

# Carmichael coal mine rail project Preliminary closure and rehabilitation strategy

Prepared for Adani Mining Pty Ltd | 26 July 2013





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## Adani Mining Pty Ltd

Carmichael coal rail project | Preliminary closure and rehabilitation  
management strategy

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## Adani Mining Pty Ltd

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# 1 Introduction

## 1.1 Project overview

Adani Mining Pty Ltd (Adani) is proposing to develop a 60 million tonne per annum (Mtpa) thermal coal mine in the north Galilee Basin approximately 160 kilometres (km) north-west of the town of Clermont, Central Queensland (Figure 1.1). Coal from the Project will be transported by rail to the existing Goonyella and Newlands rail systems, operated by Aurizon Operations Limited (Aurizon). The coal will be exported via the Port of Hay Point and the Port of Abbot Point over the 60 year (90 years in the EIS) mine life.

Project components are as follows:

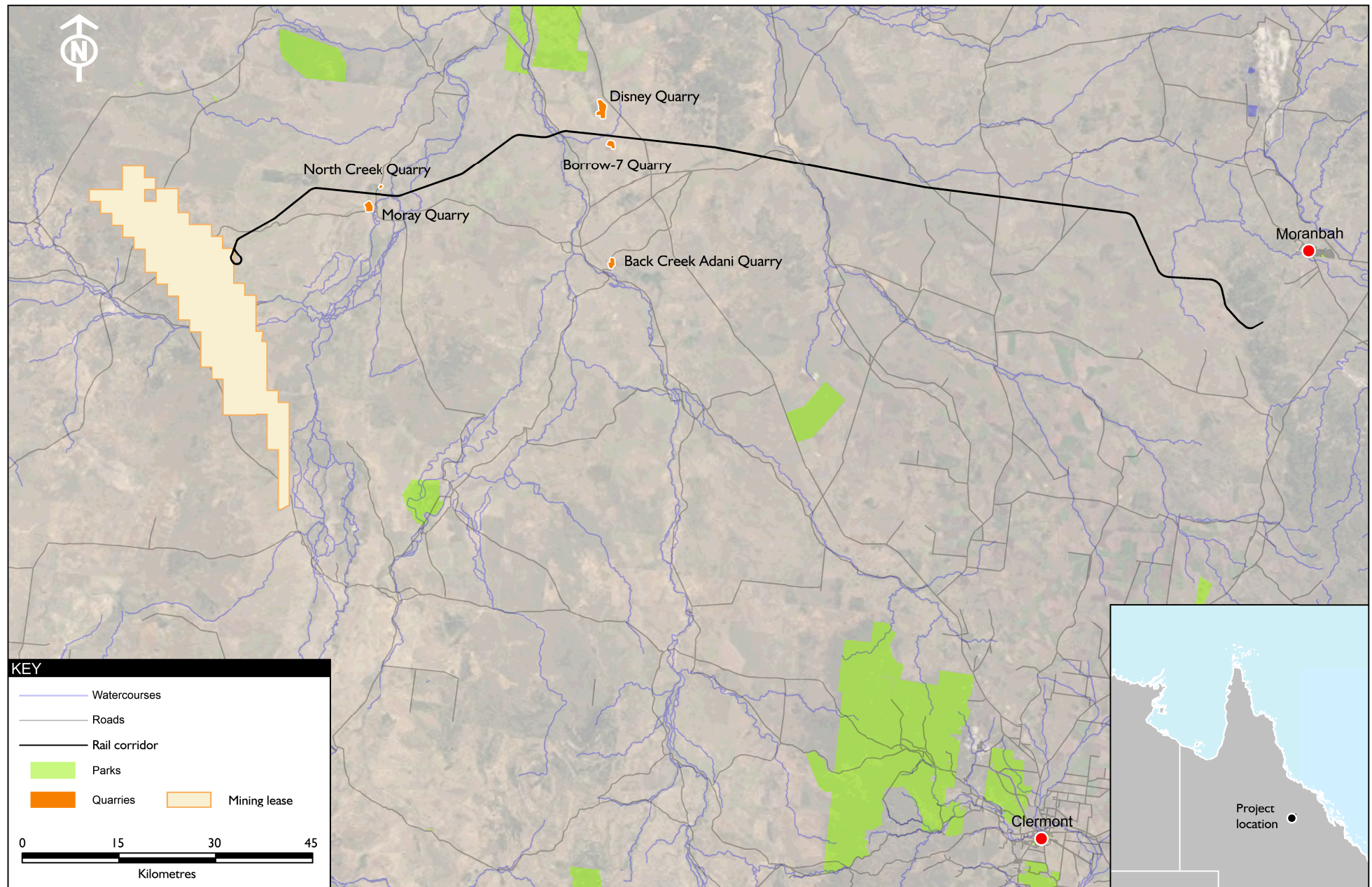
- The Project (Mine) - a greenfield coal mine over Exploration Permit for Coal (EPC) 1690 and the eastern portion of EPC 1080, which includes both open-cut and underground mining, on-mine infrastructure and associated mine processing facilities (the Mine) and the Mine (off-site) infrastructure including a workers accommodation village and associated facilities, a permanent airport site, an industrial area and water supply infrastructure.
- The Project (Rail) - a greenfield rail line connecting to mine to the existing Goonyella and Newlands rail systems to provide for the export of coal via the Port of Hay Point (Dudgeon Point expansion) and the Port of Abbot Point, respectively including:
  - Rail (west) - a 120 kilometre (km) dual gauge portion running west from the mine site east to Diamond Creek; and
  - Rail (east) - a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah.
  - Quarries - The use of five local quarries to extract quarry materials for construction and operational purposes.

## 1.2 Purpose and scope.

For the purposes of preparing this preliminary closure and rehabilitation strategy, the Project has been divided into four discrete components. These components include the:

- mine site (including all activities carried out within the mining lease);
- off-site infrastructure area (including workers accommodation village, dedicated airport, off-site industrial area, water supply, storage and transfer infrastructure, transmission lines and access roads);
- railway activities and associated infrastructure; and
- quarries.

EMGA Mitchell McLennan (EMM) was commissioned by Adani to complete a preliminary closure and rehabilitation strategy for each component. This preliminary closure and rehabilitation strategy implements the management controls and methods outlined in the *Carmichael Coal Rail Environmental Management Plan* (EMP).



The objectives of the preliminary closure and rehabilitation strategy are to:

- ensure compliance with the requirements of all relevant environmental legislation, best practice guideline, conditions of any applicable licence, approval or permit;
- provide conceptual rehabilitation management and mitigation procedures for site personnel;
- describe indicators and rehabilitation completion criteria;
- provide methods and processes to allow the site to be rehabilitated to a safe and stable condition;
- describe the proposed monitoring program for rehabilitation assessment; and
- describe the procedure to be used to revegetate the post-activity landscape to achieve the relevant performance outcomes and completion criteria.

This preliminary closure and rehabilitation strategy covers rehabilitation of all rail infrastructures being undertaken as part of the Carmichael Coal Mine and Rail Project. Rail infrastructure includes:

- rail corridor including track, passing loops, maintenance track, bridges, culverts and signalling equipment;
- permanent rail infrastructure including terminus facility and maintenance facility; and
- temporary rail infrastructure including track laydowns area, bridge laydown areas, turning circles, construction camps, construction depots and concrete batching plants.

The preliminary closure and rehabilitation strategy will evolve over time as activities progress and additional technical studies and investigations are completed. It is envisaged that with each review a continuous improvement schedule will be developed to include new items resulting from the review process.

This preliminary closure and rehabilitation strategy covers rehabilitation of all operational activities and associated infrastructure being undertaken as part of the Rail project. Construction activities requiring rehabilitation will be managed via the *Construction Mining Operations Plan* with guidance from this preliminary closure and rehabilitation strategy.

### 1.3 Preliminary strategy structure

This preliminary closure and rehabilitation strategy incorporates rehabilitation objectives, an overall management strategy and general rehabilitation methods for the three identified domains (Section 1.1) for the Carmichael Coal Mine and Rail Project (Figure 1.2).

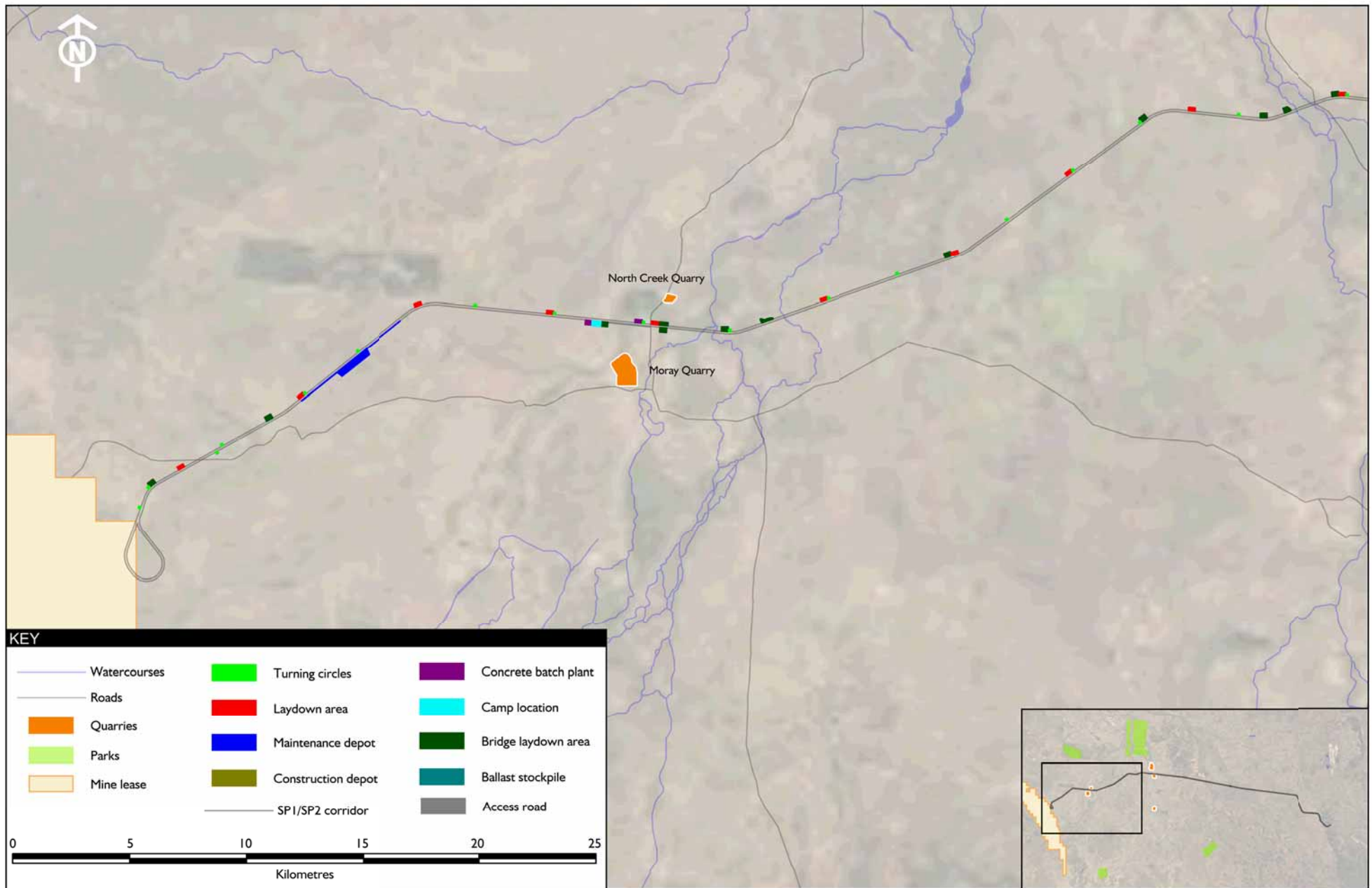
This preliminary closure and rehabilitation strategy will only be enacted in the event that the railway lines and infrastructure cannot be sold or relinquished to a third party. Removing the railway lines and associated infrastructure at closure of the Project is not the primary strategy.

