

NUNDAH BANK THIRD TRACK ENVIRONMENTAL ASSESSMENT

VOLUME 1 MAIN DOCUMENT



Nundah Bank Third Track

Environmental Assessment

Prepared for:

Australian Rail Track Corporation

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On behalf of the Upper Hunter Valley Alliance (UHVA).

Document Control Log

Revision No.	Amendment	Date	Prepared By	Checked By	Approved By
Rev A	Draft for ARTC	28 Oct 2010	GJM/CB/MT/ SP/NLB/JA	EvdH GJM/JA	GJM
Rev B	Incorporating changes from UHVA and ARTC	23 Dec 2010	GJM/NLB/CB/ MT/JK	GJM	GJM
Rev C	Amendments following DoP adequacy review	23 Feb 2010	GJM/NLB/ EvdH/ST	GJM	GJM
Rev D	Amendments following DoP adequacy review	11 March 2011	NLB	GJM	GJM

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Volume 2 Technical Paper

Technical Paper	1	Indigenous heritage
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Volume 3 Technical Papers

Technical Paper	2	Ecology
	3	Noise and vibration
	4	Traffic and transport
	5	Non-Indigenous heritage

Certification

Submission of Environmental Assessment

Prepared under Part 3A of the Environmental Planning and Assessment Act, 1979

Environmental Assessment prepared by:

Name:	Greg Marshall
Qualifications:	BE (Civil)
Address:	KMH Environmental Level 12, South Tower 1-5 Railway Street Chatswood NSW 2067
In respect of:	Nundah Bank Third Track
Applicant name:	Australian Rail Track Corporation
Applicant address:	Locked Bag 1, Broadmeadow NSW 2292
Proposed development:	Construction, operation and maintenance of approximately 4 kilometres of new third track and ancillary infrastructure at Nundah Bank between the towns of Singleton and Camberwell (refer Section 4 for detailed description of the proposed development).
Land to be developed:	Land generally required for the design refinement, construction, operation and maintenance of the proposed development including existing rail corridor and adjacent privately-owned land (refer Figures 4.1a-f).
Environmental Assessment	An environmental assessment is attached, which addresses all matters in accordance with Part 3A of the <i>Environmental Planning and Assessment Act</i> , 1979.
Declaration	I certify that I have prepared the contents of this environmental assessment in accordance with the Director-General's Requirements (DGRs) dated 27 July 2010 and that to the best of my knowledge, the information contained within this environmental assessment is not false or misleading.
Signature:	
Name:	Greg Marshall
Date:	

Glossary and Abbreviations

ABS	Australian Bureau of Statistics
AECMP	Alliance Environmental Construction Management Plan
AEP	Annual exceedence probability
AHD	Australian Height Datum
ARTC	Australian Rail Track Corporation
AS	Australian Standard
ASS	Acid Sulfate Soils
Ballast regulation	An activity or process which results in the ballast under the railway tracks becoming more durable
Rail loop	A loop that allows a rail vehicle or train to reverse direction without having to shunt or stop
Batters	The side slopes of cuttings or embankments
BS	British Standard
CLM Act	NSW Contaminated Land Management Act 1997
CMA	Catchment Management Authority
Concept design	Initial functional layout of a concept, such as for the proposed third track, to provide a level of understanding to later establish detailed parameters
Consent	Approval to undertake a development received from the consent authority
CRIA	Country Rail Infrastructure Authority
Crossover	Railway infrastructure which provides a train the ability to cross between two adjacent tracks
Cut	An excavation for constructing below the natural ground level
dB(A)	Decibels (A-weighted) - a unit of sound measurement which has its frequency characteristics modified by a filter (A-weighted) - so that it more closely approximates the frequency response of the human ear
DECC	NSW Department of Environment and Climate Change (as of 27 July 2009, now titled DECCW see below)
DECCW	NSW Department of Environment, Climate Change and Water (formerly DECC prior to 27 July 2009)
DGRs	Director-General's Requirements for the Environmental Assessment
DoP	NSW Department of Planning
Down main	In a situation with more than one rail track in the rail corridor, the Down main is the side of the track on which trains travel when they are heading away from Sydney and is usually positioned on the right when facing towards Sydney
Down side	The side of the track on which trains travel away from Sydney. For this project, the down side of the existing tracks is on the western side of the alignment
EA	Environmental Assessment of the Nundah Bank Third Track (this document)
EEC	Endangered ecological community
EPA	NSW Environment Protection Authority (as of 23 September 2003, now DECCW)
EP&A Act	NSW Environmental Planning & Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EPL	Environment protection licence
ESD	Ecologically sustainable development
Fill	Earth used to construct an embankment or raise the existing level of the ground

Formation	The ground beneath the ballast on which the rail track sits
Headways	The headway is the closest spacing between the front of two following trains travelling in the same direction, so that the second train can safely maintain the same speed as the first train
I & I	Industry and Investment NSW
ICNG	Interim Construction Noise Guideline
IGANRIP	Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects
L _{Aeq}	The average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound over the same measurement period
L _{Aeq} (15min)	Equivalent sound pressure level: The steady sound level that, over a specified 15 minutes, would produce the same energy equivalence as the fluctuation sound level actually occurring
L _{Aeq} (9hr)	The L _{Aeq} noise level for the period 22:00 to 7:00 hours
L _{Aeq} (15hr)	The L _{Aeq} noise level of the period 7:00 to 22:00 hours
LA _{max}	The maximum noise level registered during train passby with the sound level meter set to fast response
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
Level crossing	A crossing provided at ground level across the railway corridor
LGA	Local Government Area
LoS	Level of Service – A qualitative measure describing operational conditions within a road traffic stream, and their perception by motorists and/or passengers
mtpa	Million tonnes per annum
NES matters	Matters of national environmental significance, which are referred to in Part 3 Division 1 of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999
NPI	National Pollutant Inventory
NPW ACT	NSW National Parks and Wildlife Act 1974
NPWS	NSW National Parks and Wildlife Service
NSW	New South Wales
Overbridge	A road crossing where the road passes over the railway line
Oviform	Cross section in the shape of an oval
PASS	Potential Acid Sulfate Soil
PCEMP	Project Construction Environmental Management Plan. A document setting out the management, control and monitoring measures to be implemented during construction of a development, to avoid or minimise the potential environmental impacts identified during an environmental impact assessment process
POEO Act	NSW Protection of the Environment Operations Act 1997
REP	Regional Environmental Plan
Rip-rap	Rocks or other materials used to prevent erosion
RTA	NSW Roads and Traffic Authority
SEPP	State Environmental Planning Policy
SHEWMS	Safety, Health and Environment Work Method Statement
Site compound	Area enclosing construction machinery, materials and site offices usually adjacent to construction sites
SoC	Statement of Commitments
Spoil	Excess rock and/or earth material resulting from excavation activities
The Strategy	The 2009-2018 Hunter Valley Corridor Capacity Strategy 2009

TMP	Traffic Management Plan
Track possession	The period of time where trains cease operation and works on the track can be undertaken continuously, e.g., over a 48 hour period
TSC Act	NSW Threatened Species Conservation Act 1995
Turnout	A rail track component that connects two railway tracks. The turnout comprises a length of straight track and a section of curved track that joins the straight track. The curved track includes a moveable section of track. The moveable section is adjusted to allow a train to travel from the curved track to the straight track
Up main	In a situation with more than one rail track in the rail corridor, the Up main is the primary (main) rail line that trains usually traverse when they are heading toward Sydney and is usually positioned on the left when facing towards Sydney
Up relief	Secondary rail line that runs parallel with the main line(s) that trains usually traverse when they are heading toward Sydney and is usually positioned on the left of the Up Main line when facing towards Sydney. The Up Relief usually provides a passing facility enabling trains to pass those traversing or stationary on the main line thus giving relief to the main line operators/users
Up side	The side of the track on which trains travel to Sydney. For this Proposal, the up side is on the eastern side of the alignment
WARR Act	NSW Waste Avoidance and Resource Recovery Act 2001
WM Act	NSW Water Management Act 2000

Executive summary

This section presents a summary of the Environmental Assessment for the Nundah Bank Third Track. It should be read in conjunction with the Environmental Assessment report Volumes 1, 2 and 3.

What is proposed?

The Australian Rail Track Corporation (ARTC) is seeking planning approval to construct, operate and maintain an approximately 4 kilometre section of a new third track and ancillary infrastructure adjacent to existing tracks on the Main North Line between the towns of Singleton and Camberwell in the NSW Hunter Valley (the Proposal).

Key features of the Proposal shown in Figures A-E and described in Section 4 include:

- Provision of new maintenance vehicle access tracks on both sides of the rail corridor;
- Relocation and installation of signalling infrastructure;
- Removal and extension of existing track drainage structures;
- Permanent acquisition of approximately 20.6 hectares of land from three landowners resulting in a subsequent change in use of that land;
- Changes to the configuration of the Camberwell rail loop;
- Establishment of construction facilities including site compounds, accessways and ancillary facilities; and
- Establishment of a biodiversity offset to compensate for the residual effects of vegetation clearing resulting from the Proposal.

The Proposal would cost approximately \$44 million dollars (2010 prices) and be fully funded by the ARTC. Subject to planning approval, construction would commence in mid-2011 and be operational by 2013.

Why is it needed?

Coal is Australia's largest export commodity and contributes significantly to State and Federal revenue. In 2008-09, over 91 million tonnes of coal was exported from the Port of Newcastle; making it the world's largest exporting coal port.

The Hunter Valley rail network plays a crucial role in transporting passengers and freight from Muswellbrook to Newcastle. Key among these is coal freight destined for overseas markets. Current industry forecasts indicate that an export coal volume of 191 million tonnes is required from the Port of Newcastle in 2018. To achieve this volume, train headways south of Whittingham Junction will need to be reduced to around eight minutes. 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. One of these is the section of track at Nundah Bank where current headways are approximately 16.5 minutes.

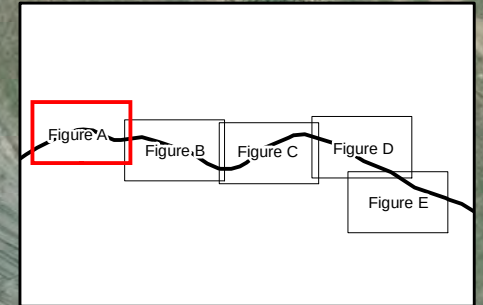
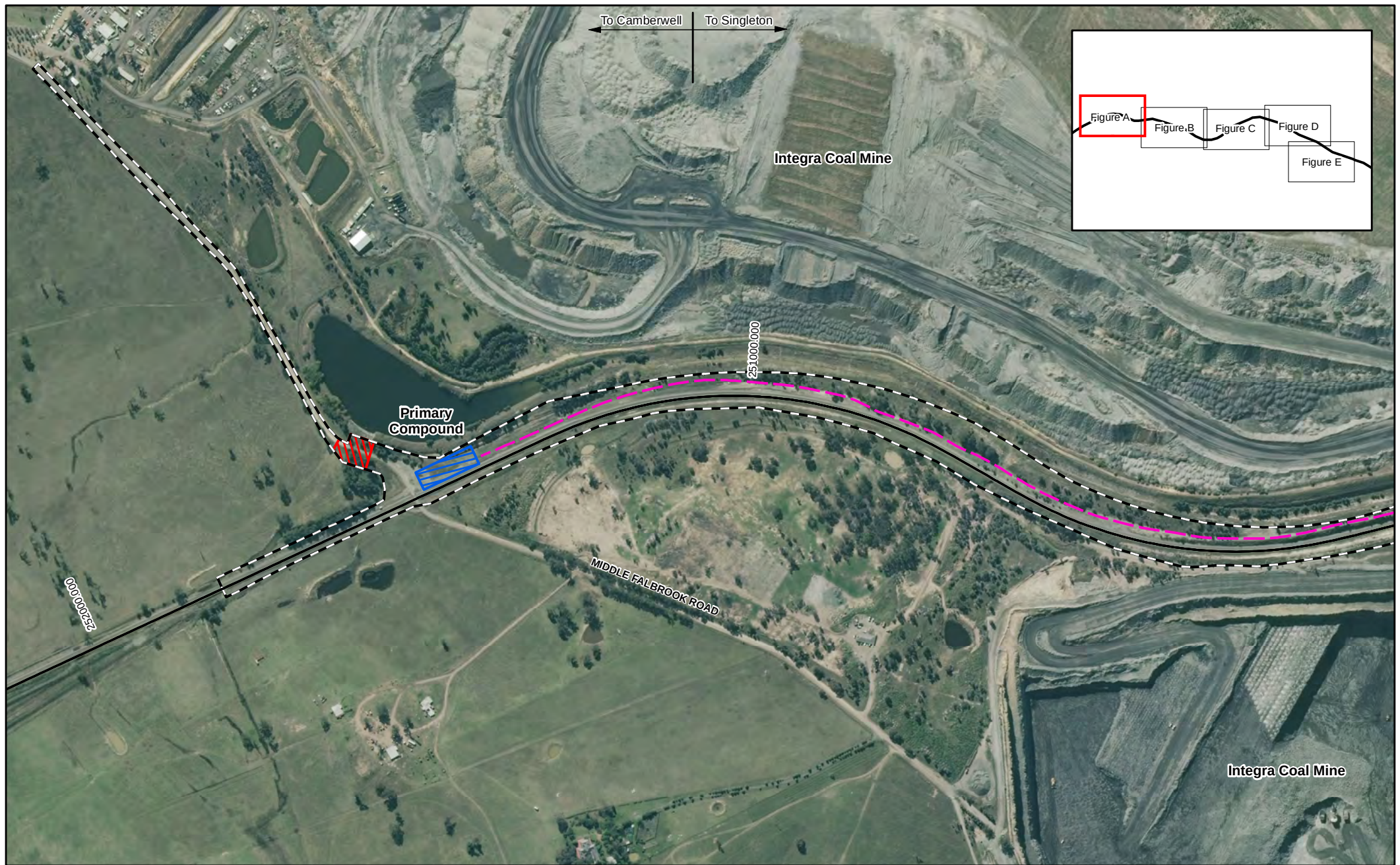
Without intervention by the ARTC, the headway of trains travelling up Nundah Bank will jeopardise the performance of the Hunter Valley rail network and constrain the efficient delivery of coal exports to the port by the third quarter of 2012. The reduction of headways on Nundah Bank is therefore necessary to alleviate this constraint and to fully harness the benefits of the other capital improvement projects currently in planning and already implemented by the ARTC in the Hunter Valley.

How does the Proposal satisfy this need?

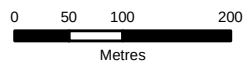
The Proposal would increase the operational capacity of the rail corridor at Nundah Bank and improve the efficiency and flexibility of train operations in this area.

A new third track would allow two trains to be on the bank at the same time on separate tracks without the risk of one train needing to come to a halt because of the other. If a train were to stall on Nundah Bank, the third track would allow continued operation on the other track thereby providing greater operational flexibility to recover from a disruption.

The Proposal is also consistent with a number of key priorities outlined the NSW State Plan (NSW Government, 2006). Specifically, these include increased business investment (Priority P1), investing in infrastructure (Priority P2) and increased business investment in rural and regional NSW (Priority P6).



A4 Original



GDA 1994 MGA Zone 56



Culvert	Middle Falbrook Road Bridge	Dam to be Modified
Access Tracks	Compound	Sediment Dam
Third Track Alignment	Stockpile	Proposed Impact Area
Existing Alignment	Turnout	

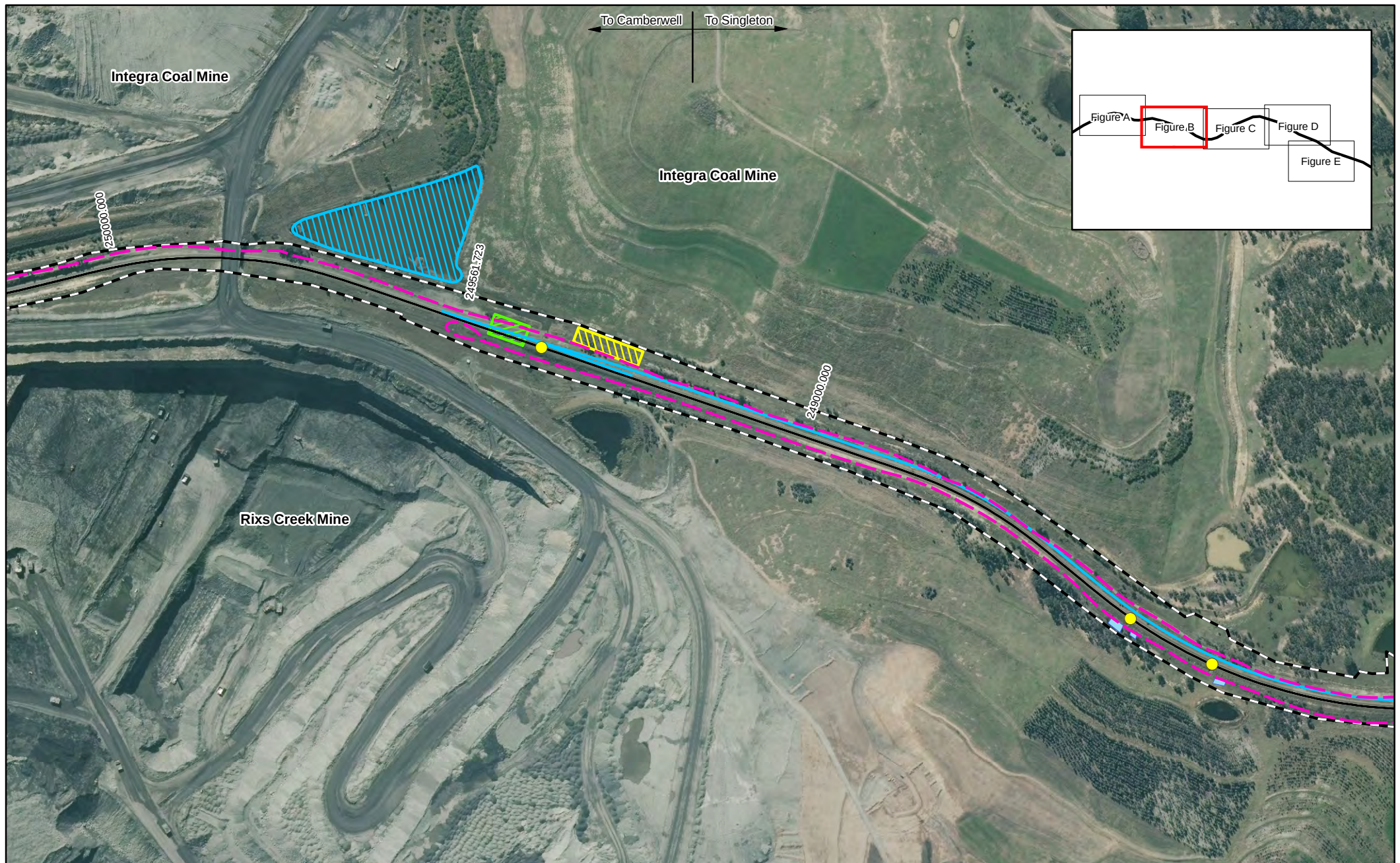


ARTC
Nundah Bank

Job Number	2110501B
Revision	A2
Date	16.02.11
Scale	1:7,000

Key Project Features

Figure A



A4 Original

0 50 100 200

Metres

GDA 1994 MGA Zone 56



Culvert

Access Tracks

Third Track Alignment

Existing Alignment



Middle Falbrook Road Bridge

Compound

Stockpile

Turnout



Dam to be Modified

Sediment Dam

Proposed Impact Area

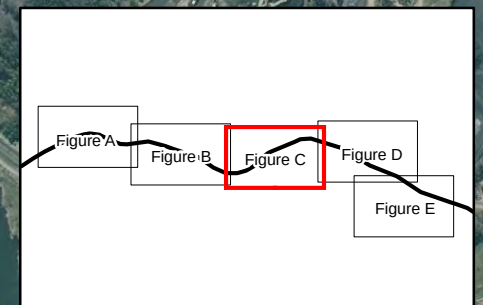
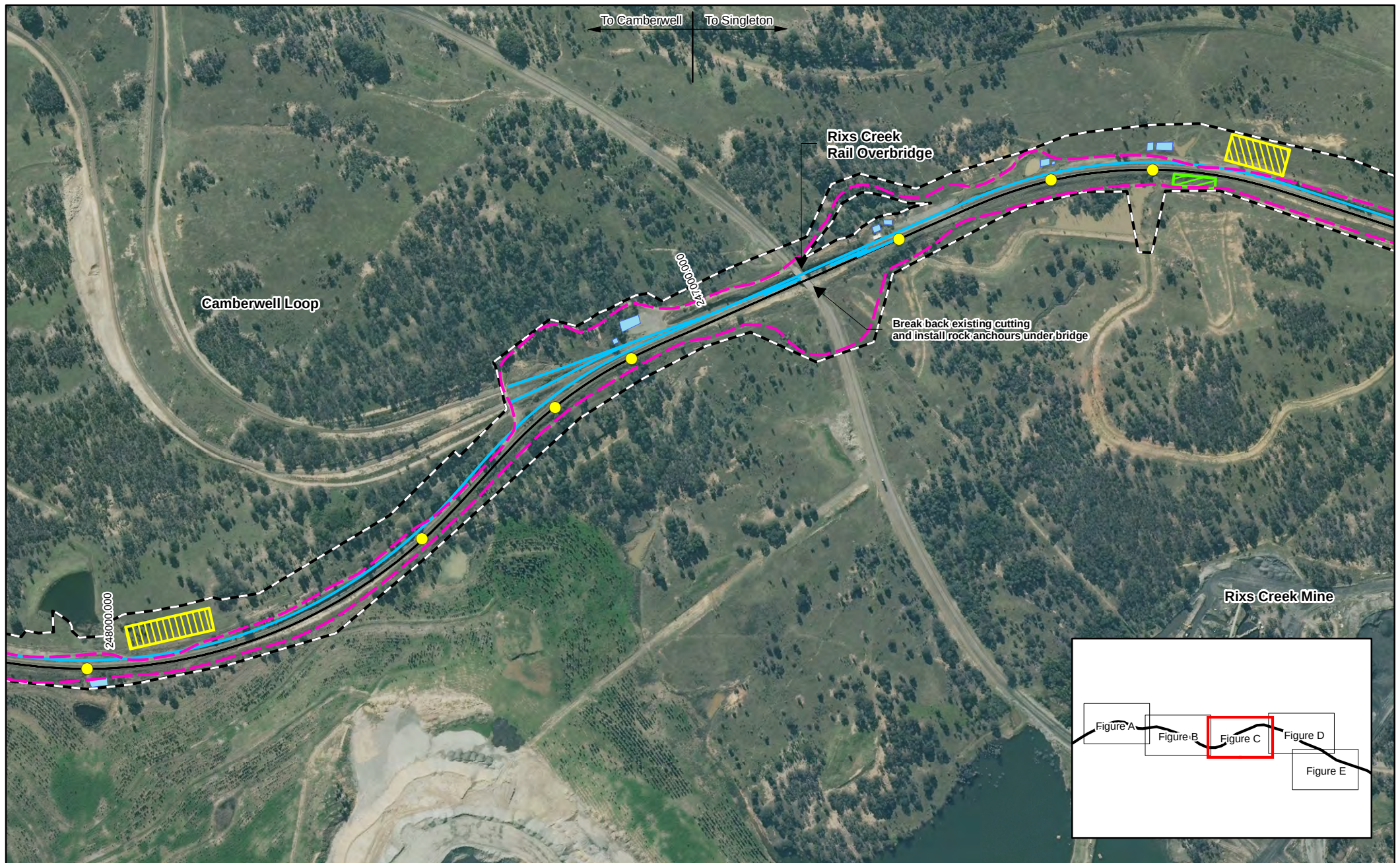


ARTC
Nundah Bank

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

Key Project Features

Figure B



A4 Original

0 50 100 200
Metres
GDA 1994 MGA Zone 56



- | | | |
|-----------------------|-----------------------------|----------------------|
| Culvert | Middle Falbrook Road Bridge | Dam to be Modified |
| Access Tracks | Compound | Sediment Dam |
| Third Track Alignment | Stockpile | Proposed Impact Area |
| Existing Alignment | Turnout | |

