NEW HOPE GROUP

J.19 Environmental Management Plan

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ENVIRONMENTAL MANAGEMENT PLAN

New Acland Coal Mine
Stage 3 Project

JANUARY 2014

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1. Introduction

1.1. Purpose of the Environmental Management Plan

The Environmental Management Plan (EM Plan) has been prepared to address the relevant Terms of Reference for the New Acland Coal Mine Stage 3 Project (the revised Project). The purpose of the EM Plan is to propose environmental protection commitments to assist the Administering Authority prepare the Environmental Authority (EA) for the application. The EM Plan for the revised Project contains:

- A description of the revised Project;
- Environmental values likely to be affected by mining activities;
- Potential adverse and beneficial impacts of the mining activities on the environmental values;
- Environmental protection objectives; and
- Control strategies adopted to achieve the environmental protection objectives and the proposed EA conditions.

The structure of this EM Plan is outlined below:

- Section 1 – Introduction provides background on the proponent, describes each of the relevant mining leases and land tenure, and identifies the relevant stakeholders.
- Section 2 – Revised Project Description describes the relevant mining activities and the land on which the mining activities are to be carried out.
- Section 3 – Environmental Values, Impacts, Commitments, and Draft Conditions describes:
  - Environmental values likely to be affected by mining activities;
  - Potential adverse and beneficial impacts of the mining activities on the environmental values;
  - Environmental protection objectives;
  - Control strategies adopted to achieve the environmental protection objectives; and
  - Proposed EA conditions (including transitional arrangements).
- Section 4 – Environmental Management describes details of the revised Project's systems for monitoring, reporting, research, training and auditing.
- Section 5 – References used throughout this document.

1.2. The Revised Project

NAC currently operates the Mine as a 4.8 million tonne (product coal) per annum (Mtpa) open cut coal mine on Mining Lease (ML) 50170 and ML 50216 adjacent to Mineral Development Licence (MDL) 244, under the approval of EA EPML00335713. The Mine reserve is forecast to be depleted by 2017. The revised Project involves the extension and operation of the Mine, while increasing production from 4.8 Mtpa up to 7.5 Mtpa of thermal product coal.

The revised Project involves the extension of the Mine's operating life to approximately 2029 with the inclusion and progressive development of two new resource areas within the area covered by MDL 244, now also covered by MLA 50232. These resource areas are identified as the Manning Vale and Willeroo resource areas. The revised Project will include mining in three new mine pits, namely Manning Vale West, Manning Vale East and Willeroo mine pits.

The key objectives of the revised Project are to:

- establish and operate a sustainable and profitable coal mine;
- construct and operate a mine that complies with all relevant statutory obligations and continues to improve operations to ensure best practice environmental management;
- construct, design and operate a mine that does not compromise environmental and social indicators and standards;
- make efficient use of current infrastructure, with upgrades and expansions for the required capacity increase;
- reduce the disturbance to environmental values by minimising the footprint requirements for road and rail construction and the use of areas already disturbed for laydown, storage and handling facilities; and
- use similar proven strategies to those adopted at the Mine, for example:
  - salvage and stockpiling of topsoil;
  - early and progressive rehabilitation of disturbed areas;
  - use of recycled water as the main water supply;
  - protection of water quality by appropriate management systems; and
  - adoption of appropriate landform designs to ensure sustainable final land use.

In addition, key features of the revised Project include the:

- development of a suitable 'offset' strategy to satisfy State and Federal requirements for clearance of significant vegetation within new operational areas (i.e. extent of surface rights areas) on MLA 50232;
- preservation of historical items within Acland;
- comprehensive and progressive rehabilitation program involving continuous monitoring and reporting in line with the agreed post mining land use; and
- amendment of NAC's existing EA commensurate to the revised Project's size and scope.

The revised Project will allow the parent company, New Hope Corporation Limited (NHCL), to expand its production capacity at the Mine to meet current and future market demands for its thermal coal products. The revised Project is particularly important considering NHCL's West Moreton Operations near Ipswich will exhaust current coal reserves in the near future.

The revised Project offers an opportunity for NHCL to expand its business base, improve profitability and increase its return to shareholders. The revised Project's thermal coal products are a highly valued energy resource that possesses lower sulphur content, provides

higher energy output and produces less greenhouse emissions than many alternative thermal coal sources.

1.2.1. Accommodation and Workforce

No construction or operational camps will be located on-site during the construction and operational phases of the revised Project. Construction and operational workforces will reside in regional towns and cities. Arrival and departure times for workers will be staggered by at least half-an-hour to minimise traffic and other interactions.

1.3. Location

The revised Project site is located within southeast Queensland's Darling Downs region 12 km north-northwest of Oakey, 35 km northwest of Toowoomba and 177 km west of Brisbane.

The main access roads to the Mine site from Toowoomba are the Warrego Highway to Jondaryan and the Jondaryan-Muldu Road from Jondaryan to the revised Project site. Alternative light vehicle access to the Mine from the Warrego Highway is via Oakey using the Oakey-Cooyar and Muldu-Plainview Roads, respectively.

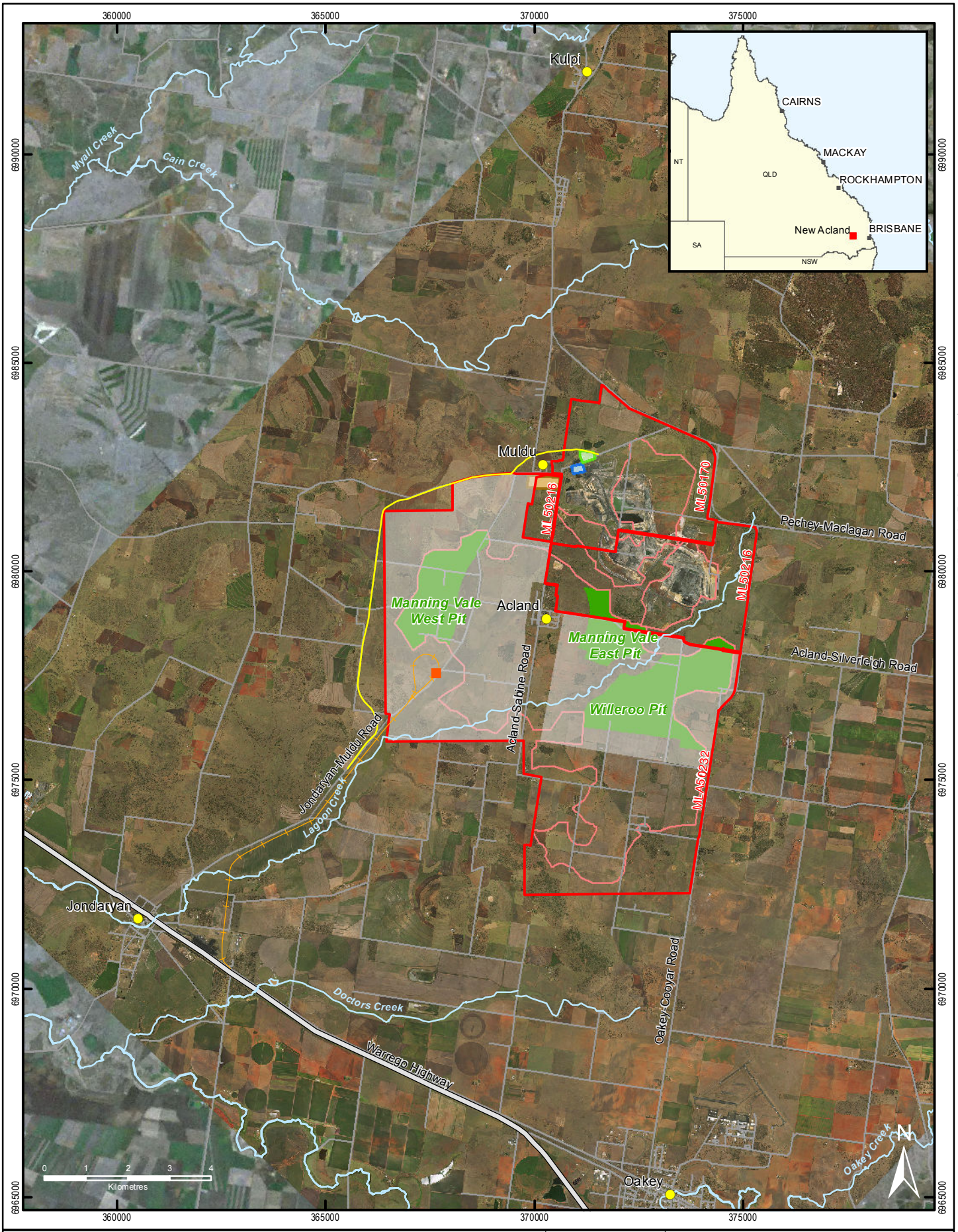
NAC will conduct the revised Project within MLA 50232 by only seeking 'surface rights' for mining over the proposed new operational footprint in the decision on the mining lease application. NAC will not possess the legal right to conduct mining activities within other areas of MLA 50232 without obtaining further statutory approval under the *Mineral Resources Act 1989* (MR Act). For the purposes of this EIS, the 'revised Project site' is defined by the following areas (Figure 1-1):

- the proposed extent of surface rights area of land within MLA 50232 that includes the new Manning Vale East, Manning Vale West and Willeroo mining areas;
- the existing mining and out-of pit-dumps areas located on MLs 50170 and 50216;
- the continued use of tailings disposal within In-Pit Tailings Storage Facilities (ITSFs) located in-pit on ML areas;
- the upgraded Mine Industrial Area (MIA) and CHPP Precinct on ML 50170;
- the new MHF on ML 50216;
- the new rail spur line from the Western Rail Corridor at Jondaryan to the revised Project, and a new balloon loop and TLF on MLA 50232; and
- the Jondaryan-Muldu Road diversion to the west of MLA 50232.

The 'Study area' is defined by the area outside of the 'revised Project site' that define the geographic limits of the environmental, social and economic impact assessment for the purposes of the EIS. The specific 'Study area' for each technical study is defined within the relevant chapter.

1.4. Project Name

The name of the revised Project is the New Acland Coal Mine Stage 3 Project. NAC currently operates the Mine as a 4.8 Mtpa open cut coal mine on ML 50170 and ML 50216, adjacent to 244, under the approval of EA EPML00335713. The existing EA covers mining activities for New Acland Coal Mine Stage 1 and 2, and is the subject of an Amendment application under the *Environmental Protection Act 1994* (EP Act) to incorporate the New Acland Coal Mine Stage 3 Project .



LEGEND

- Towns and Localities
- Train Loadout Facility
- Rail Spur
- Roads
- Creeks
- Jondaryan-Muldu Road Diversion
- Proposed Extent of Surface Rights Area
- Coal Resource Area
- Mining Tenements
- Stage 3 Pit Areas
- CHPP Precinct
- Material Handling Facility
- Mine Industrial Area

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NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 1-1 - Revised Project Overview

Scale 1:120,000 on A4
Projection: Australian Geodetic Datum – Zone 56 (AGD84)

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1.5. Project Proponent

The revised Project Proponent is NAC, which is a wholly owned subsidiary of New Hope Corporation Limited. New Hope Corporation Limited is an independent Australian company, publicly listed on the Australian Stock Exchange. Both NAC and New Hope Corporation Limited are part of the NHG.

1.6. Land Use and Tenures

All NAC's property descriptions are within the Parish of Watts, County of Aubigny. The land use on MLs 50170 and 50216 and MLA 50232 are mining, grazing and cropping.

The Mine is located within granted MLs 50170 and 50216, which are the combined New Acland Coal Mine Stage 1 and 2 areas, respectively and MLA 50232, the area of the revised Project site. Figure 1-2 defines the mining tenures and areas under each growth stage held by NAC. These mining tenures were all originally contained within NAC's MDL 244.

NAC applied for MLA 50232 over the Manning Vale, Willeroo and Sabine Reserve areas on 24 April 2007. MLA 50232 will continue to be assessed under the current *State Development and Public Works Organisation Act 1971* (SDPWO Act) EIS process. NAC will conduct the revised Project within MLA 50232 by only seeking 'surface rights' for mining over the proposed new operational footprint. NAC will not possess the legal right to conduct mining activities within all other areas of MLA 50232 without obtaining further statutory approval under the MR Act. Tenement area information is provided in Table 1-1 and their location shown in Figure 1-2.

New Hope Exploration Pty Ltd (NHEPL, a subsidiary of NHCL and a sister company to NAC) holds an Authority to Prospect 812 Permit, which encompasses MDL 244, for petroleum exploration purposes (Table 1-2).

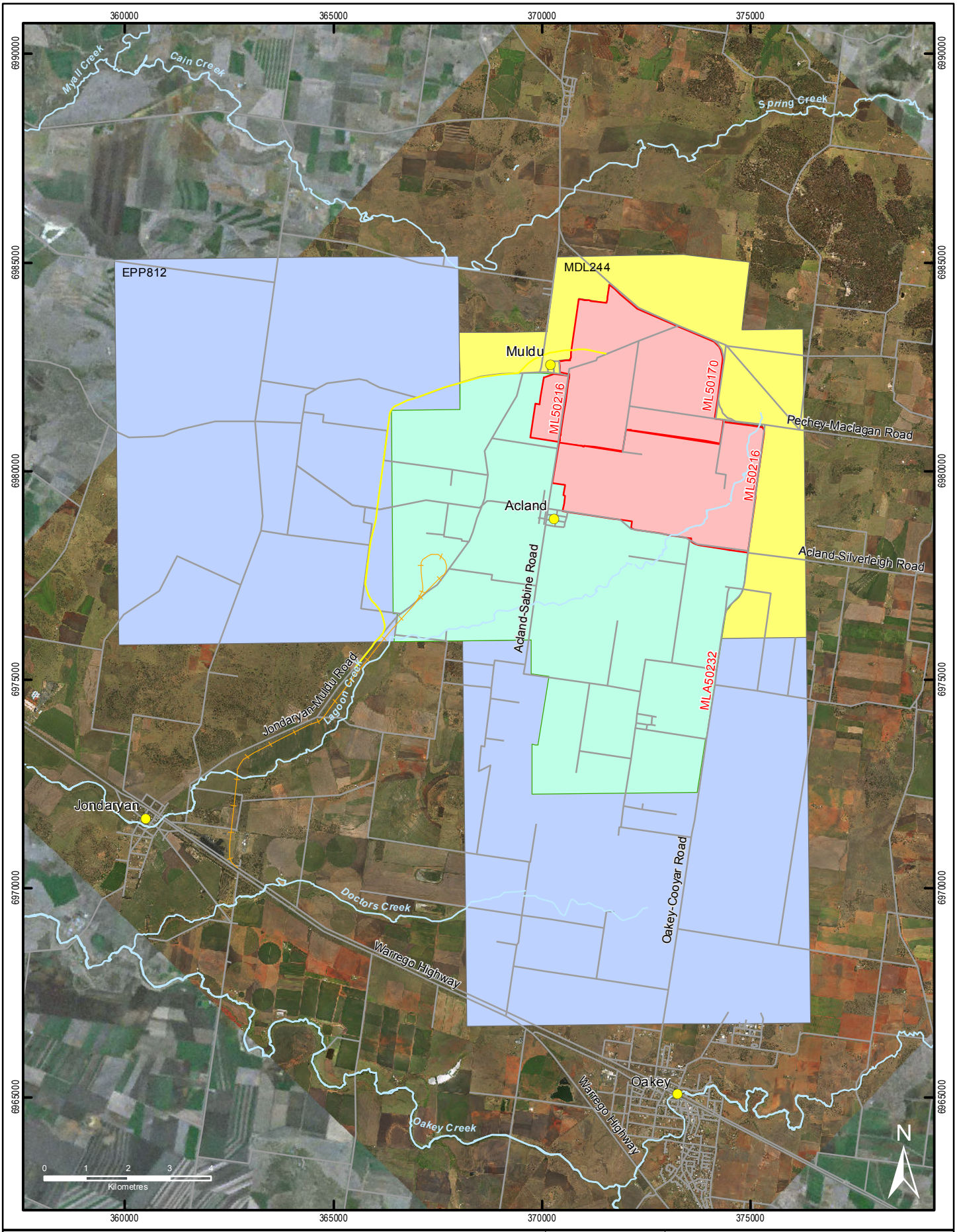
NHEPL also holds the overlying petroleum tenure, ATP 812P, which encompasses MDL 244 and only allows petroleum exploration activities to be conducted. Under the provisions of the MR Act, NAC and NHEPL have completed and lodged a Development Plan for the overlapping coal and petroleum tenures. This Development Plan was lodged with the then Department of Mines and Energy (DME) for assessment and subsequent approval prior to MLA 50232 being granted.