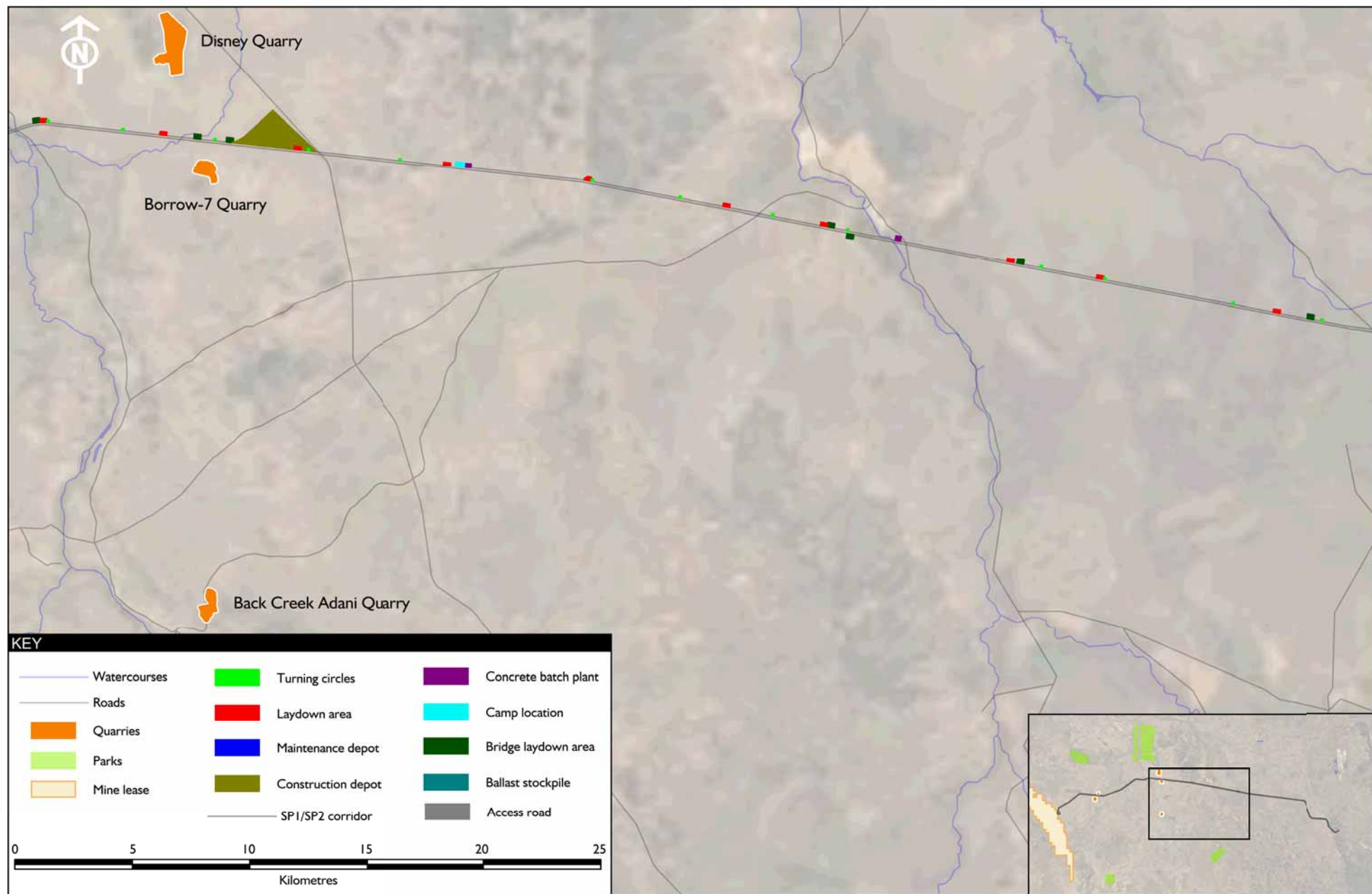
The preliminary closure and rehabilitation strategy is structured as follows:

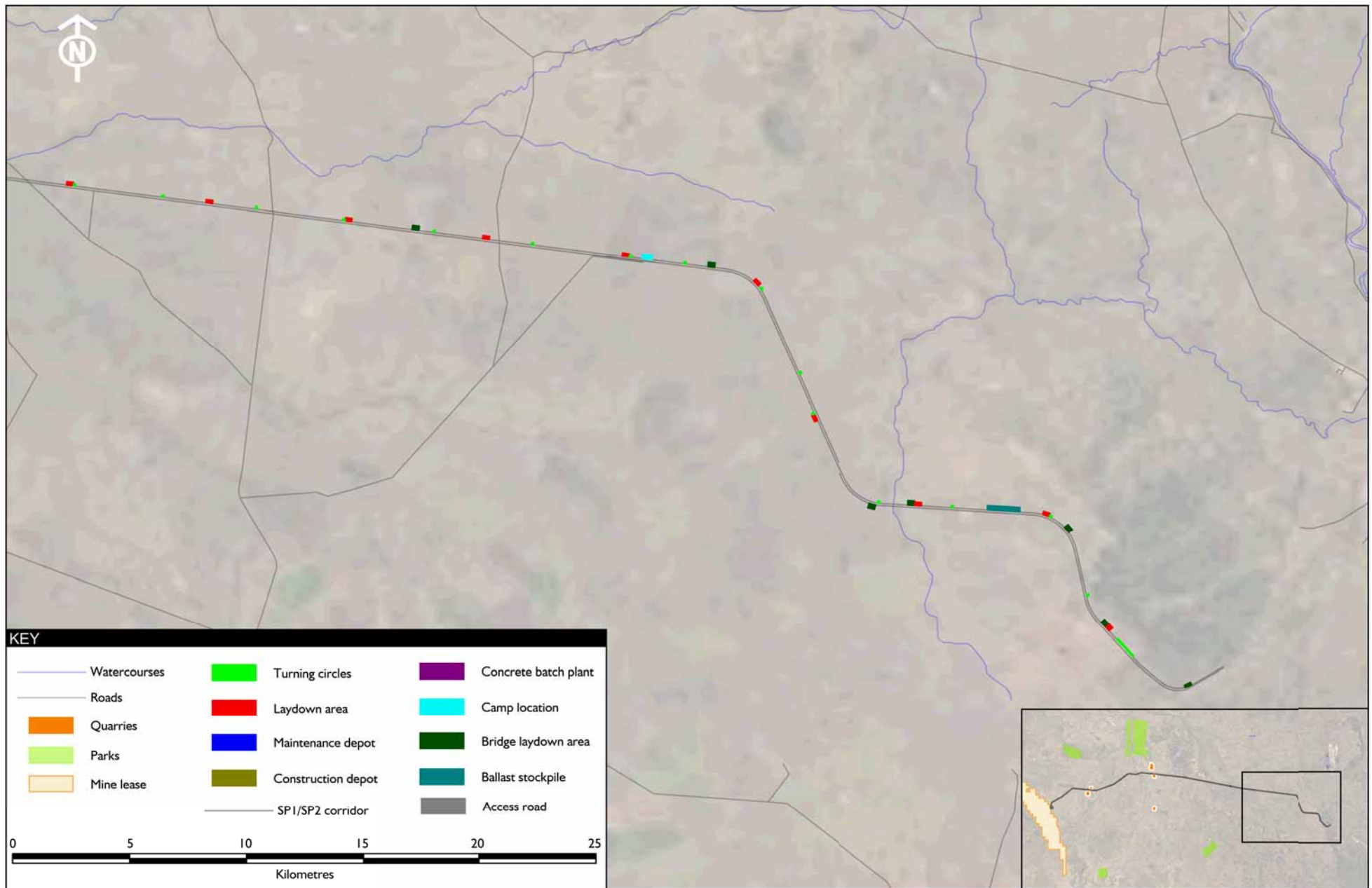
- Chapter 2 describes responsibilities, delegations and review.

- Chapter 3 describes the rehabilitation objectives. The objectives only apply in the event that the railway lines and infrastructure are to be removed and the alignment re-profiled and rehabilitated.
- Chapter 4 describes the preferred rehabilitation strategy for each domain, assuming that the primary strategy of sale or relinquishment is not available;
- Chapter 5 describes general rehabilitation activities that are common to all domains. The rehabilitation activities only apply in the event that the railway lines and infrastructure are to be removed and the alignment re-profiled and rehabilitated.
- Chapter 6 describes the final land use objectives and presents simple conceptual landforms for each domain, assuming that the primary strategy of sale or relinquishment is not available. The completion criteria presented in this chapter are intended to be used to measure and describe whether the final landforms are meeting the objectives described in Chapter 3.
- Chapter 7 describes the monitoring and maintenance program. The monitoring and maintenance program only applies in the event that the railway lines and infrastructure are to be removed and the alignment re-profiled and rehabilitated.













