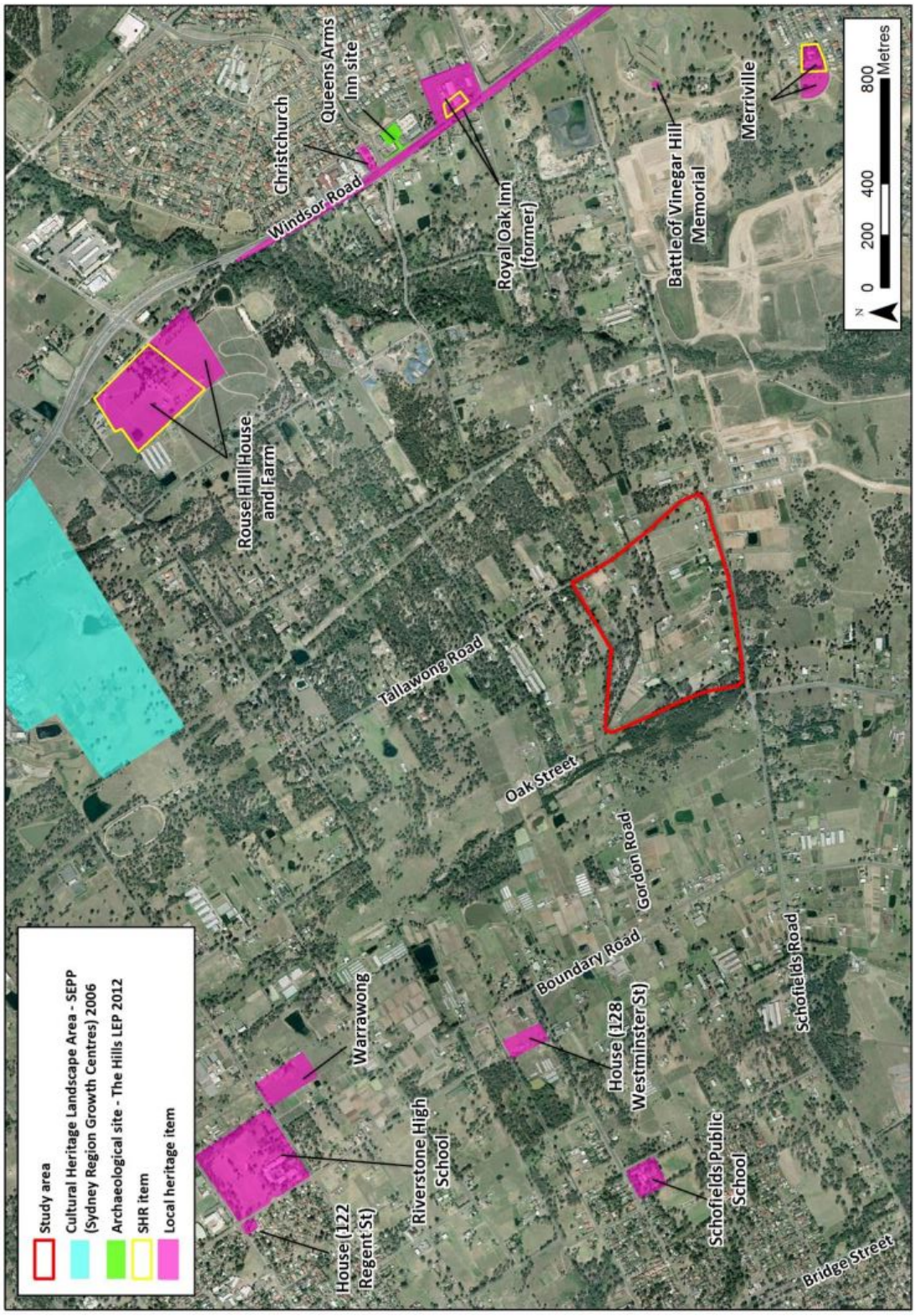

Figure 37 – Heritage Listed Items within a 2km radius of the RTRF

Source: *Non Indigenous Heritage Assessment & Statement of Heritage Impacts, Artefact 2013*

Table 47 – Assessment of Heritage Impacts

Item Ref #	Item	Statement of Heritage Impact	Potential Impact
1	Rouse Hill House & Farm	The Rouse Hill property is located 1.5 kilometres from the study area. It is an important heritage farm and museum managed by the Historic Houses Trust of NSW. The topography between the Rouse Hill property and the study area is undulating and includes many areas that are well-vegetated by bushland. It is highly unlikely that any views of the RTRF would be available from the property (refer Visual Analysis at **Section 16.0**), and if any such views did exist they would only be available from the southern or western edges of the property, rather than from the main farmstead complex, and would not have a significant impact on the heritage value of the property. *Assessment:* The RTRF proposal would not result in any appreciable heritage impacts to Rouse Hill House and Farm and would not negatively affect the heritage significance of the property.	Yes
2	Royal Oak Inn	No views of the RTRF would be available from the former Royal Oak Inn, which is located 1.8 kilometres to the east of the study area. Views in the direction of the study area are screened by vegetation adjacent to the building within the median strip of Windsor Road and to the west of Windsor Road, as well as sloping land that rises between the former inn and the study area. *Assessment:* The RTRF proposal would have no impacts to the heritage significance of the former inn.	No
3	Merriville House & Garden	No views of the proposed RTRF would be available from Merriville, which is located 1.3 kilometres to the south-east of the study area. *Assessment:* The RTRF proposal would have no heritage impact on the property.	No
4	Battle of Vinegar Hill Memorial	The memorial is located 1.6 kilometres east of the study area and no views of the study area are available from the memorial. *Assessment:* The RTRF proposal would have no heritage impact on the item.	No
5	Slab Building - Riverstone High School	The slab cottage is located 1.7 kilometres north-west of the study area. Due to the undulating landscape between the item and the study area, no views toward the proposed RTRF would be available from the slab cottage. *Assessment:* The RTRF proposal would have no heritage impact on this heritage value.	No
6	House (122 Regent Street, Riverstone)	The house is located two kilometres north-west of the study area and no views toward the proposed RTRF would be available from this site. *Assessment:* The RTRF proposal would not have any impact on this heritage value.	No
7	Warrawong	Warrawong is located 1.8 kilometres north-west of the study area and no views toward the proposed RTRF would be available from the item. *Assessment:* The RTRF proposal would not have any impact on this heritage value.	No
8	Schofields Public School	The school is located 1.6 kilometres north-west of the study area. *Assessment:* There would be no views of the proposed RTRF from the school and the RTRF proposal would have no impact on the heritage significance of the school.	No
9	House (128 Westminster Street, Schofields)	The house is located 1.2 kilometres north-west of the study area. *Assessment:* Limited views of the proposed RTRF area may be visible from the house, however, the RTRF proposal would not have a significant impact on the views or setting of the house.	Yes
10	Windsor Road	*Assessment:* Windsor Road is located 1.9 kilometres from the study area and would not be impacted by the RTRF proposal.	No
11	Christchurch	The church is located 1.8 kilometres to the east of the study area and no views toward the proposed RTRF would be available from the item. *Assessment:* The RTRF proposal would not have any impact on the church.	No
12	Queen Arms Inn Archaeological Site	The site is located 1.8 kilometres east of the study area. The views and setting of the site do not contribute to its significance and would not be impacted by the RTRF proposal in any case. *Assessment:* There would be no impacts to the heritage significance of the site.	No

14.5.2 Archaeological Potential

Until the 1950s, the RTRF site had not been subject to development. The site is not in close proximity to the farmsteads of the landowners during this time, therefore it is highly unlikely that the RTRF site would have been farmed intensively, or contain significant structures constructed on the site prior to the 1950s. Archaeological evidence for features dating from before the 1950s would be likely to be limited to post holes from former fence lines or insubstantial timber structures such as feed shelters for livestock. Such evidence would be quite ephemeral and susceptible to damage from later actions on the land.

Subsequent development during the 1960s and 1970s has caused significant disturbance to much of the RTRF site and is likely to have disturbed or destroyed any surviving archaeological evidence. If any in situ remains do survive, they are expected to very limited in extent and of low research significance.

If any in situ remains do survive, they are expected to very limited in extent and of low research significance.

This assessment of archaeological potential has been validated during fieldwork for the majority of the site. It is assumed that the heritage values on the northern part of the site would be comparable to the area for which access was available because it is characterised by similar land-use and landform modifications.

14.6 Mitigation Strategies

An assessment of the heritage listed sites listed in **Table 47** with respect to the proposed works, identified the potential for two of the items to be affected by the RTRF, Rouse Hill House, and the house at 128 Westminster Street, Schofields.

The inclusion of a vegetated buffer or boundary screening along the northern frontage of the study area would minimise the potential for views from the two properties potentially affected by the RTRF proposal. This measure is expected to be effective in mitigating any potential impacts to these items and no further mitigation measures would be required.

If unexpected archaeological finds are encountered during works, work in the vicinity of the find should cease and a qualified archaeologist should be contacted to assess the significance of the find. The NSW Heritage Council should be notified of any finds of heritage significance. Further investigation and permits may then be required. This is particularly relevant for the six most northern properties where access has not been available to date.

14.7 Conclusions

The non-Indigenous assessment and Statement of Heritage Impacts found that no heritage listed items are located within 1.2 kilometres of the study area, and that the proposal would not have any direct impacts on listed heritage items.

There is a possibility that limited views of the proposed RTRF would be available from the southern or western edges of the Rouse Hill House property (Item Ref 1), or from the house at 128 Westminster Street, Schofields (Item Ref 9). If such views were available, they would not have a significant impact on the heritage value of the items.

As discussed in the visual amenity analysis at **Section 16**, there would be no significant impacts to the views or setting of any of the other listed items, and as the items are all located more than 1.2 kilometres from the study area, there would be no appreciable impacts from noise or vibration as discussed at **Section 11**.

It is highly unlikely that any non-Indigenous archaeological material would be present within the study area, and any surviving material would be expected to be of low research significance.

15.0 Indigenous Heritage

15.1 Introduction

An Aboriginal Cultural Heritage Assessment Report was prepared by Artefact Heritage and is included in this EIS document as **Appendix J**.

15.2 Director General's Requirements

Table 48 below sets out the Director-General's Requirements as they related to Aboriginal Heritage, and where in the project these have been addressed.

Table 48 – Relevant Director General's Requirements

Director General's Requirements	Where Addressed in EIS	Technical Study
impacts to Aboriginal heritage (including cultural and archaeological significance), in particular impacts to Aboriginal heritage sites identified within or near the project. Where impacts are identified, the assessment shall:	Section 15.6	**Appendix J**
- outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the measures), demonstrate effective consultation with Aboriginal communities in determining and assessing impacts and developing and selecting options and mitigation measures (including the final proposed measures);	Section 15.3	
- demonstration that an appropriate archaeological assessment methodology, including research design, (where relevant) has been undertaken, including results; and	Section 15.3	
take into account the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DECC, 2005) and be undertaken by a suitably qualified heritage consultant	Section 15.3 and 15.4	

15.3 Assessment Methodology

The methodology for the Indigenous assessment comprised:

- Review of Heritage reports prepared for the NWRL EIS 1 and EIS 2.
- Search of the OEH AHIMS site register
- Compliance with the Growth Centres Commission (GCC) Protocol for Aboriginal Stakeholder Involvement in the Assessment of Aboriginal Heritage in the Sydney Growth Centres (referred to as the GCC Aboriginal consultation protocol) and the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation.
- Compliance with existing heritage legislation including the National Parks and Wildlife Act 1974 (NPW Act) and the 2005 Department of Environment and Conservation (DEC) (now Office of Environment and Heritage [OEH]) draft Aboriginal cultural heritage impact assessment guidelines.
- A site survey of the acquired properties within the study area that were accessible was conducted to ground truth the desktop assessment and to identify and inspect any visible heritage items. Remaining sites, being the six most northern properties, were subject to a desktop assessment only and will require ground verification.

15.4 Consultation

15.5 GCC Aboriginal Consultation Protocol

The Stakeholder Aboriginal Communities identified for the North West Growth Centre, in which the current study area is located, are:

- Deerubbin Local Aboriginal Land Council (DLALC)
- Darug Aboriginal Cultural Heritage Assessments (DACHA)
- Darug Custodian Aboriginal Corporation (DCAC)
- Darug Tribal Aboriginal Corporation (DTAC)

In accordance with the principals of the GCC Aboriginal consultation protocol, a representative of DLALC took part in the field investigation undertaken for this study, and provided input on the Aboriginal heritage values for the assessment.

The four listed organisations will be notified that further Aboriginal stakeholder identification for the project is being conducted in accordance with the consultation requirements. The notification will include an invitation to confirm that they would like to remain involved in the project as Stakeholder Aboriginal Communities.

15.6 2005 Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation

In accordance with the 2005 DEC *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*, information from government and Native Title agencies was sought. The following agencies were contacted directly on 16 May 2013:

- DLALC
- Office of the Registrar, Aboriginal Land Rights Act 1983
- National Native Title Tribunal
- NTSCORP
- Metropolitan OEH Planning and Aboriginal Heritage Section
- Blacktown City Council
- Hawkesbury Nepean Catchment Authority

An advertisement was placed in the Blacktown Sun newspaper on 15 May 2013 outlining the RTRF project and an invitation for all Aboriginal persons and organisations who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places within the study area to register their interest by 31 May 2013. The National Native Title Tribunal informed Artefact by letter that there were no native title claims within the study area.

The following Aboriginal stakeholders were identified as persons and organisations who may hold cultural knowledge relevant to the study area:

- DLALC
- DACHA
- DTAC
- DCAC
- Darug Land Observations (DLO)

- Darug Aboriginal Land Care Inc (DALC)
- Gunjee Wong Cultural Heritage Aboriginal Corporation (GWCHAC)
- Scott Franks
- Amanda Hickey Cultural Services (AHCS)
- Tony Williams

The registered stakeholders were provided with a study methodology and request for cultural information on 19 June 2013. Responses were received from Tony Williams, Tocomwal, DLO, DACHA and DALCI. DLO, DACHA and DALCI Tocomwal had a number of queries which have been addressed. Tony Williams did not provide comments on the methodology but provided cultural information which is discussed further below.

A copy of a draft version of **Appendix J** was sent to the Aboriginal stakeholder groups for their comment on 8 July. A response was received from DACHA in support of the recommendations set out in **Appendix J**. No additional responses were received.

15.7 Existing Environment

The Aboriginal Cultural Heritage Assessment Report (**Appendix J**) provides an Aboriginal history and archaeological context for the RTRF site, describing the locality of the RTRF site as a focus for Aboriginal histories pre-European contact, post-European contact, and the present day. From the silcrete quarry at Plumpton Ridge where extraction and tool manufacture activities took place, and its associated occupation sites, to the Colebee land grant, the Native Institution, and the cultural significance of the area to the Aboriginal people of Western Sydney today, the Blacktown locality is significant in its Aboriginal histories, and the histories of Aboriginal and European negotiations and interactions.

Archaeological data gathered in the locality suggests that artefacts would be found across the landscape in varying densities, with high density concentrations generally associated with watercourses. It also suggests widespread and varying use of the area by Aboriginal people.

A large number of Aboriginal sites have been recorded in the area surrounding the RTRF site. Surface artefact sites, including artefact scatters and isolated finds, were the most frequently recorded Aboriginal site type within the AHIMS extensive search area.

A search of the OEH AHIMS database was undertaken on 10th April 2013 for sites registered within the following coordinates:

GDA 1994 MGA 56	303012E – 306450E 6268331N – 6271241N
Buffer	50 m

Two Aboriginal sites listed on the OEH AHIMS site register are located within the RTRF site. This includes artefact scatters AHIMS site 45-5-4112 and 45-5-4188. One Aboriginal site not listed on the OEH AHIMS site register was located within 65 Schofields Road. The site, which consisted of a single artefact identified on a vehicle track, was located within the study area. The site name is referred to as '65 Schofields Road'.

Due to the high level of disturbance observed during the field investigation, the archaeological potential of the surveyed properties is low, as shown in **Table 49**.

AHIMS site 52-2-4112 was originally assessed as demonstrating moderate scientific significance, however subsequent sub-surface archaeological test excavation demonstrated a very low density scatter of artefacts and the site was subsequently assessed as demonstrating low archaeological significance.

Table 49 – Summary of Significance Values

Site Name / ID	Research Potential	Scientfic / Archaeological Value	Representative Value	Rarity Value	Overall Significance
45-5-4112	Low	Low	Low	Low	Low
45-5-4188	Low	Low	Low	Low	Low
65 Schofields Road	Low	Low	Low	Low	Low

The archaeological significance of the study area was found to be generally low due to high levels of disturbance resulting from development and semi-rural occupation. Three Aboriginal sites with low archaeological significance were located within the study area; including AHIMS site 45-5-4188, 45-5-4112, and the isolated artefact within 65 Schofields Road. The archaeological significance of the areas not yet surveyed is predicted to be low, but will be confirmed after a site inspection has been undertaken.

Social/cultural heritage significance should be addressed by the Aboriginal people who have a connection to, or interest in, the area. As part of the consultation process the registered Aboriginal stakeholder groups were asked to provide appropriate information on the cultural significance of the study area.

Aboriginal stakeholders have indicated that the study area has cultural significance as part of Country. One particupant identified that there are many places and sites in the vicinity of the study area that have high cultural significance but did not specify any sections of the study area as particularly culturally important.

The aesthetic and historical significance of the study area were found to be low.

Overall, the study area demonstrates low Aboriginal cultural heritage significance.

15.8 Potential Impacts

The RTRF will impact directly on recorded Aboriginal site 45-5-4188 and the site '65 Schofields Road'.

The proposal would also impact AHIMS site 45-5-4112. However, it is likely that site 45-5-4112 will be impacted by the realignment of Tallawong Road, prior to works commencing on the RTRF proposal. An area based Aboriginal Heritage Impact Permit (AHIP) was issued for site 45-5-4112 by OEH to RMS on 24 October 2012. It is therefore likely that site 45-5-4112 will be removed from the AHIMS register in the near future after impacts under the granted AHIP. RMS should therefore be consulted prior to impacts on site 45-5-4112.

15.8.1 Ecological sustainable development (ESD) principles

The RTRF proposal would adhere to the following ESD principles:

- Integration Principle;
- The Precautionary Principle; and
- Principle of Intergenerational Equity

The RTRF proposal would comply with the Integration Principle in regard to Aboriginal heritage as it will not impact on areas of high scientific or cultural significance.

The RTRF proposal would be unlikely to affect the overall significance of identified Aboriginal cultural heritage values within the study area. There is no considerable scientific uncertainty as to the impacts of the project on heritage values. The precautionary principle would nevertheless be adhered in the implementation of the proposed mitigation measures of salvage excavations and surface collection. Further, the northern portion of

the site is subject to acquisition agreements being finalised and was not accessed as part of the indigenous heritage field investigations. For the purposes of this assessment it has been assumed that indigenous heritage values are present in these areas to the same extent as in the southern portion of the site.
The RTRF proposal was considered to adhere to the Principle of Intergenerational Equity in regard to Aboriginal heritage as it will not impact on areas of high scientific or cultural significance.

15.9 Mitigation Strategies

In general, the significance of a site determines which of the following mitigation measures would be applied:

- Low archaeological significance
  - No further investigation required.
- Moderate archaeological significance
  - Conservation where possible. If conservation was not practicable, further archaeological investigation would be required such as salvage excavations or surface collection in accordance with the terms of the approval.
- High archaeological significance
  - Conservation as a priority. Impacts would only be approved if other practical alternatives have been discounted. Conditions of approval would depend on the nature of the site, but may include comprehensive salvage excavations.

No further archaeological investigation is required for Aboriginal sites 45-5-4188, 45-5-4112, and '65 Schofields Road'. Surface collection was not suggested by the Aboriginal community as a mitigation measure for the impacted sites. As the sites have a low significance it is recommended that no mitigation measures are required.

Following submission of the EIS and subsequent approvals from the Director-General, future management of Aboriginal heritage within the RTRF proposal area will be undertaken in accordance with the Construction Environmental Management Framework included in **Appendix L**. The CEMF includes the requirements for the prepareation of a Heritage Management Plan. The Indigenous Heritage component of the site induction would include information on (IH4):

- Aboriginal heritage conservation areas and/or no-go zones for each construction site.
- The legislation and penalties for impacting Aboriginal heritage objects would be conveyed to all construction managers and personnel.

Prior to the commencement of construction further ground verification will be carried out on the six northern properties for which access has not been available to date (IH7).

Aboriginal consultation should be ongoing throughout the life of the project with processes in place to involve the Aboriginal community.

15.10 Conclusions

The results of archaeological investigations suggest that large portions of the current study area have demonstrated high levels of disturbance and contain a corresponding low level of archaeological potential. No further mitigiation measures (such as salvage excavations or surface collections) are proposed prior to the works.

16.0 Visual Amenity

16.1 Director General's Requirements

Table 50 sets out the Director-General's Requirements as they relate to visual amenity impacts, and indicates where each item is addressed.

Table 50 – Relevant Director General's Requirements

Director General's Requirements	Where Addressed in EIS	Technical Study
A description of the layout and design of the project including plans and sections to show the height, bulk and scale of the proposed buildings	Section 7.0 and 16.4	Photmontages in **Appendix C**
Identification and evaluation of the visual impacts of the project on surrounding areas , including privacy and amenity impacts to surrounding receivers	Section 16.5	NA
A description of measures proposed to mitigate and manage these impacts	Section 16.5 and 16.6	NA

16.2 Methodology

The assessment of visual impact is based on the identification of the level of visual modification created by the RTRF, and the sensitivity of the viewer. Combined, these characteristics of the view are then considered to assign a level of likely visual impact. This methodology is explained below.

16.2.1 Study Area

The study area in this report refers to the area potentially subject to visual impact of the RTRF and the immediate surrounding areas.

16.2.2 Visual Modification

Visual modification refers to the change to the landscape that may occur as a result of development from a given viewpoint. This includes what has changed, and how it has changed. Visual modification describes the extent of change and identifies elements which are removed or added, changed in scale, form, shape, pattern, colour and texture, and compatibility of new elements with the existing landscape. Visual modification can result in an improvement or reduction in visual amenity.

A high degree of visual modification would result if the development contrasts strongly with the existing landscape. A low degree of visual modification occurs if there is minimal visual contrast and a high level of integration of form, line, shape, pattern, colour or texture values between the development and the environment in which it sits. In this situation the development may be noticeable, but does not markedly contrast with the existing modified landscape. **Table 51** lists the terminology used to describe the level of visual modification.

Table 51 – Visual modification levels

Visual Modification	Description
Considerable reduction or improvement in visual amenity	Substantial part of the view is altered
Noticeable reduction or improvement in visual amenity	Alteration to the view is clearly visible
No perceived reduction or improvement in visual amenity	Either the development is not visible, or if it is, the change in the view is generally unlikely to be perceived by viewers.