Table 1-1 Mining Tenure Areas

Mining Tenure	Stage	Area
ML 50170	**1** (current)	1,103 ha
ML 50216	**2** (current)	1,175 ha
	Current Mine Total:	2,278 ha
MLA 50232	**3** (proposed)	5,069 ha
	Project Total:	7,347 ha

Table 1-2 Tenements for the revised Project

Tenement Number	Description	Date of Granting	Current Lease Expiration	Lease/ Licence/ Permit Holder	Administering Authority	License to Mine or Explore
Mining						
ML 50170	Mining Lease: North Pit (Stage 1)	6/9/2001	30/9/2022	New Acland Coal Pty Ltd	Department of Mines and Energy Queensland	Coal Shale Clay Bentonite Kaolinite
ML 50216	Mining Lease: South & Centre Pit (Stage 2)	7/12/2006	31/12/2026	New Acland Coal Pty Ltd	Department of Mines and Energy Queensland	Coal
MLA 50232	Mining Lease Application: Manning Vale Willeroo Sabine (Stage 3)	Submitted 25/5/2007 awaiting ML granting	not applicable	New Acland Coal Pty Ltd	Department of Mines and Energy Queensland	Coal
Exploration and Feasibility Studies						
MDL 244	Mineral Development License	30/09/1998	30/9/2016	New Acland Coal Pty Ltd	Department of Mines and Energy Queensland	Coal
EPP812	Exploration Permit	11/11/2004	31/12/2008 (renewal application in progress)	New Acland Coal Pty Ltd	Department of Mines and Energy Queensland	Petroleum



LEGEND

- Towns and Localities
- Rail Spur
- Roads
- Creeks
- Mining Leases
- MDL Area
- EPP Area
- MLA Area

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NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 1-2
Revised Project Tenement Areas

Scale 1:120,000 on A4
Projection: Australian Geodetic Datum – Zone 56 (AGD84)

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1.7. Stakeholders

The following list outlines the stakeholders considered to be Tier One (Affected) Stakeholders, (EIS Appendix K.2 for Tier Two (Interested) stakeholders and additional information):

- key local property owners and neighbours including NHG property lessees;
- current employees;
- traditional owners;
- Federal, State and local government authorities, agencies and local elected representatives;
- local utility and service providers;
- environmental organisations;
- local community organisations;
- local industry groups;
- indigenous groups/organisations; and
- the communities of Oakey, Jondaryan, Goombungee, Kulpi and the wider Toowoomba Regional Council local government area.

1.8. Environmental Relevant Activities

It is anticipated that the environmental relevant activities (ERAs) listed in Table 1-3 will be required for the revised Project as part of the authorised mining activity under the MR Act. This list of ERAs was developed as part of the revised Project's EIS and may be further updated based on discussions with the Administering Authority during future negotiations for a new project based EA.

Table 1-3 Revised Project – ERAs to be conducted as part of the mining activity

Approval type	ERA descriptions	Relevant legislation	Relevant agency
Amendment to existing EA	Resource activities that will be the subject of the amendment application that would otherwise be ERAs may include: • ERA 8 (Chemical storage) • ERA 15 (Fuel burning) • ERA 16 (Extractive and screening activities) • ERA 50 (Bulk material handling) • ERA 60 (Waste disposal) • ERA 63 (Sewage treatment)	*Environmental Protection Act 1994* (EP Act); *Environmental Protection Regulation 2008* (EP Regulation); MR Act; *Mineral Resources Regulation 2003* (MR Regulation)	DEHP

There may be a requirement to undertake ERA to facilitate the off-lease construction of the rail spur line and balloon loop. NAC will prepare and submit a development application to obtain the required approvals. The following ERA's may be required:

- ERA 8 (Chemical storage);
- ERA 16 (Extractive and Screening activities); and
- ERA 50 (Bulk material handling).

1.9. Environmental Authority Conditions

The mining activity will be subject to the conditions of the new project EA for MLs 50170, 50216 and 50232. This EM Plan provides proposed EA conditions based on discussions with the relevant regulatory bodies, the findings of the EIS and the current Department of Environment and Heritage Protection (DEHP) model mining conditions.

An Environmental Authority (EA) under the *Environmental Protection Act 1994* (EP Act) is required for undertaking a resource activity, which includes a mining activity authorised under a ML. A single EA is required for all resource activities that are carried out as a single integrated operation. An application to amend EA EPML00335713 (to include MLA 50232) has been made for the revised Project.

The EM Plan has been prepared for the revised Project including the proposed EA conditions. Some of the proposed EA conditions for the revised conditions are stricter than the EA for operations at the Mine. The EM Plan has proposed transitional conditions that will take effect within 2 years of the commencement of construction activities to allow the Proponent to implement the proposed mitigation measures outlined in the EIS. More details on the proposed EA conditions can be found in the EMP in Appendix J.19.

2. Description of the Revised Project

The revised Project constitutes a 'mining activity' as defined in the EP Act. The key elements of the revised Project are outlined below.

2.1. Mine Development

The mine will consist of the following key components:

- continuation of existing mining activities to progressively extend to parts of the Manning Vale and Willeroo resource areas within MLA 50232, located to the south and west of current MLs 50170 and 50216;
- production of up to 7.5 Mtpa of product coal equating to approximately 14 Mtpa Run-of-Mine (RoM) coal;
- production of up to 80.4 Mt of product coal over the life of the revised Project;
- maintenance of the existing thin seam coal mining equipment, continuation of the current open cut mining techniques and expansion of the truck and loader mining fleet;
- progressive disposal of coarse rejects to cells within the overburden dumps, along with fine tailings being disposed of in ITSFs;
- emplacement of two out-of-pit spoil dumps associated with the Manning Vale and Willeroo mine pits; and
- generation of three depressed landforms at the end of mining by backfilling and re-profiling final mine pits.

2.2. Associated Infrastructure

The key infrastructure requirements for the revised Project are outlined below:

- upgrade of the existing CHPP complex, RoM and product coal stockpile areas and supporting infrastructure on ML 50170;
- continued use of tailings disposal within ITSFs located in-pit on ML areas;
- continued use of recycled water from the WWRF supplied from Toowoomba via an approved 45 km pipeline that is currently fully operational;
- continued use of a mine surface water management system involving various water management structures staged to accommodate the progressive development of the Mine and based on the principles of diverting clean water and capturing and reusing water from disturbed areas;
- upgrades to the existing administration and heavy vehicle maintenance area on ML 50170;
- relocation and potential upgrade of the current power supply for the mine operation and the local 11kV distribution system;
- diversion of the Jondaryan-Muldu Road around the Manning Vale resource area;

- decommissiong of the Jondaryan Rail Loadout Facility (JRLF);
- construction of a new 8 km rail spur line and balloon loop from Jondaryan onto MLA 50232;
- construction of the Train Loadout Facility (TLF) within MLA 50232; and
- relocation and potential upgrade of the existing local telecommunication network.

It is anticipated the construction period for associated infrastructure will occur from 2015 to 2017.

2.3. Description of the Mine

The term "mining activities" is defined under the EP Act and the revised Project will, in summary, involve the following types of mining activities.

- processing raw materials;
- a number of activities directly associated with, or facilitating or supporting, the mining and processing activities; and
- rehabilitation/remediation.

2.3.1. Mining Method and Process

The mining method utilised for the revised Project is truck and excavator/loader, which is currently employed at the Mine. This has been a proven mining method that operates efficiently with the current resource geometry while offering a significant level of flexibility.

Initially, all topsoil is stripped using bulldozers, and relocated using front end loaders and trucks and is directly respread on current progressive rehabilitation areas behind the active mine pit or stockpiled for future rehabilitation purposes. Direct respread is the preferred method to minimise topsoil handling, which reduces loss of viability from damage to soil structure and propagules. Topsoil is removed primarily for the purposes of rehabilitation followed by overburden drilling and blasting. Once the topsoil removal is completed, the following activities are undertaken:

- A new box-cut is initially developed with the overburden removed and dumped within an out-of-pit spoil dump or used to backfill other existing voids.
- Coal mining commences once sufficient overburden is removed to expose the coal seams. This involves working a number of blocks in conjunction with one another to develop a staggered pattern in relation to the vertical coal seam horizons. The overburden and thick partings (>1.5 m) are typically mined through the use of large excavators. Thin partings (<1.5 m) and coal seams are mined by loaders with assistance from dozers to rip and stack the material in windrows which increase loader productivity.
- Once the box-cut is completed, successive strips are opened to maintain consistent coal flow to the CHPP. The number of strips and blocks opened at any given time depends on the coal production schedule and equipment productivity requirements for that particular mine pit. Once enough floor area is available in the mine pit, spoil dumping then commences in-pit allowing progressive backfilling of the void as mining traverses across the resource area.

A typical cross section of an operating mine pit is shown in Figure 2-1.

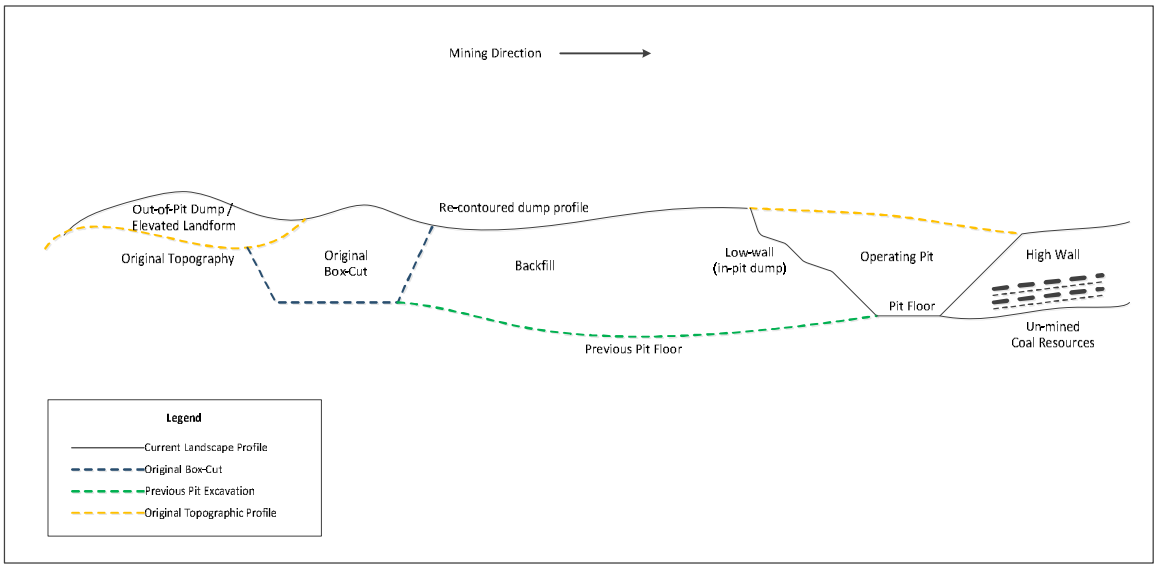


Figure 2-1 Mining Method Cross Section

A generalised representation of the mining process (from mine to customer) is presented in Figure 2-2.

Once the raw coal has been extracted from the active mine pit it is transported to the RoM pad for delivery via conveyor to the CHPP where it is processed. Coarse rejects from the CHPP are disposed of through in-pit dumping or comingled with overburden for out-of-pit dump development while fine tailings are directed to ITSFs. The product coal is then stockpiled via conveyor and transported to the TLF for distribution to various markets.

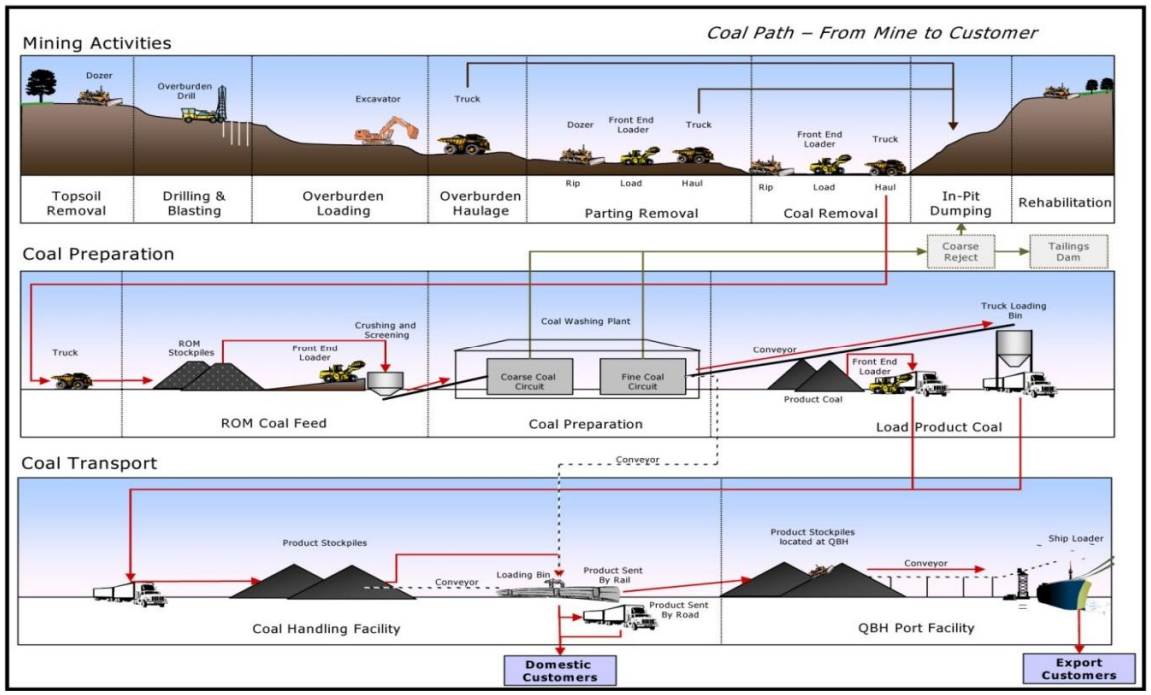


Figure 2-2 Mining Process Overview

2.3.2. Mine Plan Schedule

The revised Project involves the continued development of the Mine by the progressive commissioning of two additional resource areas within MLA 50232. The two resource areas will be developed sequentially and combined with the current operations to supply up to 7.5 Mtpa of saleable product coal for export and domestic markets until approximately 2029.

Overview of Mining Related Activities

Following the successful grant of MLA 50232 in (approximately) 2015, NAC estimates that approximately 2.5 years will be required to complete design, construction and other related activities that facilitate the continuation of mining. The proposed length of the construction period is governed by external rail developments which influence the rate of product coal transportation off-site. Table 2-1 outlines an indicative schedule for mining related activities on MLA 50232. The construction phase for the revised Project involves the increase in the mining fleet and workforce, construction of supporting infrastructure and development of the new resource areas.

