**Operation**
Emissions to air from operations on the ARTC rail network are currently addressed through the ARTC's EPL 3142.

The ARTC Environment Protection Licence EPL 3142 states in Condition O4 that: *'Significant dust generating activities on the premises must be managed in a proper and efficient manner to minimise dust emissions from the premises.'*

The EPL also includes a condition for a Pollution Reduction Program *PRP 4: Reduction of Coal Dust Emissions from Locomotive Loads*, which states:

> *'The licensee is required to comply with PRP 4 outlined in Table 4.1 [in the EPL] below by completing each described action in the program within the set timeframe. Coal dust emissions generated during the transportation of coal by rail is becoming a significant environmental issue and community concern. PRP 4 aims to significantly reduce coal dust emissions from locomotive coal loads by requiring ARTC to implement appropriate technology to significantly reduce coal dust emissions.'*

Thus, the mitigation of fugitive coal dust emission from locomotives would be controlled in accordance with PRP 4 for ARTC operations as whole.

## 7.5. Surface and groundwater

This section examines the potential effects on surface and groundwater resources during operation of the Proposal and includes a summary of the hydrological assessment undertaken by the UHVA (UHVA, 2010f). Table 7.5a outlines the DGRs relevant to surface and groundwaters and where each requirement is addressed in this section.

**Table 7.5a Director-General's Environmental Assessment Requirements - surface and groundwater**

| Director-General's Environmental Assessment Requirements | Where addressed |
|---|---|
| **Key issues** | |
| **Air, noise and water**<br>• Surface and groundwater resources and infrastructure, including existing water quality management facilities. | Section 7.5.2 and 7.5.3. |

Section 7.8 addresses the potential impacts on the identified resources during the bulk earthworks (construction) phase of the Proposal and measures to control potential impacts on water quality during construction are outlined in Section 7.8 in addition to a management strategy in Section 9.2. This section should therefore be read in conjunction with these other sections of the document.

Potential surface and groundwater impacts associated with the Proposal have been assessed in accordance with the following NSW Government guidelines where relevant:

- Australian and New Zealand Guidelines for fresh and marine water quality (ANZECC, 2000);
- Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC, 2000);
- Managing Urban Stormwater: Soils and Construction (Landcom, 2004);
- State Groundwater Policy Framework Document (DLWC, 1997);
- NSW State Government Quality Protection Policy (DLWC, 1998).
- NSW State Government Groundwater quantity management policy
- NSW State Goundwater dependent Ecosystem Policy (DLWC, 2002);
- Guidelines for Groundwater Protection in Australia (ARMCANZ and ANZECC, 1995)

### 7.5.1. Methodology
The surface and groundwater assessment comprised the following steps:

- Identification of existing surface and groundwater resources and features;
- Review of the condition and capacity of existing hydraulic structures via site inspection;

- Consideration of issues raised in consultation with government agencies and other stakeholders (refer Section 5);
- Assessment of potential changes and operational impacts; and
- Recommendation of mitigation measures to control or ameliorate potential impacts.

## 7.5.2. Existing environment

**Catchment and waterways**

The Proposal is located within the lower section of the Hunter-Central Rivers Catchment Management Authority area. The study area is located within the Glennies Creek Catchment, approximately 6 kilometres northwest of Singleton. The Hunter River is located approximately three kilometres southeast of the Proposal area, in the town centre of Singleton. Glennies Creek is located 1 kilometre northwest of the Proposal area and flows southwest from Lake St Clair and joins the Hunter River approximately 4 kilometres southwest of Camberwell Village.

The area and its waterways have been substantially modified to accommodate existing mining-related activities as well as railway development, and the landscape, geomorphology of the waterways and the hydrology of the area have been altered from their natural state.

Lake St Clair supplies water for industry and agriculture from Glennies Creek and the Hunter River, in addition to supplying drinking water to the town of Singleton. Glennies Creek is joined by a number of small tributaries downstream of Lake St Clair, one of which is Station Creek.

Station Creek follows a meandering course approximately 500 metres southwest of Glennies Creek and the 2 creeks join 1 kilometre upstream of Camberwell. The flows in Station Creek have been modified due to extensive mining by Integra Coal and continues to be used as part of Integra's site water management strategy. A section of Station Creek is classified as a „regulated river' under the *Water Management Act 2000*.

The existing Main North Line crosses Station Creek adjacent to the level crossing at Middle Falbrook Road and crosses Glennies Creek 1 kilometre north of this point. The floodplain of both channels is set in a low lying, largely rural landscape. The water storage dam located adjacent to the existing railway at Middle Falbrook Road has been used to retain surface water runoff from the Integra Coal site, which is released into Station Creek.

Rixs Creek and other minor waterways which eventually contribute to the flow of the Hunter River are located nearby.

**Flooding**

Flood investigations conducted for this Proposal and the surrounding topography indicate that the Proposal is not located within a declared floodplain.

All dams on the Integra Coal Mine site are maintained with sufficient freeboard to ensure adequate surge capacity during storm events (ICO 2008).

Inspections undertaken as part of previous studies (SKM, 2009) include observations of localised flooding at chainage 249.500 kilometres. As this location is not in a floodplain, it is likely to have been the result of recent rainfall events, the adjacent dam structure and the generally low-lying nature of the area.

**Rail corridor drainage**

There are 12 railway drainage structures crossing beneath the railway corridor within the Proposal area (refer Table 7.5b and Figure 7.5). They are variously comprised of reinforced concrete and galvanised iron culverts and pipes including one structure which may also act as a vehicle or stock underpass.

Some drainage structures have previously been extended on the up side under the rail embankment and/or access track and are in poor condition with inadequate connections to the existing headwall, oviform or other pipes.

**Water quality**

Local water quality is affected to some extent by existing agricultural activities and mining operations. Extraction of water from the system has interfered with natural river flows, and storage dams have

exacerbated these conditions. Creeks and drainage lines in the study area have been disturbed previously through minor drainage realignments and access crossings. In addition, development in the catchment has increased the liberation rates of salts into surface waters (SKM, 2009).

Station Creek flows into Glennies Creek have been modified due to Integra Coal's mine water management strategy. The water quality of Station Creek typically exhibits:

- Electrical conductivities (EC) of 300-1400µs/cm (measure of turbidity);
- A near neutral pH; and
- Suspended solids levels ranging from 20 to 150mg/L (ICO 2008).

The variability in total dissolved solids (TDS) and EC values is considered to be a function of geology and climatic conditions, such as rainfall and evaporation. The geology of some sections of the catchment has marine origins which naturally increase salts in surface waters. A review of historical water quality monitoring results (SKM, 2009) indicates current conditions are similar to those historically indicating marginal influences from mining.

Glennies Creek also displays a similar range of EC as Station Creek, with lows of 100-400µs/cm after sudden increases in stream discharges from the dam and highs of almost 1000µs/cm following periods of constant flow (sourced from www.waterinfo.nsw.gov.au for the 3 months prior to 29 June 2009, NSW Government, 2009).

**Groundwater**
Groundwater in the catchment has been used for irrigation, stock watering and domestic purposes (HCMT, 2003). A search of licensed groundwater bores was undertaken; however none exist in the study area.

Previous studies (SKM, 2009) identify the groundwater features in the vicinity of the Proposal as:

- Quaternary-age unconsolidated alluvium associated with Glennies Creek and minor drainage paths; and
- Basement coal measures comprising variable aquitards and low yielding permian aquifers (coal seams).

The groundwater from the Permian aquifers is relatively saline while the alluvial aquifers have good groundwater quality. No groundwater dependant ecosystems are known to occur in the area.

Neither of these aquifer systems has been listed as vulnerable under the current Aquifer Risk Assessment Report. However, they are covered by the State Groundwater Policy, Groundwater Protection Policy and Groundwater Dependent Ecosystem Policy (SKM, 2009).

### 7.5.3. Impact assessment

**Proposed drainage works**
Table 7.5b outlines the existing drainage infrastructure and condition as well as the proposed scope of upgrade works on which the impact assessment has been undertaken.

All existing culverts would be upgraded which would improve drainage efficiency and reduce the potential for flooding. Modifications, including extension of each of the culverts and incorporation of energy dissipators (rip-rap) are also proposed. Piped culvert extensions would use either reinforced concrete pipes or rolled steel to match the existing. Box culverts would be extended using in-situ base slabs with precast box culvert units above. All culverts would have precast headwalls and be designed in accordance with the ARTC guidelines.

**Hydrology modelling**
XP-SWMM computer modelling of the contributing catchment was undertaken to ascertain if the existing culverts are adequately sized to safely pass the 1 in 50 year annual exceedance probability (AEP) rainfall event in accordance with the ARTC design guidelines.

The surface topography data for the XP-SWMM model utilised the two metre contour data for each of the culvert catchments. The site specific design rainfall data was sourced from Australian Rainfall and Run-off (Engineers Australia, 1999). As calibration data were unavailable at the time of modelling, the soil loss parameters were derived from the soil landscape maps and soil data for the Singleton region


A4 Original

0 200 400 800

Metres

GDA 1994 MGA Zone 56

Culvert / Water Crossing

Water Storage Area

Third Track

Existing Alignment

Watercourse

ARTC
Nundah Bank

| | |
|---|---|
| Job Number | 2110501B |
| Revision | A1 |
| Date | 09.02.11 |
| Scale | 1:25,000 |

**Watercourses and Drainage Structures** **Figure 7.5**

U:\NB - Nundah Bank\DE_Design\DE06_Design_Doc\Phase_3\Drafting\GIS\Projects\ESRI\2110501B_GIS_F043_A1.mxd

(DLWC, 2001). The initial and continuing loss model was adopted in the XP-SWMM model. The site specific loss values were derived from the research by the former DLWC.

The following assumptions were made with regards to the rainfall run-off modelling:

- A free discharge was assumed from each culvert - this is a valid assumption with steep downstream slopes;
- No exit loss was applied due to the assumed free discharge;
- An inlet loss of 0.5 was assumed for all culverts; and
- It was assumed all pipes were clean.

The results of the modelling are summarised in Table 7.5c (UHVA 2010g).

**Table 7.5b Summary details of existing drainage culverts and proposed scope of alterations**

| ID | Approx. chainage (km) | Culvert type/ configuration | Current approx. length (m) | Comments on current condition | Proposed upgrade works |
|---|---|---|---|---|---|
| W1 | 245.244 | 900 millimetre diameter reinforced concrete oviform with 600 millimetre diameter RCP extension | 25 | Flows from up to down side.<br>Up side headwall is timber and in poor condition. Invert well below ground level.<br>Vegetation build-up and standing water on down side. | Approximately 13 metre increase in culvert length with culvert with 900 millimetre diameter. RCP.<br>Rip rap to be installed on both up and down sides. |
| W2 | 245.817 | 900 millimetre diameter reinforced concrete, oviform with 600 millimetre diameter RCP extension | 31 | Flows from up to down side.<br>There is no up side headwall and the pipe invert level is more than 1metre below the existing ground level. There is a large amount of erosion around up side inlet.<br>The down side invert is below the level of the immediately adjacent area with standing water mostly due to vegetation build up at the outlet. No local erosion is evident | Original pipe to be abandoned.<br>Approximately 48 metres of new 900 millimetre diameter. RCP culvert to be directional drilled under corridor.<br>Rip rap to be installed on both up and down sides. |
| W3 | 246.329 | 2850 x 6500 millimetre underbridge with cast insitu deck | 8 | Large, narrow bridge used in the past for access. Structure is oversized for surface water conveyance. Large dam 150 metres upstream and flow control dam immediately downstream of outlet. Dam may be encroached upon for construction works subject to detailed design. | Approximately 26m increase in culvert length with 2850 x 2500 millimetre box culvert.<br>Rip rap on the up side and an apron extension into the dam on the down side. |
| W4 | 246.471 | 900 millimetre diameter oviform with 1050mm diameter. RCP inlet extension | 23 | Flows from up to down side.<br>On the up side, the original cast in situ concrete oviform headwall has had timber sleepers laid over it.<br>There is vegetation build up at the down-side outlet which is causing some standing water immediately downstream of the outlet. No local erosion is evident. | Approximately 19m increase in culvert length with 900 millimetre diameter RCP.<br>Replacement of existing 1050 millimetre RCP extension.<br>Rip rap to be installed on both up and down sides. |
| W5 | 246.712 | 900 millimetre diameter oviform with 900 millimetre diameter RCP inlet extension | 35 | Flows from up to down side.<br>On the up side, there is no headwall on the up side but the pipe is protected with large rocks.<br>The down side outlet would be greatly affected by access road as it is in a very steep embankment with a dam immediately | Approximately 19 metre increase in culvert length with 900 millimetre diameter RCP.<br>Rip rap to be installed on both up and down sides. |

| ID | Approx. chainage (km) | Culvert type/ configuration | Current approx. length (m) | Comments on current condition | Proposed upgrade works |
|---|---|---|---|---|---|
| | | | | downstream. | |
| W6 | 247.095 | 900 millimetre diameter oviform with 900 millimetre diameter RCP extension | 36.5 | Flows from up to down side.<br>On the up side, there is evidence of slumping between pipe connections. This culvert passes under the mainline tracks as well as the Camberwell Rail loop arrival and departure roads.<br>On the down side, the invert is level with the immediately adjacent area but standing water is apparent at the exit of the culvert due to vegetation build up at the outlet. No local erosion is evident. | Approximately 25 metre increase in culvert length with 900 millimetre diameter RCP.<br>Resleeving or replacement of existing galvanised pipe extension.<br>Rip rap to be installed on both up and down sides. |
| W7 | 247.230 | 900 millimetre diameter oviform with 900 millimetre diameter galvanised pipe extension | 38.5 | Flows from up to down side.<br>The invert is level with the adjacent area within a cut. The pipe extension is corroded for the initial 3-5 metres.<br>On the down side, the invert of the pipe is partially blocked with vegetation growth and the outlet is above the natural low point of the gully. No local erosion is evident. | Approximately 25 metre increase in culvert length with 900 millimetre diameter RCP.<br>Resleeving or replacement of existing galvanised pipe extension.<br>Rip rap to be installed on both up and down sides. |
| W8 | 247.507 | 900 x 600 millimetre box culvert with galvanised pipe extension | 14.5 | Flows from up to down side.<br>On the up side, the galvanised extension pipe has extensive corroding in its base and has significant loss of section.<br>The down side galvanised pipe has no headwall and an invert level with the surrounding area. No local erosion is evident. | Approximately 13 metres increase in culvert length with matching box culvert.<br>Replacement of existing galvanised pipe extension.<br>Rip rap to be installed on both up and down sides. |
| W9 | 248.020 | 1200 millimetre diameter oviform | 17.68 | Flows from down to up side.<br>Both inverts are slightly below existing ground level. There is vegetation build up on the down side end which appears to drain a swampy vegetated area with standing water.<br>There is a dam immediately downstream on the up side. Erosion control would be required at the | Approximately 19 metre increase in culvert length with 1200 millimetre diameter RCP.<br>Rip rap to be installed on both up and down sides. |

| ID | Approx. chainage (km) | Culvert type/ configuration | Current approx. length (m) | Comments on current condition | Proposed upgrade works |
|---|---|---|---|---|---|
| | | | | vegetated area with standing water.<br>There is a dam immediately downstream on the up side. Erosion control would be required at the inlet and outlet ends. | |
| W10 | 248.322 | 900 millimetre diameter oviform | 18.9 | Flows from down to up side.<br>Both inverts are level with existing ground levels. The up side outlet is restricted by large boulders which appear to have been placed to prevent erosion. | Approximately 18 metre increase in culvert length with 900 millimetre diameter RCP.<br>Rip rap to be installed on both up and down sides. |
| W11 | 248.453 | 900 millimetre diameter oviform | 19 | Flows from down to up side.<br>Both inverts are level with existing ground levels.<br>The up side outlet flows into a clean water channel between clean water dams on the mine site.<br>The down side inlet is partially blocked with vegetation and ballast waste build up and appears to drain a swampy vegetated area with standing water. | Approximately 18 metre increase in culvert length with 900 millimetre diameter RCP.<br>Rip rap to be installed on both up and down sides. |
| W12 | 249.369 | 1200 x 1200 millimetre multi cell (3) box culvert | 28.95 | Flows from down to up side.<br>Both inverts are approximately 1m below water level due to backup from a dam downstream. There is also extensive vegetation build up at inlet and outlet of the culvert. | Approximately 13 metre increase in culvert length with matching 1200 x1200 millimetre multi cell (3) box culvert.<br>Rip rap to be installed on both up and down sides. |

Source: UHVA 2010e.

**Table 7.5c Summary of drainage modelling results (existing condition)**

| Id | Culvert chainage (km) | Top water level – during a 1 in 50yr storm (m AHD) | Bottom of ballast (m AHD) |
|---|---|---|---|
| **W1** | **245.244** | **118.400** | **117.572** |
| W2 | 245.817 | 120.000 | 125.244 |
| W3 | 246.329 | 117.235 | 122.533 |
| W4 | 246.471 | 119.905 | 121.701 |
| W5 | 246.712 | 117.710 | 122.657 |
| W6 | 247.095 | 114.885 | 119.561 |
| W7 | 247.230 | 112.735 | 119.157 (Camberwell loop) |
| W8 | 247.507 | 114.245 | 115.005 |
| W9 | 248.020 | 105.985 | 109.214 |
| W10 | 248.322 | 102.270 | 105.788 |
| W11 | 248.453 | 101.460 | 104.243 |
| W12 | 249.368 | 87.595 | 92.912 |

Note: Bold indicates water level exceeds top of pipe
Source: UHVA 2010f

Only one pipe (W1), at chainage 245.244 kilometres, failed to pass the ARTC's design flood flow criteria (refer Table 7.5c). Failure was due to the existing pipe extension being of smaller diameter than the existing oviform pipe. To resolve this, the culvert extension at chainage 245.244 kilometres has been sized to match the existing oviform diameter of 900mm (refer Table 7.5b).

**Station Creek Bridge upgrade**
At Station Creek Bridge, along Middle Falbrook Road, works are proposed to ensure the bridge is load bearing for construction vehicles. It is currently proposed to span the bridge using steel girders and plates and therefore no impact on water quality would occur. If foundation works were to be required, appropriate water quality controls would be implemented to protect the creek and dependent ecosystems.

**Construction water**
Construction activities would require the use of water to control dust generation and for compaction of fill etc, and this may require the use of significant quantities of water.

No surface water is proposed to be collected for reuse during construction of the Proposal. Construction water would be obtained from Integra Coal's mine water management system. Testing would be conducted to determine suitability of the water for reuse. Up to 6 megalitres per annum would be made available as required for construction of the Proposal. However water from any installed sediment control ponds may also be used for dust suppression or other uses to supplement this if needed.

As a result it is not expected that groundwater would be extracted for use during construction of the Proposal.

**Surface water runoff and quality**
The addition of the third track and access roads would not result in a substantial change in surface water runoff.

Earthworks on the formation for the third track include strip, cut and fill operations, placement and compaction of structural fill, and capping. Spoil from cut excavations would be stockpiled on site and either reused for fill operations or sealed in flat bunds within the rail corridor, covered with topsoil and vegetated. A description of the proposed construction earthworks including volumes is detailed in Section 4.7.2.

Inappropriate selection of stockpiling location or inadequate erosion and sedimentation control could lead to sedimentation of local water features such as mine dams as well as waterways such as Rixs and Station Creeks. Erosion and sediment control measures to reduce these impacts are documented in Section 7.8.

**Groundwater**
It is noted that the existing cuttings and fills of the Main North Line in the study area do not impede the existing groundwater and the majority of earthworks proposed require fill to raise the existing ground level to that required for the design and to match the existing infrastructure. However, according to the geotechnical report prepared for the Proposal, groundwater was encountered in only 9 test pits out of 114 along the length of the project at approximately 1m below ground level (UHVA 2011h). The need to excavate deeper than 1 metre across the project would be considered in light of these results during the detailed design and mitigation and management measures implemented where necessary. Such measures would be included in the Soil and Water Management Sub Plan.

It is not envisaged the works would result in any changes to the permeability of the soils in the area, and as there are no licensed groundwater bores in the study area or groundwater extraction proposed, it is considered unlikely that there would be any impact on groundwater from these sources.

**Effect on existing water storages**
Three water storages may be encroached to enable construction of the Proposal. One is located near W3 on the down side (approximate chainage 246.329) and another near W12 on the up-side (approximate chainage 249.369). A number of options exist to avoid impacts if at all possible as part of ongoing concept and future detailed design processes. They include: a local reduction in track centreline spacing, physical adjustment to the storage and lowering the top water level. The water storage at chainage 249.369 is part of Integra Coal's mine water management system and Integra Coal has agreed to reduce the water level in this pond to avoid future impact on railway drainage. All options would be further considered during detailed design.

A third water storage at approximate chainage 248.000 and also part of Integra's water system would be a source of the water for construction purposes.

### 7.5.4. Mitigation and management measures
The following mitigation and management measures would be implemented to reduce the potential for erosion and sedimentation impacts form the Proposal:

- A Soil and Water Management Sub Plan would be prepared in accordance with the requirements outlined in Section 7.8. The management framework for earthworks activities provided in Section 9.2 would support these measures.
- Hazard and Risk Management Sub Plan, as identified in Section 8.6, would be prepared to manage accidental leaks or spills during construction.
- The drainage upgrades outlined in Table 7.5b including measures to reduce scour at outlets would be implemented.
- The Proposal would be incorporated into the existing emergency response plan maintained by the ARTC for the operating railway.
- Design options for avoiding impact on the identified water storages would be further considered during ongoing concept and detailed design processes.
- The potential impact of localised flooding at chainage 249.500 kilometres would be investigated during detailed design.
- All drainage upgrades would be designed and constructed to take into account the requirements for maintaining fish passage, where relevant, and the requirements of the Soil and Water management Sub Plan with regards to water quality.

## 7.6. Transport and land use

The DGRs identify transport and land use as a key issue for the Environmental Assessment. A detailed traffic and transport impact assessment of the Proposal was conducted by specialist consultants. The detailed report is provided in Volume 2 Technical Paper 4. This section summarises the results of that study and includes a description of the interaction of the Proposal with surrounding land uses during construction and operation and the means to reduce identified impacts.

Table 7.6a outlines the DGRs relevant to transport and land use and where they have been addressed in this section.

**Table 7.6a Director-General's Environmental Assessment Requirements – transport and land use**

| Director-General's Environmental Assessment requirements | Where addressed |
|---|---|
| **Key issues** | |
| **General Construction Impacts**<br>• Transport and access, including a considered approach to minimising construction traffic impacts on public and private access. Consideration should be given to:<br>  o Construction traffic impacts, including spoil haulage, road network changes and potential disruption to the local and regional road network;<br>  o Rail traffic impacts; and<br>  o A strategy for managing rail and road traffic impacts, with a particular focus placed on those activities identified as having the greatest potential for adverse traffic flow, access or safety implications, and a broader, more generic approach developed for day-to-day traffic management. | Section 7.6.3 and Volume 2, Technical Paper 4<br>Section 7.6.3 and Volume 2, Technical Paper 4<br>Section 7.6.3 and Volume 2, Technical Paper 4 |
| **Transport and Land Use** – including but not limited to:<br>• Interactions with the broader transport network, including passenger rail services and the road network; | Section 7.6.3 and Volume 2, Technical Paper 4 |
| • Interactions with current and future land uses and resources (such as adjoining agricultural and mine development, sterilisation of mineral resources, and subsidence issues); and | Section 5, 7.6.6 and 7.8.2. |
| • Land use impacts on affected and surrounding properties and development, including acquisition, severance, access, business viability, property infrastructure impacts and mineral resources exploration. | Section 4.1, Section 4.4, and Section 7.6.6. |

## 7.6.1. Methodology

The transport and land use assessment consisted of the following steps:

- Investigation, description and examination of the existing road network (configuration, traffic volumes, conditions, etc), land uses, development consents and passenger rail services;
- Estimation of the volume of construction and operational traffic that would be generated;
- Consideration of issues raised in consultation with government agencies, adjoining landowners, residents, businesses (including Integra Coal and Rix's Creek mine) and the general public (refer to Section 5);
- Assessment of the impact that the increased construction traffic would have on the road network and adjacent land uses;
- Assessment of the impacts on the road networks and users as a result of the operation of the Proposal;
- Assessment of the existing land uses along the route of the Proposal, and the effect on those land uses; and
- Mitigation measures as necessary to reduce impacts.

## 7.6.2. Existing environment

**Regional road network**

The Proposal area is located wholly within the Singleton LGA and thus Singleton Council is the roads authority for all of the roads in the surrounding area with the exception of the New England Highway, which is a classified road controlled by the NSW RTA.

The New England Highway is part of the National Highway route and is designated National Highway 15. The highway is an arterial route which carries the majority of traffic through the Upper Hunter Valley.

Table 7.6b lists the key roads relevant to the Proposal and Table 7.6c lists the intersections relevant to the Proposal. A description of each road and intersection is also provided.

**Table 7.6b Key roads within the study area**

| Road | Description |
|---|---|
| New England Highway | The New England Highway is a national highway. The observed section of the Highway is a two-lane undivided road connecting Singleton and Muswellbrook. The lane width is 3.5 m, with a sealed shoulder width in the range from 1 metre to 2 m. The posted speed limit is 80 km/h between White Avenue and the road section further north near the Proposal corridor, and is 60 km/h between White Avenue and the intersection of John Street and Queen Street. |
| Rixs Creek Lane | Rixs Creek Lane is a 6 m to 8 m wide sealed road with no line-marking. The posted speed limit is 60 km/h.<br>The road provides a connection between the New England Highway and Rix's Creek Colliery, as well as a few rural properties. A gate is located on Rixs Creek Lane approximately 920 m to the north of the New England Highway, which restricts public access to Rix's Creek Colliery. Adjacent to the gate, there is an unsealed road off the east side of Rixs Creek Lane. |
| Bridgman Road | Bridgman Road is a two-lane undivided road connecting Singleton with the mine sites and towns located further north. A central median is provided on Bridgman Road on approach to the Blaxland Avenue and Acacia Circuit intersections.<br>The posted speed limit is 60 km/h between New England Highway and Gardner Circuit (northern end). The posted speed limit is 80 km/h between Gardner Circuit (northern end) and Retreat Road, and 100 km/h between Retreat Road and Stony Point Road. |
| Stony Point Road | Stony Point Road is a 6 m to 8 m wide sealed road with no line-marking and no speed limit signs are on display. As a rural road the default speed limit is 100 km/h. |
| Middle Falbrook Road | Middle Falbrook Road is a 4m to 7m wide sealed road with no speed limit signs on display. As a rural road the default speed limit is 100 km/h.<br>The road is particularly narrow on the section just to the north of a single lane timber bridge over Station Creek. The timber bridge is 4.6 m wide, located to the north of the level crossing with the Main North Line.<br>Middle Falbrook Road is currently a no through road at its southern end due to the presence of the Integra Coal Mine. |

**Table 7.6c Key intersections within the study area**

| Intersection | Description |
|---|---|
| New England Highway / Rixs Creek Lane | Rixs Creek Lane intersects the New England Highway forming a T-junction, with a left turn slip lane and a right turn short lane provided on the New England Highway. There is also a continuous left-turn lane from Rixs Creek Lane onto the New England Highway. The intersection is located in an 80 km/h speed limit zone on the New England Highway. |
| New England Highway / Bridgman Road | This intersection is signal-controlled, located to the west of the Hunter River. Turning lanes are provided on all approaches. |
| Intersections along Bridgman Road | The T-junctions located along Bridgman Road are priority controlled (from north to south as follows):<br>• Sandy Creek Road<br>• Integra Coal Mine access road<br>• Retreat Road<br>• Gardner Circuit (northern end)<br>• Cox Lane<br>• Gardner Circuit (southern end)<br>• Wattle Pond Road<br>• Acacia Circuit<br>• Blaxland Avenue. |
| Bridgman Road / Stony Creek Road | Stony Creek Road intersects Bridgman Road forming a T-junction with an auxiliary right-turn configuration with a left-turn slip lane provided on Bridgman Road. The intersection is located in a 100 km/h speed limit zone. There is good visibility from the intersection in all directions. |
| Middle Falbrook Road / | Stony Creek Road intersects with Middle Falbrook Road forming a T-junction. |

| Intersection | Description |
|---|---|
| Stony Creek Road | |
| Middle Falbrook Road's level crossing at the ARTC main line | Middle Falbrook Road crosses the ARTC main railway line at a level crossing. The level crossing is passively controlled by stop signs. |

**Public transport**
There are a number of public bus and school bus services operating on the New England Highway. These bus services are summarised in Table 7.6d.

**Table 7.6d Bus services**

| Route number | Route |
|---|---|
| 182 | Singleton Heights – Maitland (via North Rothbury – Branxton – Rutherford) |
| 181/182 | Woodberry to Singleton Heights (via Metford – Greenhills – Maitland – Rutherford – Branxton – North Rothbury), Greenhills to Singleton Heights (via Maitland – Lochinvar – Greta – Branxton – North Rothbury – Singleton) |
| 401 | Singleton Town Circuit |
| 402 | Singleton – Darlington (via Singleton Heights Shops and Hunterview) |
| 403 | Singleton – Singleton Heights (via Hunterview Estate) |
| GX242 | Sydney to Brisbane via New England Highway<br>– Greyhound Australia |
| GX424 | Brisbane to Sydney via New England Highway<br>– Greyhound Australia |
| School bus service | New England Highway<br>– Hunter Valley Buses Company |
| School bus service | Stony Creek Road<br>– Hunter Valley Buses Company |
| School bus service | Bridgman Road<br>– Hunter Valley Buses Company |

Bus movements have been included in the intersection counts and in the intersection analyses.

**Pedestrian and cyclists' facilities**
A pedestrian footpath is provided along the western side of Bridgman Road, between the New England Highway and to the north of Acacia Circuit.

Bicycle warning signs are provided on Bridgman Road, although no bicycle facilities are provided on the rural roads within the study area.

