and Utilities	Not listed (identified by consultant)
Campbelltown Road		Not listed (identified by consultant)
Camden Valley Way		Not listed (identified by consultant)
Ingleburn Army Camp	Governing – Defence	Commonwealth Heritage List (CHL)
Prefabricated Cottages Ingleburn Village		Commonwealth Heritage List (CHL)

Construction and operation of the project would have a number of impacts, which could potentially lead to the loss of features of heritage significance, or temporary impacts on heritage values for the duration of construction. In summary, the project will have an effect on the heritage values of the following:

- The project will have an impact on the view corridors to the south of Hurlstone Agricultural High School, but a minor impact only on the only identified heritage item associated with the school, Clarke House.

- The project will have an adverse impact on the historic and aesthetic significance of Macquarie Field House as a result of the construction of the railway across the original James Meehan Macquarie Fields grant, including the home paddocks associated with the house. The railway will have a significant adverse effect on the visual amenity and views to the north and as such will affect the SHR significance of the house. There will also be an adverse impact on the historic values of Macquarie Field House arising from the loss of the integrity of the historic alignment of Quarter Sessions Road. Although the diversion of the road is at a point outside the Macquarie Field House curtilage, the road alignment demonstrates the historic association of the house with the original land grant.
- The project footprint within Ingleburn Army Camp will have a significant impact on the form and layout of Ingleburn Village. Although the prefabricated cottages will not be directly affected, there will be an adverse impact arising from the loss of the rare urban streetscape within this military environment. There will be a significant impact on the identified CHL heritage values associated with the rarity of the cottages and the village layout.
- Construction of a bridge spanning the Upper Canal and Cowpasture Road will have an adverse impact on the historic and technical significance of the Upper Canal, and the historic and aesthetic significance of the associated Row of Bunya Pines.
- Although not identified on any heritage lists or registers, the historic road alignments of Campbelltown Road, Camden Valley Way and Cowpasture Road are important in understanding the historic regional development. There will be an adverse impact on these roads arising from the project.

Consideration

The Proponent has committed to preparation and implementation of a Heritage Management Plan in consultation with local councils to protect identified heritage items during construction. Additionally, further assessment would be undertaken for the Upper Canal, Macquarie Field House, and Ingleburn Army Camp during detailed design to confirm impact mitigation and management requirements, and to inform the measures incorporated in the Heritage Management Plan, as required by statement of commitments 52, 55 and 56.

The Department acknowledges that the construction of the project would impact on the values of a number of heritage items and to ensure that potential heritage impacts are adequately managed, the Department has recommended a number of conditions of approval to complement the Proponent's statement of commitments, including:

- to include in the Heritage Management Plan, an archaeological Strategy in accordance with NSW Heritage Council guidelines;
- to undertake archaeological monitoring during excavation and construction by a suitably qualified excavation director in areas of heritage value;
- to implement best practice archival recording, monitoring during works, and conservation interpretation, including archival recordings prepared to record the pre-construction landscape of significant historical elements, particularly the Macquarie Field House Estate home paddocks, the Upper Canal, Ingleburn Army Camp, and historic road alignments;
- to identify procedures should works encounter or unearth previously unidentified items, including the requirement to immediately cease works in that vicinity to allow an archaeologist to make an assessment of the finds; and
- to prepare a Heritage Interpretation Plan in accordance with NSW Heritage Council guidelines, incorporating the results of archaeological investigations.

With regards to concerns raised by the Sydney Catchment Authority relating to the Upper Canal, the Department has recommended a condition of approval that the Proponent conduct vibration testing and monitoring to identify minimum working distances to retained heritage items, to prevent cosmetic damage to these items.

Land use, property and infrastructure planning

Issues

The existing land use in the vicinity of the project has not changed significantly since the Concept Plan EA was prepared in 2006. The corridor passes through the following land uses: rural-residential; special uses; residential; retail; public open space and recreation; and other open spaces (including vacant land).

The key potential impacts identified in the Concept Plan EA on existing and future land uses, and additional land use impacts identified since the Concept Plan, are identified in Table 22.