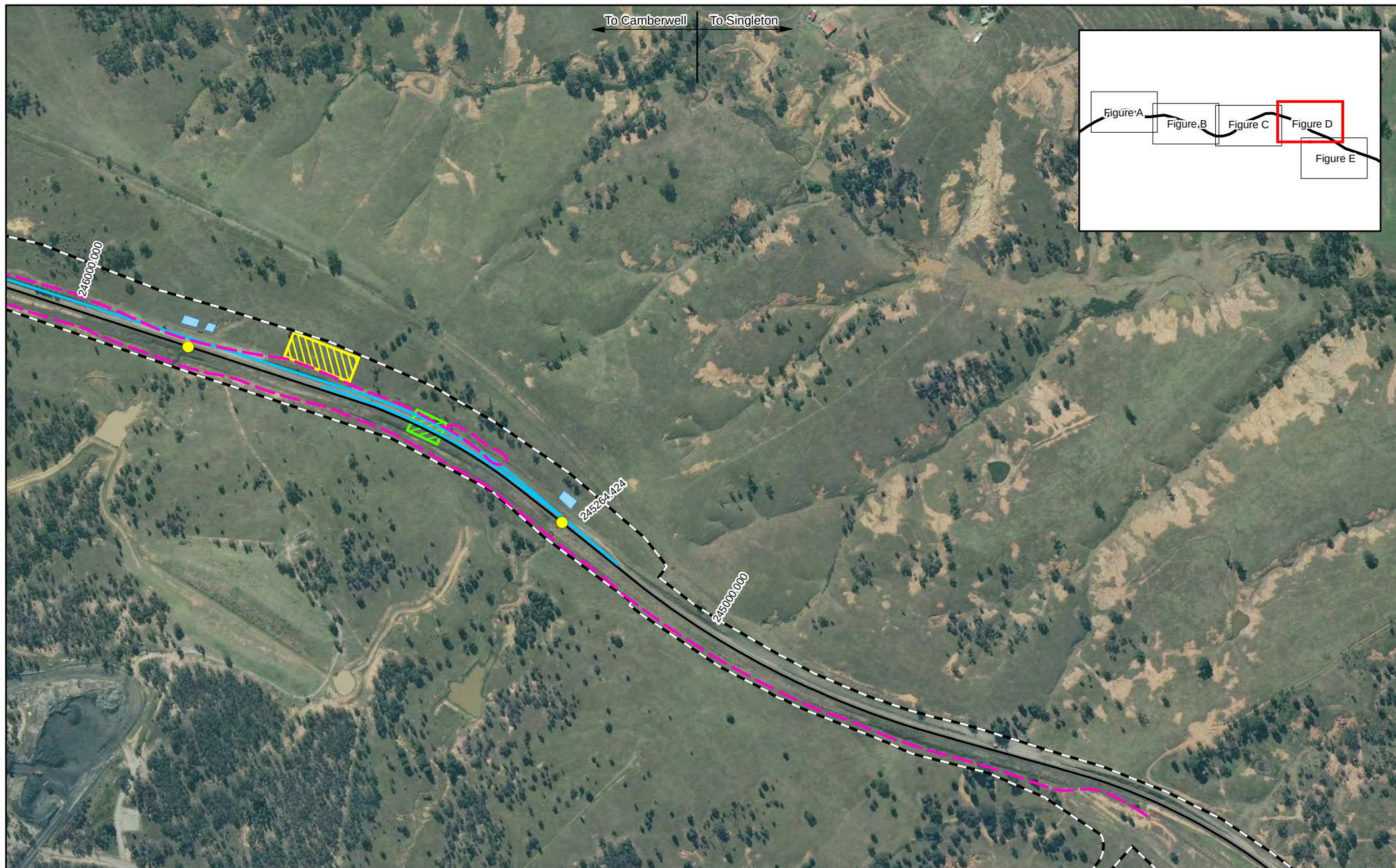


ARTC
Nundah Bank

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

Key Project Features

Figure C



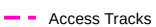
A4 Original

0 50 100 200
Metres

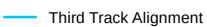
GDA 1994 MGA Zone 56



Culvert



Access Tracks



Third Track Alignment



Existing Alignment



Middle Falbrook Road Bridge



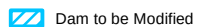
Compound



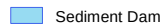
Stockpile



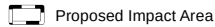
Turnout



Dam to be Modified



Sediment Dam



Proposed Impact Area

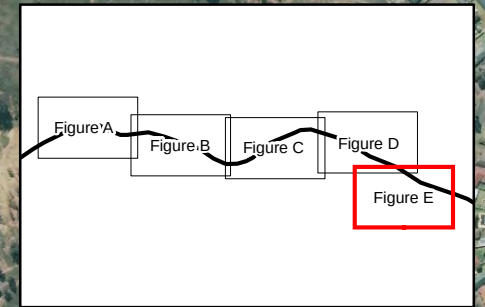


ARTC
Nundah Bank

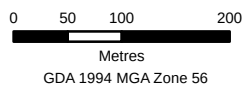
Job Number	2110501B
Revision	A1
Date	15.02.11
Scale	1:7,000

Key Project Features

Figure D



A4 Original



Culvert	Middle Falbrook Road Bridge	Dam to be Modified
Access Tracks	Compound	Sediment Dam
Third Track Alignment	Stockpile	Proposed Impact Area
Existing Alignment	Turnout	



ARTC
Nundah Bank

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

Key Project Features

Figure E

What alternatives were considered?

There were two main alternatives considered in addition to the 'do nothing' alternative. They were:

- Resignalling of the current track for loaded trains; and
- Implementation of an additional third track.

Reducing headways would be achieved by both alternatives providing an increase in rail capacity, although the amount of capacity would vary between the two alternatives as well as other inherent differences and risks.

Operational modelling showed that resignalling of the existing up main at Nundah Bank would not provide the desired level of capacity to ensure delivery of 191 million tonnes per annum to the Port of Newcastle in 2018. Additionally, this alternative would not provide any additional operational efficiency or flexibility than the current two track configuration.

Development and consideration of options therefore focussed on the third track alternative and the following primary design considerations:

- Location of the third track on either the up or down side of the existing tracks;
- Achievement of 8 or 10 minute headways by providing either a 'long' or 'short' third track respectively; and
- Providing the third track either at grade following existing topography or grade-eased with a maximum of 1:100 grade.

What criteria were used and how were the options evaluated?

Some 18 feasible third track options (refer Section 3.2) were considered to provide the required freight volumes to the Port of Newcastle in 2018. The re-signalling alternative was also reviewed to confirm whether under reduced freight volume conditions, it might provide a more cost-effective solution than the third track.

The options were considered using a combination of qualitative and quantitative criteria across economic, social and environmental parameters. A number of technical reports were completed regarding operational, economic, engineering design and environmental considerations before four options were shortlisted for more detailed evaluation.

All available information concerning these four options was collated and a workshop held in April 2010 comprising the Upper Hunter Valley Alliance (UHVA) design, construction and environmental personnel as well as the ARTC maintenance and operations representatives. The options were ranked initially on non-price performance before price was introduced. The workshop outcomes were presented and ratified by the ARTC Board in May 2010.

What consultation was conducted?

A stakeholder and community involvement plan was developed and implemented for the Proposal. The plan included a variety of consultation and communication tools including:

- A letter regarding the Proposal including a map of key features issued to a number of key project stakeholders and state and federal government agencies.
- Meetings and discussions with DECCW, Singleton Council, Rixs Creek Mine and Integra Coal.
- A letterbox drop and door-knocking of all residents along Bridgman Road, Middle Falbrook Road and Rixs Creek Lane.
- Consultation with the Aboriginal community in accordance with DWECC's *Aboriginal cultural heritage consultation requirements for proponents*, 2010.

In response to this consultation, letters were received from the Department of Planning (Heritage Branch), the Mine Subsidence Board, the Roads and Traffic Authority, the Wanaruah LALC, Gidawaa Walang Cultural Heritage Consultancy, Cacatua Aboriginal Group, Rixs Creek Mine and Integra Coal. Approximately 10 face to face meetings were held with landowners. The following issues were raised during this consultation and have been addressed in the preparation of the EA:

- Potential impacts to Middle Falbrook Bridge listed on the State Heritage Register;
- Interactions between adjoining mine developments and the Proposal, including access and sterilisation of mineral resources, and possible mine subsidence issues;
- The methodology for the air quality assessment;
- Commitment and details regarding the proposed biodiversity offset;

- The requirement to undertake a greenhouse gas emissions assessment;
- Increased rail noise experienced by residents of Singleton Heights;
- The upgrading of Singleton Council's bridge over Station Creek to support construction traffic;
- The impact of construction traffic on Bridgman Road; and
- Mitigation measures during construction for dust control in Rixs Creek Lane.

Comments were received from the Wanaruah LALC, Gidawaa Walang Cultural Heritage Consultancy and Cacatua Culture Consultants that are supportive of the assessment and recommendations of the Indigenous heritage assessment (Volume 2, Technical Paper 1). Support for the Proposal was also expressed by Rixs Creek Mine and Integra Coal.

What are the reasons for selecting the preferred option?

The preferred option, an approximately 4 kilometre at grade third track on the up side of the rail corridor was selected as the preferred option based on:

- Achievement of all the project objectives at a lower capital cost;
- Reduced scope of civil, signalling and earthworks and overall less complexity relative to other options;
- Reduced environmental and social impacts relative to Options 12 and 16; and
- It provides a brand new up main and up relief track, which can be extended in the future if required, for only a slightly greater cost than the cheapest option (Option 10).

A number of other project design and construction options were considered as part of the ongoing design development conducted in parallel with the Environmental Assessment. These included:

- Locations of site accessways;
- Details of the alterations to Camberwell Rail Loop;
- Provision/ location of turnout laydown areas/ maintenance pads;
- Site compound locations; and
- The elevation of maintenance vehicle access tracks.

What would be the 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.

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

- **Indigenous heritage** - Searches of the statutory and non-statutory registers returned nine results for listed Aboriginal sites under the AHIMS database that were located either within and/or in the immediate vicinity of the Proposal area (within 100m). These nine sites include items such as mudstone, chert, siltstone, silcrete and tuff artefacts. Field survey results identified 18 previously undocumented Aboriginal cultural heritage sites within and in the immediate vicinity of the Proposal area. These Aboriginal cultural heritage sites included nine stone artefact scatters and eight isolated stone artefacts.

All the sites within the Proposal area and in the immediate vicinity of the Proposal area were assessed as having low scientific significance.

Mitigation measures to reduce the potential for impact on the identified sites and cater for any unexpected finds would include continuing consultation with registered Aboriginal parties, development of a Cultural Heritage Management Sub Plan and establishment of exclusion zones around all identified sites within the Proposal area.

Further archaeological work may be required where impacts to Aboriginal cultural heritage sites within the Proposal area are unavoidable.

- **Ecology** - The proposal would result in the removal of approximately 22.12 hectares of native vegetation, including approximately 8.75 hectares of Central Hunter Ironbark - Spotted Gum – Grey Box Forest, which is listed as a Threatened ecological community under the TSC Act. Significance assessments were conducted and concluded that the proposal was unlikely to have a significant impact on these species due to the small potential habitat likely to be affected, its disturbed and

fragmented nature. No Endangered Population listed under the TSC Act and/or the EPBC Act was identified or was considered likely to occur in the study area.

No Threatened ecological community listed under the EPBC Act was recorded in the study area.

A Flora and Fauna Management Sub Plan would be prepared and detailed measures to avoid or reduce impacts on vegetation and habitat loss, weeds, fauna mortality, fragmentation and connectivity and aquatic disturbance would be developed and implemented.

A biodiversity offset to mitigate the residual impacts of the Proposal would be implemented.

- **Noise and vibration** – Daytime construction work would meet noise criteria. During a limited number of occasions e.g. track possessions, construction noise would exceed guidance levels although no sleep disturbance is expected. After the implementation of standard noise mitigation measures no residual impacts are expected.

The assessment indicates that the noise levels generated by the operating railway in 2018 would not exceed the relevant trigger levels in the IGANRIP guideline.

- **Air quality** - Dust would be generated by construction works particularly bulk earthworks and the movement of construction vehicles on unsealed roads. The assessment identified that construction dust levels generated by the Proposal would be minimal and much less than ambient levels from surrounding large-scale mining activities. Construction dust emissions are expected to be adequately controlled through the application of standard mitigation measures.
- **Surface and groundwater** - The Proposal would result in the upgrade of 12 drainage undercrossings however the drainage upgrade would not alter the runoff from the rail corridor or change existing surface water flows.

Due to the shallow nature of excavation, there is not expected to be any impact on aquifers or groundwater in the area. No licensed bores exist in the study area.

A Soil and Water Management Sub Plan would be implemented to control erosion and to reduce sediment entering waterways. Key activities potentially resulting in these impacts include access road construction, bulk earthworks, culvert upgrades and bridge works in Station Creek. Accidental fuel spills or leaks of chemicals would be addressed in a Hazard and Risk Management Sub Plan.

- **Transport and land use** - Construction traffic from workers and heavy vehicles associated with delivery of materials and the bulk haulage operation would access the site using a number of local and collector roads. Modelling indicated that construction traffic generated by the Proposal would result in no adverse affect on the capacity of the roads.

Approximately 20.6 hectares would be permanently acquired for the Proposal while an additional 2.7 hectares is required to be leased for construction. The surrounding land is owned by three landholders being Integra Coal and Rixs Creek mine and the predominant land use is open cut mining. The land to be acquired would result in a permanent change of use for that land from mining and agricultural uses and railway purposes.

There would be no impacts on existing or future land uses from the Proposal and the Proposal would not sterilise any high priority resources.

The Proposal is located on the eastern edge of the Patrick Plains Mine Subsidence District. Investigations undertaken during the EIA process (UHVA 2010g) have confirmed that there would be no effect on the Proposal due to mine subsidence (refer to Section 7.8). A request for approval of the Proposal has been made to the Mine Subsidence Board in November 2010.

- **Non-Indigenous heritage** - Five heritage items were identified within the study area. These include the earthen embankment, one drainage culvert, the former Rixs Creek station platform of the former Great Northern Railway, the Main North Line, and Station Creek Bridge on Middle Falbrook Road. All except the Main North Line were assessed as being of local significance. Mitigation measures include establishing exclusion zones around the former Rixs Creek station platform, a box culvert, old timber fence posts along the existing section of Rixs Creek Lane and replacing removed earth from the embankment of the former Great Northern Railway.

- **Earthworks** – Approximately 232,500 cubic metres of earthworks would be undertaken comprising site accesses, maintenance tracks and haul roads, and track foundation works. The potential for dispersive soils has been identified with further investigation required so that any such soils would be appropriately managed.

Potential risks associated with earthworks would include the management of the material and maintaining stability of existing embankments during excavation works; the 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 the management of drainage including culvert upgrades during construction.

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. 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).

- **Site compounds** – The Proposal would require the establishment and operation of 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 compounds is provided in Figures A and E.

The site compounds would only be required during the construction phase of the Proposal and therefore the potential environmental impacts associated with the compounds would be temporary. The key issues are expected to be traffic management and safety, noise impacts, air quality, waste management, resource efficiency and erosion and sedimentation resulting from water runoff.

A Site Compound and Ancillary Works Management Sub Plan would be developed to manage the potential impacts of the site compounds. A strategy for managing expected issues is also outlined in Section 9.2.4 and specific mitigation and management measures in Section 7.9.

A range of management and mitigation measures are recommended to avoid or reduce the severity of these impacts. A draft Statement of Commitments has been developed (refer Section 9.1) which, if approved, would guide subsequent stages of project development to further reduce impacts on the environment and community.

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 from expanding coal mines north and west of Singleton.

Provided that the mitigation measures and commitments outlined in this Environmental Assessment are adhered to and implemented during the construction and operational phases, the overall environmental impacts of the Proposal are considered to be manageable.

How can I comment on the Proposal or the Environmental Assessment?

Comments on any aspect of the Proposal or this Environmental Assessment can be made by making a written submission during the exhibition period of this document.

Submissions will be treated as public documents unless confidentiality is requested.

The Environmental Assessment can be downloaded from the NSW Department of Planning's website or viewed at its offices at 23-33 Bridge St, Sydney. Copies would also be available in the Singleton Council office and library.

The address for written submissions is:

Nundah Bank Third Track Project (MP 10_0094)
Major Projects Assessment
Department of Planning
GPO Box 39, SYDNEY NSW 2001

Submissions can also be made online through the Department of Planning's website.

What happens next?

Following exhibition of the Environmental Assessment, the ARTC will consider and provide a response to the issues raised in submissions and finalise its Statement of Commitments. If required, a Preferred Project Report may be completed to address any changes to the Proposal.

If the ARTC decide to seek approval for the Proposal, the Environmental Assessment, Submissions Report and any Preferred Project Report would be submitted to the Department of Planning for assessment. The Department would examine the information provided and prepare an assessment report for the Minister for Planning.

The Minister for Planning would then determine whether to grant approval to carry out the project. If approved, conditions of approval would be set to outline necessary control measures.

Consultation with the community and project stakeholders would continue throughout the detailed design and construction phases of the project.

1. Introduction

1.1. Background

The Australian Rail Track Corporation (ARTC) proposes to construct, operate and maintain a third track and associated infrastructure at Nundah Bank. The Proposal is located between Singleton and Camberwell on the Main North Line in the Upper Hunter Valley (refer Figure 1.1).

The ARTC is a company wholly-owned by the Commonwealth Government with the primary role of managing the national rail network. In September 2004, the ARTC commenced a 60-year lease of the interstate and Hunter Valley rail lines in NSW. Since commencing the lease, the ARTC has released annual Hunter Valley infrastructure enhancement strategies that set out how the ARTC plans to ensure rail corridor capacity stays ahead of the expected rapid growth in coal production exported through the Port of Newcastle.

The *2009-2018 Hunter Valley Corridor Capacity Strategy 2009* (ARTC, 2009a) (the Strategy) is the fourth annual strategy by the ARTC. It identifies the constraints on the Hunter Valley rail network, the options to resolve these constraints and a proposed course of action to achieve the necessary increase in rail capacity to facilitate coal export from the region. The means by which these capacity increases will be achieved through reducing train headways, reducing junction conflicts and by increasing capacity, either through re-signalling of the current infrastructure or by providing additional infrastructure.

The Strategy identifies that the steep section of track at Nundah Bank will become a constraint on the network by the third quarter of 2012. Unless this section of track is upgraded, it will act as a bottleneck upon the overall capacity of the Main North Line to deliver coal exports to the Port of Newcastle. As well, the constraint will have flow-on effects to other parts of the network and will substantially reduce the economic benefits associated with other recently completed and ongoing capacity upgrades by the ARTC at other locations in the Hunter Valley.

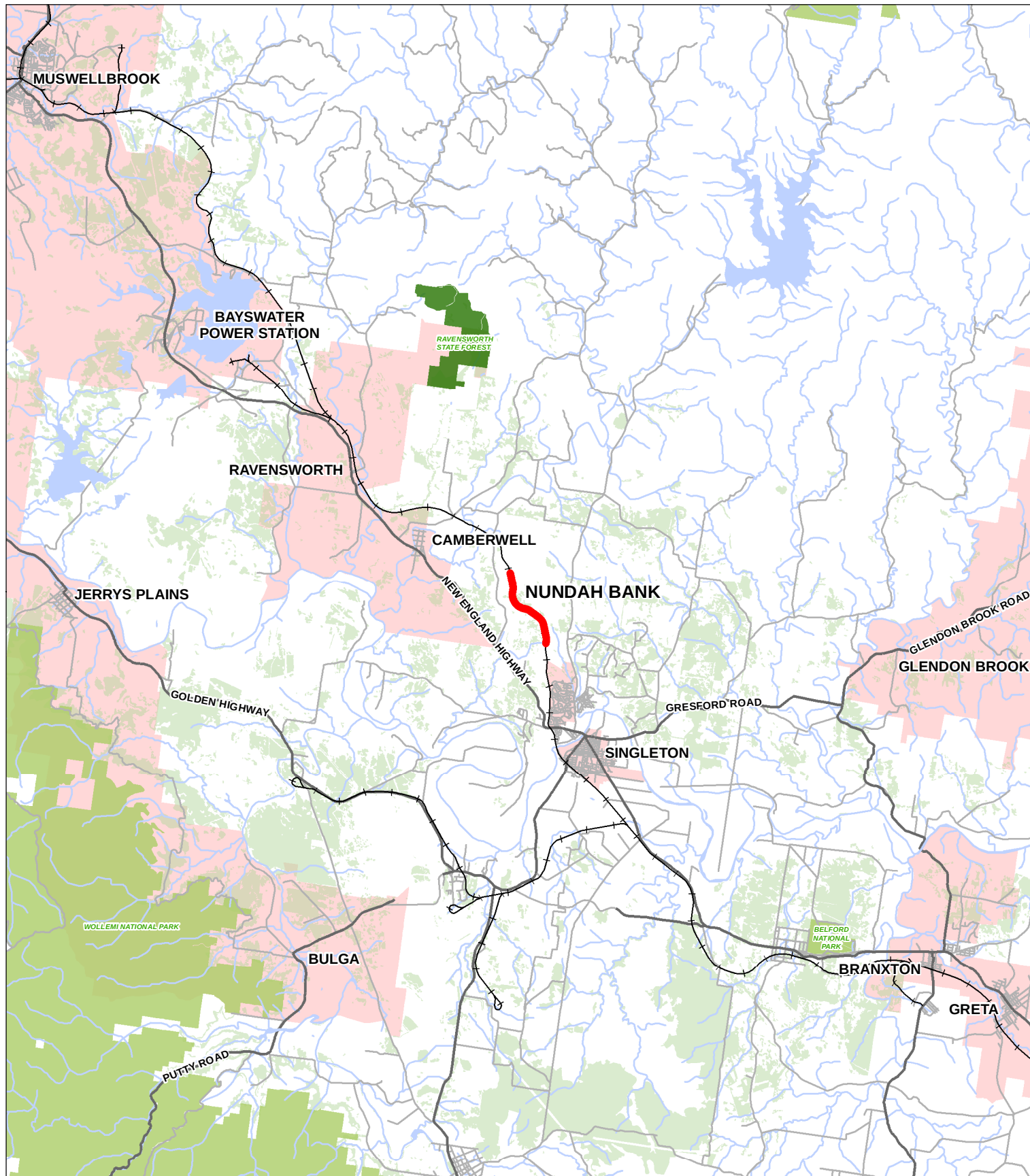
Operational modelling has shown that the required increase in rail capacity cannot be achieved by re-signalling the current infrastructure. Therefore, triplication of the Main North Line at Nundah Bank (a third track), the subject of this Environmental Assessment, is considered the most feasible means to relieve the identified constraint.

Completion of the Proposal would provide increased rail capacity on the Main North Line and facilitate the expected future increases in coal exports from the region.

1.2. Key features of the Proposal

The Proposal would involve the construction of a third track adjacent to the existing Main North Line as well as construction and/or modification of associated infrastructure such as signalling maintenance, vehicle access tracks and overbridges (refer Figures A-F). The key features of the Proposal include:

- Approximately 4 kilometres of new single, at grade track on the up side of the existing up main;
- Provision of new maintenance vehicle access tracks on both sides of the rail corridor;
- Relocation and installation of signalling infrastructure;
- Removal and extension of existing track drainage structures;
- Permanent acquisition of approximately 20.6 hectares of land from three landowners;
- Changes to the configuration of the Camberwell rail loop;
- Establishment of construction facilities including site compounds, accessways and ancillary facilities;
- Establishment of a biodiversity offset to compensate for the residual effects of vegetation clearing resulting from the Proposal.



- Third Track
- National Park
- Water course
- Main Roads
- State Forest
- Watercourse Areas
- Major Roads
- Forest or Shrub
- Built Up Areas
- +— Rail Lines

A4 Original

0 2.5 5 10

Kilometres

GDA 1994 MGA Zone 56



ARTC
Nundah Bank

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

Location Plan

Figure 1.1

1.3. Overview of the assessment and approvals process

The proposed Nundah Bank Third Track is a project to which Part 3A of the *Environmental Planning and Assessment Act*, 1979 (EP&A Act) applies. The project is consistent with the classification of rail and related transport facilities listed in Schedule 1 Clause 23 of *State Environmental Planning Policy (Major Development) 2005*.

The Minister for Planning is the approval authority for the project, and an environmental assessment (this document) is required to support the application for approval in accordance with the requirements of the EP&A Act.

Further information on the planning and approvals process relevant to the Proposal is provided in Section 2. Key stages of the approvals process are outlined in Figure 1.2.

1.3.1. Assessment requirements

Preliminary Environmental Assessment (PEA)

A PEA was prepared (UHVA 2010d) to support the Part 3A application under Section 75E of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The PEA provided:

- An overview of the relevant planning legislation and approvals process;
- A preliminary description of the proposal;
- The findings of a project risk assessment;
- A proposed scope for the Environmental Assessment (EA); and
- Facilitated the receipt of the Environmental Assessment Requirements from the Director-General of the Department of Planning (DoP) under Section 75F(2) of the EP&A Act, including requirements from other agencies.