**Land uses**
The relevant planning documents currently affecting land use within the Singleton Council Local Government Area include:

- *Singleton Land Use Strategy 2008* - This document provides the strategic framework for Singleton Council's land use planning. It comprises policies and principles to guide decisions about land use and provides the planning context for the comprehensive *Singleton Local Environmental Plan 2011* exhibited in September 2010.
- *Singleton Local Environmental Plan 1996* (SLEP) - The SLEP is the planning instrument prepared by Council and approved by the Minister for Planning and provides the statutory provisions for managing land use and development. It is this document which defines the relevant land use zones.
- *Singleton Development Control Plan 2009* - The Singleton Development Control Plan provides detailed guidelines and standards for land use and development and expands upon the aims, objectives and provisions of the LEP.

The existing rail corridor is unzoned land. Strip land adjacent to the railway corridor on both sides would need to be acquired for the Proposal. These lands are zoned 1(a) Rural under the SLEP.

Additional 1(a) Rural zoned land would be leased during construction for temporary stockpiling and environmental management measures. A zoning map of the area under SLEP is included at Figure 2.1. Details of the land acquisition and lease area required for the Proposal is provided in Section 4.4.

The rail corridor is located approximately 6 kilometres northwest of Singleton and bisects the Integra Coal mine site and is also adjacent to the Rixs Creek coal mine and rehabilitated land. Both the mines have water storages as part of a water treatment system for mine water (refer Section 4.5). The current Integra Coal operations utilise a haul route, via a bridge, over the railway line (overbridge). Apart from the mines, the surrounding areas are used for farming and grazing.

**Road network performance**
The RTA's *Guide to Traffic Generating Developments* (RTA, 2002) sets out the two-way hourly road capacities for two-lane roads with a design speed of 100 km/h for different levels of service. The guide indicates that the lane capacities in an 80 km/h zone are considered approximately 85-95% of the lane capacities in a 100 km/h zone as referenced in Table 4.5 of the guide. Table 7.6e adopted 90% as a median value for the lane capacity.

The performance of the existing road network has been measured in terms of Level of Service (LoS). LoS is one of the basic parameters used to describe the operation of an intersection. A LoS of A means that the road is operating at a good level of service with extra capacity available, while a LoS rating of F means that the road is considered to be failing. The lowest acceptable LoS is D.

**Table 7.6e Existing peak hour flow on two lane rural roads**

| Road section | Period | Volume (veh/hr) | Heavy vehicle % | LoS |
|---|---|---|---|---|
| New England Highway, north of Rixs Creek Lane | AM peak | 1,313 | 14% | D |
| | PM peak | 1,005 | 10% | D |
| New England Highway, south of Rixs Creek Lane | AM peak | 1,335 | 14% | D |
| | PM peak | 1,015 | 9% | D |

From the traffic volumes and heavy vehicle proportions, it has been determined that the New England Highway is operating at LoS D which means that the ability to manoeuvre is severely restricted due to traffic congestion, and travel speed is reduced by the increased volume. Only minor disruptions can be absorbed without extensive queues forming and service deterioration.

**Intersection performance**
Performances of road networks are largely governed by the capacity of their intersections to accommodate traffic demand. The performance of key intersections relevant to the construction and operation of the Proposal were modelled in the software package SIDRA.

Acceptable intersection performance is defined as follows:

- LoS D or better (the worst case scenario of vehicle delay was less than or equal to 56 seconds).
- Degree of Saturation (DoS) less than or equal to 0.8 at priority controlled intersection, and 0.95 at signal controlled intersection.
- 95th percentile back of queue does not interfere with other traffic movements.

Table 7.6f shows the intersection summary results, while Tables 7.6g and 7.6h show the movement summary results. The analysis was based on the 2010 traffic volumes during a survey conducted from 6.30am to 7.30pm on Tuesday 3 August 2010. Values that exceed the acceptable threshold are highlighted in bold.

**Table 7.6f 2010 intersection summary results**

| Road section | Peak hour | DoS | Delays (secs) | LoS | Queue (m) |
|---|---|---|---|---|---|
| New England Highway / Rixs Creek Lane | AM | 0.54 | 23 | B | 2 |
| | PM | 0.32 | 19 | B | 1 |
| New England Highway / Bridgman Road | AM | 1.26 | 63 | E | 368 |
| | PM | **1.00** | 50 | D | 279 |

**Table 7.6g 2010 movement summary results – New England Highway/ Rixs Creek Lane**

| Peak hour | Approach | Movement | DoS | Delays (sec) | LoS | Queue (m) |
|---|---|---|---|---|---|---|
| AM (6:30 am - 7:30 am) | South | Through | 0.54 | 0 | A | 0 |
| | | Right | 0.06 | 22 | A | 2 |
| | East | Left | 0.00 | 8 | A | 0 |
| | | Right | 0.00 | 23 | B | 1 |
| | North | Left | 0.00 | 10 | A | 0 |
| | | Through | 0.23 | 0 | A | 0 |
| PM (5:30 pm – 6:30 pm) | South | Through | 0.26 | 0 | A | 0 |
| | | Right | 0.02 | 19 | C | 1 |
| | East | Left | 0.02 | 8 | A | 0 |
| | | Right | 0.00 | 16 | B | 0 |
| | North | Left | 0.00 | 12 | A | 0 |
| | | Through | 0.32 | 0 | A | 0 |

**Table 7.6h 2010 movement summary results – New England Highway/ Bridgman Road**

| Peak hour | Approach | Movement | DoS | Delays (sec) | LoS | Queue (m) |
|---|---|---|---|---|---|---|
| AM (8:30 am - 9:30 am) | South | Left | 1.00 | 32 | C | **61** |
| | | Through | 0.31 | 42 | C | 45 |
| | | Right | 0.31 | 49 | D | 45 |
| | East | Left | 0.45 | 27 | B | 57 |
| | | Through | 0.94 | 50 | D | 368 |
| | | Right | 0.79 | **64** | **E** | 82 |
| | North | Left | 0.19 | 6 | A | 0 |
| | | Through | **1.26** | **308** | F | 248 |
| | | Right | **1.26** | **316** | F | 248 |
| | West | Left | 0.26 | 28 | B | 47 |
| | | Through | 0.53 | 21 | B | 104 |
| | | Right | 0.37 | 56 | D | 35 |
| PM (3:15 pm - 4:15 pm) | South | Left | 0.85 | 36 | C | **61** |
| | | Through | 0.73 | 54 | D | 126 |
| | | Right | 0.73 | **61** | **E** | 126 |
| | East | Left | 0.33 | 38 | C | 44 |
| | | Through | 0.68 | 37 | C | 166 |
| | | Right | **1.00** | **110** | **F** | **279** |
| | North | Left | 0.24 | 6 | A | 0 |
| | | Through | 0.90 | **79** | F | 90 |
| | | Right | 0.90 | **87** | F | 90 |
| | West | Left | 0.46 | 42 | C | 80 |
| | | Through | 0.93 | 46 | D | **223** |
| | | Right | 0.28 | 46 | D | 44 |

Analysis of the results indicates that:

- New England Highway/ Rixs Creek Lane intersection is operating satisfactorily, with LoS B or better during both the morning and afternoon peak hours. The intersection has sufficient capacity and acceptable delays under the existing conditions.
- New England Highway/ Bridgman Road intersection is operating at an acceptable LoS E during the AM peak hour and an acceptable LoS D during the PM peak hour.
- During the AM peak hour, the highest delay (316 seconds) is experienced by the southbound right turn traffic from Bridgman Road onto the New England Highway.
- During the PM peak hour, the highest delay (110 seconds) is experienced by the westbound right turn traffic from New England Highway onto Bridgman Road.
- The following queues exceed the length of the short lanes provided and overspill to the adjacent lane at the New England Highway/ Bridgman Road intersection:
    - 61 metre long queue in the northbound left turn movement on Bridgman Road during the AM peak, whilst the available turn bay length is only 30 metres.
    - 279 metre long queue in the eastbound through turn movement on New England Highway during the AM peak, whilst the available short lane length is only 170 metres.
    - 61 metre long queue in the northbound left turn movement on Bridgman Road during the PM peak, whilst the available turn bay length is only 30 metres.
    - 279 metre long queue in the westbound right turn movement on New England Highway during the PM peak, whilst the available turn bay length is only 170 metres.
    - 223 metre long queue in the eastbound through movement on New England Highway during the PM peak, whilst the available short lane length is only 135 metres.
- The New England Highway/ Bridgman Road intersection would require changes to improve the capacity to accommodate future growth in traffic volumes.

**Middle Falbrook Road level crossing**

A 24 hour traffic count was conducted on Middle Falbrook Road, at the level crossing in Camberwell from midnight on Monday 19 August 2010 to midnight Tuesday 20 August 2010. Table 7.6i summarises the results of the traffic count.

**Table 7.6i Traffic volume at Middle Falbrook Road level crossing**

| Time period | Movement direction | Light vehicles | Heavy vehicles | Total vehicles |
|---|---|---|---|---|
| Day (7:00 am to 10:00 pm) | Northbound | 17 | 10 | 27 |
| | Southbound | 16 | 6 | 22 |
| | Both directions | 33 | 16 | 49 |
| Night (10:00 pm to 7:00 pm) | Northbound | 2 | 0 | 2 |
| | Southbound | 6 | 1 | 7 |
| | Both directions | 8 | 1 | 9 |
| 24-hour | Northbound | 19 | 10 | 29 |
| | Southbound | 22 | 7 | 29 |
| | Both directions | 41 | 17 | 58 |

Within the 24 hour period of the survey, a total of 58 vehicles passed the Middle Falbrook Road level crossing. Forty-nine vehicles (84%) passed the level crossing between 7:00 am and 10:00 pm and 9 vehicles (16%) passed the level crossing between 10:00 pm and 7:00 am.

The traffic count also included a survey of the length of traffic queues at the level crossing and the time taken for a train to pass the level crossing. Table 7.6j summarises this survey data.

**Table 7.6j Length of traffic queue at the level crossing**

| Train type | Direction of train | Train arrival time on the crossing | Train departure time from the crossing | Start of train to end of train |
|---|---|---|---|---|
| Freight | Westbound | 0:42:41 | 0:43:30 | 0:00:49 |
| Freight | Westbound | 1:10:40 | 1:11:55 | 0:01:15 |
| Freight | Eastbound | 1:13:13 | 1:13:19 | 0:00:06 |

| Train type | Direction of train | Train arrival time on the crossing | Train departure time from the crossing | Start of train to end of train |
|---|---|---|---|---|
| Freight | Westbound | 1:28:53 | 1:30:01 | 0:01:08 |
| Freight | Westbound | 2:43:08 | 2:44:06 | 0:00:58 |
| Freight | Westbound | 3:15:20 | 3:16:48 | 0:01:28 |
| Freight | Westbound | 5:38:56 | 5:42:28 | 0:03:32 |
| Passenger | Westbound | 0:10:06 | 0:10:09 | 0:00:03 |
| Passenger | Westbound | 4:45:19 | 4:45:28 | 0:00:09 |

The results show that on the day of the survey:

- A total of nine trains (seven freight trains and two passenger trains) passed the level crossing on Middle Falbrook Road.
- All the trains passed the level crossing between midnight and 6:00am.
- The longest time taken for a freight train to pass the level crossing was 212 seconds (3 minutes and 32 seconds) with the average time for a freight train to pass the level crossing of 92 seconds (excluding the 6 second freight train).
- The average time for a passenger train to pass the level crossing was 6 seconds.
- No vehicles were observed being delayed by trains at the level crossing.

**Changes to New England Highway/ Bridgman Road intersection**
Singleton Council has plans to upgrade the New England Highway/ Bridgman Road intersection by the end of 2011to improve the intersection's capacity and access to North Singleton where new residential lots are planned or under construction. The upgrade would include an extended turning lane on Bridgman Road (south) and additional lanes on the New England Highway and Bridgman Road (north).

Based on the Council's advice, the initial phase of construction would involve an upgrade of Bridgman Road (south). The next stage involving additional lanes on the New England Highway and Bridgman Road (north) would be implemented some 12 months later and likely to be undertaken at the same time as construction of the Proposal. Council's construction staging plan was not available at the time of writing.

### 7.6.3. Traffic associated with the Proposal

**Site access**
The majority of construction vehicles would enter the construction site via Bridgman, Stony Point and Middle Falbrook Roads. This is due to the bulk earthworks and track installation occurring on the up side of the existing railway tracks.

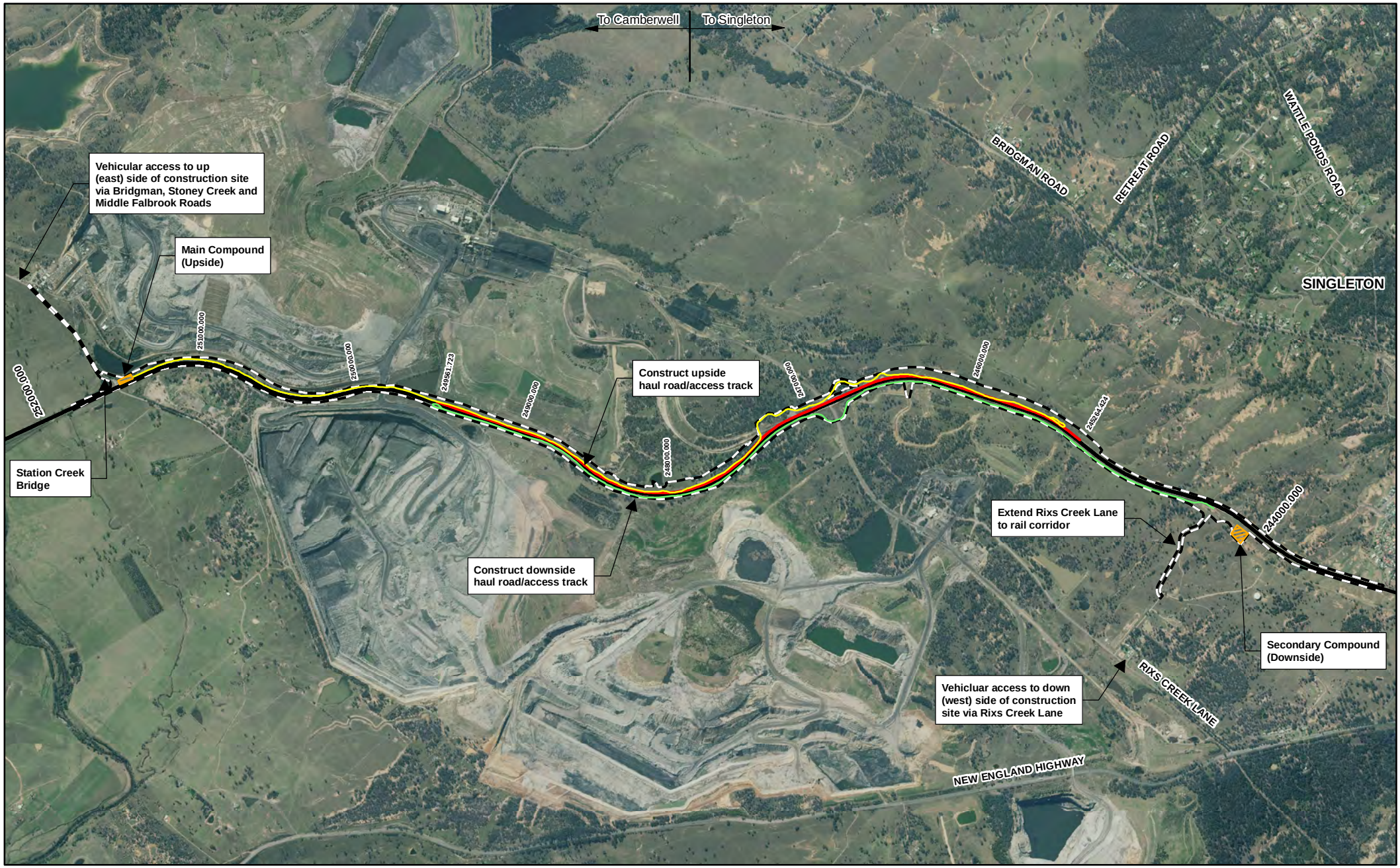
A lesser proportion of construction traffic would enter the site via Rixs Creek Lane for down side access track construction and signalling works. Rixs Creek Lane would be extended to enable construction access to the down (west) side of the railway line.

Construction access and haulage routes are illustrated in Figure 7.6.

**Traffic generation and distribution**
Construction traffic would be generated as a result of several sources.

*Traffic generated by staff travelling to and from the site*
During a typical working day, up to 70 employee vehicles in a 60-minute period would arrive at the site for work prior to 7:00 am. This would consist of 50 vehicles entering the main compound via Bridgman Road, Stony Point Road and Middle Falbrook Road and 20 vehicles entering the secondary compound via Rixs Creek Lane.

At the end of the shift, the employees would leave the compounds within approximately 60 minutes after 6:00 pm. During track possessions, up to 110 vehicles would be expected to arrive and leave the compounds, before and after working hours. This would consist of 80 vehicles entering the main




A4 Original

0 0.25 0.5 1

Kilometres

GDA 1994 MGA Zone 56

Access Track Downside
Access Track Upside
Third Track
Existing Alignment
Proposed Impact Area
Site Compound

ARTC
Nundah Bank

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| Job Number | 2110501B |
| Revision | A1 |
| Date | 09.02.11 |
| Scale | 1:25,000 |

**Construction Accesses and Haulage Routes Figure 7.6**

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compound via Middle Falbrook Road and Bridgman Road and 30 vehicles entering the secondary compound via Rixs Creek Lane.

Only those employee trips that occur during the background traffic peak hours have been included in the analysis. This includes the employee trips that occur during the AM peak hour (between 6:00 am and 7:00 am) at the New England Highway and Rixs Creek Lane intersection.

The employee trips are assumed 50/50 split from the north and south via the New England Highway.

*Construction Vehicles*
The majority of construction vehicles would enter the construction site via Bridgman Road. This is because the bulk earthworks and track installation would occur on the up (east) side of the existing railway tracks. These construction vehicles include trucks and semi-trailers delivering construction plant and equipment, and trucks with „dog trailers' delivering quarry products. During a typical working day, the material to be imported requires a maximum of 30 heavy vehicle movements into the sites per day. During track possessions, the material to be imported requires a maximum of 40 heavy vehicle movements into the site per day. Assuming truck trips are distributed evenly throughout the working hours (7:00 am and 6:00 pm), there would be four trucks per hour arriving and four trucks per hour departing from the site.

A small volume of construction traffic would enter the site via Rixs Creek Lane for the down (west) side access track construction and the signalling works. These construction vehicles include trucks and semi-trailers delivering construction plant and equipment, and trucks with „dog trailers' delivering quarry products. During a typical working day, the material to be imported requires a maximum of 10 heavy vehicle movements into the site per day. During track possessions, the material to be imported requires a maximum of 20 heavy vehicle movements into the site per day. Assuming truck trips are distributed evenly throughout the working hours (7:00 am and 6:00 pm), there would be two trucks per hour arriving and two trucks per hour departing from the site.

The heavy vehicles are assumed 50/50 split from the north and south via the New England Highway. For the trucks coming from the north on the New England Highway, the heavy vehicles are assumed to consist of 90% trucks with „dog trailers' and 10% semi-trailers and delivery trucks. For the trucks coming from the south on the New England Highway, it is assumed there would be 20% trucks with „dog trailers' and 80% semi-trailers and delivery trucks.

### 7.6.4. Potential impacts

**Mid-block level of service**
The mid-block LoS describes the performance of a road on straight sections between intersections. The mid-block LoS was assessed based on the expected construction traffic volumes for the key roads' sections (refer to Table 7.6b). Tables 7.6k and 7.6l show the mid-block LoS for both a typical working day and during track possessions.

**Table 7.6k Expected mid-block LoS on a typical working day – 2012**

| Road section | Peak hour | Volume (veh/hr) | Heavy vehicle % | LoS |
|---|---|---|---|---|
| New England Highway, north of Rixs Creek Lane | AM peak | 1,383 | 14% | D |
| | PM peak | 1,062 | 10% | D |
| New England Highway, south of Rixs Creek Lane | AM peak | 1,399 | 14% | D |
| | PM peak | 1,048 | 10% | D |

**Table 7.6l Expected mid-block LoS during track possessions – 2012**

| Road section | Peak hour | Volume (veh/hr) | Heavy vehicle % | LoS |
|---|---|---|---|---|
| New England Highway, north of Rixs Creek Lane | AM peak | 1,396 | 14% | D |
| | PM peak | 1,082 | 10% | D |
| New England Highway, south of Rixs Creek Lane | AM peak | 1,420 | 14% | D |
| | PM peak | 1,036 | 10% | D |

The tables show the key roads' sections would continue to operate at LoS D based on the anticipated construction traffic volumes, indicating that construction vehicle trips would not impose adverse impacts to traffic efficiency on these sections of the New England Highway.

**Intersection performance**

Tables 7.6m, 7.6n and 7.6o summarise the predicted performance of the key intersections during construction for both a typical working day and during track possessions.

**Table 7.6m 2012 intersection summary performance – typical working day**

| Intersection | Peak hour | DoS | Delays (sec) | LoS | Queue (m) |
|---|---|---|---|---|---|
| New England Highway/Rixs Creek Lane | AM | 0.56 | 238 | F | 4 |
| | PM | 0.32 | 21 | B | 1 |
| New England Highway/Bridgman Road | AM | **1.00** | 41 | C | 396 |
| | PM | 0.88 | 39 | C | 259 |

**Table 7.6n 2012 movement summary results – New England Highway/ Rixs Creek Lane**

| Phase | Peak hour | Approach | Movement | DoS | Delays (sec) | LoS | Queue (m) |
|---|---|---|---|---|---|---|---|
| Typical working day | AM (6:30 am – 7:30 am) | South | Through | 0.56 | 0 | A | 0 |
| | | | Right | 0.10 | 21 | B | 4 |
| | | East | Left | 0.01 | 8 | A | 0 |
| | | | Right | 0.07 | 252 | F | 3 |
| | | North | Left | 0.01 | 10 | A | 1 |
| | | | Through | 0.25 | 0 | A | 0 |
| Track possessions | PM (5:30 pm – 6:30 pm) | South | Left | 0.29 | 0 | A | 0 |
| | | | Through | 0.03 | 23 | B | 1 |
| | | East | Left | 0.01 | 8 | A | 0 |
| | | | Through | 0.01 | 18 | B | 1 |
| | | North | Left | 0.01 | 12 | A | 1 |
| | | | Through | 0.32 | 0 | A | 0 |

**Table 7.6o 2012 movement summary results – New England Highway/ Bridgman Road**

| Phase | Peak hour | Approach | Movement | DoS | Delays (sec) | LoS | Queue (m) |
|---|---|---|---|---|---|---|---|
| Track possessions | AM (6:30 am – 7:30 am) | South | Left | 1.00 | 32 | C | **61** |
| | | | Through | 0.28 | 38 | C | 61 |
| | | | Right | 0.28 | 45 | D | 46 |
| | | East | Left | 0.49 | 27 | B | 62 |
| | | | Through | 0.96 | **57** | **E** | 406 |
| | | | Right | 0.52 | **57** | **E** | 53 |
| | | North | Left | 0.20 | 6 | A | - |
| | | | Through | 0.21 | 38 | C | 90 |
| | | | Right | 0.93 | **83** | F | 90 |
| | | West | Left | 0.27 | 27 | B | 40 |
| | | | Through | 0.52 | 23 | B | 130 |
| | | | Right | 0.38 | 56 | D | 36 |
| Track possessions | PM (5:30 pm – 7:30 pm) | South | Left | 0.88 | 35 | C | **61** |
| | | | Through | 0.76 | 55 | D | 131 |
| | | | Right | 0.74 | **62** | **E** | 131 |
| | | East | Left | 0.35 | 38 | C | 46 |
| | | | Through | 0.67 | 37 | C | 163 |
| | | | Right | 0.53 | 50 | D | 79 |
| | | North | Left | 0.27 | 6 | A | NA |
| | | | Through | 0.36 | 49 | A | 64 |
| | | | Right | **0.93** | **93** | **D** | 64 |
| | | West | Left | 0.45 | 42 | C | 70 |
| | | | Through | 0.86 | 48 | D | 300 |
| | | | Right | 0.25 | 47 | D | 45 |

The tables show that the expected impact as a result of the additional construction traffic during a typical working day is minimal when compared with the do-nothing case. A summary of the results is presented below:

- Similar intersection performance as the do-nothing case;
- New England Highway/Rixs Creek Lane intersection's LoS is expected to reduce from B to F during the AM peak hour, but remain at B during the PM peak hour;
- New England Highway/Bridgman Road intersection's LoS is expected to remain at a same level; and
- The future traffic volume at the New England Highway/Bridgman Road intersection would continue to exceed the intersection's practical capacity, whether or not the Nundah Bank project proceeds.

**Middle Falbrook Road level crossing**
Given the current and predicted (2012 and 2018) construction traffic volumes at the Middle Falbrook Road level crossing, there is not expected to be any increased traffic nor any significant flow-on traffic effects from construction vehicles using the surrounding roads as haul roads.

**Public transport**
As shown in the analyses above, during the construction period, the construction vehicles are unlikely to impose any impacts on the surrounding road networks and therefore the public transport services that currently use the New England Highway, Stony Point Road and Bridgman Road.

**Pedestrians and cyclists**
There are low existing levels of pedestrian and cyclist activities in the area, and given their low volumes there is expected to be little adverse traffic or access impacts on them from additional construction vehicles.

**Track possessions**
Track possessions are scheduled routinely by the ARTC as a means of facilitating the completion of both major capital and maintenance works safely and efficiently. Possessions are scheduled several times a year, regardless of the Proposal, and would be utilised by the Proposal to install critical connections to the operating rail network e.g., signalling, crossovers and turnouts.

Construction of the Proposal would take place over a period of approximately 18 months including scheduled track possessions which would last between three to four days. Works during track possessions would take place over 24 hour periods.

During this time, there would be an interruption to freight and passenger rail services. Freight services would be rescheduled to avoid the temporary disruption. Country Rail Infrastructure Authority would organise buses to replace passenger trains.

## 7.6.5. Operation

**Road and rail traffic**
During operation, the site would be accessed as required by maintenance workers in light vehicle/ trucks. During possessions, there would be a much higher level of intensity possibly including plant and heavy vehicles. This however would only occur a few times per year.

Completion of the Proposal would facilitate the future increase in train volumes on the Main North Line including both coal and general rail freight as well as passenger traffic. Table 4.6b in Section 4 provides details of the increases by freight category relative to 2010 traffic levels.

Future access to the site would be via the established connections to the public road network e.g. Bridgman Road and Rixs Creek Lane. Locked gates would be located at the entrance to the railway corridor to restrict public access.

**Middle Falbrook Road level crossing**
The impact of more frequent trains crossing the level crossing at Middle Falbrook Road is expected to be minor despite the increased number and length of trains by 2018 due to the very low traffic volumes using these roads. There are expected to be 210 daily services of passenger and freight trains by 2018 (refer Table 4.6b). It is expected that only an average of 44 vehicles per day would have to wait for trains before being able to cross the level crossing. These vehicles would be delayed by on average 340 seconds for a freight train and 20 seconds for a passenger train. Up to 2018, on average only one vehicle would be queuing at each approach to the level crossing when required to wait.

## 7.6.6. Land use impacts

**Acquisition**
The primary land use impact of the Proposal is associated with property acquisition. Property acquisition would mainly occur as a narrow strip adjacent to the existing rail corridor on both the up and down sides of the track.

It is anticipated that approximately 20.6 hectares of land adjoining the railway needs to be permanently acquired. This area would be confirmed following detailed design and is expected to reduce. Additional temporary land leases are also required for environmental management measures. This area is estimated to be approximately 2.7 hectares. The areas proposed for temporary and permanent acquisition are shown in Figures 7.6A-E.

Table 7.6p provides an estimate of land areas to be permanently acquired and the owners of those lands.