Table 22 – Potential impacts on land use

	Description	
Identified Potential Impact	**Concept Plan EA**	**SWRL – Stage B2 EA**
Construction phase impacts on adjacent land uses	Includes noise and vibration amenity, visual amenity, social disruption, traffic/transport amenity and business impacts. These issues are considered to be manageable with the effective implementation of standard construction environmental management measures. Note: additional compulsory acquisition may be required during the construction stage.	Construction of the project would involve the occupation of additional land beyond the permanent project footprint for the placement of construction compounds, temporary access tracks, temporary drainage works, site offices and stockpiles. Construction site locations would predominantly impact private properties, and would result in short-term impacts on existing land use. Property owners would be compensated through short-term lease arrangements. Planning would be undertaken so that no residential occupation is terminated as a result of the need for construction sites (unless that land would already be required for acquisition for the permanent project). Detailed construction stage impacts would be confirmed prior to the commencement of construction. Additional land use impacts associated with construction would be further addressed as part of detailed construction planning.
Permanent impacts on directly affected properties and land uses crossed by the SWRL corridor	Direct effects on 54 rural-residential properties in Edmondson Park, Leppington and Rossmore, and 28 properties under Government ownership. These properties would be acquired (in full or in part) in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991.* In the context of the proposed future development of the area, this impact is not considered substantial.	Acquisition of only one additional private property would be required for the proposed maintenance access road to the Leppington Train Stabling Facility from Bringelly Road.
Land use severance, sterilisation and access impacts	The SWRL concept design has sought to minimise these issues and where the level of severance is expected to be high, the land acquisition strategy identified a desire to purchase whole parcels. At Edmondson Park, the impacts of severance have largely been addressed through the rezoning process, which included provision for the SWRL. The future design of the project would look at any additional crossings needed.	As the area is proposed to be developed, these issues are not expected to be significant in the long term.

The project corridor traverses the Edmondson Park precinct and Edmondson Park town centre. The three primary impacts of the project on land use within the precinct are as follows:

- the project, and specifically the proposed Edmondson Park station, will create conditions for transit-oriented development around the interchange;
- noise impacts associated with the project will result in the need for some noise mitigation for residential receivers; and
- ecological impacts from the construction and operation of the SWRL on adjacent conservation lands within the Edmondson Park Conservation Agreement 2009 require suitable construction mitigation measures and ongoing management by the operator (RailCorp).

The development of the project has been and would be closely co-ordinated and integrated with the development of the Edmondson Park precinct and town centre.

The primary measure for minimising impacts on future sensitive land uses adjacent to the project is the planning of buffer areas. The Proponent would continue to work with the Strategic Land Release Project Office of the Department of Planning so that impacts on future sensitive land uses within the South West Growth Centre are managed through a combination of land use planning controls.

Specific impacts on adjacent land uses to the proposed SWRL corridor, and proposed mitigation measures have been discussed in the previous key environmental impacts sections, including in particular Traffic, Transport, Parking and Access, Noise and Vibration, and Visual Impact, Landscaping and Urban Design.

Consideration

The Department acknowledges concerns raised in previous chapters that the project will result in impacts during construction and operation of the project, which may directly affect existing and future land use in the vicinity of the project. The Department has assessed these issues in detail in previous chapters, and recommended conditions of approval where required to ensure management of any potential impacts.

With regard to concerns raised by residents regarding potential devaluation of property value as a result of adverse construction and operational impacts, the Department acknowledges that while construction impacts would occur these would be temporary in nature, and that there may be some residual operational impacts in some areas, particularly noise as a result of operation of the train stabling facility, potential for flooding, and visual impact in some areas. The Department is satisfied that the Proponent has provided a suite of measures to be implemented during construction, including undertaking further detailed design, preparation of a CEMP, and during operation to ensure impacts to residents are minimised.

The Department recognises that potential impacts of the operation of the project need to be considered in the context of the South West Growth Centre, including the Edmondson Park and Leppington town centres. With the implementation of these measures and the Department's recommended conditions of approval, as well as the ongoing economic growth of the South West Growth Centre, and improved accessibility of the region and connectivity between the South West Growth Centre and the broad Sydney Metropolitan area, the SWRL is not expected to adversely impact property values.