Planning Focus Meeting

For some projects, the DoP convenes a planning focus meeting with relevant government authorities. The meeting provides a forum for participants to obtain information on the Proposal, and discuss key issues and potential environmental impacts. Following the meeting, the DoP seeks written comments from agencies on issues that should be addressed in the EA.

A planning focus meeting was not convened by the DoP as it was not deemed necessary considering the nature and scale of environmental impacts anticipated for this Proposal. In addition, key agencies were familiar with the Proponent and nature of the proposed works due to the ongoing nature of a number of other similar projects in the Hunter Valley.

Director-General's Environmental Assessment Requirements

Under clause 75F of the EP&A Act, the Director-General of the DoP is required to prepare and issue requirements for undertaking the EA. These identify issues to be addressed in the EA and the level of assessment required.

Relevant agencies were requested by DoP to provide input into the Director-Generals Environmental Assessment Requirements (DGRs). The following agencies provided input:

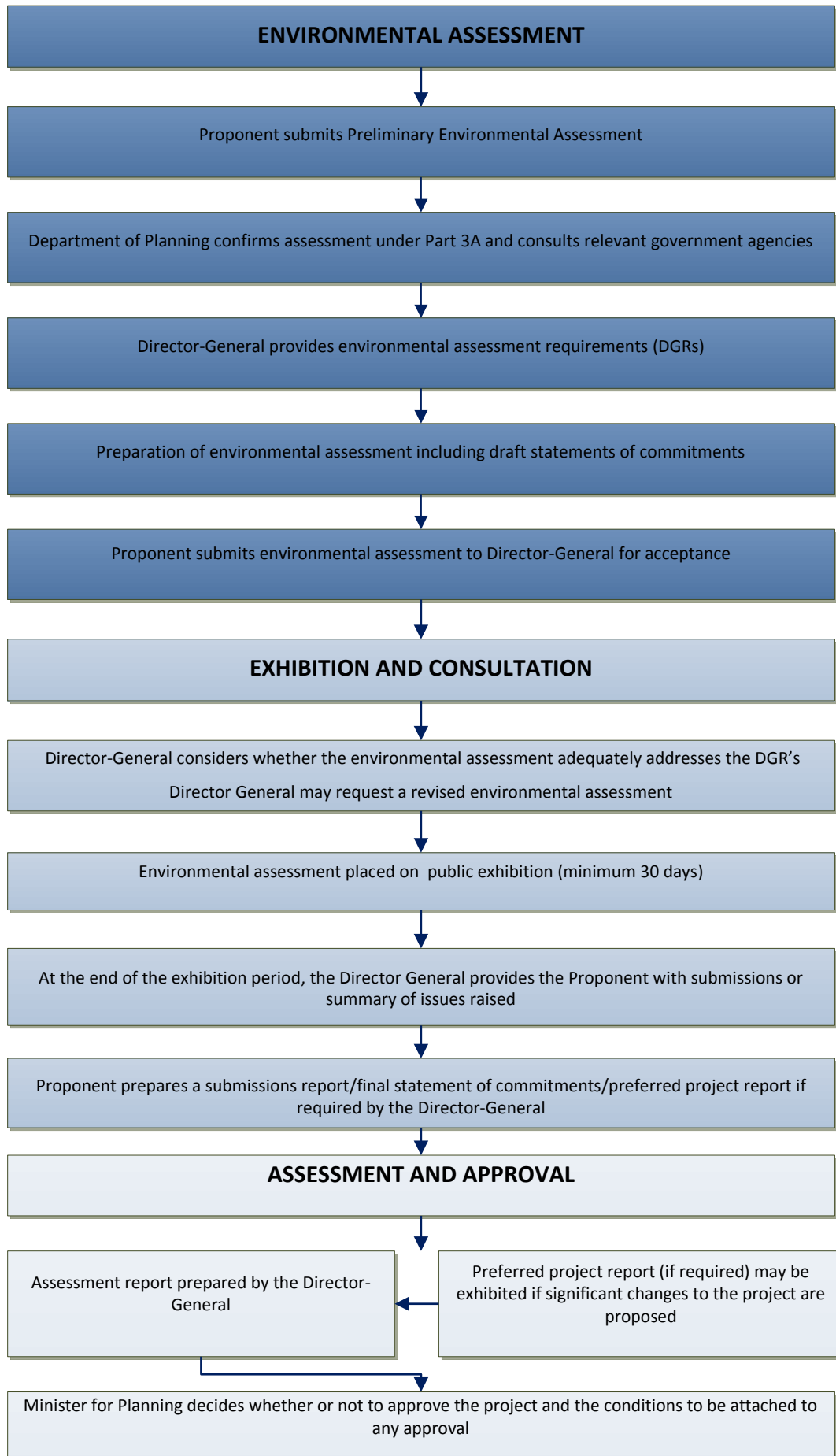
- Department of Environment, Climate Change and Water (DECCW);
- Industry and Investment NSW;
- NSW Office of Water;
- NSW Transport;
- Railcorp; and
- Mine Subsidence Board.

The DGRs for the Proposal were issued on 27 July 2010 (refer Appendix A). These requirements were prepared following submission of the project application and PEA (UHVA 2010b). More detail on each of the requirements is provided in the corresponding section.

Environmental Assessment

This EA has been prepared in accordance with the DGRs. The EA demonstrates that the ARTC has addressed the potential environmental impacts of the Proposal through extensive concept design development, robust assessment, and the development of appropriate mitigation measures.

Figure 1.2 The approval process for the Proposal under Part 3A of the EP&A Act



Exhibition

If the EA is considered adequate for exhibition, the DoP will place the EA on public exhibition for at least 30 days. During the exhibition period, submissions are invited from Government agencies and any members of the public.

The DoP may provide the UHVA with a copy of any submissions or a summary of the issues raised in the submissions. The UHVA will then respond to the issues and may modify the Proposal and the draft Statement of Commitments to address the issues raised in the submissions.

If the Proposal or draft Statement of Commitments are modified in response to issues raised, a preferred project report may be required to describe the scope of the revised Proposal. The Director-General would make this report public.

Assessment and Determination

Following the exhibition period, the DoP would, on behalf of the Minister for Planning (the Minister), review the EA, submissions received and any preferred project report. Once the DoP has completed its assessment, an assessment report would be prepared for the Director-General, which may include recommended conditions of approval. The recommended conditions would refer to the draft Statement of Commitments and may be modify and/or include additional provisions.

The assessment report would then be submitted to the Minister for Planning for determination. The Minister may refuse the Proposal, or approve it with any conditions considered appropriate. The Minister's determination and the Director-General's Environmental Assessment Report would be published on the DoP's website immediately following determination.

1.4. Purpose and scope of the Environmental Assessment

This EA supports an application for project approval from the Minister for Planning under Part 3A of the EP&A Act. It has been prepared in accordance with the EP&A Act and addresses the DGRs for the Proposal (refer to Appendix A). The EA provides:

- Background information, including information on the development of the Proposal, need for the Proposal, objectives of the Proposal and the alternatives considered;
- A description of the Proposal;
- An assessment of the potential environmental impacts of the Proposal;
- A draft Statement of Commitments to minimise and manage potential environmental and community impacts.

1.5. Structure of the Environmental Assessment

The EA is structured as follows:

Section 1 – Introduction

This section introduces the EA and provides background to the Proposal. It also provides a summary of the key features of the Proposal, an overview of the assessment and approvals process, and a summary of the structure of the EA.

Section 2 - Statutory and planning context

Section 2 provides an overview of relevant environmental planning instruments and State and Commonwealth legislation, and their application to the Proposal. It includes a review of the strategic planning context of the Proposal.

Section 3 – Strategic and project justification

Section 3 describes the strategic need and objectives for the Proposal and outlines alternatives and options considered.

Section 4 - Description of the Proposal

This section provides an overview of the Proposal and a discussion of the key design elements including a summary of the construction methodology and program, operation and maintenance of the Proposal.

Section 5 – Consultation

Section 5 provides an overview of the stakeholder and community involvement plan, the consultation activities that have been undertaken and future consultation proposed.

Section 6 – Environmental risk analysis

Section 6 outlines the process and outcomes of the environmental risk analysis conducted.

Sections 7 and 8 - Environmental assessment – key and other issues

These sections provide a description of the existing environmental features of the area potentially affected by the Proposal and provides an assessment of the key potential environmental impacts. These sections also propose mitigation measures for minimising the potential environmental impacts.

Section 9 – Environmental management

Section 9 provides a draft Statement of Commitments made by the proponent in relation to detailed design, construction and operation of the Proposal and a Construction Environmental Management Framework to manage potential impacts during construction.

Section 10 – Justification and conclusion

This section provides the justification for the Proposal in relation to the objects of the EP&A Act and in the context of ecologically sustainable development and a summary of the key findings of the EA.

Appendices and technical papers

The appendices to the EA supplement the main document. Appendix A contains the DGRs for this environmental assessment.

Volumes 2 and 3 contain the specialist technical assessments which have been prepared to assess the key potential environmental impacts of the Proposal.

2. Statutory and planning context

The *Commonwealth Environment Protection and Biodiversity Conservation Act*, 1999 (EPBC Act) and the *NSW Environmental Planning and Assessment Act*, 1979 (EP&A Act) are the two key pieces of legislation relevant to the Proposal. The application of these Acts as well as other relevant legislation and planning instruments is described in this section.

As outlined in Section 1, the Proposal would be assessed under Part 3A of the EP&A Act in accordance with SEPP (Major Development) 2005. No legislation or other planning instrument referred to in the section has any effect on the permissibility of the Proposal.

2.1. Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the Australian Government's key piece of environmental legislation. Under the EPBC Act, approval is required from the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities for any of the following controlled actions:

- An action which has, would have or is likely to have a significant impact on "matters of National Environmental Significance" (NES matters). The NES matters include:
 - The World Heritage values of a declared World Heritage property;
 - The National Heritage values of a listed National Heritage place;
 - The ecological character of a declared Ramsar wetland;
 - Listed threatened species and ecological communities;
 - Listed migratory species;
 - The Commonwealth marine environment; and
 - Nuclear actions.
- An action by the Commonwealth or a Commonwealth agency which has, would have or is likely to have a significant impact on the environment.
- An action on Commonwealth land which has, would have or is likely to have a significant impact on the environment.
- An action which has, would have or is likely to have a significant impact on the environment on Commonwealth land, no matter where it is to be carried out.

Under subsection 68(1) of the EPBC Act:

'A person proposing to take an action that the person thinks may be or is a controlled action must refer the proposal to the Minister for the Minister's decision whether or not the action is a controlled action.'

A search to determine whether matters of National Environmental Significance or other matters protected by the EPBC Act are likely to occur within the study area was undertaken in January 2010 using the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) Protected Matters Search Tool. Results of the search indicate that the following may occur within one kilometre of the Proposal alignment:

- One threatened ecological community (White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland);
- 13 threatened species; and
- 13 migratory species.

A specialist ecological report provided in Volume 3, Technical Paper 2, has confirmed that the Proposal is unlikely to have a significant impact on NES matters and is unlikely to have a significant impact on the environment in general (for actions by Commonwealth agencies or actions on Commonwealth land). A referral under the EPBC Act is therefore not required.

In addition to these matters, the ARTC (the proponent) is a Commonwealth agency and the rail corridor is classified as Commonwealth land, as it is leased by a Commonwealth agency as defined by the EPBC Act. However, it should be noted that on 14 November 2009 the *Environment Protection and Biodiversity Conservation Regulation*, 2000 was amended to exclude the ARTC as a Commonwealth agency under the EPBC Act.

2.2. Native Title Act 1993

The *Native Title Act*, 1993 administers processes relating to the recognition, protection and determination of native title and dealings with native title land. Native title is concerned with the rights and interests of Aboriginal and Torres Strait Islander peoples in relation to land and water in Australia and its territories. The Act is administered by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities.

A search of the National Native Title Register, the Register of Native Claims, and the Register of Indigenous Land Use Agreements was completed in August 2010 (refer to detailed specialist study, Volume 2, Technical Paper 1). No lands were determined to have native title and no registered native claims or Indigenous land use agreements were located within the Project Area.

2.3. Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act* 1979 (EP&A Act) is the core legislation which controls planning and development activities in NSW and provides the statutory framework under which development proposals are assessed. The EP&A Act contains three parts relevant to the environmental assessment and determination of development proposals:

- Part 3A provides for the control of major infrastructure and other projects that require approval from the Minister for Planning (including this Proposal);
- Part 4 provides for the control of development that requires development consent from a consent authority, which is usually the local council but may also be the Minister for Planning in specific circumstances; and
- Part 5 provides for the control of activities that do not require development consent and, therefore, do not fall under Part 3A or Part 4.

Part 3A of the EP&A Act is applicable to the Proposal as explained further below.

2.4. Application of Part 3A of the EP&A Act

Part 3A of the EP&A Act establishes an assessment and approval regime for development that is declared to be a Part 3A project by either a state environmental planning policy (SEPP) or ministerial order. Section 75B(1) of the EP&A Act states:

'This Part applies to the carrying out of development that is declared under this section to be a project to which this Part applies:

- (a) by a State environmental planning policy, or*
- (b) by order of the Minister published in the Gazette (including by an order that amends such a policy).'*

Major projects to which Part 3A applies are identified in *State Environmental Planning Policy (Major Development)*, 2005 (SEPP Major Development) (refer Section 2.6.1), as well as in declarations made by the Minister for Planning. The Proposal is for a heavy railway line associated with mining activities that has a capital investment value of more than \$30 million and is therefore a project to which Part 3A would apply under schedule 1, clause 23 of the SEPP (Major Development).

According to section 75D of the EP&A Act, the Minister for Planning is the approval authority for Part 3A projects:

'(1) A person is not to carry out development that is a project to which this Part applies unless the Minister has approved of the carrying out of the project under this Part.

(2) The person is to comply with any conditions to which such an approval is subject.'

In accordance with clause 75B of the EP&A Act, Part 3A of the Act applies to the Proposal. The Minister for Planning is the approval authority and an environmental assessment is required to support the application for project approval.

The Key stages in the Part 3A approvals process are outlined in Section 1.3 and are also shown in Figure 1.2.

2.4.1. Other provisions of the EP&A Act

Environmental planning instruments are legal documents that are prepared under the EP&A Act to regulate land use and development, and consist of state environmental planning policies (SEPPs) and local environmental plans (LEPs). Regional environmental plans were formerly part of the hierarchy of environmental planning instruments, however these are now deemed to be SEPPs.

Pursuant to section 75R(3) of the EP&A Act, only SEPPs apply to an 'approved project' under Part 3A. Section 75A defines 'approved project' as "a project to the extent that it is approved by the Minister under this Part, but does not include a project for which only approval for a concept plan has been given". As such, only SEPPs would apply if the Minister grants project approval to carry out the Proposal under Part 3A.

Relevant SEPPs are considered in Section 2.6.1 and local environmental plans are considered in Section 2.6.2

Section 75U(1) of the EP&A Act specifies certain authorisations which are not required for an 'approved project' under Part 3A, namely:

- '(a) the concurrence under Part 3 of the Coastal Protection Act 1979 of the Minister administering that Part of the Act;*
- (b) a permit under section 201, 205 or 219 of the Fisheries Management Act 1994;*
- (c) an approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977;*
- (d) or Aboriginal heritage impact permit under section 90 of the National Parks and Wildlife Act 1974;*
- (e) an authorisation referred to in section 12 of the Native Vegetation Act 2003 (or under any Act to be repealed by that Act) to clear native vegetation or State protected land;*
- (f) a permit under Part 3A of the Rivers and Foreshores Improvement Act 1948;*
- (g) a bush fire safety authority under section 100B of the Rural Fires Act 1997;*
- (h) a water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the Water Management Act 2000.'*

Consequently, the abovementioned authorisations would not be required if the Minister grants project approval to carry out the Proposal under Part 3A.

Under section 75V(1) of the EP&A Act, the following authorisations cannot be refused if necessary for the carrying out of an 'approved project' and are to be substantially consistent with an approval to carry out the project given under Part 3A:

- '(a) an aquaculture permit under section 144 of the Fisheries Management Act 1994;*
- (b) an approval under section 15 of the Mine Subsidence Compensation Act 1961;*
- (c) a mining lease under the Mining Act 1992;*
- (d) a production lease under the Petroleum (Onshore) Act 1991;*

- (e) *an environment protection licence under Chapter 3 of the Protection of the Environment Operations Act 1997 (for any of the purposes referred to in section 43 of that Act);*
- (f) *a consent under section 138 of the Roads Act 1993; and*
- (g) *a licence under the Pipelines Act 1967.'*

2.5. Mine Subsidence Compensation Act 1961

Sections of the Proposal are within or closely adjoin the Patrick Plains Mine Subsidence District proclaimed under the *Mine Subsidence Compensation Act, 1961* and as such approval from the NSW Mine Subsidence Board (the Board) is required to be sought for the Proposal under Section 15 of the *Mine Subsidence Compensation Act, 1961*.

A map of the Patrick Plains Mine Subsidence Area and the location of the Nundah Bank Third Track are provided in Figure 7.8.

As outlined above an approval cannot be refused if it is consistent with any approval for the Proposal granted by the Minister for Planning.

2.6. Environmental Planning Instruments

2.6.1. State Environmental Planning Policies

SEPPs, as established under the EP&A Act, relevant to the Proposal are listed and discussed below.

State Environmental Planning Policy (Major Development) 2005

Major projects to which Part 3A applies are identified in SEPP Major Development, as well as in declarations made by the Minister for Planning. Clause 6 of SEPP Major Development states:

- '(1) Development that, in the opinion of the Minister, is development of a kind:*
 - (a) described in Schedule 1 or 2, or*
 - (b) described in Schedule 3 as a project to which Part 3A of the Act applies, is declared to be a project to which Part 3A of the Act applies.'*

Clause 23 of Schedule 1 of the SEPP states that the following development is a major project:

- '(1) Development that has a capital investment value of more than \$30 million for the purpose of:*
 - (a) heavy railway lines associated with mining, extractive industries or other industry, or*
 - (b) railway freight facilities or inter-modal terminals.'*

The Proposal has a capital investment value of more than \$30 million and is for a heavy railway line associated with mining. As such, the Proposal has been declared to be a major project under clause 6 of the EP&A Act by the Director-General of the Department of Planning (DoP) and is to be assessed and approved under Part 3A of the EP&A Act.

State Environmental Planning Policy (Infrastructure) 2007

The aim of SEPP (Infrastructure) 2007 is to facilitate the effective delivery of infrastructure across NSW. Clause 79 of SEPP (Infrastructure) 2007 states that:

- 'Development permitted without consent—rail infrastructure facilities generally*
 - (1) Development for the purpose of a railway or rail infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land.'*

Therefore, pursuant to Clause 79 of the SEPP Infrastructure, the Proposal is permissible.

State Environmental Planning Policy No. 44 – Koala Habitat Protection

The aim of SEPP 44 is to:

'Encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.'

Singleton Local Government Area (Singleton LGA) is listed on Schedule 1 and therefore the Proposal is subject to the provisions of SEPP 44. Accordingly a SEPP 44 assessment was undertaken to determine if core koala habitat occurs on site and if a plan of management is required. The results of this assessment are outlined in Section 7.2.3 and in Volume 3, Technical Paper 2. No resident population of koalas was identified within the vicinity of the Proposal and as such the area is unlikely to form 'core koala habitat'. Therefore, no plan of management under SEPP 44 is required.

State Environmental Planning Policy No 55—Remediation of Land

SEPP 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. The potential for contaminated land to be encountered is discussed in Section 8.1. No land is proposed to be remediated and therefore no assessment under SEPP 55 is required for the project.

State Environmental Planning Policy (Rural Lands) 2008

SEPP (Rural Lands) aims to facilitate the orderly and economic use and development of rural lands for rural and related purposes. Part 2 of SEPP (Rural Lands) identifies rural planning principles to be considered. The majority of the Proposal is within the existing Main North Line railway corridor which is unzoned land. Other areas adjacent to the railway corridor included in the Proposal are zoned 1(a) Rural pursuant to the *Singleton Local Environmental Plan, 1996*.

The principles contained within SEPP (Rural Lands) encourage the protection and promotion of opportunities for productive and sustainable economic activities in rural areas. They also identify that in planning for rural lands, the social, economic and environmental interests of the community are to be balanced.

Land use issues are discussed in Section 7.6.

2.6.2. Local Environmental Plan

The Proposal is located within the Singleton Local Government Area (LGA). The local council planning instrument of relevance to the Proposal is the Singleton Local Environmental Plan 1996 (SLEP).

The majority of the Proposal is within the existing Main North Line railway corridor which is unzoned land. Other areas adjacent to the railway corridor included in the Proposal are zoned 1(a) Rural.

Clause 36 of the SLEP describes development that is not restricted or prohibited by SLEP, including railway undertakings. Accordingly, works associated with the Proposal would be permissible under clause 36 on the unzoned land and in zone 1(a) Rural. Therefore, planning approval from Singleton Council is not required. Regardless of the permissibility under the SLEP, the Proposal is subject to assessment under Part 3A of the EP&A Act which prevails over the local planning instrument.

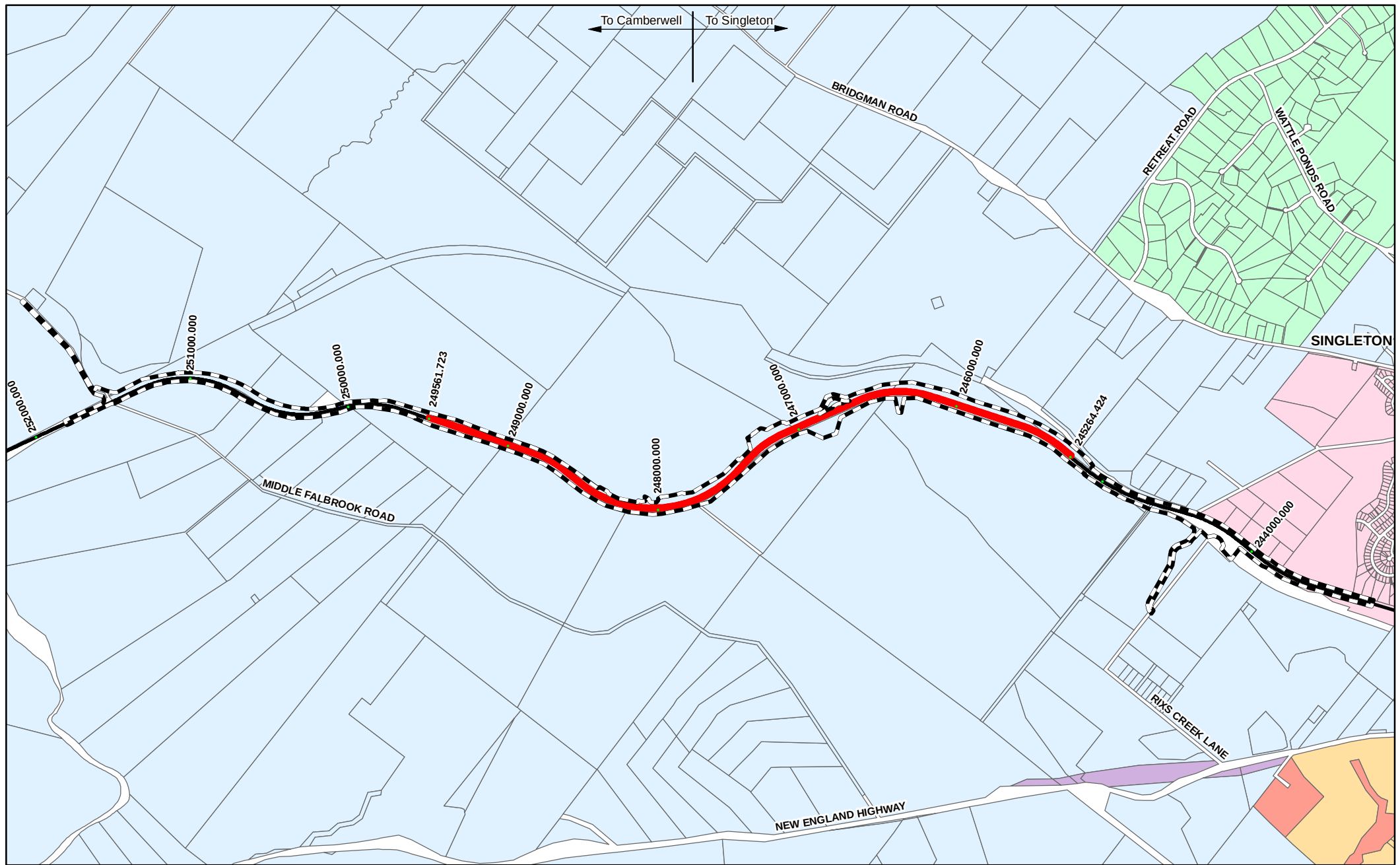
Figure 2.1 provides a zoning map of the area of the Proposal under the SLEP.