## 2 Delegation and review

### 2.1 Roles and responsibilities

**Table 2.1 Role and responsibilities**

Role	Responsibility
Rail Manager or representative	Ensure that adequate resources are available within Adani and ensure that contractors meet all compliance requirements. Implement the preliminary closure and rehabilitation strategy. Facilitate rehabilitation planning review.
Environment Manager or representative	Implement the preliminary closure and rehabilitation strategy. Review, update and further develop the RMP annually as a minimum throughout the life of the Carmichael Coal Mine and Rail Project. Train staff in environmental awareness, site issues and requirements of the monitoring program. Facilitate the monitoring and implementation of measures outlined in this preliminary closure and rehabilitation strategy. Report non-conformances to Rail Manager or representative and ensure corrective actions are closed out. Advise Rail Manager or representative and other management on environmental permit requirements and provide advice to assist with achieving compliance. Investigate environmental incidents and liaise with EHP where necessary/as requested by the Rail Manager or representative.
Employees	Be familiar with the contents of this preliminary closure and rehabilitation strategy. Ensure works are completed in accordance with the preliminary closure and rehabilitation strategy. Report all incidents or non-compliance with the preliminary closure and rehabilitation strategy to the Rail Manager immediately.
Contractors	Be familiar with this preliminary closure and rehabilitation strategy. Ensure works are completed in accordance with the preliminary closure and rehabilitation strategy. Report all incidents or non-compliance with the preliminary closure and rehabilitation strategy to the Rail Manager immediately.

### 2.2 Review

The preliminary closure and rehabilitation strategy will be reviewed annually throughout the life of the Carmichael Coal Rail Project. As the operational plan changes or rehabilitation activities are completed, the preliminary strategy will be updated to reflect these changes. Five years prior to the confirmed closure date, the final activity preliminary closure and rehabilitation strategy will be developed to properly address the post-activity landscape for the rail and infrastructure alignment.



## 3 Rehabilitation overview

### 3.1 Rehabilitation hierarchy

Adani intends to use the rehabilitation hierarchy from the department of Environment and Heritage Protection (DEHP) *Rehabilitation requirements for mining projects* to guide rehabilitation choices where possible. The rehabilitation hierarchy, in order of decreasing capacity to prevent/minimise environmental harm, is:

- avoid disturbance that will require rehabilitation to prevent or minimise future environmental harm;
- reinstate the original natural ecosystem;
- develop an alternative outcome with a higher economic value than the previous land use;
- reinstate previous land use (eg grazing); and
- develop lower value land use (if this is acceptable to the relevant stakeholders).

### 3.2 Rehabilitation objectives

The following objectives apply in the event that Adani is unable to sell or relinquish ownership of the railway lines and associated infrastructure to a third party.

The nominated post-activity land-use includes grazing on exotic pasture and/or a mosaic of native pasture and woodland habitat. For areas disturbed by rail infrastructure, the following overarching objectives will apply:

- The site will be safe to humans and fauna.
- Rehabilitation will aim to create a landform that is stable and with a similar land use capability and/or suitability that existed prior to the disturbance, unless an alternative end land use is pre-determined and agreed.
- Disturbed land will be rehabilitated so that they are non-polluting and self-sustaining or to a condition where the maintenance requirements are limited.
- Surface and ground waters leaving rail infrastructure sites will not be degraded compared to their condition prior to the commencement of disturbance. Current and future water quality will be maintained at levels that are acceptable for users downstream of the site and meet environmental needs.
- Vegetation cover will be established to reduce rates of erosion and sediment loss to levels similar to the surrounding undisturbed landscape.
- Soil suitability for use in rehabilitation will be assessed and soils will be ameliorated/conditioned as required.

It is important that the preliminary closure and rehabilitation strategy recognises the limit of how the above described overarching objectives can be applied during rehabilitation. The following continuum of objectives describes how these objectives will be met during and post rehabilitation.

### 3.2.1 Short-term

Rehabilitation objectives in the short-term are to:

- progressively reshape and stabilise disturbed areas;
- provide short-term erosion control measures;
- manage soil to ensure suitability and beneficial reuse during rehabilitation;
- ameliorate wastes and soils as necessary to address physical and chemical constraints to revegetation and erosion stability; and
- refine rehabilitation methods through continuing review and update of this preliminary closure and rehabilitation strategy.

### 3.2.2 Medium-term

Rehabilitation objectives in the medium-term are to:

- establish functionally important and structurally dominant species from surrounding relevant native vegetation communities;
- demonstrate rehabilitation succession in comparison with analogue sites; and
- reduce reliance on structural drainage and erosion control methods through landform design and construction that lends itself to the surrounding fluvial and landscape processes.

### 3.2.3 Long-term

The long-term rehabilitation objectives are to:

- monitor rehabilitation areas to ensure succession of planted native vegetation with functionality trending toward analogue native vegetation communities;
- apply adaptive management measures if natural succession is not occurring; and
- demonstrate rehabilitation performance.

## 3.3 Closure and rehabilitation schedule

A conceptual rail infrastructure rehabilitation schedule based on current approved dates of closure is provided in Table 3.1. Many of the decommissioning closure tasks will be undertaken concurrently and the duration shown is indicative of each specific task only. Any infrastructure including dams, roads and buildings, which has beneficial future use by post-activity landowners, will be left in place.

**Table 3.1**      **Summary of rehabilitation schedule**

<b>Rail</b>	<b>Disturbance area (ha)</b>	<b>Year disturbance starts</b>	<b>Year progressive rehabilitation starts</b>	<b>Year progressive rehabilitation ends</b>	<b>Total area rehabilitated (ha)</b>
Rail alignment	1,795	2014	TBA	TBA	1,795
Permanent rail infrastructure	52.34	2014	TBA	TBA	52.34
Temporary rail infrastructure	494.1	2014	2017	TBA	494.1

### 3.3.1      **Unplanned closure**

Closure may be initiated in a number of different scenarios including: planned closure, unplanned or imminent closure and temporary closure.

In the event of unplanned closure the railway line and associated infrastructure will be moth-balled while a risk assessment and asset valuation is completed to determine whether the railway line and associated infrastructure is suitable for sale or relinquishment to a third party. If the asset is suitable for sale then it will be sold. Adani will also consider relinquishing the asset to an interested party such as another mining operation or government. The final (unlikely) option in the event of unplanned closure is rehabilitation of the site.

The following sections of the preliminary closure and rehabilitation strategy describe how rehabilitation will be completed.



## 4 Alternate rehabilitation strategy

### 4.1 Domains

For the purposes of rehabilitation management and planning, this preliminary closure and rehabilitation strategy applies to the following three domains:

- Rail corridor including tracks, passing loops, maintenance tracks, bridges, culverts and signalling equipment.
- Permanent rail infrastructure including terminus facility and maintenance facility.
- Temporary rail infrastructure including track laydown areas, bridge laydown areas, turning circles, construction camps, construction depots and concrete batching plants.

The alternate rehabilitation strategies for each domain, in the event that the railway line and associated infrastructure cannot be sold or relinquished to a third party are discussed below.

The preferred rehabilitation strategies for the mine site and the off-site infrastructure, and quarries are addressed in the *Closure and Rehabilitation Strategy (Mine site)*, the *Closure and rehabilitation strategy (Off-site infrastructure)* and the *Closure and Rehabilitation Strategy (Quarries)*. Additional detail will be provided in the supplementary EIS.

#### 4.1.1 Rail alignment

The rail corridor includes:

- passing loops;
- maintenance tracks
- bridges; and
- culverts and signalling equipment.

In the event of demolition, recyclable materials will be recovered and non-recyclable components will be disposed of at authorised facilities.

All fill material used to create a flat alignment during construction will preferentially be re-profiled so that it is consistent with the surrounding landscape. A risk assessment will be conducted prior to closure and decommissioning to assess whether fill material should be completely removed. If complete removal is considered necessary then fill will be fully excavated and transported to the open-cut pit void or nearest quarry for disposal.

Contaminated soil assessments will be conducted as required (Section 4.2). Any waste, contaminated soils or other potential sources of contamination will be preferentially treated on-site. If contamination cannot be treated then it may be disposed of at an authorised facility. Incident registers will be used to identify locations where spills have occurred. Treatment versus off-site disposal will depend on whether domains are listed on the Contaminated Land Register (CLR) and Environmental Management Register (EMR) and whether it is deemed appropriate to have them removed as part of the rehabilitation process.

Compacted surfaces will be ripped/de-compacted and topsoil will be placed in accordance with the topsoil management plan and topsoil register. Vegetation will be seeded or planted and watered. Weeds will be managed until >70% cover is achieved.

De-compacted areas may be graded and re-profiled such that surface drainage is restored to reduce ponding and scouring to as low as reasonably possible.

#### 4.1.2 Permanent rail infrastructure

Permanent rail infrastructure includes the terminus facility and maintenance facility plus the following infrastructure components:

- a dual gauge reception line of 4.5 km length;
- a dual gauge 4.5 km length departure line;
- balloon loop loading line
- train loading facility comprising a weighbridge and/or overload removal device; and
- bad order siding.

All components suitable for reuse at other rail or industrial operations will be reused. Otherwise, recyclable materials will be recovered and non-recyclable components will be disposed of at authorised facilities.

A risk assessment of all below ground infrastructure and components will be completed to determine what can be removed (for reuse and/or disposal) and what can be left in place. Surface disturbance and impacts associated with the removal of below ground infrastructure and components will be considered in addition to the potential for contamination. Below ground infrastructure that is to be left in place will be made safe (eg depressurising, draining and sealing of pipelines) and the location of all infrastructure and other components will be recorded.

Contaminated soil assessments will be conducted as required (Section 4.2). Contaminated soils or other potential sources of contamination will be preferentially treated on-site. If contamination cannot be treated then it may be disposed of at an authorised facility. Incident registers will be used to identify locations where spills have occurred. Treatment versus off-site disposal will depend on whether domains are listed on the CLR or EMR and whether it is deemed appropriate to have them removed as part of the rehabilitation process.

Compacted surfaces will be ripped/de-compacted and topsoil will be placed in accordance with the topsoil management plan and topsoil register. Vegetation will be seeded or planted and watered. Weeds will be managed until >70% cover is achieved.

De-compacted areas may be graded and re-profiled such that surface drainage is restored to reduce ponding and scouring to as low as reasonably possible.

#### 4.1.3 Temporary rail infrastructure

Temporary rail infrastructure includes:

- track laydown areas;



- bridge laydown areas;
- turning circles;
- construction camps;
- construction depots; and
- concrete batching plants.