With regard to concerns that the project will impact on the rural lifestyle of the area, the EA identifies a range of measures to minimise any potentially adverse impacts of the new rail line on residents, including urban design and landscaping measures. The development of the Western Sydney Parklands and lands for biodiversity offsets will also provide enhanced natural vegetation areas in the South West Growth Centre. The Department is satisfied that these measures will minimise the majority of impacts on the community as a result of the SWRL. The Department also notes that as the area traversed by the project forms the South West Growth Centre and is the subject of plans for major urban development over the next 20 to 25 years, the area's current features will undergo major transformation irrespective of the project.

With regard to the concerns raised by Industry and Investment NSW (Mineral Resources), the Proponent has noted the coal resources and coal exploration authorisations beneath the proposed SWRL, and considers that the SWRL project is not expected to impact on the viability of existing coal resources. Notwithstanding, the Department has recommended a condition of approval that the Proponent take into consideration potential future mining induced subsidence during the detailed design and construction of the project, and to continue consulting with I&I NSW.

The Department considers that the project will assist in facilitating the development of the South West Growth Centre by providing enhanced public transport infrastructure that will facilitate the positive integration of transport and land use in the region. Accordingly, the project has been and will continue to be considered as part of developing land uses for the South West Growth Centre. The Proponent has committed to a land use, property and infrastructure planning outcome that will integrate transport and land use. The Department considers that the project responds to the future land uses that will most likely occur as part of the South West Growth Centre.

Economic and business impacts

Issues

The SWRL would take approximately five years to construct and is expected to be operational by 2016. This would involve a large investment by the NSW Government and is expected to generate considerable and positive initial and flow on economic impacts on local and regional businesses.

Construction of the project is also likely to result in minor adverse impacts on businesses located within and around the SWRL corridor. This impact is expected to be minor, with all main access routes to remain open as far as practicable. This temporary adverse impact is considered acceptable in consideration of the positive impacts that the SWRL would bring to local business during construction and operation. Consultation with local businesses has been undertaken and would continue to be undertaken.

Mitigation measures proposed to be implemented in the pre-construction stages of the project include undertaking further assessment of the magnitude of the impacts of construction on adjacent businesses, and continued consultation with business owners during construction planning to address any concerns.

It is expected that the majority of businesses would be positively impacted by the operation of the SWRL. The south west region would experience a steady increase in patron movement and population growth, with the resulting increase in demand improving sales turnover and providing greater employment opportunities for existing businesses. New opportunities for entrepreneurs would also emerge, along with inward investment into the region as new businesses are established to meet growing demand.

Although there is no direct study quantifying the SWRL's contribution to productivity, growth and economic prosperity, there is a large body of work indicating that the provision of this type of infrastructure has a positive effect on growth and standards of living.

The operation of the SWRL would bring about the following economic benefits:

- improved productivity and growth in the region – by providing public transport access to areas not previously served by rail, thereby facilitating improved connectivity, investment and residential development;
- reduced socio-economic costs – by reducing reliance on private vehicles and therefore reducing the amount of congestion and the impacts associated with congestion; and
- improved public transport affordability.

Consideration

The majority of issues raised in relation to economic / business impacts relate to access. The Department considers that preparation of a Construction Traffic Management Plan will adequately address the impacts resulting from construction activities, including access arrangements, and has recommended a condition of approval to further ensure that access to all properties is maintained during construction and operation, and that if any access is physically affected by the project it is reinstated to at least an equivalent standard, unless agreed with the property owner.

Impacts on the physical environment

Air quality and greenhouse gases

The air quality assessment undertaken for the Concept Plan EA identified that dust and other emissions would be generated during construction. Dust generating activities would include:

- loading of aggregate material onto trucks;
- operation of bulldozers, scrapers and excavators;
- movement of vehicles on unsealed roads; and
- wind erosion from exposed surfaces.

The dust load generated would be unlikely to result in reduced local air quality at the nearest potentially affected receptors with the implementation of standard management and mitigation measures. Dust emissions would, however, be higher during unfavourable weather conditions, such as dry weather and high wind. The triggers and procedures for dealing with these conditions would be detailed as part of the CEMP.