2.7. Other relevant legislation

Table 2.7a provides a summary of other legislation relevant to the Proposal.

Table 2.7a Summary of other relevant legislation

Legislation	Key requirements	Relevance to the Proposal
<i>Contaminated Land Management Act, 1997</i>	Section 60 of the Act requires landowners to report any contamination that represents a significant risk of harm to human health or the environment to the Department of Environment, Climate Change and Water.	Section 8.1 includes an assessment of the presence of contamination.



A4 Original

0 250 500 1,000
Metres
GDA 1994 MGA Zone 56



Proposed Impact Area

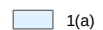


Third Track



Existing Alignment

LEP Zoning



1(a)



1(d)



2



4



5



7



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Nundah Bank

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Zoning Map of Area under Singleton LEP Figure 2.1

Legislation	Key requirements	Relevance to the Proposal
<i>Crown Lands Act</i> , 1989	Governs the use of Crown land.	Property of the Crown is affected by the Proposal. All are administered by the Lands and Property Management Authority. The Upper Hunter Valley Alliance (UHVA) is negotiating with the Crown Lands Division regarding strip acquisition for the sections of the Proposal on Crown land.
<i>Fisheries Management Act</i> , 1994	Under the Act, approval is required from the Industry and Investment NSW (Fisheries), for activities involving dredging and reclamation (section 201), blockage of fish passage (section 219) and harming of certain marine vegetation in a protected area (section 205).	Pursuant to section 75U of the EP&A Act, permits under sections 201, 205 or 219 of the Act are not required for an 'approved project' under Part 3A.
	A licence is required under section 220ZW of the Act for activities likely to harm or damage threatened species, populations or ecological communities.	An examination of threatened species, populations and ecological communities distribution ranges and habitat requirements that are listed in the Act indicates that none are likely to occur within the vicinity of the Proposal (refer to Section 7.2). Therefore, the provisions of the Act do not apply and no further assessment is required.
<i>Heritage Act</i> , 1977	Consent is required under Part 4 of the Heritage Act for development which alters, moves or damages any part of a listed heritage item.	Pursuant to section 75U of the EP&A Act, an approval under Part 4 of the Heritage Act is not required for an approved Part 3A project. An assessment of heritage items within the vicinity of the Proposal is provided in Section 7.7.
	An excavation permit is required under section 139 of the Heritage Act to 'damage, despoil, move or alter' a relic.	Pursuant to section 75U of the EP&A Act, an excavation permit under section 139 of the Heritage Act is not required for an approved Part 3A project. An assessment of heritage items within the vicinity of the Proposal is provided in Section 7.7.
<i>Land Acquisition (Just Terms Compensation) Act</i> , 1991	To give appropriate compensation to owners for land affected by an authority.	The ARTC leases the Main North Line from the owners of the NSW Hunter Valley Network, i.e. the Country Rail Infrastructure Authority (CRIA). The CRIA has rights to acquire land under the <i>Transport Administration Act</i> , 1988. The CRIA would acquire land to facilitate the construction and operation of Proposal. The additional land would then become part of the network leased by the ARTC. The process of acquisition and compensation is administered under the Act. Strip or whole properties may be

Legislation	Key requirements	Relevance to the Proposal
		acquired by agreement or by compulsory process under the Act, with appropriate compensation where relevant.
<i>National Parks and Wildlife Act, 1974 (NPW Act)</i>	Under section 87 of the NPW Act, a permit is required to disturb or move an Aboriginal object.	Pursuant to section 75U of the EP&A Act, a permit under section 87 of the NPW Act is not required for an approved Part 3A project. Section 7.1 provides an assessment of the Proposal's impact on Indigenous heritage and the potential for disturbance of known Indigenous heritage sites.
	Under section 90 of the NPW Act, consent is required to destroy, deface or damage an Aboriginal object or Aboriginal place.	Pursuant to section 75U of the EP&A Act, consent under section 90 of the NPW Act is not required for an approved Part 3A project. Section 7.1 provides an assessment of the Proposal's impact on Indigenous heritage.
	Under Part 4 of the NPW Act, the Minister may enter into a conservation agreement with a landowner.	None of the lands affected by the Proposal are known to be covered by a conservation agreement or by a plan of management adopted under the NPW Act.
<i>Native Vegetation Act, 2003</i>	Under section 12 of the Act, development consent or an authorisation under a property vegetation plan is required for the clearing of native vegetation.	Pursuant to section 75U of the EP&A Act, an authorisation under section 12 of the Act is not required for an approved Part 3A project.
<i>Noxious Weeds Act, 1993</i>	Noxious weeds are to be managed in a way to restrict their dispersal and establishment.	Four species recorded in the study area are declared noxious weeds in the Singleton LGA pursuant to the Act. Refer to Section 7.2 and Volume 3, Technical Paper 2. These noxious weeds should be disposed of and managed in accordance with assigned control categories under the Act.
<i>Protection of the Environment Operations Act, 1997 (POEO Act)</i>	Under section 48 of the POEO Act, an environment protection licence (EPL) relating to air, water and noise pollution and waste management is required for development should it be identified as a scheduled activity in Schedule 1.	The Proposal is an activity listed within Schedule 1. Under section 75V of the EP&A Act, an environment protection licence (EPL) for the Proposal cannot be refused and is to be substantially consistent with any approval given for the Proposal under Part 3A of the EP&A Act. The ARTC currently hold an EPL 3142 under the POEO Act. The conditions of this licence would apply to the Proposal. This licence would need to be amended for land to be temporarily leased to facilitate

Legislation	Key requirements	Relevance to the Proposal
		construction of the Proposal.
<i>Roads Act, 1993 (Roads Act)</i>	Section 138 of the Roads Act requires a person to obtain the consent of the appropriate roads authority for the erection of a structure, or the carrying out of a work in, on or over a public road, or the digging up or disturbance of the surface of a public road. If the applicant is a public authority, the roads authority must consult with the applicant before deciding whether or not to grant consent or concurrence.	The Proposal would result in minor works being undertaken for across the Camberwell level crossing for new signalling. The crossing allows traffic using Middle Falbrook Road to cross the Main North Line. The crossing is in the ownership of the CRIA and therefore a section 138 approval is not required. In the course of construction, no other roads would require approval for the erection of a structure; the carrying out of a work in, on or over a public road; or the digging up or disturbance of the surface of a public road. No approval is therefore required under section 138 of the Roads Act.
<i>Rural Fires Act, 1997</i>	The Act manages bushfire within the State and regulates development in bushfire prone areas.	The Proposal is not for subdivision and is not a special fire protection purpose. Approval is not required under the Act.
<i>Threatened Species Conservation Act, 1995 (TSC Act)</i>	The TSC Act requires any threatened plant or animal species, populations or ecological communities associated with a proposed development to be identified and that acceptable recovery and management strategies are implemented when a significant impact would be likely to occur.	A number of threatened species and a threatened ecological community (EEC) have the potential to occur in the locality. An assessment of the impacts on these species and the proposed management measures are provided in Section 7.2 and Volume 3, Technical Paper 2.
<i>Waste Avoidance and Resource Recovery Act, 2001 (WARR Act)</i>	This Act establishes a hierarchy of waste management (avoid, recover, dispose) encouraging efficient use of resources and minimising waste.	Waste materials generated during construction and operation of the Proposal would be managed in accordance with the principles of the waste management hierarchy referred to in the WARR Act.
<i>Water Management Act, 2000</i>	Under section 56 of the Act, an access licence is required for water extraction.	Integra Coal has agreed to allow the UHVA to use water collected on site during mining operations for construction purposes. It has been confirmed that adequate water can be provided for construction needs (refer to Section 4.5). It is therefore not considered that additional surface or groundwater will be required to be collected for construction of the Proposal.
	Section 89 of the Act relates to water use approvals, which confer a right on their holder to use water for a particular purpose at a particular location.	Pursuant to section 75U of the EP&A Act, a water use approval is not required for an approved Part 3A project.
	Section 91 relates to activity approvals and provides that certain types of development and activities that are carried out in or near a river, lake or estuary are	Pursuant to section 75U of the EP&A Act, activity approvals are not required for an approved Part 3A project.

Legislation	Key requirements	Relevance to the Proposal
	"controlled activities" and require an activity approval. Section 91 also provides that aquifer interference activities require an aquifer interference approval, which is an activity approval.	
<i>Wilderness Act</i> , 1987 (Wilderness Act)	Section 111(3) of the Wilderness Act requires a determining authority to consider the effects of a proposed activity on wilderness areas.	No wilderness areas were identified within the vicinity of the Proposal. Therefore, the Wilderness Act does not apply.

2.8. Other license or approval requirements

A summary of other licenses or approvals required is included in Table 2.8a.

Table 2.8a Summary of other license or approval requirements

Act	Administering agency/approval authority	Approval
<i>Mine Subsidence Compensation Act</i> , 1961	NSW Mine Subsidence Board	A request for approval under Section 15 of the <i>Mine Subsidence Compensation Act</i> , 1961 was submitted in November 2010 (UHVA 2010g). This approval does not have any effect on the ability of the Minister for Planning to approve the Proposal.
<i>Protection of the Environment Operations Act</i> , 1997	NSW Department of Environment, Climate Change and Water.	A variation to the ARTC's EPL 3142 may be required for land that is to be temporarily leased during construction.

3. Strategic and project justification

This section provides the strategic and project justification for the Proposal. Table 3.1a below outlines the relevant DGRs and the location where each requirement is addressed in this section.

Table 3.1a Director-General's Environmental Assessment Requirements - strategic and project justification

Director-General's Environmental Assessment Requirements	Location addressed
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 publication, such as the <i>NSW State Plan</i> .	Section 3.1
Key issues	
Project justification - Identify alternatives to the preferred project considered (including the alignment) and justify the project taking into consideration the objects of the <i>Environmental Planning and Assessment Act, 1979</i> .	Section 3.13, 3.2, and 10.1

3.1. Strategic justification

3.1.1. Need for the project

Coal is Australia's largest export commodity and contributes significantly to the State and Federal revenue. The NSW coal industry, including in the Hunter Valley, directly employs over 13,000 Australians. In 2008-09, over 91 million tonnes of coal were exported from the Port of Newcastle, making it the world's largest export coal port.

Since the commencement of the ARTC's 60-year lease of the Hunter Valley rail lines, the ARTC has released annual Hunter Valley rail infrastructure enhancement strategies describing how the ARTC proposes to ensure that rail corridor capacity stays ahead of forecast coal production in the Hunter Valley. The latest of these strategies (ARTC, 2009a) updates earlier strategies in terms of revised coal production forecasts and presents a ten year horizon of proposed infrastructure relief measures. In common with earlier strategies, the most recent strategy includes a summary of existing identified constraints, potential relief options as well as a strategy to resolve the constraints. The strategy considers both rail capacity and operational efficiency measures to maintain capacity ahead of demand.

The Hunter Valley coal chain is extremely complex. It is an interdependent network of coal handling and rail infrastructure extending across a number of coal basins and includes public and private coal handling infrastructure. It is made up of two main rail lines as well as a large number of smaller lines or coal loading "loops" associated with individual coal mines.

The general geography of the Hunter Valley rail network and some of the key coal infrastructure is shown in Figure 3.1. Similar to the Sydney rail network, operational performance at downstream locations in the Hunter Valley coal chain is substantially affected by upstream rail capacity, reliability of loading equipment, train timetabling and traffic patterns as well as other operational factors. To further complicate matters, coal train movement also needs to accommodate passenger and other general freight traffic which share the same rail lines. To achieve the desired export coal capacity at the Port of Newcastle requires simultaneously separate and joint consideration of rail capacity and operational performance at each upstream coal infrastructure and rail facility node – each with its own reliability, capacity and performance patterns.

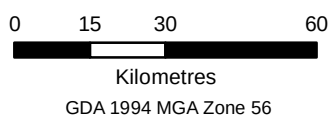
Current industry forecasts indicate that an export coal volume of 191 million tonnes is required from the Port of Newcastle in 2012. To achieve this volume, train headways south of Whittingham Junction (refer Figure 3.1) will need to be reduced to eight minutes.

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. These are at Allandale, Minimbah and Nundah Banks which are shown in Figure 3.1. At Allandale Bank, train headways have been reduced to eight minutes through the completion of new bi-directional signalling and various crossing loops which were completed in 2009. At this headway, rail capacity will not limit export capacity from the port until 2015 by which time additional infrastructure in the form of a third track between Maitland and Minimbah is expected to have been completed. Stage 1 of this project,



- Bank Locations
- Hunter Valley Rail Network
- Main Roads
- Rail Lines

A4 Original



ARTC
Nundah Bank
**Hunter Valley
Rail Network and
Bank Constraints**

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Figure 3.1

between Minimbah and Whittingham (incorporating Minimbah Bank) is currently under construction. An Environmental Assessment for Stage 2 (incorporating Allandale Bank) was approved on the 20 December 2010 by the Minister for Planning (ARTC, 2010a).

Current headways for loaded coal trains at Minimbah and Nundah Banks are approximately 14 and 16.5 minutes respectively. While the headway limitation at Minimbah Bank will be eased following completion of the Maitland to Minimbah Stage 1 project, the full capacity of this upgrade cannot be achieved until the constraint at Nundah Bank is removed. This is because the increased headway introduced by trains travelling up Nundah Bank cannot be “made up” on other downstream sections of the line.

Without intervention by the ARTC, the headway of trains travelling up Nundah Bank will jeopardise the performance of the Hunter Valley rail network and constrain the delivery of coal exports at the port in the third quarter of 2012. Modelling also indicates that forecast demand is very close to capacity throughout 2011 and early 2012. The reduction of headways on Nundah Bank from their current 16.5 minutes is therefore necessary to alleviate this constraint on the network and to fully harness the benefits of the other projects in planning and already implemented by the ARTC in the Hunter Valley.

3.1.2. Objectives of the project

The primary objectives of the project are to:

- Provide a third track at Nundah Bank which reduces operational headways sufficiently to ensure export coal volumes at the port are achieved;
- Minimise impacts on the environment;
- Minimise capital costs; and
- Minimise lifecycle maintenance costs.

The secondary objectives of the project are to:

- Reduce conflicts at Camberwell Junction to maximise capacity on Nundah Bank;
- Meet the commissioning date of third quarter 2012 for the new infrastructure;
- Minimise impacts on operations during construction; and
- Minimise signalling and communications complexity.

3.1.3. Consistency with State policies and publications

NSW State Plan

The NSW State Plan, A New Direction for NSW (NSW Government, 2006) contains a set of goals and identifies priorities for Government action that would help achieve these goals.

The Proposal would contribute towards the following objectives of the State Plan:

- Priority P1 Increased business investment;
- Priority P2 Maintain and invest in infrastructure; and
- Priority P6 Increased business investment in rural and regional NSW.

The Proposal is located in the upper Hunter Valley – a regional area characterised by rural pursuits as well as mining activities. The Proposal would result in a significant investment in rail infrastructure improving the capacity and efficiency of all rail movements; coal, passenger and other freight. Additionally, the construction phase of the Proposal would create opportunities for local businesses and suppliers of services, labour and goods - a portion of which would be invested in the local economy and businesses.

Given the importance of the Hunter Valley rail network to facilitate the export of coal at Newcastle, and the importance of coal exports to State and Federal revenue, the Proposal would also assist in maintaining the strength of the NSW economy and facilitate continued operation of a safe and reliable freight transport system.

The Proposal is therefore considered consistent with these key priorities of the NSW State Plan.

State Infrastructure Strategy

The *State Infrastructure Strategy* (NSW Government, 2008) (Infrastructure Strategy) is a rolling 10 year strategy to plan and fund the infrastructure that supports economic growth and the services that the NSW Government delivers. It is guided by NSW Government agencies', as well as the ARTC's, asset management plans, and forms the link between the infrastructure plans detailed in the four forward years of each State budget, the 10 year NSW State Plan, and the 25 year metropolitan and regional strategies.

The Infrastructure Strategy includes agency infrastructure plans for human services, justice, transport, electricity and water. The Infrastructure Strategy also maps infrastructure projects by six broad regions – Sydney, Central Coast, Hunter, North Coast, Illawarra - South East and Inland NSW.

Of relevance to the Proposal, is the agency infrastructure plan for transport. The plan provides that within four years of its commencement (i.e. by 2012), works on the NSW Interstate and Hunter Valley rail networks will be part of the State's obligation to contribute \$95 million over four years to the ARTC's investment on the Australian east coast rail corridor. The aim of this investment is to increase rail freight capacity and competitiveness. During the six years following this contribution (i.e. from 2012 to 2018), the plan provides that Government expenditure will complement the initiatives of the ARTC and the AusLink program (now the Nation Building Program). One of the ARTC's initiatives detailed in the plan includes the Hunter Valley investment strategy, worth \$375 million, to provide rail capacity to meet growing demand for coal haulage.

It is noted that the Hunter regional map for infrastructure projects does not outline any projects of relevance to the Proposal and the Proposal is not inconsistent with any of the projects listed.

The need and objectives of the Proposal is consistent with providing increased rail freight capacity in the Hunter and therefore consistent with the *State Infrastructure Plan*.

Lower Hunter Regional Strategy

The *Lower Hunter Regional Strategy* applies to the local government areas of Newcastle, Lake Macquarie, Port Stephens, Maitland and Cessnock. The Proposal falls within the Singleton Local Government Area only and as such the strategy does not apply.

3.2. Project justification

3.2.1. Alternatives

The ARTC Corridor Capacity Strategy (2009a) proposed two alternatives which would increase rail capacity at Nundah Bank and reduce headways:

- Resignalling of the current track for loaded trains; and
- Implementation of an additional third track.

Reducing headways would be achieved by both alternatives providing an increase in rail capacity, although the amount of capacity varies between the two options as well as other inherent differences and risks.

Reducing the distance between signals and providing additional signals would allow the closer spacing of coal trains and also maintain safe distances between passenger and other trains using the network. In theory, this would allow two loaded coal trains to be traversing Nundah Bank at the same time. The additional capacity provided by the reduced headways under the re-signalling alternative however would not be sufficient to ensure export coal forecasts are met at the port. Also, if a train is required to come to a halt on the bank, there is a risk that it might not be able to resume its climb with the consequence of significant operational delays. While all trains using Nundah Bank are in theory able to restart from a stop on the bank, for a variety of reasons, train stalling does occasionally occur resulting in costly delays and significant disruption to overall coal movements.

Provision of a new third track would provide similar benefits as above while suffering from fewer disadvantages. This is because a third track would allow two trains to be on the bank at the same time on separate tracks but without the risk of one train needing to come to a halt because of the other. Even if a train were to stall on the bank, the third track would allow the bank to continue to function and provide greater operational flexibility to recover. The ARTC Corridor Capacity Strategy therefore recommended that this alternative be further investigated.

3.2.2. Options consideration

Feasibility investigations

In 2009, the UHVA commenced an investigation of the feasibility of options for a third track and ancillary infrastructure at Nundah Bank. The feasibility investigations followed the ARTC project management system (PP-157) which guides the staged development and approval of proposed infrastructure projects. The six main phases are as follows:

1. Concept assessment;
2. Project feasibility;
3. Project assessment;
4. Project approval;
5. Project implementation (construction and commissioning); and
6. Project close-out.

Each phase is designed to provide an increasing level of investigation of the project from its inception through to detailed design, commissioning and operation. Phases 1 and 2 of the ARTC project development framework primarily deal with feasibility and environmental investigations and assessment as well as preliminary and concept design. Environmental, engineering and economic considerations are integrated into every stage of the process and a hold point and management approval are required for progression to the next stage.

Nine options (Options 0-9) were initially investigated including the “do nothing” approach as part of initial feasibility investigations. The options variously involved provision of a third track and ancillary infrastructure of some seven kilometres in length and achieved eight minute headways. The matrix of initial options was developed from the following primary design considerations:

- Location of the third track on either the up or down side of the existing tracks;
- Achievement of eight or 10 minute headways by providing either a „long’ or „short’ third track respectively; and
- Providing the third track either at grade following existing topography or grade-eased with a maximum of 1:100 grade.

A design review and shortlisting process was followed and desktop environmental advice was provided on the two shortlisted options in an environmental overview report (KMH, 2010a).

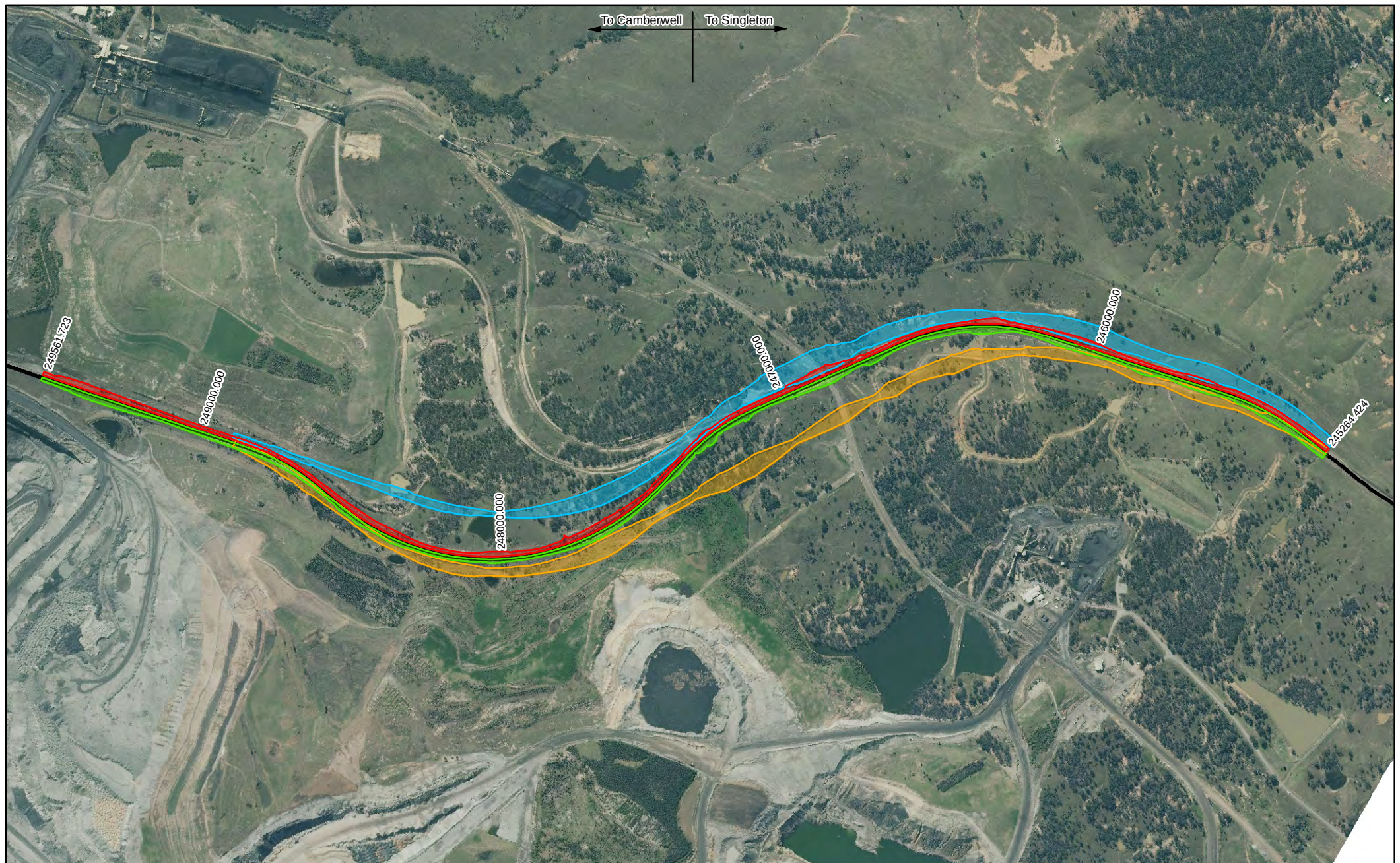
This series of options was subsequently abandoned based on revised coal contract volumes received from Hunter Valley freight operators in mid 2010. The revised coal contract volumes were substantially lower than the previous information resulting in the original nine options providing a much higher corridor capacity than required and at a cost greater than necessary.