A4 Original

0 50 100 200

Metres

GDA 1994 MGA Zone 56

Proposed Impact Area
Third Track
Existing Alignment
Permanent Land Acquisition
Temporary Lease Area

ARTC
Nundah Bank

| | |
|---|---|
| Job Number | 2110501B |
| Revision | A1 |
| Date | 15.02.11 |
| Scale | 1:7,000 |

**Proposed Land Acquisition** **Figure 7.6A**

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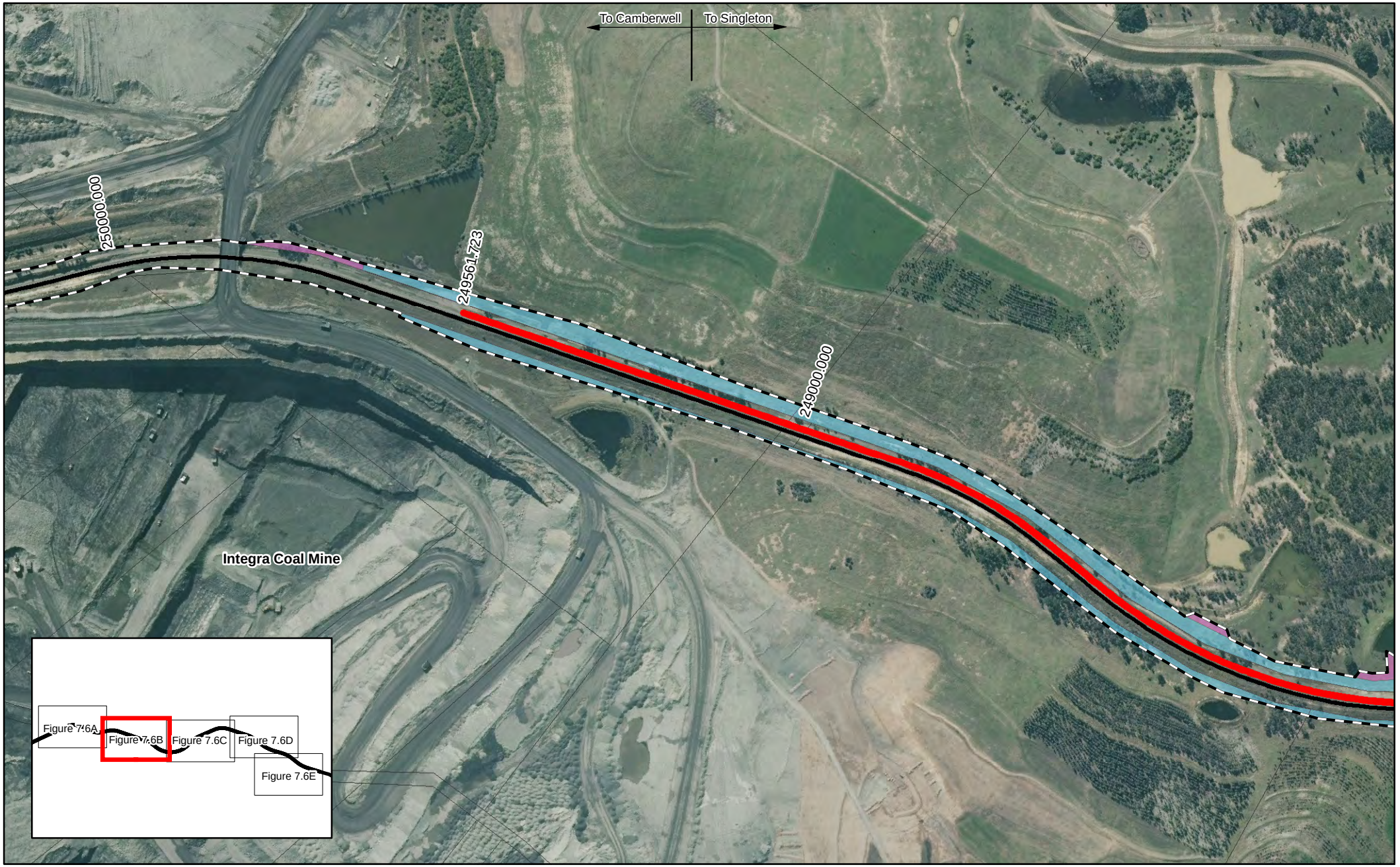


A4 Original

0 50 100 200

Metres

GDA 1994 MGA Zone 56

Proposed Impact Area
Third Track
Existing Alignment
Permanent Land Acquisition
Temporary Lease Area

ARTC
Nundah Bank

| | |
|---|---|
| Job Number | 2110501B |
| Revision | A1 |
| Date | 15.02.11 |
| Scale | 1:7,000 |

**Proposed Land Acquisition** **Figure 7.6B**

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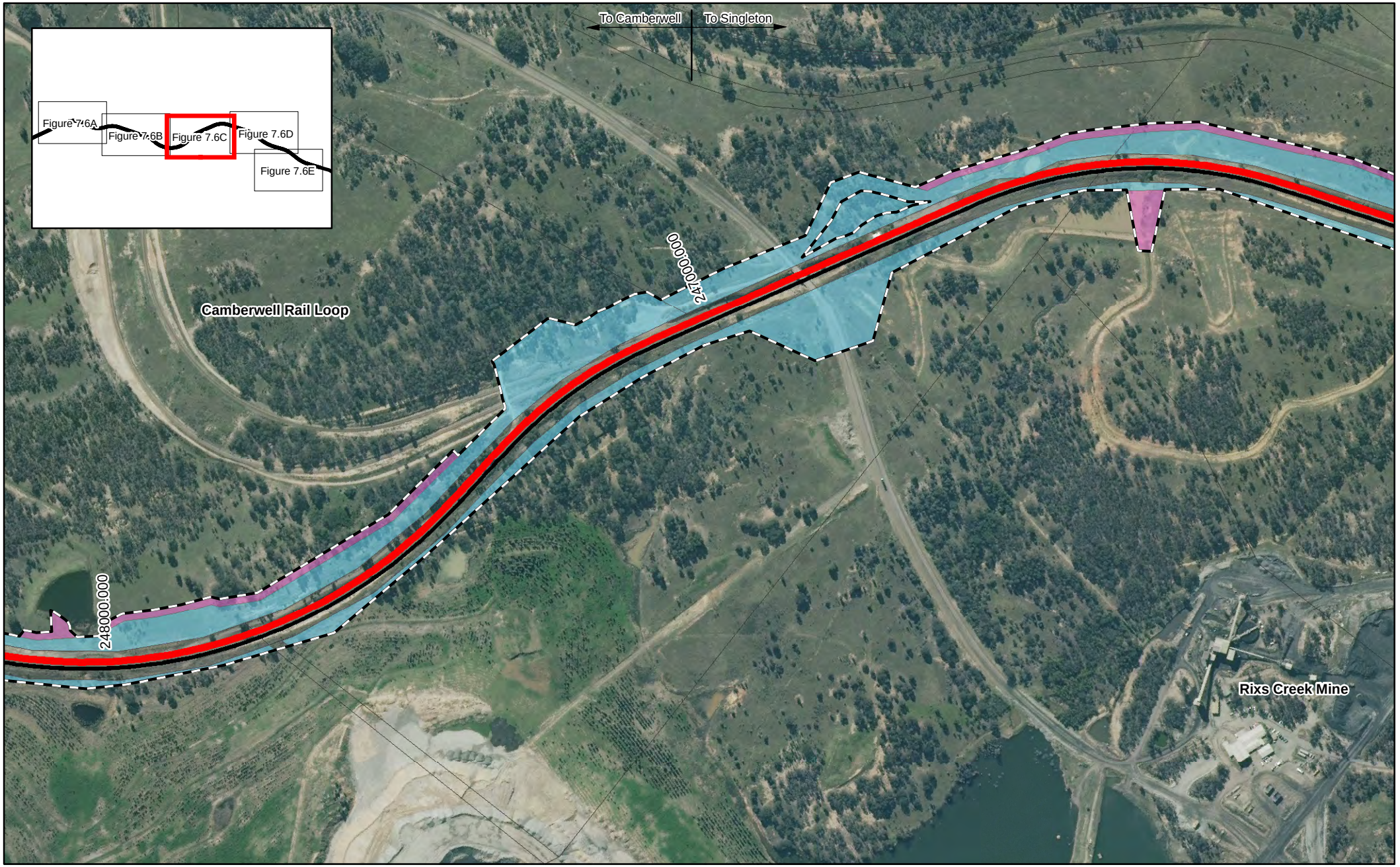


A4 Original

0 50 100 200

Metres

GDA 1994 MGA Zone 56

Proposed Impact Area
Third Track
Existing Alignment
Permanent Land Acquisition
Temporary Lease Area

ARTC
Nundah Bank

| | |
|---|---|
| Job Number | 2110501B |
| Revision | A1 |
| Date | 15.02.11 |
| Scale | 1:7,000 |

**Proposed Land Acquisition** **Figure 7.6C**

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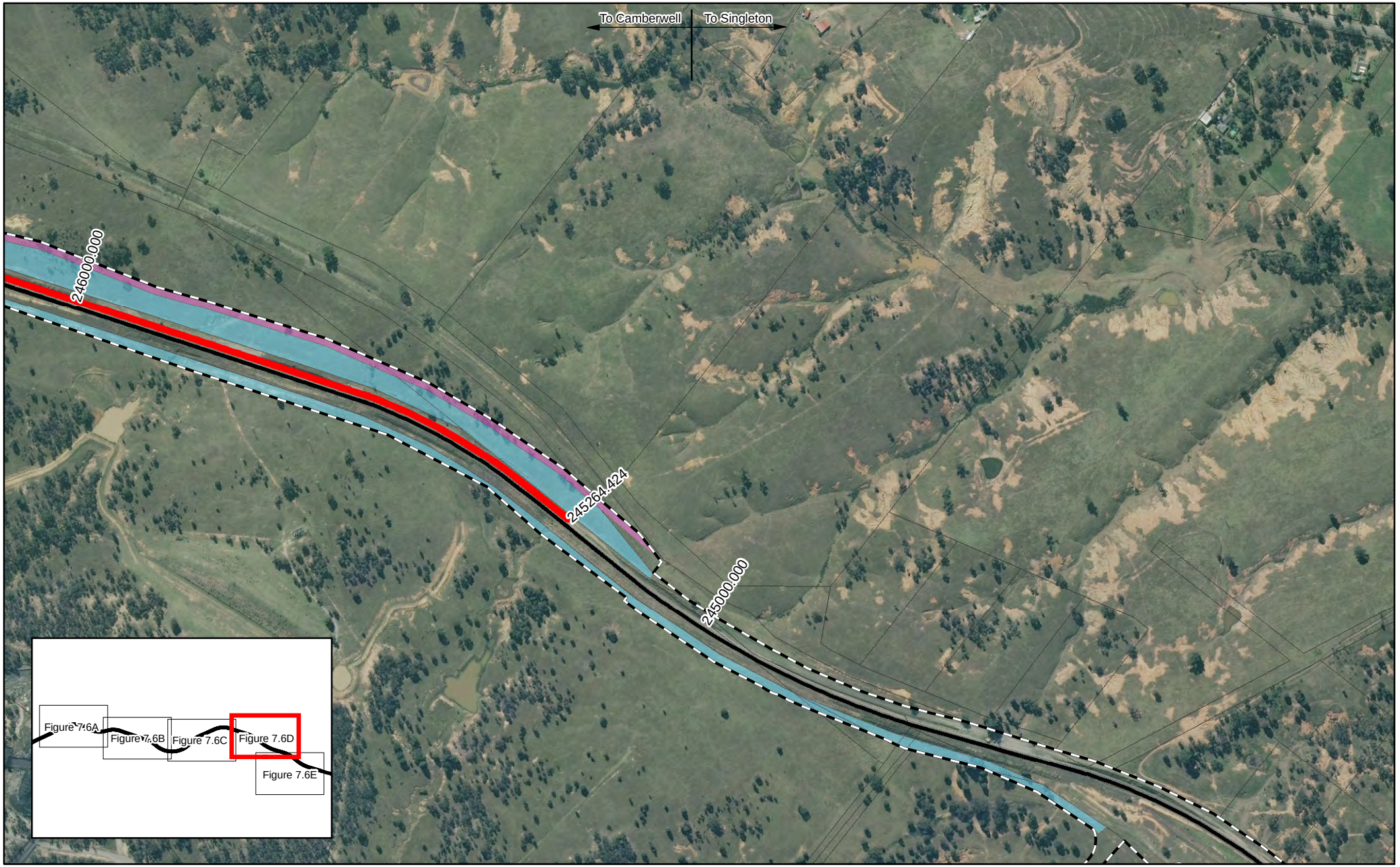


A4 Original

0 50 100 200

Meters

GDA 1994 MGA Zone 56

Proposed Impact Area
Third Track
Existing Alignment
Permanent Land Acquisition
Temporary Lease Area

ARTC
Nundah Bank

| | |
|---|---|
| Job Number | 2110501B |
| Revision | A1 |
| Date | 15.02.11 |
| Scale | 1:7,000 |

**Proposed Land Acquisition** **Figure 7.6D**

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A4 Original

0 50 100 200

Meters

GDA 1994 MGA Zone 56

Proposed Impact Area
Third Track
Existing Alignment
Permanent Land Acquisition
Temporary Lease Area

ARTC
Nundah Bank

| | |
|---|---|
| Job Number | 2110501B |
| Revision | A1 |
| Date | 15.02.11 |
| Scale | 1:7,000 |

**Proposed Land Acquisition** **Figure 7.6E**

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**Table 7.6p Summary of land acquisition**

| Owner of property | Lot | DP | Approximate area (ha) |
|---|---|---|---|
| Four Mile Pty Ltd | 239 | 829334 | 2.49 |
| Four Mile Pty Ltd | 238 | 829334 | 3.09 |
| Four Mile Pty Ltd | 236 | 829334 | 0.36 |
| Four Mile Pty Ltd | 83 | 752442 | 3.12 |
| Four Mile Pty Ltd | 94 | 752442 | 0.02 |
| Four Mile Pty Ltd | 150 | 752442 | 1.060 |
| Four Mile Pty Ltd | 235 | 752455 | 0.19 |
| Four Mile Pty Ltd | 1 | 1139094 | 1.93. |
| State Rail Authority | 1 | 441840 | 0.21 |
| State Rail Authority | 2 | 449423 | 0.12 |
| RHA Pastoral Pty Ltd | 235 | 829334 | 0.80 |
| RHA Pastoral Pty Ltd (Leased to Integra Pty Ltd) | 237 | 829334 | 5.49 |
| RHA Pastoral Pty Ltd (Leased to Integra Pty Ltd) | 22 | 752442 | 1.21 |
| RHA Pastoral Pty Ltd (Leased to Integra Pty Ltd) | 22 | 752442 | 0.48 |

The Country Rail Infrastructure Authority would acquire land needed for construction and operation of the Proposal on behalf of the ARTC. All acquisition of land would be undertaken in accordance with the provisions of the Land Acquisition (Just Terms Compensation) Act 1991 where necessary, although it is recognised by the ARTC that the negotiated acquisition of the affected areas is a more desirable outcome. This process has already commenced through the consultation conducted by the ARTC in the Hunter Valley as well as meetings held specifically relating to the Proposal. However, where negotiation with the affected landowners is not successful, compulsory acquisition in accordance with the Act would be carried out as a last resort.

Where land to be acquired for the Proposal is currently leased, mutually agreed compensation may be made for any loss of productive agricultural land or facilities. Stock fencing would be provided along the newly defined property boundaries and be constructed prior to the removal of existing fencing or any works being carried out affected the acquired land. If, during the acquisition process, an affected property becomes listed for sale on the open market, the ARTC would consider purchasing the property separately from the acquisition process detailed above.

The acquisition of private land for the Proposal would not result in impacts on surrounding land uses and would not affect the commercial viability of any businesses (coal mines) located adjacent to the corridor as only small portions of strip land are proposed to be acquired. Correspondence received from both Integra Coal and Rixs Creek (refer Section 5) confirms that the Proposal is not likely to affect their operations nor would the proposed acquisitions result in the sterilisation of any high priority resources.

**Land use**

The land proposed to be permanently acquired is zoned 1(a) Rural under the *Singleton Local Environmental Plan*, 1996 (SLEP). The permanent acquisition of that land would result in a change to the land use from mining and agricultural uses to railway undertakings. The total amount of land proposed to be permanently acquired and hence result in a subsequent change in land use is 20.6 hectares.

Clause 36 of the SLEP describes development that is not restricted or prohibited by SLEP, including railway undertakings. Accordingly, works associated with the Proposal are permissible under clause 36 on land within zone 1(a) Rural. Given that the Proposal is not prohibited under the SLEP and that its approval is subject to Part 3A of the EP&A Act, rezoning of these lands for permissibility is not required. However, it is anticipated that the land to be acquired and currently zoned 1(a) Rural would be included in the SP2 Infrastructure Zone, along with the existing unzoned land that forms the existing rail corridor, in a future Local Environmental Plan prepared by Singleton Council and gazetted in accordance with the *Standard Instrument (Local Environmental Plans) Order 2006*.

**Adjoining and surrounding land**
No access to properties would be affected by the Proposal and it is not anticipated that there would be a requirement to close any roads for construction access.

The movements of construction trucks and vehicles along local roads such as Middle Falbrook Road, Stony Point Road, Bridgman Road, and Rixs Creek Lane may result in changes in amenity from noise and vibration (refer Section 7.3), air quality (Section 7.4), socioeconomic (Section 8.5) and energy consumption and greenhouse gases (Section 8.4).

Operational impacts upon adjoining land would be limited to incremental vehicular delays at level crossings addressed in Section 7.6.5. As a result, operational mitigation measures are not deemed necessary beyond those already identified.

Three water storages associated with neighbouring land have been identified as being potentially and temporarily affected by the Proposal. This is discussed in Section 4.5.

As detailed in Section 5, no impacts to businesses identified or mineral resources are anticipated.

### 7.6.7. Mitigation measures

**Traffic**
To manage the potential construction impacts on transport, a Traffic and Transport Management Sub Plan would be developed to include the following mitigation measures:

*Traffic management plans*
Prior to any construction commencing, a construction traffic management plan (TMP) would be prepared. The plan would detail how traffic associated with construction would be managed during each stage of construction.

The construction traffic management plan would contain the following information:

- The proposed works and construction traffic impacts:
    - Proposed construction techniques;
    - Estimated duration of the works;
    - Increased traffic volume by vehicle type;
    - Anticipated or designated routes for the delivery of materials and equipment (e.g. avoid local roads and use main roads whenever possible); and
    - Summary of the potential construction impacts on the road network.

- Stakeholders:
    - The main stakeholders in the plan;
    - Roles and responsibilities of all stakeholders;
    - Contact details for all stakeholders;
    - The person responsible for developing, updating and implementing the plan; and
    - Any required approvals and licences.

- Community consultation:
    - Letterbox drops to local residents advising of potential property access restrictions (if required);
    - Signposting and advertising to warn motorists of proposed road closures and traffic diversions and other temporary traffic arrangements; and
    - Advertisements in local newspapers.

- Road safety aspects.

Considerations in relation to the avoidance of potential traffic impacts would include:

- Retention of local property and emergency access, where practicable;
- Provision of a swept path analysis to ascertain that sufficient manoeuvring space is provided for all vehicles along the access route;

- Warning signs to advise road users in advance of work zones and surrounding intersections;
- Safety signage to be installed to warn construction vehicle drivers of the presence of cyclists and pedestrians; and
- U-turn facilities for construction vehicles where necessary.

*Traffic control plans*
Traffic control plans (TCP) would be prepared for the road network surrounding the Proposal, including access points. Traffic control plans would be produced for specific road construction staging scenarios, depicting vehicle, pedestrian, bus and cyclist restrictions and protection measures.

These plans would be completed in accordance with *AS1742.3 Manual of uniform traffic control devices – Part 3: Traffic control for works on roads* and other relevant guidelines, and would include reviews of temporary road work traffic control measure, signage and speed limits in areas of potential risk.

Both the TMP and TCPs would require consultation and approval by the relevant road owner/authority.

*Monitoring and Maintenance*
A maintenance and inspection regime including road dilapidation assessments would be established to ensure that the condition of Bridgman Road, Middle Falbrook Road and Rixs Creek Lane are maintained throughout the construction period. It is not anticipated that other road users would be restricted or overly inconvenienced by construction traffic entering and leaving the construction site as the roads have low or very low traffic volumes at these access points.

**Land Use**
To manage the potential impacts to land use, the following management and mitigation measures are proposed:

- Construction of the Proposal and associated infrastructure would require the acquisition of land. All acquisition of land would be undertaken in accordance with the provisions of the *Land Acquisition (Just Terms Compensation) Act* 1991. It is recognised that the negotiated acquisition of the affected areas of individual properties is a desired outcome and this process is currently underway. However, where negotiation with the affected landowners is not successful, compulsory acquisition in accordance with the provisions of the *Land Acquisition (Just Terms Compensation) Act* 1991 would be carried out.
- Where required and agreed, compensation would be made for any loss of productive agricultural land or facilities. Stock fencing would be provided along the newly defined property boundaries and be constructed prior to the removal of existing fencing or any works being carried out on the subject land.
- Measures to mitigate amenity impacts such as noise, air, visual and social are outlined in Sections 7.3, 7.4, 8.2 and 8.5 respectively.
- Detailed design would be undertaken to reduce land use impacts on individual properties in consultation with the individual landowners.
- Access requirements for the construction phase would be discussed with individual landowners.

## 7.7. Non-Indigenous heritage

The DGRs identify non-Indigenous heritage as a key issue for the Environmental Assessment. A detailed assessment of non-Indigenous heritage is provided in Volume 2, Technical Paper 5 and summarised in this section. Table 7.7a outlines the DGRs relevant to non-Indigenous heritage and where they have been addressed in this section.

**Table 7.7a Director-General's Environmental Assessment Requirements – non – Indigenous heritage**

| Director-General's Environmental Assessment Requirements | Location addressed |
|---|---|
| **Key Issues** | |
| Heritage – including but not limited to:<br>• Non-Indigenous heritage, identification of items, archaeological and areas of heritage significance within, along or adjacent to the corridor or affected by construction activities (including the Middle Falbrook Road Bridge). This should include an analysis of the potential impacts to the values, settings and integrity of the items and archaeology, taking into account NSW Heritage Guidelines. | Section 7.7.3, 7.7.4, 7.7.5 and Volume 2 Technical Paper 5 |

## 7.7.1. Assessment approach

The non-Indigenous heritage assessment was undertaken in accordance with the *Statements of Heritage Impact: a Model* (NSW Heritage Office, 1998) and the ICOMOS *Burra Charter*. The level of research undertaken during this assessment is considered commensurate with the level of potential impacts that would result from the Proposal.

The assessment included background desktop research and heritage register searches and a field survey from Monday 6 September to Thursday 9 September 2010.

The field survey inspected the entire study area however areas of interest were identified prior to the survey through analysis of aerial photography, historical research and heritage inventory searches. This was particularly important as the study area does not have any non-Indigenous heritage items listed within its boundaries, although the region has a significant industrial past including several remnant structures.

## 7.7.2. Heritage register search results

A search of Commonwealth, State and local government heritage lists, registers and schedules was undertaken to determine the location of any heritage items within or in close proximity to the Proposal. There were no listed heritage items identified to be within the study area; however two items within the vicinity of the study area are listed under Schedule 3 of the Singleton LEP 1996.

- **Rix's Creek Coke Ovens -** situated to the west of Rix's Creek opposite the southern end of the study area (located on Lot 2 DP 598097 and Lot 4 DP 1123099). This item is classified as being of regional significance.

- **Dulwich Homestead** - situated to the west of Middle Falbrook Road, southwest of the northern end of the study area (located on Lot 2 DP 810309). This item is classified as being of local significance.

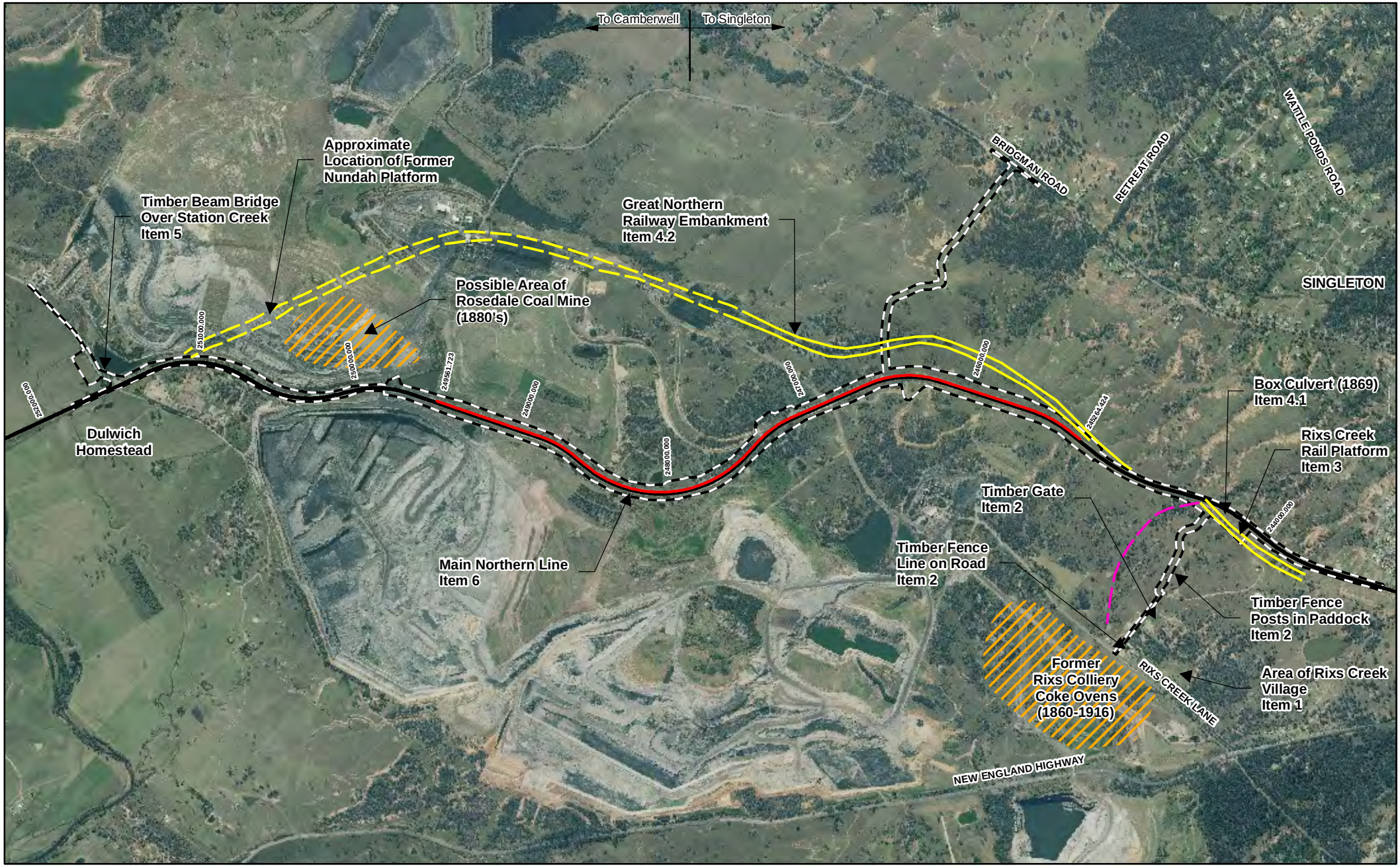
It should be noted that Middle Falbrook Bridge over Glennies Creek at Middle Falbrook is listed on the State Heritage Register, RTA's Heritage and Conservation Register and the Register of National Estate. The bridge is a DeBurgh timber truss bridge and was completed in 1904. The bridge however is over 3 kilometres from the study area and is therefore not considered within the vicinity of the Proposal.

## 7.7.3. Field survey results

During the desktop background research, a number of items/ areas were identified as having potential historical significance. The field survey was then used to investigate these areas/items further and identify any evidence of historic activities and events within the study area. The areas/items are summarised below in the order they occur from south to north along the Proposal alignment. Figure 7.7 shows the location of these items.

- **Item 2 - Evidence of historical uses such as remnant roadways, fence posts, slab buildings etc**

A survey was undertaken along the alignment of the proposed eastern extension of Rixs Creek Lane in order to identify remnants of an earlier road to Rixs Creek train platform (Item 3). The landscape is predominantly gently undulating and is cut with small creek lines. No evidence of an earlier road was noted. A small number of fence posts are located in the paddock exist and these may indicate the edges of the road to the train platform. It is possible that a road to the Rixs Creek train platform was never made and it was predominantly used as a walking track by inhabitants of the mining village.




A4 Original

0 0.25 0.5 1

Kilometres

GDA 1994 MGA Zone 56

- Possible Former Tramway (1869)
- Great Northern Railway (1889) Destroyed Section
- Great Northern Railway (1889) Surviving Section
- Third Track
- Existing Alignment
- Proposed Impact Area
- Historical Area

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Nundah Bank

| | |
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| Date | 15.02.11 |
| Scale | 1:30,000 |

**Non-Indigenous Heritage Figure 7.7**

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- **Item 3 - Rixs Creek train platform (1885)**

The train platform is located at the end of the proposed Rixs Creek Lane extension, which continues east from the terminus of the unsealed Rixs Creek Lane. The platform is situated along the Great Northern Railway embankment and was placed there 16 years after the train line began operating. The train platform was closed in 1938.

The masonry platform survives in fair condition and retains high restoration and interpretation potential. The platform is located on what would have been the western side of the rail line, before the rail line was removed. The cutting for the rail line is clear and relatively un-impacted. The bank on the eastern side of the former rail line survives and is level with the landscape on the platform side.

A small sandstone box culvert is located approximately 60 metres north of Rixs Creek train platform. The culvert type and its location beneath the embankment strongly suggest that it predates the platform and is more likely to belong to the early phase of the Great Northern Railway (1869).

- **Item 4 - Great Northern Railway (1869) embankment and associated elements**

A substantial section of the Great Northern Railway embankment survives within the Proposal area to the west of the existing rail corridor. The section of surviving embankment incorporates the Rixs Creek train platform (discussed above), a box culvert and a large sandstone culvert which is of particular interest.

  - **Item 4.1 - The box culvert**. Located on the western side of the existing rail line, beneath the rail embankment. It has collected silt on the floor and was not flowing during the survey. Both headwalls were partially visible on either side of the embankment. The headwalls are constructed of at least five visible sandstone blocks; the floor of the feature was not visible. Each block is approximately 250 millimetres in height; lengths and widths were not ascertained because the item is largely obscured.

  - **Item 4.3 - Great Northern Railway embankment**. A large section of the embankment survives within the Proposal area. The embankment varies in height along its length and in some cases appears to incorporate natural raised levels in the landscape. The embankment is particularly imposing where the large culvert (Item 4.2) is located, approximately 25 metres above the landscape on the west and 2 kilometres north of the east-west alignment of Rixs Creek Lane and the historic train platform. In this location, the embankment is at the base of a very steep incline to its east, with the landscape abruptly leveling out to a gentle slope directly on the western side. Views from the embankment at this point are commanding and uninterrupted to the distant Rixs Creek coal mine. The embankment also survives in the Rixs Creek train platform location but is at a much smaller scale being approximately 10 metres higher than the undulating farm landscape to the west. The full extent of the surviving remnants of the Great Northern Railway embankment was not ascertained as it meandered in and out of the Proposal's corridor and therefore the survey area.

- **Item 5 - Timber road bridge on Middle Falbrook Road.** Located at the northern extent of the study area, this is a short single-span timber beam bridge over Station Creek. It has timber sheeting abutments, lateral decking over the cross planks on girders and timber kerb pieces. The railings are timber, notched into the side beams.

  Individual decking planks have been replaced as evidenced by planks in various states of repair, some retaining bitumen and others displaying less wear. The date of this bridge has not been ascertained but it is possible that Station Creek has been bridged at least since the rail line was built. Being of a short span, it does not display any diagnostic features that would place it in either the pre- or post-1894 category.

- **Item 6 – Main North Line (1952).** The existing railway line (Main North Line) exists through the entire study area of the Proposal. It is of standard design and is constantly maintained. It is not considered to be a heritage item but has been considered as an element of the overall Proposal area.

Other items identified during desktop background research and verified during the field survey that are not within the Proposal area however are in the vicinity of the Proposal include:

- Item 1 - Evidence of the mining village at Rixs Creek (1860s) - No significant evidence of the mining village at Rixs Creek still exists. The survey was confined to the unsealed Rixs Creek Lane

and road reserve, which did not show any signs of formerly built areas. It is likely that the road has not been widened since demolition of the village as the current width of the road appears to be marked out by early timber fence posts.