Other emissions would be generated during construction from the operation of vehicles, RailCorp maintenance trains, site plant and machinery. These emissions include carbon monoxide, nitrous oxides, sulfur dioxide, particulate matter, volatile organic compounds, and polyaromatic hydrocarbon compounds. An increase in greenhouse gases, primarily carbon dioxide, would also be expected during construction of the project. The implementation of mitigation measures would minimise emissions from construction vehicles and plant and would not result in significant air quality impacts.

In the long term the operation of the project would benefit the local and regional air quality through the provision of public transport, generating a mode shift away from private cars. On a per capita basis, this would lead to reduced combustion of diesel and petrol fuels, consequently reducing the production of greenhouse gases. However, there would still be negligible emissions associated with:

- operation of trains;
- operation of the train stabling facility;
- maintenance using diesel rail vehicles; and
- vehicle emissions.

A submission was received from a member of the public who was concerned that trucks and machinery would cause dust build-up in residences during construction. A submission was also received from Campbelltown City Council, who considers that the Proponent should consider offsetting the greenhouse gas emissions generated as part of the development.

The Department notes that the Proponent has committed to incorporate air quality management measures into the CEMP, to address management of dust, emissions from construction plant and vehicles and any other fugitive emissions. To further ensure the adequate management of potential air quality impacts, the Department has recommended a condition of approval that the Proponent shall prepare and implement a Construction Air Quality and Dust Management Plan, with the objective of constructing the project in a manner that minimises dust impacts generated by construction works, including wind-blown and traffic-generated dust, and impacts on the receiving environment.

Additionally, the Proponent has established a carbon footprint for the project and continual tracking of this carbon footprint would occur throughout detailed design and construction of the project with the aim of minimising greenhouse gas emissions, as required by statement of commitment 11.

Geotechnical, contaminated land, and hazardous materials

The main geotechnical issues that would affect the design and construction of the project are:

- Anticipated ground conditions – soil profiles include alluvium, residual clay, and weathered shale.
- Cuts – are likely to be susceptible to erosion.
- Embankments – may require ground improvements when situated on alluvial deposits at creek crossings.
- Foundations – would be designed to address local conditions, to be considered during detailed design.
- Slope stability – the presence of soft material near ground surfaces.
- Reuse of materials – shale, sandstone and laminate would be suitable for reuse as general fill material in embankment construction, however reuse of residual soils may be limited to non-structural elements of embankments and landscaping.
- Contamination – particularly from the Ingleburn Army Camp, including:
    - grenade UXO and munitions;
    - lead particulates associated with small arms and ammunition;
    - stockpiled bonded asbestos material;
    - filled areas potentially including building rubble and/or rubbish; and
    - a large coal stockpile.

  The rural and semi rural areas may also present a moderate risk of contamination associated with herbicide and pesticide use, site filling, demolition of structures, and fuel, chemical and lubricant storage.
- Materials handling and storage – storage, handling and use of dangerous goods and/or hazardous materials.

A Phase 1 contamination investigation has been undertaken since exhibition of the EA. The Phase 1 investigation confirmed that there have been no notices or orders issued under the *Contaminated Land Management Act 1997* for any properties within the study area.

The Proponent has committed to undertaking a Phase 2 Contamination assessment prior to construction to determine the nature, extent and degree of any contamination or hazardous materials within the area of works, as required by statement of commitment 83. Contaminated material identified during any detailed assessment would be managed, classified and disposed of appropriately in accordance with all relevant legislation and guidelines, as required by statement of commitment 84.

The Department has further recommended a condition of approval requiring preparation of the Phase 2 Contamination Report prior to the commencement of bulk earth activities or construction in potentially

contaminated areas, with recommendations to be suitably incorporated into the Construction Soil and Water Quality Management Plan.

During operation of the project there is potential for contamination of land through the disposal and handling of materials, if not handled, disposed of or treated correctly. All hazardous materials storage facilities would be bunded so that any spillages are contained within a confined area.

Hazards and risks

Public safety

The construction of the project has the potential to present risks to public safety, particularly during excavation and electricity works. Residents and the general public in proximity to construction sites would be notified at the start of construction and provided information on minimising potential risks. Further, a CEMP would be prepared to address any potential risks to public safety.