Operational modelling of the resignalling alternative was also revised at this stage (ARUP, 2010) but confirmed again the previous findings that it would not alone be sufficient to achieve the revised forecast coal demands at the Port of Newcastle.

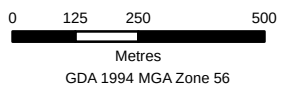
As a result, eight new design options (Options 10-18) were subsequently developed and examined to achieve the revised coal contract volumes and desired headways at the Port of Newcastle. These included four „at grade’ options and four „grade-eased’ options ranging between approximately 3.5 and 4.5 kilometres in length. Economic, environmental and engineering investigations were progressed on the revised options. Some of the key considerations are discussed in subsequent paragraphs.

Constraints posed by topography and existing infrastructure along the rail corridor had a substantial effect on the cost of implementing a proposed third track. The existing trackside signalling is located on the up side of the corridor and would be expensive to relocate as well as risk impacting on train operations during construction. Additionally, constructing the third track on the down side would avoid complicating the track configuration at the Camberwell Junction or alternatively the need for a tunnel or bridge structure reducing the amount of earthworks overall and resulting in substantial cost savings.

While achieving eight minute headways at Nundah Bank (from the current 16.5 minutes) would be consistent with other sections of the network, including south of Whittingham Junction, operational



A4 Original



- Option 10
- Option 12
- Option 14
- Option 16
- Main North Line



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Options Comparison Figure 3.2

modelling has shown that it is not necessary to achieve the forecast capacity at the port. While in future an eight minute headway over Nundah Bank may be required, modelling has confirmed that more cost-effective options will provide sufficient track capacity at this location until approximately 2015 (ARUP, 2010)

Grade-eased solutions typically provide an extra 14 million tonnes per annum (mtpa) of capacity compared to an at grade solution (ARTC, 2009a). As also discussed earlier, an at grade third track does not reduce the risk of locomotives stalling on the bank. This latter aspect was investigated further through researching historical lost capacity from trains stalling on Nundah Bank. It was determined that the difference in lost capacity was approximately 0.5 mtpa between at grade and grade-eased proposals at Nundah Bank and these levels of lost capacity would not substantially affect the overall performance of the network. Furthermore such losses have also been taken into account in operational performance modelling and therefore did not need to be considered further. Providing a grade-eased solution would result in a substantial increase in earthworks and project cost which was not commensurate with the level of operational benefits provided (ARTC, 2009a).

Shortlisted options

As a result of the feasibility investigations conducted, four options were shortlisted to be considered in further detail. They were Options 10, 12, 14 and 16 which comprised a combination of at grade and grade-eased options located both on the up and down side of the existing track. All the shortlisted options were the “short” options which achieve ten minute headways over Nundah Bank.

A Value Management Workshop was subsequently undertaken in April 2010 and attended by the UHVA design, construction and environmental personnel as well as the ARTC maintenance and operations representatives. The shortlisted options were considered and ranked by the group based on non-price criteria and price was subsequently introduced at a later stage. The workshop report containing a preferred option recommendation was presented to the ARTC in May 2010. Table 3.2a summarises the consideration of each of the four shortlisted options at the workshop. Figure 3.2 shows the four shortlisted options.

Table 3.2a Key characteristics of the four shortlisted options

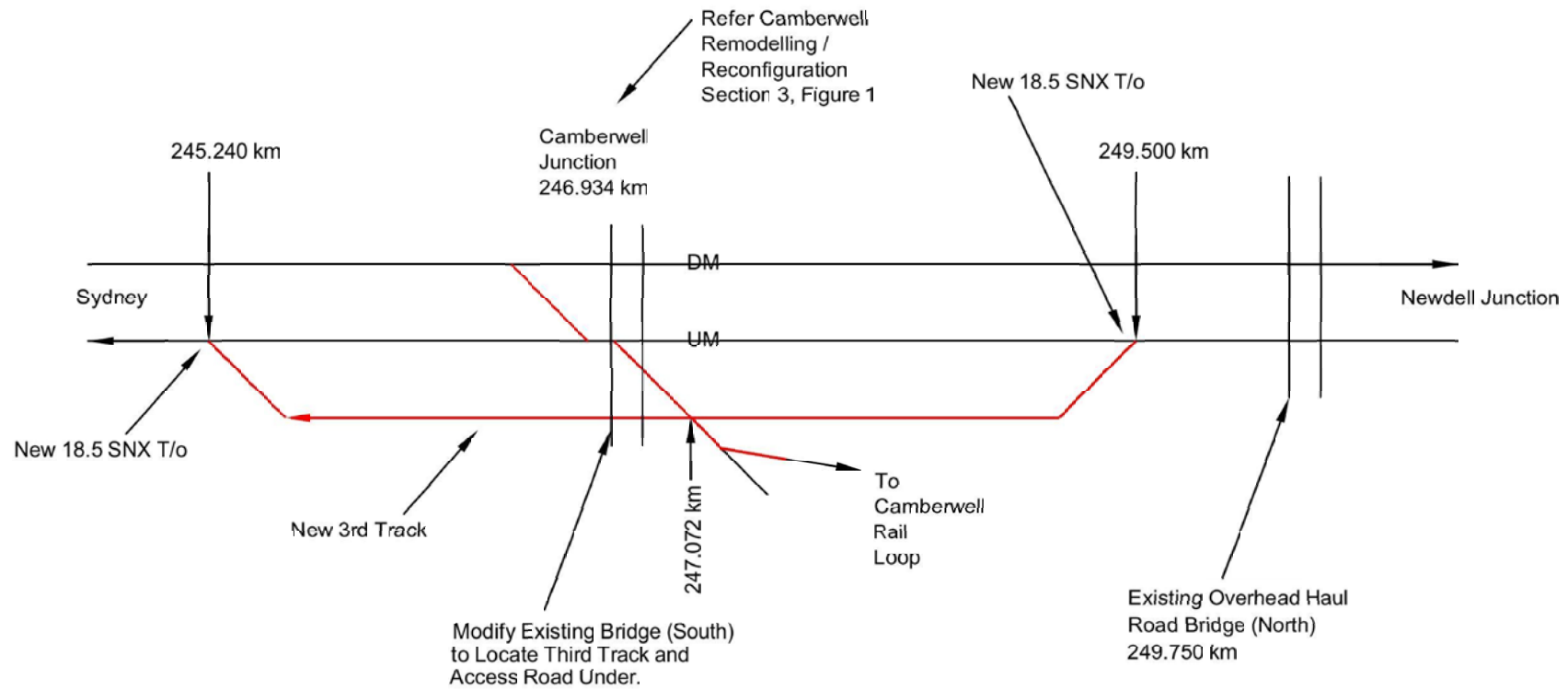
Option	Configuration	Outline scope of work	Comments/issues
10	Down side, short length, at grade	4.26km of new single track on down side. - Two reverse curves at 245.240km and 248.900km. - One new 18.5 swing nose crossing (SNX) turnout as a ladder into Camberwell Loop at 246.000km (approximately). - Two new 18.5 SNX turnouts and return curves. - Convert Down Main to Up Main and Up Main to Up Relief.	- Capital investment cost approximately \$37 million. - Steep gradients remain. Minimum train speed is 17km/h and risks locomotives potentially stalling. - Operational conflicts also identified with the coal loop - slow departing trains from the loop cause delay on the main line. - No changes at Camberwell Junction. - Minimal earthworks. - Option to extend to 6.11km in future if further reduced headway is required. - Existing Down Main would require upgrade to become new Up Main.
12	Down side, short length, grade eased	3.66km of new double track on down side. - Three reverse curves at 245.240km, 248.700km and 248.900km respectively. - One new 18.5 SNX crossover at 244.580km and three new 18.5 SNX turnouts and return curves. - Convert Down Main to Up Main and Up Main to spur (bi-	- Capital investment cost approximately \$73 million. - Vertical grade satisfies operational requirements achieving a minimum train speed of 23km/h. - No changes at Camberwell Junction. - Significant excavation and earthworks required to achieve

Option	Configuration	Outline scope of work	Comments/issues
		directional signalling).	reduced grade - approximately 289,000m³. - Option to extend length in future if further reduced headway is required but at greater cost than Option 10. - Construction works would be easier to stage and at a safer distance from the operating Up Main at the top of the bank. - More complex signalling compared to Option 10.
14	Up side, short length, at grade	4.26km new single track on up side. - Two new 18.5 SNX turnouts and return curves at 245.240km and 248.900km. - Changes at Camberwell Junction - two new 18.5 SNX crossovers and two x 18.5 SNX turnouts.	- Capital investment cost approximately \$44 million. - Steep gradients remain. Minimum train speed is 17km/h and risks locomotives potentially stalling. - Minimal earthworks – approximately 122,000m³. - Changes at Camberwell Junction. - Option to extend to 6.11kms in future if further reduced headway is required. - Requires relocation of existing trackside signalling at additional cost - Delivers new up relief and up main.
16	Up side, short length, grade eased	3.66km new single track on up side. - Two new 18.5 SNX turnouts and return curves at 245.240km and 248.900km. - Grade separation required with Camberwell Loop. New cut and cover tunnel or underbridge. - Constructability issues to be addressed.	- Capital investment cost - approximately \$83 million. - Vertical grading satisfies operational requirements achieving a minimum train speed of 23km/h. - Significant earthworks – approximately 780,000m³. - Option to extend in future. - Substantial structure required to cross the third track under the coal loop. - Major hydrology issues regarding potential alterations to existing mine drainage system. - Construction works would be easier to stage at a safer distance from the operating Up Main at the top of the bank. - Requires relocation of existing trackside signalling at additional cost. - This option achieves the same capacity as Option 14 but with a substantially higher cost.

Preferred option

Following the workshop, Option 14 was selected as the preferred option based on:

- Achievement of all the project objectives at a lower capital cost;



Legend:

Existing Track

New Track Work

- Reduced scope of civil, signalling and earthworks and overall less complexity;
- Reduced environmental and social impacts relative to Options 12 and 16; and
- It provides both a brand new up main and up relief track, which can be extended in future if required, for only a slightly higher cost than the cheapest option (Option 10).

Phase 2 of project development which commenced in May 2010 therefore focussed on advancing the preliminary and concept design of the preferred option as well as constructability issues in order to provide a suitable level of design resolution for this Environmental Assessment.

The operational characteristics of Option 14 are shown in Figure 3.3.

Other design and construction options investigated

A number of other project design and construction elements are being considered as part of the design development which is ongoing in parallel with this environmental assessment. These include:

- Site access – direct access to both ends of the worksite is desired and would be achieved through extension of an existing public road and through new road construction in the existing corridor. A number of sub-options were investigated prior to resolving the current two access points (refer Section 4.7.5);
- Camberwell Junction alterations – approach/exit speeds, turnout selection and crossing type infrastructure options were considered in detail through investigating six sub-options prior to selection of the preferred design option;
- Turnout laydown areas/ maintenance pads – provision of laydown areas approximately every 500 metres along the access track route has been included except where constraints exist. These will in future be used as maintenance pads by the ARTC if required;
- Site compound locations – ideally located within the existing rail corridor, two site compounds have been identified; both on land within the rail corridor. The primary compound would be situated on the up side at the northern end of the site near Middle Falbrook Road. Rixs Creek Lane would be extended approximately 300 metres to the east to provide construction access to the down side of the railway line and haul road. A secondary site compound would be situated near the extension of Rixs Creek Lane; and
- At grade versus existing ground level access roads – the Proposal includes provision of a maintenance vehicle access track on both the up and down sides of the existing track. The up side track exists outside the third track construction area however the down side track needs to be created. Construction of a maintenance vehicle access track on the down-side at a similar level as the rail infrastructure would require a large additional amount of earthworks. The down side access track would be constructed at existing ground level but will rise up to track level approximately every 500 metres to facilitate access to signalling infrastructure.

4. Proposal description

This section provides a detailed description of the Proposal, including details of construction, operational and maintenance activities. Table 4.1a outlines the DGRs relevant to the description of the Proposal and the location where each requirement is addressed in this section.

Table 4.1a Director-General's Environmental Assessment Requirements – key design elements

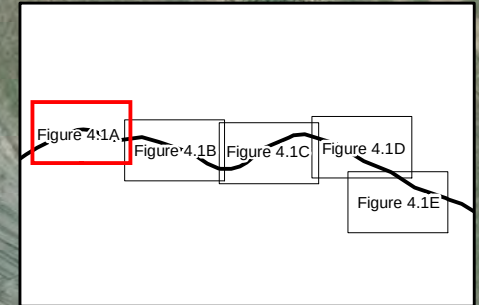
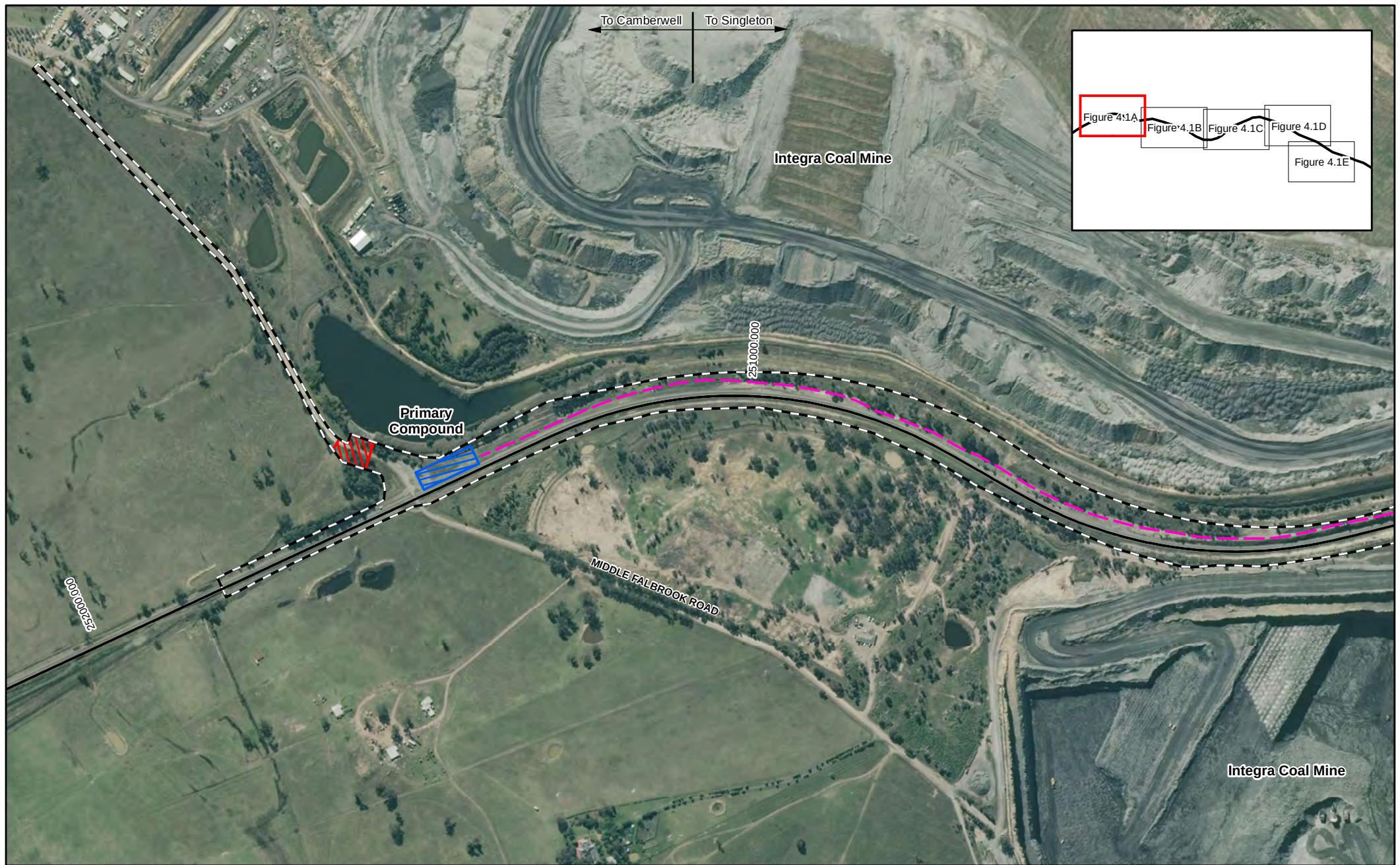
Director-General's Environmental Assessment Requirements	Location addressed
General Requirements	
A detailed description of the project including: - Location, site description, corridor, adjoining land uses (current and proposed) and planning context - Key design elements of the project, including: - Key operational components (track components, signalling systems etc) - Ancillary operational components (access tracks, bridging structures, vehicular access). - Public and private property and infrastructure interactions. - Operational characteristics, including predicted rail corridor capacity, rail traffic frequency and interactions with and opportunities for increased general freight and passenger trains. - Construction facilities and resources, including construction compounds, lay-down areas, spoil/fill quantities, stockpiling/management areas and haul roads, and water use. - Project staging and timing (if proposed).	Section 1.1, Section 2.6.2, Section 4.1, Section 4.4 and Section 7.6.2 Section 4.2 and Figures 4.1A-E Section 4.3 Section 4.4 and 7.6 Section 4.8 Section 4.7, Section 7.9 and Figure 7.9 Section 4.7.1

4.1. Overview of the proposal

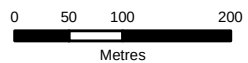
The Proposal is to construct, operate and maintain an approximately 4 kilometre section of new third track and ancillary infrastructure adjacent to the existing Main North Line at Nundah Bank. The Proposal comprises the following key elements/ activities which are described further in this section and shown in Figure 4.1A-E:

- Provision of new maintenance vehicle access tracks on both sides of the rail corridor;
- Relocation and installation of signalling infrastructure;
- Removal and extension of existing track drainage structures;
- Permanent acquisition of approximately 20.6 hectares of land from three landowners resulting in a subsequent change in use of that land;
- Changes to the configuration of the Camberwell rail loop;
- Establishment of construction facilities including site compounds, accessways and ancillary facilities; and
- Establishment of a biodiversity offset to compensate for the residual effects of vegetation clearing resulting from the Proposal.

No blasting would be required during construction of the Proposal.



A4 Original



GDA 1994 MGA Zone 56



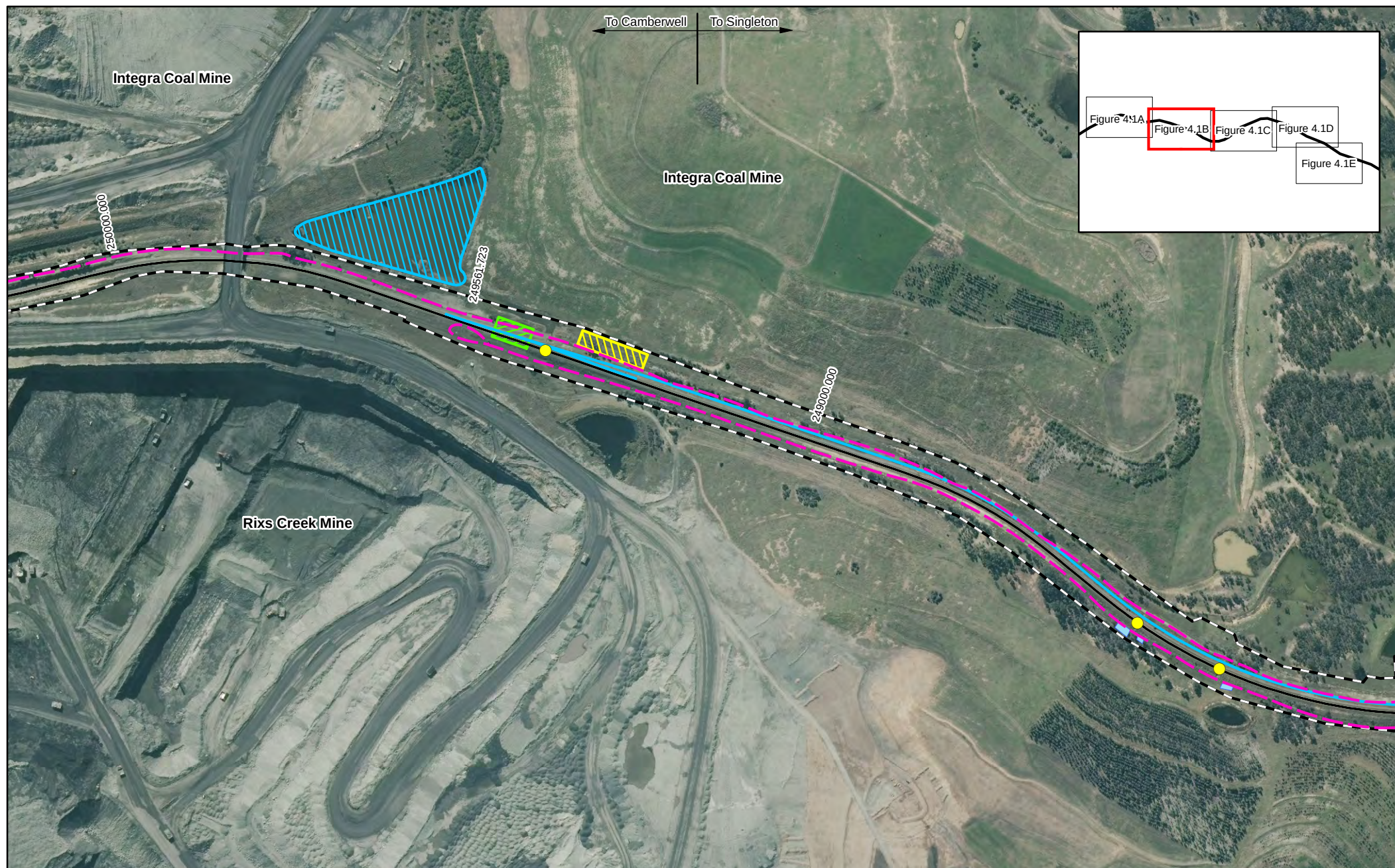
Culvert	Middle Falbrook Road Bridge	Dam to be Modified
Access Tracks	Compound	Sediment Dam
Third Track Alignment	Stockpile	Proposed Impact Area
Existing Alignment	Turnout	



ARTC
Nundah Bank

Job Number	2110501B
Revision	A2
Date	16.02.11
Scale	1:7,000

Key Project Features **Figure 4.1A**



A4 Original

0 50 100 200
Metres
GDA 1994 MGA Zone 56



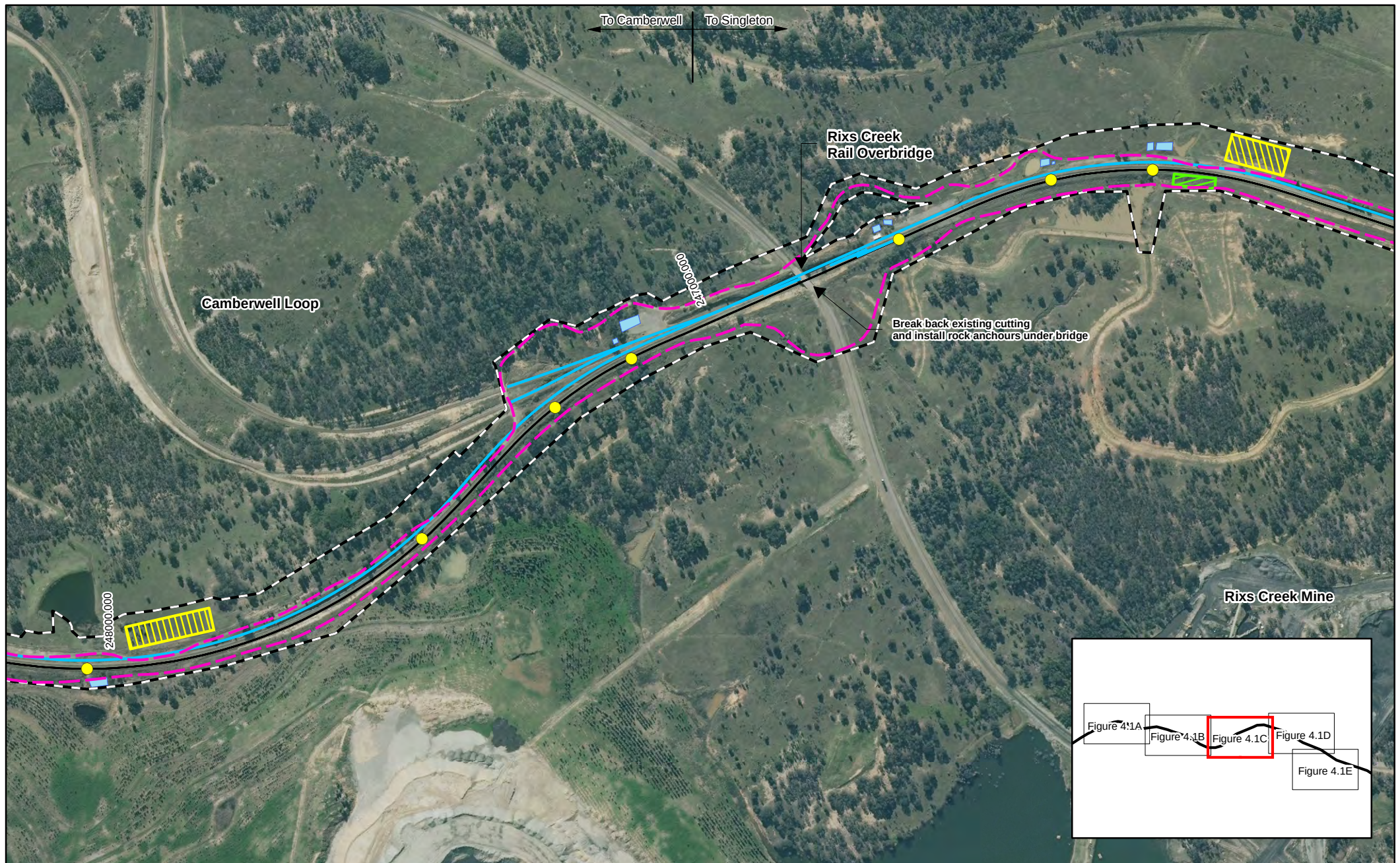
- | | | |
|-----------------------|-----------------------------|----------------------|
| Culvert | Middle Falbrook Road Bridge | Dam to be Modified |
| Access Tracks | Compound | Sediment Dam |
| Third Track Alignment | Stockpile | Proposed Impact Area |
| Existing Alignment | Turnout | |