Table 2-1 Indicative Schedule for Mining related activities on MLA 50232

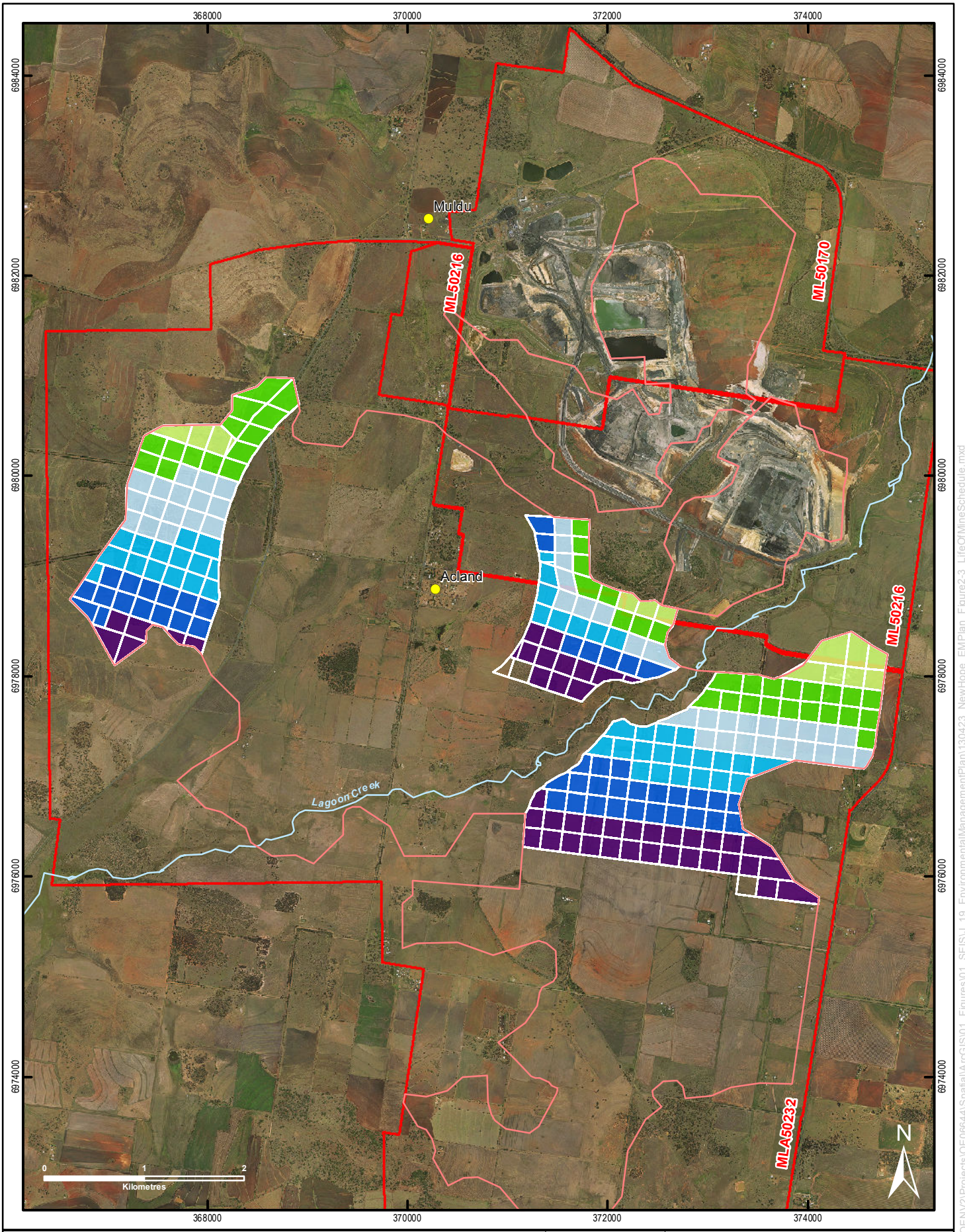
Year	Activity
2015	Environmental and mining approvals (Federal & State)
2015-2017	Cultural Heritage clearance Road closure applications Construction of the rail spur from Jondaryan and a balloon loop within the mining lease Construction of site access and roads (including re-alignments) Construction of water management structures Construction of the additional supporting infrastructure Gradual employment of additional workers
2016	Mining commences within the Manning Vale reserve area (box-cut and out-of-pit dump construction)
2016	Mining commences within the Willeroo reserve area (box-cut and out-of-pit dump construction)

NAC will be responsible for all mining activities within the revised Project site. The transportation of plant and equipment (including the additional mining fleet) to the revised Project site is expected to take the full construction period. NAC will ensure that local government services (i.e., emergency services and police) are appropriately advised of the revised Project activities and timing.

No significant quantities of additional construction materials are required for the revised Project. Sufficient basaltic materials are available from existing and new areas on-site for the construction of haul roads and other related infrastructure such as water management structures. Some minor quantities of specialist materials may be required for construction and operational purposes and would be sourced off-site on an as required basis and delivered under the appropriate transport arrangements.

Life of Mine Schedule

The life of mine schedule has been modified to allow an exclusion zone around Acland, increase the buffer distance from Oakey and to avoid disturbance of Lagoon Creek (Figure 2-3).



LEGEND

- Towns and Localities
- Mining Tenements
- Coal Resource Area
- Creeks

Year

- FY2017-18
- FY2019-20
- FY2021-22
- FY2023-24
- FY2025-26
- FY2027-29

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NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 2-3 - Life of Mine Schedule

Scale 1:50,000 on A4

Projection: Australian Geodetic Datum - Zone 56 (AGD84)

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2.3.3. Target Production Rate

Current production at the Mine is 4.8 Mtpa of product coal for the granted Mining Leases. This production rate utilises NAC's current available CHPP capacity and transport capacity of product coal off-site to the various market locations. This production rate is dependent on geological, technical, financial, statutory approvals and market factors and may vary throughout the remaining mine life.

The production rate of 7.5 Mtpa is targeted to be reached after 2017. This mine plan allows sufficient time for the mining lease to be granted and the upgrades to the CHPP to be completed. More importantly, it also coincides with the depletion of the Glen Roslyn mining reserves.

2.3.4. Out-of-pit Spoil Dumps (Future Elevated Landforms)

The primary objective of the dumping strategy for the revised Project is to backfill voids where practical to reduce the void space remaining at end of the revised Project's life. In general, dumping is carried out in-pit. Out-of-pit dumping is kept to a practical minimum and generally only carried out when a box-cut is being developed, or when ITSFs have displaced in-pit dumping volume.

The revised Project's two out-of-pit spoil dumps will be designed based on the following criteria:

- the final spoil dump slopes are battered to between 8.5 and 17 degrees slope angle based on geotechnical and final land use considerations, with a target of 8.5 degrees;
- a 10 m berm will be included at least every 20 m in dump height; and
- water management structures such as contour banks and rock-lined water ways will be constructed as required with respect to the slope length and catchment area of each spoil dump face to be treated.

Figure 2-4 represents a schematic diagram demonstrating the conceptual engineering design parameters for the out-of-pit spoil dumps or elevated landforms.

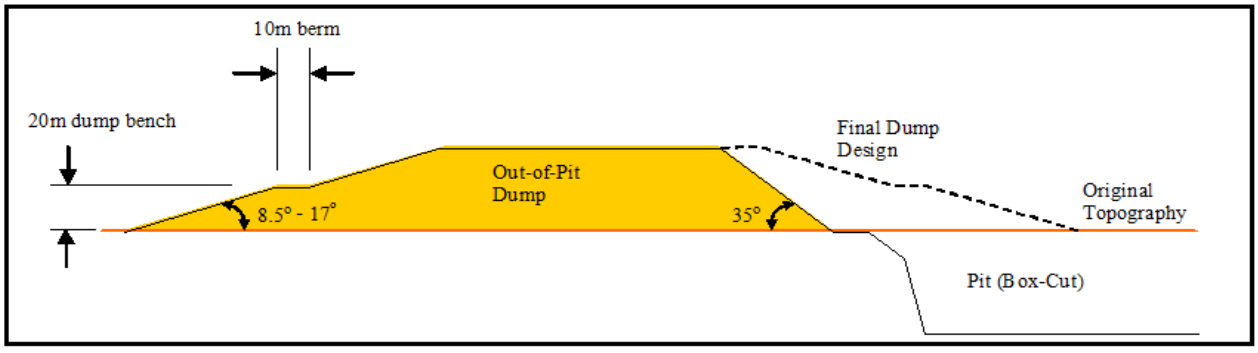


Figure 2-4 Spoil Dump Conceptual Design Plan

2.3.5. Void Design and Depressed Landforms

The revised Project's final landform design comprises a two staged approach initially involving the completion of mining activities which will result in a void being created in each

of the three mine pits. The second stage involves the backfilling and re-shaping of the voids to create depressed landforms.

Void Design

The objective of the dumping and in-pit tailings management strategies are to limit the area and quantity of voids that remain once mining has been completed. Based on the current mine design, three voids are planned to remain at the completion of mining, which correspond to the three mine pits that will be operating throughout the life of the revised Project.

Depressed Landforms

To facilitate the rehabilitation of the residual voids, the highwalls and low walls of these voids will be battered down to develop safe, stable and sustainable 'depressed landforms'. The angles for the depressed landforms will be in the order of 8.5 to 17 degrees and match the rehabilitation design angle of the out-of-pit dumps (elevated landforms).

Final Landform

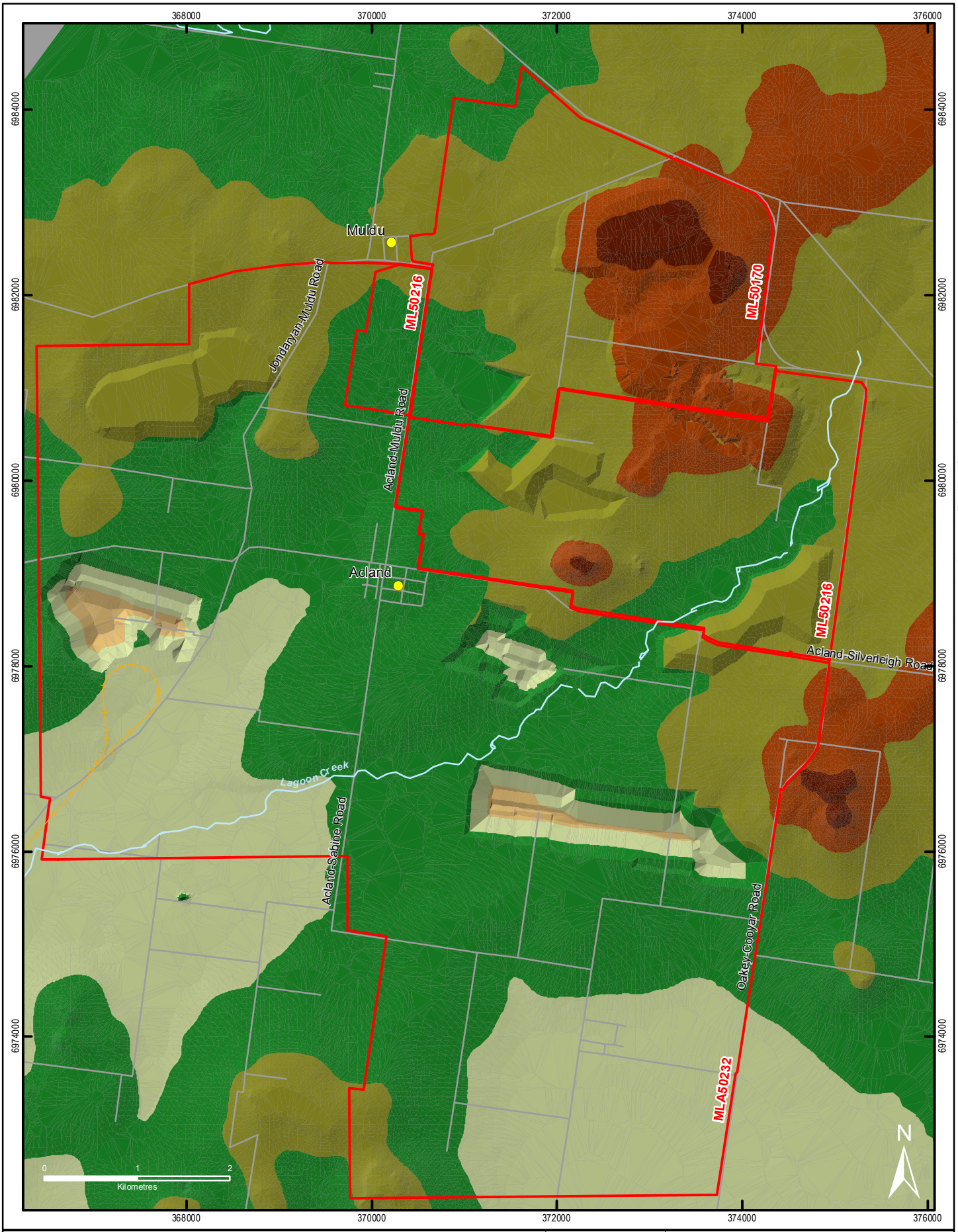
The final landform based on the development of elevated and depressed landforms as at 2029 is presented in Figure 2-5.

Ground Disturbance

To achieve the goals for the revised Project, the total estimated ground disturbance is required for the revised Project is shown in Table 2-2. The decommissioning and rehabilitation to manage this disturbance area is discussed in Section 3.9.

Table 2-2 Estimated ground disturbance

Domain	Area (ha)
Elevated landforms	314
Mining areas	921
Depressed	621
Mine infrastructure	174
TOTAL	**2,030**



LEGEND

- Towns and Localities
- Rail Spur
- Roads
- Creeks
- Mining Tenements

Elevation

- 604 - 636
- 573 - 604
- 542 - 573
- 511 - 542
- 480 - 511
- 449 - 480
- 417 - 449
- 386 - 417
- 355

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NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 2-5 - Conceptual Final Landform

Scale 1:54,000 on A4

Projection: Australian Geodetic Datum – Zone 56 (AGD84)

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2.4. Water Management

2.4.1. Water Management Principles

As a minimum, the surface water management philosophy for the revised Project will involve the:

- diversion of clean water away from disturbed areas;
- capture and adequate treatment of water that may be potentially discharged off site to ensure it complies with the water discharge limits;
- minimal disturbance of Lagoon Creek;
- protection of infrastructure and mining areas from flooding using flood bunding;
- design and construction of all water management structures using practical hydraulic parameters based on an appropriate risk based rainfall event, catchment size, slopes, discharge design and soil types;
- preferential use of water stored in onsite storages as a supplemental water source for coal washing and other activities, to minimise the likelihood of offsite water discharges;
- beneficial recycling of water for activities, such as dust suppression;
- recycling of water from the ITSFs to reduce water consumption for coal washing purposes;
- temporary or permanent bunding of all significant quantities of hydrocarbon and chemical products stored on site;
- use of spill capture and retention devices for refuelling and similar areas;
- treatment of oily water areas using an oil-water separator;
- minimisation of disturbance to an operational minimum for safe operation;
- revegetation of disturbed areas no longer required for operational use, to promote progressive rehabilitation; and
- sealing of high use traffic areas to reduce degradation.

2.4.2. Water Supply

Water supply for the revised Project will primarily be sourced from onsite storages. In the instance that onsite storages are not able to meet the revised Projects water demands, external water supply sources will be used.

A maximum external water supply allocation to the Mine of 5,650 ML/per annum (MLpa) is available from offsite sources. The major source is via a long term contract to the year 2055 with the TRC to purchase up to 5,500 ML per annum of Class A+ recycled water from the WWRF.

A second water source is minor and involves an agreement to receive 150 ML per annum (MLpa) from the Oakey Reverse Osmosis Plant. This water is received under a beneficial re-use of a waste product approval and is taken to assist the TRC with water management at its Oakey Reverse Osmosis Plant.

In addition to the water sources noted, an additional 1,321 MLpa of licensed capacity is available from the Helidon (Precipice) and Marburg (Hutton) aquifers via a series of groundwater bores. Current allocation from the Helidon aquifer is 710 MLpa, and from the

Marburg aquifer the allocation is 271 MLpa. This capacity is available as an emergency supply of process water, subject to successful future renewal of licenses.

Potable Water

Potable water originates from basalt aquifers and is sourced from licensed groundwater bores on-site and treated by a Reverse Osmosis Treatment Plant on-site. Current average consumption of potable water on site is approximately 16 kL/day, which equates to 6 MLpa. Current maximum treatment plant capacity is 22 kL/day, or 7 MLpa. Future use is projected to increase to a maximum of 50 MLpa.