16.2.3 Visual Sensitivity

Visual sensitivity refers to the nature and duration of views. Locations from which a view would potentially be seen for a longer duration, where there are higher numbers of potential viewers and where visual amenity is important to viewers can be regarded as having a higher visual sensitivity. Distance also contributes to the sensitivity of a view. In order to assist in the assessment of visual impact, the sensitivity of a viewpoint should be considered in the broadest context of possible views, from those of national importance through to those considered to have a neighbourhood visual importance. For this reason the following terminology is used to describe the level of visual sensitivity (see **Table 52**).

Table 52 – Visual Sensitivity Levels

Visual Sensitivity	Description
National	Heavily experienced view to a national icon, e.g. view to Sydney Opera House from Circular Quay or Lady Macquarie's Chair, view to Parliament House Canberra along Anzac Parade.
State	Heavily experienced view to a feature or landscape that is iconic to the State, e.g. Viewpoint to the Three Sisters at Echo Point in the Blue Mountains National Park.
Regional	Heavily experienced view to a feature or landscape that is iconic to a major portion of a city or a non-metropolitan region, or an important view from an area of regional open space. e.g. Rouse Hill House & Farm.
Local	High quality view experienced by concentrations of residents and/or local recreational users, and/or large numbers of road or rail users. e.g. expansive urban or bushland views from residential areas or local open space.
Neighbourhood	Views where visual amenity is not particularly important, such as lesser quality views briefly glimpsed from roads.

16.2.4 Visual Impact

Although there are no recognised standards for determining the significance of visual impact, there is a need to assign significance to this assessment so that there can be a clear and consistent means of evaluating visual impact. The following significance criteria have been developed specifically for this project to allow for this consistency to occur (refer **Table 53**).

Table 53 – Visual impact significance levels

		Visual Impact				
Visual Modification		National Visual Sensitivity	State Level Visual Sensitivity	Regional Visual Sensitivity	Local Visual Sensitivity	Neighbourhood Visual Sensitivity
	Considerable Reduction	Major Adverse	Major Adverse	High Adverse	Moderate Adverse	Minor Adverse
	Noticeable Reduction	Major Adverse	High Adverse	Moderate Adverse	Minor Adverse	Negligible
	No perceived reduction or improvement	Negligible	Negligible	Negligible	Negligible	Negligible
	Noticeable improvement	Major Beneficial	High Beneficial	Moderate Beneficial	Minor Beneficial	Negligible
	Considerable Improvement	Major Beneficial	Major Beneficial	High Beneficial	Moderate Beneficial	Minor Beneficial

16.2.5 Mitigation and Residual Effects

For those areas identified as likely to result in a visual impact, as a result of the project, methods for reducing these impacts have been considered and specific mitigation approaches recommended. These mitigation techniques may include the use of vegetation for screening, materials selection, colour and treatment of structures, and adjustments to the location of elements.

16.2.6 Assessment of Night Time Impacts

The assessment of night time impacts is based on the UK Institution of Lighting Engineers' *Guidance for the reduction of obtrusive light* (2005). This guidance note identifies environmental zones, useful for the categorising of night time landscape settings. These zones are:

- **E1:** Intrinsically dark landscapes – National Parks, Areas of Outstanding Natural Beauty, etc.
- **E2:** Low district brightness areas – Rural, small village, or relatively dark urban locations.
- **E3:** Medium district brightness areas – Small town centres or urban locations.
- **E4:** High district brightness areas – Town/city centres with high levels of night time activity.

Specific features of the lit landscape are then described in terms of:

- **Sky glow** – the brightening of the night sky above our towns, cities and countryside.
- **Glare** – the uncomfortable brightness of a light source when viewed against a dark background.
- **Light Trespass** – the spilling of light beyond the boundary of the property or area being lit.

From this analysis, the level of impact is assessed according to the impact levels identified in **Table 54.**

Table 54 – Night time visual impact significance criteria

		Visual Sensitivity			
Visual Modification		E1: Intrinsically dark landscapes	E2: Low district brightness	E3: Medium district brightness	E4: District brightness
	Considerable Reduction	Major Adverse	Major Adverse	High Adverse	Moderate Adverse
	Noticeable Reduction	Major Adverse	High Adverse	Moderate Adverse	Minor Adverse
	No perceived reduction or improvement	Negligible	Negligible	Negligible	Negligible
	Noticeable improvement	Major Beneficial	High Beneficial	Moderate Beneficial	Minor Beneficial
	Considerable Improvement	Major Beneficial	Major Beneficial	High Beneficial	Moderate Beneficial

16.3 Existing Visual Environment

16.3.1 Existing Character

The character of the site is influenced by Schofields Road and Tallawong Road which form the southern and eastern boundaries of the site, the riparian corridor to the west and rural properties to the north. The primary use of the land in the area is agricultural in nature with small market garden properties as well as larger rural residential properties.

The land is gently undulating, generally cleared and grass covered with individual and stands of trees scattered throughout the landscape.

16.3.2 Future Character

The future planning for this area would change the character of the area from a rural setting to an urban and suburban character. Areas to the south of Schofields Road are currently being developed for residential neighbourhoods. The area to the east of Tallawong Road will become a town centre. Areas to the north and west of the site are being planned for low to medium density residential. The areas directly adjacent to the north and south of the site would be zoned for employment uses. This represents a dramatic transformation of the locality.

The existing and future character can be compared in **Figure 38** and **Figure 39** respectively.

Figure 38 – Existing Context

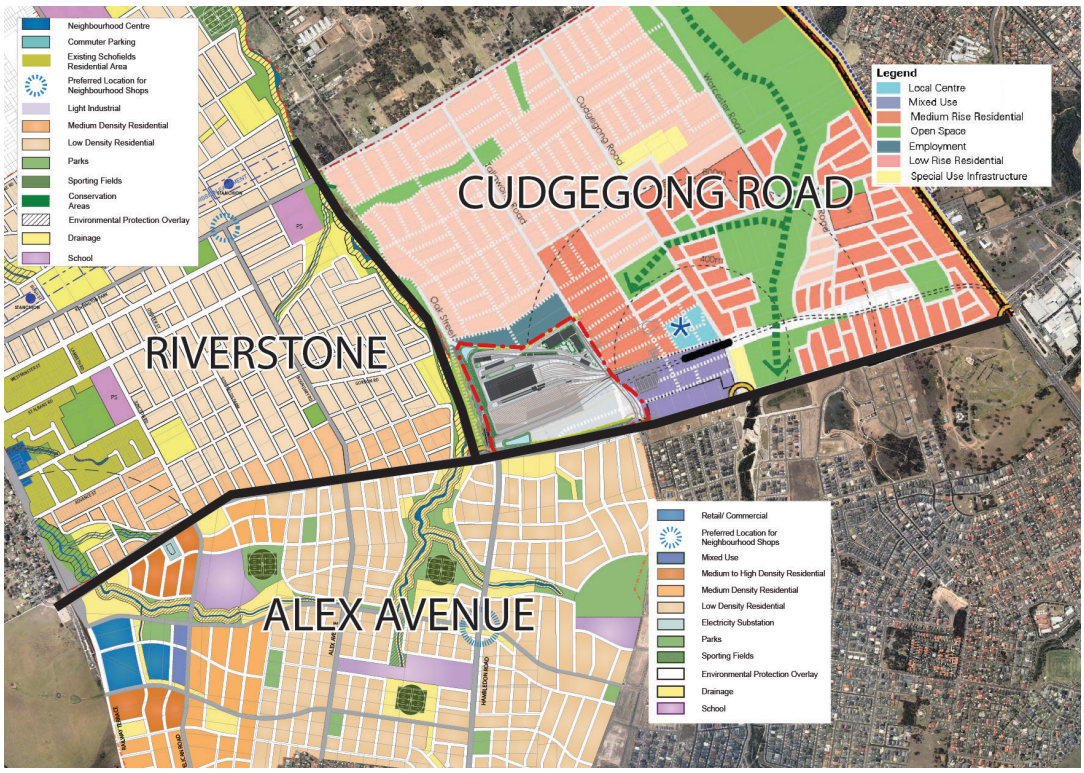

Figure 39 – Future Context

16.4 Visible Components of RTRF

The visual components of the project are shown in **Figure 40** and in the photomontages provided in **Apppendix C**, and are summarised below:

- Southern Boundary – An 8m embankment would be constructed in the south-western corner of the site from the edge of the detention pond to the stabling yard. This would be the highest portion of the embankment on the southern side of the site. The embankment would merge with the natural grade of the site towards the middle of the southern boundary. From this point to Tallawong Road the site would be in a cutting to allow for train access under Tallawong Road.
- Western Boundary – Following Hambledon Road north from Schofields Road the site elevation would rise from the road reserve to the stabling yard and maintenance workshops. The embankment would be between 6.7m and 8.8m high along the western boundary.
- Northern Boundary – The western boundary retaining walls would return around the northwest corner of the site for approximately 100m along the northern boundary edge. The embankment would decrease in height along the north east portion of boundary until the landform of the site becomes level with Tallawong Road.
- Eastern Boundary – The levels of the site would vary along the eastern boundary to take into account the site access requirements, building pad levels and grade separation requirements for the NWRL tracks under Tallawong Road.
- Rolling Stock Maintenance Workshop building 15m high located toward in the central western portion of the site. This building is the largest of the industrial sheds in terms of height and bulk.
- Bulk Supply building 8m high located in the north east corner of the site.
- Administration Building and Training Area Building located along Tallawong Road in the north east corner of the site.

- Two Infrastructure Workshops 12 to 15m high located in the north west corner of the site.
- Perimeter fencing surrounding the site.
- During evening hours the site would be lit to allow for safe use of the stabling yards at night. This would include lighting of the stabling yard, buildings, car parking areas, access roads and main pedestrian routes to and from these facilities.
- Ancillary Structures – There are other structures located throughout the site (such as water tanks) but generally located along the main access road or associated with larger structures. A telecommunications tower would be located on the site near Tallawong Road. It would be approximately 30m high.

The future development site located at the corner of Schofields and Tallawong Roads (not subject to this application) is proposed to be zoned for employment uses under the *Draft Cudgegong Road Structure Plan*.

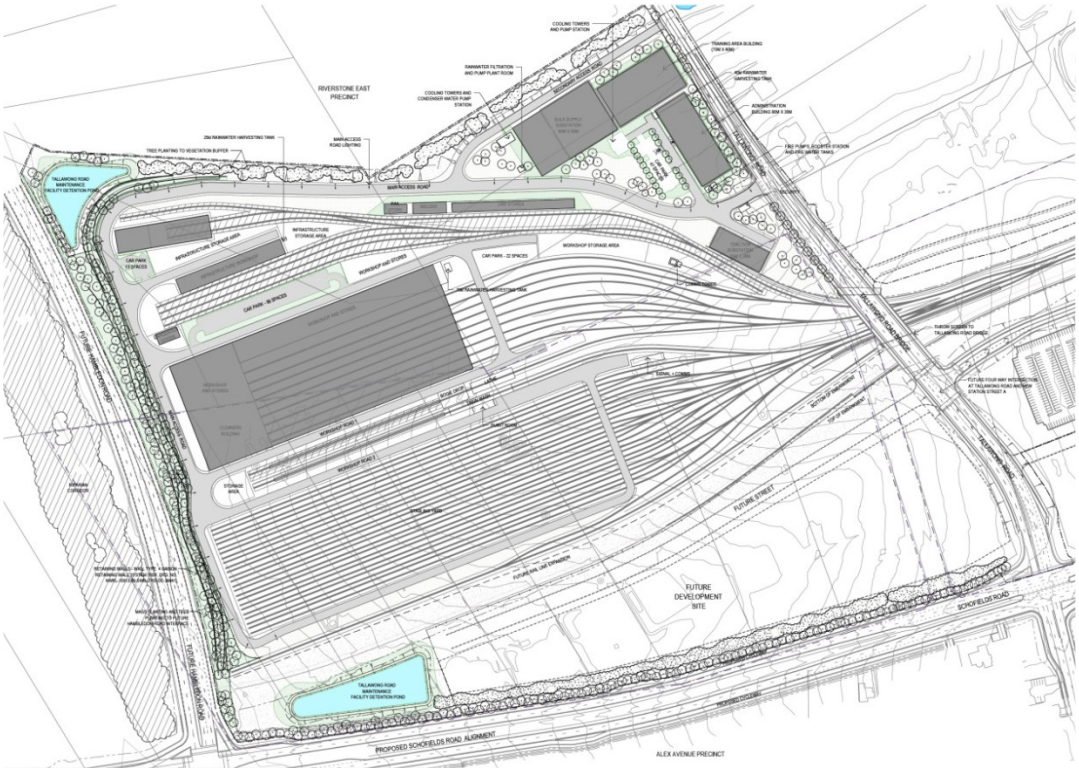

Figure 40 – Visual Components of the RTRF

16.5 Potential Impacts

16.5.1 Visual Sensitivity

The RTRF is currently sited within a rural landscape setting consisting primarily of large lot rural residential and market garden properties. However, the future character of the locality will be of an urban and suburban character. This is demonstrated in new residential neighbourhoods currently under construction to the south of the site and Indicative Layout Plans developed by the Growth Centres for the Cudgegong Road Station and town centre as well as new residential areas planned to the north and west of the site.

Considering the existing and future character of the area as well as the existing topography and future major infrastructure needs, the views in this area are considered to be of 'local'

and 'neighbourhood' Visual Sensitivity Levels. Generally, the visual sensitivity level drops from local to neighbourhood when considering the existing visual character to the future visual character of the area. This is due to the fact that as development fills in around the site, and into the surrounding areas, the RTRF would contrast less with its immediate surroundings and the number of views to the site would be reduced by new intervening development. Thus the visual impact would be reduced to a local level.

16.5.2 Views from Adjoining Roads

There are three adjoining roads to consider: Schofields Road (primary road), Tallawong Road (realigned) and the proposed northern extension of Hambledon Road (yet to be built north of Schofields).

Schofields Road

Schofields Road runs parallel to the RTRF and forms the southern boundary of the site. Changes in the view to the site from Schofields Road are:

- Construction Phase – Views from this location would include site hoarding, earth embankments, site works, construction plant and the upper portions of the workshop construction.
- Operational Phase – Existing rural residential properties would be replaced with embankments along the southern edge of the stabling yard, especially prominent at the south west corner, and a large scale workshop (approx. 15m high and 250m long). Views to the site would be filtered through proposed roadside vegetation and screening. While the workshops would be built on an embankment which is 8m above the road level, the siting of the workshops are located approximately 250 to 300m from the road reserve. Given the distance of the workshop to Schofields Road the primary visual component would be the 8m embankment and the change to the landform from its existing state.
- Future Considerations – The future development site located between Schofields Road and the RTRF may provide a visual buffer between the road and the RTRF. The facility would be behind any future development with views being concentrated at the south west corner of the site. The detention pond would not obstruct views to the RTRF.

The visual impact assessment from Schofields Road is described in **Table 55**.

Table 55 – Visual Impact Assessment from Schofields Road

Character	Visual Sensitivity Level	Visual Sensitivity Justification	Visual Impact	Mitigation Measures
Existing	Local	Views from this location will be highly modified due to the amount of earthworks needed for the facility and change to the local landform.	Minor Adverse	– High and low level screening to Schofields Road – Landscaping around the detention pond.
Future	Neighbourhood	Views from this location will be reduced when the employment lands between Schofields Road and the site are developed.	Negligible	– As Above

Tallawong Road

Tallawong Road runs along the eastern boundary of the site and provides the access to the RTRF. The existing alignment of the road will be altered from its current position as part of the NWRL. Changes in the view to the site from Tallawong Road are:

- Construction Phase – Tallawong Road will be realigned prior to the construction phase of the RTRF or during the early phase of construction for the RTRF. During this phase

the majority of the earthworks and site grading will occur. This will represent a major change to the existing topography and landscape.

- Operational Phase – The facility will be visible from the bridge over the rail lines. The Administration and Training Buildings will front Tallawong Road and be landscaped with car parking to the rear. It is proposed that tree planting line the length of the facility along Tallawong Road.
- Future Considerations – The *Draft Cudgegong Structure Plan* includes a mixed use town centre and medium density residential with employment uses immediately adjoining the site. These uses will be able to respond to any impacts relating to the RTRF through design, siting of buildings and the road network.

The visual impact assessment from Tallawong Road is described in **Table 56**.

Table 56 – Visual Impact Assessment from Tallawong Road

Character	Visual Sensitivity Level	Visual Sensitivity Justification	Visual Impact	Mitigation Measures
Existing	Local	Views from this location will be highly modified due to the industrial nature of the facility and the scale of the sheds within the existing rural setting.	Minor Adverse	– Landscaping along Tallawong Road frontage. – Integrate landscaping and security fencing.
Future	Neighbourhood	Views from this location will be reduced when the Cudgegong Town Centre is developed.	Negligible	– As Above – New development surrounding the site can and should respond to the facility through design, siting of buildings and through the future road pattern.

Hambledon Road(future extension north of Schofields Rd)

Hambledon Road will run north-south along the western boundary between the RTRF and the First Ponds Creek riparian corridor. The views from the Hambledon Road corridor include:

- Construction Phase –There will be a significant change to the outlook from this location. It is expected that the RTRF would be constructed prior to the Hambledon Road northern extension. The earthworks required for the facility would result in the creation of an embankment between 6.7 and 8.8m in height and retaining walls to stabilise the land. Screening and vegetation would take time to fill in and the visual outlook would be of a large scale construction site.
- Operational Phase / Future Considerations – There will be no development along the future road for the length of the RTRF. The visual impact would be in the form of embankments and a series of stepped retaining walls that would breakdown the vertical distance between the road level and the facility. Planting and screening would be incorporated into the level changes between the retaining wall and the road reserve. The Maintenance Workshop would be visible from Hambledon Road..

The visual impact assessment from Hambledon Road is described in **Table 57**.

Table 57 – Visual Impact Assessment from Hambledon Road

Character	Visual Sensitivity Level	Visual Sensitivity Justification	Visual Impact	Mitigation Measures
Existing	Local	Views from this location would be highly modified due to the scale of earthworks and the location of the workshops along the boundary.	Moderate Adverse	– Landscaping and tree planting along Hambledon Road frontage to form a green buffer to retaining walls. – Retaining walls to be coloured in a muted natural tone. – Workshops to consider a muted natural tone.
Future	Neighbourhood	Views from this location would remain prominent in the proposed future development scenario, though some distant views to the site would be reduced through new development.	Minor Adverse	– As Above.

16.5.3 Views from Residential Areas

From the North

The site is currently surrounded by rural residential properties located at varying distances. There are a number of residential properties on Tallawong Road, in the vicinity of the intersection with Macquarie Road, which may have views to the site. Views from these properties would include the stabling yards and workshops visible through landscaped screening and perimeter security fencing.

The visual impact assessment from the northern view catchment is described in **Table 58**.

Table 58 – Visual Impact Assessment from the North

Character	Visual Sensitivity Level	Visual Sensitivity Justification	Visual Impact	Mitigation Measures
Existing	Local	The scale of the facility would be visually dominant within the landscape due to the degree of earthworks and workshops and would contrast with the character of the surrounding existing landscape. During construction, the site would be surrounded by hoarding. Construction vehicles would be seen using Tallawong Road.	Minor Adverse	– Landscaping and tree planting along the northern frontage to form a green buffer to retaining walls – Retaining walls to be coloured in a muted natural tone. – Workshops to consider use of a muted natural tone with landscaping to their northern elevations.
Future	Neighbourhood	The future land use for the northern edge of the site may provide a visual buffer to the facility.	Negligible	– As Above

From the South

Approximately 100m to the southeast of the site is The Ponds residential community. The site is likely to be visible from both low lying and elevated areas of this development. During construction, the lower lying areas of The Ponds community would view hoarding, additional traffic on Schofields Road, site clearing and construction activities which rise above the hoarding. Views to these elements would be filtered through intervening

vegetation and built form. During operation, these views would include workshops and trains stabled beyond. These elements would be visible in the middle ground and would have a scale and character in contrast to the surrounding residential and rural residential context.

The visual impact assessment from the southern view catchment is described in **Table 59**.

Table 59 – Visual Impact Assessment from the South

Character	Visual Sensitivity Level	Visual Sensitivity Justification	Visual Impact	Mitigation Measures
Existing	Local	Intervening built form and vegetation in the foreground, would provide some filtering of these views. Existing development is located approximately 100m from the closest point of the facility.	Negligible	– Tree planting along the southern embankment would break down views to the facility. – Landscaping around the detention pond.
Future	Neighbourhood	Future development along Schofields Road may further reduce views to the site.	Negligible	– As Above

From the East

There are currently dispersed residential structures to the east of the site along Tallawong Road. There is the opportunity for new development within the Cudgegong Road Station precinct could respond to the facility through design and siting of buildings.

The visual impact assessment from the eastern view catchment is described in **Table 60**.

Table 60 – Visual Impact Assessment from the East

Character	Visual Sensitivity Level	Visual Sensitivity Justification	Visual Impact	Mitigation Measures
Existing	Local	The visual amenity of this area would be reduced during the construction and operation phase of the facility given the change to the landscape and the addition of the workshop structures.	Minor Adverse	– Landscaping along Tallawong Road. – Integrate landscaping and security fencing.
Future	Neighbourhood	Future development along Tallawong Road may further reduce views to the site.	Negligible	– As Above

From the West

There are distant residential structures to the west of the site beyond the existing heavily wooded riparian corridor that generally runs north/south providing a large green buffer to the site.

The visual impact assessment from the western view catchment is described in **Table 61**.

Table 61 – Visual Impact Assessment from the West

Character	Visual Sensitivity Level	Visual Sensitivity Justification	Visual Impact	Mitigation Measures
Existing	Local	During the construction and operational phases of the facility there would be a visual impact due to earthworks and new workshops.	Minor Adverse	– Landscaping and tree planting along the Hambledon Road frontage to form a green buffer to retaining walls. – Retaining walls to be coloured in a muted natural tone. – Workshops to consider use of a muted natural tone or use natural materials (such as stones)..
Future	Neighbourhood	Additional built form to the west of the site would further reduce distant views to the site thus reducing the visual impact.	Negligible	– As Above

Views from Rouse Hill House

Rouse Hill House is an important heritage farm and museum managed by the Historic Houses Trust of New South Wales, and is on the Register of the National Estate. Rouse Hill House is located to the north east of the rail facility and approximately 1.5km to the site. Due to topography and dense tree lines and groups of tree the rail facility would not be visible. This is illustrated in **Figure 41** and **Figure 42** below.