ARTC
Nundah Bank

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

Key Project Features **Figure 4.1B**



A4 Original

0 50 100 200
Metres
GDA 1994 MGA Zone 56



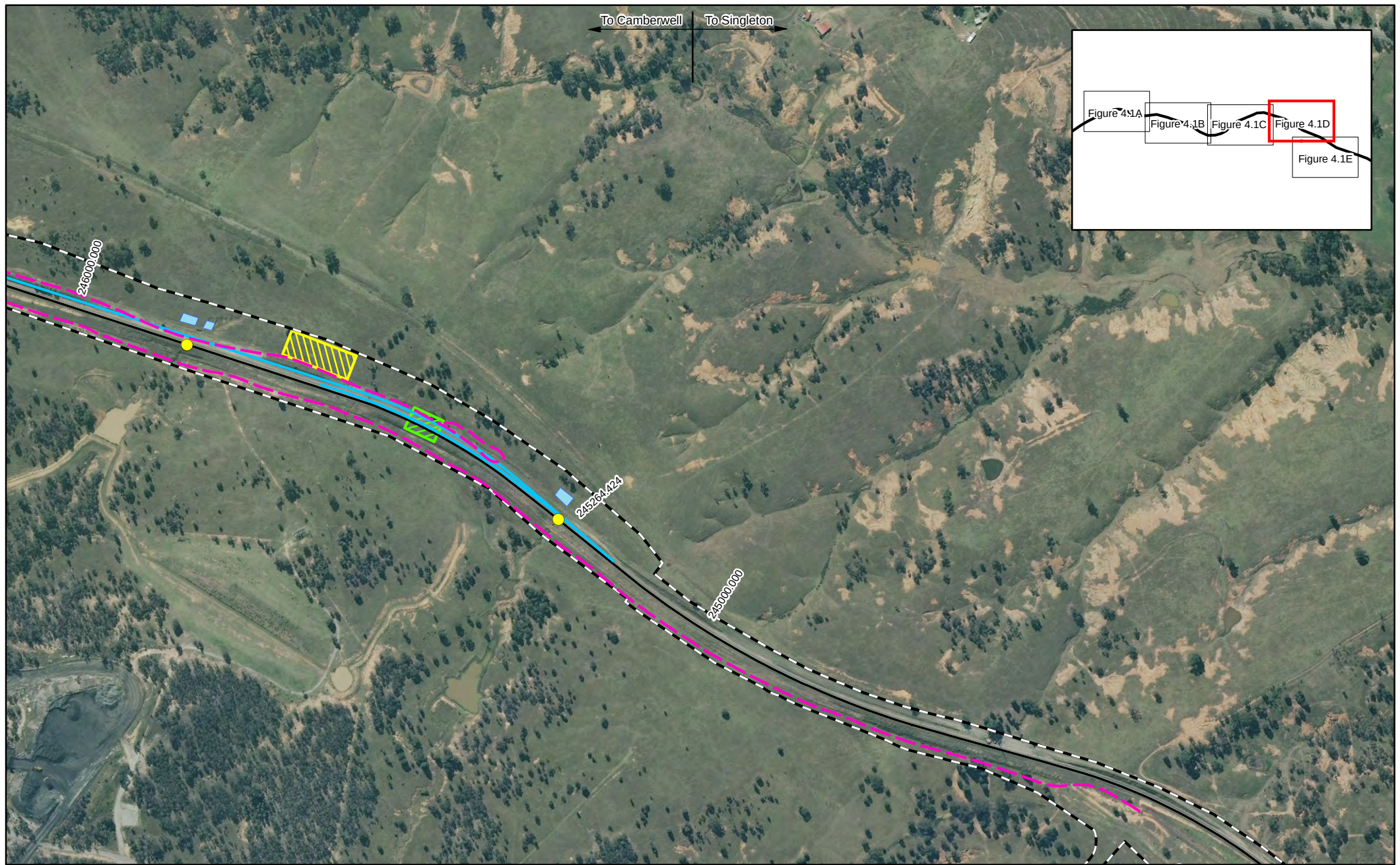
- | | | |
|---|---|--|
| ● Culvert | Middle Falbrook Road Bridge | Dam to be Modified |
| — Access Tracks | Compound | Sediment Dam |
| — Third Track Alignment | Stockpile | Proposed Impact Area |
| — Existing Alignment | Turnout | |



ARTC
Nundah Bank

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

Key Project Features **Figure 4.1C**



A4 Original

0 50 100 200
Metres

GDA 1994 MGA Zone 56



- | | | |
|---|--|---|
| ● Culvert | ▨ Middle Falbrook Road Bridge | ▨ Dam to be Modified |
| — Access Tracks | ▨ Compound | ■ Sediment Dam |
| — Third Track Alignment | ▨ Stockpile | □ Proposed Impact Area |
| — Existing Alignment | ▨ Turnout | |



ARTC
Nundah Bank

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

Key Project Features **Figure 4.1D**



A4 Original

0 50 100 200

Metres

GDA 1994 MGA Zone 56



- | | | |
|-----------------------|-----------------------------|----------------------|
| Culvert | Middle Falbrook Road Bridge | Dam to be Modified |
| Access Tracks | Compound | Sediment Dam |
| Third Track Alignment | Stockpile | Proposed Impact Area |
| Existing Alignment | Turnout | |



ARTC
Nundah Bank

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

Key Project Features

Figure 4.1E

4.2. Key operational components

4.2.1. Track configuration

The proposed third track would comprise approximately 4 kilometres of new at grade track on the up side parallel to the existing Main North Line. The track would be located between approximate chainages 245 and 249 kilometres. Track centres would generally be 7.5 metres apart, however where infrastructure restrictions exist, such as at the Rixs Creek overbridge (refer Section 4.3.2), track centres would be reduced to 4.5 metres. Figure 4.2 presents a cross-section of the Proposal showing the proposed new third track infrastructure.

Swing nose turnouts would be installed at each end of the third track to facilitate a turnout speed of 60 to 80 kilometres per hour. The new track would be designed to allow coal trains to travel at 80 kilometres per hour and passenger trains to travel at 90 kilometres per hour.

The Camberwell Junction would be reconfigured with two new turnouts and two crossovers to allow continued access to and from the Camberwell Rail Loop following construction of the Proposal.

4.2.2. Signalling

Existing signalling is located parallel to the alignment of the existing up side track and would need to be decommissioned to make way for the construction of the proposed new third track and ancillary infrastructure. New signalling infrastructure would be installed within the rail corridor on the down side.

The decommissioning of existing signalling infrastructure would occur between approximate chainages 243 kilometres and 252 kilometres. One of the existing trackside signal huts on the up side, the Camberwell relay room at approximately 246.745 kilometres, would be demolished.

The installation of new signalling infrastructure on the down side would involve trenching and laying conduits and pits from approximate chainage 245 kilometres to 251 kilometres and installing walk-in signal huts and signal location cases. Signal location cases and walk-in huts house telecommunications equipment and switchgear.

Signals would be installed at the standard three metres from the rail edge and signal posts located at 500 metre intervals. The existing Camberwell relay room would only be demolished after commissioning the new huts and Camberwell Rail Loop.

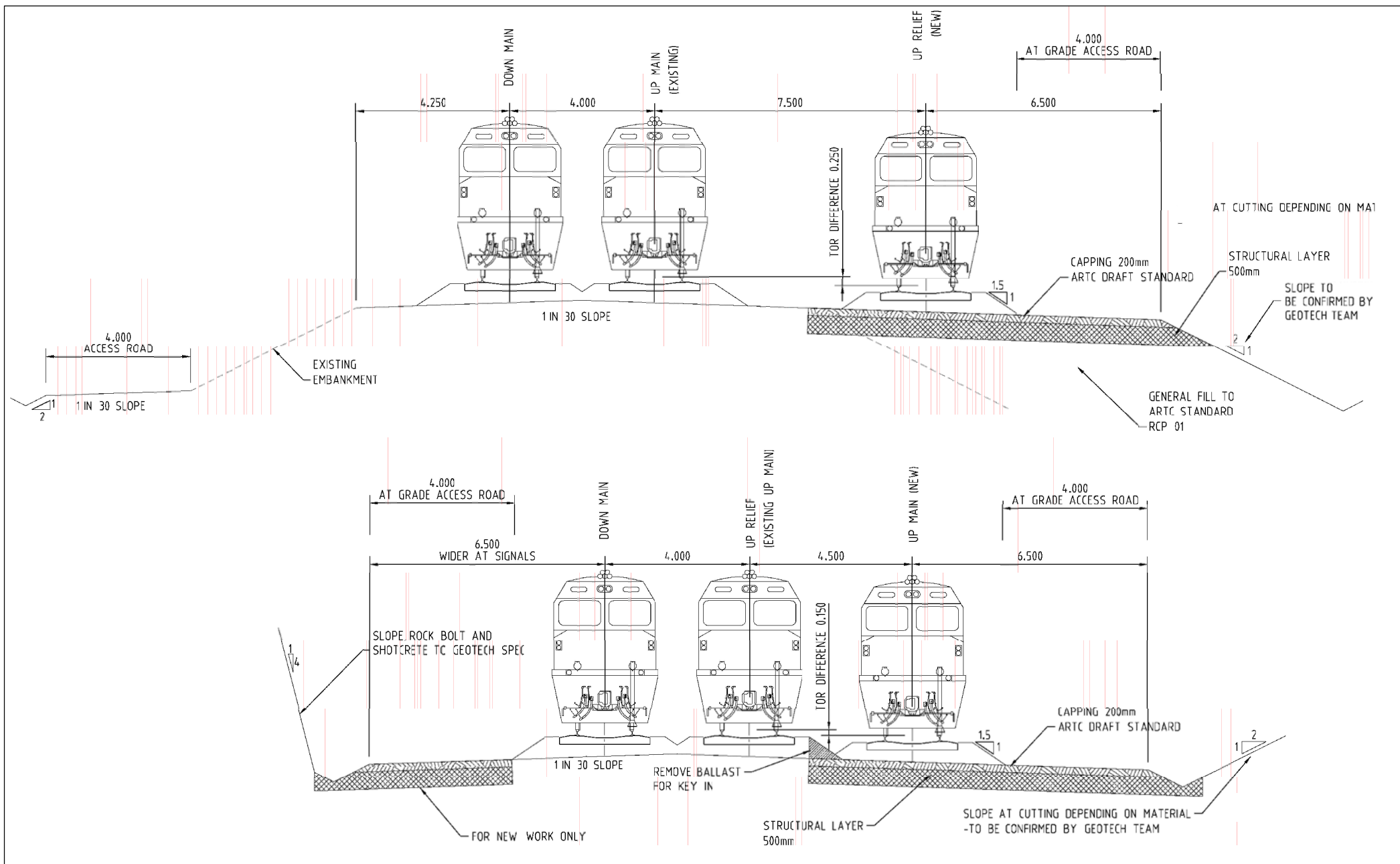
Walk-in signal huts would be installed at the following locations:

- One 6 metre x 3 metre hut at approximate chainage 245 kilometres on the down side;
- Two 4 metre x 3 metre huts at approximate chainage 246 kilometres on the down side;
- One 6 metre x 3 metre hut at approximate chainage 247 kilometres on the up side; and
- One 6 metre x 3 metre hut at approximate chainage 249 kilometres on the down side.

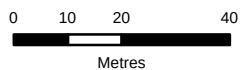
The signal huts would be mounted on steel skids and bolted to a concrete slab that would be laid during ground preparation. The huts would be constructed of prefabricated colourbond panel and be delivered on a flat bed truck.

Double width signal location cases would be installed at approximate chainage 247 kilometres and two at approximate chainage 248 kilometres. Single width location cases would be installed at approximate chainages 247, 248 and 249 kilometres. Where required, access would be provided from the location cases to the access track if the location cases are not at the same level via stairs made of galvanised iron or concrete, etc.

There would be a number of locations where underboring would be required beneath the tracks to provide signal cable connections to infrastructure located on the up side or in the middle of the tracks.



A4 Original



Proposed Third Track Works



ARTC
Nundah Bank

Job Number	2110501B
Revision	A1
Date	09.02.11
Scale	NA

Cross Sections of Proposed Third Track Works Figure 4.2

4.3. Ancillary operational components

4.3.1. Maintenance vehicle access tracks

ARTC safety standards require that for a three track configuration, a maintenance vehicle access track is provided on both sides of the rail infrastructure to facilitate access for inspection and maintenance activities.

On the up side, the third track would be constructed in the location of the existing vehicle access track and a new track would be provided adjacent to this. On the down side, the maintenance vehicle access track would be constructed between the existing down main and the signal walk-in huts and location boxes. Both vehicle access tracks would be partially located on private land to be acquired as part of the Proposal (refer Section 4.4 and 7.6.6).

During construction, the future maintenance access tracks would be used as haul roads to limit unnecessary vegetation removal and other environmental impacts. Provision has been made for turnout/laydown areas to be located approximately every 500 metres along the maintenance vehicle access tracks to access to signalling infrastructure. Further details of earthworks are provided in Section 7.8.

4.3.2. Rixs Creek rail overbridge

The Rixs Creek rail overbridge is located at approximate chainage 246 kilometres and facilitates the transport of coal via truck between Rixs Creek Mine and the coal loader located at the Camberwell Rail Loop.

The overbridge spans the existing railway and needs to be modified to allow the additional infrastructure to be constructed.

The modifications include structural changes to the bridge supports as well as excavating the rock cutting and installing rock anchors. As mentioned in Section 4.2.1, the spacing between the existing and third track would be reduced to 4.5 metres to reduce the scope of modifications required to the bridge.

4.3.3. Upgrade of Station Creek Bridge

Station Creek is located along Middle Falbrook Road and is crossed by a small, single lane wooden bridge (refer Photo 4.3a). Initial assessment of the bridge indicates that it would require a structural upgrade to carry the proposed construction loads, although the current proposal is to span the existing structure using steel plates or girders so that the bridge is unaffected. Further assessment would be carried out as part of ongoing concept and detailed design to determine the exact scope of upgrade works required in consultation with Singleton Council.

Photo 4.3a Station Creek Bridge



4.4. Property acquisition

To enable the construction of the third track and ancillary infrastructure, land would need to be acquired from private properties on both sides of the existing rail corridor. Additional land would be leased during construction for temporary stockpiling and environmental management measures. Such measures would include the design and installation of erosion and sediment controls detailed in Section 7.8.4.

A right-of-way easement would also be created for the extension of Rixs Creek Lane to the rail corridor on the down side to be used for construction vehicle access. The easement would be created over land currently owned by Rixs Creek mine.

Table 4.4a provides a summary of land that would be temporarily leased during construction and permanently acquired for the operation of the railway. These areas may be further refined as part of ongoing concept and detailed design.

Table 4.4a Summary of land acquisition

Land acquisition	Approximate area (Hectares)
Total land to be permanently acquired for railway operations	20.6
Total land to be leased temporarily during construction	2.7

Further details and figures showing affected properties are provided in Section 7.6.6.

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.

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 gazetted in accordance with the *Standard Instrument (Local Environmental Plans) Order 2006*.

4.5. Water storages, drainage and construction water

Three water storages associated with neighbouring land have been identified as being potentially affected by the Proposal. The first is located at approximate chainage 246.329 on the down side and the second at approximate chainage 249.700 on the up side (refer Figure 7.5 in surface and water quality section). 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 second water storage 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. The third water storage is at approximate chainage 248.000 and is also part of Integra's water system. Negotiations are continuing with Integra to use the water from this storage for construction purposes.

Twelve drainage culverts beneath the corridor would be extended beneath the third track and proposed access track. These culverts range from approximately 900 millimetres in diameter to 1.2 x 1.2 metre box culvert structures. Some existing ribbed galvanised iron pipes would be demolished to facilitate construction of the culvert extensions. Further detail regarding the existing drainage culverts and the proposed scope of alterations is provided Section 7.5.

Construction water would also be sourced from Integra Coal's mine water management system. Integral Coal has indicated that up to six megalitres per year could be made available. Testing would

be performed prior to use to ensure the quality is appropriate for activities such as dust suppression, fill compaction, etc. Additional water, if required, would be sourced from on site sediment control facilities.

There are no licensed groundwater bores in the vicinity of the Proposal and no groundwater extraction would be required for construction purposes.

4.6. Services and utility adjustments

Services in the vicinity of the Proposal include rail-related signalling (refer Section 4.2.2), electrical cabling and a Telstra cable. The Telstra cable crosses the track from the down side to the up side at 247.350 kilometres. The cable continues along the up side until 249.500 kilometres where it crosses back to the down side.

An Energy Australia high voltage overhead power line crosses the corridor at chainage 246.600 kilometres. One pole and stay wire would be relocated to make way for the proposed third track and vehicle access track. Energy Australia has committed to undertaking preliminary design and obtaining necessary approvals for the required relocation works.

All services and utilities relocations/ adjustments would take place in the first nine months following the site establishment and mobilisation phase.

Telecommunications and electricity would be provided to compound yards via existing Telstra, Railcorp and Energy Australia infrastructure in the area. Satellite dishes and generators would be used for telecommunications and electricity to compound yards and amenity buildings isolated from existing infrastructure.

4.7. Construction

4.7.1. Outline program

Subject to planning approvals, construction of the Proposal would commence in the third quarter of 2011 and last for approximately 18 months. Details of the key construction phases are shown in the outline program in Table 4.7a. Not all phases are discrete and some activities may overlap or be conducted in parallel with others. Not shown in the outline program are a number of track possessions which will be required to install critical operational components such as upgraded and new turnouts, track crossovers, etc.

Table 4.7a Outline construction program

Work phase	3Q11	4Q11	1Q12	2Q12	3Q12	4Q12
Mobilisation and site establishment						
Construction of access tracks and haul roads						
Earthworks and civils						
Formation and track construction						
Signalling						
Commissioning and handover						

4.7.2. Construction methodology

The outline construction methodology is summarised in Table 4.7b and the key construction activities conducted in each main work phase described thereafter.

Table 4.7b Indicative construction activities

Work phase	Activity
Mobilisation and site establishment	- Undertake land acquisition and fence site boundaries - Install environmental controls

Work phase	Activity
	• Install traffic signage for site ingress/egress • Isolate work areas from live rail corridor • Conduct survey • Conduct geotechnical investigations
Construction of site compounds, access tracks and haul roads	• Establish site compounds • Construct extension of Rixs Creek Lane to rail corridor • Clear vegetation where haul roads and third track are to be constructed • Upgrade existing wooden bridge on Middle Falbrook Road • Adjust services and utilities
Earthworks and civils	• Strip and stockpile topsoil • Extend existing culvert structures for new third rail track • Bulk earthworks • Cut back rock batters to widen existing cuttings • Install rock anchors to support existing bridge abutments at Rixs Creek Mine overbridge • Import, place and compact structural fill, capping material and ballast for construction of rail track formation • Construct cess drains / open channels • Install new turnouts and crossovers during track possessions • Install sleepers and rail for new third track
Signalling	• Locate signalling on the up side • Undertake trenching • Lay cables on the down side • Install signal huts and location cases • Decommission signalling on the up side and demolish Camberwell relay room
Testing and commissioning	• Test and commission railway systems and signals • Hand over new third track to the ARTC
Demobilisation	• Remove site compounds • Landscape and rehabilitate affected areas • Remove environmental controls • Remove site related traffic signage

Mobilisation and site establishment

A range of preparatory activities would be conducted to delineate the site and identify and establish key work areas. If not already completed during pre-construction, all land acquisition and leases would be finalised to enable possession of the site. Survey works would be undertaken to identify key work areas, establish the site control system and the project boundaries. Fencing would be undertaken to delineate the site boundaries and to separate the works areas from the live rail corridor. Traffic directional signage would be installed and geotechnical investigations commenced.

The location of the new third track, haul roads and access tracks would be identified and the areas cleared of vegetation in readiness for construction. Environmental and traffic management controls would be installed ahead of the main civil works.

Construction of site compounds, access tracks and haul roads

Two site compounds would be established to provide facilities to support construction activities, one on either side and at either end of the rail corridor. The primary site compound would be situated on the up side at the northern end of the site near Middle Falbrook Road. This compound would be

located inside the existing rail corridor with vehicular access off Middle Falbrook Road. The secondary compound would be located at the end of the proposed Rixs Creek Lane extension on the down side within the rail corridor. Further detail regarding the compounds is provided Section 7.9. The location of site compounds is shown on Figures 4.1A and 4.1E.

Haul roads would be constructed on both sides of the corridor, parallel to the existing tracks, to enable construction traffic to move independently on either side without the need for a rail crossing.

Necessary strengthening works would be undertaken at the location of the wooden bridge over Station Creek on Middle Falbrook Road to ensure construction traffic can safely cross Station Creek.

Earthworks and civils

Topsoil stripping of the area where the new infrastructure would be located would be undertaken in 200 - 300 metre lengths so that large areas of stripped soil are not left exposed for any longer than necessary. This would minimise wash out of soils during wet weather or dust generation during dry windy periods. Imported structural fill and capping would be placed and compacted in stages as the stripping, cut and fill operations progress. Earthworks are likely to proceed from north to south along the route.

A borrow pit would be excavated at approximate chainage 245264 kilometres to allow for the construction of the embankment.

The cutting beneath the Rixs Creek Mine overbridge would be widened for the new infrastructure using excavators fitted with hydraulic hammers prior to installing rock anchors to stabilise the bridge abutments.

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 the spoil quality. However the offsite movement of spoil, should it be required, does not form part of the Proposal. Further discussion of the geology and soils and mitigation measures to limit potential for erosion and sedimentation are provided in Section 7.8. Proposed stockpile locations are shown in Figures 4.1A-E.

The approximate volume of earthworks for each material type is outlined in Table 4.7c.

Table 4.7c Approximate earthworks volume

Material	Approximate volume (cubic metres)	Description
Topsoil	9,500	Topsoil would be stripped from the location of haul roads and the third track formation. Topsoil would be stockpiled within the construction site and used to top dress exposed areas at the completion of construction.
Cut	101,000	Cut material would be hauled to on site stockpiles or to areas where fill is required.
Fill	49,000	Fill material would be hauled to on site stockpiles or to areas where fill is required.
Structural fill	40000	Structural fill would utilise virgin cut material or be imported from local quarries in the Hebden and Muswellbrook area and from other quarries within the Hunter Valley via Bridgman and Middle Falbrook Road. Haulage would be via truck & dog and would enter the site on the down side.
Capping	14,000	As per description of structural fill above
Ballast	19,000	As per description of structural fill above
Total	232,500	

Approximately 4 kilometres of sleepers and rail would be laid for the new third track. Installation of the majority of the third track would occur during normal working hours following completion of earthworks, however operationally critical works would be installed during track possessions (refer Section 4.7.4).