- Item 2 - Evidence of historical uses such as remnant roadways, fence posts, slab buildings etc - The surface of Rixs Creek Lane and adjacent items were examined for evidence of early use. No definitive evidence of the early road was noted, nor were any slab buildings, culverts beneath the road or other infrastructure noted in the vicinity of the unsealed road. The only surviving features along the road that are not recent are the row of early timber and wire fence posts and the timber entrance gate to 88 Rixs Creek Lane (Lot 21 DP 248630). The timber fence posts survive intermittently along the northern side of Rixs Creek Lane across a weedy, unlevelled road shoulder. It is possible that the fence line marks the edge of the road reserve. The timber entrance gate is of rural character and displays evidence of earlier timber elements but is unlikely to be of significant age or technical achievement.

- Item 4.2 - The large sandstone culvert - Located approximately 2 kilometres north of Rixs Creek platform. This culvert is at the base of a high section of the Great Northern Railway embankment. It possesses a high level of technical and research interest in that each headwall is of a very different design. The floor on the eastern side is composed of sandstone flagging; the floor on the western side was under muddy water and not visible. The eastern (ingress) headwall is smaller than its western counterpart and it is heavily eroded (very likely due to the volume and speed of water flowing down the hill). The western (egress) headwall is considerably larger than the eastern headwall; it is intact and in excellent condition. An aspect of high technical and aesthetic interest is the design of the western headwall: it is built to align with the embankment but has been designed to be viewed at an angle. When viewed from straight on, the building elements are not square and the conduit recedes into the embankment at an angle. The reason for this is unknown as there is no evidence of structures or locations that the headwall would be viewed from. It is therefore likely that the motivation for the design is that the downstream side of the creek flowed at an angle for the embankment and the viewing angle is assumed to be from the creek line.

- The Rixs Creek Coke Ovens (1884) - No evidence of the Coke Ovens was noted from the survey. It is understood that remnants of these features survive but that they are beyond the Proposal corridor and therefore would not be impacted by the Proposal.

- Tram line (1869) - The Rixs Creek tram line diverged westerly from the main train line in the vicinity of Rixs Creek train platform. Surviving evidence was sought during the survey but nothing was found and the former tram line is likely to be north of the area that would be impacted by the Proposal.

- Dulwich Homestead (1876) - The homestead is listed on the Singleton LEP and was built in 1876 by Thomas Ware Smart on an earlier homestead with the same name. Dulwich is at least 340 metres from the Proposal.

- Middle Falbrook Bridge over Glennies Creek - Located approximately 3 kilometres from the proposed impact area of the Proposal and approximately 650 metres from the proposed construction traffic routes. The bridge would not be used to access the proposal area during construction and therefore would not be impacted by the Proposal.

### 7.7.4. Assessment of significance

The items verified during the field survey provide evidence of key historical events or activities in the study area. These items therefore require an assessment of significance in order to determine whether they are of heritage significance and consequently whether the Proposal would impact on any items of significant heritage value. The items which require an assessment of significance include:

- **Item 4 -** The former Great Northern Railway (including the embankment, culvert, Rix's Creek platform and tramway junction);
- **Item 6 -** The Main North Line (including the embankment and culverts);
- **Item 5 -** The timber road bridge on Middle Falbrook Road; and
- **Item 1 -** Potential archaeological relics of the mining village at Rixs Creek.

Rix's Creek Coke Ovens and Dulwich Homestead have previously been assessed for their heritage significance which is reflected in their listing as heritage items under the Singleton LEP 1996. Dulwich Homestead has also had its significance assessed in the context of a Proposal to expand the operation of Integra Open Cut mine (NEXUS, 2008). The significance of these items as previously assessed is accepted and they have not been reassessed in this report.

**Item 4 – The former Great Northern Railway**
The remnant features of the former Great Northern Railway, as they survive within the Proposal corridor are of local significance for their ability to demonstrate the technical achievements of the NSW Government Railways during the period of John Whitton's control as well as the importance of coal mining to the economy of the local region. Further research is required to determine if the former Great Northern Railway and its components are of State significance for their rarity value, technical and aesthetic achievement as well as its role in the development of the state of NSW.

**Item 6 – The Main North Line**
The Main North Line, in its operational form, is an important part of the transportation network within NSW and between NSW and Queensland. It is also significant as a means of transportation of coal and other mining-related material to the economy of the nation. As an operating railway line however, the Main North Line is not a heritage item and does not require the many maintenance restrictions applied to heritage items.

**Item 5 – Timber road bridge on Middle Falbrook Road**
The single-span timber beam bridge over Station Creek has indicative local significance as a representative example of items of its type within NSW.

**Item 1 - Potential archaeological relics of the mining village at Rixs Creek**
Should intact archaeological deposits associated with the former Rixs Creek Village survive, they are likely to yield information relating to domestic, commercial and civic activities of the inhabitants. It is also likely that the different phases of the village's growth and decline are embodied in the potential archaeological deposits. The site of the former Rixs Creek Village is likely to be of local significance.

## 7.7.5. Potential impacts

An assessment of the potential impacts of the Proposal on heritage items has been undertaken including potential impacts from the construction compounds, stockpile sites and construction haul roads (refer Table 7.7b.).

The assessment of potential impacts addresses each site where heritage items, or the potential for heritage items, have been identified. The third track does not have the potential to impact heritage items within the railway corridor however ancillary works may have an effect on identified heritage items.

**Table 7.7b Impact assessment on identified heritage items**

| Area | Location/ heritage items | Proposed change | Potential impacts |
|---|---|---|---|
| **Primary site compound** | This compound would be situated at the northern end of the Proposal area near Middle Falbrook Road within the rail corridor.<br>No identified heritage items. | A temporary site compound is proposed within the existing rail corridor. Details relating to establishment of the compound would be developed during detailed design. | No heritage items were identified within the main compound area and therefore no impacts expected. |
| **Rixs Creek Lane road extension** | The eastern extension of Rixs Creek Lane through paddocks to the rail corridor. The road is at the southern end of the study area for the Proposal.<br>A small number of fence posts are located in the paddock and these may indicate the edges of the road to the train platform. | Rixs Creek Lane would be extended and would comprise a crushed rock, two-lane road across the paddock. | There are no impacts expected to the wooden fence posts. |
| **Secondary compound** | The compound is proposed to be on the down side of the rail track and will be accessed by the Rixs Creek Lane | Temporary buildings would be placed in this area with limited ground penetration expected e.g., site sheds, offices, | There is potential for impacts to the former Great Northern Railway embankment (Item 4.3), the small box culvert |

| Area | Location/ heritage items | Proposed change | Potential impacts |
|---|---|---|---|
| | extension.<br>A small box culvert (Item 4.1) and former Rixs Creek train platform (Item 3) are located in the near vicinity. | parking, etc. | (Item 4.1) and the former Rixs Creek train platform (Item 3) in this area.<br>The embankment is a sturdy element of the former railway group and provided that it is utilised only for support compound elements such as temporary site sheds, the impacts would be minimal. |
| **Middle Falbrook Road access** | At the northernmost extent of the study area of the Proposal. | It is proposed to upgrade the timber bridge (Item 5) over Station Creek to ensure that it is capable of supporting construction traffic. | Impacts to the timber bridge would depend on the scope of upgrade involved. |
| **Middle Falbrook Road Bridge over Glennies Creek** | The bridge is located approximately 600 metres from the main construction haulage route at the intersection of Stony Point Road and Middle Falbrook Road. | No changes proposed. | Damage to the bridge would occur if heavy construction vehicles were to detour from the proposed haulage route. |

## 7.7.6. Mitigation and management measures

The following mitigation and management measures are proposed to reduce the potential for impact of the identified sites and to cater for any unexpected finds:

- Exclusion zones would be established around the wooden fence posts, timber gate, etc along Rixs Creek Lane and the former railway platform and box culverts in the secondary compound area (refer Table 7.7c).
- Exclusion zones would be established 2 metres beyond the boundaries of the item and marked with brightly coloured para-webbing or similar.
- All construction personnel would be inducted on the importance of avoiding exclusion zones. Personnel would also be inducted on the procedures to follow in the event of an unexpected find.
- Work would stop immediately in the event of unexpected heritage items or archaeological sites being uncovered during construction. A qualified archaeologist would be contacted to make an assessment of the find. Should the find be a relic, the Heritage Council would be notified under Section 146 of the Heritage Act 1977.
- Council would be consulted regarding the Station Creek bridge upgrade works and heritage implications. Should major changes to the bridge be necessary, a digital photographic record of the bridge would be made prior to, and at completion of, the rehabilitation.
- Should the proposed impacts vary from those detailed in this report, the changes would be incorporated into the mitigation/amelioration table (Refer Table 7.7c) to ensure that all items listed in this EA are ameliorated following construction if disturbed. Should areas that have not been surveyed be included in the impact zones, addition survey and reporting would be necessary.
- Should the proposed impacts vary from those detailed in this report and impacts to identified heritage items be unavoidable, a detailed assessment of the item would be required in order to establish a detailed site history and assessment of significance. These details would be required in order to guide specific mitigation measures for identified impacts and to ensure that all items listed in this EA are ameliorated following construction if disturbed.

Table 7.7c identifies area-specific mitigation measures to either avoid impacts to identified heritage items or recommendations to ameliorate impacts that are unavoidable.

**Table 7.7c Proposed area-specific mitigation measures**

| Area | Heritage Items | Mitigation/amelioration |
|---|---|---|
| Primary compound | None | N/A |

| Area | Heritage Items | Mitigation/amelioration |
|---|---|---|
| Rixs Creek Lane extension | Item 2 timber fence posts | Although impacts to these items are not expected, inadvertent impacts may occur. In order to avoid inadvertent impacts ensure the following:<br>• Areas of sensitivity such as old timber fence posts and the timber gate should be identified in exclusion zones and avoided;<br>• Stop work if unexpected finds are encountered. |
| Secondary compound – Rixs Creek | Item 3 – Former Rixs Creek train platform, Item 4.1 – Small box culvert, Item 4.3 - Railway embankment | Although impacts to these items are not expected, inadvertent impacts may occur. In order to avoid inadvertent impacts ensure the following:<br>• Identify heritage items and include in an exclusion zone. |
| Access to proposed impact area of the Proposal from Middle Falbrook Road | Item 5 - timber bridge | It is proposed to upgrade the timber bridge over Station Creek. The bridge is functioning road infrastructure that demonstrates evidence of constant maintenance and upgrade. The following is recommended:<br>• Rehabilitation to ensure that it withstands construction traffic is acceptable provided that the rehabilitation measures do not deviate from the traditional materials that would be used for maintenance of this type.<br>• Consult with Council heritage officer when details of upgrade are known. |
| Middle Falbrook Road Bridge over Glennies Creek | None | The Traffic and Transport Sub Plan of the PCEMP would include a management measure to ensure that the State Heritage Register listed Middle Falbrook Bridge over Glennies Creek in Middle Falbrook is not use by heavy construction vehicles. This would include additional communication requirements regarding the use of the bridge by UHVA personnel and contractors via UHVA induction, pre-start briefs and toolbox talks. |

## 7.8. Earthworks

Section 4.7 provides details of the proposed construction works including approximately 232,500 cubic metres of earthworks to be undertaken comprising site accesses, maintenance tracks and haul roads, and track foundation works. This section provides an assessment of the geology and soil characteristics in the vicinity of the Proposal with a particular focus on the risks that might occur during construction from erosion and sedimentation. Mitigation measures would be implemented to control erosion and sedimentation of watercourses and the potential movement of soils offsite via the specified measures as well as a management framework outlined in Section 9.2.

Table 7.8a below outlines the DGRs relevant to earthworks and the locations where they are addressed in this section.

**Table 7.8a Director-General's Environmental Assessment Requirements - earthworks**

| Director-General's Environmental Assessment Requirements | Location addressed |
|---|---|
| **Key Issues** | |
| **General construction impacts**<br>The Environmental Assessment must assess the impacts of and present a management framework for:<br>• Earthworks, including a considered approach to minimising impacts associated with the excavation, movement, stockpiling, rehabilitation and disposal of spoil and fill, with consideration given to:<br>· Soil characteristics, including acid sulphate soils and potential land contamination;<br>· Quantification of bulk earthworks and spoil balance and disposal of excess spoil; | Section 7.8.2 and 8.1<br>Section 4.7.2 and 7.8.3 |

| | |
|---|---|
| · Erosion and sedimentation control measures at excavation, storage and placement locations to protect adjoining watercourses; and<br>· A strategy for managing earthworks with a particular focus on those works that have the greatest potential to disturb soils that are contaminated, have a high erosion and run off hazard and adverse impacts on watercourses, and a broader, more generic approach developed for ongoing construction management. | Section 7.8.4<br><br>Section 9.2 |

## 7.8.1. Methodology

The assessment comprised the following steps:

- Review of existing literature and online resources including reports prepared for the Proposal for relevant information;
- Consideration of issues raised in consultation with government agencies and other stakeholders (refer Section 5);
- Assessment of potential construction and operational impacts, including subsidence and erosion and disposal of excess spoil; and
- Recommendation of mitigation measures to control or ameliorate any potential impacts.

## 7.8.2. Existing environment

**Geology**

The existing rail alignment is in the northernmost part of the Sydney Basin which contains rock of Permian-Triassic age and is a thick sequence of relatively under formed sedimentary rocks. The surface geology for the third track alignment consists of Mulbring Siltstone and Whittingham Coal Measures (previously referred to as the Singleton Coal Measures).

Between chainages 245.240km and 244.800km, the surface geology for the alignment appears to be close to the intersection of the Mulbring Siltstone and the Whittingham Coal Measures, and then from chainage 244.800km to the southern end of the proposed third track, the line is wholly within the Whittingham Coal Measures, until it crosses the alluvial material of the Glennies Creek flood plain. The Mulbring Siltstone is a marine sequence and can also be interbedded with sandstone.

The Whittingham Coal Measures consist of sandstone, shale, mudstone, conglomerate and coal seams. These rocks are exposed in various cuttings along the alignment. In finer-grained rock types such as shale and mudstone, fresh rocks seldom have strengths exceeding high, with strength reducing to low or extremely low when they are extremely weathered. In the coarse grained rocks such as the conglomerate, the moderately weathered rock can display a higher strength than the fresh rock, which is high strength, although the strength of the rock reduces with continued weathering. Table 7.8b provides a geological section of the Proposal.

**Table 7.8b Geological section of the Proposal**

| Approximate chainage (km) | | Geology | Existing fill height | Existing cut height |
|---|---|---|---|---|
| From | To | | | |
| 245.240 | 245.900 | Coal measures.<br>Rocks are jointed sandstone with interbeds of siltstone preferentially eroding and undercutting. Also includes blocky sandstone rock with siltstone and clay interbeds.<br>The less weathered rock is of moderate high to high strength. | – | 6-11m |
| 245.900 | 246.300 | Coal measures.<br>Rocks are jointed sandstone with interbeds of siltstone preferentially eroding and undercutting. Also includes blocky sandstone rock with siltstone and clay interbeds.<br>The less weathered rock is of moderate high to high strength. | – | 14-16m |
| 246.300 | 246.750 | Coal measures.<br>Rocks are jointed sandstone with interbeds of siltstone preferentially eroding and undercutting. Also includes blocky sandstone rock with siltstone and clay interbeds.<br>The less weathered rock is of moderate high to high strength. | – | 6-9m |

| Approximate chainage (km) | | Geology | Existing fill height | Existing cut height |
|---|---|---|---|---|
| From | To | | | |
| 246.750 | 247.150 | Coal measures.<br>Cutting on the existing track 246.760km is a double sided cutting 6-8m high, composed of jointed sandstone with interbeds of siltstone preferentially eroding and undercutting. Loose sandstone blocks up to 1m in size present. Bedding dip direction parallel to track.<br>Blocky rock is medium high strength. | – | 16-20m |
| 247.150 | 248.000 | Coal measures.<br>Cutting on the existing track at 247.530km is a double sided cutting (320m) up to 6-7m high in blocky sandstone rock with siltstone and clay interbeds that are prone to erosion and undercutting. Up and down sides battered at 45-60º.<br>Rock is medium high strength. | – | 7-11m |
| 248.000 | 249.700 | Coal measures. The existing track is on an embankment crossing a natural drainage line near the ridge line. | 0-8m | – |
| 249.700 | 249.850 | Coal measures. | 0-2m | – |
| 249.850 | 250.375 | Coal measures.<br>Cutting on existing track at approximately 250.000km is a double sided cutting up to 4m high in blocky sandstone and conglomerate rock with well developed clay and siltstone interbeds that are prone to erosion and undercutting. Up and down sides battered at 45-60º with 3m wide cess drain on down-side and 2-4m on up-side.<br>Rock is medium high strength. | – | 2-6m |
| 250.375 | 251.500 | Coal measures. | 0-4m | – |
| 251.625 | 252.140 | Quaternary Deposits. | 0-4m | – |

Source: SKM, 2009

The Proposal borders the eastern edge of the Patrick Plains Maine Subsidence district as shown in Figure 7.8. Information provided by the Department of Industry and Investment indicates that there are several abandoned underground mines located in the vicinity of the Proposal. Consultation with the Mine Subsidence Board (refer Section 5) identified the interaction of the Proposal with historical underground mining and possible subsidence issues as an item that required further investigation. Approval from the Mine Subsidence Board is also required prior to development within the identified subsidence district.

Historical underground mines are located to the east and north of the Proposal. The Rosedale Collieries are the closet abandoned mines, located approximately 180 metres to the north. Due to the distance of these mine workings from the Proposal, it is unlikely that there would be any impact from sinkhole subsidence (UHVA 2010g).

An assessment of potential trough subsidence was also undertaken and concluded that at the western extent of mining works, the depth of mining is approximately 80 metres from the ground surface. On the surface, the separation distance between the Proposal and potential trough subsidence zone would be approximately 140 metres which is sufficient to ensure that there would be no impact on the Proposal (UHVA 2010g). Discussions with current open cut mine operators indicate that they do not have any underground operations in the Proposal area and are not proposing any in the future.

The desktop study report (UHVA 2010g) has been submitted to the Mine Subsidence Board for approval separate to the Environmental Assessment.

**Soils**

According to the Department of Environment and Climate Change's Natural Resources Atlas, the soils in the Proposal area have a rural land capability classification of "soils generally suitable for grazing" and a soil type classification of "yellow and red texture contrast soils".

Analysis of the available soil profiles shows that to the west of the Camberwell Rail Loop between the current rail line and the New England Highway, the soils are described as clayey sand, loamy sand, and sandy loam in the topsoil layer, with subsoils ranging from clayey sand to sandy clay to clay.

North of the Proposal area, near Middle Falbrook Road east of the existing rail line, the soil type is Brown Clay with the topsoil and subsoil consisting of clays with clearly observable grains.

Similarly, to the east of the Proposal area near Bridgman Road, the soil type is Brown Clay with the thin topsoil consisting of silty clay loam and subsoil consisting of clays with clearly observable grains.

To the north east of the Proposal area, near Stony Point Road, the soil is described as sandy loam/loam in the topsoil layer and clay in the subsoil layer.

A search of CSIRO's Australian Soil Resource Information System indicated that the Proposal area has a low probability of the presence of acid sulfate soils. A search of the NSW Natural Resources Atlas also showed no acid sulfate soils mapped in the Proposal area.

The NSW Natural Resources Atlas indicates that the southern portion (from the beginning of the Proposal area at chainage 245.240km to approximately chainage 248.500km) of the Proposal area is subject to a moderate salinity hazard.

Dispersive soils are soils in which the particles separate from one another (disperse) in contact with water. This means that soil particles can be transported away leading to erosion and piping. There are some indications of dispersive soil behaviour in the cuttings of the Mulbring Siltstone evident along the track (SKM 2009, GHD 2010).

### 7.8.3. Impact assessment

The Proposal would involve conventional bulk earthworks. Potential for dispersive soils has been identified with further investigation required so that any such soils can be appropriately managed.

Potential risks associated with earthworks would include:

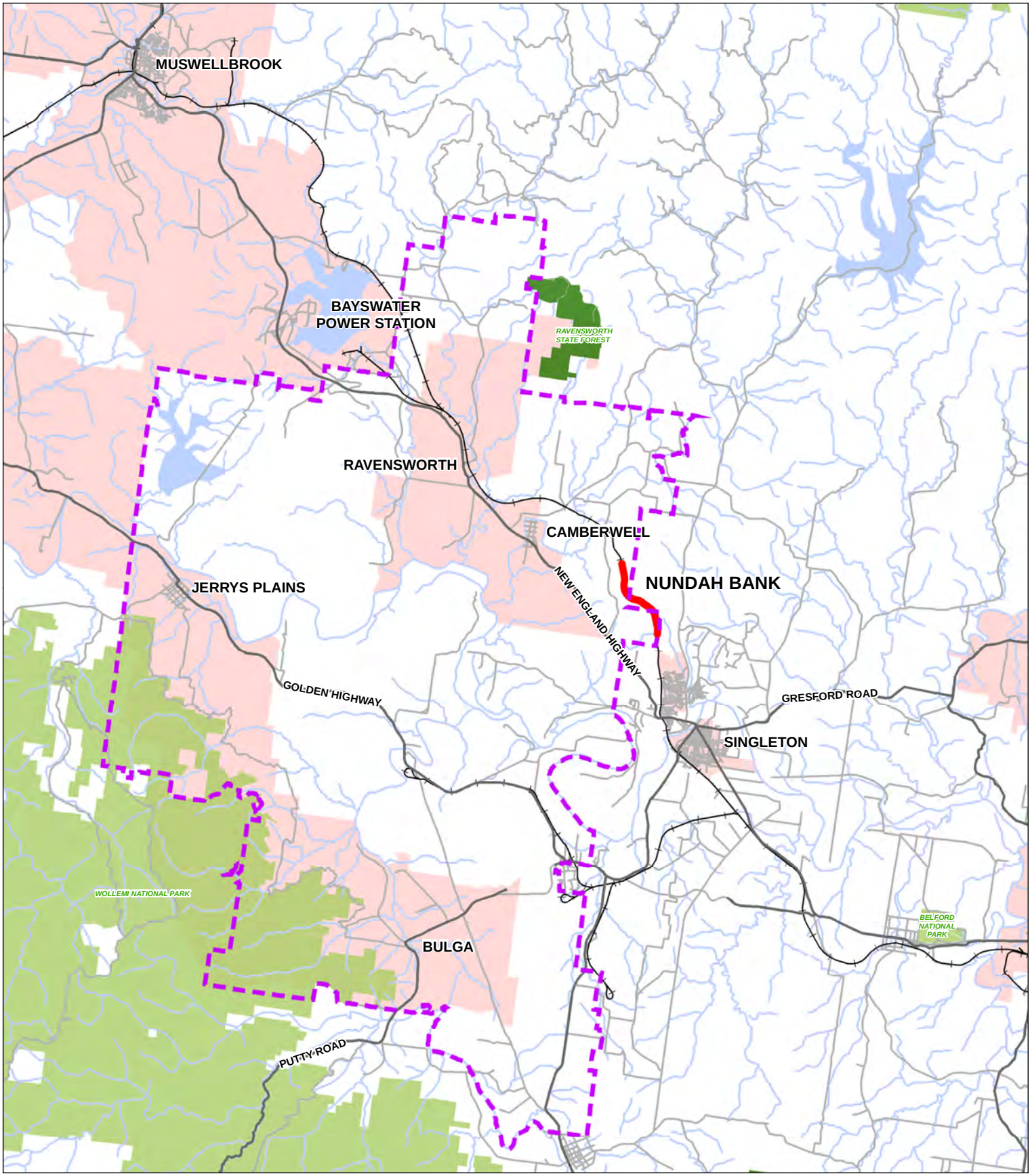
- Management of the material and maintaining stability of existing embankments during excavation works;
- Management of scour and erosion in areas disturbed by construction activities and in spoil disposal areas, particularly in areas of dispersive soils and near creeks and drainage lines; and
- Management of drainage including culverts during construction.

Erosion and sediment control would be managed in accordance with the principles of *Managing Urban Stormwater: Soils and Construction. Volume 1* (Landcom, 2004) (blue book). The Proposal would incorporate appropriate water management controls such as sediment ponds and where possible, permanent locations for the controls would be identified so that they can also be used during construction.

Implementation of the Proposal would include cess drains along the side of the track used to collect water from the ballast to stop it from becoming waterlogged. Cut batter erosion and sedimentation of cess drains may occur in the Mulbring Siltstone Formation due to the dispersive nature of the soils. The potentially erosive nature of the soils and weathered rock could also inhibit the establishment of vegetation.

Design of cut batters and fill embankments would be undertaken to take into account potential future erosion of slopes and drainage impairment. Cuttings would be designed of an appropriate width to provide a buffer from the railway track to manage any identified sediment issues. Where necessary, batter slopes would be reduced or batter treatments would be used to reduce erosion potential and promote vegetation cover. All drains and slopes would be designed in accordance with the ARTC guidelines and good engineering practice.

Spoil from excavations would be stockpiled on site and either reused for fill operations or sealed in flat bunds within the rail corridor, covered with topsoil and vegetated. Investigations separate to this Proposal are continuing into the feasibility of the beneficial reuse of excess spoil (topsoils and sub-soils) between the Proposal and adjacent mine sites. Any excess spoil proposed to be moved offsite would first be tested to ensure it is not contaminated and that the proposed end use is compatible with




Third Track
Main Roads
Major Roads
Rail Lines
Patrick Plains Mine Subsidence District
National Park
State Forest
Forest or Shrub
Watercourse
Water Storage Area
Built Up Areas

A4 Original

0 2.5 5 10

Kilometres

GDA 1994 MGA Zone 56

N

UHVA

ARTC

ARTC
Nundah Bank

**Patrick Plains Mine Subsidence Area**

| | |
|---|---|
| Job Number | 2110501B |
| Revision | A1 |
| Date | 09.02.2011 |
| Scale | 1:250,000 |

**Figure 7.8**

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the spoil quality. The offsite movement of spoil, should it be required, does not form part of the Proposal.

The presence of a moderate salinity hazard is unlikely to present an impact on the Proposal. All track components and materials are designed with a 100-year design life and inherent high levels of durability given their nature. No impacts on the infrastructure are expected.

### 7.8.4. Mitigation and management measures

The following testing would be undertaken to inform the detailed design of the Proposal:

- Geotechnical testing to identify the scope and severity of soil dispersivity and other areas of high risk and prudent design to avoid identified issues; and
- Testing of water from Integra Coal's mine water management system to ensure suitability for reuse.

The primary means to reduce potential impacts associated with earthworks would be achieved through the development and implementation of a Soil and Water Management Sub Plan as part of the PCEMP. This would be supported by the management framework for earthworks outlined in Section 9.2.

The Soil and Water Management Sub Plan would incorporate the design and installation of erosion and sediment controls in accordance with Managing Urban Stormwater, Soils and Construction (DECC, 2008) (the blue book) and would include the following:

- Routine water quality monitoring at control and impact locations of potentially effected watercourses both upstream and downstream of the site prior to and post any discharges from sediment basins;
- Details of the appropriate procedures for handling, stockpiling and assessing materials during site works;
- Adoption of appropriate compaction and moisture controls where any problematic soils may be placed as general fill in embankments;
- Appropriate treatment of soils to inhibit dispersive characteristics if required;
- Contingency to manage acid sulfate soils if encountered, such as treatment and disposal, and including the preparation of an acid sulfate soils management plan where required; and
- Use of cleared vegetation to provide a natural erosion barrier and assist during rehabilitation upon completion of construction.

Prior to earthworks there would be a range of erosion and sediment controls implemented which would include but would not be limited to:

- Establishment of sediment filters, sediment traps and/or sediment basins to capture sediment and prevent sediment laden water discharge to the downstream environment.
- Construction of temporary catch and diversion drains to reduce erosion hazard and prevent clean water from upstream of the corridor flowing onto disturbed areas and hence becoming dirty water.

Additional mitigation and management measures to be included in the Soil and Water Management Sub Plan include:

- Exposed surfaces would be stabilised as soon as practicable following completion of construction through progressive revegetation.
- Appropriate erosion and sedimentation controls would be implemented for the Station Creek bridge upgrade once the detailed design has been determined.
- Appropriate numbers and types of spill kits would be kept on site at all times and any spillage would be immediately and appropriately cleaned up. In the event of a large or hazardous spill, the Fire Brigade, Police, Ambulance and the Department of Environment, Climate Change and Water would be contacted as appropriate.

- All construction personnel would be inducted into soil and water management, including their environmental responsibilities how to manage potential soil and water impacts.
- Refuelling of plant and machinery would either by fuel trucks with spill trays or within bunded areas or off site in appropriate locations wherever possible.
- The area of disturbance would be minimised so that the potential export of sediment is minimised.
- Construction compounds, including machinery, fuel and chemical storage areas and stockpiles would be located away from flood prone areas, stream banks, channels and stormwater drainage areas as well as areas of heritage, ecological or other value.
- Stockpiles in place for longer than 10 days would be stabilised with a fast growing sterile annual grass or covered.
- Surface water flows would be diverted around stockpiles by bunds and/or diversion drains, and around work areas.
- The number of construction compounds and designated work zones would be limited to reduce the area of overall disturbance for the Proposal.
- Construction materials would be appropriately stored on site to prevent leaching, leaking or other transfer of material into waterways or onto land.

During operation of the third track, maintenance of the infrastructure would be undertaken in accordance with the ARTC protocols which would include maintenance and repairs of culverts and other drainage infrastructure as well as necessary earthworks such as embankments and cuttings.

## 7.9. Site compounds

The Proposal would require the establishment and operation of at least two site compounds to provide facilities that support construction activities. The primary site compound would be located near Middle Falbrook Road and the secondary compound near Rixs Creek Lane. The indicative location of these construction site compounds is provided in Figure 4.1A-4.1E.

Table 7.9 outlines the DGRs relevant to assessing construction site compounds and where each requirement is addressed in this section.