Mine Water Use

The Mine's current process water demand and the revised Project's future process water demand at a production rate of 7.5 Mtpa are outlined in Table 2-3. The process water demand varies depending on a range of factors including rainfall/runoff and groundwater inflow within the active mine pits.

Table 2-3 Current Mine and Future Project Raw Water Demands

Water Supply Activity		**Current Usage (approx) (ML/ year)**	**Future Usage (2021) (approx) (ML/ year)**
Operation of the CHPPs	(~550 L/RoM tonne)	5,280	8,250
Wash down of machinery			
Fire suppression			
Shower and ablution use			
Dust suppression (~ 45 L/RoM tonne)		432	675
TOTAL USAGE		5,712	8,925
Estimated recovery Tailings Storage Facilities (50%)		2,860	4,460
Estimated water collected at site (rainfall runoff & groundwater inflows)		740	1,170
TOTAL NET WATER USAGE (~220 L/RoM tonne)		2,545	3,295

Water Management Infrastructure

The current and future water management infrastructure is summarised in Table 2-4 with a schematic of the mine water management system presented in Figure 2-6.

Table 2-4 Water Management Infrastructure

Structure	Size/Volume	Location
Existing Water Management Infrastructure		
Environmental Dam 1	126 ML	Northwest mining lease boundary area (ML 50170).
Environmental Dam 2	232 ML	Downstream of the tailings dam, southwest mining lease boundary area (ML 50170).
Environmental Dam 3	45 ML	Southern mining lease boundary (ML 50216).
Environment Dam 4	110ML	Southwest section of mining lease (ML 50216).
Sediment Dam 1	97 ML (including 16 ML of sediment)	Near the product coal haul road exit, western mining lease boundary area (ML 50170).
Sediment Dam 2	62 ML	Near the South Pit's out-of-pit dump (ML 50216).
Process Water Dam 1	136 ML	North of the main administration area, adjacent the main access to the current Mine (ML 50170).
Process Water Dam 2	175 ML	Immediately east of Raw Water Dam 1 (ML 50170).
Tailings Dam (Out-of-pit) TSF 1 – Stage 1 & 2	2,550 ML (of tailings)	Western mining lease boundary area (south of the RoM stockpile area) (ML 50170). – Stage 1 is under rehabilitation.
Tailings Dam (In-pit) ITSF 1	2,800 ML (of tailings)	Within the North Pit (ML 50170).
Tailings Dam (In-pit) ITSF 2-1	3,320 ML (of tailings)	Within the North Pit (ML 50170).
Tailings Dam (In-pit) ITSF 2-2	3,400 ML (of tailings)	Within the North Pit (ML 50170).
Return Water Dam	300 ML	Upstream of Environmental Dam 2, western mining lease boundary area (ML50170)
Lagoon Creek Flood Bund	1:1,000 yr AEP flood protection (approx.. 3.5 m high and 3 km in length)	Between Lagoon Creek and the South Pit area (ML50216).
Additional Water Management Infrastructure		
Process Water Dam3	100 ML	TBA
Sediment Dam 3	160 ML	North of Manning Vale East Pit.
Sediment Dam 4		North of Willaroo Pit.
Environment Dam 5	150 ML	Near the Southwest mining lease boundary (MLA 50232) north east of the rail loop and spur.
Environment Dam 6		South of Manning Vale East final pit extent.
Environment Dam 7		Southeast of Willaroo final pit extent.
Tailings Dam (In-Pit) ITSF 4	7.9 Mm^3	Within the Centre Pit (ML 50216).
Tailings Dam (In-Pit) ITSF5	8.6 Mm^3	Within the Centre Pit (ML 50216).
Lagoon Creek Flood Levee 2	Approximately 3.5 m high and 1.5 km in length	Between Lagoon Creek and the Manning Vale East Pit area.
Additional Water Management Infrastructure (cont.)		
Lagoon Creek Flood Levee 3	Approximately 3.5 m high and 2 km in length	Between Lagoon Creek and the Willeroo Pit area.

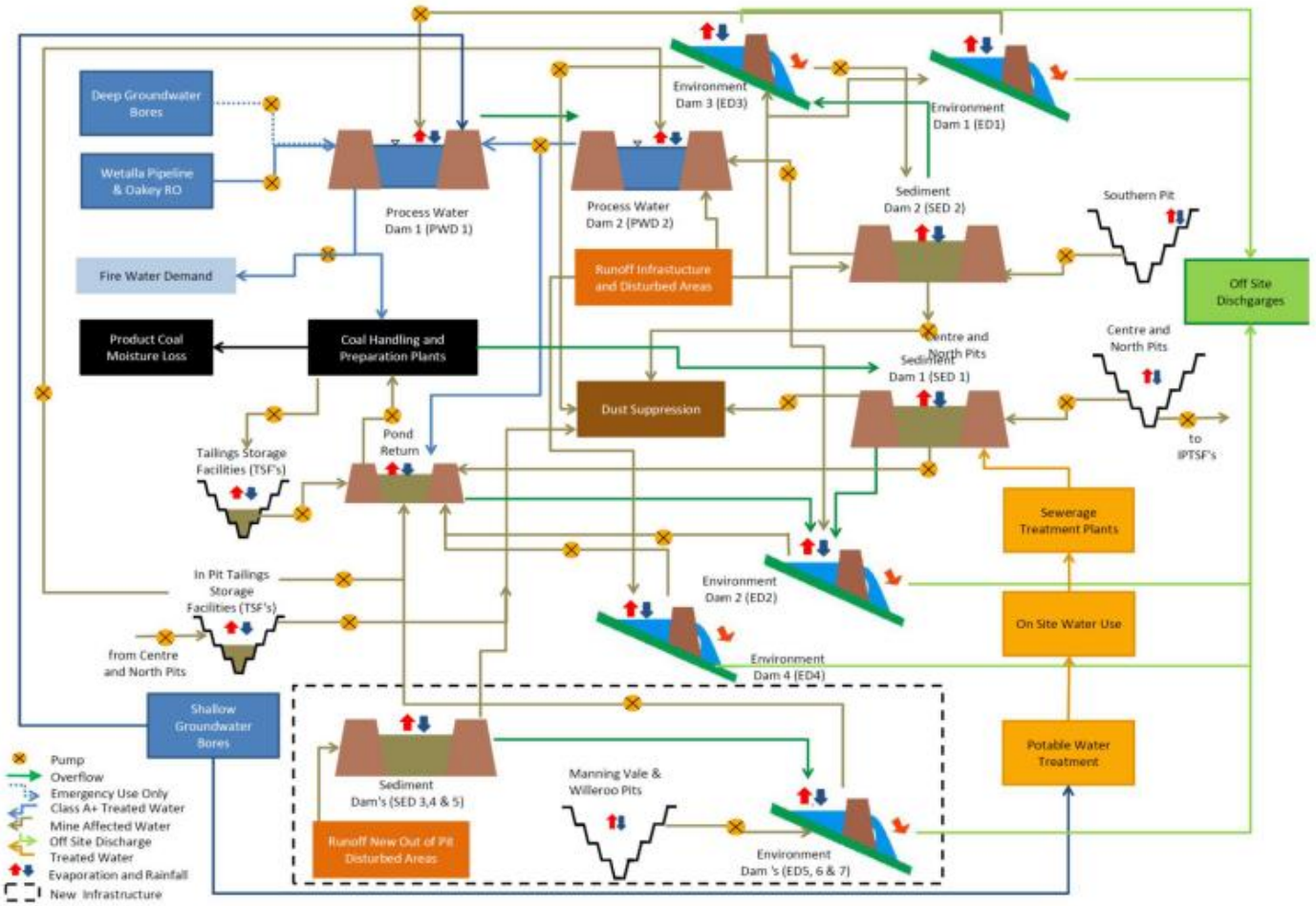
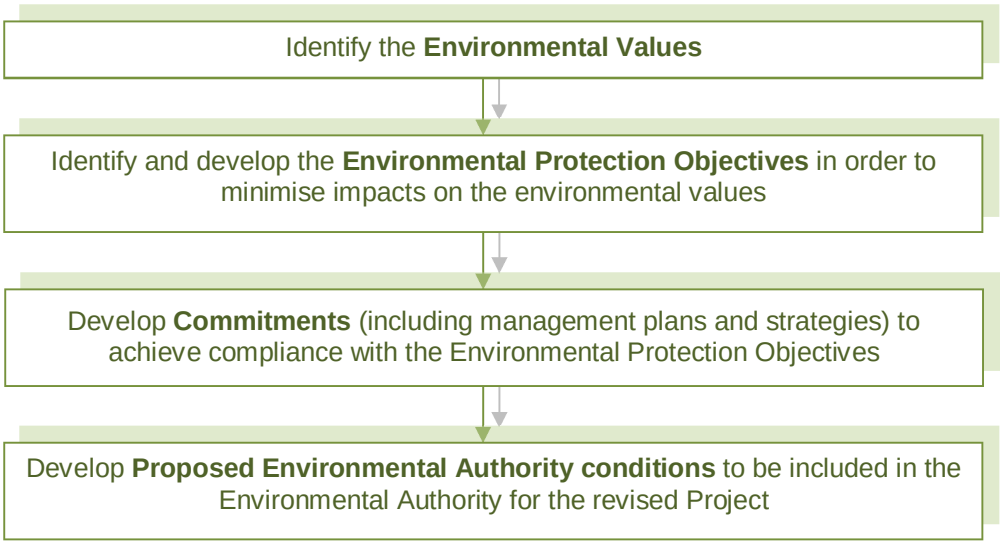


Figure 2-6 Water Management System Schematic

3. Environmental Values, Impacts, Commitments and Draft Conditions

3.1. Content of the Section

This EM Plan was compiled by following the requirements of the EP Act. This process is shown below.



The guiding definitions for the terms that are used throughout the EM Plan are:

Background: information to provide context of the environmental value being considered.

Environmental Values: Environmental values are those qualities or physical characteristics of the environment that are conducive to ecological health, public amenity or safety.

Section 9 of the EP Act describes an Environmental Value as:

- a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety; or
- another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.

Environmental Protection Objectives: Describes the key elements of the environment and the outcomes to be protected in order to minimise impacts on the environmental values.

Performance Criteria: These are the indicators by which the level of achievement of the environmental protection objectives can be determined, in a measurable and auditable way.

Control Strategies: These are the methods for achieving the environmental protection objectives.

Monitoring: This describes how the success of the control strategies is measured and the monitoring frequency.

Commitments: Describes the technological and design elements together with management plans and strategies proposed to be taken to meet the environmental protection objectives and achieve the standards.

Proposed Environmental Authority Conditions: These are draft conditions containing measurable indicators and standards that are proposed to be included in the EA to protect identified environmental values that may be impacted by the revised Project.

3.2. General Conditions

There are a number of general issues that do not relate to environmental values or control strategies, but are to be included in the EA. Conditions of the EA are proposed here for *'Schedule A – General Conditions'*.

3.2.1. Proposed Environmental Authority Conditions: Schedule A – General Conditions

A1 This environmental authority authorises environmental harm referred to in the conditions. Where there is no condition or this environmental authority is silent on a matter, the lack of a condition or silence does not authorise environmental harm.

A2 In carrying out the mining activity authorised by this environmental authority, the holder of this environmental authority must comply with Figure 1-1 (Revised Project Overview—Mine Area).

A3 The holder of this environmental authority must:

a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority
b) maintain such measures, plant and equipment in a proper and efficient condition
c) operate such measures, plant and equipment in a proper and efficient manner
d) ensure all instruments and devices used for the measurement or monitoring of any parameter under any condition of this environmental authority are properly calibrated.

Monitoring and Inspection

A4 Except where specified otherwise in another condition of this environmental authority, all monitoring records or reports required by this environmental authority must be kept for a period of not less than 5 years.

A5 Upon request from the administering authority, copies of monitoring records and reports will be made available and provided to the administering authority's nominated office within 10 business days or an alternative timeframe agreed between the administering authority and the holder.

A6 Any management or monitoring plans, systems or programs required to be developed and implemented by a condition of this environmental authority should be reviewed for effectiveness in minimising the likelihood of environmental harm on an annual basis, and amended promptly if required, unless a particular review date and amendment program is specified in the plan, system or program.

A7 All environmental monitoring and investigations and hazardous dam/levee design, certification and inspections must be conducted by appropriately qualified persons.

Financial assurance

A8 New activities that may cause either significant harm or nuisance or may influence financial assurance must not be conducted until the environmental authority holder has lodged a commensurate amount of financial assurance with the administering authority as security for compliance with this environmental authority and any costs or expenses, or likely costs or expenses, mentioned in section 292 of the Act.

A9 The amount of financial assurance must be reviewed by the holder of this environmental authority when a plan of operations is amended or replaced or the authority is amended.

Risk management

A10 The holder of this environmental authority must develop and implement an environmental risk management system for mining activities which mirrors the content requirement of the Standard for Risk Management (ISO31000:2009), or the latest edition of an Australian standard for risk management, to the extent relevant to environmental management, by <<Insert date 3 months from date of issue>>

Notification of emergencies, incidents and exceptions

A11 The holder of this environmental authority must notify the administering authority by written notification within 24 hours, after becoming aware of any or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with, the conditions of this environmental authority.

A12 Within 10 business days following the initial notification of an emergency or incident, or receipt of monitoring results, whichever is the latter, further written advice must be provided to the administering authority, including the following:

a) results and interpretation of any samples taken and analysed
b) outcomes of actions taken at the time to prevent or minimise unlawful environmental harm
c) proposed actions to prevent a recurrence of the emergency or incident.

Complaints

A13 The holder of this environmental authority must record all environmental complaints received about the mining activities including:

a) name, address and contact number for of the complainant
b) time and date of complaint
c) reasons for the complaint
d) investigations undertaken
e) conclusions formed
f) actions taken to resolve a reasonable and legitimate complaint
g) any abatement measures implemented
h) person responsible for resolving the complaint.

A14 The holder of this environmental authority must, when requested by the administering authority, undertake relevant specified monitoring within a reasonable timeframe nominated or agreed to by the administering authority to investigate any

complaint of environmental harm or nuisance. The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures, where required and implemented, must be provided to the administering authority within 10 business days of completion of the investigation, or no later than 10 business days after the end of the timeframe nominated by the administering authority to undertake the investigation.

A15 Where a condition of this environmental authority requires compliance with a standard, policy or guideline published externally to this environmental authority and the standard is amended or changed subsequent to the issue of this environmental authority, the holder of this environmental authority must:

a) comply with the amended or changed standard, policy or guideline within 2 years of the amendment or change being made, unless a different period is specified in the amended standard or relevant legislation, or where the amendment or change relates specifically to regulated structures referred to in condition XX, the time specified in that condition
b) until compliance with the amended or changed standard, policy or guideline is achieved, continue to remain in compliance with the corresponding provision that was current immediately prior to the relevant amendment or change.

END OF CONDITIONS FOR SCHEDULE A

3.3. Air Quality

3.3.1. Background

Dust and greenhouse gas emissions are potential air contaminants. In general, gaseous emissions such as SO_x and NO_x are potential air contaminants from mining activities but are not significant owing to their very low levels of emission. Short term rapid emissions of NO_x and SO_x may be periodically associated with blast plumes.

The following existing sources contribute to particulate emissions in the vicinity of the revised Project site.

- dust generated from agricultural activities;
- motor vehicle exhaust and dust emissions from roads;
- smoke from bushfires and controlled burns; and
- operation of the Mine.

The adopted background air quality concentrations are shown in Table 3-1.

Table 3-1 Adopted background concentrations for the revised Project

Pollutant	Averaging period	Background concentration	Units
Total Suspended Particulates (TSP)	Annual	28	$\mu g/m^3$
Particulates as PM_{10}	24 hours	14	$\mu g/m^3$
Particulates as $PM_{2.5}$	24 hours	5	$\mu g/m^3$
	Annual	2.8	$\mu g/m^3$
Dust deposition	1 month	63	$mg/m^2/day$

3.3.2. Environmental Value

The environmental values of the air environment to be enhanced or protected under this EM Plan are the qualities of the air environment that are conducive to suitability for people's amenity and health.