Temporary rail infrastructure will be closed, decommissioned and rehabilitated following completion of the rail construction (Table 3.1). The following general strategy will be applied.

All components suitable for reuse at other rail or industrial operations will be reused. Otherwise, recyclable materials will be recovered and non-recyclable components will be disposed of at authorised facilities.

A risk assessment of all below ground infrastructure and components will be completed to determine what can be removed (for reuse and/or disposal) and what can be left in place. Surface disturbance and impacts associated with the removal of below ground infrastructure and components will be considered in addition to the potential for contamination. Below ground infrastructure that is to be left in place will be made safe (eg depressurising, draining and sealing of pipelines) and the location of all infrastructure and other components will be recorded.

Contaminated soil assessments will be conducted as required (Section 4.2). Contaminated soils or other potential sources of contamination will be preferentially treated on-site. If contamination cannot be treated then it may be disposed of at an authorised facility. Incident registers will be used to identify locations where spills have occurred. Treatment versus off-site disposal will depend on whether domains are listed on the CLR or EMR and whether it is deemed appropriate to have them removed as part of the rehabilitation process.

Compacted surfaces will be ripped/de-compacted and topsoil will be placed in accordance with the topsoil management plan and topsoil register. Vegetation will be seeded or planted and watered. Weeds will be managed until >70% cover is achieved.

De-compacted areas may be graded and re-profiled such that surface drainage is restored to reduce ponding and scouring to as low as reasonably possible.

## 4.2 Management of contaminated land

Railway lines and associated infrastructure are likely to be deemed contaminated under the *Environmental Protection (EP) Act 1994*. The CLR and Environmental EMR are administered by the Department of Environment, Heritage and Planning (EHP) under Chapter 7, Part 8 of the EP Act.

The process for assessing and removing land from the CLR will need to be confirmed with EHP at the time of closure.

Under the current EHP system the following general phases will need to be completed by a suitable qualified person:

1. Have a suitable qualified person complete a stage 1 or stage 2 contaminated land assessments.

2. If there is no contamination then the suitable qualified person will produce a report for submission to EHP requesting that the site be removed from the CLR.
3. If the contaminated site still contains contaminated soil, but it is being appropriately managed then the suitable qualified person can reflect this in their report. This may still allow the land to be removed from the CLR.

The process for assessing and removing land from the EMR will need to be confirmed with EHP at the time of closure. The system is currently under review by EHP. It is however likely that in addition to a report from a suitable qualified person an additional review and report will be required from a third-party-reviewer to verify the suitable qualified persons report.

### 4.3 Post-activity land use preliminary strategy

The post-activity land use preliminary strategy described in this section will only be enacted in the event that the railway line and associated infrastructure cannot be sold or relinquished to a third party.

This section of the preliminary closure and rehabilitation strategy outlines Adani commitments to a sustainable post-activity land use of the proposed areas of disturbance from the Carmichael Coal Mine and Rail Project. Where possible the proposed post-activity land use preliminary strategy will return the final landform as closely as possible to its original condition. That is rehabilitated land will have a similar suitability and range of land use options as those that existed prior to the activity. The basic strategy for how this will be achieved is described in Section 4.1.

All areas significantly disturbed will be rehabilitated in accordance with Table 4.1.

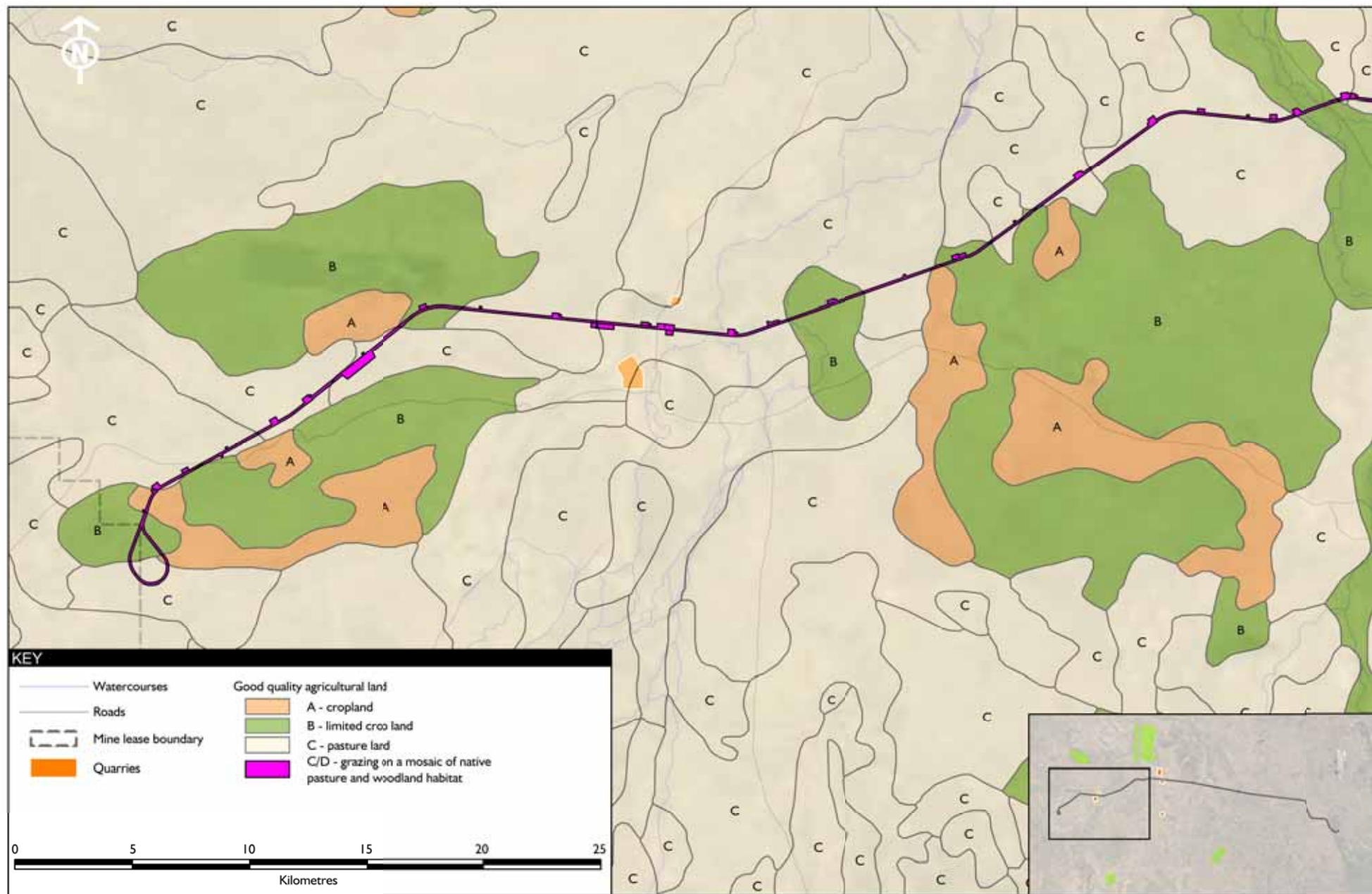
Table 4.2 presents an early conceptual post-activity land use preliminary strategy. Figure 4.1 illustrate the post-activity good quality agricultural land (GQAL) ranking.

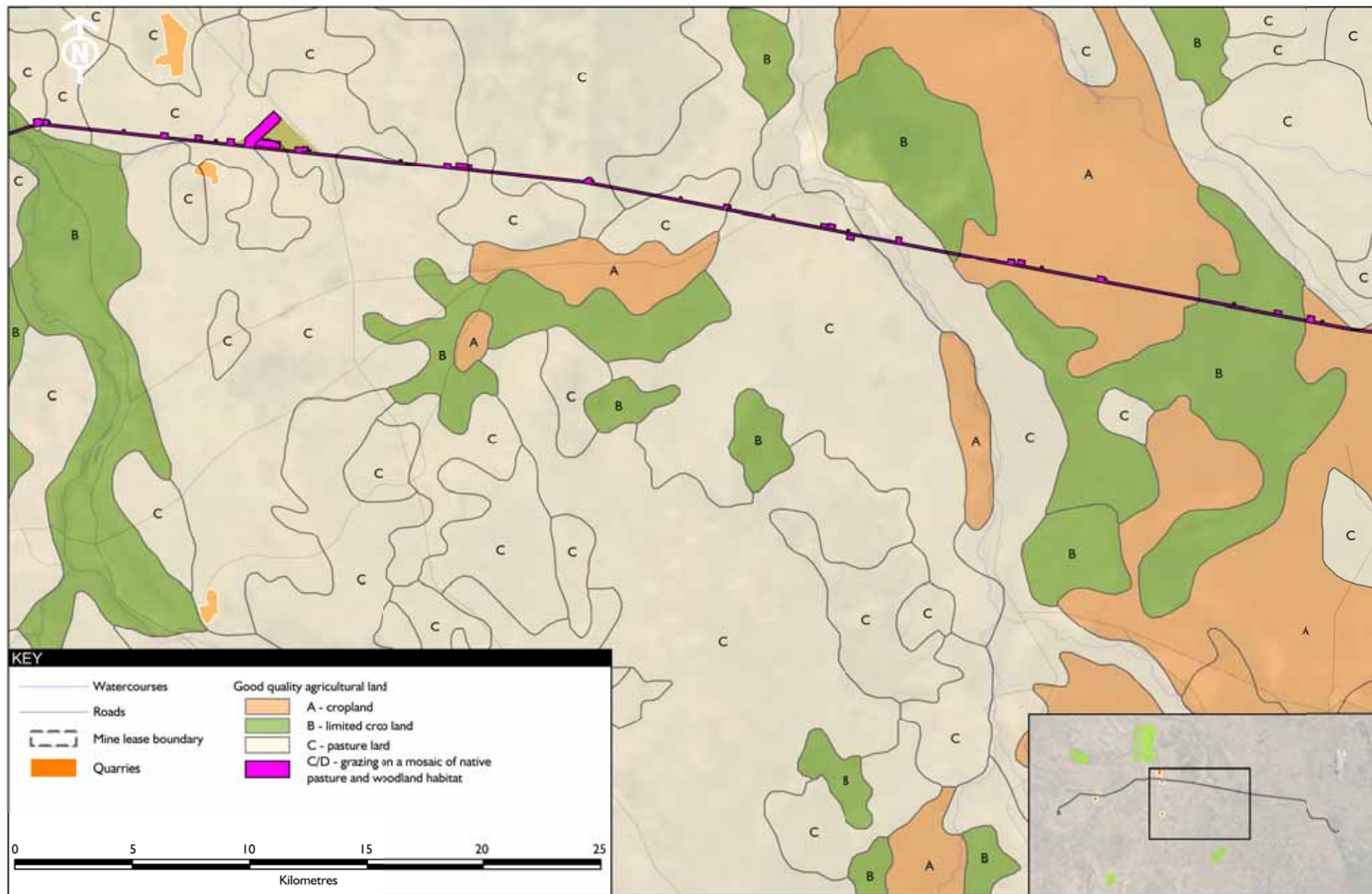
**Table 4.1**      **Summary of final land use and rehabilitation**