**Table 7.9a Director-General's Environmental Assessment Requirements for site compounds**

| Director-General's Environmental Assessment Requirements | Location addressed |
|---|---|
| **Key Issues** | |
| General Construction Impacts – the Environmental Assessment must assess the impacts of, and present a management framework for:<br>• Site compounds and ancillary construction locations, with consideration given to:<br>  ○ The identification and assessment of both primary and secondary site compounds and facilities (including waste and chemical storage) on the receiving environment; and<br>  ○ A strategy for managing site compounds, with particular focus placed on primary site compounds, and a broader more generic approach developed for lower-risk activities. | Section 7.9.1 and 7.9.2<br>Section 9.2 |

## 7.9.1. Description of site compounds

**Primary site compound**
The primary site compound would be situated on the up side within the rail corridor at the northern end of the site near Middle Falbrook Road (refer Figure 4.1A). Bridgman Road, Middle Falbrook Road and Stony Point Road would all be utilised for vehicular access to the compound (Refer to Section 7.6).

The site is flat and has been surveyed as being weed dominated with some Plantation (refer to Section 7.2). Weed dominated vegetation is the most common vegetation within the rail corridor. This

vegetation is not consistent with a native vegetation community (Photograph 7.2c). The vegetation characteristics of this community are summarised in Table 7.2d. Plantation consists of planting undertaken by the mines following completion of mining activities. Although the plantings generally consist of *Eucalyptus* spp., this vegetation is not consistent with a native vegetation community. The ground cover was dominated by introduced species. The vegetation characteristics of this community are summarised in Table 7.2e.

The area surrounding the compound is generally used for mining or agriculture and is zoned 1(a) Rural under the SLEP. There are several private properties within the vicinity of the compound. This includes a residence located at approximately 1170 metres to the northwest on land leased from Integra Coal. Dulwich Homestead, in Middle Falbrook Road, is located approximately 550 metres to the south-west of the primary compound.

The proposed primary site compound would contain:

- Site offices (demountables);
- Vehicle access and parking;
- Loading and unloading area;
- Ablutions facilities;
- Water storage and septic tanks;
- Storage containers; and
- Storage / laydown areas.

Figure 7.9 provides the indicative layout of the primary site compound.

**Secondary site compound**
The secondary site compound would be located inside the rail corridor on the downside at the end of the proposed extension of Rixs Creek Lane. This is approximately 600 metres from the existing Rixs Creek Lane and approximately 1 kilometre to the south of the proposed third track. The New England Highway and Rixs Creek Lane would be utilised for vehicular access to the secondary compound site.

The site is flat and is vegetated with Derived Grassland. Immediately to the west of the compound is a small area of Central Hunter Ironbark – Spotted Gum – Grey Box Forest. This vegetation would be protected with exclusion fencing prior to clearing for the site compound.

The area surrounding the compound is generally used for mining or agriculture and is zoned 1(a) Rural under the SLEP. There are several private properties within the vicinity of the secondary compound located in Rixs Creek Lane. The nearest residential receiver to the compound is located at 88 Rixs Creek Lane, approximately 780 metres from the proposed compound, with three other properties at 58, 76 and 80 Rixs Creek Lane, approximately 1080, 1020 and 1010 metres away from the compound respectively.

The proposed secondary site compound would contain:

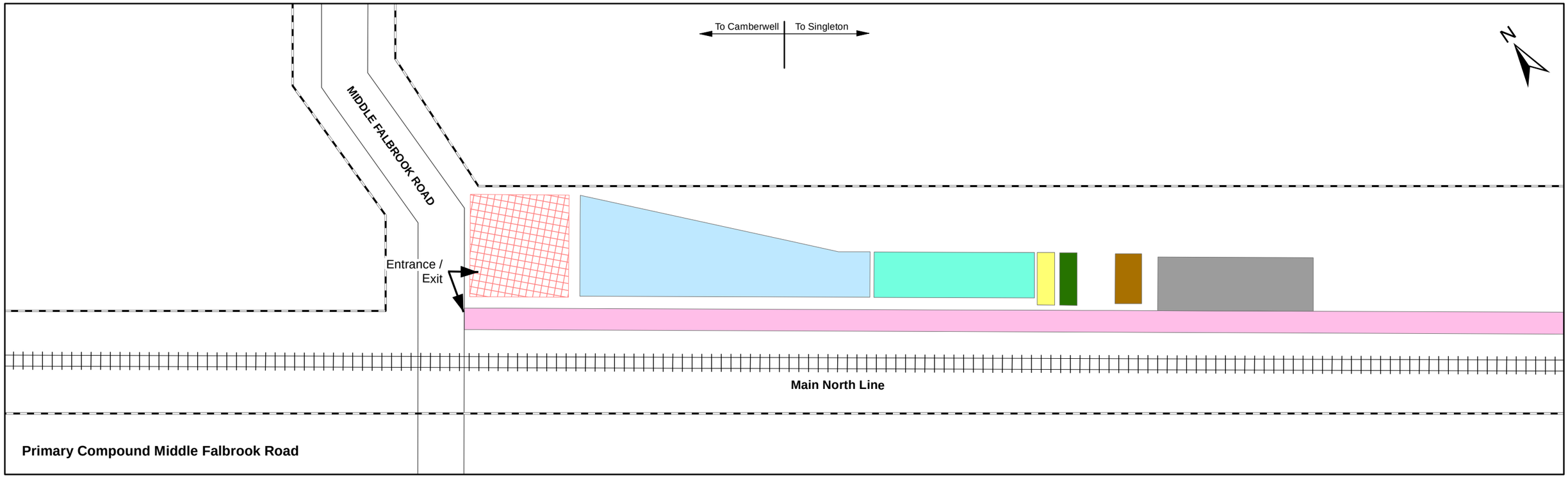
- Vehicle access and parking;
- Stockpile areas;
- Water storage and septic tanks;
- Storage containers; and
- Ablutions facilities.

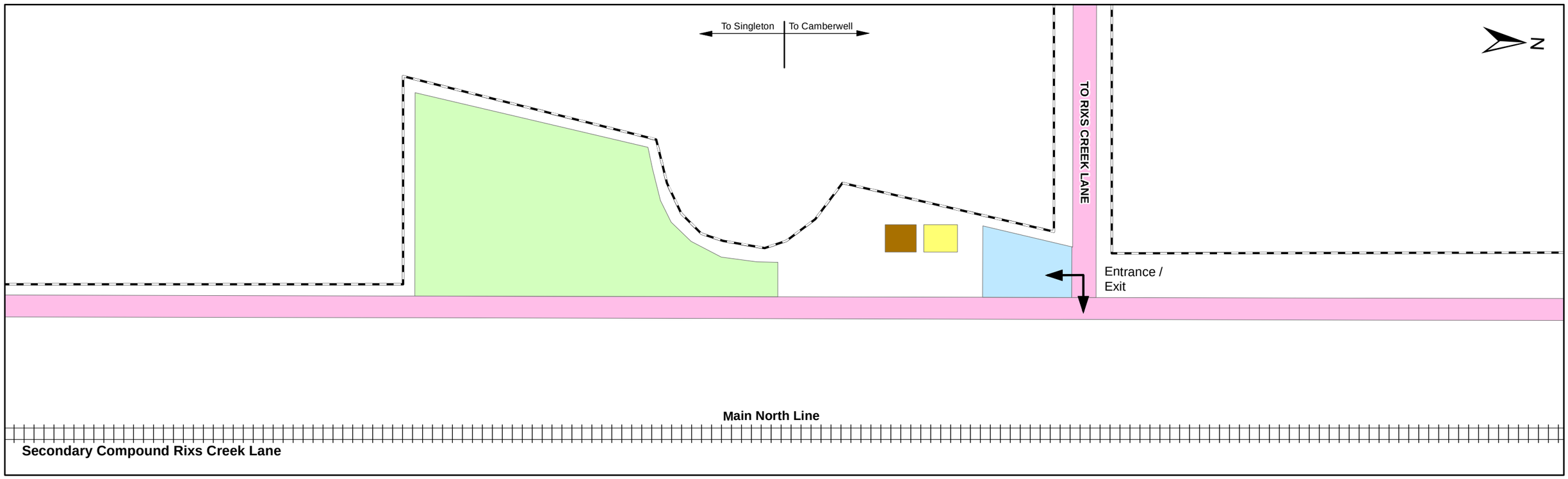
Figure 7.9 provides the indicative layout of the secondary site compound.

## 7.9.2. Potential impacts and assessment

The site compounds would only be required during the construction phase of the Proposal and would be removed and the areas rehabilitated following completion. Therefore the potential environmental impacts associated with the compounds would be temporary in nature. The key environmental issues associated with the location of the site compounds and the activities to be conducted within them are expected to be:

- Ecology




A3 Original

Indicative Locations of Amenities and Facilities
- Facilities
- Access track/haul road
- Car park area
- Office and meeting rooms
- Storage tanks
- Stockpile area
- Storage containers
- Storage/lay down area
- Loading and unloading area
- Proposed Impact Area

ARTC
Nundah Bank
Proposed Third Track

| | |
|---|---|
| Job Number | 2110501B |
| Revision | A2 |
| Date | 16.02.2011 |
| Scale | N.A |

**Indicative Compound Layout Figure 7.9**

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- Traffic management and safety;
- Noise impacts;
- Air quality;
- Waste management;
- Resource efficiency; and
- Erosion and sedimentation resulting from water runoff.

**Ecology**

There would be clearing of existing vegetation to enable the establishment of the site compounds. The primary compound area is within the existing corridor and is weed dominated or has already cleared for current rail operations. Immediately to the west of the secondary compound is a small area of Central Hunter Ironbark – Spotted Gum – Grey Box Forest. The Plantation and Central Hunter Ironbark – Spotted Gum – Grey Box Forest would be protected with exclusion fencing prior to clearing and during construction.

**Traffic management**

There would be increased traffic movements resulting from activities such as delivery of plant and materials and site personnel travelling to and from the site compounds. The movements would be continuous throughout the construction period and working day but would peak during worker arrival and departure hours. Increased traffic separate movements would also be expected during track possessions. The interaction between vehicles and personnel at the site compounds would be controlled by speed limits within the compounds as well as designated walkways and vehicle access paths.

General mitigation and management measures for traffic management are provided in Section 7.6. Specific mitigation measures relating to site compounds are provided in Section 7.9.3. With the implementation of the prescribed mitigation measures, the traffic and safety issues at site compounds are expected to be acceptable.

**Construction noise**

No construction activities would take place at the site compounds although activities associated with loading/ unloading of plant, laydown of equipment, etc could give rise to complaints particularly during out of hours working periods such as during track possessions. The closest sensitive receiver to the site compounds is Dulwich Homestead, in Middle Falbrook Road, which is located approximately 550 metres to the south-west of the primary compound.

Existing mining operations and rail movements dominate the ambient noise environment. Noise modelling indicates that noise generated from the compounds and access roads would be within the relevant noise level criteria during and outside of standard working hours (refer to Section 7.3 and Table 7.3f). It is noted that works outside of standard construction hours would be limited to approximately five track possessions over the 18 month construction period. Activities at the site compounds would peak during these times.

General mitigation and management measures for construction noise are provided in Section 7.3. Specific mitigation measures are provided in Section 7.9.3 below.

**Air quality**

Vehicle movements would potentially result in fugitive dust emissions from the compound sites. The potential impacts are expected to be minor in relation to other construction activities and from surrounding land uses given the remoteness of sensitive receivers and the relatively low vehicle movements.

General mitigation and management measures for air quality are provided in Section 7.4. Specific mitigation measures are provided in Section 7.9.3 below.

**Waste management**

Activities undertaken at the construction site compounds have the potential to generate solid and liquid waste. Key waste sources would include:

- Small volumes of liquid wastes such as oils and used chemicals from equipment maintenance e.g. small quantities of fuel, solvents, etc;
- Domestic waste including food scraps, glass and plastic bottles, paper and plastic containers, survey paint and aluminium cans;
- Waste generated from packaging;
- Site sewage; and
- Surface water runoff.

Wastes would be managed in accordance with the waste management hierarchy and separate collection and disposal arrangements, as required.

The potential impacts of the site compounds on waste generation are expected to be minor with the implementation of the management and mitigation measures provided in Section 8.3 and the specific mitigation measures provided in Section 7.9.3 below.

**Resource efficiency**

During detailed design, consideration of the use of resource efficient devices and appliances should be undertaken for the site compounds. This would include:

- Refurbished or previously used facilities e.g. site offices and containers;
- Energy efficient devices e.g. lights, microwaves, AAA rated and plumbing fittings; and
- Use of Green Power for project electrical demands.

The resource efficiency of the compounds would be managed through the implementation of the management and mitigation measures provided in Section 8.4 and the specific mitigation measures provided in Section 7.9.3 below.

**Erosion and sedimentation**

The construction site compounds have the potential to generate erosion and sedimentation impacts as a result of vegetation clearing, stockpiling of soil and the movement of plant and equipment on unsealed roads. The potential runoff of stormwater from the site compound areas also has the potential to generate sediment-laden water.

The construction and operation of the construction site compounds has the potential to result in erosion and sedimentation impacts. However, with the implementation of the mitigation measures in Sections 7.8 and 7.9.3 below, these impacts would be miner.

### 7.9.3. Mitigation and management measures

A Site Compound and Ancillary Works Management Sub Plan would be developed to manage the potential impacts of the site compounds. The Sub Plan would include the following mitigation measures:

- Potential impacts to ecology would be managed through the Flora and Fauna sub plan;
- Potential traffic impacts would be managed through the Traffic and Transport Sub Plan;
- Potential noise impacts would be managed through the mitigation and management measures described in Section 7.3 and below;
- Potential air quality impacts would be reduced through the mitigation and management measures described in Section 7.4 and below;
- Waste impacts would be managed through the Waste Management Sub Plan and the specific measures provided below;
- Resource use impacts would be managed through the mitigation and management measures described in Section 8.4; and
- Potential erosion and sedimentation impacts would be managed through the Soil and Water Sub Plan and the specific measures provided below.

Other mitigation and management measures would include:

- Trucks would not stand idling with their engines on for long durations, in particular when near sensitive receivers;
- Deliveries would not occur outside of standard working hours unless:
    - required outside these hours by the Police or other authorities for safety reasons;
    - required in an emergency to avoid the loss of lives, property and /or prevent environmental harm; or
    - the work can be undertaken in such a way that would be inaudible at sensitive receivers.
- Potential air quality impacts would be managed by enforcing speed limits within the site compound areas and access roads;
- Vehicle accesses would be watered as necessary to avoid dust generation;
- Hard surfaces would be provided on haul roads and parking areas where there is a risk of generating a dust nuisance and sediment laden stormwater runoff;
- Shake down areas would be provided at exit points to prevent tracking of dirt and mud onto public roads. Dirt that is tracked onto public roads would be cleaned up at the end of each working day, and more frequently if it poses a risk to motorists or the environment;
- A waste recycling system would be implemented in the offices and lunch rooms for paper, bottles etc;
- The use of solar panels and/ or Green Power would be considered during detailed design;
- Energy/resource efficient fittings and appliances would be provided at the site compounds e.g. lights, water saving devices, etc;
- Consideration would be given to harvesting rain water from the site sheds for use in dust suppression and other construction activities;
- Consideration would be given to installing low flow urinals to reduce water demand;
- Opportunities would be sought to use refurbished or previously used facilities, e.g. offices, for the site compounds and to reuse or recycle when they are no longer required;
- Site facilities would be orientated to reduce the need for air conditioning and heating where possible;
- Erosion and sediment control plans would be developed for the site compounds;
- Controls would be established to divert clean water generated offsite from entering the site compounds;
- Controls would be established to collect and treat stormwater generated for the site compounds;
- Erosion and sediment controls would be established prior to clearing the site compounds;
- Chemicals and other hazardous goods would be stored with appropriate controls, including containment / bunding, and in accordance with relevant legislation or guidelines;
- The boundaries of the site compounds would be demarcated prior to clearing operations to ensure any environmentally sensitive areas are protected and the extent of clearing is minimised;
- Topsoil and sub soil would be stockpiled for use in rehabilitation of site compounds;

- Vegetation removed from the site compounds would be mulched for use in rehabilitation of the site;
- Trees within the site compound would be retained where possible and protected with exclusion fencing prior to clearing of the site compounds;
- Any noxious weeds within the site compound boundaries would be managed in accordance with best practice;
- Topsoil infested with noxious weeds would not be used in restoration unless weed control and herbicide application has been undertaken prior to clearing;
- Site compound areas would be rehabilitated upon completion of the works.

# 8. Assessment of other issues

## 8.1. Contaminated land and hazardous materials

### 8.1.1. Existing environment

The railway corridor and properties immediately adjacent to the Proposal present as a moderately disturbed environment, altered from its natural state by decades of development for the railway, agricultural activities and coal mining. Mining has co-existed with farming and grazing in the area since the early 1900s and more recent open cut mining activities have been underway for at least the last 20 - 30 years. The railway between Newcastle and Singleton was completed in the 1860s and was relocated from its former position in the 1950s to facilitate ongoing open cut mining of the area. Railway cuttings from the old alignment remain in the landscape and were observed during site visits conducted for the Environmental Assessment. (For more information, refer Section 7.7).

### 8.1.2. Assessment methodology

A desktop investigation was undertaken to assess the potential for contamination within the footprint of the Proposal. The scope of the assessment included:

- A desktop review of existing regional land uses and practices using aerial photos;
- Consultation with adjacent landowners;
- Site visits; and
- A review of DECCW's contaminated land register.

Site visits were undertaken on 21 January 2010, 15 April 2010 and 20 August 2010 by representatives of the UHVA to identify any visible signs or potential sources of contamination.

### 8.1.3. Potential impacts

No records relating to contamination or remediation notices were found on DECCW's contaminated land register for the site, however there is a high potential for contamination to exist within the existing rail corridor as a result of past and present rail activities.

One of the existing trackside huts, the Camberwell Relay Room at approximately 246.745 kilometres (refer Photo 8.1a) on the up side of the Main North Line is proposed to be demolished and removed as part of the works. Signalling huts and cabinets represent potential sources of hazardous materials such as lead paint and asbestos. Disused equipment within the hut may also be hazardous.

Stockpiles of fill material and ballast have been observed throughout the corridor and a collection of empty plastic oil or fuel containers were noticed south of Camberwell Junction within the rail corridor (approximate chainage 247.000). Contaminants may be present in railway ballast materials and soils within and adjacent to the railway from railway operations and maintenance activities and from other sources such as the storage and use of pesticides, storage and fuelling of machinery and the use of asbestos cement pipes in irrigation or drainage. Mobilisation of contaminants could occur during demolition or construction activities including contaminated or hazardous materials and result in off-site contamination via stormwater runoff or emissions to air.

Reusing/ recycling of surplus construction materials and components is an objective of waste minimisation however there may be an Occupational Health and Safety (OH&S) risk for workers involved in handling of contaminated materials. This issue is also addressed in the Hazards and Risks section of the Environmental Assessment (refer Section 8.6).

**Photo 8.1a Camberwell Relay Room**

Based on the assessment undertaken, historic knowledge of the area and site inspections, the following contaminants and materials may be present in the study area:

- Fuels, oils and grease from operation and maintenance of the rail corridor;
- Asbestos fibres from brake pads;
- Ballast and excess fill material impacted with oil and grease and other substances;
- Herbicide and pesticide residues from spraying around the signalling huts, tracks and rail corridor fences; and
- Camberwell Relay Room equipment.

Table 8.1a presents a summary of the potential sources and contaminants of concern for the Proposal.

**Table 8.1a Potential contaminants and associated sources**

| Location | Potential Source(s) | Potential contaminants |
|---|---|---|
| Rural lands used for farming/ grazing | • Spraying for weed and pest control<br>• Use of fertilisers | • Total petroleum hydrocarbons (TPH)<br>• Polynuclear aromatic hydrocarbons (PAHs)<br>• Heavy metals<br>• Organophosphate pesticides (OPP) |
| Rail corridor | • Fill and ballast material<br>• Asbestos fibres from train brakes<br>• Spraying for weeds and pest control<br>• Fuels, oils and greases<br>• Asbestos and lead paint residues in former signalling huts<br>• Ballast and spoil stockpiles<br>• Disused/reconditioned railway | • Total petroleum hydrocarbons (TPH)<br>• Benzene, toluene, ethylbenzene and xylene (BTEX)<br>• Polynuclear aromatic hydrocarbons (PAHs)<br>• Heavy metals<br>• Asbestos<br>• Organochlorine pesticides (OCP)<br>• Organophosphate pesticides (OPP) |

| Location | Potential Source(s) | Potential contaminants |
|---|---|---|
| | components<br>• Electrical transformers<br>• Illegal dumping | • Organochlorine pesticides (OCP)<br>• Polychlorinated biphenyls (PCB) |

The majority of potential impacts would occur during the construction phase through the demolition, excavation and handling of potentially contaminated and hazardous materials. Mitigation measures provided below (including those in Section 8.3 and 8.6) are designed to reduce the risks to workers and the environment to acceptable levels.

While there would be ongoing contamination of the railway corridor resulting from maintenance works and operational activities, potential impacts would be dispersed along the corridor and reduced by continued training and awareness of railway workers, providing appropriate Personal Protective Equipment (PPE) and work methods and ensuring maintenance is carried out routinely and wastes are appropriately disposed of.

### 8.1.4. Mitigation and management measures

Mitigation measures would include the following:

- A Hazard and Risk Management Sub Plan would be developed and implemented as part of the PCEMP (refer Section 8.6) and would include measures to manage potential interaction with contaminated land and materials and other unexpected hazards;
- Prior to the removal of any railway ballast or the removal of spoil from within the existing railway corridor, samples would be taken to establish the level of contamination that exists and the suitability of the material for its intended use. Sampling would be undertaken in accordance with Guidelines for Consultants Reporting on Contaminated Sites (DECCW 2000) and classified in accordance with DECCW's Waste Classification Guidelines (DECCW 2009). Contaminated material identified during the sampling would be managed and disposed of appropriately in accordance with all relevant legislation and guidelines, including the *Protection of the Environment Operations Act 1997* and the *Waste Avoidance and Resource Recovery Act 2001*;
- If the presence of contaminants is confirmed to be in concentrations above the intended future use criteria, the UHVA would identify opportunities for remediation of affected areas or materials prior to or during construction. Remediation work would be planned and undertaken in accordance with the *Contaminated Land Management Act 1997* and SEPP 55 – Remediation of Land;
- All waste would be managed and disposed of in accordance with relevant legislation (refer Section 8.3);
- A hazardous material survey would be undertaken prior to the demolition of the Camberwell Relay Room and would include procedures for managing and disposing of any hazardous materials identified including asbestos.

## 8.2. Visual

The visual assessment identifies potential impacts to the site and immediate surrounding area, in terms of landscape character and scenic quality. There are no public or residential viewpoints to the Proposal corridor.

### 8.2.1. Existing environment

**Site context**

The study area consists of gently rolling hills. Historically a grazing area, the area is now an extensive coal mining area and the proposed impact area is bounded by mining leases including active open cut coal mining, revegetation areas for the mines, sedimentation dams and land leased for farming and grazing. The surrounding land has been extensively cleared. Within the study area is the existing Main North Line.

The landforms along the alignment consist of undulating hills of low relief with broad drainage lines, narrow drainage lines between mounds of regenerated and active open cut mine spoil, and alluvial flood plains. The local relief is generally 30 to 120 metres.

**Landscape character and scenic quality**

The Proposal's surrounding landscape character is a mix of:

- The industrial-like character of both the existing railway line and associated infrastructure, as well as the nearby open cut coal mines; and
- Rural farmland, consisting of open grassed paddocks, areas of bushland and scattered trees.

Landforms vary from the flatter parts of the floodplain to an undulating landscape, with the area crossed by a number of minor watercourses.

The majority of the vegetation in the general area has been previously cleared and largely modified. The proposed impact area contains five distinct vegetation types (refer Section 7.2 and Figures 7.2a-f), with the dominant type Central Hunter Spotted Gum – Ironbark – Grey Box Forest, consisting generally of a low understorey and larger trees.

The scenic quality of the study area could be described as moderate to low, with the study area not having any particularly notable characteristics, nor being an uncommon landscape type in the local area.

**Visibility**
There are no surrounding public or residential viewpoints to the proposed impact area. The proposed impact area therefore has a low sensitivity to visual change, and a relatively high capacity to „absorb', or integrate the proposed new railway alignment.

### 8.2.2 Visual attributes of the Proposal

The majority of works associated with the Proposal would be contained within a narrow corridor of 50 metres either side of the existing railway alignment. The exception is a limited number of places where the area of disturbance would widen to approximately 100 metres which would include fill batters and cut slopes. Outside this corridor, there would be additional land areas affected by the construction of permanent unsealed access roads which would also require some earthworks and vegetation clearing.

The major visual changes associated with the Proposal would be:

- Approximately 4 kilometres of single, at grade track;
- Widening beneath the existing Rixs Creek mine overbridge to provide extra width for the new third track and access roads;
- The removal of approximately 22.12 hectares of native vegetation; and
- Construction of two permanent unsealed access roads (only one of which would be additional to the existing infrastructure).

During construction, the installation of temporary ancillary infrastructure such as construction compounds, sedimentation basins and stockpile areas would also be undertaken.

### 8.2.3 Potential impacts and mitigation

The main visual impact of the Proposal would be changes associated with the construction of the new alignment, including bulk earthworks and removal of vegetation.

The overall visual impact of the Proposal would be low, due to:

- The key elements of the Proposal, being consistent with the existing infrastructure, would represent an incremental increase rather than a substantial new element in the landscape. The new infrastructure would also adjoin the existing railway corridor;
- Relatively limited amount of earthworks and vegetation removed; and
- There being no near field residential or external viewpoints to the corridor.

While no mitigation measures are considered necessary to minimise the visual amenity of the Proposal, it is noted that mitigation measures forming part of other sections in this Environmental Assessment would assist in reducing visual impact. These would include minimising the area of vegetation clearing and reducing the construction footprint to as small as possible which would be conducted as part of the ongoing concept and detailed design.

## 8.3. Waste minimisation

This section identifies and provides a description of the potential waste impacts associated with the Proposal, for both construction and operational activities.

### 8.3.1. Assessment methodology

An assessment of the potential waste generation impacts of the Proposal has been undertaken for the construction and operational phases which included identification of the likely key sources of waste and management of wastes in the context of existing legislation and guidelines and best practice.

In NSW, waste management is dealt with in accordance with the principles of a resource management hierarchy outlined in the *Waste Avoidance and Resource Recovery Act* 2001 (WARR Act) and gives consideration to the principles of ecologically sustainable development. The hierarchy, in order of preference, is to:

- Avoid;
- Reduce/ reuse;
- Recycle; and
- If necessary, dispose of wastes.

Waste minimisation for the Proposal would be planned and undertaken in accordance with the above principles and following additional legislation and guidelines where relevant:

- Protection of the Environment Operations Act 1997 – Schedule 1;
- Waste Classification Guidelines, Part A : Classification of Waste (DECC, 2008);
- Environment Compliance Report: Liquid Chemical Storage, Handling and Spill Management Part B: Review of Best Practice and Regulation (DEC, 2005);
- Construction and Demolition Waste Action Plan (DEC 1998);
- Environmental Guidelines: Assessment, Classification and Management of Non Liquid and Liquid Waste (DECC 1999);
- Green Waste Action Plan (DEC 1997); and
- Waste Planning for Industry: A Guide (Waste Management Authority of NSW 1990).

As construction would be undertaken by the UHVA, the following additional policies would also be adopted:

- UHVA Environmental and Community Policy, 2010;
- UHVA Objectives and targets, 2010; and
- Leighton Contractors Group Environmental Policy, 2010.

### 8.3.2. Key waste sources

**Construction**

During the construction phase, key waste sources would include:

- Green waste from vegetation clearing;
- Surplus construction materials including spoil, concrete, crushed rock, rail and used rail components e.g. turnouts;
- Liquid wastes such as oils and used chemicals from equipment maintenance;
- Domestic waste from site personnel including food scraps, glass and plastic bottles, paper and plastic containers;
- Site sewage and other wastewater run-off including water utilised for dust suppression; and
- Demolition waste from the Camberwell Relay Room (brick, galvanised iron) and removed drainage culverts including galvanised iron/ steel, concrete and asbestos cement (AC) drainage pipes.

Where possible, sections of hollow-bearing trees or other vegetation which could be utilised as shelter by fauna would be placed or left in-situ.

The Proposal would require the installation of two additional turnouts and crossovers and the rehabilitation of the existing up main. If acceptable to the ARTC, reconditioned components and surplus rail sections would be sourced and used as part of the Proposal.

Overall, the quantities of wastes generated by the Proposal are expected to be manageable through the application of the above legislation and guidelines and would not cause a significant reduction in capacity of existing landfills. Additionally, subject to further investigation, there are a number of practical options for reusing/ recycling surplus materials/ components.

**Operation**
There would be only minor amounts of waste generated by the Proposal during the operational phase of the Proposal with waste arising from the following sources:

- Surplus materials from track/ component repairs;
- Wastewater from ballast regulation;
- Oils and greases including containers from component maintenance; and
- Spillage of coal dust, grain, etc from moving trains through the action of wind and vibration.

It is not anticipated that maintenance and repair works would generate significant amounts of waste.

### 8.3.3. Mitigation and management measures

**Construction**
A Waste Management Sub Plan would be developed as part of the PCEMP which would guide the identification, separation and management of all wastes arising from the construction of the Proposal. The sub plan would also document the processes or procedures to further explore opportunities associated with material component recycling/ reuse. The sub plan would also include the following mitigation measures:

- All waste streams generated by the Proposal and management opportunities (e.g. avoid, reuse, recycle) would be identified;
- All wastes would be classified in accordance with DECC (1999) *Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes* into the following categories:
    - Hazardous: including flammable materials or liquids;
    - Industrial: asbestos containing materials;
    - Solid: general domestic waste;
    - Liquid: greywater or sewage; and
    - Inert: vegetation, concrete, asphalt.
- The appropriate number and types of bins would be provided onsite for each of the different types of waste. Bins would be clearly marked and monitored for cross-contamination of wastes;
- Hazardous wastes would be disposed of according to legislative requirements including tracking of disposal through dockets and manifests;
- Salvage and reuse of certain materials would be undertaken where possible e.g. drainage structures, electrical cables, fences, etc;
- Recycling of waste oils and disposal of waste tyres would be undertaken at approved locations;
- Details of waste disposed and recycled would be recorded. All waste dockets and manifests, quantities, methods, location and inspection times and dates would be submitted to UHVA;
- Treated timber, which contains arsenic, pesticide treatments or which contain chlorine residues, would be managed and disposed of appropriately;
- Other specific requirements for ecology, contaminated materials and surface and groundwater detailed in relevant sections of this environmental assessment;

- Where possible, sections of hollow-bearing trees or other vegetation which could be utilised as shelter by fauna would be placed or left in-situ;
- Topsoil would be stripped prior to the bulk earthworks commencing and, following completion of works, would be reapplied to areas proposed to be revegetated;
- Surplus construction fill would be stockpiled on site; and
- Opportunities would be sought to reuse any suitable surplus fill on other ARTC capital upgrade works in the locality.