3.3.3. Potential Impacts on the Environmental Value

Dust

The potential sources of dust emissions from construction activities, including construction/upgrade of the existing CHPP precinct, the material handling facility and the MIA, the rail loop and spur and TLF, water infrastructure and the Jondaryan-Muldu Road realignment include:

- wind erosion from exposed areas after vegetation clearing;
- dust from operation of earthmoving equipment;
- emissions from fixed and mobile equipment;

- topsoil disturbance and removal; and
- wheel generated dust from vehicle movements.

The same sources will apply in the future during the project decommissioning phase.

Operation

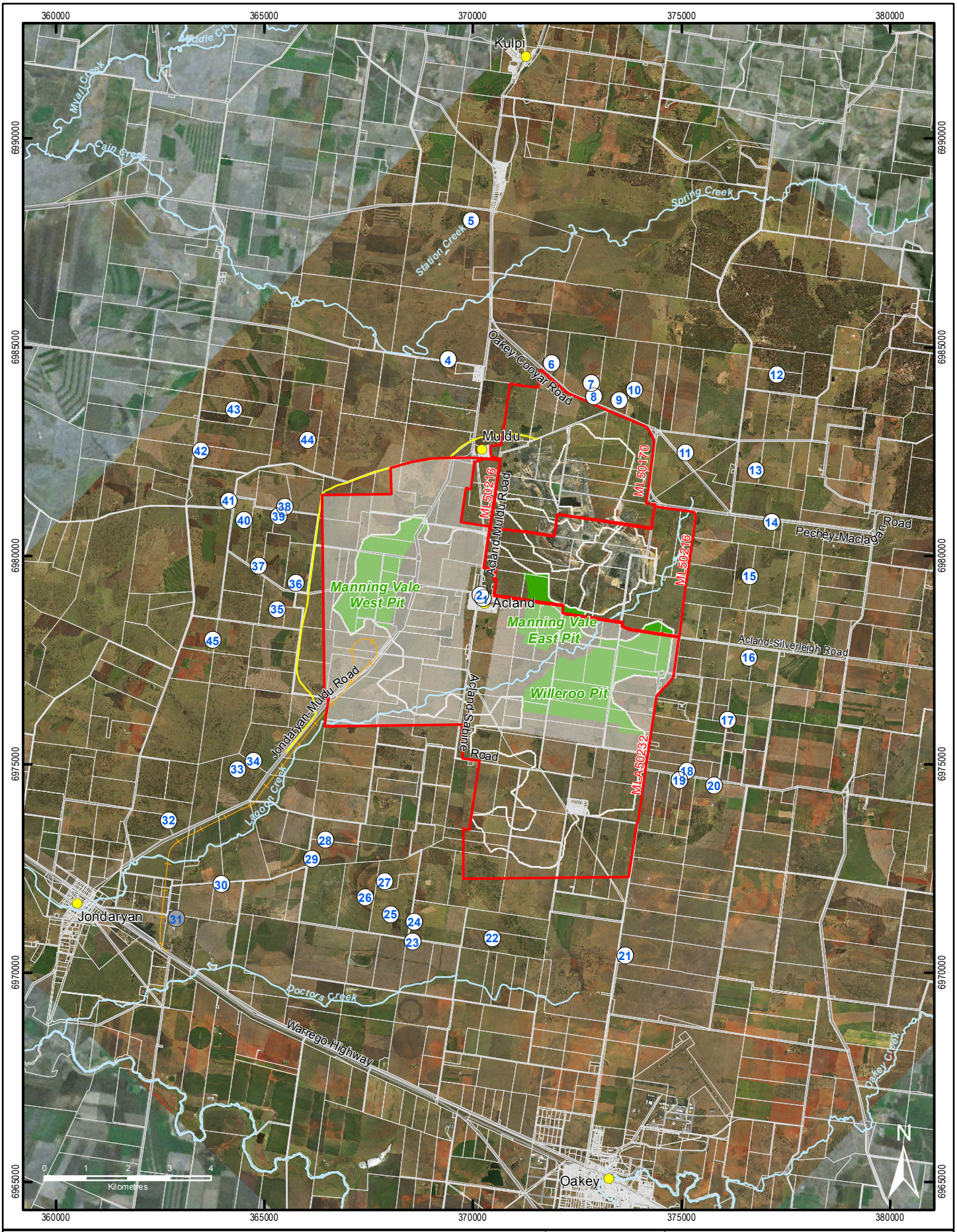
During operations, the main emissions to air are particulate matter generated by the onsite mining activities which primarily occur as a result of the following activities:

- excavation of coal and overburden;
- bulldozer and grader operations;
- loading/unloading of haul trucks;
- wheel generated dust from haul trucks and other vehicles;
- drilling and blasting activities;
- wind erosion from disturbed areas and stockpiles;
- operation of the conveyors/ transfer points at CHPP;
- stacking and reclaiming at the MHF; and
- operation of the TLF.
- Dust emissions will vary according to the following factors:
- coal seam, overburden and interburden properties;
- prevailing meteorological conditions;
- the mining activities occurring, such as vegetation clearing, topsoil stripping, overburden removal or coal extraction;
- location, condition (e.g. moisture content) and extent of stockpiles; and
- length of time that cleared areas remain unvegetated.

Product coal will be transported from the CHPP precinct to the TLF via an internal sealed haul road. The existing Jondaryan – Muldu Road that traverses to the east of the Manning Vale West resource area will be closed to the public. Wheel generated dust from sealed roads is considered to be negligible has not been modelled as part of this air quality assessment.

Nearest sensitive receptors for dust are all near neighbours immediately surrounding the revised Project site as shown in Figure 3-1. The nearest sensitive receptors to the proposed private haul road are all located at least 500 m from the private haul road.

Dust monitoring undertaken by NAC has indicated that actual dust levels are significantly lower than the predicted/modelled dust levels for current operations, and this situation is expected to be the case for the revised Project.



LEGEND

- Towns and Localities
- Sensitive Receptor - Residential
- Sensitive Receptor - Commercial
- Rail Spur
- Jondaryan-Muldu Road Diversion
- Creeks
- Mining Tenements
- Proposed Extent of Surface Rights Area
- Stage 3 Pit Areas

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NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 3-1 - Sensitive Receptors

Scale 1:120,000 on A4

Projection: Australian Geodetic Datum - Zone 56 (AGD84)

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Greenhouse Gases

NAC is acutely aware of its corporate responsibilities in relation to greenhouse gas emissions and is clearly focussed on minimising its carbon footprint.

The main greenhouse gas emissions from the revised Project are generated from diesel use, which is also the main operational cost. Therefore, NAC possesses strong social, economic and ecological imperatives to reduce its diesel usage, and therefore, improve its greenhouse gas emissions. NAC is looking to accomplish this goal through a range of new and existing reduction strategies.

The main sources of Scope 1 and Scope 2 greenhouse gas emissions for the revised Project are:

- direct CO_2 emissions from combustion of diesel in mining equipment and trucks;
- indirect CO_2 emissions due to consumption of electricity; and
- fugitive emissions from construction, open cut coal mining and decommissioning.

Greenhouse gas emissions were estimated based on published emissions factors. The operation of the revised Project is estimated to result in approximately 0.18 Mt CO_2-e on an annual basis. These emissions represent an increase of 0.055 Mt CO_2-e in greenhouse gas emissions when compared to current operations of the Mine. The increase in greenhouse gas emissions above current operations of the Mine represents 0.01 per cent of Australia's annual greenhouse gas emissions.

The revised Project is considered to have a low vulnerability to climate change.

3.3.4. Environmental Protection Objective

The revised Project's environmental protection objectives for air quality are:

- to minimise the impacts of mine-derived dust on sensitive receptors beyond the revised Project's boundaries; and
- to implement reasonable energy minimisation initiatives.

3.3.5. Performance Criteria

The performance criteria for air quality are:

- compliance with the requirements of the new project EA;
- rail activities will comply with South West System Coal Dust Management Plan and other future related requirements;
- compliance with the Queensland Rail Code of Practice – Railway Noise Management;
- dust and particulate monitoring in accordance with the control strategies outline below;
- no substantiated dust and fume (NO_x or SO_x) complaints from the community;
- the airborne dust deposition rate as a result of mining activities will not exceed an average annual 120 mg/m^2/day at nearby sensitive receptors; and

- adherence to the air quality objectives in the EPP (Air) that are considered relevant to the operation of the Mine and the revised Project (Table 3-2).

Table 3-2 Air quality objectives in the EPP (Air) relevant to the revised Project

Pollutant	Air Quality Objective	Averaging Period	Allowable Exceedances
Total Suspended Particulates (TSP)	90 µg/m^3	Annual	-
Particulates as PM_{10} (<10 µm)	50 µg/m^3	24 hours	5 per year
Particulates as $PM_{2.5}$ (<2.5 µm)	25 µg/m^3	24 hours	
	8 µg/m^3	Annual	-
Nitrogen dioxide (NO_2)	250 µg/m^3	1 hour	
Carbon monoxide (CO)	11,000 µg/m^3	8 hours	
Sulphur dioxide SO_2	570	1 hour	1 day each year
	230	1 day	1 day each year

3.3.6. Control Strategies

Air quality and specifically dust, fumes and greenhouse gas emissions will be managed by NAC's EMS based on the Air Quality Management Plan (AQMP) in the EIS, Appendix J.10.

Dust Control

NAC currently manages its operations to minimise the potential to generate dust impacts at nearest sensitive receptors. Dust control measures for the revised Project are presented in Table 3-3.

Table 3-3 Dust control measures for the revised Project

Mining Activity	Dust Control Measures
Material extraction and handling	Loading/dumping overburden The drop height of material from excavators will be minimised when loading trucks. Modification of operations will occur during adverse weather conditions (e.g. dust storms, gale force winds and storm conditions). Water carts will be employed to keep mine roads and work areas in a moist condition. Dozer operations on overburden dumps will be modified or suspended if dust generation is excessive.
Drilling and Blasting	Dust curtains will be installed on drill rigs (i.e. under the drill deck with fabric filters to collect dust). Water injector will be used on drill rigs to minimise dust emission. Local residents (neighbours) will be advised of blasting events (date and time). Blasting operations will be modified during adverse weather conditions (e.g. dust storms, gale force winds and storm conditions). Blasts will occur during daytime hours only and not on weekends or public holidays. Gravel/basalt stemming will be used in blast holes. Blasts will be monitored for effectiveness, e.g. plume, gas emissions and stemming. Specific procedures for blast fume management will continue as standard practice and will be updated as required to ensure continuous improvement.

Mining Activity	Dust Control Measures
Haul roads	Water carts will maintain moisture conditions on haul roads. Road grading and maintenance will be undertaken on a regular basis. Key actions include: - Application of coarse rejects on haul roads to reduce dust generation. - Grading procedures to achieve constant spread of fines and coarser material. Speed on haul roads will be limited to 60km/h (20 km/h on selected corners). Where feasible, the volumes of trays on haul trucks will be maximised to increase carrying capacity and to reduce vehicle kilometres travelled on haul roads. Visual monitoring of haul roads and major work areas will be undertaken to identify noticeable dust generation for corrective actioning. Certain site roads will be sealed (near administration area – site access and employee car park). Efficient watering will be conducted during peak periods of activity and within areas of concentrated activity. Well defined and planned haul routes and internal roads will be developed to maximise efficiency of travel. Obsolete mine roads will be rehabilitated. The private haulage route from the Materials Handling Facility to Train Loading Facility will be a sealed road.
Exposed areas	The pre-strip areas will be planned to minimise the time of exposure following clearing in advance of mine development. Exposed areas/active areas will be watered if dust generation is observed. Where possible, topsoil will be stripped when its moisture content is elevated but not sodden. A vegetative cover will be established as soon as feasible on areas prepared for rehabilitation. Progressive rehabilitation will be conducted behind the active pit areas to minimise exposed areas. Unauthorised clearing of non-mine areas will be prevented using a 'permit to disturb' system.
ROM Pad	Water will be applied on a regular basis by a water cart on trafficked areas within the ROM Pad's operational area. Visual monitoring of ROM coal stockpiles will be undertaken to identify noticeable dust generation for corrective action. Water will be applied on the ROM coal stockpiles if significant dust levels are being generated.
CHPP and ROM Bin	ROM Bin Automatic water sprays will be installed at the ROM hopper bin to produce a fine mist to suppress dust generated when sensors are triggered. Surge Bin Dust curtains will be installed. Waters sprays will be used. Crushing Wet crushing will be employed. This activity will be fully enclosed. Conveyors Water sprays will be used on transfer points.
MHF	An automatic sprinkler system will be employed to moisten product coal stockpiles. Water sprays will operate at transfer points on conveyors. Coal spills will be removed regularly to minimise the potential for dust generation. A vacuum sweeper will operate on roads near the MHF. The washed coal will normally retain a moisture level of approximately 10%.

Mining Activity	Dust Control Measures
CHPP, MHF, TLF	No coal will be stored in open/exposed stockpiles. An enclosed overhead bin will deliver the coal to each rail wagon as part of the train loadout system. Coal will be loaded by side tipper into a hopper as part of the train loadout system. Veneering and profiling of the loaded coal will be conducted to minimise dust emissions during transport.

Adaptive Air Quality Management

In addition to the dust controls identified in Table 3-3, a series of adaptive management measures for the revised Project include the suspension or modification of operations in response to the following triggers:

- potential dust risk predictions from the dust forecasting system;
- warning or exceedance alarms from the strategic real time air quality monitoring system; and
- observation(s) of significant dust generation during visual monitoring of mining activities.

An indicative hierarchy of controls in response to potential dust risk predictions from the dust forecasting system is presented in Table 3-4. Successful implementation of adaptive air quality management will significantly reduce potential for air quality impacts from the revised Project.

Table 3-4 Hierarchy of Dust Controls Actions

Trigger	Possible Dust Control Actions
Dust risk predicted from the Manning Vale East Pit	1. Increase watering rate applied to haul roads in the Manning Vale East Pit 2. Suspension of overburden/interburden blasting if meteorological conditions are unfavourable 3. Suspension or modification of dozer operations on overburden dumps 4. Suspension of night-time operations (6am - 6pm) in the Manning Vale East Pit (If required) 5. Suspension or modification of all or selected overburden and/or coal handling activities (including excavation, loading, dumping and hauling)
Dust risk predicted from the Manning Vale West Pit	1. Increase watering rate applied to haul roads in the Manning Vale West Pit 2. Suspension of overburden/interburden blasting if meteorological conditions are unfavourable 3. Suspension or modification of dozer operations on overburden dumps 4. Suspension or modification of all or selected overburden and/or coal handling activities (including excavation, loading, dumping and hauling)
Dust risk predicted from the Willeroo Pit	1. Increase watering rate applied to haul roads in the Willeroo Pit 2. Suspension of overburden/interburden blasting if meteorological conditions are unfavourable 3. Suspension or modification of dozer operations on overburden dumps 4. Suspension or modification of all or selected overburden and/or coal handling activities (including excavation, loading, dumping and hauling)

With the cooperation of landholders, NAC has been monitoring for PM_{10} concentrations and dust deposition rates at a number of sensitive receptors to determine if mining operations are generating air quality impacts at nearest sensitive receptors. To detect if mine operations are

generating potential nuisance impacts, air quality monitoring will continue to be undertaken and expanded to accommodate the revised Project. Consultation with the landholders and implementing dust mitigation measures should assist in reducing the potential for dust nuisance.

Fume Management

NAC have developed fume management procedures at the Mine which will be adopted for the revised Project. The fume management procedures form part of the AQMP (EIS Appendix J.8). Key actions include:

- Review weather forecast;
- Establish 300 m and 500 m minimum machine and personnel exclusion zones;
- Establish Fume Management Zone based on expected meteorological conditions;
- Notify neighbours on blast contact list of time and date of blast, and whether their residence is in the fume management zone;
- Set up portable weather station to monitor field meteorological conditions;
- Blast when meteorological conditions favourable; and
- Capture and record relevant blast data.