Activities to be undertaken during track possessions would include:

- Removal of existing track and sleepers;
- Reconditioning of formation where tracks have been removed;
- Installation and commissioning of turnouts and crossovers;
- Tamping and ballast regulation; and
- Installation and commissioning of signals.

Five track possessions have been identified and proposed to be used between November 2011 and November 2012. Generally, each track possession is expected to be 72-84 hours in duration with works being undertaken on a 24 hour basis throughout this period to ensure that the railway can be handed back to the ARTC in time for resumption of normal train operations.

These, and other out of hours works, would not be undertaken near residential areas, however the works would be subject to separate approvals adopting the process outlined in the ARTC's EPL 3142.

Signalling

The existing signalling along the alignment is located on the up side of the railway corridor and is situated where the new third track would be constructed. Hence, this signalling equipment would be re-constructed on the down side prior to the up side signalling being decommissioned.

Testing and commissioning

Following completion of construction, various elements of the new infrastructure would be tested to ensure the required quality and design tolerances have been achieved and to confirm performance within the required operating parameters. The commissioning phase of the new signalling infrastructure would be a particularly crucial aspect of this phase given the complexity of the signalling network and consequences of signal failure. Following successful completion of the commissioning phase and the rectification of any identified material defects, the new third track infrastructure would be handed over to the ARTC.

Demobilisation

Following completion of construction, exposed areas would be progressively rehabilitated and once the infrastructure has been handed over to the ARTC, demobilisation would occur with the removal of site compounds, fencing, signage and temporary facilities. Any temporary environmental controls would also be removed.

4.7.3. Plant and equipment

A range of plant and equipment would be required for the various construction activities and phases.

Table 4.7d lists the plant and equipment that are likely to be used on the Proposal. Not all equipment listed would be utilised at once or at a single location.

Table 4.7d Construction plant and equipment

Plant/equipment	Number	Application
Graders	2	Trimming of access tracks, structural fill and capping layers
20 tonne (t) excavators	3	Excavating topsoil and cut material, loading tip trucks
30t excavators	3	Excavating topsoil and cut material, loading tip trucks
40t excavators	2	Digging and breaking out rock from cuttings
40t excavators with hammer	2	Breaking rocks from cuttings
5t excavator	2	Small excavations, trenching for culvert extensions
Loader	2	Loading quarry material on site
Bulldozers	3	Stripping topsoil, pushing/placing fill, structural fill and capping
Backhoe	1	Trenching and general works

Plant/equipment	Number	Application
Bobcat	1	General site works
Tip trucks	4	Hauling material around the site
Articulated dump trucks	6	Hauling material around the site
Truck and dog	10+	Importation of structural fill, capping and ballast
Franna cranes	3	Lifting precast culverts, turnouts and culverts
Mobile crane	1	Lifting turnouts and crossovers
Rollers	4	Compaction of access track and formation materials
Drilling rig	1	Installation of rock anchors
Concrete trucks	4+	Delivery of concrete for culvert structures
Tamper	1	Tamping of track ballast
Ballast regulator	1	Regulates and profiles ballast
Front end loaders	2	Movement of material and loading

4.7.4. Construction workforce and work hours

It is anticipated that between 30 and 120 staff would be on site at any one time. During site establishment there would be approximately 30 staff. This number would peak at around 120 staff during bulk earthworks operations and track possessions.

Works would generally be undertaken during standard construction hours:

- 7am to 6pm Monday to Friday;
- 8am to 1pm Saturday; and
- No works on Sundays or public holidays.

Construction work which may be required to be undertaken outside of the above standard work hours would include:

- Track possessions;
- Works undertaken by utility service providers; and
- Oversize deliveries, unloading of machinery or any other emergency work required or as stipulated by the RTA/ police for safety reasons.

Any work proposed to be conducted outside of the standard work hours would be subject to a separate approval and following the process outlined in the ARTC's EPL 3142.

4.7.5. Construction traffic and access

Figure 7.6 shows the proposed locations of the two site compounds and construction access and haulage routes.

The majority of construction vehicles would enter the site via Bridgman, Stony Point and Middle Falbrook Roads. Some construction traffic would also enter the site via Rixs Creek Lane for down side access. Rixs Creek Lane would be extended to enable construction access to the down side of the railway line.

The road extension from Rixs Creek Lane would be constructed from compacted crushed rock. Water carts would be used where necessary to control dust created by construction traffic on this road.

Construction traffic would include light vehicles (workers travelling to and from site at the start and finish of shifts), semi trailers delivering construction plant and equipment, „truck and dogs’ delivering quarry materials and mobile cranes.

The anticipated maximum number of light and heavy vehicles entering the construction site during different phases of construction is provided in Table 4.7e.

Table 4.7e Anticipated maximum construction traffic volumes

Construction traffic type	Volume per day
Light vehicles	
Average (peak) number of light vehicles entering via Middle Falbrook Road	50 (80)
Average (peak) number of light vehicles entering via Rixs Creek Lane	20 (30)
Heavy vehicles	
Average peak number of heavy vehicles entering via Middle Falbrook Roads	40 (45)
Average peak number of heavy vehicles entering via Rixs Creek Lane	10 (20)

Note: Average volumes represent the number of vehicles entering the site on a typical working day. Peak volumes represent the number of vehicles entering the site during track possessions throughout the construction period.

Further details regarding traffic movements, potential impacts on surrounding land uses and mitigation measures are provided in Section 7.6.

4.7.6. Construction environmental management

Concurrent with any planning approval granted, the Minister for Planning may specify conditions to enhance the benefits and manage the impacts of the Proposal. These conditions would be drafted having regard to the ARTC's Statement of Commitments (refer Section 9.1) as well as the Construction Environmental Management Framework provided (refer Section 9.2 and Volume 3 Technical Paper 5).

A project construction environmental management plan (PCEMP) would be established for the construction phase of the project. The PCEMP would provide the framework for the management of all potential environmental and social impacts resulting from construction activities. The PCEMP would outline the environmental mitigation and management measures to be implemented during the construction phase and would document mechanisms for demonstrating compliance with the Minister for Planning's Conditions of Approval, other relevant project approvals and the Statement of Commitments. The PCEMP would also set out an auditing and inspection framework for the site.

An outline structure of the PCEMP is provided in Section 9.2.5 along with a strategy for managing potential impacts from site compounds, construction noise, construction traffic and earthworks.

4.8. Operation and maintenance

4.8.1. Corridor capacity

The total capacity of the corridor would vary on a daily basis and is subject to a number of operational factors. Table 4.8a outlines the maximum capacity achievable based on assumptions regarding these key operational parameters.

Table 4.8a Maximum operating capacity at Nundah Bank

Operational aspect		Existing Up Main only with tonnage signal (existing situation)	Existing Up Main only without tonnage signal	Existing Up Main with the new third track
a	Headway on the bank (minutes)	15	12	10
b	Minutes per day	1440	1440	1440
c	Absolute paths per day	96	120	144
d	Coal paths utilised by non-coal trains	28	28	28
e	Maximum available coal paths per day	68	97	116
f	Paths lost to junction conflicts at Mt Owen Junction and Camberwell Junction	12	12	12

Operational aspect		Existing Up Main only with tonnage signal (existing situation)	Existing Up Main only without tonnage signal	Existing Up Main with the new third track
g	Coal train paths that can be planned in the timetable without considering train moving off impacts	56	85	104
h	Paths lost due to the impact of train moving off time	0	0	0
i	Coal train paths that can be planned in the timetable	61	85	104
j	Average train net weight	7200	7200	7200
k	Nominal days of operation a year	365	365	365
l	Path utilisation index	75%	75%	75%
m	Train cancellation	0	0	0
Theoretical coal capacity (Mtpa)		110.4	168.0	205.0

Source: ARUP, 2010

Note: Assumes 365 operating days per year, no allowance for cancellations.

As discussed in Section 2, the required capacity for this section of track in 2018 is 191mtpa which is only achieved with implementation of the Proposal.

Table 4.8b shows the existing and proposed number and type of trains that are expected to use the infrastructure following completion.

Table 4.8b 2010 and 2018 train forecast at Nundah Bank

Train type	Train pass bys per 24 hours					
	2010 (Existing)			2018		
	Day	Night	Total	Day	Night	Total
	7am-10pm	10pm-7am	24-hour	7am-10pm	10pm-7am	24-hour
Freight (coal and non-coal)	54	32	86	127	76	204
Passenger	4	2	6	4	2	6
Total	58	34	92	131	78	210

Source: ARTC 2010b

Maintenance activities

During operation of the project, a variety of maintenance activities would be undertaken by the ARTC using the constructed access roads and maintenance tracks. Minor maintenance works would usually be undertaken without disruption to rail services. More substantial capital or maintenance activities would be undertaken during rail possessions and over consecutive 24 hour periods. Maintenance activities would include:

- Rail welding, grinding or re-railing;
- Tamping or ballast regulation;
- Track re-conditioning/ resleepering;
- Ballast cleaning;
- General maintenance of drainage structures, access tracks or embankments including weed and vegetation management; and

- Signalling maintenance.

These works would be undertaken in accordance with the ARTC's standard environmental management measures and the ARTC Code of Practice for Environmental Impact Assessment of Development Proposals in New South Wales (ARTC, undated).

5. Stakeholder consultation

This section details the approach adopted to consultation and the activities undertaken for the Proposal. Table 5.1a outlines the DGRs relating to consultation and where they have been addressed in this section.

Table 5.1a Director General's Environmental Assessment Requirements – Consultation

Director General's Environmental Assessment Requirements	Where addressed
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): - Local, State or Commonwealth government authorities including: - Department of Planning (Heritage Branch); - Department of Environment and Climate Change and Water (including the NSW Office of Water); - NSW Department of Industry and Investment - Transport NSW - NSW Mine Subsidence Board - Singleton Shire Council; - Service and infrastructure providers including - NSW Roads and Traffic Authority; - RailCorp; and - Country Rail Infrastructure Authority; - Specialist interest groups including Local Aboriginal Land Councils and minerals related stakeholders; - The public, including adjoining and affected landowners and businesses (e.g. Integra Coal and Rix's Creek mines). The Environmental Assessment must describe the consultation process undertaken and identify the issues raised (including where these have been addressed in the document).	Section 5.1.5 Section 5.1.5 Section 5.1, Section 5.1.6, Section 7.1 and Volume 2, Technical Paper 1. Section 5.1.5 and Section 5.1.6 Section 5.1 and Section 5.1.5

5.1. Stakeholder and community involvement plan

A stakeholder and community involvement plan was developed and implemented for the Proposal and included the following key elements:

- Identification of the communication and consultation needs and aspirations of stakeholders and the community;
- Identification of the communication tools required to meet those needs and aspirations; and
- Defining the responsibility and timing of consultation/communications.

Throughout the development of the Proposal design, the stakeholder and community involvement plan was revisited at regular intervals. To implement the stakeholder and community consultation plan, a number of tools and activities were utilised and are detailed below.

Consultation with the Aboriginal community was undertaken via the field surveys conducted and reporting process as part of the Aboriginal heritage impact assessment (refer Section 7.1 and Volume 2, Technical Paper 1).

5.1.1 Objectives

The objectives of the consultation undertaken for the Proposal were to:

- Provide information about the Proposal and the planning approvals process to potentially affected landowners and other key stakeholder groups including the wider community;

- Provide stakeholders and the community with the opportunity to express their views about the Proposal;
- Understand stakeholder and community issues, values and concerns related to the project; and
- Incorporate stakeholder and community issues into each phase of investigation, from consultation on the design to the development of the environmental assessment report.

5.1.2 Tools and activities

Consultation activities commenced in July 2010 at the start of the concept design and environmental assessment process. This involved a variety of communication tools which were tailored to the interests and needs of the specific groups. A summary of the tools that were implemented, the stakeholders targeted and the purpose of the consultation is provided in Table 5.1b.

Table 5.1b Consultation tools

Activity	Stakeholder targeted	Purpose of consultation
Director-General's Requirements	Government agencies	To seek technical advice and comment regarding the project key issues to inform the Director-General's requirements.
Aboriginal consultation	Local Aboriginal Land Council and local Aboriginal Groups	To identify interested parties and seek their involvement and expertise in conducting an accurate assessment of impacts and appropriate mitigation measures. Consultation was undertaken in accordance to DECCW's <i>Aboriginal cultural heritage consultation requirements for proponents</i> , 2010.
UHVA 1800 information line	Landowners and the general public	A 1800 number is in place for all UHVA projects. This number was used throughout the environmental assessment process to capture community enquiries for the Proposal. All calls to the 1800 number are responded to within 2 hrs or the next business day.
Stakeholder letters	All stakeholders	Stakeholders received a letter introducing the project and explaining the consultation process. The opportunity to have a one on one briefing was also offered.
One on one meetings	Impacted landowners/ nearby residents along Bridgman Road, Singleton Council and adjacent coal mines	One on one meetings were held to gauge interest in the Proposal and better understand specific issues. Feedback was recorded in a consultation database.
Letterbox drop	Nearby residential communities including Obanvale, Rixs Creek and impacted landowners	Letter to residents introduced the project and invited feedback on the Proposal.

A consultation database was established to log, manage and close out contact and issues raised by Stakeholders during the environmental assessment.

5.1.3 Director-General's requirements

The Director-Generals requirements for the Environmental Assessment were informed based on the Preliminary Environmental Assessment (UHVA 2010d) and through the Department of Planning's familiarity with the scope of the project from other ongoing ARTC capital upgrade projects recently approved or currently underway.

Letters were received by the Department of Planning containing submissions informing the preparation of the DGRs from:

- Department of Environment, Climate Change and Water;
- Mine Subsidence Board;
- Railcorp;
- NSW Office of Water;

- NSW Industry and Investment; and
- NSW Transport.

A planning focus meeting was not held for the project.

5.1.4 1800 line

During the three week consultation period (31 August to 24 September 2010) no calls were received seeking further information or requesting a meeting to discuss the project.

The 1800 line has remained available throughout the environmental assessment from July 2010 and will be place following determination.

5.1.5 Stakeholder letters and discussions

A letter was issued on 3 September 2010 to a number of key project stakeholders comprising an outline description and a location map of the key features of the Proposal. Table 5.1c summarise the issues raised.

Letters were sent out to local, State and Commonwealth government authorities and service and infrastructure providers in accordance to the DGRs. Letters in response to these letters were received from the Department of Planning (Heritage Branch), the Mine Subsidence Board and the Roads and Traffic Authority.

Meetings and discussions were also held with the Department of Environment, Climate Change and Water, Singleton Council, Rixs Creek Mine and Integra Coal Mine. Letters were received from Rixs Creek Mine and Integra Coal Mine in response to these meetings and discussions.

Table 5.1c Summary of issues raised by stakeholders during the Environmental Assessment

Stakeholder	Comment	Where addressed
Department of Planning (Heritage Branch)	Notes Middle Falbrook Road is listed on the State Heritage Register. Any impacts on the bridge need to be identified and assessed in the EA. As necessary, a heritage management plan to manage the impacts may be required.	Section 7.7 and Volume 3, Technical Paper 1 and 5.
Mine Subsidence Board	Interactions between adjoining mine developments and possible subsidence issues need to be identified and investigated.	Section 7.6 and 7.8
Roads and Traffic Authority	Previously responded to the DoP. Await adequacy assessment of the EA to review the traffic impact assessment.	Section 7.6 and Volume 3, Technical Paper 4.
Department of Environment, Climate Change and Water	- Recommended the removal of the requirement in the DGRs to undertake a greenhouse gas emissions assessment because the emissions are likely to be minimal. - Recommended using similar methodology as in Maitland to Minimbah Third Track air quality assessment and assess the potential cumulative impacts against the existing ambient background air quality already determined - Seeking commitment and details from the proponent regarding the biodiversity offset e.g. species, location of area, size of land, timeframes for implementation, etc.	Section 7.2 and 8.4
Singleton Council (At a meeting of 31/09/10)	Increased rail noise would be experienced by residents of Singleton, in particular Singleton Heights. Council requested consultation with the residents of Singleton Heights as part of the EA.	Since operational noise at Singleton Heights is a strategic issue outside the area of study, Council were directed to contact ARTC personnel directly.

Stakeholder	Comment	Where addressed
	- The road underbridge on the New England Highway at Singleton is a bottleneck for traffic. The bridge needs to be replaced in order for the highway to be widened. The inability to widen the highway was identified as inhibiting the rezoning of some land for residential redevelopment. - Discussions required with Council in relation to the upgrading of the Middle Falbrook Road bridge over Station Creek to support vehicle loads associated with construction traffic.	A name and contact details were provided. It was acknowledged that this was not an issue relating to the EA and that an interagency solution was needed to address this issue separately to the Proposal. Design investigations ongoing. Further consultation will be undertaken when a scope of works for the bridge has been confirmed.
Rixs Creek Mine	- The Proposal will not result in sterilisation or encroachment - Will not disrupt access to land for future development - Support the Proposal	Section 7.6.6
Integra Coal/ Vale	- Support the Proposal - Will not unreasonably hinder mining operations - Will not sterilise mineral resources	Section 7.6.6
The Wanaruah LALC and registered Aboriginal Parties	- The Wanaruah LALC, Gidawaa Walang Cultural Heritage Consultancy and Cacatua Culture Consultants are supportive of the recommendations of the Indigenous heritage report. - Cacatua Culture Consultants stated they believed every effort to protect Aboriginal culture was being made. - No objections to the mitigation measures proposed or additional mitigation measures were requested.	Section 7.2 and Volume 2, Technical Paper 2.

5.1.6 Letterbox drop and landowner meetings

A letterbox drop was undertaken on 31 August 2010 to all residents along Bridgman Road, Middle Falbrook Road and Rixs Creek Lane. Door-knocking was also undertaken on that day to explain the Proposal, answer questions and receive feedback on the Proposal. Approximately 10 face to face meetings were held with landowners.

Key issues raised throughout the community consultation process are summarised in Table 5.1d. Each issue is also cross-referenced to where it is addressed in the Environmental Assessment.

Table 5.1d Key landowner issues and comments

Topic	Issues	Where addressed
Increased vehicle movement and noise	- Bridgman Road is already very busy and construction vehicles would not make much difference given existing vehicle movements and noise. - Bridgman Road is already too busy and construction vehicles would only add to the already high amount of traffic on the road and associated noise.	Section 7.6 and Volume 3 Technical Paper 4

Dust created by construction trucks in Rixs Creek Lane (crushed rock road)	Residents raised the need to ensure that appropriate mitigation measures were used during construction to control dust.	Section 7.4
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No letters were received from the community in response to the letterbox drop or following the face to face meetings conducted.

5.2. Future consultation

As required, displays and community information sessions would be coordinated to ensure a high level of information is available about the Proposal. Notices would be published in the local media, particularly regarding any expected traffic disruptions.

A Near Neighbour Strategy has also been developed to continue communication particularly leading up to the construction phase. A near neighbour for the purposes of the strategy, is a resident or landholder whose land borders the proposal area. Others in the vicinity may also be added to the list of near neighbours, depending upon how they may be affected by the Proposal.

The 1800 line would continue throughout the EA process and construction phase.

Meetings with the registered Aboriginal Parties would be undertaken if the project is approved and would be involved where any proposed excavation or salvage work is conducted for Aboriginal artefacts.

6. Environmental risk analysis

This section details the approach to the environmental risk analysis and a summary of the potential impacts associated with construction and operation, mitigation measures and potential residual impacts. Full details of these aspects are presented in Sections 7 and 8.

Table 6.1a provides the DGRs relating to environmental risk analysis.

Table 6.1a Director-General's Environmental Assessment Requirements – Environmental risk analysis

Director General's Environmental Assessment Requirement	Where addressed
Environmental risk analysis	
Notwithstanding the 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 - Potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this risk analysis, an appropriately detailed impact assessment of this additional key environmental impact must be included in the Environmental Assessment.	Table 6.2b (Sections 7 and 8 presents details of all issues, impacts, mitigation and residual impacts). No additional key issues identified.

6.1. Approach and methodology

The purpose of the environmental risk analysis is to identify potentially significant environmental impacts associated with the Proposal and if necessary, determine any further assessment needs.

During the project application and preliminary environmental assessment phase of the Proposal, an initial risk assessment of the environmental issues was conducted and documented in the Preliminary Environmental Assessment (UHVA, 2010d). Further environmental input was also provided during the options assessment process (UHVA 2010a).

The environmental risk analysis was reviewed and updated as part of the EA process in order to achieve the following objectives:

- Identify and confirm key environmental impacts of the Proposal and assist stakeholders to focus on the issues for assessment.
- Identify any additional key issues not specified in the DGRs that would require investigation. This includes an analysis of environmental impacts and potential residual environmental impacts after the application of proposed mitigation measures.
- Verification of the key environmental risks following any changes to the concept design and as the scope of the Proposal develops throughout the EA phase.
- Encourage a level of investigation that is commensurate with the risk of the potential environmental impacts which may result from the Proposal.

The environmental risk analysis was conducted on 10 September 2010 in a workshop held in Sydney with the environmental impact assessment authors.

Each potential environmental issue was systematically reviewed by the group with reference to the current scope of the Proposal, the findings of the specialist studies conducted as well as input and issues raised by the community and stakeholders. The proposed scope and extent of mitigation was also discussed, along with potential residual impacts and a residual risk category i.e. post mitigation assigned.

6.2. Risk analysis

An environmental risk category was assigned to each environmental issue based on the likelihood and severity of the risk occurring and the ability of the proposal team to manage these risks through environmental mitigation measures. This allowed any additional key issues, not identified in the DGRs, to be identified and appropriately assessed. An explanation of each risk category is provided in Table 6.2a.

Table 6.2a Risk category definitions

Risk categories	
A	The Proposal may have a medium to high level impact. Investigations are required to determine the level of potential impact and to identify appropriate measures to mitigate and manage the impacts.
B	The Proposal may have a low to medium level of impact. However, the environmental impacts can be reduced to an acceptable level through the use of standard mitigation and management measures.
C	The Proposal would have a low level impact manageable through the use of standard mitigation and management measures.

Those issues nominated as key issues by the Director-General are identified in the table and by default therefore would be identified as risk category A before the application of mitigation and management measures.

Table 6.2b summarises the potential impacts of the Proposal (refer Sections 7 and 8 for further details).

Table 6.2b Environmental risk analysis

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
Key issues					
Indigenous heritage	Impacts during construction	Yes	Searches of the statutory and non-statutory registers returned nine results for listed Aboriginal sites under the AHIMS database that were located either within and / or in the immediate vicinity of the Proposal area (within 100 m). These nine sites include items such as mudstone flakes, mudstone artefacts, chert and siltstone flakes, indurated mudstone, mudstone and silcrete artefacts and tuff and silcrete artefacts. Field survey results identified 18 previously undocumented Aboriginal cultural heritage sites within and in the immediate vicinity of the Proposal area. These Aboriginal cultural heritage sites included nine stone artefact scatters and eight isolated stone artefacts. All the sites within the Proposal area and in the immediate vicinity of the Proposal area were assessed as having low scientific significance. The study area was also determined to have a low scientific significance. No comments from registered Aboriginal Parties in relation to cultural significance were made during consultation. As Aboriginal people are the primary determiners of their cultural heritage and no comments were received, the cultural significance of all the sites was not able to be determined. Mitigation measures to reduce the potential for impact on the identified sites and cater for any unexpected finds would include the PCEMP, continuing consultation with registered Aboriginal parties, development of a Cultural Heritage Management Sub Plan and establishment of exclusion zones around all identified sites within the Proposal area. Further archaeological work may be required where impacts to Aboriginal cultural heritage sites within the Proposal area are unavoidable. The residual impacts of the proposal in regard to Aboriginal cultural heritage are considered to be low with the implementation of proposed mitigation measures.	C	Volume 1 Section 7.1 and Volume 2 Technical Paper 1.
Terrestrial and aquatic flora and fauna	Impacts during construction and operation	Yes	The study area is within the Sydney Basin bioregion and the site contains five distinct vegetation types: Central Hunter Spotted Gum Forest and derived grassland, aquatic vegetation along drainage lines and dams, weeds and plantation (mining rehabilitation). The worst case corridor clearing proposal would result in the removal of 22.12 hectares of native vegetation, including 8.75 hectares of Central Hunter Ironbark - Spotted Gum – Grey Box Forest, which is listed as an Endangered ecological community under the TSC Act. No Threatened ecological community listed under the EPBC Act was recorded in the study area. No Endangered Population listed under the <i>Threatened Species Conservation Act 1995</i> and/or the <i>Fisheries Management Act 1994</i> was identified or was considered likely to occur	C	Volume 1, Section 7.2 and Volume 3, Technical Paper 2.