The operation of the proposed SWRL would present only low-level risks to the community, particularly considering that the alignment would be securely fenced and would operate with strict security procedures. Key hazards would relate to potential damage, injury or loss of life caused by interaction with electricity or illegal access to the rail corridor and train stabling facility. Crime prevention through environmental design principles would be applied to all elements of the project.

One submission raised concern over electromagnetic fields created by the electricity substation at Denham Court, and potential to create the possibility of cluster cancers in the community. The Proponent's assessment of the electric and magnetic fields associated with the Integral Energy substation concluded that there is unlikely to be an impact from electromagnetic fields created by the substation.

The Department considers that the Proponent's commitment to adopt the *NSW Police Crime Prevention Through Environmental Design* guidelines, and RailCorp guidelines in future design development to address potential impacts on public safety and security, as well as fencing all construction compounds and work areas to prevent public access during construction, is adequate to ensure the safety of the public from construction and operational impacts of the project.

Services and utilities

The proposed works could result in disruption to utility services during construction. Users may experience short disruptions to telecommunication connections and street lighting when these are relocated as part of the proposed works. The services and utilities which cross the rail corridor are identified in Table 23, including relevant responsible authorities.

Table 23 – Existing services and utilities

Utility	Relevant Authority
Ethane gas pipeline	APA Group
Eastern gas pipeline	Alinta Asset Management
Water mains	Sydney Water Corporation
Upper Canal	Sydney Catchment Authority
Telstra line and optical fibre cable	Telstra
Overhead power transmission lines	Integral Energy & Transgrid

Construction impacts with respect to services and utilities may also include potential for damage to services and utilities, and plant and/or equipment, as well as injury to persons should cables, mains or pipelines be accidentally damaged during excavation or plant movement. Investigations would be carried out during the detailed design phase of the project so that appropriate measures are in place to minimise this risk.

An ethane gas pipeline east of Camden Valley Way would be crossed by the project. Consultation with asset owners would be required during detailed design so that measures are provided to protect the pipeline. The potential for disturbance to the Upper Canal during construction would be assessed in further detail and minimised during detailed design.

The operation of the project is not expected to adversely affect services and utilities, as summarised below:

- existing gas pipelines would not be affected;
- the Upper Canal would remain accessible at all times;
- management of Telstra line maintenance would be required to ensure no disturbance to the future railway operations; and
- 132kV lines would be clear of the rail line, however 33kV lines would be relocated underground.

While the Department notes that the Proponent has committed to addressing potential impacts on utilities and services, including preparation of a Services and Utilities Sub Plan, and establishment of appropriate protection and risk management procedures to protect utilities, the Department has recommended a condition of approval which requires the Proponent to prepare a Construction Safety Study in accordance with the Department of Planning's Construction Safety Study Guideline – Hazardous Industry Planning Advisory Paper No. 7.

Bushfire risk

The construction of the project has the potential to present bushfire risks, particularly during electricity works. The potential for bushfire risk to impact on the construction of the project has not specifically been assessed, and as such a Hazard and Risk Management Sub Plan would be prepared as part of the CEMP to address any bushfire risks.

The operation of the project is unlikely to contribute to bushfire risk. The project, in particular the Edmondson Park and Leppington stations, and the Leppington TSF, would be considered to be in areas of low bushfire risk following clearing of vegetation within the identified clearing footprint. The risk would diminish with the development of the future town centres around the two stations.

Campbelltown City Council's submission stated that given that the proposal transects land identified to be bush fire prone, and in parts bordered by vegetation, then bush fire management actions should be considered. These include the establishment and maintenance of an asset protection zone, and for an access point for the relevant fire authority to adjoining lands past the railway infrastructure.

NSW Rural Fire Service, while not providing a formal submission, in correspondence to the Department, raised concern that a significant percentage of the proposed track will pass through land that is identified as being bush fire prone. Predominantly, this is the length that passes through Edmondson Park. A number of issues were subsequently raised for consideration in the bush fire risk assessment for the project, to be considered in light of the aims and objectives of *Planning for Bush Fire Protection 2006*.