In addition to general fume management practices, NAC continues to work closely with its explosive suppliers to minimise the potential for post blast fume. Recent developments to minimise potential impacts include innovation blasting methods and explosive products. These developments are likely to benefit the broader mining industry, particularly those mining operations operating in a fume sensitive environment.

Greenhouse Gases

There are a range of mitigation and management measures for greenhouse gas emissions, which will be implemented or continued by the revised Project. These management measures are aligned with other operators in the black coal industry. The measures can be broadly categorised as:

- reduce fuel usage from operations (improving operational efficiency). NAC is continuously evaluating methods to reduce fuel usage and are committed to undertaking the following actions to reduce fuel usage from mining operations for the revised Project:
  - mine planning to reduce haulage distances
  - improving efficiency of payload management (e.g. run-of-mine coal haulage);
  - considering fuel efficiency of mining equipment and haul trucks during procurement;
  - maintaining mining equipment and haul trucks in good working order so fuel efficiency of equipment is maximised;
  - modifying operational procedures to improve the fuel use of selected machines (for example, minimising unnecessary idling of mobile equipment); and
  - implementing an operator education program to promote more fuel efficient operation of machines.
- reduce electricity usage from operations through:

  - using power factor correction equipment at the CHPP to improve electricity consumption efficiency; and
  - using LED lighting where practical for general access and safety lighting, e.g. around personnel access walkways and doors and conveyor walkways, which can result in a reduction of electricity consumption.
- use of alternate fuels such as compressed natural gas (CNG) and liquefied natural gas (LNG) for its on-site mining fleet, and in consultation with its trucking contractor, for the haulage of product.
- capturing or flaring coal seam gas. Gas content analysis undertaken has determined the Mine is in a low gas domain. The revised Project site is expected to have similar gas content to the Mine. Fugitive emissions represent approximately 1 per cent of greenhouse gas emissions from the revised Project. Capturing or combusting coal seam methane is not considered a feasible option for achieving significant reductions in greenhouse gas emissions from the revised Project.
- reporting and analysis. Based on the revised Project's estimated annual greenhouse gas emissions the following actions will be undertaken to fulfil legislative requirements:
  - report annual greenhouse gas emissions under the National Greenhouse and Energy Reporting System under the NGER Act (facility threshold is 25,000 t CO2-e / year); and
  - identify, evaluate and publicly report cost effective energy savings opportunities under the EEO Act (facility threshold is 0.5 PJ energy consumed / year).
- Under the EEO Act, NAC are committed to investigating energy efficiency and other opportunities with a view to reducing its carbon footprint. Initiatives such as a solar power and tree screening and planting are examples of options currently being considered.
- carbon sequestration. A carbon sequestration program near the revised Project site is considered to have a relatively low potential to offset greenhouse gas emissions. The reduction in greenhouse gas emissions provided by a carbon sequestration program is not expected to outweigh the costs of implementing the program.
- carbon trading. Under the Clean Energy Act 2011, NHG are required to pay a carbon price for Scope 1 greenhouse gas emissions from their operations that exceed 25,000 kt CO_2-e. The carbon price is currently fixed but will transition to a fully flexible price under an emissions trading scheme market.
- The transition to an emissions trading scheme will provide opportunities to offset emissions through carbon trading. NHG will investigate opportunities to offset greenhouse gas emissions from the revised Project through the trading scheme under the *Clean Energy Act 2011*.
- research and contributions to industry bodies. NAC are also a foundation member of the COAL 21 fund, a voluntary industry fund dedicated to greenhouse abatement measures in the Black Coal industry. As of April 2013, approximately $250 million has been committed to demonstration projects as well as a national research program managed by Australian National Low Emissions Coal Research (ANLEC) Ltd.

The proposed management measures to reduce greenhouse gas emissions from the revised Project are consistent with other mining operations in Queensland.

3.3.7. Monitoring

The air quality monitoring requirements for the revised Project are presented in Table 3-5 and locations of air quality monitoring equipment for the revised Project are presented in Figure 3-2.

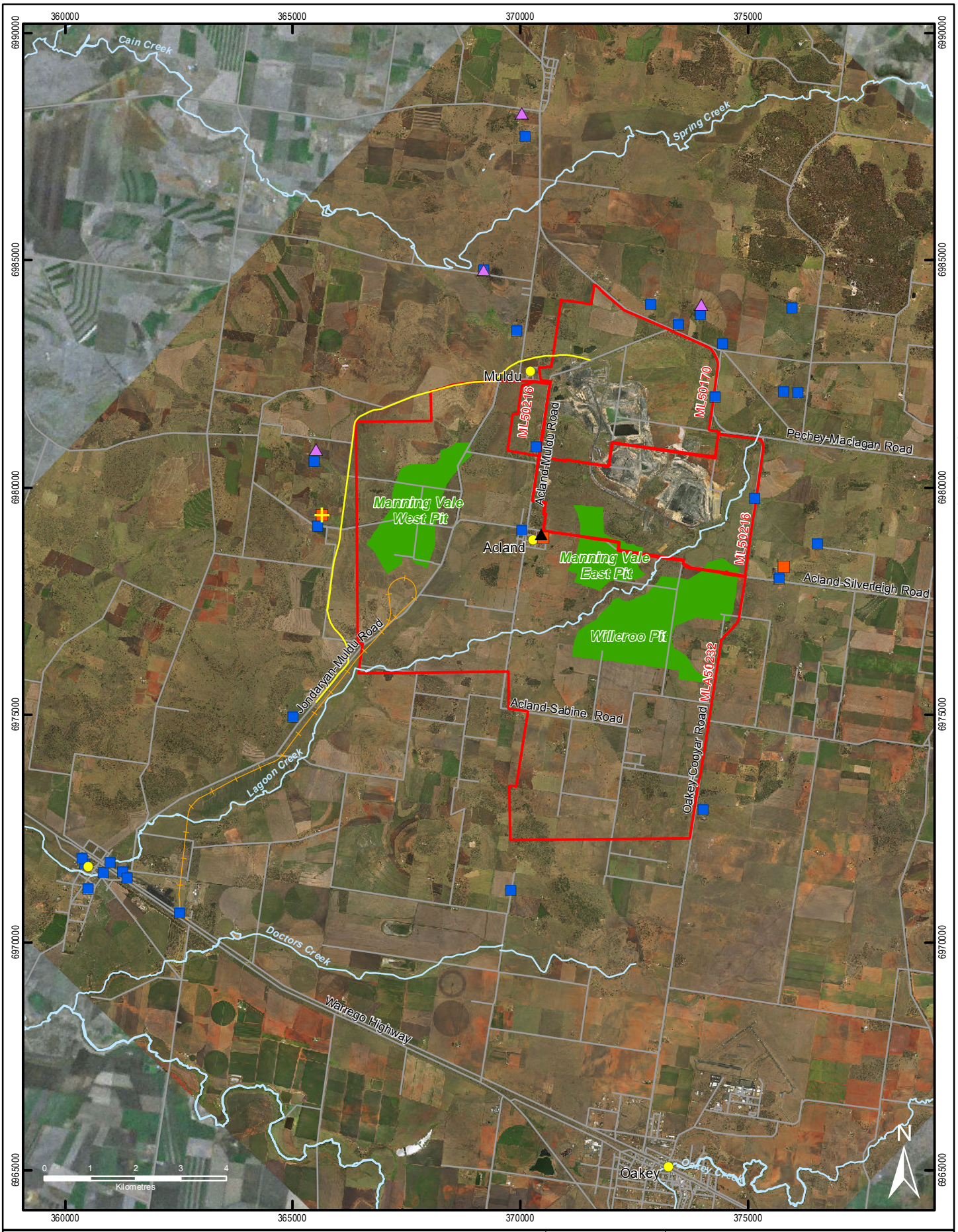
Table 3-5 Summary of air quality monitoring requirements for the revised Project

Instrument	Air Quality Indicator	Frequency	Air Quality Objective	Nuisance Goal	Methodology
TEOM	PM_{10}	Real-time	50 µg/m^3 (24 h avg)	-	AS/NZS 3580.9.8:2008
	TSP[#]	Real-time	90 µg/m^3 (annual)	80 µg/m^3 (24 h avg)	AS/NZS 3580.9.8:2008/ AS 3580.9.11:2009
High Volume Samplers	PM_{10}	Quarterly	50 µg/m^3 (24 h avg)	-	AS/NZS 3580.9.6:2003
Dust Deposition gauges	Insoluble solids	Monthly	-	120 mg/m^2/day (monthly average)	AS/NZS 3580.10.1:2003
Meteorological Station	-	Hourly	-	-	AS 3580.14:2011

[#] there are no specific standards for measurement of real time TSP. The TEOM/BAM requires a suitable size-selective inlet to monitor TSP.

The rationale for each component of the air quality monitoring program is:

- Meteorological Station – analysis of data to will provide supporting data Real time PM10 – determine compliance with EPP (Air) objective of 50 µg/m3 and facilitate adaptive air quality management;
- Real time TSP – determine potential nuisance impacts to west of Manning Vale West Pit and determine compliance with EPP (Air) objective of 90 µg/m3;
- Quarterly PM10 monitoring - continue historical monitoring and determine compliance with EPP (Air) objective of 50 µg/m3;
- Dust deposition gauges – determine potential nuisance impacts and to continue historical monitoring; and
- to assess potential for air quality impacts following any investigations of dust concerns raised.



LEGEND

- Towns and Localities
- Proposed rea time PM_{10} concentration
- Proposed real time TSP concentration
- Proposed Quarterly PM_{10} Monitoring Locations
- Proposed Dust Deposition guages
- Proposed Meteorological Station
- Rail Spur
- Roads
- Jondaryan-Muldu Road Diversion
- Creeks
- Mining Tenements
- Stage 3 Pit Areas

NEW HOPE GROUP

SKM

NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 3-2 - Proposed Air Quality Monitoring Locations for the revised Project

Scale 1:110,000 on A4

Projection: Australian Geodetic Datum – Zone 56 (AGD84)

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3.3.8. Commitments

- The Proponent will implement the AQMP for the site prior to the commencement of any vegetation clearing or construction activities.
- The Proponent will achieve and maintain the level of dust control outlined in the EA.
- The Proponent will investigate all substantiated dust related complaints and implement corrective actions resulting from substantiated complaint investigations as required.
- All monitoring and sampling techniques will be consistent with the Queensland Government's Air Quality Sampling Manual and applicable Australian Standards as outlined in Section 3.3.7.
- The revised Project will maintain plant and equipment in a proper condition.
- The revised Project will investigate energy efficiency ratings of plant and equipment for consideration in [plant installations.
- A greenhouse gas inventory will be maintained and reported as required by the NGER legislation

3.3.9. Proposed Environmental Authority Conditions: Schedule B – Air

Condition B13 will take effect within 2 years of the commencement of construction activities on MLA 50232. Conditions B1-B12 as listed below will only apply until this time.

Transitional conditions

Dust Nuisance

B1 Subject to Conditions B2 and B3 the release of dust or particulate matter or both resulting from the mining activity must not cause an environmental nuisance, at any sensitive place.

B2 When requested by the administering authority, dust and particulate monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive place, and the results must be notified within 14 days to the administering authority following completion of monitoring.

Dust Deposition Monitoring

B3 If the Environmental Authority holder can provide evidence through monitoring that the following limits are not being exceeded then the holder is not in breach of B1:

a) Dust deposition of 120 milligrams per square metre per day, averaged over one month, when monitored in accordance with AS 3580.10.1 Methods for sampling and analysis of ambient air - Determination of particulates - Deposited matter - Gravimetric method of 2003; and
b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (µm) (PM10) suspended in the atmosphere of 50 micrograms per cubic metre over a 24 hour averaging time, at a sensitive place downwind of the operational land, when monitored in accordance with:

- Particulate matter - Determination of suspended particulate PM10 high-volume sampler with size-selective inlet - Gravimetric method, when monitored in accordance with AS 3580.9.6 Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM (sub) 10 high volume sampler with size-selective inlet - Gravimetric method of 2003; or

- Any alternative method of sampling PM10, which may be permitted by the 'Air Quality Sampling Manual' as published from time to time by the administering authority.

NOTE: You must propose which monitoring method is appropriate in accordance with condition B3 (a) or (b) or both.

B4 If monitoring indicates exceedence of the relevant limits in Condition B3, then the Environmental Authority holder must:

- address the complaint including the use of appropriate dispute resolution if required; or

- as soon as practicable or at the request of the administering authority, implement dust abatement measures so that emissions of dust from the activity do not result in further environmental nuisance.

B5 Rehabilitation must be carried out in such a manner as to minimise releases of wind-blown dust and erosion.

B6 Dust emissions from mining activities must be suppressed by the use of water or treated in any other suitable manner to prevent a dust nuisance at a sensitive place.

B7 All sealed traffic areas must be cleaned as necessary to minimise the release of dust and particulate matter to the atmosphere.

B8 Trafficable areas must be sealed with bitumen or an equivalent hard surface, or otherwise maintained to the satisfaction of the administering authority, in a condition which minimises the release of windblown or traffic generated dust.

B9 Temporary roads used for material haulage must be watered or treated in any other suitable manner, to minimise wind-blown or traffic generated dust.

Odour nuisance

B10 Subject to condition B11, the release of noxious or offensive odour(s) or any other noxious or offensive airborne contaminant(s) resulting from the mining activity must not cause an environmental nuisance at any sensitive or commercial place.

B11 When requested by the administering authority, odour monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.

B12 If monitoring indicates Condition B10 is not being met then the environmental authority holder must:

a) address the complaint including the use of appropriate dispute resolution if required; or
b) immediately implement odour abatement measures so that emissions of odour from the activity do not result in further environmental nuisance.

Conditions after 2 years

Dust and particulate matter monitoring

B13 The Proponent shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the dust and particulate matter emissions generated by the mining activities do not cause exceedances of the following levels if measured at any sensitive or commercial place:

a) Dust deposition of 120 milligrams per square metre per day, averaged over 1 month, when monitored in accordance with the most recent version of Australian Standard AS3580.10.1. Methods for sampling and analysis of ambient air—Determination of particulate matter—Deposited matter – Gravimetric method.

b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometres (PM10) suspended in the atmosphere of 50 micrograms per cubic metre over a 24-hour averaging time, for no more than 5 exceedances recorded each year, if monitored in accordance with the most recent version of either:

   1. Australian Standard AS3580.9.6 Methods for sampling and analysis of ambient air Determination of suspended particulate matter—PM 10 high volume sampler with size-selective inlet – Gravimetric method; or

   2. Australian Standard AS3580.9.9 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM 10 low volume sampler—Gravimetric method.

c) A concentration of particulate matter suspended in the atmosphere of 90 micrograms per cubic metre over a 1 year averaging time, if monitored in accordance with the most recent version of AS/NZS3580.9.3:2003 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—Total suspended particulate matter (TSP)—High volume sampler gravimetric method.

END OF CONDITIONS FOR SCHEDULE B

3.4. Waste Management

3.4.1. Background

The waste management strategies proposed for the revised Project will incorporate those already in use at the NAC Mine and will consider waste management from the concept and planning stages through design, construction, operation and decommissioning.

- The major sources of waste with the potential to cause impacts are:
- vegetation cleared from areas to be disturbed by the revised Project;
- regulated waste (hydrocarbon waste, detergents, solvents, batteries, tyres);
- general waste (food scraps, paper, rags, cans and glass);
- scrap metal and off cuts from maintenance activities and from the construction of the CHPP precinct, water supply pipeline and mine infrastructure areas; and
- sewage effluent and sludge.

The estimated volume and management methods are shown in Table 3-6 for construction wastes and Table 3-7 for wastes produced during operation. These are based on minimising the potential environmental impacts associated with waste generation at the revised Project.