**Operation**
Any waste generated during the operational phase would be managed in accordance with relevant guidelines and/ or existing ARTC waste management practices.

Excess materials/ components would be identified and reconditioned/ reused if acceptable to the ARTC.

## 8.4. Energy demand and greenhouse gases

Greenhouse gases produced via human activities (predominantly energy consumption) has been considered a major contributing factor to the observed changes in climate over the 20th century. Climate change is defined as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climatic variability observed over comparable time periods (IPCC 2010).

Greenhouse gases (GHG) absorb heat from the sun in the atmosphere and reduce the amount of heat escaping into space. This greenhouse effect is one of several effects contributing to overall climate change. The primary greenhouse gases are water vapour, carbon dioxide, methane, nitrous oxide and ozone (DCCEE, 2010).

Where relevant, the energy demand and greenhouse gas assessment has been undertaken in accordance to the Greenhouse Protocol:

- Corporate Standard, World Council for Sustainable Business Development and World Resources Institute;
- National Greenhouse Accounts Factors, Australian Department of Climate Change;
- National Greenhouse Energy Reporting System, Technical Guidelines;
- National Carbon Accounting Toolbox; and
- Australian Greenhouse Emissions Information System following Government guidelines.

### 8.4.1. Existing environment

In 2008, New South Wales emitted a total of 164.7 million tonnes carbon dioxide equivalent ($CO_2$-e). The largest contributing sector was the stationary energy generation sector contributing approximately 49% of total emissions for the State. The transport sector (including air, road (domestic and freight), rail and shipping) was estimated to produce 21 Mt $CO_2$-e, approximately 13% of State emissions (DCCEE, 2008).

The Proposal is located within the Singleton LGA of the Lower Hunter Region and airshed. The main contributors to greenhouse gas emissions in this region are 18 coal mines and two coal-fired power stations. Other predominant regional industries which contribute to GHG emissions include defence training, viticulture, beef and dairy cattle.

The existing coal rail network that links mining operations in the region with the Port of Newcastle produces greenhouse gas emissions primarily through the combustion of diesel fuel by locomotives. Without augmentation, the existing Nundah Bank section of the Main North Line is expected to reach capacity by 2012 (ARTC, 2009a) resulting in trains having to stop, idle and re-accelerate to their nominated speed. Such delays create backlogs of other freight trains that must wait until the line becomes clear. Furthermore, an incline exists along Nundah Bank between Glennies Creek and Camberwell Junction which would require increased torque (and additional fuel use) to return the train to its nominated speed. This capacity constraint combined with the rail track incline has the potential to increase operational emissions from additional fuel consumption if the Proposal does not proceed.

## 8.4.2. Impact assessment

**Construction**

Greenhouse gas emissions during the construction phase of the Proposal would result from the following activities:

- *Clearing of vegetation* - Approximately 8.75 hectares of predominantly Spotted gum and Ironbark would be cleared through the construction of the third track and associated infrastructure (refer Section 7.2). This would result in a small loss in the carbon absorption capacity of the area and release of $CO_2$ through decomposition of cleared biomass and emissions from vehicles and equipment used for clearing purposes. It is estimated that approximately 2,500 tonnes of $CO_2$-e would be released as a result of this action.

- *Energy consumption* - It is estimated that at least 54 vehicles, trucks, and heavy machinery would be required for the duration of construction which would equate to approximately 270 vehicle movements (see Tables 4.6 and 4.7). Other sources of energy consumption would include fixed plant such as pumps, compressors and generators powered by diesel or other fuels. Greenhouse gases including carbon dioxide would be emitted as a result of combustion of fuel. Relatively small quantities of electricity would be used at site compounds over the 18 month construction period for lighting, heating and cooling needs.

- *Embodied energy* – construction materials such as rail track steel, concrete sleepers and culverts, signalling infrastructure and bridge construction materials all require energy to be expended in their manufacture (termed embodied energy). The manufacturing of these materials and delivery to site would result in greenhouse gas emissions generated offsite.

Energy use and greenhouse gas emissions from construction would be temporary and is expected to be minor compared to the operational energy use over the project life. Consequently, construction related greenhouse gas generation is not anticipated to be significant.

**Operation**

Greenhouse gas emissions generated during the operation of the Proposal would result primarily from the combustion of fuel from locomotive movements along the track. Some increase in electricity use in powering additional signals would occur but this is an incremental increase which would be minor.

The Proposal would provide increased capacity and therefore an increase in rail movements (refer Table 4.9). Based on the projected increase in rail movements, it is estimated that by 2018, carbon emissions associated with the 4 kilometre section of new track would increase by approximately 62 tonnes $CO_2$-e per year of operation. Over an assumed 25 year design life for the rail line, this equates to a total of 1,550 t$CO_2$-e. This is the equivalent to approximately 0.007% of total NSW transport emissions (based on 2008 NSW emissions data). Where this amount can be mitigated, this increase in operational emissions is not expected to be significant.

The increased capacity provided by the Proposal reduces the chance of stalls, bottlenecks and a backlog of standing trains, allowing locomotives to maintain regular speed. This has the potential to reduce fuel consumption and emissions on a per train basis.

Other greenhouse gas emissions from operations would include vehicle emissions from maintenance activities and electricity consumption from additional signalling stations; however, these emissions are not expected to be significantly different to existing operations.

## 8.4.3. Mitigation and management measures

The impact of the Proposal on greenhouse gas emissions would be mitigated to some extent by the implementation of the mitigation measures proposed in Section 7.2.5 e.g., minimise the cleared area of vegetation. In particular, the proposed biodiversity offsetting of the residual impacts of vegetation clearance from the Proposal would also offset the increased greenhouse gas emissions of the Proposal (assuming a similar density of planting and maturity is achieved).

Other measures which would be implemented include:

- Where feasible, vehicles, construction equipment and machinery would be selected on the basis of low energy usage and clean emissions and of the minimum size to complete tasks effectively;

- Where feasible, biofuels (such as biodiesel, ethanol or blends) would be used to reduce the greenhouse gas emissions associated with fuel use for mobile and fixed plant;
- Where practicable, vehicle engines and construction plant would be turned off when not in use;
- Construction machinery would be maintained in accordance with manufacturer's requirements to maintain operating (and fuel) efficiency;
- Material and personnel would be locally sourced where possible to reduce transport-related emissions. The use of shuttle buses for construction personnel would be considered;
- Where possible, the distance of stockpile and laydown areas would be minimised to reduce transport-related emissions;
- The use of recycled/reconditioned materials would be considered in appropriate circumstances e.g., ballast, aggregate, and recycled content in steel to minimise the embodied energy in construction materials and avoid the use of new materials where possible;
- Low greenhouse-intensity materials would be used where possible (such as materials produced with reduced energy inputs and from suppliers using carbon offsets);
- Where feasible, solar arrays to power ancillary site facilities e.g., site offices would be installed; and
- Where feasible, renewable energy (green power) would supply electricity requirements.

## 8.5. Socioeconomic

Social impacts are generally recognised as those that change people's way of life, culture, traditions, community structure, cohesion or stability. Social impacts can be positive, negative or neutral depending on circumstance. Through detailed technical investigations and public consultation, social impacts are better understood.

The assessment of social impacts involves four key steps:

- Assessment: involves profiling the social environment to develop a greater understanding of a community. Once the social context is understood, issues can be identified and the impacts assessed;
- Prediction: involves considering the identified issues and determining the probability of occurrence and the importance to those affected;
- Mitigation: involves determining how these impacts can be managed to produce the minimum degree of impact; and
- Monitoring: involves the tracking of identified issues, as well as identifying any unexpected impacts that may arise in the operational phase.

### 8.5.1. Assessment methodology

The identification of potential social impacts has been undertaken using qualitative and quantitative research and involved:

- Site visits;
- Community profiling, using data soured from Singleton Council and Australian Bureau of Statistics (ABS) census data;
- Information provided by technical specialists including, noise, traffic and transport, heritage, visual and air quality assessment reports; and
- Information gained through community consultation.

A review of the following reports and databases has been carried out as part of the identification of potential social impacts:

- *Nundah Bank Third Track: Noise and Vibration Assessment* – Section 7.3 and Technical Paper 3;
- Air quality data for the Upper Hunter – Section 7.4;

- *Nundah Bank Third Track Traffic and Transport Impact Assessment* – Section 7.6 and Technical Paper 4;
- Heritage (Indigenous and non-Indigenous) database searches, mapping and report – Section 7.1, Section 7.7 and Technical Papers 1 and 5;
- Singleton Council website;
- Australian Bureau of Statistics (ABS) census data; and
- A variety of communication channels used to engage with the community as outlined in Section 5.

### 8.5.2. Social profile

The study area includes the suburbs of Camberwell, Bridgman and Singleton Heights in the Singleton Local Government Area (LGA). Singleton LGA covers approximately 4,893 square kilometres. In the most recent census (2006), the Singleton LGA had a population totalling 21,937.

The demographic characteristics of the study area which include the suburbs of Camberwell, Bridgman and Singleton Heights are outlined below.

**Camberwell and Bridgman census district**
In the 2006 census, Camberwell had a total population of 379 and Bridgman 478.

These census districts are rural in nature with low population densities. Farming and mining are the key activities. The population density for Camberwell and Bridgman was four to five people per square kilometre and five to six people respectively.

The industry generating the most significant employment within the local study area for Camberwell and Bridgman was coal mining with 16.3 per cent and 15.4 per cent of the respective populations.

In Camberwell 29.9 percent of occupied private dwellings were fully owned, with 31.5 per cent being purchased. In Bridgman 40.7 percent of occupied private dwellings were fully owned, with 40.0 percent being purchased (ABS, 2006a and 2006b).

**Singleton Heights census districts**
In the 2006 census, Singleton Heights had a total population of 4777 with coal mining generating the most significant employment in the district at 18.9 percent of the respective population.

In Singleton Heights, 22.7 percent of occupied private dwellings were fully owned, with 37.1 percent being purchased (ABS 2006c).

The residential subdivision of Singleton Heights is located south of the Proposal. It is an established and growing residential area located between Bridgman Road and the rail line. The subdivision is home to approximately 5,000 people.

Table 8.6a provides an overview of the local and regional demographic characteristics. The table highlights the low population density and isolated nature of the area surrounding the Proposal area at Camberwell and Bridgman.

**Table 8.6a Local and regional demographic characteristics**

| Characteristics | Camberwell | Bridgman | Singleton Heights |
|---|---|---|---|
| Total population | 379 | 478 | 4,777 |
| Population density (square kilometres) | 4-5 | 5-6 | 681-2580 |
| District area (square kilometres) | 83.8 | 90.2 | 3.2 |

Source: ABS 2006 Census QuickStats (ABS, 2006, 2006a, 2006b, 2006c)

**Surrounding land use and residential receivers**
The Proposal site lies within the existing Main North Line corridor, which is unzoned under the SLEP. The surrounding area is generally used for mining or agriculture and is zoned rural under the SLEP.

There are several coal mines surrounding the Main North Line in the vicinity of the Proposal along with several main and local roads including the New England Highway, Bridgman Road, Rixs Creek Road, Middle Falbrook Road and Stony Point Road.

There are several private properties within the vicinity of the Proposal. Three residential receivers are located along Bridgman Road and Rixs Creek Road (refer to Figure 7.3 in Section 7.4). The nearest residential receiver is located at 427 Bridgman Road, approximately 770 metres from the rail line, with two other properties at 411 and 447 Bridgman Road, approximately 920 metres and 950 metres away from the rail line. Various private residences are accessed from these roads with setbacks.

Bridgman Road, Rixs Creek Road, Middle Falbrook Road and Stony Point Road would all be utilised for vehicular access to the construction site. Bridgman Road, Stony Point Road and Middle Falbrook Road would provide access to the up (east) side of the site and Rixs Creek Road would provide access to the down (west) side of the site.

### 8.5.3. Social and socioeconomic considerations

The Proposal would result in a long term, economic benefit in relation to the increased capacity and efficiency of passenger and freight movements (particularly coal) on the Main North Line.

Construction of the Proposal would also result in local employment opportunities as well as create demand for local goods and services including construction-related supplies, accommodation, etc. This local investment would result in a broader multiplier effect in the region.

The Proposal would improve the efficiency of coal exports transported to the Port of Newcastle. The completed Nundah Bank Third Track Project would provide a more reliable network and capacity for all forms of train usage (mostly freight), which would result in an important contribution to the State and National economies.

The construction and operation of the Nundah Bank Third Track would also impact the local community. It is considered however, that the application of the prescribed mitigation measures would be sufficient to manage the impacts noting that the surrounding land uses are dominated by coal mining activities and that the nearest sensitive receiver is approximately 770 metres from the works. In other locations along public roads proposed to be used as construction haulage routes, receiver setbacks may be closer and some disturbance and changes in amenity may result.

### 8.5.4. Key social issues

The site is in a remote location, predominantly within the existing rail corridor. Based on the DGRs, the technical investigations undertaken and consultation with the community, the key social issues are expected to be:

- Traffic management during construction;
- Noise during construction;
- Land acquisition;
- Air quality issues during construction;
- Operational noise; and
- Operational air quality.

**Traffic management during construction**

There would be potential impacts resulting from increased traffic delivering materials, plant, and equipment and site personnel travelling to and from the site. The traffic impact assessment determined that these potential impacts would not significant on the surrounding road network capacity. Property owners along Rixs Creek Road and Bridgman Road would however experience higher traffic volumes and truck movements than usual, particularly during track possessions when works would be conducted over consecutive 24 hour periods.

Mitigation and management measures for transport and land use are provided in Section 7.6.

**Noise during construction**

There would be potential for construction noise impacts to occur during construction.

Existing mining operations and rail movements dominate the ambient noise environment. The closest sensitive receiver is approximately 770 metres to the east at Bridgman Road, Obanvale.

Noise modelling indicates that construction noise would be within the relevant noise level criteria during standard working hours. The predicted noise levels for construction outside of standard working hours may exceed ICNG criteria. Works outside of standard construction hours would be limited to approximately five track possessions over the 18 month construction period.

There would also be potential noise impacts to sensitive receivers as a result of construction vehicles utilising local roads. Noise modelling however, showed that the traffic noise levels would comply with the relevant criteria on typical days however, the criteria may be exceeded during night time works. This would be monitored and the community notified in advance of extended work hours during track possessions.

Mitigation and management measures are provided in Section 7.3.

**Land acquisition**
Although the majority of the proposal would be within the existing rail corridor, additional land along the corridor on both sides of the track would be acquired for construction and operation of the Proposal. The acquisition of land would be carried out in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* where required or through mutual agreement.

Details are provided in Section 4 and negotiations with these landowners are ongoing.

**Air quality issues during construction**
Vehicle movements and construction activity would increase dust emissions. The potential impacts are considered relatively minor in comparison to dust emissions from surrounding land uses and the remoteness of sensitive receivers.

Potential dust emissions would be controlled and managed in accordance with standard mitigation and management measures outlined in Section 7.4.

**Operational noise**
The future projected increase in train movements would increase noise levels for adjacent receivers; however the actual noise levels are predicted to remain within the relevant noise level criteria. Therefore no noise mitigation is required.

Monitoring of noise levels and strategic management of operational noise issues in the Hunter Valley is an ongoing issue being progressed jointly by the ARTC and DECCW and is an issue raised by stakeholders as part of the consultation for this environmental assessment.

**Operational air quality**
The potential sources of air emissions during the operational phase of the Proposal include locomotive exhaust emissions and fugitive coal dust from loaded coal wagons.

The results of operational air quality modelling showed that emissions from locomotives and fugitive coal individually would not exceed the relevant criteria given the remoteness of sensitive receivers.
Mitigation and management measures are provided in Section 7.4.

### 8.5.5. Mitigation and management measures

**Construction**
The following mitigation and management measures would be implemented as a component of the PCEMP that would be developed for the project. The PCEMP would include measures to address the mitigation and management of the potential impacts on the local community including:

- Noise mitigation and management measures as described in Section 7.3;
- Air quality mitigation and management measures described in Section 7.4; and
- Traffic mitigation and management measures described in Section 7.6.

Other mitigation and management measures would include:

- Negotiations with landholders in relation to any land acquisition would be carried out in accordance with the (Land Acquisition *Just Terms Compensation* Act) 1991 where required;

- Dilapidation reporting would be undertaken prior to works commencing for items which may be impacted by the Proposal;
- Local contractors and personnel would be employed for the construction phase, where suitable;
- Consideration would also be given to employment of people of Aboriginal origin where suitable and in accordance with the UHVA and the ARTC policies; and
- Finalising the concept and detailed designs to reduce identified impacts on the environment and the community.

A consultation strategy has been prepared and would continue to be implemented for the construction and operational phases of the Proposal including:

- Communication with adjacent landholders providing sufficient information on construction activities and timeframes;
- Provision of newsletters, channels for feedback including community information telephone line;
- Communication of construction related road changes that may affect the local community; and
- Maintain communications between the local community and the ARTC following construction where appropriate.

## 8.6. Hazards and risks

This section identifies potential hazards and risks associated with construction and operation of the Proposal not addressed elsewhere that may affect the environment, public or construction personnel. Hazards and risk associated with the Proposal can be broadly separated into two categories:

- Environmental hazards – any activity or outcome that may affect the health of the environment; and
- Health and safety hazards – any activity or outcome that may affect the health or safety of construction workers and/or the public.

### 8.6.1. Hazards and risks during construction

**Environmental hazards**

Environmental hazards during construction may arise during the transport, use or storage of hazardous goods. Hazardous goods that would be required during construction include fuel, lubricating oils, and other chemicals. Spills or leaks of these materials could result in the contamination of land and pollution of waterways. The potential risk of spills and leaks would be managed through the implementation of appropriate mitigation measures. Improper demolition and disposal of hazardous materials may also pollute the environment.

The discovery of contaminated land during construction could result in contamination being spread or dispersed into the environment if not handled and disposed of appropriately. This is discussed in more detail in Section 8.1.

Potential also exists to trigger a bushfire in or adjacent to the Proposal area if hot works are undertaken.

**Health and safety hazards**

There is the potential for health and safety hazards to affect construction personnel and/or members of the public. The health and safety hazards associated with construction of the Proposal include:

- Impacts to/from the adjacent operational railway lines;
- Truck and increased vehicle movements on local roads;
- Slipping or tripping on uneven surfaces within worksites;

- Working at height on embankments and overbridges;
- Heavy plant and equipment operating within the construction site;
- Coming into contact with overhead wires or below ground services; and
- The discovery of contaminated land.

There may be other construction hazards or risks arising from a more detailed understanding of the proposed construction works and detailed design including confined spaces, fire or explosions, flash flooding etc that should also be addressed.

All construction hazards and risks would be identified and addressed in a Hazard and Risk Management Sub Plan for the Proposal as outlined in Section 8.6.3.

### 8.6.2. Operational hazards and risks

The major risks that may arise during operation of the Proposal include:

- Vehicle/rail accidents at Middle Fallbrook Road level crossing;
- Derailment
- Utilities failure such as power, signalling or communications;
- Geotechnical failures such as rock falls and soil slumping; and
- Structural failure of rail lines or overbridges.

These types of events are, by their nature, major hazards which are typically characterized by a high consequence but very low likelihood of occurrence.

### 8.6.3. Mitigation and management measures

Construction hazards and risks associated with the Proposal would be addressed through a risk assessment prior to construction commencing. A Hazard and Risk Management Sub Plan would be developed to guide the management of identified and unexpected events. The Hazard and Risk Management Sub Plan would be incorporated into the PCEMP. The PCEMP would also include the following specific measures to minimise hazards and risks during construction:

- The storage of hazardous goods and refuelling and maintenance activities would be undertaken within designated bunded areas where appropriate spillage response equipment is available and in accordance with Australian Standards and DECCW's guidelines;
- Where refuelling and maintenance activities are undertaken away from designated bunded areas, a drip tray or similar would be used to prevent soil contamination from spills;
- Hazardous materials would not be stored on a floodplain or below the 20 year ARI flood level.
- Chemical spill kits would be available and accessible to construction workers. All spills and leaks would be reported to the Environmental Manager and immediate action would be taken to contain and clean up the spill;
- A health and safety management plan would be prepared prior to the commencement of construction and would require the induction of all site personnel. The health and safety management plan would include:
    - Procedures for the safe storage and handling of hazardous materials in accordance with relevant legislation and standards;
    - Procedures for operating site plant; and
    - Procedures for identifying hazards and risks on site and ensuring people are adequately protected.
- All workers would have a valid Rail Induction Safety Certificate.
- All construction personnel would be inducted into the potential hazards and risks of the Proposal, including how to recognize potential contamination.

The risk assessment would also be used to review potential operational hazards and risks however given the nature of the Proposal are similar to other current the ARTC infrastructure, it is not anticipated that any additional items would be identified. Any additional items would be included in an updated to the ARTC's emergency management plan.

The identified operational risks would be covered by the ARTC's network-wide emergency management plan. Therefore, no additional mitigation or management measures are required.

## 8.7. Cumulative impacts

Cumulative impacts to the environment may be caused through an accumulation of impacts resulting from a succession of projects or by a number of projects being undertaken concurrently. By definition a cumulative impact may exceed the project-specific impact identified in an Environmental Assessment.

The ARTC Corridor Capacity Strategy (ARTC, 2009) identifies a number of infrastructure bottlenecks and proposes an array of upgrades at various locations along the Main North Line between Newcastle and Narrabri and on the Ulan Line in the Hunter Valley to address these issues. As previously discussed, this includes completed, ongoing or proposed works at:

- Minimbah, Nundah and Allandale banks;
- Newdell, Drayton and Muswellbrook junctions;
- between Antiene and Muswellbrook generally (Main North Line);
- between Muswellbrook and Ulan generally (Ulan Line); and
- between Muswellbrook and Narrabri generally (Main North Line).

In addition to these, there are likely to be other minor capital and/ or maintenance works being carried out concurrently by the ARTC or the CRIA. Other capital projects or maintenance activities would also include road capacity improvements being undertaken by the RTA or Singleton Council e.g. New England Highway/ Bridgman Road intersection.

While specific details of the scope of works and timing of each Proposal have not been obtained, it is likely that resultant cumulative issues include the following:

- Clearance of native vegetation and disturbance/ removal of habitat;
- Construction and operational noise and vibration;
- Construction and operational air quality;
- Increased greenhouse gases (both during construction and operation);
- Potential road safety and vehicular traffic impacts during construction.
- Modification/ removal of items of Non-Indigenous or Indigenous heritage;
- Other construction related issues;
- Acquisition of private land;
- Scheduled track possessions;
- Rail capacity improvements; and
- Socioeconomic opportunities and impacts.

An outline of how these key issues have been addressed is provided below.

By their nature, a number of these items e.g. operational air quality and noise and vibration are best addressed strategically rather than at the project level as they have far-reaching implications for the network owners and therefore require a policy-level response. An example of this is operational noise and vibration which is being addressed jointly by DECCW and the ARTC in monthly forums along with other rail agencies. For this Proposal, operational noise levels are well within guideline levels and therefore no mitigation is necessary. Similarly operational air quality is within guidance levels.

The modification/ removal of items of heritage significance are managed through a separate permitting and approvals process involving a number of bodies depending on item. This may include Singleton Council and NSW Department of Planning (Heritage Branch). A part of this process is the identification and assessment of importance of the items identified in the Environmental Assessment and exhibited for public comment. Consultation for this Proposal has also included consultation with these groups.

The study of Indigenous heritage for this Proposal has adopted the DECCW requirements in relation to identifying and engaging with local Indigenous knowledge-holders and including them in archaeological field surveys. The draft Indigenous heritage report and findings has also been provided to them for comment prior to the exhibition of the EA.

One of the more significant elements of the major rail infrastructure projects is the adverse effect on biodiversity through clearing of native vegetation and the reduction in habitat for native fauna. For both the Maitland to Minimbah third track as well as this Proposal, a commitment to implement a biodiversity offset for this impact has been made. This reflects the reality that these projects are being undertaken in a largely rural landscape where important ecological resources exist and the land required for the increased capacity inevitably involves clearance and disturbance to terrestrial and aquatic resources. The proposed biodiversity offset scheme is managed by DECCW and prescribes a systematic and verifiable approach to providing, as far as possible, a „replacement' habitat elsewhere in the region. For the Nundah Bank Third Track, it is proposed that this biodiversity offset also be considered for use as an offset for the increased greenhouse gas emissions of the project both during construction and operation.

Other amenity issues such as construction dust, construction noise and vibration, disruption or changes to access, road works, construction traffic, etc can all be satisfactorily managed by applying established processes and regulatory guidelines following the planning approval and through ongoing dialogue between involved parties including the community. While some impacts would not be able to avoided, these would be temporary and would be carried out with prior warning to affected persons. Where necessary, specific amelioration measures would be agreed with individuals to either: minimise inconvenience and disruption; or to complete the works as quickly as possible.

The acquisition of private land is a particularly sensitive issue as it is often linked emotionally to the landowner. While direct negotiation and agreement from the landowner is the preferred approach by the ARTC, where necessary there is the fallback to the legislated provisions in the *Land Acquisitions (Just Terms Compensation) Act,* 1991 to ensure an equitable outcome is achieved. Except where fixed facilities are required, the majority of land likely to be acquired for the types of capacity improvement projects similar to Nundah Bank is strip land immediately adjacent to the existing rail corridor. Notwithstanding, all land proposed to be acquired may be considered important for a range of reasons.

To facilitate construction of the various rail upgrades, track possessions are required to install critical components and where connections to the operating tracks are required. Track possessions are planned and co-ordinated by the ARTC up to several years in advance of works. During track possessions, construction and maintenance of key rail infrastructure components is undertaken resulting in a disruption to scheduled passenger and freight services. While inconvenient, these disruptions occur routinely each year and construction of the ARTC capital improvement projects need to tie into these scheduled track possessions. Therefore, the continuation of the track possession program is not considered to be a cumulative impact of the Proposal.

The Proposal and other related works by the ARTC would result in a significant increase (>200%) in the capacity of the Main North Line and branch lines by 2018. It would substantially improve the operational efficiency and flexibility of the network at a large number of locations which would provide significant benefits to both freight and passenger train services. Regarding coal freight services, achieving the demand for export coal at the Port of Newcastle is critical to maintaining the strength of both the State and National economies given the importance of coal to Australia's export revenue.

During the construction stage of the Proposal, there would be substantial opportunities for local employment and suppliers to service the construction teams resulting in a substantial investment in a number of local communities and towns. This would range from general labour, machine operators and fitters, suppliers of related machine equipment, local accommodation and food outlets and more.

The cumulative impacts of the project, while not insignificant, are considered to be justified in terms of the environmental, economic and social benefits which would result from the capacity upgrade.

# 9. Environmental management

## 9.1. Draft statement of commitments

The ARTC is committed to undertaking its activities in an environmentally responsible manner and effectively managing any risks that may lead to an impact on the environment and including the community. This Environmental Assessment has identified a range of environmental impacts and recommended mitigation measures to avoid or reduce the impacts. These measures have informed the development of the draft statement of commitments (SoC) which would be implemented by the ARTC as part of the construction and operation of the Proposal. In most instances, greater detail as to how these outcomes would be achieved is provided in the environmental impact assessment in this document. Additional details and in some instances, more specific mitigation measures and procedures would be developed in the PCEMP following any approval granted by the Minister for Planning and as a consequence of ongoing investigations and design development.

The draft SoCs include:

- the desired environmental outcome;
- details of the action or commitment;
- the timing of when the action or commitment is to be undertaken; and
- reference documents including this document and others.

The draft SoCs may be revised in response to public submissions made during the EA exhibition period and/or design changes. Any revisions would be incorporated into the Submissions Report and/ or Preferred Project Report before final submission to DoP. The final SoCs would be considered by the Department of Planning in assessing the Proposal.

Following any approval granted by the Minister for Planning, the final SoCs as well as the Minister's Conditions of Approval would guide subsequent planning approvals, design development, construction and/or operation phases of the project. All alliance partners and subcontractors working on the project on behalf of the ARTC will be required to undertake all work in accordance with the final SoCs and MCoAs.

Table 9.1a outlines the relevant DGR's requiring the development of the draft Statement of Commitments and where this requirement is addressed in this section.