	Domain		
	Rail alignment	Permanent rail infrastructure	Temporary rail infrastructure
Approximate surface area (ha).	1,795	52.34	494.1
Pre-activity land use.	Combination of grazing on exotic pasture and/or a mosaic of native pasture and woodland habitat.		
Post activity land use.	Grazing on exotic pasture and/or a mosaic of native pasture and woodland habitat.		
Project covers range.	>70% cover of grasses		
Target slope range (%).	Consistent with surrounding landscape typography OR Slopes consistent with a safe and stable landform		

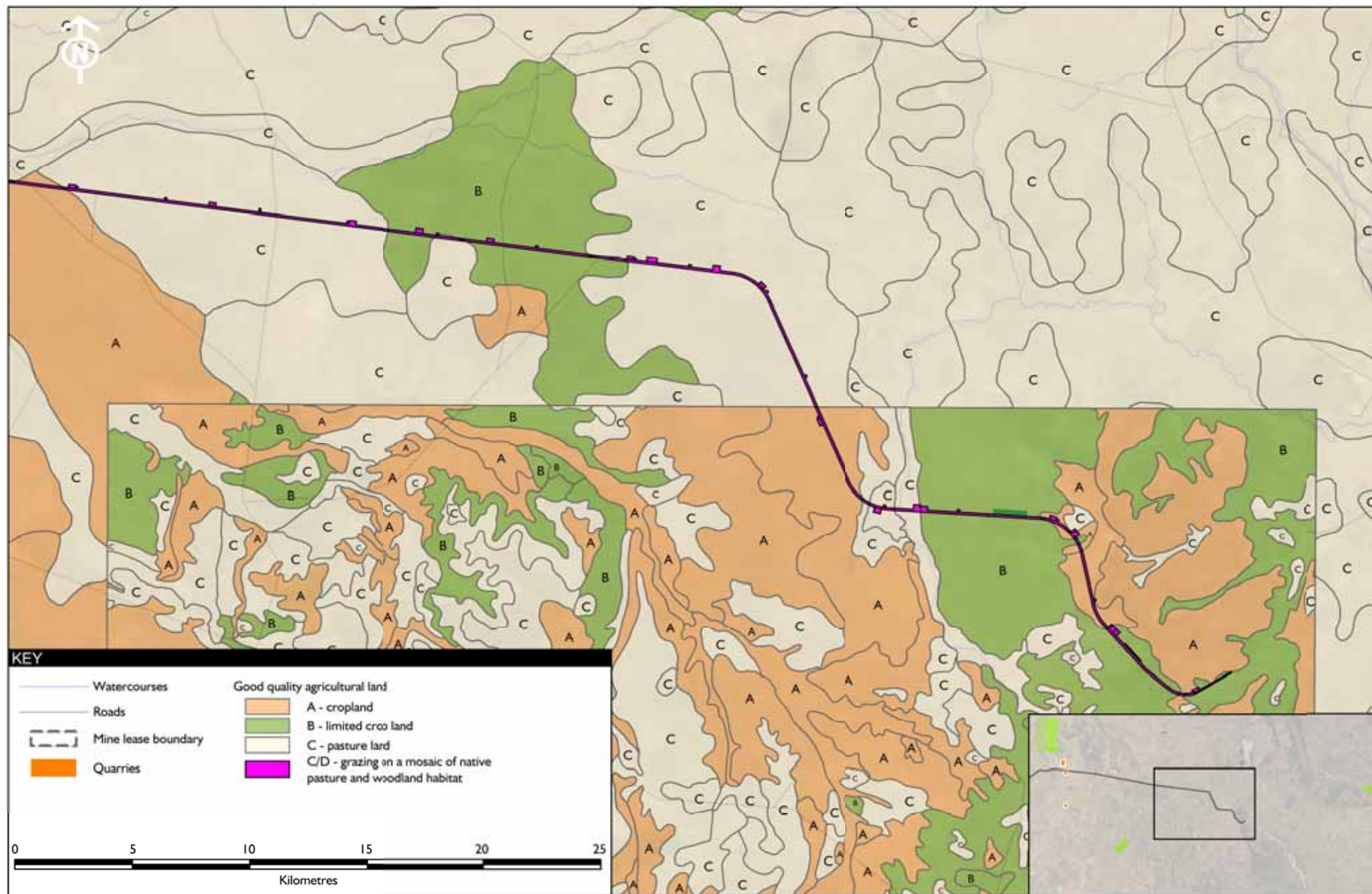
**Table 4.2**      **Conceptual post- activity land use summary**

<b>Domain</b>	<b>Pre- activity GQAL</b>	<b>Post- activity GQAL</b>	<b>Description/reason for loss/gain of GQAL</b>
<b>Rail alignment</b>	TBA	C/D – 1,795	No net gain of class A or class B GQAL. Aim is to return land to low ranking class C or class D land.
Permanent rail infrastructure	B - 0.50 C - 51.84	C/D – 52.34	No net gain of class A or class B GQAL. Aim is to return land to low ranking class C or class D land.
Temporary rail infrastructure	A - 47.15 B - 66.35 C - 380.6	C/D – 494.1	No net gain of class A or class B GQAL. Aim is to return land to low ranking class C or class D land.













## 5 General rehabilitation activities

The operational life of the Carmichael Coal Mine and Rail Project is over 60 years, therefore a general overview of closure and rehabilitation is provided based on current legislative and other potential requirements, noting that such requirements may be different at the time of closure and rehabilitation. Relevant legislative and other obligation and their potential impact on closure and rehabilitation is summarised in Appendix A.

The general rehabilitation methods and principles detailed in this chapter are common across all domains. Specific rehabilitation methods for landforms for each domain are presented in Chapter 6.

### 5.1 Decommissioning

The overall philosophy is to reinstate the rail alignment and associated infrastructure to pre-disturbance condition or an agreed alternate land use. The following decommissioning strategy will be used:

- Adani will appoint a demolition contractor at closure.
- Prior to commencing full scale removal of plant and equipment and structural demolition; the following will be carried out by Adani personnel who are familiar with the process and equipment:
  - all operations completed and equipment isolated and left in a safe condition;
  - main plant area electrically isolated, and checked;
  - all chemical and materials storages emptied and purged;
  - all services isolated, purged and tested; and
  - handover to demolition contractor.
- Once the demolition contractor takes possession of the site they will need to secure the site;
- Issues that impact on the demolition method will need further consideration in the decommissioning management plan including:
  - how to deal with live services that cross the demolition site that are required for operations;
  - lay down and storage areas for scrap; and
  - the requirements of legislation at the time of decommissioning.

#### 5.1.1 Scrap and salvage items

It is likely that across the site there will be a significant number of items that have residual salvage value that could be realised at a sale or auction. Items that may have significant scrap or salvage value include:

- sleepers;
- rail lines;

- ancillary rail structures;
- aluminium cladding; and
- copper from electrical services and some service pipework.

## 5.2 Environmental management

### 5.2.1 Topsoil stockpiling and application

Appropriate topsoil management during construction and rehabilitation is critical to the successful rehabilitation of disturbed areas. Topsoil management during construction and operation will include activities such as vegetation clearing, topsoil stripping, subsoil removal, stockpiling, re-profiling, ripping and de-compacting and soil amelioration.

A topsoil management plan (TMP) will be developed to maximise the recovery and reuse of topsoil. The TMP will include:

- all relevant aspects for topsoil retrieval such as stripping, stockpiling, erosion prevention and re-spreading procedures, stockpile locations and inventory;
- topsoil stripping quantities formulated from soil survey information;
- testing procedures to determine whether amelioration/conditioning is required;
- procedures for the application of amelioration/conditioning; and
- stripping and stockpile management.

### 5.2.2 Erosion and sediment control

During construction activities, erosion and sediment control plans (ESCPs) will be developed for each work area. General principles for erosion and sediment control will be drawn from the International Erosion Control Association (Australasia) (IECA) *Best Practice Erosion and Sediment Control*.

### 5.2.3 Surface water management

Information on surface water conditions and proposed surface water management at the site is provided in detail in the supplementary EIS.

### 5.2.4 Revegetation

Revegetation will be completed preferentially using seeds collected from local plant stocks and will likely include a mixture of pasture seed with a selection of native trees and shrubs. The specific species mix for each rehabilitation area will be based on:

- the end land use;
- slope and drainage characteristics; and
- availability of topsoil for placement in rehabilitation areas.

Revegetation will take place soon after the placement of topsoil. Revegetation may be by seeding or planting of tube stock.

Revegetated areas will be watered regularly until established. Weed inspections and control will be undertaken regularly until vegetation cover criteria are met (70% coverage).

### 5.2.5 Weed and pest control

Weeds will be managed across the site through a series of control measures, including:

- all vehicles and equipment will be cleaned at an approved weed wash down station and certified before being allowed on site;
- all offsite soil and materials of plant origin will be certified as weed free by the supplier using the Queensland Government weed hygiene declaration form or similar;
- regular inspections of disturbed areas for weed proliferation (including within subsided areas where ponding occurs and at key water resource locations) will be done; and
- a weed and pest control program will be developed and implemented.



## 6 Preliminary final landform strategy

### 6.1 Rail Corridor

#### 6.1.1 Final land use objectives

The final land use proposed for the rail alignment is grazing on exotic pasture and/or a mosaic of native pasture and woodland habitat. Rehabilitation will be consistent with the rehabilitation objectives in Section 3.1.

A conceptual post-activity land use preliminary strategy, which includes this domain, is described in Section 4.3.

#### 6.1.2 Landform design

Landform design will achieve a safe and stable landform with drainage restored such that ponding, obstruction of overland flow and scouring is avoided. Detailed land form designs will be developed prior to closure and detailed preliminary strategies prepared.