Table 3-6 Waste Management: Construction Phase

Waste Type	Source(s)	Management Methods	Approximate Quantity
Cleared Vegetation	Site Infrastructure (rail loop and balloon loop, MHF and TLF)	Where possible use on re-vegetated areas. Reuse on-site as fauna habitat or dispose of in waste dump.	Small amounts of vegetation
Excavated Waste	Site Infrastructure (rail loop and balloon loop, MHF and TLF)	Refill any excavations and spread any excess over the nearby area and allow re-vegetating with appropriate sediment control if likely to be exposed to surface water. Waste materials will be reused as much as practicable to construct haul roads and pads.	All used as fill on-site
Concrete	Site Infrastructure area (MHF, TLF workshops and buildings)	Minimise waste by producing/procuring only the amount necessary. Disposal in waste rock dump. Pre fabrication if possible.	<10 t
Steel/ metal off cuts	Site Infrastructure area (MHF, TLF workshops and buildings)	Minimise waste by producing/procuring only the amount necessary. Segregation and collection on-site. Transportation off-site by a waste contractor for off-site recycling.	<20 t
Timber – pallets and off-cuts	Site Infrastructure area (MHF, TLF workshops and buildings)	Minimise waste by producing/procuring only the amount necessary. Good pallets returned to sender. Damaged pallets disposed of in waste dump, chip and reuse on site as mulch for landscaping and erosion control.	<2 t

Waste Type	Source(s)	Management Methods	Approximate Quantity
Paints and Resins	Site Infrastructure area (MHF, TLF workshops and buildings)	Minimise waste by producing/procuring only the amount necessary. Collection on-site and storage in a segregated area. Transportation off-site by licensed regulated waste transporter and disposal off-site by a regulated waste receiver.	Minor amounts (All available parts should be painted off-site before Installation on-site).
General wastes including putrescible & organic (food waste), some plastics and paper	Construction offices, workshop	General waste will be taken off-site for disposal at a nearby landfill.	<500 t
Recyclables - including paper, cardboard, plastics, glass, aluminium cans	Construction offices	Incorporate into existing waste management system - Collection on-site. Transportation by a waste contractor for off-site recycling.	<10 t
Grease trap wastes	Workshop	Incorporated into existing waste management system - Wastes will be collected and disposed of off-site by a licensed regulated waste transporter, to a licensed regulated waste receiver, for recycling and disposal.	< 3 t
Waste Oil and Containers	Workshop	Collected and stored on-site in a bunded facility (compound, temporary or pallet). Transported off site by a licensed regulated waste transporter, to a licensed regulated waste receiver for recycling.	45 t
Oily Water	Workshop	Oil will be separated from water. The resulting oil will be collected and transported off-site by a licensed regulated waste transporter to a licensed regulated waste receiver for recycling. The separated water is directed to a sediment dam for evaporation or possible reuse on-site for dust suppression activities.	4 t
Electrical Wastes	Contractor crib rooms, offices, facilities, CHPP precinct and infrastructure facilities	Collection and segregation on-site. Transportation by a waste contractor for off-site recycling.	< 10 t
Sewage Effluent	Construction and Administration Offices	Sewage will be pumped to the STP for treatment and disposal in accordance with the EA.	25 ML annum (based on 450 EP). Max construction volume assumed.

Table 3-7 Waste Management: Operational Phase

Waste Type	Source(s)	Management Methods	Approximate Quantity
Waste oil, oily waste and waste from oil separator	CHPP precinct, Workshops	Collected and stored in a bunded tank. Transported off site by a licensed regulated waste transporter, to a licensed regulated waste receiver, for recycling or treatment and disposal.	15 t per MT of ROM coal
Oily sludge, absorbent, degreaser, grease, oily rags, oil filters	CHPP precinct, Workshops	Collected on-site. Then transported off-site by a licensed regulated waste transporter, to a licensed regulated waste receiver, for recycling or treatment and disposal.	3 t per Mt of ROM coal (oily sludge, absorbent, greases) 25 000 L/a (rags) 0.75 t per Mt coal (filters)
Waste Oil containers	CHPP precinct, Workshops	Drained on site. Drums will be transported off-site by waste contractor for off-site reuse, recycling or disposal. Oil will be collected, then transported off- site by a licensed regulated waste transporter to a licensed regulated waste receiver, for recycling.	Approximately 150 units per year
Scrap metal	Mine plant, including administration, workshops	Minimise waste by producing/procuring only the amount necessary. Segregation and collection on-site. Transportation off- site by a waste contractor for off-site recycling.	30-50 t (inclusive of mine plant equipment)
General wastes including putrescible and organic (food waste), some plastics and paper not suitable for recycling	Workshop, offices	General waste will be taken off-site for disposal at Oakey landfill.	190 t per annum
Recyclables – including paper and cardboard, plastics, and glass.	Workshop, offices	Collection and segregation on-site. Transportation by a waste contractor for off-site recycling.	150 t per annum
Paints and resins	CHPP precinct, Workshops	Minimise waste by producing/procuring only the amount necessary. Collection on-site and storage in a segregated area. Transportation off-site by licensed regulated waste transporter and disposal off-site by a regulated waste receiver.	<2 t per annum
Timber pallets and off-cuts	CHPP precinct, Workshops	Minimise waste by producing/procuring only the amount necessary. Good pallets returned to sender. Damaged pallets disposed of in landfill.	<2 t per annum
Tyres	Workshops	Tyres will be stored and disposed of in the spoil dumps or transported off-site by a licensed regulated waste	750 t per annum

Waste Type	Source(s)	Management Methods	Approximate Quantity
		transporter to a licensed regulated waste receiver for recycling or disposal.	
Vehicle Batteries	Workshops	Collected on-site in a segregated area. Then transported off-site by a licensed regulated waste transporter to a licensed regulated waste receiver for recycling.	120 t per annum
Anti-corrosion Agents	Workshops	Collection and segregation on-site. Transportation by a waste contractor for off-site processing.	<50 t per annum
Regulated waste - sewage waste and residues (sewage sludge)	STP	Sewage sludge is treated on-site at the STP. The thickened sludge will be removed from site from a licensed contractor during the decommissioning phase.	<1 t per annum
Regulated waste – sewage wastewater discharged from the STP	STP	STP effluent will be discharged to a sediment dam for possible reuse on-site for dust suppression and/or evaporation, or discharged to the process water system in accordance with the EA.	18 ML per annum (based on 200 EP) Volume will vary depending on the number of personnel on site.

At the decommissioning phase of the revised Project, a comprehensive assessment of waste will be undertaken in line with the waste management hierarchy to identify the most appropriate measures to manage the remaining waste. Site infrastructure will generally be decommissioned and sold off, relocated to another NHG mine site, or demolished in line with the post mine land use. The estimated volumes of each waste type likely to be generated during the decommissioning phase of the revised Project and their management method are shown in Table 3-8.

Table 3-8 Waste Management: CHPP & Infrastructure Decommissioning Phase

Waste Type	Source(s)	Management Methods	Approximate Quantity
Waste oil, oily waste and waste from oil separator and electrical transformers	CHPP precinct, Workshops	Bunded tank and residue oils will be collected and removed from site by a licensed contractor for recycling or treatment and disposal.	10 t
Oily sludge, absorbent, degreaser, grease, oily rags, oil filters	CHPP precinct, Workshops	Collected on-site. Then transported off-site by a licensed regulated waste transporter, to a licensed regulated waste receiver, for recycling or treatment and disposal.	2 t
Waste Oil containers	CHPP precinct, Workshops	Drained on-site. Drums will be transported off-site by waste contractor for off-site reuse, recycling or disposal. Oil will be collected, then transported off- site by a licensed regulated waste transporter to a licensed regulated	50 drums

Waste Type	Source(s)	Management Methods	Approximate Quantity
		waste receiver, for recycling.	
Scrap metal	Mine plant, including Administration, Workshops	Segregated and collection on-site. All scrap metal to be removed for recycling. All re-usable steel and functioning equipment will be sold and removed from site.	2,000 t
Electrical Waste	CHPP precinct, Workshops, Administration	Collection and segregation on-site. Transportation by a licensed waste contractor for off-site recycling.	600 t
Rubber (such as conveyor belts, linings)	CHPP precinct	Collection and segregation on-site. Transportation by a licensed waste contractor for off-site recycling.	<5 km of belt
Radioactive sources (density gauges)	CHPP precinct	Removed and transported off-site by a licensed contractor	3 sources
General wastes including putrescible and organic (food waste), some plastics and paper not suitable for recycling	Workshop, offices	General waste will be taken off-site for disposal at Oakey or nearby landfill.	<500 t
Recyclables - including paper, cardboard, plastics, glass, aluminium cans	Workshop, offices	Collection and segregation on-site. Transportation by a waste contractor for off-site recycling.	<10 t
Concrete	Site Infrastructure area (CHPP precinct, Workshops & Buildings)	Removed and segregation on site. Transportation by a licensed waste contractor for off-site recycling or disposal.	< 5, 000 t
Regulated waste - sewage waste and residues (sewage sludge)	STP	The residual sewerage sludge is recovered by a licensed STP contractor for appropriate disposal off-site in compliance with regulated waste requirements.	<20 t

3.4.2. Environmental Values

The environmental values to be protected through the management of waste are the:

- health and amenity of people ;
- biological integrity of the disturbed surface water aquatic ecosystem;
- suitability of surface water for agricultural use;
- availability and suitability of groundwater for agricultural use;
- maintenance of a stable, non-polluting landform; and

- suitability of the land for a beneficial post mining land use.

3.4.3. Potential Impacts on the Environmental Value

General wastes

Revised Project activities that generate wastes may impact on the environmental values listed above through poor on-site management. Inappropriate disposal of waste may lead to the contamination of land and water and cause adverse effects on ecosystems and human health. Environmental harm will only occur if wastes are not managed appropriately.

Mining Waste

The management of spoil, coarse rejects and dewatered tailings has the potential to impact on the identified land environmental values.

It is likely that spoil material will be suitable for revegetation. Topsoil is used as a surface treatment to promote revegetation, maximise natural revegetation from propagules (e.g. seeds, etc.) and minimise any effects from sodic spoil present at sub-soil depths. If necessary, consideration may be given to incorporating gypsum (calcium source) into the surface horizon of the final spoil dump to reduce the sodicity.

Results suggest that acid rock drainage (ARD) from coarse rejects and dewatered tailings presents a low risk. If necessary, occurrences of ARD at the revised Project site would be managed using a containment system, such as in-pit encapsulation within inert or neutralising material.

3.4.4. Proposed Environmental Protection Objective

The revised Project's environmental protection objectives for wastes are:

- to avoid contaminating land, surface water or groundwater through poor waste management practices;
- to manage waste through the use of licensed contractors, transporters and disposal facilities; and
- to minimise the generation of waste in accordance with the waste management hierarchy listed in the Environmental Protection (Waste Management) Policy 2000 (EPP (Waste))which involves:
  - implementation of the waste minimisation hierarchy with these waste management options:
  - waste avoidance;
  - waste re-use;
  - waste recycling; and
  - waste disposal (as a last option); and
  - compliance with national and state waste management policies, the EP Act and associated regulatory instruments as a minimum.

3.4.5. Performance Criteria

- Manage waste in accordance with the waste management hierarchy and the Waste management plan; and
- Prevent environmental harm through appropriate management of general and mineral waste and waste streams.

3.4.6. Control Strategies

General wastes

Solid and liquid wastes will be managed by NAC's EMS based on the Waste Management Plan (WMP) in the EIS, Appendix J13. Liquid wastes are addressed in Section 3.7. Surface Water and Mining and tailings wastes are addressed in Section 3.8 Land Management. Mine waste management is detailed in Section 4.7. Solid wastes will be managed as below.

- Waste management mitigation measures and commitments for the revised Project are provided in Table 3-9.

Table 3-9 Summary of Mitigation Measures and Commitments

Mitigation measure	Commitment
Construction Waste Minimisation	▪ Assessment of construction methods and possible waste generation areas will be undertaken in line with the waste management hierarchy to identify the most appropriate measures to manage all wastes.
Updates to the WMP	The WMP will be periodically updated to incorporate aspects of the revised Project and involved the following process: ▪ Identification and minimisation of waste streams; ▪ Improve where possible on the waste disposal and management techniques currently adopted; ▪ All waste generated on-site during the construction and operational phases will be disposed of in accordance with the WMP; ▪ Contracts with construction companies will be negotiated to place responsibility on all contractors to adopt best practice waste minimisation procedures; ▪ Waste monitoring and auditing will be undertaken; and ▪ training will be provided to personnel and contractors in relation to waste management requirements and practices.
Decommissioning Waste Minimisation	▪ An assessment of waste will be undertaken in line with the waste management hierarchy to identify the most appropriate measures to manage the remaining waste.

Hazardous Materials

All hazardous materials used on-site will be recorded in the Hazardous Materials Register (HMR). This register includes details on storage location, storage requirements, handling

information and disposal procedures. This information is also available in MSDS's which are kept for all materials and chemicals maintained within the HMR.

In addition:

- the storage and handling of flammable and combustible liquids will be implemented in accordance with the applicable provisions of AS 1940-2004;
- contractors will provide a list of hazardous chemicals and MSDS prior to bringing chemicals on-site;
- no chemical will be allowed on site without an MSDS;
- a chemical register will be continued on-site;
- corrosive materials will be stored and handled in accordance with AS 3780.8 (Class 8 substances – corrosives);
- fuels, oils and chemicals in containers of 200 L or more will be stored in a bunded area with capacity of at least 110% of the largest container;
- fuels, oils and chemicals in containers less than 200 L capacity will be stored as above or in a fenced, bunded and roofed compound;
- all fuels, oils and chemicals will be clearly labelled;
- transfer of bulk fuel and handling of hazardous chemicals will be undertaken only by trained personnel and in accordance with a Standard Operating Procedure;
- spill cleanup kits including absorbent materials will be kept at each fuel and chemical storage facility; and
- an area will be designated for the temporary storage or bioremediation of hydrocarbon contaminated soils.
- The revised Project will continue to generate wastes similar to those presently generated at NAC, which presently have limited market demand. There are likely to be opportunities to reuse and recycle aluminium cans, some containers such as glass bottles, paper, and scrap steel. Some general wastes will be recycled or reused on site, such as pallets, or disposed of by licensed waste management contractors. The revised Project will review the marketability of all wastes for recycling and reuse on a regular basis and will update the WMP accordingly.

Waste Rock Management

Following over ten years of mining operation within the Mine and extensive resource delineation activities within the Study area, NAC believes based on experience that the risk of a significant occurrence of ARD within the Study area is low. This assumption is supported by the geochemical investigations completed for the revised Project's EIS, and is further supported by the geology of the revised Project's coal deposits, which were not formed as 'marine regression' environments (typically associated with acid generation), are all the same formation (depositional history), and contain strata with a significant proportion of calcareous material (acid neutralising).

Based on the low level of risk, NAC will continue to use surface water monitoring, on-going geological assessments and rehabilitation performance to monitor for ARD. If required, waste rock dump design investigations will be undertaken to facilitate:

- physical characterisation of available non-acid forming (NAF) materials for burying potentially-acid forming (PAF) materials;
- physical characterisation of the PAF rock to be covered; and
- development of selective placement options.

A surplus of NAF waste rock materials is available within the Study area for construction of earthen covers.

3.4.7. Monitoring

Waste monitoring and auditing will be undertaken at the revised Project. The purpose of monitoring waste management activities and outcomes on-site include:

- Assessing actual waste results and comparing with predicted impacts and mitigation measures;
- Monitoring for potential environmental impacts; and
- Providing baseline data to enable continuous improvement of waste avoidance, reduction and management measures.

3.4.8. Commitments

- General Waste
- A WMP will be regularly reviewed and revised as required.
- Recycling of glass, aluminium, steel and cardboards will be undertaken, if feasible.
- Regular monitoring and auditing will be undertaken, with a program to address any outstanding non-conformances.
- Waste Rock Management
- NAC will evaluate the acid generation potential appropriately regularly during mining operations to assess its acid generating capacity.
- The following measures will be implemented to manage mine waste. Low capacity PAF (PAF-LC) and PAF mine waste:
    - progressively backfilled into pit voids and placed below the pre-mining groundwater level; and
    - co-mingled with non-acid forming (NAF) materials in out of pit dumps during construction.