The Department notes that the Proponent has submitted concept designs for the SWRL to the NSW Fire Brigade for comment. Consultation with the NSW Fire Brigade would be ongoing during detailed design to ensure that relevant fire safety requirements are achieved. While the Proponent has committed to incorporating bushfire risk management into the CEMP, the Department considers that more comprehensive guidelines are required, and has recommended a condition of approval that the Proponent shall design and construct the project in consultation with the NSW Rural Fire Service, in accordance with of the aims and objectives of *Planning for Bush Fire Protection 2006*, and address the following matters:

- the risk of ignition from rail sources increasing the likelihood of wildfire;
- the need for fuel control in areas adjacent to rail infrastructure;
- the need for asset protection zones around infrastructure such as stations and ancillary facilities;
- the provision of an adequate water supply and hydrants at strategic points such as stations and service points; and
- the need for adequate access for emergency vehicles to service or defend rail infrastructure.

7. CONCLUSIONS AND RECOMMENDATIONS

The *Draft South West Subregional Strategy* identifies that over 25% of new dwellings and more than 15% of new jobs planned for Sydney over the next 25 years will be within the south west subregion of Sydney. A significant proportion of this growth will be within the South West Growth Centre.

The provision of an efficient and reliable public transport system is, therefore, key to the sustainable development of the south west region. The SWRL will connect the South West Growth Centre to the existing rail network providing direct and frequent rail services to Liverpool and the Sydney CBD.

The Department considers that Stage B2 of the SWRL is justified on the basis that it is a vital infrastructure project, and in the public's interest. The adverse consequences of not proceeding with the project would be significant in the long term, in terms of the capacity of the rail network and road network congestion, poor level of accessibility between homes and jobs, and potential unsustainable land release and development.

Following a detailed assessment of the Proponent's Environmental Assessment and Submissions and Preferred Project Report, and the submissions received from agencies, councils and the public during the exhibition period for the project, the Department is satisfied that the impacts of the project can be appropriately mitigated or managed to acceptable levels. The Department therefore recommends that the project be approved subject to the recommended conditions of approval.

The recommended conditions of approval for the project provide for the mitigation and management of key impacts associated with the project during the detailed design, construction and operational phases of the project. These include specific environmental conditions for noise and vibration impacts, traffic and transport impacts, ecological impacts, urban design and landscaping, soil and water impacts, hazards and risk, heritage impacts, and air quality impacts. The Department has also recommended conditions of approval for environmental management, including the requirement for a Construction Traffic Management Plan, a Construction Noise and Vibration Management Plan, a Construction Soil and Water Quality Management Plan, a Construction Groundwater Management Plan, and a Construction Flora and Fauna Management Plan.

The Department believes that these requirements would provide for the implementation of best management practices during all phases of the project, and would ensure that the construction and operational impacts of the project on the surrounding environment and the amenity of local residents and rail commuters are managed to acceptable levels.

The Department acknowledges that there will be residual impacts on the environment and local community regardless of the implementation of the recommended conditions of approval, particularly with respect to the impacts on the noise environment in the vicinity of the corridor and the train stabling facility. Noise and vibration auditing will be required to confirm compliance with the predictions referred to in the Operational Noise and Vibration Review, and if the monitoring indicates an exceedance of the noise and vibration targets, the Proponent will be required to implement further reasonable and feasible measures.

The Department has concluded that these residual impacts are considered to be acceptable given the benefits that the total project would provide to the general public through improved network capacity and performance. Consequently, the Department recommends that the Minister for Planning approve the South West Rail Link – Stage B2 Glenfield to Leppington rail line, subject to the recommended conditions of approval.

28/10/10

Daniel Keary
Director
Infrastructure Projects

28.10.10

Chris Wilson
A/Deputy Director-General
Development Assessment & Systems Performance

APPENDIX A – RECOMMENDED CONDITIONS OF APPROVAL

APPENDIX B – STATEMENT OF COMMITMENTS

APPENDIX C – SUBMISSIONS AND PREFERRED PROJECT REPORT

APPENDIX D – ENVIRONMENTAL ASSESSMENT