All infrastructures not identified for future use will be removed from the site.

##### i Drainage

Compacted soil and development/removal of infrastructure may affect drainage patterns and water quality. Where possible, interrupted overland flows will be restored such that ponding, obstruction of overland flow and scouring (concentration of flow) is avoided.

##### ii Slope

Landform design will ensure slopes are representative of the surrounding landscape. Slopes will not exceed 6°.

##### iii Cover

The rail alignment will have:

- ripping to remove compaction;
- 0.2 m of topsoil respread on the surface;
- grass and tree species seed applied consistent with the final land use; and
- weed management until revegetation ground cover reaches 70%.

#### 6.1.3 Completion criteria and monitoring

The proposed monitoring schedule for the rail alignment is described in Table 6.1.

**Table 6.1**      **Proposed monitoring of the rail alignment**

<b>Monitoring<sup>1</sup></b>	<b>Frequency<sup>2</sup></b>	<b>Period of monitoring after rehabilitation is completed</b>
Erosion	half-yearly	5 years
Surface water	quarterly	5 years
Geotechnical (stability)	half-yearly	5 years
Rehabilitation (Ecology)	annually	5 years
Dust-monitoring	during closure earthworks	-

Notes: <sup>1</sup> monitoring is described in detail in Chapter 7.

<sup>2</sup> the frequency of monitoring will be subject to the environmental authority (EA) conditions for the Carmichael Coal Mine and Rail project. This preliminary closure and rehabilitation strategy will be updated to reflect the EA conditions if they are different to what is indicated in this preliminary closure and rehabilitation strategy.

**i**      **Interpretation of completion criteria and monitoring table (Table 6.2)**

All reporting is to be completed as an annual rehabilitation monitoring report unless otherwise specified in Table 6.2. Further detail on reporting will be documented in the rehabilitation monitoring management plan.

Quantified indicators will be developed at the first annual review of the preliminary closure and rehabilitation strategy incorporating criteria from the environmental authority.

Monitoring and reporting will be completed for five years post-rehabilitation as per Table 6.1.

Table 6.2 makes reference to Landform Function Analysis. The procedure for how to complete this analysis will be documented in the rehabilitation monitoring management plan.

It should be noted that Table 6.2 makes reference to comparison to an analogue site. An analogue site is defined as a site of similar environment features eg slope, soil, vegetation that can be compared to a representative rehabilitated area to compare whether the rehabilitated area is performing similarly to the undisturbed analogue site.

The completion criteria have been presented aligning to the phase of closure relevant to the domain. That is:

- decommissioning – cleaning the site up;
- landform establishment – earthworks for landform and surface water management;
- vegetation establishment – seeding and planting; and
- sustainable final landform – a functioning landscape with minimal intervention and agro-economic value.

**Table 6.2 Summary of completion criteria for the rail alignment**

Phase	Objective	Completion criteria	Indicator that completion criteria is being met
Decommissioning	All infrastructures, not identified for future use, will be removed.	Buildings and foundations removed.	Buildings and foundations removed.
	Unwanted bituminous sealed areas will be removed.	Bituminous seals will be tested for contaminants. Contaminated bitumen will be removed from site. Uncontaminated bitumen can be used as fill.	Bituminous seals removed.
	Clean-up of potential/actual contamination.	Hydrocarbons less than assessment criteria. Heavy metals less than assessment criteria.	Hazardous material audit and contamination at acceptable level. Site is assessed by a suitable qualified person and removed from CLR, EMR or both.
	Dust generation below acceptable limits.	Dust below assessment criteria.	Evidence in reporting that dust monitoring results at sensitive receptors has complied.
Landform establishment	Slopes are stable.		As built design reports. No evidence of slumping of slopes.
	Topsoil replacement consistent with pre-activity conditions.	Soil based criteria typical with analogue sites or fall within desirable ranges provided by the agricultural industry (to be determined based on sampling results). Depth - = 0.2 m.	Monitoring and comparison to analogue site.
	Dust levels below thresholds.	Dust based criteria typical with analogue sites.	Monitoring and comparison to analogue site.
	Appropriate management of surface water.	All permanent sediment traps and drains meet approved design criteria. All regulated structures meet design criteria. All non-permanent structures are decommissioned in accordance with regulating authority requirements.	Certification by an appropriately qualified person.
	Non-polluting.	Not contributing excess sediment load to downstream watercourses when compared to a suitable analogue sites.	Surface water monitoring and reporting.

**Table 6.2**      **Summary of completion criteria for the rail alignment**

Phase	Objective	Completion criteria	Indicator that completion criteria is being met
Vegetation establishment	Establishment of the functionally important and structurally dominant species from the relevant native vegetation communities.	The diversity of shrubs and juvenile trees with a stem less than 5 cm is comparable to that of the analogue sites.	Monitoring and comparison to analogue site.
		Number of weeds species and surface area cover $\leq$ analogue site.	Monitoring and comparison to analogue site.
		Equal or greater proportion of over storey species occurring as regeneration.	Monitoring and comparison to analogue site.
	Demonstrating rehabilitation succession.	The number of tree species, shrub species, herbs and forbs and grasses species regardless of age comprising the vegetation community is comparable to that of the analogue sites.	Monitoring and comparison to analogue site.
	Vegetation covers to minimise erosion.	Evidence that the vegetation type and density are of species suited to the fill composition, slope, aspect, climate and other factors.	Vegetation type and density.
		Vegetation types and density are comparable with the relevant reference site.	Vegetation type and density.
		Minimum of 70% vegetation cover is present.	Foliage cover.
		Foliage cover is comparable with the relevant reference site.	Foliage cover.
		Nutrient cycling is occurring and the presence of leaf litter is assisting in limiting erosion of the soil /fill surface.	Leaf litter, humus, depth of growing medium.
Sustainable landscape	Landform generally blends in with surrounding landscape and is stable ie no sodic saline soil or spoil at the surface of the landform and minimal erosion.	Soils surface cover $\geq 70\%$ .	Monitoring and reporting.
		Exchangeable Sodium Percentage (ESP) $\leq 6\%$ for surface soil and fill.	Monitoring and reporting



**Table 6.2**      **Summary of completion criteria for the rail alignment**

Phase	Objective	Completion criteria	Indicator that completion criteria is being met
		Absence of gullies >300mm wide or deep and gullies stable.	Erosion monitoring and reporting.
		Land function stability analysis based on key characteristics including: Soil cover; Litter cover; Cryptogam cover; Crust broken-ness; Erosion type and severity; Deposited materials; Surface resistance to disturbance; Slake test; Compaction; and Surface roughness.	Landform function analysis and reporting.
		Nutrient recycling based on key characteristics including: Soil fertility; Soil organic matter; Litter cover; and Perennial grass basal and tree and shrub foliage cover.	Landform function analysis and reporting.
	Weed infestation less than pre-activity conditions.	Equal or lesser proportion of weed species occurring in regeneration by comparison to analogue site.	Rehabilitation monitoring and reporting.
	Agricultural cattle Grazing.	Determination of safe carrying capacity for future land use and future management strategies/agreements in place. Land maintenance requirements are comparable to reference sites.	Cattle stocking trials indicate areas nominated for cattle grazing as a post mining land use are sustaining an equal to or better stocking rate than that calculated for relevant reference site. Landform stability when grazed. Safety of landform for stock and for undertaking management activities associated with stock.

## 6.2 Permanent rail infrastructure

### 6.2.1 Final land use objectives

The final land use proposed for permanent rail infrastructure is grazing on a mosaic of native pasture and woodland habitat. It is preferential for rail infrastructure to be relinquished to the state government. Rehabilitation will be consistent with the rehabilitation objectives described in Section 3.1.

A conceptual post-activity land use preliminary strategy, which includes this domain, is described in Section 4.3.

### 6.2.2 Landform design

Landform design will achieve a safe and stable landform with drainage restored such that ponding, obstruction of overland flow and scouring is avoided. Detailed land form designs will be developed prior to activity closure and detailed plans prepared.

All infrastructures not identified for future use will be removed from the site.

#### i Drainage

Compaction of soils and development/removal of infrastructure may affect drainage patterns and water quality. Where possible, interrupted overland flows will be restored such that ponding, obstruction of overland flow and scouring (concentration of flow) is avoided.

#### ii Slope

Landform design will ensure slopes are representative of the surrounding landscape. Slopes will not exceed 6°.

#### iii Cover

The permanent rail infrastructure will have:

- earthworks to reinstate a landform relative to the surrounding landscape;
- ripping to remove compaction;
- 0.2 m of topsoil respread on the surface;
- grass and tree species seeding consistent with the final land use; and
- weed management until revegetation ground cover reaches 70%.

### 6.2.3 Completion criteria and monitoring

The proposed monitoring schedule for the permanent rail infrastructure is described in Table 6.3.

**Table 6.3 Proposed monitoring of the permanent rail infrastructure**

Monitoring <sup>1</sup>	Frequency <sup>2</sup>	Period of monitoring after rehabilitation is completed
Erosion	half-yearly	5 years
Surface water	half yearly and event based	5 years
Geotechnical (stability)	half-yearly	5 years
Rehabilitation (Ecology)	annually	5 years
Dust-monitoring	during closure earthworks	-

Notes: <sup>1</sup> monitoring is described in detail in Chapter 7.

<sup>2</sup> the frequency of monitoring will be subject to the environmental authority (EA) conditions for the Carmichael Coal Mine and Rail project. This preliminary closure and rehabilitation strategy will be updated to reflect the EA conditions if they are different to what is indicated in this preliminary closure and rehabilitation strategy.

#### i Interpretation of completion criteria and monitoring table (Table 6.4)

All reporting is to be completed as an annual rehabilitation monitoring report unless otherwise specified in Table 6.4. Further detail on reporting will be documented in the rehabilitation monitoring management plan.

Quantified indicators will be developed at the first annual review of the preliminary closure and rehabilitation strategy incorporating criteria from the environmental authority.

Monitoring and reporting to be completed for five years post-rehabilitation as per Table 6.3.

Table 6.4 makes reference to Landform Function Analysis. The procedure for how to complete this analysis will be documented in the rehabilitation monitoring management plan.

It should be noted that Table 6.4 makes reference to comparison to an analogue site. An analogue site is defined as a site of similar environment features eg slope, soil, vegetation that can be compared to a representative rehabilitated area to compare whether the rehabilitated area is performing similarly to the undisturbed analogue site.