Figure 41 – Rouse Hill House View – Plan

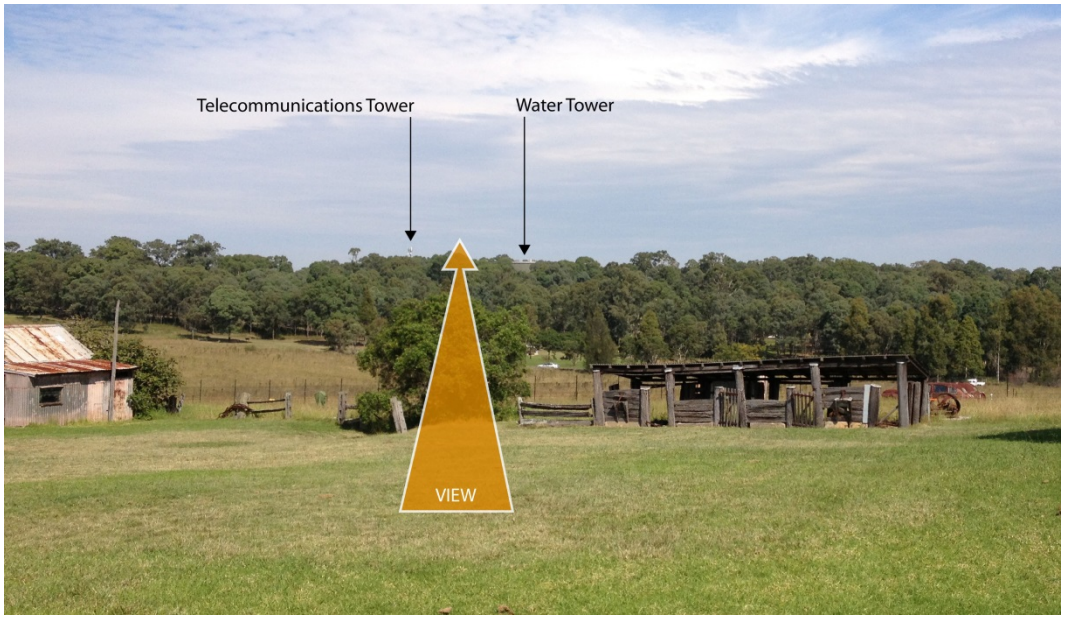

Figure 42 – Rouse Hill House View

16.5.4 Night Lighting Impacts

The visual setting of this area is considered to be an E2: Low District Brightness area, which includes lighting associated with local streets and illuminated windows of surrounding rural residential properties. In the future condition the visual setting would increase to E3: Medium District Brightness considering the proximity of the Cudgegong Town Centre and the significant increase in dwellings and streets.

There are distant residential structures to the west of the site beyond the existing heavily wooded riparian corridor that generally runs north/south providing a large green buffer to the site.

The night time visual impact assessment is described in **Table 62**.

Table 62 – Night Time Visual Impact Assessment

Character	Visual Sensitivity Level	Visual Sensitivity Justification	Visual Impact	Mitigation Measures
Existing	Local	The project would introduce additional light during operation and construction into an area visually dominated by a relatively dark landscape. In the short term, the effect of the required lighting would be noticeable within its rural setting especially given the 24hr operation of the facility.	Minor Adverse	– Directed lighting – Cut-off fittings
Future	Neighbourhood	Given the future planning for the area the lighting effect may become less noticeable given the close proximity of the future town centre, additional employment lands, additional residential dwellings and streets and the upgrade to Schofields and Hambledon Roads which would include significant additional street lighting.	Negligible	– As Above

16.5.5 Privacy

The RTRF provides for significant separation between on-site buildings are adjoining residential dwellings, as well as for intervening vegetation. As such, it is not considered that the the RTRF will result in any privacy issues.

16.6 Mitigation Strategies

Tables 54 to 62 include mitigation strategies to minimise assessed visual impacts. These mitigation strategies are summarised in **Table 63** below.

Table 63 – Operational Visual Impact Mitigation Strategies

No.	Mitigation Measure
OpV2	Cut–off and directed lighting would be used to ensure glare and light spill on surrounding existing and future residents are minimised.
OpV3	The colour and materials of service facility buildings would be selected to blend into adjacent bushland setting.

No.	Mitigation Measure
OpV10	High quality landscape and urban treatments would be used in and around the RTRF including: – Landscaping around detention ponds. – Landscaping along the Tallawong Road frontage. – Tree planting along the southern embankment. – Landscaping and tree planting along the Hambledon Road frontage to form a green buffer to retaining walls. – Retaining walls to be coloured in a muted natural tone or use natural materials (such as stones). – Buildings to consider use of a muted natural tone with landscaping to their northern elevations. – Integrated landscaping and security fencing. – Landscaping and tree planting along the northern frontage to form a green buffer to retaining walls
Note:	*Identifying codes for mitigation measures are taken, where possible, from EIS 1 and EIS 2 for NWRL to maximise consistency. As such, the codes are not always sequential for this EIS.*

In addition to the permanent mitigation strategies described above, bets practice visual impact mitigation meaures would be applied during construction activities, consistent with measures that would be applied at other NWRL construction sites. These measures are provide in **Table 64**.

Table 64 – Construction Visual Impact Mitigation Strategies

No.	Mitigation Measure
V1	Existing vegetation around the perimeter of the construction sites would be retained where feasible and reasonable to act as a visual screen.
V2	Cut-off and directed lighting would be used to ensure glare and light trespass are minimised.
V4	Regular maintenance of site hoarding and perimeter site areas would be undertaken, including the prompt removal of graffiti.
V5	Visual mitigation would be implemented as soon as feasible and reasonable, and remain for the duration of the construction period.
V10	Hoardings would be designed to visually recede in more rural or bushland settings.
Note:	*Identifying codes for mitigation measures are taken, where possible, from EIS 1 and EIS 2 for NWRL to maximise consistency. As such, the codes are not always sequential for this EIS.*

16.7 Conclusion

The RTRF is currently sited within a rural landscape setting consisting primarily of large lot rural residential and market garden properties. However, the future character of the locality will be of an urban and suburban character.

Generally, the visual sensitivity level of the surrounding area is reduced when considering the future visual character of the area due to the fact that as development fills in around the site, and into the surrounding areas, the RTRF would contrast less with its immediate surroundings and the number of views to the site would be reduced by new intervening development.

The visual impact of the facility are assessed as being of a minor to negligible level with the application of mitigation measures to screen and shield view corridors, primarily through the inclusion of perimeter landscaping around the facility.

17.0 Land Use, Local Business and Community Facilities

17.1 Local Business Impacts

17.1.1 Introduction

An assessment has been undertaken to identify and provide a qualitative assessment of the potential impacts on local businesses within the immediate vicinity of the RTRF during construction and operation.

Broadly, the RTRF would provide employment opportunities for 100 employees (approximate peak) during construction and an estimated 300 employees during operation.

17.1.2 Methodology

Table 65 sets out the Director-General's Requirements as they relate to the local business impacts, and indicates where each item is addressed.

Table 65 – Relevant Director General's Requirements

Key Issue	Where Addressed in EIS
Impacts on affected properties and land uses, including impacts related to access, land use, business activities, future development potential and property acquisition;	Section 17

The assessment of local business impact during operation and construction phases adopted the following approach:

- An overview of the Blacktown LGA's key business characteristics including the number of businesses by employment and turnover.
- Identification of business types within the RTRF site and surrounding land.
- An assessment and discussion of the construction and operational impacts (positive and negative) on businesses located in the immediate vicinity of the stabling vicinity.
- Identification and discussion of mitigation measures that would assist in alleviating potential negative impacts associated with the construction and operation of the stabling facility.

17.1.3 Existing Environment

The RTRF is located within the Blacktown LGA. The key business characteristics within Blacktown LGA that are potentially affected by the RTRF are outlined in the following sections. Businesses are classified by employment and turnover size based on a count of businesses using ABS data (2011):

- Employment size:
  - Small: businesses which employ 1-19 employees;
  - Medium: businesses with 20-199 employees; or
  - Large: businesses that employee at least 200 employees.
- Turnover size:
  - Small: businesses with an annual turnover of less than $100,000;
  - Medium: businesses which have turnover of more than $100,000 and less than $500,000; and
  - Large: businesses which have turnover greater than $500,000.

The Blacktown LGA covers an area of 247 km^2 and is predominantly residential, commercial and semi-rural in character. ABS (2011) recorded the population of Blacktown City to be 307,816 in 2011 which is approximately 7% of the total population in Sydney. It is currently the most populous and fastest growing LGA in NSW (ABS, 2011).

The following is noted about the business environment in Blacktown LGA:

- Small businesses (95%) are by far the highest category in terms of employment size. Based on the updated ABS data, no large employers were registered within Blacktown LGA. There are businesses within the LGA that would be categorised as large employers, however this is not reflected in the ABS data.
- Blacktown LGA had businesses which primarily produce turnover in the small category (60%) with just over a third in the medium category (34%). The top industry in each turnover size category is shown at **Table 66**.

Table 66 – Number of businesses by employment and turnover size

Size	Local Businesses by Employment Size		Local Businesses by Turnover Size	
	%	Top Industry	%	Top Industry
Small	95	Construction	60	Transport, Postal and Warehousing
Medium	5	Utilities, Accommodation and Food, Rental, Hiring and Real Estate, Health Care and Social Assistance	34	Construction
Large	0	N/A	6	Construction

Business Types

Identification and classification of existing businesses in the immediate vicinity has been determined through visual observation from publicly accessible areas.

A small number of agricultural businesses are located in the rural land within and surrounding the RTRF. These businesses include orchards, market gardens and poultry farms which are small businesses. Market gardens and poultry farms that have been identified are shown in Figure

These businesses are generally located to the north and north-west of the stabling yards within the Riverstone and Riverstone East Growth Centre Precincts and are unlikely to continue in this location as the area urbanises, land values increase and the businesses move out.

Other businesses that may operate from the properties within the RTRF site and the surrounding area include home businesses such as trades, consruction support enterprises and professional services such as accountants.

Further afield are light industrial areas on Old Windsor Road, and the Rouse Hill Town Centre and other retail located Old Windsor Road, as shown in **Figure 43**.

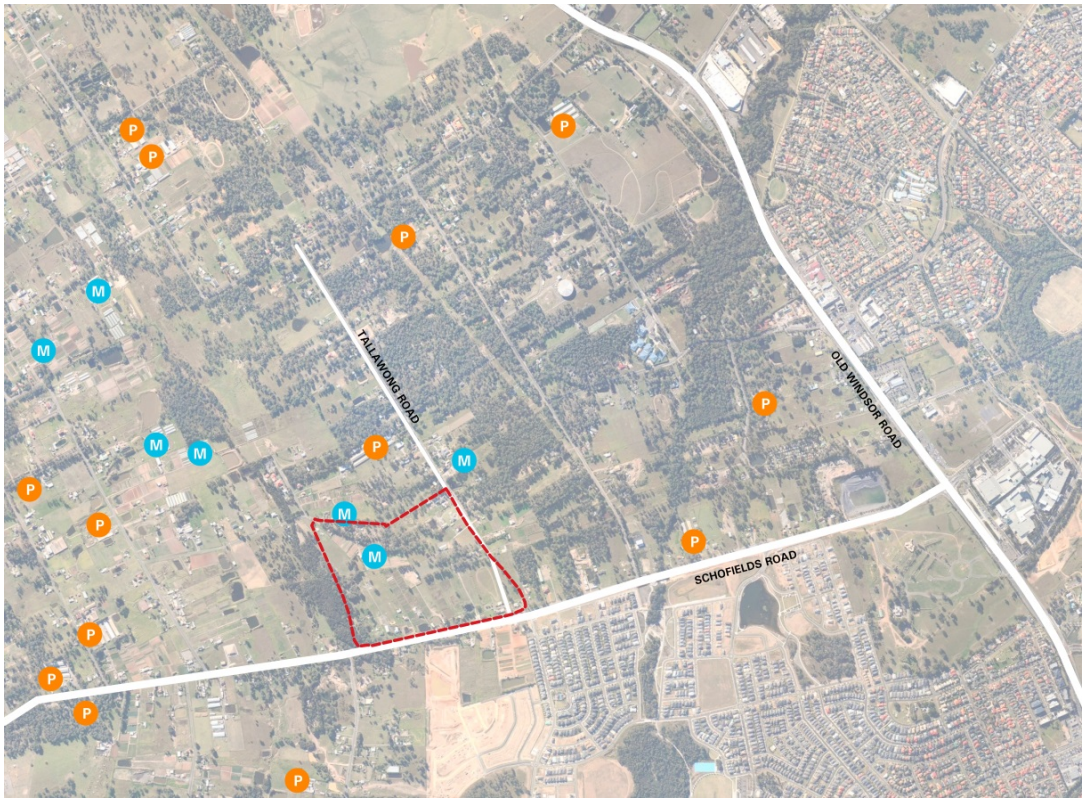

Figure 43 – Local Businesses - Poultry Farms (P) and Market Gardens (M)

17.1.4 Potential Impacts

Potential Impacts during Construction

The existing agricultural businesses within the RTRF locality are unlikely to be significantly affected by the construction of the RTRF. Poultry farms may be affected by noise impacts caused by the construction.

Construction workers are likely to travel to Rouse Hill Town Centre for retail services which will result in positive flow on effects for worker expenditure in the local area.

Construction businesses make up a high proportion of businesses in the Blacktown LGA. As such, these businesses may support the initial and flow on construction activities for the RTRF.

Potential Impacts during Operation

The following section assesses the potential impacts on local businesses during the operation of the stabling facility. It includes:

- Identification of the potential impacts (positive and negative) on local businesses during the operation of the stabling facility.
- Assessment of the type, direction and magnitude of potential impacts by qualitatively discussing the impacts at the stabling facility.

The potential impacts to the local businesses during operation are limited to noise and light pollution of small agricultural businesses within the local vicinity. There are potential impacts associated with noise and light emissions, particularly with regard to poultry farms, orchards and market gardens.

These businesses are very few in number and the operational impacts would be limited in the long term due to the future character of the area moving away from rural uses. The planned transition from a rural to urban environment will encourage the businesses to move out of the local area.

The land owners of these businesses (often also the business owner) are likely to benefit from increased land values, enabling the business to relocate while earning capital through the land sale.

The RTRF would increase employment opportunities within the local area by approximately 300 jobs during operation. These additional jobs will increase worker expenditure on retail and positively impact the retail services at the future local centre in Cudgegong Road and Rouse Hill Town Centre.

The RTRF supports the broader rapid transit network which will improve accessibility of the surrounding area for all employee groups working in Norwest, Macquarie Park, North Sydney, St Leonards and Sydney CBD.

17.1.5 Mitigation Measures

As part of the NWRL, TfNSW has specialist Place Managers to act as a single, identifiable and direct point of contact for local residents, business people and community groups with the project during construction. Place Managers would work closely with all affected local businesses to help ensure timely responses to queries. (Mitigation measure LB2)

Based on the above findings, no further mitigation measures are required to those addressed elsewhere in this EIS, including those relating to Noise (at **Section 11**) and Air Quality (at **Section 19**).

17.2 Land Use and Community Facilities

17.2.1 Introduction

This section assesses the potential impact of the operation and construction of the RTRF on existing land uses, known land uses and community facilities. The assessment considers the existing character of the site, existing and proposed planning controls, potential future character, potential impacts on the surrounding land uses (during operation and construction) and the mitigation measures to manage any impacts.

DP&I recently exhibited the *Draft Cudgegong Road Structure Plan* which includes the RTRF. The Draft Structure Plan identifies the recommended future land use framework for the site and the surrounding land. The assessment of this report focuses on the ability for the RTRF to integrate within the draft Structure Plan, future context of the site and surrounding environment.

The RTRF is an important component of the future rapid transit network, which will provide the opportunity for the broader Cudgegong Road station precinct to be developed for higher density residential, business and commercial development. As part of the broader project, the RTRF will create the opportunity for the surrounding land uses to evolve to a more dense urban environment.

The land use and community facilities assessment aims to integrate the RTRF with the existing and future character of the surrounding area, both during construction and operation.

17.2.2 Methodology

Table 67 sets out the Director-General's Requirements as they relate to the land use planning and community facilities, and indicates where each item is addressed.

Table 67 – Relevant Director General's Requirements

Key Issue	Where Addressed in EIS
Taking into account relevant local, regional and State planning policies including the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* and related precinct and structure planning.	Section 17.2.3 and 17.2.4

The assessment of the land use and community facilities impact during operation and construction phases adopted the following approach:

- Definition of the catchment for assessment which focuses on the footprint of the RTRF and the broader area of impact during operation.
- Description of the existing environment – including the natural and built environment, planning controls (existing and proposed), key attractions and community facilities. This information has generally been sourced from desktop analysis and a site visit to the site and surrounding area.
- Review of strategic planning policies and master plans relevant to the RTRF.
- Identification of community facilities that may be affected during construction and/or operation of the RTRF.
- Assessment of the potential implications for the existing and likely future land uses, from construction and through operation of the RTRF. The assessment focuses on the likely future land use framework for the site and the surrounding land.
- Identification of mitigation measures to manage potential impacts on land use and community facilities during both construction and operation phases.

17.2.3 Existing Environment

This section describes the existing environment within and surrounding the proposed RTRF. Landuses in the area surrounding the site are shown in **Figure 44**.

An area of approximately 1km surrounding the RTRF is established as the area of assessment. This area provides a likely area of influence and captures the potential impacts of the RTRF on surrounding land uses and community facilities.

Existing Character and Land Use

The RTRF is located within Sydney's North West Growth Centre, within the Riverstone East precinct. The site is currently rural in nature, with large lots (approximately 2ha) used for residential purposes. The residential density is very low on the site. In contrast, land to the south of Schofields Road is currently developing as new residential suburbs.

The site is located in an area that is currently, and will continue to, evolve from rural in nature to urban. The surrounding area will typically accommodate new residential areas ranging in densities. The Riverstone East precinct will accommodate approximately 15,000 new residents. Land to the south (i.e. Alex Avenue precinct) will accommodate 18,000 new residents, land to the east (i.e. Area 20 precinct) will accommodate 6,400 residents and land to the west (i.e. Riverstone precinct) will accommodate 27,000 residents.

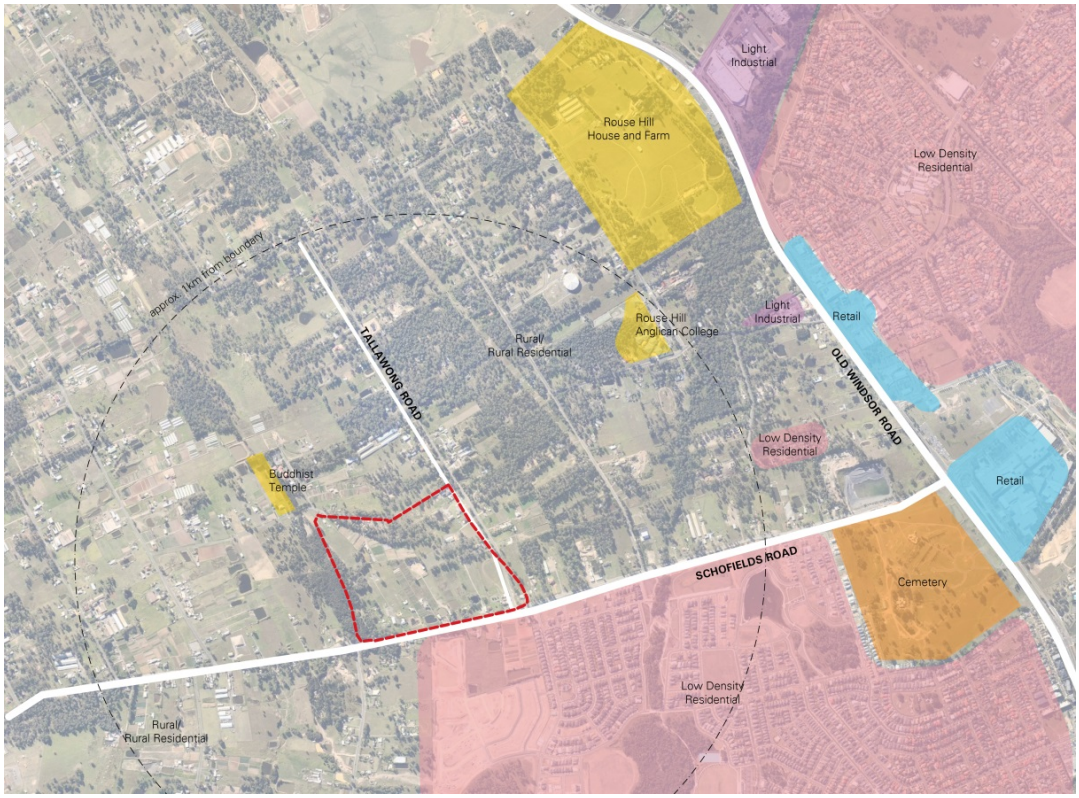

Figure 44 – Surrounding Land Uses and Community Facilities

Zoning

The RTRF site is currently zoned under Blacktown Local Environmental Plan (LEP) 1998 as 1(a) General Rural. The land to the north of the RTRF is also zoned 1(a) General Rural. Blacktown Council recently exhibited the draft Blacktown LEP 2013 which will replace the Blacktown LEP 1998. The draft Blacktown LEP proposes to zone the RTRF site to predominantly RU4 Rural Small Holdings and land adjoining Tallawong Road and Schofields Road to SP2 Infrastructure. The draft Blacktown LEP also proposes to zone land to the north of the RTRF to RU4 Rural Small Holdings.

The RTRF and land to the north will be subject to the Riverstone East precinct planning process which will rezone the land from rural to urban land uses. The precinct planning was announced in March 2013 and will be completed in the short term. Whilst the RTRF is generally inconsistent with the objectives of the existing General Rural zone and the proposed RU4 Rural Small Holdings zone, the Riverstone East precinct planning process provides the opporuntity for the rezoning process to take into account the location of the RTRF.

Land to the east, west and south of the RTRF is governed by State Environmental Planning Policy (Sydney Region Growth Centres) 2006. Land to the east of the RTRF is currently zoned IN2 Light Industrial with B2 Local Centre, B4 Mixed Use and residential zones further east. Land to the west of the site is predominantly zoned a mix of R2 Low Density Residential and R3 Medium Density Residential. Land to the south of the site is predominantly zoned R2 Low Density Residential. Some land to the west and south is also zoned SP2 Infrastructure and RE1 Public Recreation, for drainage and open space purposes.

Figure 45 identifies the zoning under the draft Blacktown LEP 2013 and the Growth Centres SEPP.