**Table 9.1a Director-General's Environmental Assessment Requirements - Statement of Commitments**

| Director-General's Environmental Assessment Requirements | Location addressed |
|---|---|
| **General requirements** | |
| The Environmental Assessment must include the following:<br>A draft Statement of Commitments incorporating or otherwise capturing measures to avoid, minimise, manage, mitigate, offset and/or monitor impacts identified in the impact assessment sections of the Environmental Assessment. The Statement of Commitments must clearly articulate the desired environmental outcome of the commitment. The Statement of Commitments must be achievable, measurable (with respect to compliance), and time-specific, where relevant. | Table 9.1b |

**Table 9.1b Draft Statement of Commitments**

| Objective | Reference No. | Key action | Timing | Reference documents |
|---|---|---|---|---|
| Environmental management | | | | |
| Compliance and continuous improvement in environmental management. | EM1 | The UHVA Alliance Environment and Community Management Plan (AECMP) will be implemented on the project. | Pre-construction and construction. | ISO 14001:2004 Environmental Management Systems – requirements with guidance for use.<br>ISO 19011:2003 Guidelines for Quality and/or Environmental Management Systems Auditing. |
| | EM2 | A Project Construction Environmental Management Plan (PCEMP) will be developed and implemented by suitably qualified and experienced personnel and will incorporate as a minimum the mitigation and management measures in the EA and other measures in the AECMP. | Pre-construction and construction. | *Guideline for the Preparation of Environmental Management Plans* (DIPNR 2004). |
| Create awareness and a strong foundation to manage environmental issues. | EM3 | Environmental management tools such as environmentally sensitive area maps will be developed, demarcated and signposted where necessary. Maps will be made available during all on site inductions to construction personnel. | Pre-construction and construction. | |
| | EM4 | All construction personnel will receive inductions and toolbox training regarding environmental management. | Pre-construction and construction. | |
| | EM5 | The PCEMP will be developed using the Construction Environmental Management Framework provided in the Environmental Assessment | Pre-construction and construction. | Volume 1, Section 9.2 |
| | EM6 | The PCEMP will contain an Aspect and Impact Register and include Environmental Management Sub Plans (EMSP) as required | Pre-construction and construction. | |
| Community consultation | | | | |
| The community is kept informed by various means about the project. | CC1 | The community will be kept informed with measures such as:<br>• Letter box drops, media releases and community updates<br>• An internet site established and maintained for the duration of the project<br>• Variable message signs<br>• Targeted consultation with affected individuals or groups<br>Information to be provided will include:<br>• Details of future works programs | Pre-construction and construction | |

| Objective | Reference No. | Key action | Timing | Reference documents |
|---|---|---|---|---|
| | | • General construction progress | | |
| Ensure effective management of community enquiries or complaints. | CC2 | Communication management will include:<br>• Toll free project information and complaints line<br>• Directions on how to register a complaint or make an inquiry<br>• Acknowledgement of complaints within 48 hours<br>• A complaint recording and tracking system | Pre-construction and construction. | Alliance Environmental Communication Management Plan (AECMP) |
| Indigenous heritage | | | | |
| Manage impacts on Indigenous heritage. | IH1 | Any Aboriginal heritage items will be managed in accordance with the Aboriginal Cultural Heritage Assessment Report (CHAR), which identifies mitigation measures, developed in consultation with Aboriginal stakeholders and DECCW | Pre-construction and construction. | |
| | IH2 | Aboriginal sites identified to be conserved will be managed as environmentally sensitive areas. | Pre-construction and construction. | Volume 1, Section 7.3 of the Environmental Assessment and Volume 2, Technical Paper. |
| | IH3 | If human skeletal material is encountered at any time during the project, work in the vicinity will cease immediately and the [site manager] notified. The following organisations will be notified: the ARTC, police, state coroner, DECCW, the Heritage Branch, Aboriginal stakeholders and the project archaeologist. If the find is determined to be a historical burial, consultation with the appropriate stakeholders (Heritage Branch, ARTC, Land owner) will determine the most appropriate action. | Construction | *NPW Act 1974 Skeletal remains – Guidelines for the management of human skeletal remains under the Heritage Act* 1977 (NSW Heritage Office 1998). |
| Ecology | | | | |
| Manage impacts on flora and fauna. | FF1 | Areas of vegetation identified to be retained will be managed as environmentally sensitive areas. | Pre-construction. | Volume 1 Section 7.2 of the Environmental Assessment and Volume 2 Technical Paper 2. |
| | FF2 | A suitably qualified and experienced ecologist will conduct pre-clearing fauna surveys, including an inspection of tree hollows immediately prior to tree felling. Fauna with the potential to be harmed during clearing activities will be relocated into suitable adjacent habitat. | Pre-construction and construction. | Department of Environment and Conservation 2004, *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft),* Department of Environment and Conservation, Hurstville. |
| | FF3 | A two-stage clearing process will be adopted for all felling of hollow-bearing trees. | Construction. | |
| Manage the | FF4 | Weed control will be carried out, and techniques will vary | Pre-construction and | *Noxious Weeds Act 1993* |

| Objective | Reference No. | Key action | Timing | Reference documents |
|---|---|---|---|---|
| spread of weeds. | | depending on the species targeted and the area to be treated. This will be in consultation with Singleton Council. | Construction. | |
| Enhance existing habitat. | FF5 | Natural and artificial habitat features and resources (such as felled logs and nest boxes) will be placed in suitable areas to provide alternative habitat for displaced fauna. | Pre-construction and Construction. | |
| Offset loss of vegetation and fauna habitat. | FF6 | A biodiversity offset package will be developed in consultation with DECCW and other relevant government agencies. | Pre-construction and Construction. | *Department of Environment and Climate Change 2008, Principles for the use of Biodiversity Offsets in NSW*<br>*Department of Environment Climate Change 2009, BioBanking Assessment Methodology and Credit Calculator Operational Manual.*<br>*Department of Sustainability, Environment, Water, Population and Communities, Draft Policy Statement: Use of environmental offsets under the EPBC Act* |
| Noise and vibration | | | | |
| Minimise construction noise impacts. | CN1 | Standard mitigation and management measures will be used to reduce construction noise at sensitive receivers:<br>• All mechanical plant will be silenced by best practical means using current technology.<br>• Noise suppression devices will be maintained to the manufacturer's specifications.<br>• Internal combustion engines will be fitted with a suitable muffler in good working order.<br>• Construction traffic will be well maintained and operated in a manner such that noise emissions are minimised. | Pre-construction and construction | Volume 1 Section 7.3 of the Environmental Assessment and Volume 2 Technical Paper 3<br>*NSW Interim Construction Noise Guideline* (DECC 2009)<br>*NSW Government's Environmental Criteria for Road Traffic Noise* (EPA 1999)<br>AS 2436-1981 Guide to noise control and construction, maintenance and demolition sites |
| | CN2 | Out of hours construction activities will be undertaken in accordance with DECCW's Interim Construction Noise Guidelines including:<br>• Minimise the need for reversing or movement alarms.<br>• Avoid dropping materials from a height, as far as possible.<br>• Avoid metal to metal contact on equipment, as far as possible.<br>• Schedule truck movements to avoid residential streets where possible during works outside of standard working | Construction | *NSW Interim Construction Noise Guideline* (DECC, 2009). |

| Objective | Reference No. | Key action | Timing | Reference documents |
|---|---|---|---|---|
| | | hours.<br>• Avoid mobile plan clustering near sensitive receivers, particularly during works outside of standard working hours (night time track possession works). | | |
| Air quality | | | | |
| Minimise construction air quality impacts. | CA1 | Standard dust and emission control measures will be implemented to manage construction air quality impacts at sensitive receivers. | Construction | Section 7.4 of the Environmental Assessment |
| Surface and groundwater | | | | |
| Conservation of water. | SG1 | Water efficient fittings and work practices will be adopted. | Construction | Section 7.5 of the Environmental Assessment |
| Minimise scouring of the landscape. | SG2 | Design of drainage improvements to incorporate means to reduce erosion and scouring | Pre-construction and construction | Section 7.5 of the Environmental Assessment |
| Minimise impacts on existing water storages | SG3 | Design options will aim to reduce identified potential impacts on existing water storages adjacent to the proposed works. | Pre-construction and construction | |
| Transport and land use | | | | |
| Avoid or minimise impacts on traffic and the road network. | TA1 | Pre- and post-construction road dilapidation reports will be prepared for local and /or regional roads likely to be used for construction. Any damage resulting from construction (not normal wear and tear) will be repaired unless alternative arrangements are made with the relevant road authority. | Pre-construction and operation | |
| | TA2 | Construction vehicle movements and works programs will incorporate traffic control measures to minimise traffic and transport impacts on local roads and the existing highway. | Pre-construction and operation | RTA Traffic Control at Worksites (RTA 2003a) |
| Ensure minimum safety requirements are implemented and maintained on local roads. | TA3 | Consultation with RTA and Singleton Council will be undertaken to rectify identified road safety deficiencies and ensure adequate levels of safety are maintained during construction. | Pre-construction and Construction | UHVA Stakeholder and Community Involvement Plan |

| Objective | Reference No. | Key action | Timing | Reference documents |
|---|---|---|---|---|
| Minimise impacts on non-Indigenous heritage. | TA4 | The Middle Falbrook Bridge over Glennies Creek in Middle Falbrook will not be used by heavy construction vehicles. This will be communicated as part of the relevant UHVA induction, pre-start briefs and toolbox talks. | Pre-construction and construction | Section 7.7 of the Environmental Assessment |
| Non-Indigenous heritage | | | | |
| Minimise impacts on non-Indigenous heritage. | NA1 | Mitigation (archival record, test/salvage excavation) will be undertaken for heritage items impacted. | Pre-construction and construction | *How to prepare archival records of heritage items* (NSW Heritage 1998).<br>Section 7.7 of the Environmental Assessment |
| | NA2 | Non-Indigenous sites identified to be conserved will be managed as environmentally sensitive areas. Items will be ameliorated following project construction if disturbed. | Pre-construction and construction | Section 7.7 of the Environmental Assessment |
| | NA3 | If human skeletal material is encountered at any time during the project, work in the vicinity will cease immediately and the [site manager] notified. The following organisations will be notified: the ARTC, the police, the state coroner, DECCW, the Heritage Branch, Aboriginal stakeholders and the project archaeologist. If the find is determined to be a historical burial, consultation with the appropriate stakeholders (Heritage Branch, ARTC, Land owner) will determine the most appropriate action. | Pre-construction and construction | *NPW Act 1974 Skeletal remains – Guidelines for the management of human skeletal remains under the Heritage Act* 1977 (NSW Heritage Office 1998). |
| | NA4 | The Middle Falbrook Bridge over Glennies Creek in Middle Falbrook will not be used by heavy construction vehicles. This will be communicated as part of the relevant UHVA induction, pre-start briefs and toolbox talks. | Pre-construction and construction | Section 7.7 of the Environmental Assessment |
| Earthworks | | | | |
| Minimise soil loss and sedimentation of waterways. | SW1 | Develop and implement a Soil and Water Management Sub Plan will be developed and implemented as part of the PCEMP. | Pre-construction and construction | *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom 2004)<br>*Managing Urban Stormwater: Soils and Construction Volume 2D, Main Road Construction* (DECC 2008b). |
| | SW2 | A soil conservation specialist will be engaged to provide advice on erosion and sedimentation control. | Pre-construction and construction | Section 7.8 of the Environmental Assessment |
| | SW3 | Stabilisation of exposed areas will be undertaken progressively. | Construction | Section 7.8 of the Environmental Assessment |
| | SW4 | Upstream and downstream water quality monitoring of waterways will be conducted at control and impact locations pre | Construction | Section 7.8 of the Environmental Assessment |

| Objective | Reference No. | Key action | Timing | Reference documents |
|---|---|---|---|---|
| | | and post discharge from sediment basins. | | |
| Avoid contamination of waterways. | SW5 | Spill kits will be kept on site at all times and spills will be contained immediately.<br>In the event of a large or hazardous spill, the Fire Brigade, Police, Ambulance and the Department of Environment, Climate Change and Water will be contacted as appropriate. | Construction | AS 1940 The storage and handling of flammable and combustible liquids.<br>*Storing and handling liquids: Environmental protection – participants manual* (DECC 2007).<br><br>*Environmental compliance report: Liquid chemical storage, handling and spill management – Part B Review of best practice and regulation* (DECC 2005) |
| | SW6 | Bunded areas will be used for storage of potentially hazardous and/or contaminating materials and activities.<br>Refuelling will be undertaken in appropriate offsite locations wherever possible. | Construction | Section 8.4 of the Environmental Assessment |
| Contaminated land and hazardous materials | | | | |
| Minimise risk to environment and personnel. | CL1 | Any proposed removal of spoil, ballast etc from the railway corridor will be tested to identify and any contamination which may result in impacts on the environment. If contaminated material is identified it will be reused and/or disposed in accordance with the relevant guidelines. | Pre-construction and construction | Section 8.1 of the Environmental Assessment<br>Waste Classification Guidelines: Parts 1 and 2 (DECC 2008a).<br><br>*Protection of the Environment Operations Act 1997* |
| Manage contaminated land. | CL2 | If any unknown contaminated sites are encountered, all works at that site will stop immediately. Works will not recommence until the material is analysed and management measures are developed. | Pre-construction and construction | Waste Classification Guidelines: Parts 1 and 2 (DECC 2008a). |
| Visual | | | | |
| Minimise visual amenity impacts | VL1 | Landscaping treatments will include native plant species endemic to the local area. | Pre-construction and construction | Section 8.2 of the Environmental Assessment |
| Waste minimisation | | | | |
| Minimise waste. | WM1 | The waste minimisation hierarchy principles of avoid, reduce, reuse, recycle or dispose will apply to all aspects of the project. | Construction | *Waste Avoidance and Resource Recovery Strategy* (DECC 2006)<br>NSW Government's Waste Reduction and Purchasing Policy.<br>*Environmental guidelines – assessment, classification* |

| Objective | Reference No. | Key action | Timing | Reference documents |
|---|---|---|---|---|
| | | | | *and management of liquid and non-liquid waste* (DECC 1999). |
| | WM2 | Where possible, material using recycled/ reconditioned components will be sourced for appropriate uses. | Construction | Leighton Contractors Group Environmental Policy |
| Energy demand and greenhouse gases | | | | |
| Minimise greenhouse gas emissions and energy use. | EG1 | Greenhouse gas emissions will be minimised by limiting the extent of clearing of vegetation that sequesters carbon and adopting energy efficient work practices including consideration of:<br>• Energy efficient design of site buildings;<br>• Selection of energy efficient equipment, machinery and materials and low emission fuels;<br>• Placement and design of site compounds to minimise unnecessary vehicle movement;<br>• Regular servicing of site plant and equipment;<br>• Training of construction personnel in energy efficient plant operation; and<br>• The use of accredited GreenPower or solar arrays for construction electricity use and/or operational signalling power supplies. | Construction | |
| | EG2 | The biodiversity offsets achieved for the project will be accredited as an offset for the greenhouse gas emissions emitted during construction and operation. | Construction and operation | |
| Socioeconomic | | | | |
| Property access is maintained. | SA1 | Property access will be maintained for the duration of the construction. If required, temporary or alternative access will be provided in consultation with the affected landowner(s). | Construction | AECMP |
| Manage impacts to directly affected | SA2 | Negotiations for property acquisition will include consideration of property adjustments where required to maintain existing farm management practices where appropriate. | Pre-construction and construction | |

| Objective | Reference No. | Key action | Timing | Reference documents |
|---|---|---|---|---|
| properties. | | | | |
| Hazards and risks | | | | |
| Minimise risks and hazards to the environment, community and construction personnel. | HR1 | Hazardous materials will be stored in bunded areas within the construction site. Hazardous materials will not be stored on a floodplain below the 20 year ARI flood level. | Pre-construction and construction. | AS 1940 The Storage and Handling of Flammable and Combustible Liquids.<br>*DEC Bunding and Spill Management Guidelines* (in DEC Environmental Protection manual for Authorised Officers). |
| | HR2 | Potentially hazardous and contaminating activities will be in bunded areas or in other areas where suitable containment measures are in place to prevent discharge into the environment. | Pre-construction and construction. | AS 1940 The Storage and Handling of Flammable and Combustible Liquids |
| Cumulative impacts | | | | |
| Reduce impacts on the operational (passenger) rail network. | CU1 | Co-ordination with the ARTC will be undertaken regarding track possessions | Construction | |

## 9.2. Construction environmental management framework

This section sets out the UHVA's Construction Environmental Management Framework (CEMF), describing the approach to environmental management for the Nundah Bank Third Track Project. It includes an outline of the PCEMP and supporting Environmental Management Sub Plans (EMSP). All impacts identified in the Environmental Assessment would be managed in accordance with this framework.

The DGRs identify the construction environmental management framework as a key issue for the EA. Table 9.2a outlines the relevant DGRs and where they have been addressed in this section.

**Table 9.2a Director-General's Environmental Assessment Requirements - construction environmental management framework**

| Director-General's Environmental Assessment Requirements | Location addressed |
|---|---|
| **Key issues** | |
| General construction impacts **–** the Environmental Assessment must assess the impacts of, and present a management framework for:<br>• site compounds and ancillary construction locations, with consideration given to:<br>o the identification and assessment of both primary and secondary site compounds and facilities (including waste and chemical storage) on the receiving environment; and<br>o a strategy for managing site compounds, with a particular focus placed on primary site compounds, and a broader, more generic approach developed for lower-risk activities; | Section 9.2 |
| • noise and vibration**,** with consideration given to:<br>o the intensity and duration of noise and vibration impacts from all activities and sources on and off site;<br>o the nature, sensitivity and impact to potentially affected receivers and structures, scheduling construction works having regard to the nature of construction activities (including transport, blasting and tonal or impulsive noise-generating works),<br>o a strategy for managing construction noise and vibration, with a particular focus placed on those activities identified as having the greatest potential for adverse noise or vibration impacts, and a broader, more generic approach developed for lower-risk activities; and<br>o the *Interim Construction Noise Guidelines* (DECC, 2009) and *Assessing Vibration: A Technical Guideline (DEC, 2006)*; | Section 7.3 and 9.2 |
| • transport and access, including a considered approach to minimising construction traffic impacts on public and private access. Consideration should be given to:<br>o construction traffic impacts, including spoil haulage, road network changes and potential disruption to the local and regional road network;<br>o rail traffic impacts; and<br>o a strategy for managing rail and road traffic impacts, with a particular focus placed on those activities identified as having the greatest potential for adverse traffic flow, access or safety implications, and a broader, more generic approach developed for day-to-day traffic management. | Section 7.6, 9.2 and Volume 2, Technical Paper 4 |
| • earthworks, including a considered approach to minimising impacts associated with the excavation, movement, stockpiling, rehabilitation and disposal of spoil and fill, with consideration given to:<br>o soil characteristics, including acid sulfate soils and potential land contamination;<br>o quantification of bulk earthworks and spoil balance and disposal of excess spoil;<br>o erosion and sedimentation control measures at excavation, storage and placement locations to protect adjoining watercourses;<br>o air quality impacts on sensitive receivers, in particular cumulative impacts from adjacent mining operations; and<br>o a strategy for managing earthworks with a particular focus on those works that have the greatest potential to disturb soils that are contaminated, have a high erosion and run off hazard and adverse impacts on watercourses, and a broader, more generic approach developed for ongoing construction management. | Section 7.8, 9.2 |

### 9.2.1. Project environmental obligations

The project environmental obligations to be detailed in the PCEMP and EMSPs would be obtained from the following documents, approvals and permits/licences and Submissions Report:

- EA, including the final Statement of Commitments (SoC);
- Submissions Report;
- The Minister's Conditions of Approval (MCoA);
- The ARTC's amended Environment Protection Licence No. 3142;
- Any licence under the *National Parks and Wildlife Act 1974*;
- *Threatened Species Conservation Act 1995* Section 91 licence; and
- Other applicable legal and other requirements.

### 9.2.2. Standards and guidelines

The PCEMP and supporting EMSPs would incorporate best environmental management practices; policies, standards, codes of practice and guidelines that are relevant to the project including:

- ISO 14001:2004 *Environmental Management Systems*;
- Department of Planning (formerly the Department of Infrastructure, Planning and Natural Resources) (2004) *Guideline for the Preparation of Environmental Management Plans*;
- Department of Planning (2006) *NSW Major Projects Assessment System – A community guide*;
- Landcom (2004) *Managing urban stormwater: Soils and Construction – Volume 1, 4th Edition* (The Blue Book);
- AS 1940:2004 *The storage and handling of flammable and combustible liquids*; and
- UHVA Environment and Community Policy.

### 9.2.3. Construction environmental management context

The UHVA has an Environmental Management System (EMS) that forms part of the ISO 14001:2004 certified Leighton Way Integrated Management System. This section describes the relationship between this overarching EMS and the PCEMP.

The key elements of ISO 14001 to be included and addressed in the PCEMP are listed below:

- Environment policy;
- Environmental objectives;
- Legislative and other requirements;
- Roles and responsibilities;
- Sub-contractor management;
- Document and records management;
- Communication;
- Risk management;
- Implementation of controls;
- Review and monitoring; and
- Incident management.

**Alliance environment and community management plan**

The Alliance Environment and Community Management Plan (AECMP) forms part of the ISO 14001:2004 certified Leighton Way Integrated Management System. It describes the EMS that would be applied across all the UHVA projects and details the common processes and tools that would be used within each project.

Core components and related topics covered in the AECMP include the following:

- Environment and community policy;
- Planning;
- Implementation and operation; and

- Checking and corrective action.

**Project Construction Environmental Management Plan**
The PCEMP is a project site-specific functional management plan that will be prepared for each the UHVA project. It provides the systems, tools and processes through which all environmental aspects, impacts, risks and obligations are identified and managed, to ensure environmental best practice is applied and legal compliance is achieved during construction. An outline of the structure of the PCEMP is as follows:

1 Project Description
2 Introduction
   a. Purpose, Objectives and Scope of the PCEMP
   b. Project setting
   c. Project background
   d. Environmental Assessment
   e. Project Approval
   f. Project Program
3 Legislative and other requirements
   a. Legislation
   b. Licences and permits
   c. Ministers Conditions of Approval
   d. Statement of Commitments
   e. ARTC requirements
   f. Relationship of the PCEMP to ISO14001:2004
   g. Other requirements
4 Environmental Risk Assessment Methodology
5 Environmental Management Framework
   a. The UHVA project management system
   b. Policies
   c. Environmental Management Document Structure
      i. PCEMP
      ii. Environmental Management Sub Plans
      iii. Environmental Procedure and Guidelines
      iv. SHEWMS
      v. Checklists, forms and registers
   d. Document Control and Records Management
   e. Roles and Responsibilities
   f. Environmental resources
6 Processes
   a. Identify and assess
      i. Identify sensitive receivers
      ii. Identify environmental constraints
      iii. Identify and assess environmental risks and opportunities
      iv. Environmental objectives and targets
      v. Ancillary facilities
      vi. Subcontractors and suppliers
   b. Consult and communicate
      i. Consultation for environmental approvals
      ii. External environmental communication
      iii. Environmental training
      iv. Internal environmental communication
   c. Implement controls

i. Controlling environmental risks
ii. SHEWMS

d. Review and monitor
i. Environmental inspections
ii. Environmental monitoring and measurement
iii. Environmental review and auditing
iv. Management review and improving environmental performance

e. Manage incident
i. Incident response planning
ii. Environmental non-conformances and corrective and preventative actions

The PCEMP supported by a suite of site-specific environmental planning and management documents including an Environmental Aspects and Impacts Risk Register, Environmentally Sensitive Area Maps, EMSPs and other environmental management tools.

*Environmental Aspects and Impacts Register*
The Environmental Aspects and Impacts Register captures construction activity aspects and impacts relevant to the project and determines an activity risk rating using a consequence and likelihood matrix. The register identifies the mitigation measures to be implemented to eliminate or reduce the risk, the key personnel responsible for implementing controls, timeframes and the resulting residual risk rating.

*Environmental Sensitive Area Maps*
Environmental Sensitive Area Maps are developed as a tool to identify the project extents, project boundaries and access points, existing sensitive receivers and any areas of environment and/or heritage significance such as environmentally sensitive areas, no go zones, and areas of known contamination.

*Environmental Management Sub Plans*
EMSPs are developed as required to supplement the PCEMP and to provide detail on the UHVA's approach to the management of specific environmental risks/aspects throughout project construction. Each EMSP details specific management and mitigation measures and actions complied from the EA including draft SoC and relevant technical assessments, Submissions Report, MCoA and other relevant project approval documents and applicable guidelines. EMSPs are prepared for the project as required by the MCoA but would include the following, for the Nundah Bank Third Track Project:

- Cultural heritage;
- Flora and fauna;
- Soil and water;
- Waste management;
- Hazard and risk management;
- Traffic and transport;
- Earthworks;
- Noise and vibration; and
- Site compounds and ancillary works.

*Environmental Management Tools*
The PCEMP provides a number of environmental management tools to be used to minimise and manage environmental impacts and risks on site. These tools include:

- Environmental management procedures;
- Environmental inspection checklists and registers;
- SHEWMS; and
- Environmental induction and toolboxes.

The relationship between the AECMP, PCEMP, EMSPs and environmental management tools is illustrated in Figure 9.2a.

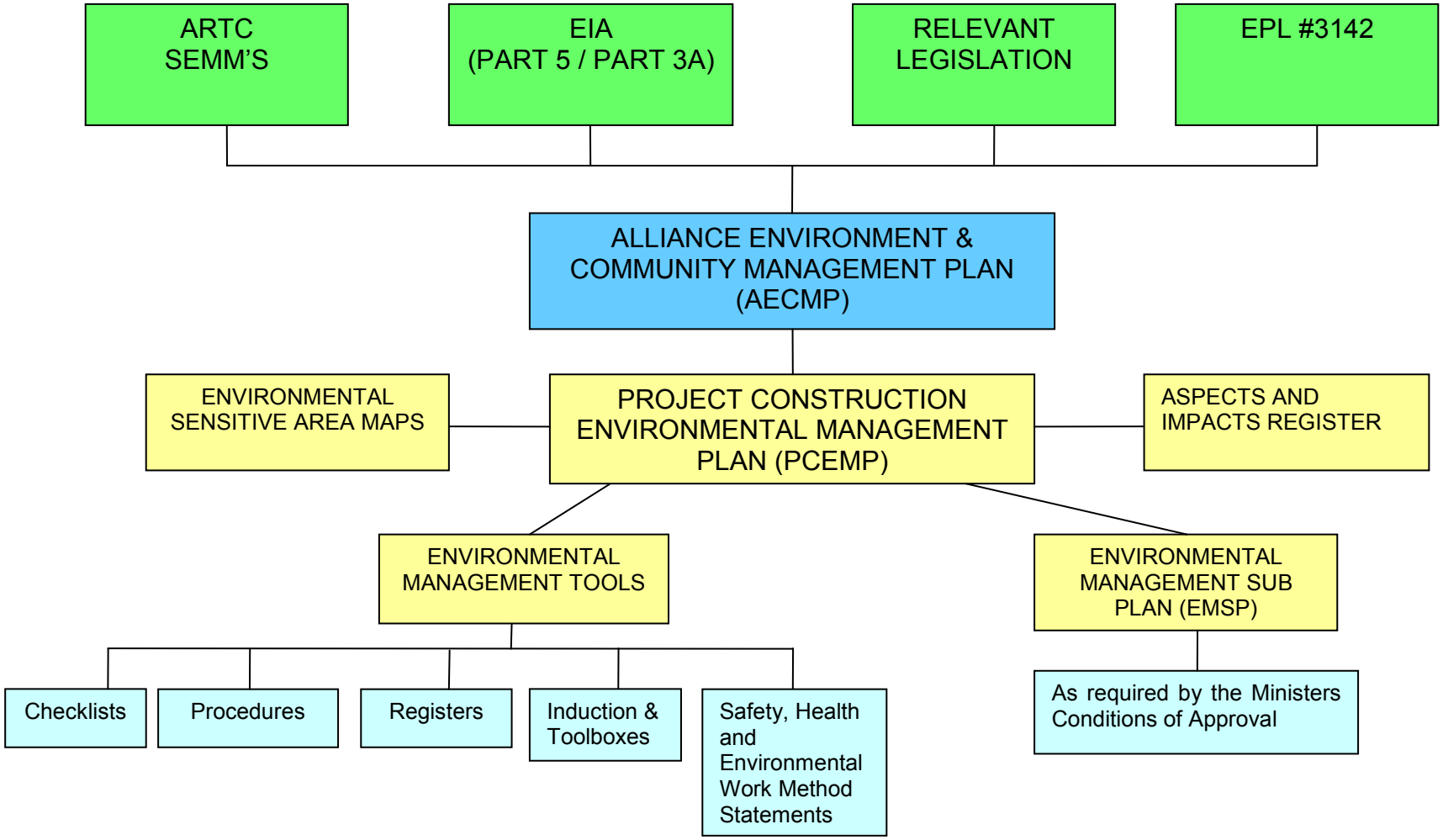


**Figure 9.2 Relationship between various project management plans and tools**

### 9.2.4. Site compounds and ancillary construction locations

The primary and secondary site compounds would be established at the northern and southern extents of the Proposal area to provide offices, ablutions and first aid facilities, hardstand for mobile, fixed plant and parking, maintenance workshops, and storage of waste, chemicals and construction materials.

Ancillary works to be undertaken as part of the mobilisation to site would include formation or upgrade of haul roads, construction of sediment basins, installation of fencing and property access, upgrades to the local road network, stockpiling materials and relocation of utilities.

**Objectives**
The objectives for the management of the site compounds and ancillary construction locations are to:

- Minimise the impact on the receiving environment from the establishment of site compounds and ancillary works;
- Minimise the risk of ongoing activities associated with site compounds and ancillary works impacting on the receiving environment; and
- Rehabilitation of the compound area to a state comparable prior to their establishment.

**Principles**
The following management principles would be adopted to reduce impacts associated with establishment and management of site compounds and ancillary construction locations:

- Comply with all conditions of approval and other relevant requirements;
- Ensure areas for proposed site compounds and ancillary works have been assessed in the EA and are not identified as environmentally sensitive areas / no go zones;
- Ensure areas for proposed site compounds and ancillary works meet the MCoA;
- Establish site compounds and locate ancillary works in areas already cleared of native vegetation or required to be cleared for project construction, where practicable;
- Consider locations for site compounds that have adequate space, are on relatively level land, are more than 100m from nearby sensitive residential;
- Locate site compounds within existing ARTC lease areas if possible; and
- Establish site compounds and ancillary construction locations where they would not impact on construction activities.

**Approach**
The following approach would be adopted in the establishment and management of site compounds and ancillary construction locations:

- Review proposed locations against the EA, including SoC, and MCoA, to assess locations against all conditions and commitments;
- Review final project design layout, construction methodologies, program sequence and staging, and access points to the local road network to ensure site compounds are appropriately located;
- Identify specific activities to be undertaken at each site compound and ancillary works location;
- Review the EA and other relevant documentation to identify potential impacts and management and mitigation measures for inclusion in the PCEMP and ESMP;
- Include site compounds and ancillary works in the Environmental Aspects and Impacts Register;
- Prepare a site compound and ancillary works EMSP to document the impacts and mitigation measures and to assign responsibilities for their management;
- Prepare a specific construction activity Safety, Health and Environment Work Method Statement (SHEWMS) and related documents (e.g. erosion and sediment control plan, chemical storage and waste) to ensure potential environmental impacts are incorporated and mitigation measures and actions are documented;
- Prior to completion of the EMSP and SHEWMS, undertake a construction team review to confirm that the management and mitigation measures can be effectively implemented; and
- Communicate the requirements in relation to the establishment and management of site compound and ancillary construction locations to all project personnel and sub contractors through the UHVA induction, pre-start briefs and toolbox talks.