Completion criteria for the permanent rail infrastructure are presented in Table 6.4. The completion criteria have been presented aligning to the phase of closure relevant to the domain. That is:

- decommissioning – cleaning the site up;
- landform establishment – earthworks for landform and surface water management;
- vegetation establishment – seeding and planting; and
- sustainable final landform – a functioning landscape with minimal intervention and agro-economic value.

**Table 6.4 Summary of completion criteria for the permanent rail infrastructure**

Phase	Objective	Completion criteria	Indicator that completion criteria is being met
Decommissioning	All infrastructures, not identified for future use, will be removed.	Ballast, sleepers, rail fixings and rail removed.	Ballast, sleepers, rail fixings and rail removed.
	Clean-up of potential/actual contamination.	Hydrocarbons less than assessment criteria. Heavy metals less than assessment criteria.	Hazardous material audit and contamination at acceptable level. Site is assessed by a suitable qualified person and removed from CLR, EMR or both.
	Dust generation below acceptable limits.	Dust below than assessment criteria.	Evidence in reporting that dust monitoring results at sensitive receptors has complied.
Landform establishment	Slopes are stable.	Re-profiled areas are stable with slopes not exceeding 6°.	As built design reports. No evidence of slumping of slopes.
	Topsoil replacement consistent with pre-activity conditions.	Soil based criteria typical with analogue sites or fall within desirable ranges provided by the agricultural industry (to be determined based on sampling results). Depth - = 0.2 m.	Monitoring and comparison to analogue site.
	Dust levels below thresholds.	Dust based criteria typical with analogue sites.	Monitoring and comparison to analogue site.
	Appropriate management of surface water.	All permanent sediment traps and drains meet approved design criteria. All regulated structures meet design criteria. All non-permanent structures are decommissioned in accordance with regulating authority requirements.	Certification by an appropriately qualified person.
	Non-polluting.	Not contributing excess sediment load to downstream watercourses when compared to a suitable analogue sites.	Surface water monitoring and reporting.
Vegetation establishment	Establishment of the functionally important and structurally dominant species from the relevant native vegetation communities.	The diversity of shrubs and juvenile trees with a stem less than 5 cm is comparable to that of the analogue sites.	Monitoring and comparison to analogue site.
		Number of weeds species and surface area cover ≤ analogue site.	Monitoring and comparison to analogue site.

**Table 6.4**      **Summary of completion criteria for the permanent rail infrastructure**

Phase	Objective	Completion criteria	Indicator that completion criteria is being met
	Demonstrating rehabilitation succession.	Equal or greater proportion of over storey species occurring as regeneration.	Monitoring and comparison to analogue site.
		The number of tree species, shrub species, herbs and forbs and grasses species regardless of age comprising the vegetation community is comparable to that of the analogue sites.	Monitoring and comparison to analogue site.
	Vegetation covers to minimise erosion.	Evidence that the vegetation type and density are of species suited to the fill composition, slope, aspect, climate and other factors.	Vegetation type and density.
		Vegetation types and density are comparable with the relevant reference site.	Vegetation type and density.
		Minimum of 70% vegetation cover is present.	Foliage cover.
		Foliage cover is comparable with the relevant reference site.	Foliage cover.
		Nutrient cycling is occurring and the presence of leaf litter is assisting in limiting erosion of the soil /fill surface.	Leaf litter, humus, depth of growing medium.
		Leaf litter, humus, depth of growing medium comparable with the relevant reference site.	Leaf litter, humus, depth of growing medium.
Sustainable landscape	Landform generally blends in with surrounding landscape and is stable ie no sodic saline soil or spoil at the surface of the landform and minimal erosion.	Soils surface cover ≥70%.	Monitoring and reporting.
		Exchangeable Sodium Percentage (ESP) ≤6% for surface soil and fill.	Monitoring and reporting
		Absence of gullies >300mm wide or deep and gullies stable.	Erosion monitoring and reporting
		Land function stability analysis based on key characteristics including: Soil cover; Litter cover;	Landform function analysis and reporting.

**Table 6.4**      **Summary of completion criteria for the permanent rail infrastructure**

Phase	Objective	Completion criteria	Indicator that completion criteria is being met
		Cryptogam cover; Crust broken-ness; Erosion type and severity; Deposited materials; Surface resistance to disturbance; Slake test; Compaction; and Surface roughness.	
		Nutrient recycling based on key characteristics including: Soil fertility; Soil organic matter; Litter cover; and Perennial grass basal and tree and shrub foliage cover.	Landform function analysis and reporting.
	Weed infestation less than pre-activity conditions.	Equal or lesser proportion of weed species occurring in regeneration by comparison to analogue site.	Rehabilitation monitoring and reporting.
	Agricultural cattle Grazing.	Determination of safe carrying capacity for future land use and future management strategies/agreements in place.  Land maintenance requirements are comparable to reference sites.	Cattle stocking trials indicate areas nominated for cattle grazing as a post mining land use are sustaining an equal to or better stocking rate than that calculated for relevant reference site.  Landform stability when grazed. Safety of landform for stock and for undertaking management activities associated with stock.

## 6.3 Temporary rail infrastructure

### 6.3.1 Final land use objectives

The final land use proposed for the temporary rail infrastructure is grazing on a mosaic of native pasture and woodland habitat. Rehabilitation will be consistent with the rehabilitation objectives in Section 3.1.

A conceptual post-activity land use preliminary strategy, which includes this domain, is described in Section 4.3.

### 6.3.2 Landform design

Landform design will achieve a safe and stable landform with drainage restored such that ponding, obstruction of overland flow and scouring is avoided. Detailed land form designs will be developed prior to activity closure and detailed plans prepared.

All infrastructures not identified for future use will be removed from the site.

#### i Drainage

Compaction of soils and development/removal of infrastructure may affect drainage patterns and water quality. Where possible, interrupted overland flows will be restored such that ponding, obstruction of overland flow and scouring (concentration of flow) is avoided.

#### ii Slope

Landform design will ensure slopes are representative of the surrounding landscape. Slopes will not exceed 6°.

#### iii Cover

The temporary rail infrastructure will have:

- earthworks to reinstate a landform relative to the surrounding landscape;
- ripping to remove compaction;
- 0.2 m of topsoil respread on the surface;
- grass and tree species seeding consistent with the final land use; and
- weed management until revegetation ground cover reaches 70%.

### 6.3.3 Completion criteria and monitoring

The proposed monitoring schedule for the temporary rail infrastructure is described in Table 6.3.

**Table 6.5 Proposed monitoring of the temporary rail infrastructure**

Monitoring <sup>1</sup>	Frequency <sup>2</sup>	Period of monitoring after rehabilitation is completed
Erosion	quarterly	1 years
Surface water	quarterly and event based	1 years
Geotechnical (stability)	quarterly	1 years
Rehabilitation (Ecology)	annually	1 years
Dust-monitoring	during closure earthworks	-

Notes: <sup>1</sup> monitoring is described in detail in Chapter 7.

<sup>2</sup> the frequency of monitoring will be subject to the environmental authority (EA) conditions for the Carmichael Coal Mine and Rail project. This preliminary closure and rehabilitation strategy will be updated to reflect the EA conditions if they are different to what is indicated in this preliminary closure and rehabilitation strategy.

#### i Interpretation of completion criteria and monitoring table (Table 6.4)

All reporting is to be completed as an annual rehabilitation monitoring report unless otherwise specified in Table 6.4. Further detail on reporting will be documented in the rehabilitation monitoring management plan.

Quantified indicators will be developed at the first annual review of the preliminary closure and rehabilitation strategy incorporating criteria from the environmental authority.

Monitoring and reporting to be completed for one year post-rehabilitation as per Table 6.3.

Table 6.4 makes reference to Landform Function Analysis. The procedure for how to complete this analysis will be documented in the rehabilitation monitoring management plan.

It should be noted that Table 6.4 makes reference to comparison to an analogue site. An analogue site is defined as a site of similar environment features eg slope, soil, vegetation that can be compared to a representative rehabilitated area to compare whether the rehabilitated area is performing similarly to the undisturbed analogue site.

Completion criteria for the temporary rail infrastructure are presented in Table 6.4. The completion criteria have been presented aligning to the phase of closure relevant to the domain. That is:

- decommissioning – cleaning the site up;
- landform establishment – earthworks for landform and surface water management;
- vegetation establishment – seeding and planting; and
- sustainable final landform – a functioning landscape with minimal intervention and agro-economic value.



**Table 6.6**      **Summary of completion criteria for the temporary rail infrastructure**

Phase	Objective	Completion criteria	Indicator that completion criteria is being met
Decommissioning	All infrastructures, not identified for future use, will be removed.	Ballast, sleepers, rail fixings and rail removed.	Ballast, sleepers, rail fixings and rail removed.
	Clean-up of potential/actual contamination.	Hydrocarbons less than assessment criteria. Heavy metals less than assessment criteria.	Hazardous material audit and contamination at acceptable level. Site is assessed by a suitable qualified person and removed from CLR, EMR or both.
	Dust generation below acceptable limits.	Dust below than assessment criteria.	Evidence in reporting that dust monitoring results at sensitive receptors has complied.
Landform establishment	Slopes are stable.	Re-profiled areas are stable with slopes not exceeding 6°.	As built design reports. No evidence of slumping of slopes.
	Topsoil replacement consistent with pre-activity conditions.	Soil based criteria typical with analogue sites or fall within desirable ranges provided by the agricultural industry (to be determined based on sampling results). Depth - = 0.2 m.	Monitoring and comparison to analogue site.
	Dust levels below thresholds.	Dust based criteria typical with analogue sites.	Monitoring and comparison to analogue site.
	Appropriate management of surface water.	All permanent sediment traps and drains meet approved design criteria. All regulated structures meet design criteria. All non-permanent structures are decommissioned in accordance with regulating authority requirements.	Certification by an appropriately qualified person.
	Non-polluting.	Not contributing excess sediment load to downstream watercourses when compared to a suitable analogue sites.	Surface water monitoring and reporting.