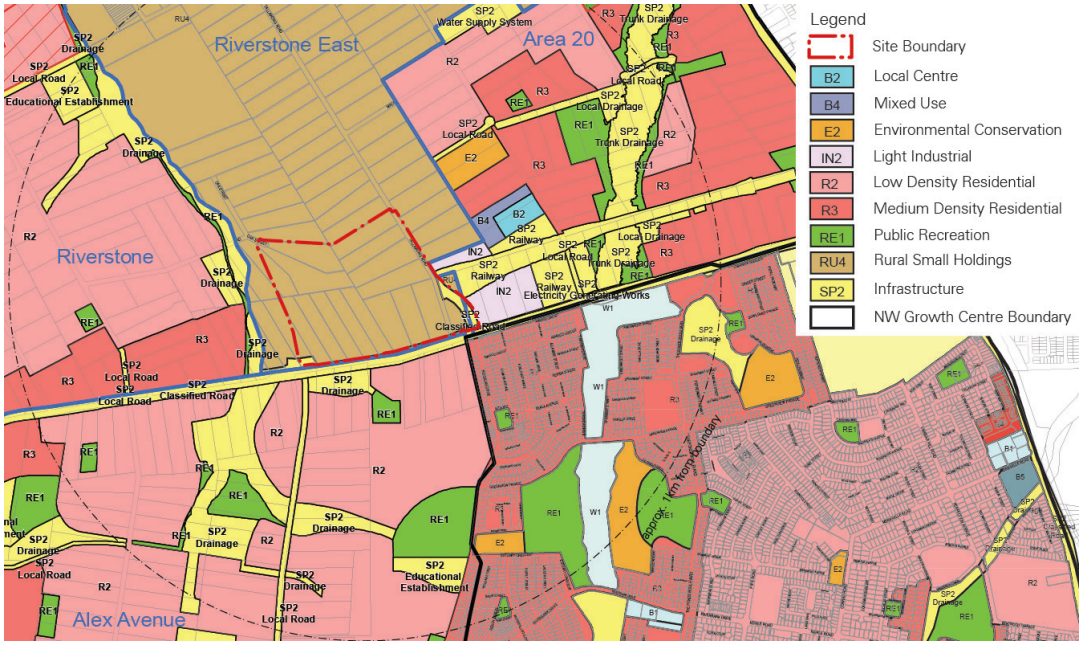

Figure 45 – Combined zoning map

Key Attractors

There are few key attractors within 1km of the site. The Lankarama Sri Lankan Buddhist Temple (north-west of the site) would act as an attractor during special events.

Retail

There is no retail within 1km radius from the RTRF. Retail at Rouse Hill Town Centre (outside 1km radius) is the key retail centre servicing the site.

Educational Establishments

Rouse Hill Anglican School is the only school within 1km from the site. Future schools are likely to be developed as part of future residential developments on surrounding land.

Open Space

There are no existing open space areas within the RTRF site. Open space areas within 1km of the RTRF include Rouse Hill Regional Park and neighbourhood parks within the residential developments to the south of Schofields Road.

There are a number of neighbourhood parks and riparian corridors which will be developed as part of the future residential development in land surrounding the RTRF.

17.2.4 Potential Future Development

The RTRF (as part of the rapid transit network) will facilitate the transition of the surrounding area from a rural to an urban environment. The key policies and strategies guiding the future development of the RTRF and surrounding land are outlined below.

Riverstone East Precinct Planning

DP&I recently announced the release of the Riverstone East growth centre precinct. The precinct planning will deliver a new land use framework for the RTRF and land to the north. The Riverstone East precinct is to accommodate 5,300 dwellings and 15,000 new residents.

Cudgegong Road Station Draft Structure Plan

The *Draft Cudgegong Road Structure Plan* was prepared by DP&I as part of the recently exhibited North West Rail Link Corridor Strategy. The Draft Structure Plan assumes a smaller stabling yard and recommends the site for the RTRF be zoned for employment purposes (as shown at **Figure 46**). The purpose of this zoning is to provide for the employment needs of the growing community. The Draft Structure Plan envisages light industrial uses which will assist in the mitigation of impacts from the RTRF.

The location of the RTRF is generally consistent with the *Draft Cudgegong Road Structure Plan*. However, the increased footprint will reduce the potential for other employment generating land uses. There is the opportutnity to make amendments to the Draft Structure Plan to take this into account as the ongoing structure planning process continues.

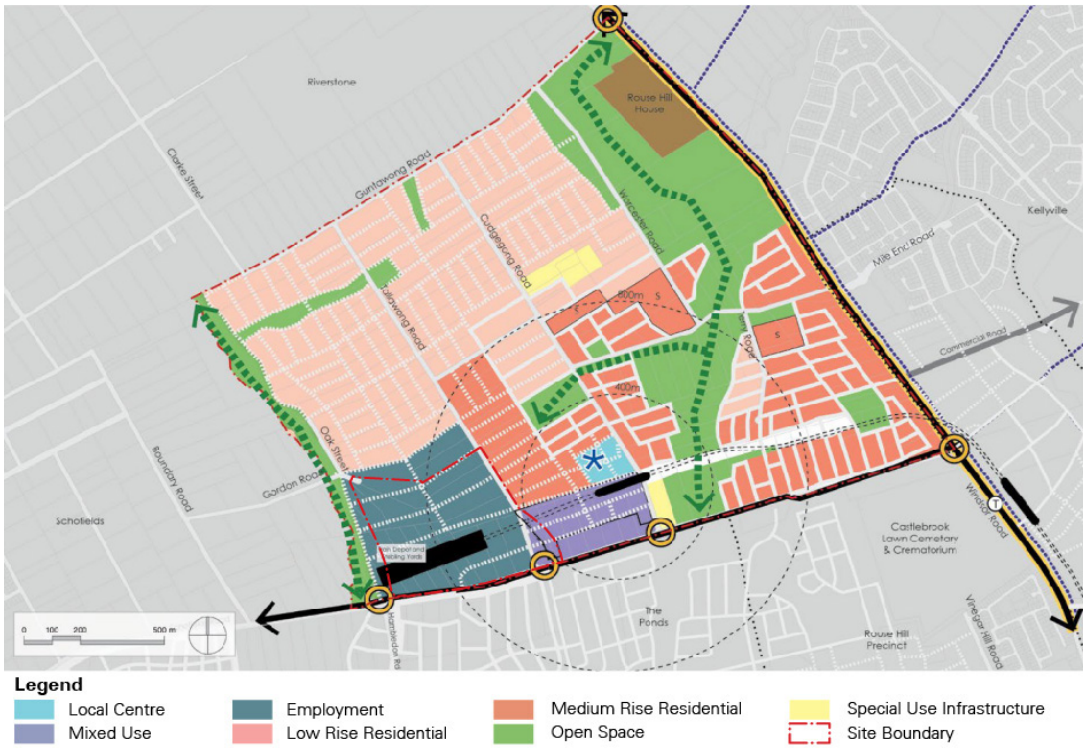

Figure 46 – Cudgegong Road Station Draft Structure Plan

17.2.5 Potential Impacts– Construction

The specific implications of the RTRF during construction on the existing land uses (at the time of construction) are:

- There will be some disruption of traffic movements during the construction of the realigned Tallawong Road and rail underbridge to connect the facility to NWRL at Cudgegong Road Station. These works are not the subject of this EIS but may be perceived as part of the one project during construction.
- There is little pedestrian movement around the RTRF (due to the rural character) however, some distribution of pedestrian connections may occur during construction.
- Construction vehicles accessing the site may cause impacts to traffic flows along Schofields Road and Tallawong Road. Construction traffic is addressed at **Section 10**.

The Lankarama Sri Lankan Buddhist Temple is likely to be affected by the noise generated during the construction of the facility (refer **Section 11)**. No other community facilities are likely to be affected.

17.2.6 Potential Impacts– Operation

The RTRF, as part of the rapid transit network, will improve the public transport availability to the existing and future population and decrease reliance on private transport. Therefore, the operation of the RTRF will have positive impacts on the broader community in regards to access to transport.

The specific implications of the RTRF on the existing land use are:

- The RTRF will result in the conversion of 36ha of currently rurally zoned land to an industrial land use. This land is proposed ot zoned for employment uses under the *Draft Cudgegong Road Station Structure Plan*.
- The existing surrounding land uses are able to continue during operation of the RTRF.

The specific implications of the RTRF on the future land use are:

- The RTRF would provide new employment uses on the site, consistent with the employment uses proposed under the *Draft Cudgegong Road Station Structure Plan*.
- There may be land use and design implications for the development of land immediately adjacent the RTRF site.

The Lankarama Sri Lankan Buddhist Temple has the potential to be affected by the noise generated during the ongoing operation of the facility (refer **Section 11**). No other community facilities are likely to be affected.

17.2.7 Mitigation Measures

Mitigation measures for the operational and construction phases of RTRF have been developed to avoid, reduce or manage potential impacts. These impacts relate to issues addressed elsewhere in this EIS, particularly those relating to amenity (refer to assessment of noise at **Section 11**, visual amenity at **Section 16** and air quality at **Section 19**).

Liaison is to continue with the DP&I and local councils to ensure the RTRF is integrated with relevant local and regional land use planning (particularly Draft Blacktown LEP 2013, Draft Cudgegong Road Station Structure Plan and Riverstone East Growth Centres Precinct Plan). Planning strategies, environmental planning instruments and development controls should reflect the planning, construction and operation of the RTRF. (Mitigation measure OpLC1)

Consultation with the local community is to continue throughout the planning process for the project and construction phases to ensure the local community members (existing and future) have adequate information about the project.

17.3 Conclusions

The RTRF will have minimal impacts on existing community facilities and businesses in the local area.

The RTRF is consistent with the future proposed employment land use for the area as set out in the Draft Cudgegong Road Station Structure Plan. Liaison is to continue with the DP&I and local councils to ensure the RTRF is integrated with relevant local and regional land use planning.

18.0 Climate Change and Greenhouse Gas Emissions

18.1 Introduction

An initial climate change risk assessment has been undertaken for the NWRL project. The risk assessment identified a number of adaptation options to address potential climate change impacts.

An indicative carbon footprint for the construction and operation of the RTRF has been undertaken separately for this assessment.

18.2 Director General's Requirements and Statement of Commitments

Table 68 sets out the Director-General's Requirements as they relate to Climate Change and Greenhouse Gas Emissions, and where in the project these have been addressed.

Table 68 – Relevant Director General's Requirements

Key Issue	Where Addressed in EIS
Air Quality, including but not limited to greenhouse gas emissions	Section 18.6 and 18.7

18.3 Climate Risk Assessment Methodology

A Climate Change Risk Assessment and Adaptation Study was prepared for the NWRL project and was reviewed for applicability to the RTRF.

This climate change risk assessment and adaptation study identifies risks and risk mitigation measures associated with the predicted impacts of climate change on the design, construction and operation of the NWRL.

The climate change risk assessment was conducted in accordance with:

- The risk management approach set out in AS/NZS ISO 31000:2009 Risk management – Principles and guidelines and ISO/IEC 31010 Risk management – Risk assessment techniques.
- The Australian Green Infrastructure Council (AGIC) Guidelines for Climate Change Adaptation.

The climate change projections used in this assessment have been derived and collated in accordance with the DRAFT Australian Standard (DR AS 5334) *Climate change adaptation for settlements and infrastructure*, which suggests that the following six consecutive steps should be applied to determine the climate change context that will inform the climate risk assessment and subsequent adaptation responses:

- Define the greenhouse gas emissions scenario
- Define future time slices
- Define the climate variables
- Selection of climate data
- Determine other associated impact studies required

- Obtain past meteorological record

Climate change projections are subject to considerable uncertainty. Projections for the following key climate variables which are most appropriate to the project area have been included:

- Solar radiation
- Annual mean maximum temperature and summer mean maximum
- Highest temperature
- Temperature (heatwaves)
- Annual mean rainfall
- Seasonal mean rainfall
- Extreme rainfall
- Rainfall intensity
- Wind speed
- Relative humidity
- Average annual potential evaporation
- Hail
- Cyclones
- Bushfire risk.

The climate change projections for years 2030, 2050 and 2070 have been considered. Projections indicate that there will be an increase in average and maximum temperatures by approximately 3°C by 2070 with an expected increase in the frequency of heatwaves. Rainfall intensity is also expected to increase by 10% by 2070.

18.4 Potential Impacts

Potential risks to the RTRF Infrastructure are detailed in **Table 68**. The key climate variables that have the potential to impact on the RTRF are extreme high temperatures, increased heat waves, and an increase in rainfall intensity, as follows:

- Maximum temperature days are predicted to increase:
  - From a current long term average of 14.6 days per year of over 35oC to 18.4 days in 2030 and 34.9 days in 2070
  - From a current long term average of 2.1 days per year of over 40oC to 3.2 days in 2030 and 8 days in 2070
- Maximum temperature heatwaves are predicted to increase:
  - From a current average long term number of 1.2 times per year where 35oC is exceeded for 3 to 5 consecutive days to 1.6 times in 2030 and 4.7 times in 2070
  - From a current average long term number of 0.1 times per year where 40oC is exceeded for 3 to 5 consecutive days to 0.1 times in 2030 and 0.6 times in 2070
- Rainfall intensity is predicted to change:
  - For a 40 year Annual Recurrence Interval (ARI) 1 day rainfall event an increase of +5% by 2030 and +2% by 2070
  - For a 100 year ARI 2 hour rainfall event a decrease of -10% by 2030 and an increase of +10% by 2070
  - For a 5 year ARI 2 hour rainfall event no change by 2030 and an increase of +10% by 2070

Table 69 – Potential risks to infrastructure

Project Component	Risk Description	Risk Assessment
Risks relating to temperature increases		
Track buckling	Increased frequency, severity and duration of extreme temperatures (days exceeding 35 °C) leading to rail track movement/cracking/buckling.	Tolerable Risk The temperature increase is within the scope of the track design. Trains move at low speeds at the RTRF. The rail infrastructure would be subject of regular inspection and maintenance.
Air conditioning of critical equipment failing	Increased frequency, severity and duration of extreme temperatures leading to increased failure of air conditioning equipment on critical communications and control equipment resulting in reduced network capacity and increasing potential for major safety incidents.	Tolerable Risk Electrical system is designed around diversity and redundancy, and emergency backup provision is a feature of the circuit design across all voltages. As an additional redundancy measure, batteries and Uninterruptable Power Supplies are included to provide sufficient time to divert power supplies and co-ordinate emergency responses.
Increased ventilation and cooling cost	Increased frequency, severity and duration of extreme temperatures (days exceeding 35 °C) leading to increased cost (incl. maintenance) to ventilate and cool RTRF buildings.	Tolerable Risk Use of water cooled A/C systems for staff air conditioned spaces to offer increased adaptive capacity.
Interruptions to mains power	Increased frequency, severity and duration of extreme temperatures (days exceeding 35 °C) leading to more frequent interruptions to mains power supply.	Tolerable Risk Electrical system is designed around diversity and redundancy, and emergency backup provision is a feature of the circuit design across all voltages.
Risks relating to increased rainfall intensity		
Ground stability issues, risk of landslides and embankment / slope failure	Climate change causes increased frequency and severity of extreme rainfall events leading to flooding or saturation of embankments and ground conditions.	Tolerable Risk Embankments and slopes would be designed to take account of climate change – related increases in rainfall intensity. A regular inspection cycle would identify potential issues relating to instability..
Extreme rainfall causing malfunctioning of power supplies and communications.	Increased frequency and severity of extreme rainfall events leading to more frequent malfunctioning of power supplies, communications and associated circuitry.	Tolerable Risk Electrical system is designed around diversity and redundancy, and emergency backup provision is a feature of the circuit design across all voltages.
Extreme rainfall causing flooding of rail infrastructure.	Increased extreme rainfall by 2070 has the potential interrupt service and cause damage to infrastructure.	Tolerable Risk The RTRF will be designed based on a 100 year ARI event plus an additional 10% increase in rainfall intensity to provide a nominal allowance for potential impacts due to climate change.
Other Risks		
Storm, hail and wind causing damage to exposed infrastructure	Increased frequency and severity of extreme storm, hail and wind events leading to debris, fallen trees and branches impacting infrastructure (structural, electrical and communications) and customers.	Tolerable Risk Weather protection has been included in concept design.
Bushfire damage to aboveground infrastructure	Increased frequency, severity and duration of bushfires damaging aboveground infrastructure and generating health and safety impacts on customers.	Tolerable Risk The RTRF would be designed to be fire resistant in accordance with standards.
Increased solar radiation leading to accelerated degradation of external materials	Increased annual average UV radiation leading to accelerated degradation of external materials.	Tolerable Risk Resilience to degradation associated with solar radiation would be considered in materials selection.

Delays in trains leaving the RTRF due to extreme weather conditions and events have the potential to impact on rapid transit network services and subsequently customer satisfaction and patronage.

18.5 Adaptation Strategies

Specific climate change adaptation measures relevant to the RTRF include:

- The provision of back up cooling for critical equipment
- Use of water-cooled chillers, which offer better reliability than air-cooled chillers in temperatures over 40°C
- For design of drainage elements, a 10% increase in design rainfall intensities was adopted to provide a nominal allowance for potential climate change impacts. No changes to infrastructure levels have been required.

To provide ongoing resilience to the impacts of climate change, it will be necessary to assess and respond to risks throughout the project life cycle. The Fifth Assessment Report (AR5) of the United Nations Intergovernmental Panel on Climate Change (IPCC) will be finalised in 2014 and will provide updated climate change projections which could be different to those currently utilised. Revised Australian Rainfall and Runoff (AR&R) guidance is anticipated which may suggest a change in approach to designing for climate change. Ongoing monitoring of climate change variables and projections would be undertaken.

Changes to design during design development could result in changes to risk levels. These would be assessed on a case by case basis.

18.6 Greenhouse Gas Assessment

GHG emissions are reported as tonnes of carbon dioxide equivalent (tCO2-e). Emissions categorised into three different scopes to help delineate between direct emissions from sources that are owned or controlled by a project and upstream indirect emissions that are a consequence of project activities but occur at sources owned or controlled by another entity. The three GHG scopes are:

- Scope 1 emissions (direct emissions) are generated directly by a project, eg emissions generated by the use of diesel fuel by construction plant/ equipment.
- Scope 2 emissions (indirect emissions) are generated outside of a project's boundaries to provide energy to the project, eg the use of purchased electricity from the grid.
- Scope 3 emissions, are all indirect emissions (not included in scope 2) due to upstream or downstream activities, including emissions associated with the extraction, production and transport of purchased construction materials.

The objectives of the GHG assessment were to:

- Identify the sources of GHG emissions associated with construction and operation of the RTRF.
- Quantify the GHG emissions associated with each GHG source.
- Present the Scope 1, 2 and 3 GHG emissions.
- Identify opportunities (mitigation measures) which may be implemented to reduce the GHG emissions associated with construction and operation of the RTRF.

The various Scope, 1, 2 and 3 emissions sources identified for the RTRF are provided in **Table 70**.

Table 70 – GHG Emissions Sources and Scope

Activity	Emission Source	Emission Scope
Construction, including earthworks, civil works and installation of rail infrastructure, buildings and structures.	Fuel – used for transport purposes	3
	Fuel – used onsite	1 and 3
	Electricity – used onsite	2 and 3
	Materials	3
Operations	Fuel – used onsite	1
	Materials	3
	Electricity – used on site	2 and 3
	Waste	3
	SF6 gas losses from Gas Insulated Switchgear and Ring Main Unit Switchgear within substations	1
	HFC gas losses from air conditioning systems	1

It is estimated that construction of the RTRF would generate approximately (note all numbers have been rounded up):

- 50,440 tCO2-e of direct scope 1 GHG emissions
- 10,802 tCO2-e of indirect scope 2 GHG emissions
- 30,862 tCO2-e of indirect upstream scope 3 GHG emissions
- 92,105 tCO2-e of total scope 1, 2 and 3 GHG emissions

The main source of GHG emissions associated with the construction of the RTRF are from the use of fuel on-site (Scope 1 emissions) and from the embodied energy within the materials used for construction of the infrastructure, principally steel and concrete (Scope 3 emissions).

It is estimated that operations associated with the final design capacity of the RTRF (ie stabling for 45 trains and maintenance for 76 trains), would annually generate approximately (note all numbers have been rounded up):

- 127 tCO2e of direct scope 1 GHG emissions
- 13,585 tCO2e of indirect scope 2 GHG emissions
- 4,702 tCO2e of indirect upstream/downstream scope 3 GHG emissions
- 18,414 tCO2-e of total scope 1, 2 and 3 GHG emissions

The main source of GHG emissions associated with the operation of the RTRF is from the use of electricity at the facility (Scope 2 emissions).

18.7 Greenhouse Gas Mitigation

Aspects of the RTRF that would reduce GHG emissions are presented below according to their GHG emission category and design element.

18.7.1 Construction

Mitigation measures which would be implemented to further reduce the GHG emissions associated with the construction of the RTRF include:

- Minimising the quantity of fuel and electricity used by construction plant and equipment.
- Minimising the quantity of fuel used in the transport of materials and spoil.
- Minimising the embodied carbon of materials used.
- Minimising the electricity consumption of site infrastructure and tunnelling operations.
- Offsetting a proportion of the electricity needs associated with major civil construction works.

Specific mitigation measures that will be applied to mitigate GHG emissions are set out in **Table 71**.

Table 71 – GHG Mitigation Measures during Construction

No.	Mitigation Measure
GHG1	Spoil management would be undertaken in accordance with the spoil reuse hierarchy
GHG2	Where feasible and reasonable local materials would be preferentially used.
GHG3	If feasible and reasonable low GHG intensive alternative fuels (for example biofuels) would be used in construction equipment and vehicles.
GHG4	Vehicles with low fuel consumption ratings would be preferentially used where feasible and reasonable.
GHG5	Construction equipment and vehicle operators would be trained in driving practices which reduce fuel consumption.
GHG6	Construction equipment and vehicles would be regularly maintained to maximise fuel efficiency.
GHG9	A minimum of 20% of electricity needs associated with construction works would be offset.
GHG 11	If feasible and reasonable materials with lower embodied emissions would be preferentially specified for use.
GHG 12	An updated GHG assessment would be prepared during the detailed design stage of the project.

Note: Identifying codes for mitigation measures are taken, where possible, from EIS 1 and EIS 2 for NWRL to maximise consistency. As such, the codes are not always sequential for this EIS.

18.7.2 Refrigerants

The RTRF would include the use of refrigerants R410A, R134A and R407A, which have a low Global Warming Potential in comparison to other refrigerants currently available in Australia and suitable for use in underground and enclosed environments.

18.7.3 Electricity

Measures that would reduce the quantity of electricity consumed per unit of operation include:

- Demand operated ventilation has been incorporated into the design. The system operates based on temperature and carbon dioxide levels, to ensure that it only operates when needed.
- Water cooled chillers, considered to be twice as efficient as the air-cooled alternative, have been incorporated to provide cooling to staff areas, critical equipment and environmental shelters.
- Waste heat can be recovered from critical equipment areas for use in space heating in winter.

- Energy efficient heating, ventilation, and air conditioning equipment has been designed for, which exceeds requirements under Part J of the Building Code of Australia. The cooling equipment is 60% more efficient than the minimum requirements of Part J5.4 of the National Construction Code 2011.
- High efficiency motors (with variable speed drives for all fan and pump applications).
- Inclusion of demand controlled and timed lighting.
- Inclusion of energy efficient light fittings, signals and communication equipment.