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
			in the study area. No Threatened species of plant listed under the TSC Act or the EPBC Act was identified in the study area. However, significance assessments were completed on two Threatened plant species, <i>Diuris tricolor</i> (Vulnerable under the TSC Act) and <i>Bothriochloa biloba</i> (Vulnerable under the EPBC Act), based on the presence of potential habitat. These assessments concluded that the proposal was unlikely to have a significant impact on these species due to the small area of potential habitat likely to be affected, it's disturbed and fragmented nature and ongoing disturbance. Four Threatened species of animal listed under the TSC Act and/or the EPBC Act were recorded in the study area including, Squirrel Glider, Grey-crowned Babbler, Little Lorikeet and Grey-headed Flying-fox. Significance assessments were also completed on a further 36 Threatened species of animal, based on the presence of suitable habitat. Significance assessments completed for these species concluded that the proposal was not likely to have a significant impact. A referral under the EPBC Act was therefore not prepared or submitted. The worst case corridor clearing impacts of the Proposal have been mitigated through the planning process by the provision of early advice on the potential environmental impacts of options as well as during the process of this environmental assessment. It is noted that a „corridor assessment’ approach has been conducted based on a worst case area of impact. A Flora and Fauna Management Sub Plan would be prepared and detailed measures to avoid or reduce impacts on vegetation and habitat loss, weeds, fauna mortality, fragmentation and connectivity and aquatic disturbance would be developed and implemented. A biodiversity offset to mitigate the residual impacts of the Proposal would be implemented. The residual impacts are therefore considered low.		
Aquatic flora and fauna	Impact during construction	Yes	Worst case works required to the Middle Falbrook Road bridge over Station Creek may alter creek bed characteristics and increase sediment loading subject to further investigations, although the current proposal is to span the existing bridge structure entirely using steel plates and girders. Therefore, little aquatic disturbance in the study area is expected once the construction of any structure is completed provided the crossing is designed according to NSW Department of Industry and Investment (Fisheries) guidelines on fish passage and damage to any aquatic habitat and riparian vegetation during construction is minimised. The residual impact of this activity given the current bridging proposal is considered low.	C	Volume 1, Section 7.2 and Volume 3, Technical Paper 2.
Noise and vibration	Noise impacts during construction	Yes	The distance to the nearest sensitive receiver is approximately 770 metres. The noise and vibration specialist report indicates that the noise levels generated by typical worst case scenarios for each stage of construction are predicted to be within the Interim Construction Noise Guideline (ICNG) levels at the nearest sensitive receivers during	C	Volume 1, Section 7.3 and Volume 3, Technical Paper

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
			standard working hours. Out of hours works are also proposed to be undertaken during track possessions. The assessment indicated that the evening and night time construction noise criteria are likely to be exceeded during the bulk earthworks and track construction phase. A subsequent assessment of these noise levels indicated that awakening reactions were unlikely to occur during these periods. Traffic noise resulting from construction traffic was also investigated. Traffic impacts to residences on Middle Falbrook Road, Bridgman Road and Rixs Creek Lane are expected to comply with the Environmental Criteria for Road Traffic Noise (ECRTN) guideline values during the daytime. Similar to night time construction noise however, traffic movements during the night are expected to result in exceedances of the night time noise criteria. While evening and night time works would occur, they would take place only 4-5 times during the construction period. A portion of the night time works would also be located at Camberwell Junction which is shielded by topography from the nearest receivers. Standard mitigation practices would be applied to site equipment and machinery reinforced by toolboxing and environmental awareness training of site workers, particularly prior to night time works. Letterboxing affected residences would also be conducted in advance of track possession works. The residual impact of construction noise is therefore considered low.		3.
	Noise impacts during operation	Yes	The distance to the nearest sensitive receiver is approximately 770 metres. The noise and vibration specialist report indicates that the noise levels generated by the operating railway in 2018 would not exceed the relevant trigger levels in the Interim Guidelines for the Assessment of Noise from Rail Infrastructure Projects (IGANRIP) guideline and thus the development does not trigger the need for a full assessment of reasonable and feasible mitigation. No mitigation measures are proposed and no residual impacts are expected. The residual impact of operational noise is therefore considered low.	C	Volume 1, Section 7.3 and Volume 3, Technical Paper 3.
	Vibration impacts during construction and operation	Yes	The distance to the nearest sensitive receiver is approximately 770 metres. The most stringent goal level specified in DECCW's <i>Assessing Vibration: A Technical Guideline</i> is 0.2mm/s peak particle velocity (PPV) for the assessment of continuous vibration occurring at night with regard to human comfort. A 30 tonne rock hammer would produce much less than 0.1mm/s PPV at the distance of 770m to the nearest receiver for this project. This magnitude of vibration is unperceivable and thus vibration levels produced during construction do not warrant further investigation or assessment. The residual impacts of construction and operational vibration are therefore considered low.	C	Volume 1 Section 7.3, volume 3 Technical Paper 3
Air quality	Dust generation during	Yes	Dust would be generated by construction works particularly bulk earthworks and the movement of construction vehicles on unsealed roads. The assessment identified that construction dust levels generated by the Proposal would be less than ambient levels from	C	Volume 1, Section 7.4.

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
	construction		surrounding large-scale mining activities. The potential for dust impacts decreases with distance from the construction areas and based on similar ARTC construction projects, affects at sensitive receivers located more than approximately 500 metres distant would be negligible. Construction dust emissions are expected to be adequately controlled through the application of standard mitigation measures. The residual impacts are expected to be low.		
	Emissions during operation	Yes	Operational impacts would include fugitive coal dust resulting from wind action on exposed coal wagons and emissions from locomotives. The generation of coal dust would depend primarily on wind speed, moisture content of the coal and train speed. Based on previous studies, these emissions are not anticipated to exceed any relevant air quality guidelines, standards or criteria. Potential cumulative impacts from locomotive emissions and fugitive coal dust were quantitatively assessed including NO₂, CO, SO₂ and PM₁₀. For NO₂, CO and SO₂, the peak contribution from the Proposal is orders of magnitude below the relevant criteria and would be negligible. Peak contributions of PM₁₀ emissions from the Proposal are also not expected to exceed relevant criteria but may, if combined with ambient air quality above the guideline values, exceed the relevant criteria. Emissions to air from operations on the ARTC rail network are currently addressed through the ARTC's EPL. It is considered that the contribution of the Proposal to air quality is not significant. The residual impact following mitigation is therefore considered to be low.	C	Volume 1, Section 7.4.
Surface water resources	Surface water quality and drainage	Yes	The Proposal is located in the Glennies Creek catchment in the lower section of the Hunter-Central Rivers Catchment Management Authority. The area has been substantially modified by historical farming, grazing, railway development and coal mining including the hydrology, geomorphology and the landscape generally. Station Creek is heavily modified and is regulated as part of Integra Coal's water management strategy. A number of informal water storages exist adjacent to the railway. The Proposal is not located within a declared floodplain. The water quality of both Station Creek and Glennies Creek are similar with neutral pH, ranging salinity and suspended solids ranging from 20-150 mg/L. The Proposal would result in the upgrade of 12 drainage structures. The culverts have previously been extended in an ad hoc fashion using a variety of materials. Replacement culverts would be made of reinforced concrete generally matching the existing pipe size and including scour protection at the downstream end. A hydrologic assessment was conducted to ensure the culvert upgrades would pass the design flood flow. The Proposal would not have any material effect on the runoff from the rail corridor or change existing surface water flows. Two existing water storage ponds would be encroached by the Proposal. Integra Coal have agreed to lower the water level in	C	Volume 1, Section 7.5 and 7.8

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
			the largest of these to facilitate construction and an overall drainage improvement. Up to six megalitres of water per year would be sourced from Integra Coal for construction purposes. Testing would be carried out to ensure the water was suitable for use. Supplementary water would be sourced from on-site sedimentation ponds if required. A Soil and Water Management Sub Plan would be implemented to control potential sources of erosion and to reduce sediment entering waterways. The Sub Plan would also address any riparian or aquatic habitats potentially affected. Key activities potentially resulting in these impacts include access road construction, bulk earthworks, culvert upgrades and any works in Station Creek. Accidental fuel spills or leaks of chemicals would also be addressed in the plan. The Proposal is not expected to result in adverse impacts on surface water runoff or quality. The residual impacts would be low.		
	Surface water quality and drainage	Yes	The Proposal would not significantly affect surface water flow patterns or volumes assuming the proposed scope of work at Station Creek bridge and elsewhere and there is not expected to be an impact to local surface water quality during operation. The ARTC's emergency response plan for the Main North Line would be revised if necessary to manage spills, accidents, and other incidents resulting from the new infrastructure. The residual impacts would be low.	C	Volume 1, Section 7.5.
Groundwater	Water quality during construction and operation	Yes	No licensed groundwater bores exist within or nearby the study area. No groundwater extraction is proposed. Due to the shallow nature of excavation and the proposed scope of work at Station Creek bridge, there is not expected to be any impact on aquifers or groundwater in the area. According to the Geotechnical Factual Report (UHVA 2011h) prepared for the Proposal, groundwater was encountered in 9 test pits out of 114 tests pits along the length of the project at approximately 1m below ground level in most instances. 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. The residual impacts would be low.	C	Volume 1, Section 7.5.
Transport and land use	Construction traffic generation and road capacity	Yes	Construction traffic from workers and heavy vehicles associated with delivery of materials and the bulk haulage operation would access the site using a number of local and collector roads. The traffic volumes and frequency of movements would vary with the time of day and the stage of construction. Most light vehicle trips would generally occur in the AM and PM peak periods. Bulk haulage operations would continue throughout the day. During track possessions, which include the evening and night time periods, the intensity and number of movements would be expected to be at their peak. Both mid-block and intersection capacity analyses were conducted to investigate the potential impacts from construction traffic. The analysis detailed existing conditions, 2012	C	Volume 1, Section 7.6 and Volume 3, Technical Paper 4.

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
			(do nothing) and 2012 (with the Proposal). The results indicated that the construction traffic generated by the Proposal would result in no adverse effect on the capacity of the roads. A range of safety deficiencies were identified on local roads to be utilised during construction and a process outlined for further analysis and approval of specific traffic management/ control plans to facilitate construction. The residual impact of construction traffic generation and its effect on the roads investigated is considered low.		
	Operation/ maintenance traffic generation and road capacity	Yes	Operational/ maintenance traffic would be of much lower volume than construction traffic, except when track possessions or other major capital works are proposed (however these would be similar to the scenario addressed as part of the construction assessment). More generally, there is not expected to be any impact associated with operational/ maintenance traffic and no mitigation is proposed. The residual impact is therefore considered to be low.	C	Volume 1, Section 7.6 and Volume 3, Technical Paper 4.
	Middle Falbrook Road level crossing delays	Yes	The future traffic delay at the Middle Falbrook Road level crossing resulting from more frequent train movements was analysed. Currently traffic movements on Middle Falbrook Road are very low at 60 vehicles per day and future growth is also expected to be very low. The numbers of vehicles delayed would increase proportionally to the increase in number of trains, from 18 in 2012 to 44 in 2018 however for any one train passby, the average number of cars delayed would be two. The delay would be on average approximately 340 seconds per freight train and 20 seconds per passenger train. The impact is expected to be low and no mitigation measures are proposed. No residual impacts are expected.	C	Volume 1, Section 7.6 and Volume 3, Technical Paper 4.
	Land use	Yes	The Main North Line at Nundah Bank is situated within a valley and is currently not accessible by public road. The predominant land uses are open cut mining activities on both sides of the rail corridor and beyond this, agricultural uses. The nearest residential premises are located approximately 770 metres away on Bridgman Road. Construction of the Proposal would require the acquisition of private land adjacent to both sides of the existing alignment. The surrounding land is owned by three landholders being Integra Coal, Rixs Creek mine and Railcorp. Approximately 20.6 hectares is to be permanently acquired for the Proposal while an additional 2.7 hectares is required for construction. An easement is required to construct an access road southward to the rail corridor from Bridgman Road (Refer Figure 4.1A). The land to be acquired would have a change in use from agricultural and mining to railway purposes. There would be minimal impact on existing or future surrounding land uses from the Proposal. The consultation section (Section 5) documents submissions received from both mining companies which support the Proposal and state that there would be no sterilisation of any high priority resources or effect on their business viability. The Proposal is located on the eastern edge of the Patrick Plains Mine Subsidence District and there would be no impact on the Proposal (UHVA 2010g). The ARTC have commenced consultation with the affected land owners regarding acquisition and ideally would conclude these discussions through mutual agreement.	C	Volume 1, Section 7.6 and Volume 3, Technical Paper 4.

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
			However failing this, the procedures specified in the Land Acquisition (Just Terms Compensation) Act 1991 would be followed for all lands to be acquired. The residual impacts of the Proposal on land use are considered to be low.		
Non-Indigenous heritage	Impact on significant heritage items during construction	Yes	Assessment comprised register searches, review of background/ historical information and a site survey over four days. There are no listed heritage items within the study area although there are two items in the vicinity; Rixs Creek Coke Ovens and Dulwich House. Six items were identified in the study area and were verified on site and four were assessed for significance (two had been previously assessed). These included the earth embankment, two drainage culverts and the former Rixs Creek station platform of the former Great Northern Railway, the Main North Line, Station Creek bridge on Middle Falbrook Road and potential archaeological relics from early mining and settlement at Rixs Creek village. All except the Main North Line were assessed as being of local significance. Mitigation measures include establishing exclusion zones around the former Rixs Creek station platform, a large sandstone culvert, old timber fence posts along the existing section of Rixs Creek Lane and replacing removed earth from the earthen embankment of the former Great Northern Railway. A stop works instruction for any unexpected finds would also be implemented. Once details of the Station Creek bridge upgrade are known, it is proposed to seek comment from Council on alterations. No additional mitigation measures are considered necessary. The residual impacts are considered low.	C	Volume 1, Section 7.7 and Volume 3, Technical Paper 5.
Site compounds	Impact to receiving environment	Yes	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 Figures A and E. The site compounds would only be required during the construction phase of the Proposal and therefore the potential environmental impacts associated with the compounds would be temporary. The key issues are expected to be traffic management and safety, noise impacts, land acquisition, air quality, waste management, energy use and greenhouse gas emissions, erosion and sedimentation resulting from water runoff and ecology. A Site Compound and Ancillary Works Management Sub Plan would be developed to manage the potential impacts of the site compounds. The residual impacts are considered low.	C	Section 7.9 and Section 9.2.4.
Earthworks	Pollution of surrounding areas	Yes	The surface geology in the study area consists of Mulbring Siltstone and Whittingham Coal Measures. The Mulbring Siltstone is a marine sequence and there is some evidence of potentially dispersive soil behaviour in cuttings. The Whittingham Coal Measures consist of sandstone, shale, mudstone, conglomerate and coal seams.	C	Volume 1, Section 7.8.

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
			The soils in the Proposal area have a rural land capability generally suitable for grazing and a soil type classification of yellow and red texture contrast soils. They are variously described as loamy and clayey and combinations of both. A Soil and Water Management Subplan would be prepared and implemented. Upstream and downstream monitoring of water quality in affected watercourses would be conducted. The residual impact would be low.		
	Impact of soil characteristics and subsidence on the Proposal	No	A search of CSIRO's Australian Soil Resource Information System indicated that the Proposal area has low probability for the presence of acid sulfate soils and no acid sulfate soils are mapped in the area. The NSW Natural Resources Atlas shows the southern portion of the study area is subject to a moderate salinity hazard. The Proposal borders the eastern edge of the Patrick Plains Mine Subsidence District. Investigations and a detailed report on potential impacts has been prepared in parallel with this Environmental Assessment and submitted to the Mine Subsidence Board for approval. It was concluded that the identified issues would have no impact on the Proposal (UHVA 2010g). The dispersive nature of some soils may inhibit the revegetation of some areas and require additional installation/ maintenance of drains e.g. at the top and toe of slopes or require more frequent cleaning. Batters may require treatment to minimise erosion. These impacts are however considered manageable through standard engineering and/ or maintenance responses. Geotechnical testing would be conducted to further investigate the nature and scope of dispersive soils in the Proposal area. Railway components are designed with a design life of 100 years and durability considerations are a core aspect of their design and manufacture. The potential for moderate salinity would not significantly affect the design of the Proposal. The residual risk would be low.	C	Volume 1, Section 7.8.
Other Issues					
Contaminated land and hazardous materials	Release of significant contamination into the environment	No	The study area contains the existing railway corridor as well as adjacent land which has been disturbed and highly modified as a result of historical development for mining and agricultural purposes. A search of DECCW's contaminated land register revealed no listed sites within the vicinity of the project however historical railway uses may have resulted in contamination of the railway corridor and materials. Contaminants of concern include ballast and fill materials contaminated with fuel, oils, grease, asbestos and herbicides. The Camberwell Relay Room would also be demolished as part of the project and may contain asbestos containing materials or lead paint. Prior to demolition, a survey for these or other hazardous materials would be conducted. During construction, mobilisation of on-site contaminants could also result in off-site contamination via stormwater runoff and during the process of transportation and	C	Volume 1, Section 8.1.

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
			emplacement of contaminated spoil. Testing would be conducted on all fill or spoil material proposed to be taken off-site. All wastes would be classified according to DEC Waste Classification Guidelines and reused or disposed of accordingly. A Hazard and Risk Management Sub Plan would be developed and implemented to manage these and other unexpected hazards. Worker occupational health and safety is addressed in Section 8.6. Operation of the Proposal would result in low levels of contamination being spread by operating locomotives and maintenance activities onto the surrounding soils. Overall however, operational impacts are not considered to pose a significant risk of contamination to the environment. The residual impacts during both construction and operation would be low.		
Visual	Changes to landscape (during construction and operation)	No	The surrounding landscape is a mix of the industrial-like character of 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. The scenic quality of the study area could be described as moderate to low with the site not having any particularly notable characteristics, nor being an uncommon landscape type in the local area. The site is unable to be accessed by public road and is in a valley which is not viewable from any residential areas. The site therefore has a low sensitivity to visual change and a relatively high capacity to absorb or integrate the Proposal. The Proposal would result in a number of visual changes. Principal among these would be vegetation clearance and widened cut and fill batters for the new infrastructure. The rail infrastructure itself, variously comprising signals, track, turnouts, etc would be similar to the existing infrastructure and therefore the visual impacts would be incremental and overall low. While no mitigation measures are considered necessary to minimise the visual impact of the Proposal, mitigation measures developed for other issues addressed in the Environmental Assessment would also assist in reducing the visual impact. An example would be 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 of the project. The residual impacts are therefore considered low.	C	Volume 1, Section 8.2.
Waste	Generation and disposal of wastes	No	During the construction phase, waste sources would include green waste, surplus construction materials, domestic waste, site sewage and other wastewater run-off. There would be minor quantities of demolition waste produced from the removal of the Camberwell Relay Room and various drainage structures. Waste materials would be disposed of in accordance with relevant legislation/ guidelines following a review of potential for reuse. A Waste Management Sub Plan would be developed and implemented during construction incorporating the waste management hierarchy principles and ensuring different waste	C	Volume 1, Section 8.3.

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
			streams are identified, separated and disposed of accordingly. During operation there would be only minor amounts of waste generated including surplus materials from repairs, oils and grease containers from maintenance and operational activities, and coal dust along the edges of the corridor. Any waste generated during the operational phase would be managed in accordance with the resource management hierarchy principles of the WARR Act and the ARTC's waste management policy. The residual impacts would be low.		
Energy demand and greenhouse gases (GHG)	Resource efficiency and emissions	No	Energy would be consumed in various forms during construction of the Proposal including electricity use, fuel use and energy embodied in the raw materials and components used in manufacture. As a result, greenhouse gases would be liberated from the manufacture and combustion process. Additionally, clearing of vegetation would also result in a minor loss in the carbon absorption capacity. Emissions generated during construction would be small and temporary by comparison with operational emissions from operating locomotives. Minor amounts of electricity would also be used to power signals and other track components. GHG emissions over a 25 year life from the operation of this section of track have been estimated to be equivalent to approximately 0.007% of NSW transport emissions. Mitigation measures to be implemented as part of other issues e.g., minimising vegetation clearance would reduce a loss in absorption capacity. Water and energy saving features including possible use of Greenpower would also reduce emissions. The biodiversity offset would also act as an offset for GHG emissions from the operating project. The residual impact would be low.	C	Volume 1, Section 8.4.
Socioeconomic impacts/benefits	Changes in amenity	No	The study area is located in the Singleton LGA which has a population of 21,937. Farming and mining are the most common employment vocations of residents. Based on the technical studies completed, the DGRs and the consultation conducted, the key social issues are: traffic management during construction; noise and vibration during construction; land acquisition; air quality issues during construction; operational noise; and operational air quality. While the technical studies show a low likelihood of impact following mitigation, there would be disturbance and changes in amenity for local residents. Ongoing consultation with the affected community would be implemented and would be important to allay concerns as well as providing advance notice of track possessions and other major activities. Residual impacts are expected to be low.	C	Volume 1, Section 8.5.
	Improved corridor capacity and operational	No	The Proposal would provide greatly increased corridor capacity as well as operational flexibility which would benefit both freight and passenger services on the Main North Line. The residual benefits would be high.	A	Volume 1, Section 8.5.

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
	flexibility				
	Economic development	No	The Proposal would contribute to ongoing economic development in the region and maintain the wealth of the State and nation. There would be opportunities for local employment and construction-related suppliers as well as goods and services e.g. accommodation and servicing the construction workforce. The residual benefits would be high.	A	Volume 1, Section 8.5.
Hazards and risks	Risk to the environment and workers	No	Hazards and risks associated with the construction phase of the Proposal would include environmental hazards e.g., storing and handling hazardous materials and occupational health and safety or construction-related hazards e.g., operation of heavy machinery, working at height, flash flooding, etc. A risk assessment would be undertaken to identify these and any other hazards and risks to the environment and workers and toolbox training to reinforce agreed mitigation measures conducted. The outcomes would also be documented in a Hazard and Risk Management Sub Plan. Operational risks and hazards would be managed through existing ARTC network-wide emergency management procedures. The residual impact would be low.	C	Volume 1, Section 8.6.
Cumulative	Adverse impacts on the community and the environment	No	The ARTC is undertaking a large amount of capital improvements in the Hunter Valley involving numerous small as well as large scale projects. In addition, the RTA and Councils and other stakeholders may be undertaking other works which may have a cumulative impact with the project. Key issues which may be exacerbated as a result of these projects would include: • 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 and change in land use; • Scheduled track possessions; • Rail capacity improvements; and • Socioeconomic benefits and impacts A number of these issues are being addressed strategically by the ARTC in conjunction with the relevant Government agency e.g., operational noise and air quality with DECCW.	The Proposal is not able to address these broader, strategic issues in isolation.	Volume 1, Section 8.7.

Issue	Potential impact	Key issue in DGRs	Risk analysis - proposed mitigation measures and potential residual impact after application	Risk category following mitigation	Reference in this document
			A portion of the other impacts would be temporary only during construction, however the remainder would be cumulative impacts of the capacity improvement program e.g. vegetation clearance, greenhouse gas emissions, Indigenous and non-Indigenous heritage, hydrology and hydraulics and land acquisition. Biodiversity offsets are proposed for some of the larger projects to offset residual ecological impacts and in some cases, this may also serve to offset the increase in GHG emissions from the projects but this is not expected to fully offset the other issues in their entirety.		
	Benefits to the Government		One of the social benefits outlined above relates to improved corridor capacity and the benefits provided to all forms of rail transport using the Main North Line including passenger traffic. As noted in Section 3.1, the full economic benefits of downstream rail corridor improvements cannot be fully achieved until the Proposal is in place. If the Proposal is approved, the ARTC and the NSW and Federal Governments would accrue benefits resulting from the improved cost-effectiveness of the capacity enhancements already in place between Nundah Bank and the Port of Newcastle. The residual impacts (benefits) would be moderate to high.	A	Section 3.1.

6.3. Conclusion

The environmental risk analysis did not identify any key environmental issues in addition to those already identified in the Environmental Assessment and DGRs.

However a number of environmental issues that would present a moderate to high residual benefit after the application of mitigation measures included:

- Social benefits including improved corridor capacity and operational flexibility for freight and passenger trains, opportunities for local employment, suppliers and services associated with the construction of the Proposal and maintained prosperity for the region; and
- Economic benefits to the Government resulting from the improved cost-effectiveness derived from implemented projects should this Proposal be approved.

Adverse cumulative effects resulting from the implementation of the ARTC Corridor Capacity Strategy also identified however the Proposal is unable to address these broader, more strategic issues in isolation.

A strategic impact assessment of these projects across the region would be required to form a more comprehensive view of the severity of the cumulative impacts and their balance relative to the benefits achieved.