**Table 6.6 Summary of completion criteria for the temporary rail infrastructure**

Phase	Objective	Completion criteria	Indicator that completion criteria is being met
Vegetation establishment	Establishment of the functionally important and structurally dominant species from the relevant native vegetation communities.	The diversity of shrubs and juvenile trees with a stem less than 5 cm is comparable to that of the analogue sites.	Monitoring and comparison to analogue site.
		Number of weeds species and surface area cover $\leq$ analogue site.	Monitoring and comparison to analogue site.
		Equal or greater proportion of over storey species occurring as regeneration.	Monitoring and comparison to analogue site.
	Demonstrating rehabilitation succession.	The number of tree species, shrub species, herbs and forbs and grasses species regardless of age comprising the vegetation community is comparable to that of the analogue sites.	Monitoring and comparison to analogue site.
	Vegetation covers to minimise erosion.	Evidence that the vegetation type and density are of species suited to the fill composition, slope, aspect, climate and other factors.	Vegetation type and density.
		Vegetation types and density are comparable with the relevant reference site.	Vegetation type and density.
		Minimum of 70% vegetation cover is present.	Foliage cover.
		Foliage cover is comparable with the relevant reference site.	Foliage cover.
		Nutrient cycling is occurring and the presence of leaf litter is assisting in limiting erosion of the soil /fill surface.	Leaf litter, humus, depth of growing medium.
		Leaf litter, humus, depth of growing medium comparable with the relevant reference site.	Leaf litter, humus, depth of growing medium.
Sustainable landscape	Landform generally blends in with surrounding landscape and is stable ie no sodic saline soil or spoil at the surface of the landform and minimal erosion.	Soils surface cover $\geq 70\%$ .	Monitoring and reporting.
		Exchangeable Sodium Percentage (ESP) $\leq 6\%$ for surface soil and fill.	Monitoring and reporting
		Absence of gullies >300mm wide or deep and gullies	Erosion monitoring and reporting

**Table 6.6**      **Summary of completion criteria for the temporary rail infrastructure**

Phase	Objective	Completion criteria	Indicator that completion criteria is being met
		stable. Land function stability analysis based on key characteristics including: Soil cover; Litter cover; Cryptogam cover; Crust broken-ness; Erosion type and severity; Deposited materials; Surface resistance to disturbance; Slake test; Compaction; and Surface roughness.	Landform function analysis and reporting.
		Nutrient recycling based on key characteristics including: Soil fertility; Soil organic matter; Litter cover; and Perennial grass basal and tree and shrub foliage cover.	Landform function analysis and reporting.
	Weed infestation less than pre-activity conditions.	Equal or lesser proportion of weed species occurring in regeneration by comparison to analogue site.	Rehabilitation monitoring and reporting.
	Agricultural cattle Grazing.	Determination of safe carrying capacity for future land use and future management strategies/agreements in place.  Land maintenance requirements are comparable to reference sites.	Cattle stocking trials indicate areas nominated for cattle grazing as a post mining land use are sustaining an equal to or better stocking rate that that calculated for relevant reference site.  Landform stability when grazed. Safety of landform for stock and for undertaking management activities associated with stock.



## 7 Monitoring and maintenance

This section of the preliminary strategy describes conceptual monitoring and maintenance activities that will be undertaken post-rehabilitation.

The post-rehabilitation phase commences upon completion of this preliminary closure and rehabilitation strategy. During post-rehabilitation, monitoring will be conducted to assess whether the rehabilitation objectives and criteria are being met, while maintenance will be undertaken to address those areas where rehabilitation objectives and criteria are not being successfully met. At this stage, the identified monitoring and maintenance activities are conceptual and will need to be refined as the preliminary strategy develops in the future.

Upon completion of rehabilitation activities, maintenance and monitoring will be conducted at various intervals.

Post-rehabilitation monitoring plans will need to be confirmed with relevant government authorities.

### 7.1 Surface water

Detailed information on surface water will be outlined in the receiving environment management plan (REMP).

### 7.2 Geotechnical monitoring and soil testing

Geotechnical monitoring and soil testing will be undertaken by a qualified geotechnical engineer who will assess the stability and quality of post-closure features in the activity area. Monitoring frequency is presented in Chapter 6.

The requirement for erosion monitoring will be addressed in future iterations of this preliminary closure and rehabilitation strategy.

### 7.3 Dust monitoring and analyses

Dust monitoring and analyses will be conducted to assess the quality of post-rehabilitation corrective action to control dust generation. This will be conducted as part of a dust control program to identify and quantify airborne dust concentrations. Monitoring frequency is presented in Chapter 6.

### 7.4 Rehabilitation monitoring

A rehabilitation monitoring schedule is presented in Chapter 6

A procedure is yet to be developed describing the specific monitoring methodologies to determine statistical adequacy of the sample population. These methodologies will entail but not be limited to: transect location determination, floral and faunal sampling and identification, and biodiversity assessments.

## 7.5 Weed and feral animal control and inspection

Weed and feral animal control will be conducted annually during the first five years after rehabilitation for permanent infrastructure locations and the rail corridor. For temporary locations, weed and animal control will be conducted for a period of one year following rehabilitation.

Weed and feral animal inspections will be conducted in all areas of rail infrastructure sites, and control will be performed as required.

## 7.6 Maintenance

Maintenance will encompass post-rehabilitation monitoring to identify areas requiring maintenance, and identify and address deviations from the expected outcomes upon closure.

Maintenance activities will include the maintenance of new vegetation (eg addition of fertiliser, re-planting of significant areas of failed vegetation) prior to its establishment within the ecosystem; upkeep of water management structures; regular checking, replacement and probable repairs, where necessary, to newly fenced areas and signage in the event that they become compromised after closure.

## Appendix A

### Legal and other requirements

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A critical factor in defining the scope and context of closure and rehabilitation is to identify and evaluate the legal and other obligations that affect closure and rehabilitation. Legal requirements for closure and rehabilitation are general found in legislation or in the Development Approval conditions which are established in the early stages of project development. Other obligations include internal standards, external commitments and industry codes and guidelines. In most cases, the other obligations that influences decisions are often far more onerous and comprehensive than regulatory requirements.

## A.1 Legal Requirements

A summary of potential issues and related legislation and best practice guidelines that may apply at closure or rehabilitation and the potential obligation that may arise is summarised in Table A.1.

It should be noted that Table A.1 is not an exhaustive list, rather it is tailored based on what is perceived as rehabilitation issues identified during the preparation of this preliminary closure and rehabilitation strategy.

**Table A.1** Summary of Legalisation and best practice and potential Project obligation

Issue	legislation	Objective	Obligation
<b>Flora and Fauna</b>	Environmental Protection and Biodiversity Conservation Act 1999	To provide a federal environmental protection framework as well as determining nationally endangered species and communities.	Not to undertake action that may have a significant impact on a “matter of national environmental significance” or on the environment within Commonwealth land without approval under the Act.
<b>Due Diligence</b>	Environmental Protection Act 1994	To protect the environment while allowing development that improves the total quality of life and ecologically sustainable development.	General environmental 'duty of care' to be observed to ensure that any potential environmental impact from the Project is minimised.
<b>Contamination</b>	Environmental Protection Regulation 1998	Lists Environmentally Relevant Activities, which are activities that may potentially cause environmental harm and require approval. Also gives effect to National Environmental Protection Measure (NEPMs).	The NEPM contamination allows the development site specific clean-up criteria to determine the required level of remediation. These criteria are known as Health Investigation Levels (HIL's).
<b>Waste</b>	Environmental Protection (Waste) Regulation 2000	Provides waste management strategies to limit impact of waste on the environment.	Management of regulated wastes will be subject to this legislation.
<b>Water</b>	Environmental Protection (Waters) Policy 2009	Provides a framework to develop water quality guidelines to protect Queensland waters and prevent pollution.	Water quality measurement parameters may be sort from relevant guidelines.
<b>Air</b>	Environmental Protection (Air) Policy 2008	Specifies air quality indicators and goals to protect the environmental values and provides a framework for making consistent and fair decisions about managing the air environment and involving the community.	Air quality measurement parameters may be sort from relevant guidelines.

Table A.1 Summary of Legalisation and best practice and potential Project obligation

Issue	legislation	Objective	Obligation
<b>Safety</b>	Work Health and Safety Act 2011	To prevent a person's death, injury or illness being caused by a workplace, by a relevant workplace area, by work activities, or by plant or substances for use at a workplace.	Compliance with safety requirements throughout the closure period to be incorporated into the closure plan.
<b>Industrial Relations</b>	Workplace Relations Act 1996	The principal object of this Act is to provide a framework for cooperative workplace relations which promotes the economic prosperity and welfare of the people of Australia.	Closure plan to consider impact on employees of the operation.
<b>Water</b>	ANZECC Guidelines	Provide guidelines for the monitoring and management of water ways	Guidelines to provide details of water monitoring requirements.
<b>Land Use</b>	Land Act 1994	Relates to the administration and management of nonfreehold land and deeds of grant in trust and the creation of freehold land, and for related purpose	Regulates the opening and closing of road reserves and land dealings relating to changes in land tenure.
<b>Flora and Fauna</b>	Nature Conservation Act 1992	To provide framework for the protection of state listed threatened species and communities.	Rehabilitation strategies may need to include any state listed threatened species or communities that occur in the area.
<b>Due Diligence</b>	State Development and Public Works Organisation Act 1971	To provide state planning and organisational legislation that aids in the delivery of ecologically sustainable development.	Commitments during the EIS phase may impact on the rehabilitation of the site.
<b>Flora and Fauna</b>	Vegetation Management Act 1999	Regulates clearing of vegetation to ensure appropriate management and conservation.	Development to comply with state and regional vegetation management plans and policies and also comply with vegetation management practices on leased and freehold land.
<b>Due Diligence</b>	Minerals Council of Australia (MCA) (2000) Code for Environmental Management	Now superseded by Enduring Value – the Australian Minerals Industry Framework for Sustainable Development.	Highlights a range of closure Scenarios that should be considered during plannings. Scenarios include:  Planned Closure: This occurs when mining and processing ceases due to economic or operational requirements, or if the resource is exhausted. In this situation a decommissioning and closure plan will be prepared and submitted to the regulatory

Table A.1 Summary of Legalisation and best practice and potential Project obligation

Issue	legislation	Objective	Obligation
			<p>authorities for approval prior to closure.</p> <p>Unplanned Closure: This occurs when processing ceases due to financial constraints or non-conformances with regulatory requirements. In this situation a decommissioning plan will be prepared immediately.</p> <p>Care and Maintenance: This can occur if the economics of the project area are unfavourable or if there is some impediment to extracting the resource. In this situation a 'caretaker' manages the site until conditions become favourable again. A decommissioning plan will be prepared which takes into account the recommencement. The plan will be implemented when a decision has been made to close the operation.</p>
<b>Land Use</b>	Strategic framework for Mine Closure – Australian and New Zealand Minerals Council of Australia	States mine life criteria and rehabilitation guidelines	May be relevant to rehabilitation requirements.





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