18.7.4 Materials

Measures that would reduce the quantity of materials for the RTRF include:

- Prioritised use of pre-cast elements. The use of pre-cast concrete results in less waste material and energy expended in construction in comparison to concrete cast in-situ
- Design refinements and optimisation to minimise the absolute quantities of steel and concrete used on the project.
- Use of post-tensioned concrete which has been shown to use less materials and have a lower embodied energy than reinforced concrete.
- Use of robust self-finished materials, to avoid the use of paints and adhesives and to reduce the quantity of materials required for maintenance and replacement.

18.7.5 Renewable Energy

An assessment into the opportunities, costs and benefits for onsite renewable and low carbon intensity energy generation on the project has been undertaken. This assessment identified solar photovoltaics (PV) as the most feasible renewable/low carbon intensity energy generation technology for application at the RTRF. There is potential for PV systems to be installed on the roofs of RTRF buildings for use at the RTRF.

In order to achieve the NWRL Sustainability Policy Objectives to (1) improve the shift towards lower carbon transport, (2) reduce the operational, construction and embodied carbon emissions associated with the project and (3) identify low carbon energy generation and procurement options, a feasible project target could be to source five per cent of operational electricity demand from onsite renewable or low carbon sources at the RTRF.

18.7.6 Carbon Offset Options

There are a range of options available to avoid or reduce the GHG emissions associated with the operational electricity use of the project. The use of carbon offsets to counterbalance the emissions associated with electricity consumption is a common practice in Australia and internationally. In order to achieve the NWRL Sustainability Policy Objectives to (1) improve the shift towards lower carbon transport and (2) identify low carbon energy generation and procurement options, a feasible project target could be to offset 100 per cent of the electricity needs for the operational phase of the project. TfNSW are exploring options to achieve this.

Options for offsetting the GHG emissions associated with operational electricity use include investment in wind or solar generation projects, purchasing GreenPower from an accredited GreenPower provider and purchasing accredited biosequestration offsets created under the Federal Government's Carbon Farming Initiative, or a combination of these.

18.8 Conclusions

The results of the climate change risk assessment indicate that the RTRF is generally resilient to the impacts of climate change, to the extent that reliable climate projections are available, as no extreme or high risks have been identified.

Tolerable climate change risks related to the RTRF should be addressed in the design, construction and operation of the project. Each stage in the project should consider the most up to date climate change projections and design guidelines. The climate risks require ongoing review and response by designers and constructors.

The GHG assessment has identified the dominant sources of GHG emissions associated with the construction and operation of the RTRF. Mitigation measures have been proposed which will minimise, as much as practicable, the emissions of GHGs as a result of the construction of the RTRF. A suite of possible mitigation measures has also been proposed regarding the detailed design and operational activities of the RTRF. These will be further investigated in subsequent stages of design.

19.0 Air Quality

19.1 Introduction

This chapter provides the air quality impact assessment of the RTRF. The detailed Air Quality Assessment prepared by Todoroski Air Sciences Pty Ltd is included **Appendix K** of this EIS.

19.2 Director General Requirements and Statement of Commitments

Table 72 sets out the Director-General's Requirements as they relate to Air Quality, and where these requirement shave been addressed in the EIS.

Table 72 – Relevant Director-General's Requirements: Air Quality

Requirement	Where Addressed in EIS	Technical Study
Air Quality, including but not limited to		**Appendix K**
modelling and assessment of air pollutants, including an assessment of atmospheric pollutants of concern for local air quality including fugitive and point sources	Section 19.5	
potential odour from exhaust emissions	Section 19.5	
greenhouse gas emissions	Section 18	
taking into account the Approved Methods for the Modelling and Assessment of Air pollutants in NSW (DEC, 2005)	Section 19.3	

19.3 Assessment Criteria

This section identifies the applicable air quality criteria as they relate to the RTRF.

19.3.1 Particulate Matter

The air quality goals refer to three classes of particulate matter based on the size of the particles. Total Suspended Particulate matter (TSP) measures the total mass of all particles suspended in air. TSP typically refers to particles 50μm (micrometres) in size or less. TSP is defined further into two sub-classes, they are PM10 particles, particulate matter with aerodynamic diameters of 10µm or less, and PM2.5, particulate matter with aerodynamic diameters of 2.5µm or less. Deposited dust is also relevant to this assessment and refers to any dust that falls out of suspension in the atmosphere.

The air quality criteria that are relevant to the RTRF assessment are outlined in the NSW EPA document *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (NSW DEC, 2005) and are presented in **Table 73**.

Table 73 – NSW EPA Air Quality Assessment Criteria

Pollutant	Averaging Period	Impact	Criterion
TSP	Annual	Total	90µg/m^3
PM10	Annual	Total	30µg/ m^3
	24-hour	Total	50µg/ m^3
Deposited Dust	Annual	Incremental	2g/ m^{3}month
		Total	4g/ m^3/month

The EPA currently does not have impact assessment criteria for $PM_{2.5}$ concentrations, however, the National Environment Protection Council (NEPC) has released a variation to the National Environmental Protection Measure (NEPM) to include advisory reporting standards for $PM_{2.5}$ as presented in **Table 74**.

Table 74 – Advisory Standard for PM2.5 Concentrations

Pollutant	Averaging Period	Criterion
$PM_{2.5}$	24-hour	25µg/ m^3
	Annual	8µg/ m^3

The *Protection of the Environment Operations (Clean Air) Regulation 2010* also sets standards for the concentration of emissions of solid particulates from general activities and plant. These standards are shown in **Table 75.**

Table 75 – Standards of concentration for scheduled premises: general activities and plant

Air impurity	Activity or plant	Standard of concentration
Solid particles (Total)	Any activity or plant (except as listed below)	50 mg/ m^3
	Any plant used for heating metals	50 mg/ m^3
	Any crushing, grinding, separating or materials handling activity	20 mg/ m^3

19.3.2 Other Air Pollutants

Emissions of other air pollutants would also potentially arise from activities occurring at the RTRF site, with these emissions generated from sources such as petrol and diesel powered equipment used during construction and operation. Emissions from petrol and diesel powered equipment include carbon monoxide (CO), nitrogen dioxide (NO_2) and such as sulphur dioxide (SO_2).

Diesel powered trains would not be used at the RTRF and have not been included as a potential source of air emissions. One or two diesel powered infrastructure maintenance vehicles would be operated from the RTRF, with infrequent use.

It is not expected that emissions from the site will impact on levels of these air pollutants so the relevant criteria are not listed.

19.3.3 Odour

Assessment criteria for complex mixtures of odorous air pollutants are outlined in the NSW EPA document *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*. This criterion has been refined to take into account the population densities of specific areas.

The NSW criteria for acceptable levels of odour range from 2 to 7 odour units (OU), with the more stringent 2 OU criteria applicable to densely populated urban areas and the 7 OU criteria applicable to sparsely populated rural areas, as outlined in **Table 76** below.

Table 76 – Impact assessment criteria for complex mixtures of odorous air pollutants

Population of Affected Community	Criterion (OU)
Urban (>~2000) and/or schools and hospitals	2.0
~500	3.0
~125	4.0
~30	5.0

Population of Affected Community	Criterion (OU)
~10	6.0
Single rural residence (≤~2)	7.0

Given the status of the environment around the site presently, odour criteria ranging from 5 to 7 OU would be applicable at present. In the future a large portion of the surrounding community would reside in an urban environment, and a 2 OU criterion would be appropriate.

19.4 Existing Environment

19.4.1 Local Climate

Long-term climatic data from the Bureau of Meteorology (BoM) weather stations at Prospect Reservoir (Site No. 067019) and Richmond RAAF (Site No. 067105) were used to characterise the local climate.

The data indicate that January is the hottest month with mean maximum temperatures of 28.4°C and 30.0°C respectively at the Prospect Reservoir and Richmond RAAF stations. July is the coldest month with mean minimum temperatures of 6.1°C and 3.6°C respectively.

Humidity levels exhibit variability and seasonal flux across the year and rainfall peaks during the summer months and declines during winter. Wind speeds during the warmer months tend to have a greater spread between the 9 am and 3 pm conditions compared to the colder months at Prospect Reservoir, however, the difference between 9 am and 3 pm wind speed is relatively constant at Richmond RAAF across the year.

Rainfall peaks during the summer months and declines during winter at both stations.

Wind speeds during the warmer months tend to have a greater spread between the 9am and 3pm conditions compared to the colder months at Prospect Reservoir, however the difference between 9 am and 3 pm wind speed is relatively constant at Richmond RAAF across the year.

19.4.2 Local Air Quality

The main sources of air pollution in the wider area surrounding the RTRF may include agricultural activities, emissions from local human activities such as motor vehicle exhaust and domestic wood heaters, urban activity and various other commercial and industrial activities.

Concentrations of PM10 are nominally highest in the spring and summer months. This is attributed to the warmer weather leading to drier ground and elevating the amount of windblown dust, the occurrence of bushfires and also increased pollen levels.

Annual average PM10 levels recorded at surrounding BOM monitoring sites during 2012 are below the criterion of 30$\mu g/m^3$. The maximum recorded 24-hour average PM10 concentrations are below the 50$\mu g/m^3$ criterion, with the exception of one monitor, where the criterion was exceeded on three occasions in August 2012. An investigation into the cause of these exceedences suggests a potential bushfire or back burning event in the area may have been the cause.

Annual average PM2.5 levels recorded at this monitoring site are below the advisory reporting standard of 8$\mu g/m^3$ and the maximum 24-hour average levels were below 25$\mu g/m^3$ for all months except August. The elevated levels recorded in August coincide with the elevated PM10 levels during the same period.

19.5 Potential Impacts

19.5.1 Construction

Construction works would include activities that have the potential to generate dust emissions and impact on the surrounding air quality. Potential dust emissions may be generated from activities including:

- Earthworks
- Exposed areas and stockpiles during periods of high wind speed
- Exhaust emissions from the operation of construction vehicles and plant

The estimated dust emissions for earthworks associated with construction activities are presented in **Table 77.** Emission factors from the *US EPA AP42 Compilation of Air Pollutant Emission Factors* and the State Pollution Control Commission's *Air Pollution from Coal Mining and Related Developments* were applied to estimate the potential dust emissions.

Table 77 – Estimated annual TSP emission rate - Construction activities

Activity	TSP emissions (kg/year)
Loading spoil to haul truck	89
Hauling to Emplacement (on-site)	3,811
Hauling fill material onto the site	2,406
Emplacing on-site	167
Dozers on various activities	12,473
Wind erosion from exposed areas and stockpiles	15,319
Total TSP emission (kg/yr)	**34,265**

The quantity of dust is approximately proportional to the amount of material that is handled and the amount of activity of the plant items. Thus the total quantity of emissions generated can be reasonably calculated for the project overall, however the dust generated over any short time frame is difficult to quantify due to the short, sporadic nature of the construction phase activities. The type and quantity of machinery used, the size of exposed areas, and meteorological conditions are also varying factors on any given day. Given that the activities would occur for a limited period, it is unlikely that there would be any significant or prolonged effect at any off-site location.

Emissions of the pollutants and odours generated from the exhaust emissions of diesel powered machinery and plant equipment are generally considered to be too small, too infrequent or too widely distributed to generate any significant off-site pollutant concentrations. In any case these emissions are generally included in the particulate emissions estimation equations for the activity.

19.5.2 Operation

The trains are electric and do not generate any significant air emissions. Operational activities that could cause emission of air pollutants are described below.

Potential Impact to RTRF Workers

Specific activities associated with the operation of the RTRF that have the potential to generate air emissions and impact on workers at the RTRF include:

- Washing, degreasing and painting of small parts of trains.
- Servicing track infrastructure equipment.

- Track welding and repair.
- Fugitive emissions arising from the dangerous goods store.
- Graffiti removal.

These activities have the potential to release intermittent or temporary emissions of particulate matter, chemical fumes and fine metal particles into the immediate air environment and a worker's breathing space which can create health issues that may range from minor to serious incidents or illness.

Potential Impact to Surrounding Areas

Activities associated with the operation of the RTRF that have the potential to generate air emissions and impact on the surrounding air quality include:

- Maintenance of trains.
- Operation of workshops and associated infrastructure for train maintenance.
- Vehicle movements including staff vehicle movements and site operations movements.

Maintenance activities would occur within the enclosed maintenance workshop and generally these activities have low potential for any significant off-site emissions or odours to arise as they will occur within a building, and potential emissions and odours can be contained or their release effectively managed.

Activities listed above that have the potential to generate air emissions and impact on workers at the RTRF can generally be contained within dedicated work areas, and the mitigation needed to protect workers health would also ensure that levels at more distant receptors remain low and not significant. As such, these activities have a low likelihood of causing any significant off-site impacts. Detectable effects might occur for graffiti removal from large external areas of trains that are stabled near the edges of the stabling area. However, receptors in such locations are located well away from the trains and workshops, making the risk of any such impact small.

19.6 Mitigation Strategies

19.6.1 Construction

To control dust generation during construction activities and reduce the potential for off-site impacts, appropriate operational and physical mitigation measures, which are routinely adopted during construction works will be utilised. These are detailed in **Table 78**.

Table 78 – Construction Air Quality Mitigation Measures

No.	Mitigation Measure
A1	Working face and areas of open excavation would be kept to a minimum, where feasible and reasonable.
A2	Water suppression would be used for active earthwork areas, stockpiles, gravel roads and loads of soil being transported to reduce wind-blown dust emissions.
A4	The amount of excavated material held on site would be minimised.
A5	Areas of exposed earth would be minimised by staging construction activities and progressively landscaping and vegetating completed areas as the construction activities proceed, where feasible and reasonable.
A6	Enclosed rubble chutes and conveyors would be used where feasible and reasonable. Drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment would be minimised and/or water used to suppress dust emissions from such equipment.
A7	Cutting, grinding or sawing equipment would only be used in conjunction with suitable dust suppression techniques such as water sprays or local extraction.
A9	Dust generating activities would be assessed during periods of strong winds and rescheduled, where required.

No.	Mitigation Measure
A10	All vehicles carrying loose or potentially dusty material to and/or from the site would be covered.
Spoil Stockpiles	
A11	Stockpiles would be located away from sensitive receivers, where feasible and reasonable, and protected from the elements through barriers, covering or establishing a cover crop.
Haul Roads	
A12	Longer term and/or heavily used haul roads would generally be sealed. The criteria for sealing haul roads would be defined during detailed construction planning. Sealed haul roads would be regularly cleaned.
A13	Unsealed haul roads would be regularly damped down with fixed or mobile sprinkler systems.
A14	Vehicular and foot traffic would be restricted to designated areas.
A15	Appropriate site speed limits would be imposed and signed on haul routes.
A16	Wheel-wash facilities or rumble grids would be provided and used near site exit points, and a street-cleaning regime would be implemented to remove any dirt tracked onto roads.
Demolition	
A17	Water suppression would be used during demolition as required.
A18	The insides of buildings would be stripped where feasible and reasonable, before demolition.
A19	Biological debris (such as bird nests and droppings) would be bagged and removed or damped down prior to building demolition.
A20	Debris screens or sheeting would be used to screen buildings, where dust-producing activities are taking place.
A21	An asbestos survey would be undertaken of buildings that would be demolished as part of the NWRL construction works. The survey would be conducted by a suitably qualified person.
A22	Asbestos handling and management would be in accordance with: – NSW Occupational Health & Safety Act 2000. – NSW Occupational Health & Safety Regulation 2001. – Code of Practice for the Safe Removal of Asbestos 2nd edition (NOHSC, 2005). – Code of Practice for the Management and Control of Asbestos in Workplaces (NOHSC, 2005). – NSW Protection of the Environment Operations (Waste) Regulation 2005: 'Section 42 Special Requirements Relating to Asbestos Waste'. – AS2601:1991 Demolition of Structures.
Vehicles and Equipment	
A23	Engines of on site vehicles and plant would be switched off if left idling for extended periods of time.
A24	Low emission vehicles and plant fitted with catalysts, diesel particulate filters or similar devices would be used, where feasible and reasonable.
A25	Plant would be well maintained and serviced in accordance with manufacturers' recommendations.
A26	Haul routes and plant (including generators) would be sited away from sensitive receivers, such as dwellings and schools, where feasible and reasonable.
A27	Vehicle emissions would be minimised through methods such as using alternative modes of transport, such as encouraging car pooling by construction workers, and maximising vehicle utilisation by ensuring full loading and efficient routing.
A28	Precautions would be implemented to prevent the occurrence of smoke emissions or fumes from site plant or stored fuel oils.

Note: Identifying codes for mitigation measures are taken, where possible, from EIS 1 and EIS 2 for NWRL to maximise consistency. As such, the codes are not always sequential for this EIS.

19.6.2 Operation

Air emission would be managed in accordance with an Operations Environmental Management Plan which would include an Air Quality section.

Generally, low emissions solvents used for graffiti removal can be used to minimise emissions, but this will not always be the case for effective treatment.

The operational mitigation measures are detailed in **Table 79**. Pollution control measures applied at the site would be designed to meet the requirements of the *Protection of the Environment Operations Act 1997* and *Protection of the Environment Operations (Clean Air) Regulation 20*10.

Table 79 – Operational Air Quality Mitigation Measures

No.	Mitigation Measure
OpA1	Develop an OEMP including an Air Quality section.
OpA2	Location and design of air ventilation, car parks and kiss and ride facilities to consider avoidance of air quality impacts on sensitive receivers.
OpA3	Dedicated painting, degreasing, cutting, grinding, welding and similar such areas to be fitted with effective fume extraction systems to protect workers adequately, and if necessary filtration to ensure that no excessive impacts occur at nearby receptors.
OpA3	Where possible, activities where large quantities of solvents or air pollutants may be released near the site boundary and upwind of a receptor should be avoided or postponed to a more suitable period of weather. Where possible, low VOC solvents should be used, in the minimal quantity necessary to be effective.

Note: Identifying codes for mitigation measures are taken, where possible, from EIS 1 and EIS 2 for NWRL to maximise consistency. As such, the codes are not always sequential for this EIS.

19.7 Conclusions

The predominant construction impacts would be associated with dust generation from exposed surface areas, including materials stockpiles, hardstand areas and unformed access tracks. These impacts are typically managed through the use of water carts and temporary covers as applicable. Management planning strategies to assist in the reduction of exposed surface areas during construction, which comprise excavation scheduling and progressive stabilisation strategies, would also significantly reduce the potential for adverse impacts to local air quality.

Operational activities can also be managed to maintain potential impacts to acceptable levels. The primary means to manage operational impacts is through adequate design of the dedicated workshop areas to include the normal levels of air pollution capture, treatment or dispersion as well as management of ventilation and provision of respiratory PPE devices for site staff working within these areas.

Overall, air quality is not expected to be adversely affected due to the operation of the RTRF. The trains are electric and do not generate any significant air emissions. The activities needed to maintain these trains also have generally low levels of air emissions, and can be conducted in well-designed workshops which can effectively control and mitigate such emissions as well as personnel exposure to these emissions.

This RTRF would complement the NSW State Plan and aims of the EPA's Action for Air through a number of direct and indirect means. The operation of the RTRF and related infrastructure aims to reduce dependence on private motor vehicle transport and hence would reduce traffic emissions by providing the accessible public transport in the northwest region of Sydney. The increased uptake of public transport, and the corresponding decreased dependence on private motor vehicles would have a positive effect on the regional air quality for Sydney.

20.0 Hazards, Risks and Waste

20.1 Introduction

This section provides consideration and assessment of hazards and risks associated with storage and handling of chemicals and other dangerous goods, as well as in relation to bushfire risk, and the issues associated with management of wastes.

20.2 Director General Requirements

The following sections address the Director-General's Requirements as they relate to hazards, risks and wastes, which are listed in **Table 80**.

Table 80 – Director-General's Requirements: Hazards, Risks and Wastes

Requirement	Where Addressed in EIS
Hazards, Risks and Wastes, including but not limited to	
consideration of the hazards and risks associated with the use, storage and transportation of dangerous goods consistent with the Department's Applying SEPP 33 (DUAP, 1994), and if relevant, a Preliminary Hazard Analysis in accordance with the Department's Hazardous industry Advisory Paper No. 6 Guidelines for Hazard Analysis;	Section 20.3
An assessment of bushfire hazards, including the identification of access and egress from the site and evacuation routes;	Section 20.4
the identification and management of chemicals and waste material.	Section 20.3 (chemicals) Section 20.5 (Waste)

20.3 Hazardous Materials

20.3.1 Screening Thresholds

DP&I's guideline *Applying SEPP 33* sets out the screening thresholds for different classes of dangerous goods. The relevant thresholds are set out in **Table 81**.

The purpose of the initial *State Environmental Planning Policy No. 33 – Offensive and Hazardous Development* (SEPP 33) risk screening is to determine if more detailed assessment is required given a certain quality of each type of dangerous good. If storage and transportation of dangerous goods is below these risk screening thresholds then, under SEPP 33, the facility is not considered to be potentially hazardous development and a Preliminary Hazards Analysis is not required.

It is not known at this stage the actual quantities of these dangerous goods. As such, an assessment of the thresholds at which storage and transportation of these dangerous goods would be expected to result in the potential for impacts has been carried out. The RTRF will be operated such that these thresholds are not exceeded.

Table 81 – Hazardous Materials Screening Analyses

Class of Dangerous Good	Description of Dangerous Good Class	Use at the RTRF	Threshold for Storage at RTRF	Threshold for Transportation for RTRF
1. Explosives	Substances or articles used to produce explosions or pyrotechnic effects.	No Class 1 materials will be stored or used at the RTRF.	NA	NA
2 Compressed or liquefied gases, or gases	Class 2.1 — flammable gases (gases which ignite on contact with an ignition source).	Acetylene would be stored for the purposes of oxyacetylene welding.	5 m^3 (at 5 m from the site boundary) [1]	Over 30 movements per week or more than 2t per load.