### 9.2.5. Noise

The construction of the project would generate elevated noise and vibration levels in the immediate vicinity of the works. A noise and vibration assessment has been undertaken for the project and is provided in Volume 2, Technical Paper 3. The noise and vibration assessment concluded that, since the nearest residential sensitive receptor is approximately 770 m from the project, there is unlikely to be a significant impact on nearby sensitive receivers from construction noise and negligible impact from construction vibration. Vibration impacts are therefore not considered further in this strategy.

Traffic noise to be generated on the local road network during construction has also been assessed as part of the noise and vibration assessment. The anticipated traffic noise was assessed against the DECCW (1999) *Environmental Criteria for Road Traffic Noise*, based on a typical set back of 50m for residential sensitive receptors. The noise and vibration assessment concluded that predicted traffic noise levels at the assumed setback comply with the relevant criteria on typical days with the exception of peak periods, including some night time works, during which the traffic noise criteria are expected to be exceeded.

**Objectives**
The construction noise management objectives for the project are to:

- Reduce the intensity and duration of elevated noise levels from construction works at nearby residential sensitive receptors;
- Minimise the intensity and duration of elevated noise levels from construction traffic at nearby residential sensitive receptors; and
- Maintain ongoing consultation with residential sensitive receptors in the vicinity of the project and project access routes regarding the construction works, timing of works and potential noise impacts.

**Principles**
The following management principles would be adopted to reduce construction noise at source and to minimise construction noise impacts at nearby residential sensitive receptors throughout the construction works:

- Comply with all conditions of approval and other relevant requirements;
- Consider the proximity of sensitive receptors when locating work site facilities and stationary equipment;
- Identify opportunities to reduce the intensity and duration of noise generation;
- Consider acoustic sound performance when selecting plant and equipment for use on site;
- Schedule construction works and bulk material deliveries to comply with the MCoA, EPL and other requirements; and
- Implement an information program, including a dedicated project hotline, to inform local residents of the construction program and time periods when construction noise could exceed the noise affected management level.

**Approach**
The following approach would be adopted to manage noise throughout project construction:

- Identify site compounds and ancillary work locations, project footprint, project access routes and known sensitive residential noise receptors;
- Review project construction methodologies, plant and equipment and construction program to identify opportunities to minimise noise impacts;
- Identify potential impacts and management and mitigation measures for inclusion in the PCEMP and ESMP;
- Review the EA, the *Interim Construction Noise Guidelines* (DECC, 2009) and other relevant documentation;
- Include construction noise in the Environmental Aspects and Impacts Register;
- Prepare a noise EMSP to document the impacts and mitigation measures and to assign responsibilities for their management;
- Prepare a specific construction activity SHEWMS to ensure potential environmental impacts are incorporated and mitigation measures and actions are documented;

- Prior to completion of the EMSP and SHEWMS, undertake a construction team review to confirm that the management and mitigation measures can be effectively implemented; and
- Communicate the requirements in relation to noise management to all project personnel and sub contractors through the UHVA induction, pre-start briefs and toolbox talks.

### 9.2.6. Transport and access

The construction of the project would generate increased movements of light and heavy traffic on the surrounding local road network in the vicinity of the works. A traffic and transport impact assessment has been undertaken for the project and is provided in Volume 2, Technical Paper 4 of the EA.
The traffic impact assessment concluded:

- The additional light and heavy traffic to be generated during project construction is not expected to have a significant impact on the surrounding road network;
- The New England Highway / Bridgman Road intersection would continue to operate beyond its practical capacity, regardless of any additional traffic resulting from the project; and
- There are a number of road safety issues on the surrounding road network including local roads and intersections and intersections with the New England Highway.

**Objectives**
The traffic management objectives for the project are to:

- Ensure a safe environment for existing road users and project personnel and sub contractors;
- Minimise traffic impacts associated with project construction on the surrounding road network;
- Minimise impacts associated with project construction on the adjacent rail line traffic;
- Maintain access for local residents, utility providers, and mine personnel and sub contractors; and
- Maintain ongoing communications with local residents and users of the local road network regarding potential traffic impacts.

**Principles**
The following management principles would be adopted to minimise construction traffic impacts on local residents and existing users of the surrounding road network, and on significant heritage items:

- Comply with all conditions of approval and other relevant requirements;
- Consider the location of local residents and traffic routes of users of the surrounding road network and the locations of Indigenous and non-Indigenous heritage items when selecting site access roads and planning construction haulage operations;
- Consider timing of local school bus runs and mine shifts when scheduling any road safety mitigation upgrades of the surrounding road network;
- Implement an information program to inform local residents and existing users of the local road network of the construction program, construction haulage operations and time periods when traffic impacts may occur.

**Approach**
The following approach to traffic impact management would be adopted throughout the project:

- Confirm the traffic characteristics of the local road network and surrounding arterial roads and the potential impacts of the project construction;
- Review project construction access roads and haulage operation routes, final construction methodology and predicted daily haulage movements to identify any No Go areas and to identify opportunities to minimise traffic impacts on the local and surrounding road network and items/areas of Indigenous and non-Indigenous heritage;
- Review the EA, including the traffic impact assessment, and other relevant documentation to identify potential impacts and management and mitigation measures for inclusion in the PCEMP and ESMP;
- Include traffic in the Environmental Aspects and Impacts Register;
- Prepare a traffic EMSP to document the impacts and mitigation measures and to assign responsibilities for their management;
- Prepare a specific construction activity SHEWMS to ensure potential environmental impacts are incorporated and mitigation measures and actions are documented;

- Prior to completion of the EMSP and SHEWMS, undertake a construction team review, to confirm the management and mitigation measures can be effectively implemented; and
- Communicate the requirements in relation to traffic management to all project personnel and sub contractors through the UHVA induction, pre-start briefs and toolbox talks.

### 9.2.7. Earthworks

The construction of the project would involve clearing and grubbing, bulk earthworks, spoil placement and stabilisation, import and placement of structural fill and formation compaction, installation or extension of culverts, and construction of sediment dams. Adequate management of earthworks is a central part of the success of bulk earthwork and formation durability, reducing the impact of erosion and sedimentation of these structures and minimising air and water quality impacts to nearby residents and local waterways.

**Objectives**

The earthworks management objectives for the project are:

- Prevent erosion of earthworks, formation and drainage structures;
- Avoid sediment migration offsite;
- Minimise dust generation and migration offsite;
- Prevent pollution of local waterways; and
- Minimise areas of exposed surface at any time.

**Principles**

The following management principles would be adopted to manage and minimise impacts associated with earthworks:

- Comply with all conditions of approval and other relevant requirements;
- Identify opportunities to reduce clearing footprint, excavation, movement and stockpiling of material, disposal off site, dust generation and erosion and sedimentation;
- Ensure stockpile and sediment basin locations have been assessed in the EA and are not identified as environmentally sensitive areas / no go zones; and
- Apply the relevant principles of soil and water management listed in *Managing Urban Stormwater: Soils and Construction. Volume 1* (Landcom, 2004).

**Approach**

The following approach to earthworks management would be adopted prior to and throughout the project construction works:

- Review project construction methodologies, program and plant and equipment list, project footprint including quantification of bulk earthworks, spoil balance and permanent spoil placement locations and temporary stockpiles to identify opportunities to minimise impacts associated with earthworks;
- Review project construction program in relation to adjacent mining operations and potential cumulative air quality impacts;
- Identify areas of land to be cleared or disturbed and construction staging of disturbance works, location of drainage lines and waterways, nearby residents, and areas of known contamination;
- Review soil characteristics of the construction works profile noting areas of specific management such as highly saline soils and expansive and dispersive soils;
- Review the Landcom (2004) management principles, the EA and other relevant documentation to identify potential impacts and management and mitigation measures for inclusion in the PCEMP and ESMP;
- Include earthworks in the Environmental Aspects and Impacts Register;
- Prepare an earthworks EMSP to document the impacts and mitigation measures and to assign responsibilities for their management;
- Prepare a specific construction activity SHEWMS to ensure potential environmental impacts are incorporated and mitigation measures and actions are documented;
- Consider the Landcom (2004) suggested work sequence approach to earthworks management when preparing for and undertaking construction works;
- Prepare progressive erosion and sedimentation control plans;

- Prior to completion of the EMSP and SHEWMS, undertake a construction team review, to confirm the management and mitigation measures can be effectively implemented; and
- Communicate the requirements in relation to earthworks management to all project personnel and sub contractors through the UHVA induction, pre-start briefs and toolbox talks.

# 10. Justification and conclusion

## 10.1. Overview

The strategic need, alternatives and options considered in the development of the Proposal is presented in Section 3.

Coal is Australia's largest export commodity and contributes significantly to State and Federal revenue.

The Hunter Valley rail network plays a crucial role in transporting passengers and freight from Muswellbrook to Newcastle. Between the Port of Newcastle and Muswellbrook, there are sections of track where trains must climb steep grades resulting in the minimum headway between trains being greater than desired which reduces the overall capacity of the network. One of these is the section of track at Nundah Bank where current headways are approximately 16.5 minutes. To achieve the 2018 export coal volume at the Port of Newcastle, headways on Nundah Bank need to be reduced to around 8-10 minutes. Without intervention by the ARTC, the headway of trains travelling up Nundah Bank will jeopardise the overall performance of the Hunter Valley rail network by the third quarter of 2012. The reduction of headways on Nundah Bank is therefore necessary to alleviate this constraint and to fully harness the benefits of the other capital improvement projects currently in planning or already implemented by the ARTC in the Hunter Valley.

The consequences of not proceeding with the Proposal would be significant in the short, medium and long term with regard to the capacity of the rail corridor and the impact on export coal volumes able to be delivered to the Port of Newcastle. This would result in declining State and Federal revenues and more congestion and delays to freight and passenger traffic using the Main North Line.

The Proposal would improve operational flexibility as well as providing the increased corridor capacity on Nundah Bank.

## 10.2. Proposal justification having regard to the EP&A Act

Further justification for the Proposal, in relation to the objects of the EP&A Act, ESD consideration and a balance considered of the likely short and long term impacts and benefits of the Proposal is outlined in the following sections. Consideration of the objects of the EP&A Act is presented in Table 10.1a.

**Table 10.1a Objects of the EP&A Act and relevance to the Proposal**

| Objective | Comment |
|---|---|
| (a) (i) To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment. | The Proposal would facilitate the extraction of minerals in the Hunter Valley, particularly coal, by improving the efficiency of the freight transportation system. The option selection process and the development of the concept design have incorporated environmental inputs and sought to reduce environmental and social impacts.<br>Impacts of the Proposal on native vegetation and adjacent land uses have been reduced by locating the Proposal adjacent to the existing rail line which adheres to best practice planning principles.<br>The Proposal would not result in the sterilisation of mineral resources and would contribute to maintaining the strength of the State and Federal economies. There would also be a local boost in revenue resulting from employment, goods and services during the construction period. |
| (a) (ii) To encourage the promotion and coordination of the orderly and economic use and development of land. | The Proposal would contribute to a significant increase in the capacity of the Upper Hunter Valley rail network and in doing so contribute to the continued growth and economic development of resources in the region. |
| (a) (iii) To encourage the protection, provision and coordination of communication and utility services. | Existing utilities and services in the area would be identified and protected during the construction phase. A Hazard and Risk Management Sub Plan would deal with accidental disruption to services as well as other matters. The provision of utilities would not change as a result of the operation of the Proposal. |

| Objective | Comment |
|---|---|
| (a) (iv) To encourage the provision of land for public purposes. | The Proposal would not directly result in the provision of land for public purposes however a part benefit of the Proposal would accrue to the travelling public who use the passenger rail service to Scone and Newcastle via less delays and congestion. |
| (a) (v) To encourage the provision and coordination of community services and facilities. | The Proposal would not impact on the provision of existing community services and facilities. |
| (a) (vi) To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats. | This Environmental Assessment requires the development and inclusion of environmental management and mitigation measures to minimise and avoid potential impacts on native flora and fauna. Biodiversity issues were addressed routinely at key stages of Proposal development and a specialist ecology report was prepared as part of the Environmental Assessment. Measures to minimise and avoid potential impacts on threatened species, populations and ecological communities and their habitats have been considered and a biodiversity offset proposed to mitigate residual effects. |
| (a) (vii) To encourage ecologically sustainable development. | Section 10.2 summarises how the principles of ecologically sustainable development were considered during the options assessment, design and environmental assessment phases of the Proposal. |
| (a) (viii) To encourage the provision and maintenance of affordable housing. | The Proposal is for the development of rail infrastructure and would not have an impact on the provision or maintenance of affordable housing. |
| (b) To promote the sharing of responsibility for environmental planning between the different levels of government in the State. | The Proposal is to be assessed under Part 3A of the EP&A Act. The NSW Minister for Planning determines Part 3A project applications.<br>Input into the DGRs was obtained from relevant NSW Government departments and agencies at the time of the lodgement of the Project Application and prior to exhibition.<br>The ARTC consulted Singleton Council during the preparation of this Environmental Assessment (refer to Section 5).<br>Consultation with different levels of government would be ongoing throughout future phases of the Proposal. |
| (c) To provide increased opportunity for public involvement and participation in environmental planning and assessment. | The ARTC has undertaken a range of consultation activities to inform and receive feedback from the public and affected landowners during the environmental assessment phase of the Proposal. Further detail on this consultation is provided in Section 5.<br>The Environmental Assessment would be placed on public exhibition by the NSW Department of Planning for a minimum of 30 days. In accordance with the requirements of the EP&A Act, stakeholders and the public would be invited to make submissions. This process provides further opportunity for public involvement and participation in the assessment of the Proposal. |

## 10.3. Principles of ecologically sustainable development

Ecologically sustainable development (ESD) requires the effective integration of economic, social and environmental considerations in the decision making process and can be achieved through consideration of the following four principles:

- The precautionary principle;
- Inter-generational equity;
- Conservation of biological diversity and ecological integrity; and
- Improved valuation, pricing and incentive mechanisms.

The principles of ESD have been an integral consideration during the options development and environmental assessment of the Proposal. The ARTC is committed to delivering the Proposal in an environmentally responsible manner and managing or eliminating any risks that may lead to an adverse effect on the environment. Details of how the principles of ESD have been incorporated into the Proposal are provided in Table 10.1b.

**Table 10.1b Incorporation of ESD principles into the Proposal**

| Ecologically sustainable development principle | Comment |
|---|---|
| Precautionary principle | The precautionary principle has been applied throughout the development of the Proposal. From option assessment through to concept design development and Environmental Assessment, the precautionary principle has been applied.<br>A number of specialists were engaged to undertake assessments and evaluate the key environment risks associated with the Proposal and to identify mitigation measures to reduce potential environmental impacts.<br>An environmental risk analysis was also undertaken as part of the environmental assessment (refer Section 6).<br>Furthermore, a corridor assessment of the „worst case' impacts has been conducted and it is likely that through ongoing concept and detailed design, that the identified impacts would be further reduced. |
| Inter-generational equity | Issues that have a potential long term impact, such as waste disposal, greenhouse gas emissions and vegetation clearing have been considered in detail during the environmental assessment of the Proposal and mitigation measures to reduce these impacts have been proposed. Principal among these is the proposed biodiversity offset for the Proposal which would also offset potential GHG emissions during construction and operation.<br>The Proposal has been developed to anticipate the needs of future generations, by developing and improving infrastructure for the coal industry and in turn, the economic conditions in the Upper Hunter Valley and beyond.<br>Additionally, measures have been formulated to minimise potential impacts on existing land uses and potential future land use activities. These measures would assist in achieving the principle of intergenerational equity. |
| Conservation of biological diversity and ecological integrity | A key objective of the Proposal is to minimise the adverse impacts to biological diversity and ecological integrity. Where potential impacts have been identified, mitigation measures have been developed to reduce the scale and intensity of the impacts.<br>The option assessment process and the development of the concept design have sought to minimise disturbance to native vegetation and habitat where feasible. This includes minimising impacts to native fauna species, and therefore maintaining biological diversity.<br>A range of mitigation measures to minimise the potential impact on environmental aspects, including ecology, noise, air quality, water and waste, would play a role in conserving ecological integrity. The proposed biodiversity offset would reduce the residual impacts of the Proposal on biodiversity values. |
| Improved valuation and pricing of environmental resources. | Environmental issues have been considered throughout the strategic planning and consideration of options for the Proposal. The value placed on the environment is evident in the extent of planning and environmental investigations and the ARTC's commitment to implement mitigation measures (refer Section 9.1). Further development of these measures would be undertaken prior to construction and the cost of the works ins inclusive of the specified environmental mitigation and management measures. |

## 10.4. Key benefits and impacts of the Proposal

If approved, the Proposal would maintain the economic prosperity of the region primarily through the continued employment of the 13,000 Australians employed directly or indirectly by the mining industry. As well, the strength of the State and National economies would be preserved. There would also be local employment opportunities and for goods and services supporting the Proposal. There would also be an improvement in operational flexibility which would benefit both freight and general passenger services.

Along with these benefits, the Proposal, if approved, would result in a number of adverse impacts including:

- Clearance of 37 hectares of native vegetation and associated loss of fauna habitat;
- Acquisition of 19 hectares of private land from adjacent landowners;
- Potential sedimentation of waterways during drainage works and earthworks;
- Increased emissions of greenhouse gases during both construction and operation;
- Changes to social amenity particularly during construction and associated with the spoil haulage operation and 24 hour works during track possessions.

A range of management and mitigation measures would be undertaken to avoid or reduce the severity of these impacts. A draft Statement of Commitments has been proposed which, following approval, would guide subsequent stages of project development to further reduce impacts on the environment and the community.

## 10.5. Conclusion

This Environmental Assessment has been prepared in accordance with Part 3A of the *Environmental Planning and Assessment Act 1979*. In particular, it addresses each of the issues raised by the Director-General of the NSW Department of Planning (refer Appendix A). The Environmental Assessment also includes consideration of issues raised by the community and stakeholders during development of the Proposal and completion of this environmental assessment.

This Environmental Assessment has confirmed the Proposal has a strong economic and social justification, considering the significant regional transport and economic benefits it would provide for freight, existing business and communities within the Upper Hunter Valley and to State and Federal revenue. The Proposal would contribute to the ARTC's aim of ensuring rail corridor capacity in the Upper Hunter Valley stays ahead of the expected rapid growth in coal production exported through the Port of Newcastle.

Some adverse impacts would also result due to the nature of the Proposal. Disturbance from construction noise, heritage and traffic impacts may occur, particularly during the Proposal's construction. These are however expected to reduce once the Proposal becomes operational.

Various measures and commitments would be implemented to avoid and/ or manage the identified impacts associated with the Proposal's construction and operation. These are reflected in the draft Statement of Commitments presented in Section 9.1 and would be incorporated into the PCEMP and various sub plans to be approved prior to construction commencement.

Provided the measures and commitments specified in this Environmental Assessment are adhered to during the project's construction and operation, the overall environmental impacts are considered to be manageable.

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URS, 2009, *Integra Open Cut Project: Biodiversity Assessment*

Waste Management Authority of NSW, 1990, *Waste Planning for Industry: A Guide*

# Appendix A

Director-General's Requirements for the Environmental Assessment

NSW GOVERNMENT | Planning

Contact: Lisa Chan
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Our ref: 10/07372

Mr Mick Nadalin
Senior Project Manager Hunter Valley Major Project
Australian Rail Track Corporation
Locked Bag 1
BROADMEADOW NSW 2292

Dear Mr Nadalin

**Director General's Requirements for the Environmental Assessment of the Proposed Nundah Bank Third Track Project (MP 10_0094)**

Reference is made to your correspondence dated 28 June 2010, requesting Director-General's requirements for the proposed Nundah Bank Third Track project.

I have attached a copy of the Director-General's requirements (DGRs) for the environmental assessment of the project. These requirements have been prepared following consultation with the relevant government agencies.

It should be noted that the Director-General's requirements have been prepared based on the information provided to date. Under section 75F(3) of the Act, the Director-General may alter or supplement these requirements if necessary and in light of any additional information that may be provided prior to the Proponent seeking approval for the Project.

I would appreciate it if you could contact the Department at least two weeks before you propose to submit the Environmental Assessment (EA) for the Project to determine:

- the fees applicable to the application;
- consultation and public exhibition arrangements that will apply;
- options available in publishing the EA via the Internet; and
- number and format (hard-copy or CD-ROM) of the EA that will be required.

Prior to exhibiting the EA, the Department will review the document to determine if it adequately addresses the DGRs. The Department may consult with other relevant government agencies in making this decision. If the Director-General considers that the EA does not adequately address the DGRs, the Director-General may require the Proponent to revise the EA to address the matters notified to the Proponent. Following this review period the EA will be made publicly available for a minimum period of 30 days.

If your proposal includes any actions that could have a significant impact on matters of National Environmental Significance, it will require an additional approval under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act). This approval would be in addition to any approvals required under NSW legislation and it is your responsibility to contact the Department of Environment, Water, Heritage and the Arts if an approval under the EPBC Act is required for your proposal (6274 1111 or http://www.environment.gov.au). If it is determined that an approval is required under the EPBC Act, please contact the Department immediately as supplementary Director-General's requirements will need to be issued.

If you have any enquiries about these requirements, please contact Ms Lisa Chan on (02) 9228 6226 or via email at lisa.chan@planning.nsw.gov.au.

Yours sincerely

27/7/10

Daniel Keary
**Director**
**Infrastructure Projects**
*As delegate for the Director-General*

# Director-General's Requirements

**Section 75F of the *Environmental Planning and Assessment Act 1979***

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| **Application** | MP 10_0094 |
| **Project** | **Nundah Bank Third Track Project**<br>The construction of approximately 4.26 km of new track and ancillary infrastructure to provide for a new Up side track in a parallel configuration to the existing Main Northern Railway line and vehicular maintenance access tracks on both sides of the new track. Associated works include:<br>• tracks, turn outs, return curves and changes to Camberwell Mine Rail Junction;<br>• major earthworks, track formation, drainage and minor structures;<br>• signalling system;<br>• modification to existing Rix's Creek mine haul road rail overbridge; and<br>• ancillary infrastructure. |
| **Location** | At Nundah Bank near Rix's Creek in the NSW Hunter Valley. Located between the towns of Singleton and Camberwell. |
| **Proponent** | Australian Rail Track Corporation |
| **Date issued** | 27 July 2010 |
| **Expiry date** | 27 July 2012 |
| **General requirements** | The Environmental Assessment (EA) must include the following:<br>1. an **executive summary**.<br>2. a **detailed description** of the project including:<br>▪ location, site description, corridor, adjoining land uses (current and proposed) and planning context;<br>▪ key design elements of the project, including:<br>o key operational components (track components, signalling systems etc);<br>o ancillary operational components (access tracks, bridging structures, vehicular access);<br>▪ public and private property and infrastructure interactions;<br>▪ operational characteristics, including predicted rail corridor capacity, rail traffic frequency and interactions with and opportunities for increased general freight and passenger trains;<br>▪ construction facilities and resources, including construction compounds, lay-down areas, spoil/fill quantities, stockpiling/ management areas and haul roads, and water use; and<br>▪ project staging and timing (if proposed).<br>3. an **assessment of the key issues**, with the following aspects addressed for each key issue (where relevant):<br>▪ the existing environment and its significance;<br>▪ planning, land use, development and licensing matters (including strategic and statutory matters);<br>▪ the potential impacts (direct, indirect and cumulative) of the project at both construction and operation stages, in accordance with relevant policies and guidelines, and how the project has been designed to minimise these impacts;<br>▪ description of measures to be implemented to avoid, minimise, manage, mitigate, offset and/or monitor the impacts of the project; and<br>▪ any residual impacts.<br>4. a **draft Statement of Commitments** incorporating or otherwise capturing measures to avoid, minimise, manage, mitigate, offset and/or monitor impacts identified in the impact assessment sections of the Environmental Assessment. The Statement of Commitments must clearly articulate the desired environmental outcome of the commitment. The Statement of Commitments must be achievable, measurable (with respect to compliance), and time-specific, where relevant.<br>5. **certification** by the author of the Environmental Assessment that the information contained in the Assessment is neither false nor misleading. |

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| **Key issues** | **Strategic Justification –** describe the strategic need, justification and objectives for the project, including its consistency with the aims and objectives of relevant State policies and publications, such as the *NSW State Plan*.<br><br>**Project Justification –** identify alternatives to the preferred project considered (including the alignment), and justify the project taking into consideration the objects of the *Environmental Planning and Assessment Act 1979.*<br><br>**General Construction Impacts –** the Environmental Assessment must assess the impacts of, and present a management framework for:<br>▪ site compounds and ancillary construction locations, with consideration given to:<br>o the identification and assessment of both primary and secondary site compounds and facilities (including waste and chemical storage) on the receiving environment; and<br>o a strategy for managing site compounds, with a particular focus placed on primary site compounds, and a broader, more generic approach developed for lower-risk activities;<br>▪ noise and vibration**,** with consideration given to:<br>o the intensity and duration of noise and vibration impacts from all activities and sources on and off site;<br>o the nature, sensitivity and impact to potentially affected receivers and structures,<br>o scheduling construction works having regard to the nature of construction activities (including transport, blasting and tonal or impulsive noise-generating works),<br>o a strategy for managing construction noise and vibration, with a particular focus placed on those activities identified as having the greatest potential for adverse noise or vibration impacts, and a broader, more generic approach developed for lower-risk activities; and<br>o the *Interim Construction Noise Guidelines* (DECC, 2009) and *Assessing Vibration: A Technical Guideline (DEC, 2006)*;<br>▪ transport and access, including a considered approach to minimising construction traffic impacts on public and private access. Consideration should be given to:<br>o construction traffic impacts, including spoil haulage, road network changes and potential disruption to the local and regional road network;<br>o rail traffic impacts; and<br>o a strategy for managing rail and road traffic impacts, with a particular focus placed on those activities identified as having the greatest potential for adverse traffic flow, access or safety implications, and a broader, more generic approach developed for day-to-day traffic management.<br>▪ earthworks, including a considered approach to minimising impacts associated with the excavation, movement, stockpiling, rehabilitation and disposal of spoil and fill, with consideration given to:<br>o soil characteristics, including acid sulphate soils and potential land contamination;<br>o quantification of bulk earthworks and spoil balance and disposal of excess spoil;<br>o erosion and sedimentation control measures at excavation, storage and placement locations to protect adjoining watercourses;<br>o air quality impacts on sensitive receivers, in particular cumulative impacts from adjacent mining operations; and<br>o a strategy for managing earthworks with a particular focus on those works that have the greatest potential to disturb soils that are contaminated, have a high erosion and run off hazard and adverse impacts on watercourses, and a broader, more generic approach developed for ongoing construction management.<br><br>**Heritage –** including but not limited to:<br>• Indigenous heritage, objects, places of significance, natural and landscape values of the site and surrounding area, taking into account the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005); and<br>• Non-Indigenous heritage, identification of items, archaeology and areas of heritage significance within, along or adjacent to the corridor or affected by construction activities (including the Middle Falbrook Road Bridge). This should include an analysis of the potential impacts to the values, settings and integrity of the items and archaeology, taking into account NSW Heritage Guidelines. |

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| | **Ecology** – including but not limited to:<br>▪ flora, fauna and habitat, with specific consideration of Endangered Ecological Communities, threatened flora, fauna and populations;<br>▪ vegetation clearing (and resultant foraging, roosting, habitat loss, fragmentation, connectivity and edge effects) and operational impacts (such as increase in rail movements); and<br>▪ consideration of: *the Draft Guidelines for Threatened Species Assessment* (DEC and DPI, 2005), *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC, 2004) and *Principles for the Use of Biodiversity Offsets in NSW* (DECCW, 2008).<br><br>**Air, Noise and Water –** including but not limited to:<br>▪ air, noise and vibration impacts along the corridor associated with rail operations and ongoing maintenance, including where relevant, specific consideration of impacts to sensitive receivers;<br>▪ surface and groundwater resources and infrastructure, including existing water quality management features; and<br>▪ consideration of: *Interim Guidelines for the Assessment of Noise from Rail Infrastructure Projects* (DECC/DoP, 2007), *Assessing Vibration: A Technical Guideline* (DEC, 2006), and *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2005).<br><br>**Transport and Land Use** - including but not limited to:<br>▪ interactions with the broader transport network, including passenger rail services and the road network;<br>▪ interactions with current and future land uses and resources (such as adjoining agricultural and mine development, sterilisation of mineral resources, and subsidence issues); and<br>▪ land use impacts on affected and surrounding properties and development, including acquisition, severance, access, business viability, property infrastructure impacts and mineral resources exploration. |
| **Environmental Risk Analysis** | Notwithstanding the above key assessment requirements, the Environmental Assessment must include an environmental risk analysis to identify potential environmental impacts associated with the project (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental risk analysis, an appropriately detailed impact assessment of this additional key environmental impact must be included in the Environmental Assessment. |
| **Consultation** | The Environmental Assessment must demonstrate that an appropriate and justified level of consultation with relevant stakeholders occurred during the preparation of the Environmental Assessment including (but not limited to):<br>▪ local, State or Commonwealth government authorities including:<br>o Department of Planning (Heritage Branch);<br>o Department of Environment, Climate Change and Water (including the NSW Office of Water);<br>o NSW Department of Industry and Investment;<br>o Transport NSW;<br>o NSW Mine Subsidence Board;<br>o Singleton Shire Council;<br>▪ service and infrastructure providers including:<br>o NSW Roads and Traffic Authority;<br>o RailCorp;<br>o Country Rail Infrastructure Authority;<br>▪ specialist interest groups including Local Aboriginal Land Councils and minerals related stakeholders; and<br>▪ the public, including adjoining and affected landowners and businesses (eg Integra Coal and Rix's Creek mines).<br><br>The Environmental Assessment must describe the consultation process undertaken and identify the issues raised (including where these have been addressed in the document). |