Class of Dangerous Good	Description of Dangerous Good Class	Use at the RTRF	Threshold for Storage at RTRF	Threshold for Transportation for RTRF
dissolved under pressure	Class 2.2 — non-flammable, non-toxic gases: gases which are neither flammable nor poisonous whether compressed or cryogenic.	Class 2.2 materials are not considered to be hazardous materials under SEPP 33.	NA	NA
	Class 2.3 — poisonous gases: gases liable to cause death or serious injury if inhaled.	No Class 2.3 materials will be stored or used at the RTRF.	NA	NA
3 Flammable liquids	PGI — highly flammable liquids: boiling point below 35° C.	Highly flammable liquids will not be stored at the RTRF.	NA	NA
	PGII — flammable liquids: flashpoint of less than 23° C and boiling point above 35° C.	Substances such as petrol, acetone, and methylated spirits may be stored on site as solvents and degreasing agents. Petrol will be stored during construction.	2 m^3 (at 5 m from the site boundary) [1].	Over 45 movements per week or more than 3t per load.
	PGIII — liquids: flashpoint above 23° C but not exceeding 61° C and boiling point greater than 35° C.	Substances such as kerosene, mineral turpentine may be stored on site as solvents and degreasing agents.	2 m^3 (at 5 m from the site boundary) [1].	Over 60 movements per week or more than 10t per load.
4 Flammable solids	Substances liable to spontaneous combustion and substances which in contact with water emit flammable gases.	No Class 4 materials will be stored or used at the RTRF.	NA	NA
5 Oxidising agents and organic peroxides	Class 5.1 — oxidising agents.	Some cleaning products (include bleach) contain Class 5.1 materials.	2t	Over 30 movements per week or more than 2t per load.
	Class 5.2 — organic peroxides.	No Class 5.2 materials will be stored at the RTRF.	NA	NA
6 Poisonous (toxic) and infectious substances	Class 6.1(a) — poisonous (toxic) substances.	Pesticides may be stored at the RTRF for weed control in the landscaped areas.	0.5 m3 (or 0.5 t)	NA
	Class 6.1(b) — harmful (toxic) substances.	No Class 6.1(b) materials will be stored at the RTRF.	NA	NA
	Class 6.2 — infectious substances.	No Class 6.2 materials will be stored at the RTRF.	NA	NA
7 Radioactive substances	Materials or combinations of materials which spontaneously emit radiation.	No Class 7 materials will be stored at the RTRF.	NA	NA
8 Corrosive Substances	Substances which by chemical action, will cause severe damage when in contact with living tissue, or in the case of leakage will materially damage or even destroy other goods.	Acids and alkali materials will be used at the RTRF for cleaning purposes.	PG(I)- 5t / 5m^3 PG(II)- 25t / 25m^3 PG(I)- 50t / 50m^3	Over 30 movements per week or more than 2t per load.
9 Miscellaneous Dangerous Goods	Substances and articles which present dangers not covered by other classes.	No Class 9 materials will be stored at the RTRF.	NA	NA

Note 1: The table shows the minimum volume to be stored at a minimum distance from the site boundary as specified in Applying SEPP 33. The threshold increases via a logarithmic relationship setting a larger non-hazardous volume as distance from the boundary increases.

20.3.2 Construction

The construction activities would require the temporary storage of oils and fuels, including petrol and diesel. Oils are not classified as dangerous goods under the Australian Dangerous Goods Code. Petrol is considered to be a Class 3 Flammable Liquid in Packaging Group II (PGII). Diesel is classified as a Class C1 Combustible Liquid. Combustible Liquids are not considered hazardous unless they are stored with Class 3 Flammable Liquids. If a diesel is stored together with petrol then it is treated as a Class 3 Flammable Liquid. As such, storage of diesel or petrol at the RTRF construction site will not occur in the same location.

For Class 3 Flammable Liquids (PGII), SEPP33 establishes a screening threshold which relates to the quantity of petrol stored and the distance to the site boundary. The screening threshold in Applying SEPP 33 sets a minimum threshold of 2 m^3 of petrol to be stored at 5 metres from the site boundary, increasing (via a logarithmic relationship) to 2,000 m^3 at 50 metres form the site boundary. The guideline does not specify a threshold beyond 50 metres from the site boundary.

The construction site for the RTRF is large, and contains a significant area available for storage of petrol and diesel more than 50 metres from the boundary. As such, the actual volume of petrol and diesel likely to be stored the site will be able to be managed such that the screening thresholds in Applying SEPP 33 are not exceeded. As such the site would not be a potentially hazardous site. Storage of petrol would be in accordance with *Australian Standard AS 1940–2004: Storage and Handling of Flammable and Combustible Liquids.*

Minor quantities of other chemicals may be required during construction, however these would be well below the screening thresholds. These would be stored in bunded areas, and site specific controls would be developed to reduce the environmental release of potentially harmful chemicals and to reduce the risk of any such releases entering local waterways (Mitigation measure SW38).

20.3.3 Operation

Only small quantities of dangerous goods would be stored at the RTRF. Dangerous Goods that would be stored are solvents, paints, cleaning fluids, greases, acids and alkali materials – which would be used for cleaning or trains, minor repairs and maintenance of trains and graffiti removal. These dangerous goods are identified where relevant in **Table 81**, and are discussed further below.

All dangerous goods will be stored inside buildings or other appropriate storage facilities. Alternatively, dangerous goods may be brought onto site for immediate use, and may not be stored at the RTRF.

Given the low quantities of materials to be stored at the site, and the commitment to store volume below the thresholds set out in *Applying SEPP 33*, a PHA is not considered to be necessary.

Class 2.1 Compressed Gases

Acetylene would be stored for the purposes of welding. It is expected that up to 10 cylinders would be required to be stored at the RTRF at any one time. A standard large cylinder of Acetylene is approximately 0.4 m^3. As such 10 cylinders would correlate to approximately 4 m^3, which is below the minimum threshold (of 5 m^3) for a pressurised flammable gas. It is highlighted that the location of the dangerous goods store is 12 metres from the site boundary. At that distance over 110 m^3 of Class 2.1 Compressed Gases could be stored below the potentially hazardous threshold. The RTRF will store significantly less than this quantity of Class 2.1 Compressed Gases.

Class 3 Flammable Liquids

Substances such as petrol, acetone, kerosene, mineral turpentine and methylated spirits may be stored on site as solvents and degreasing agents. These substances are within Packaging Groups II and III. The dangerous goods store is 12 metres from the site boundary. At that distance approximately 400 m^3 of Class 3 Flammable Liquids (PGII or PGIII) could be stored below the potentially hazardous threshold. The RTRF will store significantly less than this quantity of Class 3 Flammable Liquids.

Class 5 Oxidising Agents

Applying SEPP 33 sets a screening threshold for all Class 5.1 Oxidising Agents of 5 tonnes except for ammonium nitrate and dry pool chlorine, which would not be stored at the RTRF. The volumes to be stored at the RTRF will be managed so that these screening thresholds are not exceeded.

Class 6 Poisonous Substances

The RTRF will use only small amounts of commercial pesticides for landscaping on-site landscaping purposes. It is not expected that more than 0.5 m^3 would be required to be stored at any one time.

Class 8 Corrosive Substances

Acids and alkali materials will be used at the RTRF for cleaning purposes. Applying SEPP 33 sets a different screening threshold for each different packaging group as shown in **Table 81**. The volumes to be stored at the RTRF will be managed so that these screening thresholds are not exceeded.

Transportation Thresholds

Because of the small volumes of dangerous goods to be stored at the RTRF, the transportation thresholds set out in *Applying SEPP 33* will not be exceeded.

Applying SEPP 33 does not contain a threshold for the transportation of Class 6.1(a) Poisonous Substances (pesticides). It is not expected that more than one movement per week would be required for the delivery of small quantities of pesticide to the site would be required.

20.4 Bushfire Risks

Bushfire risk is defined as the chance of a bushfire igniting, spreading and causing damage to life and property, and assets of value (including ecological assets) to the community. Factors contributing to bushfire risk include vegetation type, slope, aspect, weather conditions and proximity of hazards to assets (the further away an asset is located from a bushfire hazard, the less likely it is to be damaged or destroyed by a bushfire).

For the RTRF proposal, bushfire risk is most likely to arise from the area of riparian vegetation adjoining the site to the west. This vegetation is mapped as 'Vegetation Category 1' bushfire prone land. However, the land surrounding the site is the subject of planning for future development as urban land. As such, the nature and extent of vegetation immediately surrounding the RTRF is expected to change over time. Specifically, it is expected that the extent of vegetation will reduce as the urban development of the surroundings progresses.

There is no statutory requirement to comply with the requirements *of Planning for Bushfire Protection 2006* or, for the approval of the Rural Fire Service concerning measures to be taken with respect to the development to protect persons, property and the environment from the danger that may arise from a bushfire. Notwithstanding this, matters that are generally considered necessary by the Rural Fire Service for industrial developments include the provision of a "defendable space" (Asset Protection Zone) to widths necessary to provide a safe working environment for fire-fighters and the protection of the building;

fuel management of the vegetation within the defendable space; access provisions for emergency services; construction standards to buildings; water supplies for firefighting operations and evacuation provisions.

Since the land will be developed with minimal vegetation it will not be bushfire prone land and there is a low bushfire risk to the development. As such, there is no requirement to provide a formal 'defendable space' or construction standards for the buildings. However, the buildings at the RTRF will all be surrounded with sealed roads which could provide access for fire fighting vehicles. The RTRF will also include for the provision of a fire-fighting water supply to allow for fire fighting connection.

Furthermore, an Evacuation Plan will be prepared so that emergency evacuation is managed in a controlled, coordinated and efficient way if an emergency event occurs within or external to the development. Evacuation would be via Tallawong Road, although other evacuation routes would be investigated as part of the preparation of the emergency evacuation plan.

Hot works (including vegetation clearing requiring heat producing equipment), could also contribute to the outbreak of a bush fire. In order to mitigate this, hot work not to be undertaken on declared total fire ban days, and bushfire awareness would be included in staff induction and in toolbox talks.

20.5 Waste Management

20.5.1 Construction Waste Sources

The project has the potential to generate a number of different types of waste during the civil construction works which would require management and disposal in accordance with relevant state legislation and government policies.

The key waste stream anticipated to be generated during the civil construction works is excess fill associated with excavation of the site, which is expected to result in approximately 140,000 m3 of spoil requiring management and disposal. The majority of excavated spoil material would be uncontaminated crushed sandstone material, classified as Virgin Excavated Natural Material (VENM).

Other waste streams anticipated to be generated during the civil construction works include:

- Demolition waste from demolition of residential and commercial buildings: concrete, bricks, tiles, timber (untreated, treated), metals, plasterboard, carpets, electrical and plumbing fittings and furnishings (doors, windows).
- Hazardous waste (including asbestos).
- Green waste from the clearing and grubbing of vegetation.
- General construction waste: timber formwork, scrap metal, steel, concrete, plasterboards and packaging material.
- General waste from office and crib rooms: putrescibles, paper, cardboard, plastics, glass and printer cartridges.
- Waste from operation and maintenance of vehicles and machinery: adhesives, lubricants, waste fuels and oils, engine coolant, batteries, hoses and tyres.
- Wastewater from other sources including dust suppression and washdown and sewerage/greywater from construction compounds.

20.5.2 Spoil Management

Waste management activities associated with the construction works are not considered to pose a significant risk to the environment given that standard measures are available to address waste generation, storage, disposal and re-use in order to reduce impacts. The NWRL Project has a strategy for re-use of spoil material (VENM) which follows a hierarchy of spoil management and reuse options, in order of preference as follows:

- Reuse within the project.
- for environmental works.
- other development projects.
- land restoration.
- landfill management.

The NWRL project in its entirety is targeting 100% beneficial reuse of the usable spoil, recognising that a proportion of excavated material would not be a reusable resource. It is highlighted that the quantity of excess spoil has been minimised by the balancing of cut and fill for the RTRF. In this case 140,000 m3 of excess spoil represents only 25% of the total excavation, meaning that 75% of the soil will be reused at the RTRF in the construction of the embankment and building pad levels.

There are a number of extractive industry voids and other sites in Western Sydney that are potentially available for large scale VENM disposal. These include:

- Wallgrove Quarry, Archibald Road, Eastern Creek.
- CSR PGH Schofields Quarry Meadows Road.
- CSR PGH Horsley Park Old Wallgrove Road, Horsley Park.
- Lend Lease Australian Defence Industry Site, St Marys.
- Austral Plant 3 Old Wallgrove Road, Horsley Park.
- Penrith Lakes Development Corporation Penrith Lakes Scheme.

The capacity of the above listed spoil reuse locations suggest that adequate opportunity exists for spoil to be appropriately managed during the civil construction works. The actual spoil reuse sites for the project would need to be determined closer to the commencement of construction, as sites which may accept spoil materials from 2013 through to completion of excavation may change. Determination of the disposal sites would be the ultimate responsibility of the contractor.

Any spoil that does not meet the definition of VENM (or otherwise subject of an exemption under the Waste Regulations) will need to be classified in accordance with *NSW Waste Classification Guidelines Part 1: Classifying Waste* (DECC 2008), and would be directed to a waste management facility lawfully permitted to accept the specified classification of waste. The volume of excess spoil which do not meet the definition of VENM (or as ENM) is expected to minimal.

20.5.3 Operation Waste Management

A variety of solid and liquid wastes are expected to be generated due to the operation of the RTRF, however this is expected to be relatively minor when compared with construction generated waste.

The main types of activities that would generate waste are detailed below.

- Train Cleaning Activities: general wastes would be collected from cleaning activities on trains. These wastes would include general non-recyclable waste, recyclable wastes such as plastics and aluminium cans and office waste including paper and plastics as

well as general litter. Waste would primarily be generated by the general public. There is significant potential, however to minimise waste impacts at this source level by providing the means of disposing of waste into separate waste streams including recyclable disposal for paper, plastics, aluminium and general recycling and non-recyclable disposal. This would ensure less energy expenditure for the separation of wastes at the point of disposal.

- Train Maintenance Activities:
  - Waste oil and greases generated during cleaning, inspection and maintenance activities on the trains
  - Train maintenance consumables.
  - Spent spill kit absorbent materials used to clean up spills.
  - Solvents, paints, cleaning fluids, greases, acids and alkali materials – which would be used for cleaning, minor repairs and graffiti removal.
- General office waste.

The management of waste during operation is not considered a key issue given that impacts may be reduced using standard measures. No significant adverse waste impacts are anticipated to occur during operation of the RTRF.

20.5.4 Mitigation Measures

Waste management in NSW is prioritised according to the principles of a resource management hierarchy embodied in the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act). The hierarchy is as follows:

- Avoidance of unnecessary resource consumption.
- Resource Recovery (including reuse, reprocessing, recycling and energy recovery).
- Disposal.

TfNSW is committed to the objectives of responsible management of waste and would ensure that the project complies with this hierarchy and the legislation relevant to waste management including the *Protection of the Environment Operations Act 1997* and associated regulations, the *Waste Classification Guidelines* (DECC 2008) and the *NSW Government's Waste Reduction and Purchasing Policy (WRAPP) Guidelines*.

The project would target the following in regards to waste management:

- 100% beneficial reuse of usable spoil.
- 95% beneficial reuse of construction and demolition waste.

The Environmental Management Framework, provided in **Appendix L**, details the environmental, stakeholder and community management systems and processes for the construction of the NWRL.

Mitigation measures have been developed to avoid, reduce and manage identified potential impacts and are set out in **Table 82**.

Table 82 – Waste Management Mitigation Measures

No.	Mitigation Measure
W1	All waste would be assessed, classified, managed and disposed of in accordance with the Waste Classification Guidelines (DECC, 2008).
W2	All waste materials removed from the sites would only be directed to a waste management facility lawfully permitted to accept the materials.
W3	Excavated material and spoil would be beneficially reused on the NWRL project site or other sites, where feasible and

No.	Mitigation Measure
	reasonable, in accordance with the NWRL spoil use hierarchy.
W4	Appropriate storage, treatment and disposal procedures would be implemented for any contaminated spoil.
W5	Cleared site vegetation would be mulched for reuse in rehabilitation and landscaping works. Topsoil generated during site preparation activities would be stockpiled for reuse in landscaping activities.
W6	Initial and ongoing education would be provided to staff and sub-contractors regarding the importance of appropriately managing waste.
W7	Recyclable wastes, including paper at site offices, would be stored separately from other wastes. Storage facilities would be secure and recyclables collected on a regular basis.
W8	Reusable materials would be stored separately, in secure facilities.
W9	Worksites would be free of litter and good housekeeping would be maintained.
W10	Vermin proof bins would be utilised onsite.
W11	Waste oil, other liquid wastes and spillages would be collected and stored in bunded areas.
W13	Waste truck loads would be covered, and tailgates secured prior to trucks leaving the worksite.
W14	Centralised reporting and auditing of waste volumes and disposal destinations would be employed.
W15	Construction waste would be minimised by accurately calculating materials brought to the site and limiting materials packaging.
W16	Materials such as (noise hoarding, site fencing, and so on) would be reused or shared, between sites and between construction contractors where feasible and reasonable.
OpW1	Develop an Operational Environmental Management Plan including a section on Operational Waste and Resource Recovery Management. This would detail opportunities for avoiding waste generation and responsible disposal methods for different waste streams.

Note: Identifying codes for mitigation measures are taken, where possible, from EIS 1 and EIS 2 for NWRL to maximise consistency. As such, the codes are not always sequential for this EIS.

21.0 Cumulative Impacts

The following sections contain an assessment of only those issues which are considered to have potential cumulative impacts.

Cumulative impacts are incremental environmental impacts that are caused by past, present or reasonably foreseeable future activities which, when combined, may have a cumulative effect. When considered in isolation, the environmental impacts of any single project upon any single receiver or resource may not be significant. Significant effects may arise, however, when individual effects are considered in combination, either within the same project or together with other projects.

This Section provides an assessment of the potential cumulative impacts and interactions that may arise as a result of the NWRL and the construction and operation of other projects concurrent with, and in close proximity to the RTRF site.

Relevant projects for which cumulative impacts are considered possible are identified below.

- NWRL Cudgegong Road Station – construction and operation.
- NWRL Train Operations – operation.
- Schofields Road Upgrade – construction.
- Urban development within Alex Avenue and Area 20 precincts within the North West Growth Centre – construction and operation.

These projects would have the following potential cumulative impacts with the RTRF:

- Utilities and servicing during operations of the RTRF.
- Potential cumulative air quality impacts during construction.
- Potential cumulative noise impacts during construction and operations.

Cumulative impacts during construction would include:

- Noise and vibration impacts to receptors throughout the area including those along Windsor Road, Schofields Road, Tallawong Road, Cudgegong Road, Rouse Road, Macquarie Road and Hambledon Road, as a result of construction and related traffic.
- Cumulative air quality impacts.
- Disruption to traffic along various roads, including Schofields Road as a result of construction related traffic.
- Water quality impacts on First Ponds Creek as a result of potential pollution of stormwater run-off from construction activities.

Cumulative impacts during operation would include:

- Demand for utilities and services.
- Increase in noise levels.
- Visual amenity and landscape.
- Land use.
- Access and traffic.

21.1 Utilities and Services

The Utility Services Assessment report in **Appendix D** has considered the servicing requirements for the RTRF in the context of infrastructure and servicing requirements of the surrounding development. As much of the infrastructure is currently in the planning phase there is the opportunity to influence the design of the infrastructure to accommodate the requirements of the RTRF. TfNSW will continue to liaise with utility providers in this regard.

21.2 Air Quality

Cumulative air quality impacts arising due to activities at the facility are unlikely to occur when considering the current local land use in the vicinity of the RTRF. The RTRF site is located in an area away from other industrial activities which may generate similar air emissions would result in cumulative air quality impacts.

When considering the scale of air emissions emanating from the RTRF and the mitigation measures utilised at the site, the potential air emissions would be minimal and hence unlikely to result in cumulative impacts regardless of the future land uses surrounding the RTRF.

21.3 Noise

Construction noise will be managed in accordance with the NWRL Construction Noise and Vibration Strategy.

The cumulative operational noise impact of more than one development can be compared against the amenity criteria provided in the EPA's *Industrial Noise Policy* (INP). The amenity criteria act like an overall cap on industrial noise levels at any receptor. However, there are a limited number of other industrial developments in the vicinity of the RTRF. Existing agricultural industries (such as poultry farms) are likely to be relocated as the area urbanises.

The RTRF has been assessed in accordance with the INP. The INP specifically does not deal with transportation corridors (roadways, railways and air corridors). The rail alignment for the NWRL has been assessed in accordance with the Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects (IGANRIP). The IGANRIP does not apply to projects involving maintenance facilities for rolling stock which should be assessed in accordance with the INP.

The INP and IGANRIP provide separate assessment methodology (including different project specific noise levels and different noise averaging periods) and are mutually exclusive. The noise impact assessment has made assumptions as to the likely background noise levels for an urban area, which is subject of low density transportation systems.

21.4 Traffic and Transport

Cumulative impacts may arise as a result of a number of other planned and potential construction activities with the vicinity of the RTRF site, including the construction of the Cudgegong Road Station precinct, the Schofields Road upgrade and urban development activities within the Alex Avenue and Area 20 precincts within the North West Growth Centre.

The Stage 1 upgrade of the Schofields Road is expected to be completed by late-2014, and it has been agreed with RMS that there will be no substantive overlap or cuculative traffic impacts. Stage 2 works are subject to funding arrangements and will occur over a further 24 – 30 months. It is anticipated that the construction phase of the RTRF may coincide with the Schofields Road Upgrade (Stage 2). Cumulative impacts of the RTRF and the Schofields

Road Upgrade (Stage 2) will be managed through ongoing liaison with the RMS throughout the duration of construction works.

There are also potential cumulative impacts concerning the timing of the RTRF construction phase in relation to construction within adjacent urban development areas, including the Alex Avenue Growth Centres Precinct. Whilst ongoing construction activities have been taken into account in traffic counts undertaken for the NWRL, future urban development patterns and timing may change the number and dispersal of construction and residential traffic within the existing road network. For this reason the mitigation measures require consultation with key stakeholders within the Alex Avenue Growth Centre Precinct to ascertain and manage potential cumulative traffic impacts within the locality.

Construction activities for both the RTRF and the NWRL will occur within the same timeframe and TfNSW will be responsible for managing the cumulative impacts of these projects, particularly with regard to construction traffic generated within the Cudgegong Road Station Precinct. Construction traffic for both projects will be managed within the NWRL Construction Environmental Management Framework (**Appendix L**) which details the environmental, stakeholder and community management systems and processes for the construction phase, including for traffic management. The cumulative construction traffic impact will be less than was forecast in NWRL EIS 1 due to the balancing of earthworks at the RTRF site, and the resultant substantial reduction in the amount of spoil requiring off-site disposal.

In light of the above it is considered that cumulative impacts of the proposed development can be suitably managed through the mitigation measures outlined in **Section 10**.

21.5 Surface Water and Flooding

The surface water impacts are predicted to be negligible with the implementation of best practice stormwater management during construction operations. In particular:

- The incremental increase in stormwater pollutant loads during construction is likely to be consistent with the concentration of pollutant loads from the existing land uses on, and adjacent to, the RTRF site.
- The incremental change in stormwater pollutant loads from the RTRF site during the operational phase is likely to result in an improvement of water quality in First Ponds Creek.
- The operational phase of the RTRF site would create an incremental increase in low flows from the broader First Ponds Creek catchment. This would result in some changes to the ephemeral hydrologic regime of First Ponds Creek and will have some impacts on the local ecology resulting in a loss of macrophytes dependent on ephemeral hydrology. These impacts will be less than those normally experienced by waterways in existing suburbs and would be in line with impacts associated with current best practice stormwater management.

As such, the potential cumulative impacts are therefore considered to be acceptable.

22.0 Environmental Risk Analysis

22.1 Introduction and Methodology

This chapter includes the Environmental Risk Analysis (ERA) for the RTRF proposal and identifies the following elements:

- Potential environmental impacts associated with the project, environmental performance criteria and development standards.
- Mitigation measures and any significant residual impacts.
- The nature and extent of environmental impacts likely to remain after the implementation of control measures.

The ERA is based on input from the specialist environmental consultants detailed in the preceding chapters, and is consistent with the ERA prepared for the SSI Application. This ERA seeks to qualitatively categorise each environmental issue. **Table 83** below outlines the methodology used to guide the identification of appropriate risk ratings.

Risk categorisation is determined based on the matrix in **Table 83** which balances the likelihood of an impact occurring with the consequences of the impact. The criteria for determining likelihood and consequence are identified in **Table 84** and **Table 85** below.

Table 83 – Risk analysis categories and criteria for risk ranking

Consequence	Likelihood				
	Very unlikely	***Unlikely***	***Possible***	***Likely***	***Almost certain***
Catastrophic	High	Very High	Very High	Extreme	Extreme
Major	Moderate	High	High	Very High	Extreme
Moderate	Low	Moderate	Moderate	High	Very High
Minor	Low	Low	Low	Moderate	High
Insignificant	Low	Low	Low	Low	Moderate

Table 84 – Criteria for evaluating likelihood

Descriptor	Description	Probability
Almost Certain	The event is almost certain to occur in the course of normal or abnormal construction or operational circumstances.	>90%
Likely	The event is more likely than not to occur in the course of normal construction or operational circumstances.	51% – 90%
Possible	The event may occur in the course of normal construction or operational circumstances.	26% – 50%
Unlikely	The event is unlikely to occur in the course of normal construction or operational circumstances.	5% – 25%
Very Unlikely	The event may occur in exceptional construction or operational circumstances only.	< 5%

Table 85 – Criteria for evaluating consequence

Descriptor	Level Definition
Catastrophic	Long term (greater than three months) and irreversible impacts. Resulting in a major prosecution under relevant environmental legislation.
Major	Medium term (between one and three months) and potentially irreversible impacts. Resulting in a fine or equivalent penalty under relevant environmental legislation.
Moderate	Moderate and reversible impacts, or medium term (between one and three months).
Minor	Minor and reversible impacts, or short term impacts (less than one month).
Insignificant	Minor, negligible impacts.

Each potential environmental impact was initially ranked between low and extreme based on the environmental impacts that could potentially result if the potential impacts were unmitigated.

Subsequent to this initial risk ranking the environmental issues identified were assigned a second risk ranking to indicate the risk following implementation of the recommended mitigation measure/s.

22.2 Outcomes

Table 86 below summarises the findings of the ERA. These findings present the outcome of the assessment of anticipated potential impacts, proposed mitigation measures and any environmental impacts for which mitigation still results in some impact occurring.

All environmental issues assessed in the preceding chapters are considered within the ERA, and is consistent with the ERA prepared for the SSI Application. Environmental issues not identified as 'key issues' in the DGRs for the RTRF proposal are also considered.

The ERA identifies where the environmental impacts associated with the RTRF proposal warrant mitigation, with the measures proposed as summarised detailed in Section 23 of this report. This ERA then assesses the effectiveness of these mitigation measures in addressing the potential environmental impact and identifies 'residual risk', being the risk unable to be practically controlled. This residual risk includes issues which are typically beyond the control of the proponent, contractor and assessment authority, such as weather events.

Where residual risks exist, management strategies will be implemented to minimise the risk. Residual risk identification is purposefully conservative in nature and should be taken as a 'worst-case' scenario.

No additional key issues have been identified as a result of the ERA.

Table 86 – Environmental Risk Analysis Outcomes

Issue	DGRs Matter for Consideration?	Potential Impact	Consequence	Likelihood	Risk ranking before control measures applied	Mitigation measure	Residual Consequence	Residual Likelihood	Risk ranking after control measures applies	EIS Section/ Appendix/ Reference
Land use, property and infrastructure planning	Yes	Implications for existing and future planning, land use and development strategies including planning for the Riverstone East Precinct	Moderate	Likely	High	Consultation with DP&I and Council	Minor	Very Unlikely	Low	Chapter 17
	Yes	Impacts on existing and planned infrastructure and utility services	Major	Very Unlikely	Moderate	Consultation with asset owners, including during detailed design	Minor	Very Unlikely	Low	Section 7.2.9
Biodiversity and ecology	Yes	Impacts on endangered or critically endangered ecological communities (flora and fauna)	Moderate	Almost Certain	Very High	Offsets in accordance with strategic certification	Minor	Almost Certain	High	Chapter 13
	Yes	Potential impacts on riparian vegetation and aquatic ecology of First Ponds Creek and its tributaries	Moderate	Likely	High	Site specific mitigation measures	Minor	Possible	Low	Chapter 13

Issue	DGRs Matter for Consideration?	Potential Impact	Consequence	Likelihood	Risk ranking before control measures applied	Mitigation measure	Residual Consequence	Residual Likelihood	Risk ranking after control measures applies	EIS Section/ Appendix/ Reference
Transport and traffic	Yes	Potential impacts on the local and regional road network during construction	Minor	Almost Certain	High	Provision of shuttle service for workers & servicing of offsite parking areas & Schofields Station. Schedule heavy vehicle movements outside peak periods	Insignificant	Almost Certain	Moderate	Chapter 10
	Yes	Potential impacts on the local and regional road network during operation	Moderate	Very Unlikely	Low	Prepare workplace travel plans: alternative modes for journeys to & from work	Minor	Very Unlikely	Low	Chapter 10
Noise and vibration	Yes	Potential noise impacts from operations in relation to existing and likely future land uses	Moderate	Almost Certain	Very High	Site specific mitigation measures and operational controls	Minor	Likely	Moderate	Chapter 11
	Yes	Potential noise impacts during construction	Moderate	Almost Certain	Very High	Standard mitigation measures	Minor	Almost Certain	High	Chapter 11
Non-Indigenous heritage and archaeology	Yes	Direct and indirect impact (including areas of heritage potential) of any sites	Minor	Very Unlikely	Low	Work to cease if unexpected archaeological finds are encountered.	Minor	Very Unlikely	Low	Chapter 14

Issue	DGRs Matter for Consideration?	Potential Impact	Consequence	Likelihood	Risk ranking before control measures applied	Mitigation measure	Residual Consequence	Residual Likelihood	Risk ranking after control measures applies	EIS Section/ Appendix/ Reference
Indigenous heritage and archaeology	Yes	Direct and indirect impact (including areas of heritage potential) of any sites	Minor	Almost Certain	High	Investigation and salvage. Work to cease if unexpected archaeological finds are encountered.	Insignificant	Almost Certain	Moderate	Chapter 15
Flooding and hydrology	Yes	Increased flood levels from temporary construction sites and completed facility	Major	Likely	Very High	Flood detention basins	Minor	Unlikely	Low	Chapter 12
	Yes	Pollution of water courses from sediment laden surface water runoff, and contamination through spills of fuels or chemicals	Major	Likely	Very High	Sediment & erosion control and stormwater filtration.	Minor	Unlikely	Low	Chapter 12
	Yes	Change to instream environment from alteration to water flow	Major	Likely	Very High	Infiltration, stormwater harvesting, detention	Moderate	Unlikely	Moderate	Chapter 12
	Yes	Impacts on salinity levels of the riparian corridor	Minor	Possible	Low	Standard mitigation measures	Insignificant	Unlikely	Low	Chapter 12
Bushfire	No	Potential for bush fire threat along the First Ponds Creek corridor	Major	Very Unlikely	Moderate	Site specific and standard mitigation measures	Moderate	Very Unlikely	Low	Section 20.4

Issue	DGRs Matter for Consideration?	Potential Impact	Consequence	Likelihood	Risk ranking before control measures applied	Mitigation measure	Residual Consequence	Residual Likelihood	Risk ranking after control measures applies	EIS Section/ Appendix/ Reference
Visual impacts, landscape and urban design	Yes	Impact on the visual amenity of the locality, particularly in combination with loss of vegetation	Moderate	Almost Certain	Very High	Site specific design and screening/ landscaping	Minor	Almost Certain	High	Chapter 16
	Yes	Construction phase would also introduce new elements into the visual landscape	Moderate	Almost Certain	Very High	Site specific screening.	Insignificant	Almost Certain	Moderate	Chapter 16
Social and Economic impacts	Yes	Potential amenity impacts to properties in the vicinity of the site	Moderate	Almost Certain	Very High	Application of mitigation measures for other aspects	Minor	Likely	Moderate	Chapter 17
Greenhouse Gas & climate change	Yes	Emissions of greenhouse gases during construction and operation contributing to climate change	Minor	Possible	Low	Risk assessment and sustainability initiatives	Insignificant	Unlikely	Low	Chapter 18
Air quality	Yes	Impacts to surrounding receivers from dust and exhaust emissions during construction	Minor	Likely	Moderate	Standard construction works mitigation measures	Insignificant	Possible	Low	Chapter 19

Issue	DGRs Matter for Consideration?	Potential Impact	Consequence	Likelihood	Risk ranking before control measures applied	Mitigation measure	Residual Consequence	Residual Likelihood	Risk ranking after control measures applies	EIS Section/ Appendix/ Reference
	Yes	Localised impacts to surrounding receivers from exhaust emissions from plant and traffic associated with the facility	Minor	Likely	Moderate	Site specific and standard mitigation measures	Minor	Unlikely	Low	Chapter 19
Resource use	No	Increased demand for potable water for use in the train wash facility	Minor	Almost Certain	High	Sustainability initiatives (water reuse)	Minor	Unlikely	Low	Section 8.4
	No	Increased electricity consumption during construction and operation	Minor	Almost Certain	High	Sustainability initiatives (reduce/ offset)	Insignificant	Likely	Low	Section 8.4
	No	Increased demand on local and regional resources including sand and aggregate during construction	Minor	Almost Certain	High	Sustainability initiatives (reduced resource use)	Insignificant	Likely	Low	Chapter 8
Cumulative impacts		Impacts to local community and the environment compounded by other concurrent construction activities in the vicinity of the project (including the NWRL)	Moderate	Possible	Moderate	Site specific and standard mitigation measures	Minor	Likely	Moderate	Section 21

23.0 Mitigation Measures

The collective measures required to mitigate the impacts associated with the proposed works are detailed in **Table 87** below. These measures have been derived from the previous assessment in Sections 9 to 21 and those detailed in appended reports.

Table 87 – Mitigation Measures Summary Table

No.	Mitigation Measures
Soils, Groundwater and Contamination	
Operation	
Soils and Contamination	
OpSG2	Procedures to quickly address any contaminant spill or accident would be developed and implemented during operation of the station sites.
Construction	
Contamination	
SG14	In the event of discovery of previously unidentified area(s) of potentially contaminated material, all work would cease in the vicinity of the discovery and not recommence until the extent of contamination has been assessed and if necessary, a Remediation Action Plan or similar has been prepared and endorsed by an accredited Site Auditor.
SG15	A Site Auditor would be required to certify that any contaminated areas have been remediated to a standard consistent with the intended land use prior to operation of the remediated site(s)
SG16	Bunds around fuel depots and stockpile areas would be installed to minimise the risk of contaminants reaching the water table.
Groundwater Management	
SG17	A groundwater monitoring plan would be prepared for the duration of the construction period. Parameters to be monitored would include groundwater levels and groundwater quality with field parameters, laboratory parameters and sample frequency to be developed prior to construction.
SG19	Water sampling and testing of groundwater would be undertaken during construction to determine the most suitable treatment processes to meet the required water quality standards.
Groundwater Treatment	
SG26	All feasible and reasonable opportunities for groundwater reuse for construction purposes or recycling nearby would be utilised in the first instance. Should groundwater inflows and required treatment volumes outstrip potential for water reuse for construction purposes, options for discharge would be investigated.
SG27	Where water salinity is found to be too high for discharge to creeks, brackish water reverse osmosis would be undertaken.
SG28	Dissolved iron would typically be removed from discharge water by oxidising the Ferric ion (Fe3+) to Ferrous (Fe2+) which enables precipitation and physical removal.
SG29	Water turbidity would typically be treated by settling / filters.
SG30	Iron reducing bacteria in discharge water would be typically treated by biocide dosing.

No.	Mitigation Measures
Soil Salinity	
SG34	Appropriate soil salinity mitigation measures would be adopted in accordance with Western Sydney Regional Organisation of Council's Draft Salinity Code of Practice and the former Department of Infrastructure, Planning and Natural *Resources' Guidelines to Accompany Map of Salinity Potential in Western Sydney* (2002). These mitigation measures would be included within Sub-Plans to the CEMP at all sites within areas of known risk of soil salinity.
Soil Contamination	
SG41	Excavation for offsite disposal will be subject of additional assessments for waste classification with particular focus on Areas of Environmental Concern including above-ground storage tanks, farm dams and asbestos in buildings.
SG48	Retaining walls will be designed to be free draining.
Traffic and Transport	
Construction	
T1	Directional signage and line-marking would be used to direct and guide drivers and pedestrians past construction sites and on the surrounding network. This would be supplemented by permanent and portable Variable Message Signs, where reasonable and feasible, to advise drivers of any potential delays, traffic diversions, speed restrictions, or alternative routes.
T2	The public would be notified of proposed traffic changes by newspaper, radio, project web site and other forms of community liaison.
T3	Co-ordination would occur with RMS via the Transport Management Centre's Traffic Operations Manager in the event of incidents or undue congestion.
T4	Management of pedestrian and vehicular access to and past construction sites would occur to ensure safe entry and exit procedures. Depending on the location, this may require manual supervision, physical barriers, temporary traffic signals and modification to existing signals or, on occasions, police presence.
T5	Access to existing properties and buildings would be maintained.
T6	Traffic controllers would manage heavy vehicle movements at worksites, and monitor the need for pedestrian control.
T7	All trucks would enter and exit the worksites in a forward direction, where feasible and reasonable.
T10	The need for, and provision of, alternative remote parking locations and shuttle bus transfers for daytime and night time construction staff would be considered for all construction sites during detailed construction planning.
T12	The Traffic and Transport Liaison Group established for the NWRL would consider individual events and any other special event needs and, make reasonable and feasible short-term adjustment to the construction phase activities and / or review and update detailed TMPs.
T34	Shuttle bus services for construction workers, would be provided to service strategic off-site parking areas and public transport facilities, such as Schofields Railway Station.
T35	Scheduling the movements of heavy vehicle haulage and deliveries outside peak periods, where feasible and practicable.
T36	TfNSW would liaise with the RMS and other stakeholders to manage cumulative issues during RTRF construction.

No.	Mitigation Measures
Operation	
OpT6	Consideration of peak period movements in assigning shift hours and changeover patterns for maintenance staff at the RTRF. Ideally these should be undertaken outside identified peak periods, noting that some staff may be constrained by rail operations.
OpT7	Preparation of workplace travel plans for RTRF entities that would provide alternative modes for journeys to/from work. The proximity of the future Cudgegong Road Station provides a significant opportunity to contribute towards a higher public transport mode share for RTRF staff journeys. The potential for RTRF staff shuttle services between the site and Cudgegong Road Station should be considered as part of this workplace travel plan
Noise and Vibration	
Construction	
NV1	Noise and vibration mitigation measures described in the NWRL Construction Noise and Vibration Strategy would be implemented.
Operation	
OpNV8	The implementation of feasible and reasonable noise and vibration mitigation measures such as: - The design of the sheds and equipment for the train wash and wheel lathe facilities would include noise mitigation as required in order to comply with the applicable noise criteria at the nearest noise sensitive receivers.
OpNV9	The implementation of feasible and reasonable noise and vibration mitigation measures such as: - Investigate the option to incorporate silencers in the compressed air lines of the rolling stock to reduce noise associated with brake air release events.
OpNV10	The implementation of feasible and reasonable noise and vibration mitigation measures such as: - Investigate methods to minimise rolling stock auxiliary noise levels during procurement.
OpNV14	Liaise with Planning Authorities and land development / delivery organisations to minimise the potential future land use conflict between the RTRF and future residential development in order minimise noise impacts on future residents.
Surface Water and Flooding	
Construction	
Flooding	
SW3	Construction equipment (or excess material) would be removed from flood prone areas (being the 100 year ARI flood extent) if wet weather is approaching and at the completion of each day's work activity. Stockpile sites would be located outside the Probable Maximum Flood. (check wording and use SW3)
Water Quality and Erosion and Sediment Control	
SW14	Water quality mitigation measures would be implemented in accordance with relevant requirements of: - Landcom Managing Urban Stormwater - Soils and Construction Volumes 1 and 2 (2009). - NOW Guidelines for Controlled Activities. - ANZECC Guidelines for Fresh and Marine Water Quality. - ANZECC Guidelines for Water Quality Monitoring and Reporting. - Water Management Act 2000. - Applicable Environment Protection Licences.

No.	Mitigation Measures
SW15	Treatment measures would be applied to water collected in sediment basins, including settling of coarse sediments, the use of flocculation for finer sediments and pH correction.
SW16	As a first preference, treated surface water collected in sediment basins would be reused onsite, eg for dust suppression. Additional opportunities for re-using water on site or for construction would be investigated and implemented where feasible and reasonable.
SW17	Exclusion zones would be designated on construction sites to limit disturbance.
SW18	Re-vegetating or stabilising disturbed areas would occur as soon as feasible.
SW20	Appropriate erosion control measures would be installed such as sediment fencing, check dams, temporary ground stabilisation, diversion berms or site regrading.
SW21	Clean water runoff would be diverted away from the works or disturbed areas wherever possible.
SW22	Temporary sediment basins would be installed as appropriate. The exact size and layout of sediment basins would be determined as part of the CEMP in accordance with the requirements of the relevant Environment Protection Licence.
SW26	Surface controls to promote ground stability, limit run-off lengths and reduce run-off velocities within the work sites would be implemented.
SW27	Ground stability would be re-established as soon as practicable following the completion of construction.
SW28	Installation of any permanent scour protection measures required for the operational phase would occur as soon as practical.
Riparian Corridor	
SW32	Where water is released into local creeks, outlet scour protection and energy dissipation would be implemented. The discharge point would be at the upstream end of a large pool where feasible and reasonable, to allow for slowing of water.
SW37	Temporary stockpile locations for both site establishment and earthworks operations would be specified prior to the commencement of construction activities. Diversion drains and erosion and sediment control measures would be in place prior to the commencement of any stockpiling activities. Material would only be stockpiled in designated stockpiling areas.
Contamination and Spills	
SW38	Site specific controls would be developed to reduce the potential for environmental releases of potentially harmful chemicals and to reduce the risk of any such releases entering local waterways. Storage of hazardous materials such as oils, chemicals and refuelling activities would occur in bunded areas.
Monitoring and Implementation	
SW40	A qualified environmental officer would be employed to advise on appropriate controls and to monitor the implementation and maintenance of mitigation measures.
SW41	All site staff would be engaged through toolbox talks or similar with appropriate training on soil and water management practices.
SW42	A surface water quality monitoring program for the construction period would be implemented to monitor water quality upstream and downstream of the construction areas. The monitoring programme would commence prior to commencement of any construction works and would build on available water quality data.
SW43	Surface water and water quality monitoring would be carried out periodically and after rainfall events. Monitoring would examine a range of appropriate indicators in accordance with standard guidelines.

No.	Mitigation Measures
SW44	Inspection of water quality mitigation controls (e.g. sediment control fences, sediment basins) would be carried out regularly and following significant rainfall to detect any breach of performance.
SW45	A stormwater management plan that identifies the appropriate design standards for flood mitigation based on the duration of construction, proposed activities and flood risks would be developed for each construction site. The plan would develop procedures to ensure that threats to human safety and damage to infrastructure are not exacerbated during the construction period.
Operations	
OpSW4	Treatment measures would be applied to water collected in on site detention basins, including settling of coarse sediments, the use of flocculation for finer sediments and pH correction.
OpSW6	The RTRF would be located above the 100 year ARI flood level.
OpSW11	Development within the floodplain would be designed to minimise adverse impacts on adjacent development for flooding up to the 100 year ARI event. And would be designed to maintain the operation of key evacuation routes, minimise impacts on critical infrastructure and flood hazard for flooding up to the PMF.
OpSW14	Water quality treatment measures (including a combination of swales, bioretention systems, water quality basins, gross pollutant traps) would be integrated into the drainage system to mitigate impacts to waterways.
OpSW15	A holistic approach to water quality and stormwater management would be adopted that incorporates Water Sensitive Urban Design principles to minimise impacts on the existing hydrologic regime. Such measures would include: - Managing total runoff volumes through the use of rainwater tanks and measures that promote stormwater infiltration. - Minimising increases in peak flows through the use of detention and retention measures as appropriate. - Preserving and enhancing the amenity of waterways by maintaining or providing natural vegetated measures. - Treating stormwater through a range of at source and end point measures that are integrated with the urban landscape.
OpSW16	A surface water quality monitoring program would be developed post construction to monitor water quality upstream and downstream of the works. Monitoring procedures and performance criteria would be established in consultation with local councils and relevant government agencies.
Non-Indigenous Heritage	
OpEH2	The inclusion of a vegetated buffer or boundary screening along the northern frontage of the study area will be provided to minimise the potential for views from Rouse Hill House and the house at 128 Westminster Street, Schofields.
Ecology	
Operational	
OpE2	Noxious and environmental weeds would be controlled within the site boundary
OpE6 and E15	To reduce disturbance to bats and nocturnal birds where reasonable and feasible, a range of measures would be undertaken, such as: - Artificial lighting would be directed to where it is needed and in a downwards orientation to avoid light spillage, Artificial light would be positioned to face away from areas of native vegetation. - Low-pressure sodium lamps would be used instead of high-pressure sodium or mercury lights. Where mercury lights are used, UV filters would be fitted. - The brightness of lights would be reduced to as low as legally possible, and in conformance with workplace health and safety standards.

No.	Mitigation Measures
	- Amplified speakers would be directed downwards and away from areas of native vegetation
Construction	
E1	The ecological component of the site induction would include information on: - Sensitivity of surrounding vegetation (particularly threatened vegetation). - Sensitivity of threatened fauna species (birds and bats). - Site environmental procedures (vegetation management, sediment and erosion control, protective fencing, weed control). - Emergency and incident response/ spill management (chemical spills, fire, injured fauna).
E2	Pre-clearing surveys would be undertaken to identify the presence of: - Hollow bearing trees and other habitat features - Threatened flora and fauna.
E6	Trees containing hollows would be felled using "Slow drop" technique (or similar as agreed with OEH). The slow-drop technique involves nudging and shaking the tree, followed by a controlled lowering of the tree to the ground.
E7	Where feasible and reasonable, topsoil and habitat elements (eg logs and felled trees) from sites that have few weed species would be stored and reused onsite.
E10	Construction sites would be revegetated using endemic native plant species where appropriate.
E12	To prevent establishment or spread of weeds: - Machinery would be cleaned before entering work sites - Weeds would be removed from within the mapped native vegetation areas at least 10m from the edge of the construction footprint (where access allows). - Cleared weed material would be disposed of at a site licensed to receive green waste.
E22	Where native vegetation is to be retained adjacent to or within construction sites, protective fencing and signage would be maintained in accordance with Australian Standard 4970 – 2009 Protection of Trees.
Indigenous Heritage	
IH4	The Indigenous Heritage component of the site induction would include information on: - Aboriginal heritage conservation areas and/or no-go zones for each construction site. - The legislation and penalties for impacting Aboriginal heritage objects would be conveyed to all construction managers and personnel.
IH7	Prior to the commencement of construction further ground verification of indigenous cultural and archaeological heritage will be carried out on the six northern properties for which access was not attained in the preparation of the Aboriginal Cultural Heritage Report prepared by Artefact.
Visual Amenity	
Operational	
OpV2	Cut–off and directed lighting would be used to ensure glare and light spill on surrounding existing and future residents are minimised.
OpV3	The colour and materials of service facility buildings would be selected to blend into adjacent bushland setting.
OpV10	High quality landscape and urban treatments would be used in and around the RTRF including: - Landscaping around detention ponds. - Landscaping along the Tallawong Road frontage. - Tree planting along the southern embankment. - Landscaping and tree planting along the Hambledon Road frontage to form a green buffer to retaining walls. - Retaining walls to be coloured in a muted natural tone or use natural materials (such as

No.	Mitigation Measures
	stones). - Buildings to consider use of a muted natural tone with landscaping to their northern elevations. - Integrated landscaping and security fencing. - Landscaping and tree planting along the northern frontage to form a green buffer to retaining walls
Construction	
V1	Existing vegetation around the perimeter of the construction sites would be retained where feasible and reasonable to act as a visual screen.
V2	Cut-off and directed lighting would be used to ensure glare and light trespass are minimised.
V4	Regular maintenance of site hoarding and perimeter site areas would be undertaken, including the prompt removal of graffiti.
V5	Visual mitigation would be implemented as soon as feasible and reasonable, and remain for the duration of the construction period.
V10	Hoardings would be designed to visually recede in more rural or bushland settings.
Local Business, Land Use and Community Facilities	
Operational and Construction	
LC1	Liaison would continue with statutory organisations, DP&I and local Councils to ensure the Project is integrated with local and regional land use planning, and that environmental planning instruments reflect the planning, construction and operation of the Project, and include integrated planning provisions to enhance potential future development.
LC2	Consultation would continue with the community throughout the project planning and construction phases to ensure that community members have adequate information about the project, the timing and scope of activities in their local area and impacts on their local facilities and recreational areas. Area specific Place Managers have been allocated to undertake this ongoing consultation.
LB2	The project has specialist Place Managers to act as a single, identifiable and direct point of contact for local residents, business people and community groups with the project during construction. Place Managers would work closely with all affected local businesses to help ensure timely responses to queries.
Climate change and greenhouse gas emissions	
GHG1	Spoil management would be undertaken in accordance with the spoil reuse hierarchy
GHG2	Where feasible and reasonable local materials would be preferentially used.
GHG3	If feasible and reasonable low GHG intensive alternative fuels (for example biofuels) would be used in construction equipment and vehicles.
GHG4	Vehicles with low fuel consumption ratings would be preferentially used where feasible and reasonable.
GHG5	Construction equipment and vehicle operators would be trained in driving practices which reduce fuel consumption.
GHG6	Construction equipment and vehicles would be regularly maintained to maximise fuel efficiency.
GHG9	A minimum of 20% of electricity needs associated with construction works would be offset.

No.	Mitigation Measures
GHG 11	If feasible and reasonable materials with lower embodied emissions would be preferentially specified for use.
GHG 12	An updated GHG assessment would be prepared during the detailed design stage of the project.
Air Quality	
A1	Working face and areas of open excavation would be kept to a minimum, where feasible and reasonable.
A2	Water suppression would be used for active earthwork areas, stockpiles, gravel roads and loads of soil being transported to reduce wind-blown dust emissions.
A4	The amount of excavated material held on site would be minimised.
A5	Areas of exposed earth would be minimised by staging construction activities and progressively landscaping and vegetating completed areas as the construction activities proceed, where feasible and reasonable.
A6	Enclosed rubble chutes and conveyors would be used where feasible and reasonable. Drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment would be minimised and/or water used to suppress dust emissions from such equipment.
A7	Cutting, grinding or sawing equipment would only be used in conjunction with suitable dust suppression techniques such as water sprays or local extraction.
A9	Dust generating activities would be assessed during periods of strong winds and rescheduled, where required.
A10	All vehicles carrying loose or potentially dusty material to and/or from the site would be covered.
Spoil Stockpiles	
A11	Stockpiles would be located away from sensitive receivers, where feasible and reasonable, and protected from the elements through barriers, covering or establishing a cover crop.
Haul Roads	
A12	Longer term and/or heavily used haul roads would generally be sealed. The criteria for sealing haul roads would be defined during detailed construction planning. Sealed haul roads would be regularly cleaned.
A13	Unsealed haul roads would be regularly damped down with fixed or mobile sprinkler systems.
A14	Vehicular and foot traffic would be restricted to designated areas.
A15	Appropriate site speed limits would be imposed and signed on haul routes.
A16	Wheel-wash facilities or rumble grids would be provided and used near site exit points, and a street-cleaning regime would be implemented to remove any dirt tracked onto roads.
Demolition	
A17	Water suppression would be used during demolition as required.
A18	The insides of buildings would be stripped where feasible and reasonable, before demolition.
A19	Biological debris (such as bird nests and droppings) would be bagged and removed or damped down prior to building demolition.
A20	Debris screens or sheeting would be used to screen buildings, where dust-producing activities are taking place.

No.	Mitigation Measures
A21	An asbestos survey would be undertaken of buildings that would be demolished as part of the NWRL construction works. The survey would be conducted by a suitably qualified person.
A22	Asbestos handling and management would be in accordance with: - NSW Occupational Health & Safety Act 2000. - NSW Occupational Health & Safety Regulation 2001. - Code of Practice for the Safe Removal of Asbestos 2nd edition (NOHSC, 2005). - Code of Practice for the Management and Control of Asbestos in Workplaces (NOHSC, 2005). - NSW Protection of the Environment Operations (Waste) Regulation 2005: 'Section 42 Special Requirements Relating to Asbestos Waste'. - AS2601:1991 Demolition of Structures.
Vehicles and Equipment	
A23	Engines of on site vehicles and plant would be switched off if left idling for extended periods of time.
A24	Low emission vehicles and plant fitted with catalysts, diesel particulate filters or similar devices would be used, where feasible and reasonable.
A25	Plant would be well maintained and serviced in accordance with manufacturers' recommendations.
A26	Haul routes and plant (including generators) would be sited away from sensitive receivers, such as dwellings and schools, where feasible and reasonable.
Operational	
OpA1	Develop an OEMP including an Air Quality section, which would include consideration of areas on the site to be maintained in a condition to minimise erosion (water and wind erosion). This may include vegetation, gravel surfacing, or paving of heavily trafficked areas.
OpA2	Location and design of air ventilation, car parks and kiss and ride facilities to consider avoidance of air quality impacts on sensitive receivers.
OpA3	Dedicated painting, degreasing, cutting, grinding, welding and similar such areas to be fitted with effective fume extraction systems to protect workers adequately, and if necessary filtration to ensure that no excessive impacts occur at nearby receptors.
OpA3	Where possible, activities where large quantities of solvents or air pollutants may be released near the site boundary and upwind of a receptor should be avoided or postponed to a more suitable period of weather. Where possible, low VOC solvents should be used, in the minimal quantity necessary to be effective.
Waste Management	
Operational	
OpW1	Develop an Operational Environmental Management Plan including a section on Operational Waste and Resource Recovery Management. This would detail opportunities for avoiding waste generation and responsible disposal methods for different waste streams.
Construction	
W1	All waste would be assessed, classified, managed and disposed of in accordance with the Waste Classification Guidelines (DECC, 2008).
W2	All waste materials removed from the sites would only be directed to a waste management facility lawfully permitted to accept the materials.
W3	Excavated material and spoil would be beneficially reused on the NWRL project site or other sites, where feasible and reasonable, in accordance with the NWRL spoil use hierarchy.

No.	Mitigation Measures
W4	Appropriate storage, treatment and disposal procedures would be implemented for any contaminated spoil.
W5	Cleared site vegetation would be mulched for reuse in rehabilitation and landscaping works. Topsoil generated during site preparation activities would be stockpiled for reuse in landscaping activities.
W6	Initial and ongoing education would be provided to staff and sub-contractors regarding the importance of appropriately managing waste.
W7	Recyclable wastes, including paper at site offices, would be stored separately from other wastes. Storage facilities would be secure and recyclables collected on a regular basis.
W8	Reusable materials would be stored separately, in secure facilities.
W9	Worksites would be free of litter and good housekeeping would be maintained.
W10	Vermin proof bins would be utilised onsite.
W11	Waste oil, other liquid wastes and spillages would be collected and stored in bunded areas.
W13	Waste truck loads would be covered, and tailgates secured prior to trucks leaving the worksite.
W14	Centralised reporting and auditing of waste volumes and disposal destinations would be employed.
W15	Construction waste would be minimised by accurately calculating materials brought to the site and limiting materials packaging.
W16	Materials such as (noise hoarding, site fencing, and so on) would be reused or shared, between sites and between construction contractors where feasible and reasonable.
Hazardous Goods	
DG1	All dangerous goods stored at the site would be below the screening thresholds set out in *Applying SEPP 33* for potentially hazardous development.
OpDG1	All dangerous goods stored at the site would be below the screening thresholds set out in *Applying SEPP 33* for potentially hazardous development.

Note: Identifying codes for mitigation measures are taken, where possible, from EIS 1 and EIS 2 for NWRL to maximise consistency. As such, the codes are not always sequential for this EIS.

24.0 Project Justification

24.1 Project Objectives

The RTRF seeks to provide an effective and economical facility capable of servicing Sydney's rapid transit rail network into the future. The objectives of the RTRF proposal have been drawn from those identified in the *Long Term Transport Master Plan for NSW* and *Sydney's Rail Future* and are critical to the NSW Government's plan to deliver high quality public transport for metropolitan Sydney. The objectives of the RTRF are as follows:

- Provide a facility for train stabling, train maintenance, and rail infrastructure maintenance that is capable of supporting the needs of Sydney's rapid transit rail network into the future.
- Meet the operational and technical specifications required by TfNSW.
- Compatibility with approved development and potential extension of the NWRL.
- Permit the progressive development of the RTRF to expand in line with Sydney's rapid transit network, with operations commencing in conjunction with the NWRL and growing as the rapid transit network expands.
- Appropriately manage and mitigate any environmental impacts of the proposal as far as is reasonably practicable.

The RTRF proposal is consistent with the project objectives.

24.2 Consistency with Relevant Strategic Plans and Policies

Table 88 below provides a summary of the RTRF proposal's consistency with key strategic plans and policies.

Table 88 – Summary of consistency with key strategic and statutory plans and policies

Instrument/Strategy	Comments
NSW State Plan 2021	The RTRF proposal supports the renovation and expansion of infrastructure to increase patronage on public transport.
Long Term Transport Master Plan for NSW and Sydney's Rail Future	The RTRF proposal provides infrastructure to support Sydney's future rapid transit rail network which is a key component of the Long Term Transport Master Plan for NSW. The RTRF provides for the staged expansion of the facility to support the delivery of the Rapid Transit Rail network over time.
Draft Metropolitan Strategy for Sydney 2031 and the Metropolitan Plan for Sydney to 2036	The RTRF provides essential infrastructure to support Sydney's future public transport network.
North West Rail Link Corridor Strategy	The RTRF is consistent with the objectives of the NWRL Corridor Strategy in terms of compatibility with proposed land uses.
Draft Cudgegong Road Structure Plan	The RTRF is consistent with the Draft Cudgegong Road Structure Plan in that it provides employment uses, does not adversely impact on land uses proposed in the vicinity of the site, and supports the operations of NWRL.

24.2.1 Environmental Planning and Assessment Act 1979

The RTRF proposal is consistent with the objects of the *Environmental Planning and Assessment Act 1979,* as specified in Section 5, in that it:

- Provides for the proper management of the Sydney metropolitan area through the provision of a critical new piece of public transport infrastructure which will deliver long term benefits to the operation of railways.
- Promotes the economic welfare of the Sydney metropolitan area by providing essential support services for Sydney's public transport network and providing new employment opportunities within a suitable site.
- Promotes the social and economic welfare of businesses and individuals within proximity of the site by minimising impacts on surrounding properties during the construction and operational phases of the RTRF, including potential impacts such as noise, traffic and lighting.
- Promotes and coordinates the orderly and economic use of land by providing essential transport support services in an appropriate location which allow for the progressive expansion of the facility over time to meet the future needs of the network.
- Ensures the protection of new and planned utility and communications infrastructure in the vicinity of the site and ensures that suitable provision is made for the servicing of the RTRF.
- Provides land for the essential public purpose of providing infrastructure and support facilities to Sydney's public transport network.
- Ensures the protection and conservation of threatened species, populations and ecological communities, and their habitats, in accordance with the Biodiversity Certification of the Growth Centres SEPP under the TSC Act.
- Has regard to the principles of ecologically sustainable development as outlined in **Section 24.5** below.
- Has provided appropriate opportunities for participation and input from relevant levels of government, government agencies and the general public through the consultation process detailed in **Section 6** of this EIS and through the statutory public exhibition period.

24.3 Social and Economic Issues

24.3.1 Economy and Employment

Any impacts of the RTRF on local agricultural businesses would be largely offset by the transition in the nature of local employment uses as the locality becomes increasingly urbanised.

The RTRF will provide net benefits to the economy through the employment of 100 construction workers during the peak construction stage, and indicatively 300 operational staff in management, administration, maintenance and cleaning positions.

The RTRF will provide wider benefits to the Sydney economy by providing essential infrastructure services to support the accessibility, operation and growth of Sydney's public transport network both in the short-medium term (NWRL) and the longer term (second Sydney Harbour crossing and conversion of selected southern lines).

24.3.2 Land Use

The RTRF is consistent with the Draft Cudgegong Road Structure Plan, which sets out the proposed urban structure and land uses, and proposes the site for employment uses.

The proposal will have minimal impacts on the use of land in the vicinity of the site in the short term

24.4 Biophysical Issues

This EIS takes into account the following potential biophysical impacts of the RTRF proposal:

- Soils and contamination.
- Noise and vibration.
- Surface water and flooding.
- Ecology.
- European and indigenous heritage.
- Visual amenity.
- Climate change and greenhouse gas emissions.
- Air quality.
- Hazards, risks and waste.

In all instances the environmental assessment concludes either that there will be no adverse impacts as a result of the RTRF proposal, the impacts are acceptable or that mitigation strategies and measures are available such that the potential impacts can be mitigated to a level whereby they are acceptable.

24.5 Ecologically Sustainable Development

The principles of ecologically sustainable development (ESD) are set out in section 6(2) of the *Protection of the Environment Administration Act 1991* (NSW). The principles of ESD include intergenerational equity, the precautionary principle, conservation of biological diversity and ecological integrity and improved valuation, pricing and incentive mechanisms. The principles of ESD have informed the site selection, design, construction and proposed operation of the RTRF.

It is appropriate for decisions made under the EP&A Act to have regard to the objects of the Act, as set out in Section 5 of the Act, including ESD.

The EP&A Act adopts the definition of 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 - namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*
>
> *(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*

(ii) an assessment of the risk-weighted consequences of various options,

(b) inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

(c) conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

(d) improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services, such as:

(i) polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

Importantly, the development of the RTRF is consistent with the principles of ESD as it meets the needs of the present without compromising the ability of future generations to meet their own needs. ESD measures have been integrated into the design of the RTRF, and the facility itself shall contribute to the operation of more sustainable transport modes throughout Sydney. Sustainability is discussed in greater detail at **Section 8** of this EIS. Each principle of ESD as relevant to the proposed development is addressed below.

24.5.1 Precautionary principle

The precautionary principle is utilised when uncertainty exists about potential environmental impacts. It provides that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

The precautionary principle requires careful evaluation of potential environmental impacts in order to avoid, wherever practicable, serious or irreversible damage to the environment.

Within the assessment of environmental values of the RTRF, the precautionary principle has been applied to infer presence of values (largely indigenous heritage and ecological values) in those areas that were not able to be accessed. Similarly, quantitative comparison of predicted performance against noise, air and traffic criteria has been undertaken using 'worst case' scenarios.

24.5.2 Inter-generational equity

Inter-generational equity is concerned with ensuring that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. The RTRF proposal has been designed to benefit both the existing and future generations by:

- Including capacity for the RTRF to provide for both the current and future needs of Sydney's public transport network by providing for the progressive expansion of the facility over time to meet the operational needs of the rapid transit network.

- Assessing, and where necessary mitigating, the potential environmental impacts of the RTRF proposal for the current and future context of the subject site.
- Implementing safeguards and management measures to protect environmental values.

The proposal has integrated short and long-term social, financial and environmental considerations so that any foreseeable impacts are not left to be addressed by future generations. Issues with potential long term implications such as noise emissions would be avoided and/or minimised through construction planning and the application of safeguards and management measures described in this EIS and the appended technical reports.

24.5.3 Conservation of biological diversity and ecological integrity

The principle of biological diversity upholds that the conservation of biological diversity and ecological integrity should be a fundamental consideration. The RTRF would not have any adverse effect on biological diversity and ecological integrity. Design and management measures to minimise impacts on the First Ponds Creek waterway and ecology are included in the CEMP and OEMP and will contribute directly to the conservation of biological diversity and ecological integrity within the catchment.

24.5.4 Improved valuation, pricing and incentive mechanisms

The RTRF proposal is being progressed by TfNSW based on the environmental, economic and social merits of planning for the future infrastructure and servicing needs of Sydney's rapid transit network through one approval. A detailed analysis of alternatives to the RTRF proposal was undertaken in order to determine the most suitable proposal and site on the basis of a range of criteria.

The principles of improved valuation and pricing of environmental resources requires consideration of all environmental resources which may be affected by a proposal, including air, water, land and living things. Mitigation measures for avoiding, reusing, recycling and managing waste during construction and operation would be implemented to ensure resources are used responsibly in the first instance in order to divert resources from landfill.

25.0 Conclusion

The Environmental Impact Statement (EIS) has been prepared to consider the environmental, social and economic impacts of the proposed construction and operation of a Rapid Transit Rail Facility at Tallawong Road, Schofields. The EIS has addressed the issues outlined in the Director-General's Requirements (**Appendix A**) and accords with Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* with regards to consideration of relevant environmental planning instruments, strategic policies, alternatives to the proposal and the relevant potential environmental, economic and social impacts of the proposal.

Having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development, the carrying out of the project is justified for the following reasons:

- The proposal is permissible with consent and meets all requirements of the relevant planning controls for the site;
- The proposal is consistent with the principles of ecological sustainable development as defined by Schedule 2(7)(4) of the *Environmental Planning and Assessment Regulation 2000* (refer to Section 7.3);
- The site is adequately serviced with utilities and services;
- The proposal is consistent with, and essential to, the delivery of the public transport network improvements proposed under *NSW Long Term Transport Master Plan* and *Sydney Rail Future: Modernising Sydney's Trains*; and
- The RTRF proposal would support the operations of Sydney's rapid transit rail network and will contribute to the delivery of significant economic, social and environmental benefits to the Sydney metropolitan area and the State.

26.0 Glossary of Terms

Abbreviation	Term in Full
AHD	Australian Height Datum
ABS	Australian Bureau of Statistics
AEC	Areas of Environmental Concern
AGIC	Australian Green Infrastructure Council
AGO	Australian Greenhouse Office
AHIMS	Aboriginal Heritage Information Management System
ARI	Average Recurrence Interval
ASS	Acid Sulfate Soils
BMP	Best Management Practices
BoM	Bureau of Meteorology
CBD	Central Business District
CCTV	Closed Circuit Television
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CNVS	Construction Noise and Vibration Strategy
CoPC	Contaminants of Potential Concern
CPW	Cumberland Plain Woodland
DACHA	Dharug Aboriginal Cultural Heritage Assessments
DCAC	Dharug Custodian Aboriginal Corporation
DEC	Department of Environment and Conservation
DECCW	Department of Environment, Climate Change and Water
DGRs	Director General's Environmental Assessment Requirements
DLALC	Deerubbin Local Aboriginal Land Council
DLWC	Department of Land and Water Conservation
DO	Dissolved Oxygen
DoS	Degree of Saturation
DP&I	Department of Planning and Infrastructure
DTAC	Dharug Tribal Aboriginal Corporation
ECRL	Epping to Chatswood Rail Line
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EIS1	North West Rail Link State Significant Infrastructure Application – Major Civil Works (SSI-5100)
EIS2	North West Rail Link State Significant Infrastructure Application – Rail Stations, Rail Infrastructure and Systems (SSI-5414)
ENM	Excavated Natural Material
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
ERA	Environmental Risk Analysis
ERSA	Engineering, Rail Systems and Architecture

Abbreviation	Term in Full
ESD	Ecologically Sustainable Development
FTE	Full Time Equivalent
GCC	Growth Centres Commission
GDE	Groundwater dependent ecosystems
GHG	Greenhouse gas
ICNG	Interim Construction Noise guideline
INP	Industrial Noise Policy
IPCC	Intergovernmental Panel on Climate Change
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007*
LGA	Local Government Area
LoS	Level of Saturation
MNES	Matter of National Environmental Significance
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
NBN	National Broadband Network
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measures
NML	Noise management level
NPWS	National Parks and Wildlife Service
NSW EPA	New South Wales Environment Protection Authority
NTSCORP	Native Title Service Corporation
NWRL	North West Rail Link
OEH	Office of Environment and Heritage
OEMP	Operational Environmental Management Plan
OH&S	Occupational Health and Safety
PASS	Potential Acid Sulfate Soils
PMF	Probable Maximum Flood
POEO Act	*Protection of the Environment Operations Act 1997*
PPE	Personal Protective Equipment
RBL	Rating background level (ambient noise)
REFCF	River Flat Eucalypt Forest on Coastal Floodplains
RMS	Roads and Maritime Services
RNP	Road Noise Policy
RTRF	Rapid Transit Rail Facility
SEI	Stream Erosion Index
SEPP	State Environmental Planning Policy
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SIS	State Infrastructure Strategy
SRD SEP	*State Environmental Planning Policy (State and Regional Development) 2011*
SSI	State Significant Infrastructure
TCA	Transport Construction Authority
TDS	Total dissolved solids
TfNSW	Transport for New South Wales
TMP	Transport Management Plan

Abbreviation	Term in Full
TN	Total Nitrogen
TP	Total Phosphate
TSC Act	*Threatened Species Conservation Act*
TSP	Total Suspended Particulate matter
UV	Ultra-violet
VENM	Virgin Excavated Natural Material
WARR Act	*Waste Avoidance and Resource Recovery Act 2001*
WSUD	Water Sensitive Urban Design