3.4.9. Proposed Environmental Authority Conditions: Schedule C – Waste Management

C1 Unless otherwise permitted by the conditions of this environmental authority or with prior approval from the administering authority and in accordance with a relevant standard operating procedure, waste must not be burnt.

C2 The holder of this environmental authority may burn vegetation cleared in the course of carrying out extraction activities provided the activity does not cause environmental harm at any sensitive place or commercial place.

C3 The holder of this environmental authority may dispose of inert waste (packing material) associated with blasting into open pits, buried in a manner such that it will not impede saturated aquifers.

Disposal of Tyres

C4 Where practicable, scrap tyres resulting from the mining activities can be disposed of into open pits provided tyres are placed as deeply in the spoil as reasonably possible and this practice does not cause an unacceptable fire risk or compromise mine safety.

C5 Scrap tyres resulting from the mining activities disposed within the operational land must not impede saturated aquifers or compromise the stability of the consolidated landform.

Waste Rock Management

C6 Subject to the release limits defined in Schedules E and F, all reasonable and practicable measures must be implemented to prevent hazardous leachate being directly or indirectly released or likely to be released as a result of the activity to any groundwater or watercourse.

Tailings disposal

C7 Suitable tailings storage facility management plans must be developed and implemented for the construction, operation and decommissioning of all in-pit and out-of-pit tailings storage facilities within Mining Leases 50170, 50216 and 50232 (New Acland Coal Mine) to reasonably prevent unauthorised environmental harm to the downstream receiving environment (i.e. land, surface water and groundwater).

END OF CONDITIONS FOR SCHEDULE C

3.5. Noise and Vibration

3.5.1. Background

The revised Project site is located within a predominantly rural environment with background noise levels influenced by traffic, existing mining activities and local rural activities.

The revised Project has the potential to generate noise and vibration impacts at nearby sensitive receptors. Activities at the revised Project vary in location and nature throughout the mine life. Therefore noise levels at sensitive receptors will also vary throughout the life of the revised Project. Many properties surrounding the revised Project site have been acquired by NAC or are under negotiation. Therefore there are a limited number of sensitive receptors, which may be affected by the revised Project. The nearest sensitive receptors are shown in Figure 3-1. Sensitive receptor 3 (in Muldu) has been removed from Figure 3-1 because NAC have reached agreement to relocate the current tenant and purchase this property.

The Mine and local and mine traffic on the Jondaryan-Muldu Road contributes to the existing noise environment. The Mine and its traffic on the Jondaryan-Muldu Road have been in operation since 2002. The only potential significant ground vibration source in the vicinity of the revised Project site is the Mine.

Background L_{A90} noise level at each monitoring location is typical of similar rural settings, influenced by local and distant traffic, insects, birds and rustling leaves. Each location monitored displayed a similar trend in background noise variation, with relatively low day time noise levels, which slightly increased during the evening followed by relatively low night time noise levels.

Construction & Decommissioning Noise

Due to the proposed construction hours and the separation distances (minimum 400 m) between construction activities and nearby sensitive receptors, noise impact from construction activities will be minimal.

Similarly, due to the proposed decommissioning hours, the limited nature of decommissioning activities and the separation distances (minimum 400 m) between decommissioning activities and nearby sensitivreceptors, noise impact from decommissioning activities will be minimal.

Operational Noise

A number of operating scenarios were investigated and noise modelling exercises were carried out, with the aim to assist in developing a mining operation that would demonstrate best practice and comply with legislative noise limits while achieving a feasible and viable mining operation.

The noise modelling exercises and operational scenarios investigated include the:

- effect of replacing the excavator (noisier equipment) with a loader (quieter equipment) to achieve the same output;
- viability of night time operation in Manning Vale East pit with regards to complying with EPP Noise night time criteria;
- comparison of conveyor versus haul truck options;

- feasibility of using existing equipment (not noise attenuated);
- use of a mixture of noise attenuated and existing equipment; and
- use of noise attenuated equipment.

A summary of the investigated scenarios and the noise modelling results are tabulated in Table 3-10. For the purpose of presenting the differences in s sound power levels (SWL) between existing and noise attenuated equipment, the SWL of existing and noise attenuated excavators, track dozers, loaders and rear dump trucks are tabulated in Table 3-11.

Table 3-10 Summary of the Investigated Scenarios and the Noise Modelling Results

Scenario	**(1) Effect of Replacing Excavator with Loader**	**(2) Viability of Night Time Operation in Manning Vale East pit**	**(3) Comparison of Conveyor versus Haul Truck**	**(4) Existing versus Attenuated Equipment**	**(5) Mixture of Equipment versus Attenuated Equipment**
Period	Day	Night	Day/Night	Day/Night	Night
Pits	All 3	All 3	3 (day) 2 (night)	3 (day) 2 (night)	All 3
Equipment	Excavators, track dozers, loaders and rear dump trucks are attenuated.	Excavators, track dozers, loaders and rear dump trucks are attenuated.	Attenuated rear dump trucks compared to open and unmitigated conveyors.	Excavators, track dozers, loaders and rear dump trucks are attenuated.	Excavators, track dozers, loaders and rear dump trucks are attenuated in all three pits versus excavators, track dozers, loaders and rear dump trucks are attenuated in Manning Vale East pit plus existing equipment at the other two pits.
Results	0 to 0.6 dB(A) lower at sensitive receivers with loader	Between 0 and 6 dB(A) higher at sensitive receivers compared to only two pits operating	Between 2 and 8 dB(A) higher with conveyor at sensitive receivers	Between 4 and 6 dB(A) higher with existing equipment at sensitive receivers	Up to 6 dB(A) lower with attenuated excavators, track dozers, loaders and rear dump trucks in all three pits

Table 3-11 SWL of existing and attenuated equipment

Item	Existing equipment sound power level dB(A)	Attenuated equipment sound power level dB(A)
350 t and 500 t Excavator	124	118
900kW Loader	117	114
180 t and 220 t Rear Dump Truck	115	112
50 t to 100 t Track Dozer	115	113

Results from the noise modelling exercises and operating scenarios investigated show that:

- noise levels would be up to 6dB(A) lower at the noise sensitive receivers if the noisier equipment including excavators, track dozers, loaders and rear dump trucks are noise attenuated;
- replacing the excavators with loaders reduces noise levels at the noise sensitive receivers by up to 0.6dB(A);
- to comply with legislative noise limits in EPP Noise, limited mining operation could be allowed in the Manning Vale East pit during the night time; and
- noisier equipment including excavators, track dozers, loaders and rear dump trucks will need to be noise attenuated to achieve compliance with legislative noise limits in EPP Noise.

These critical findings have assisted in developing the mine plan, mining fleet and operational schedule for the revised Project.

Maximum Operational Noise (L_{AMax})

The aim of the maximum operational noise modelling is to predict a realistic worst case instantaneous maximum noise level from the mining operation. It has been assumed that whilst a large number of items of equipment will be operating at average engine speed, some mobile and fixed equipment will be operating at maximum engine speed or load. The following operational scenario has been modelled which is considered conservative and is unlikely to occur on a regular basis.

- A worst case scenario of a haul truck dumping coal into an empty Rom bin (Noise level highest when ROM bin is empty);
- A water truck, wheel dozer and a track dozer operating at maximum engine speed;
- Two rear dump trucks in proximity to Manning Vale West pit and Willeroo pit, respectively, operating at maximum engine speed; and
- Two side tipping trucks travelling at maximum engine speed along the haul route in close proximity to the noise sensitive receptors;
- The rest of the equipment fleet operating at average engine speed.
- Worst case meteorological condition of Stability Class F with a 2.9 m/s wind in the direction of the noise sensitive receptors with both the Manning Vale West and Willeroo Pits operating

The maximum operational noise level from the mining operation is predicted to range between LAmax 11 dB(A) at noise sensitive receptors 31 and LAmax 45 dB(A) at noise sensitive receptor 2. The maximum operational noise levels at the noise sensitive receptors will therefore meet the Planning for Noise Control Guideline's sleep disturbance criterion of LAmax 52 dB(A) during the worst case temperature inversion condition at all noise sensitive receptors over the life of the revised Project.

3.5.2. Environmental Value

The revised Project's environmental values to be enhanced or protected are:

- the acoustic qualities suitable for the wellbeing of a community, including its social and economic amenity; and
- for the wellbeing of the individual, including the individual's opportunities to sleep, relax and converse without unreasonable interference from intrusive noise or vibration.

3.5.3. Potential Impacts on the Environmental Value

Revised Project activities that may impact on the acoustic environmental values are listed below:

- Noise impacts from mining equipment: trucks, hydraulic excavators, drills, dozers, front end loaders , and graders;
- Noise impacts from processing and handling equipment such as crushers, CHPPs, workshop operations, train loadout facilities, haul road, blasting, and light vehicles;
- Vibration impacts from blasting; and
- Noise impacts from operation of the rail spur.

The level of noise at nearby receivers will vary depending on the location and elevation of the noise sources, the intervening topography, noise barriers, atmospheric conditions, and the distance between the source and receiver.

All noise sensitive receptors surrounding the revised Project site are residences. The noise sensitive receptors surrounding the revised Project site and the proposed rail spur are shown in Figure 3-1. Sensitive receptor 3 (in Muldu) has been removed from Figure 3-1 because NAC have reached agreement to relocate the current tenant and purchase this property.

3.5.4. Proposed Environmental Protection Objective

Pursuant to the EP Act, environmental values to be enhanced and protected by the EPP (Noise) are:

- the qualities of the acoustic environment that are conductive to protecting the health and biodiversity of ecosystems;
- the qualities of the acoustic environment that are conducive to human health and amenity, including by ensuring a suitable acoustic environment for individuals to sleep, study and be involved in recreation, including relaxation and conversation; and
- the qualities of the acoustic environment that is conducive to protecting the amenity of the community.

3.5.5. Performance Criteria

The performance criteria for noise and vibration are:

- Compliance with the requirements of the revised Project's EA;
- Noise and vibration monitoring in accordance with the control strategies outlined in Section 3.5.6; and
- The number of substantiated noise and vibration complaints from the community.

3.5.6. Control Strategies

Noise and vibration will be managed by NAC's EMS based on the Noise and Vibration Management Plan (NVMP) in the EIS, Appendix J11.

By implementing noise management and mitigation measures including reduced night time operation, as required, and using attenuated equipment (noise attenuation of noisier equipment including excavators, track dozers, loaders and rear dump trucks), the predicted noise levels from the mining operation will meet the EPP Noise $L_{Aeq,adj,1\ hr}$ at all noise sensitive receptors over the life of the revised Project except at noise sensitive receiver 3. NHG are currently in discussions with the owners of this property with a view to agreeing on appropriate mitigation measures.

However, the predicted noise level from the mining operation will exceed the *Planning for Noise Control Guideline*'s PNL at a number of noise sensitive receptors. The DEHP has acknowledged that a PNL of 28 dB(A) is a very low level for practical compliance purposes and a large number of mines and industries around Queensland struggle to comply with a PNL of 28dB(A).

The following mitigation measures are proposed by NAC as commitments to reduce the revised Project's potential noise impact.

- NAC will establish a real-time noise monitoring network, which will be used in conjunction with a weather forecasting system and an adaptive management process, to proactively relocate, reduce or stop noisier mining operations.
- NAC has developed a NVMP for the revised Project, and is presented in Appendix J.11. The NVMP will be administered as an accompanying document to the revised Project's Plan of Operations.
- Based on ambient conditions (climate and the current mine plan)and feedback from the real-time noise monitoring (warning and alarm protocols), NAC may be required to limit or stop mining operations in the Manning Vale East pit during the night time period. This requirement is based on the noise assessment work completed for the revised Project's EIS.
- NAC will ensure noisier mining equipment, including excavators, track dozers, loaders and rear dump trucks, is fully attenuated. This requirement is based on the noise assessment work completed for the revised Project's EIS.
- Where possible, NAC will schedule noisier operations in-pit at night or during daylight hours only. For example, dumping of overburden and dozer activity on overburden dumps at or above ground surface may be restricted during night periods (10pm to 7am).

- If no suitable or acceptable noise amelioration solutions are available for a particular noise issue, NAC will negotiate in good faith with all affected property owners for property purchase or by agreement implement some other form of amicable arrangement (e.g. acoustic treatment of the dwelling, relocation or replacement of the dwelling at another suitable location, relocation of the landowner to another living arrangement for the period of the issue or any other suitable innovative solution). NAC would be responsible for all reasonable costs associated with any agreed solution to a noise issue. In the event agreement cannot be reached, NAC will enter into mediation with the affected party and employ the services of a third party to facilitate this process

- NAC will ensure proper maintenance and operational procedures will be undertaken to minimise noise emissions from equipment, including proper servicing and maintenance of exhaust systems on mine equipment.

- NAC will implement its Noise and Vibration Management Plan, as presented in Appendix J.11 to minimise the risk of noise complaints from nearby sensitive receptors to the revised Project. All complaints received in relation to the revised Project's operation will be managed as outlined in NAC's Local Stakeholder Engagement Plan as presented in Appendix J.18. NAC's approach to complaints management is based on the key principles of timeliness, sensitivity, fairness and impartiality, and confidentiality. NAC is committed to open communication with its local stakeholders and active complaint resolution when issues or concerns are raised about its mining operations. Where practicable, NAC using the mine planning process will utilise topsoil and other dumps as noise barriers between active mine operations and nearby noise receptor locations.

- NAC will continue to utilise broad band alarms instead of reverse beepers on all mobile equipment.

- NAC will continue to limit the speed of heavy vehicle traffic on haul roads.

- NAC will continue its current proactive monthly noise monitoring program and will expand its coverage around the revised Project site.

- NAC will continue its proactive assessment of possible noise attenuation options for both mobile or stationery noise emitting equipment. Noise emissions with tonal, impulsive and/or intermittent characteristics will be targeted for noise attenuation.

For the management of airblast overpressure and vibration, the following measures will be adopted for the revised Project.

- Field data will be used to best design blasts with an adequate buffer in place to meet noise/ vibration limits and the type of stemming required for the area.

- In the event of a blast issue, the maximum instantaneous charge of subsequent blasts will be reduced using delays, reduction of hole diameter, etc. (i.e. until the blast issue is resolved).

- In the event of a blast issue, the burden and spacing of subsequent blasts will be changed by altering the drilling pattern and/or delay layout, or altering the hole inclination (i.e. until the blast issue is resolved).

- The stemming depth and type will be adequate for each blast event.

- Blast events will only be conducted during favourable weather conditions.

- The monitoring of blasts will continue at the nearest sensitive receptors based on the interpretation of pre-blast weather data.
- The practice of advising near neighbours will continue in advance of each blast. All new near neighbours surrounding the revised Project site will be proactively invited to join the blast notification contact list.
- A qualified professional with suitable experience will be responsible for the revised Project's blast management.

3.5.7. Monitoring

A monitoring program will be implemented as per a NVMP and will include the following activities:

- NAC will continue its current proactive monthly noise monitoring program and will expand its coverage around the revised Project site.
- NAC will ensure all complaints will be investigated in a timely manner to determine the source of the nuisance noise. Where appropriate, noise monitoring will be conducted at the affected residence, and as required, noise amelioration solutions will be investigated and implemented by agreement.
- The monitoring of blasts will continue at the nearest sensitive receptors based on the interpretation of pre-blast weather data.
- All blast complaints will be investigated in a timely manner to determine the extent of the issue. Where appropriate, blast monitoring will be conducted at the affected residence, and as required, blast mitigation solutions will be investigated and implemented by agreement.

3.5.8. Commitments

- Noise and vibration monitoring will be undertaken as per the EA.
- The Proponent will implement the NVMP.
- All substantiated noise and vibration complaints will be investigated and corrective action will be implemented as required.

3.5.9. Proposed Environmental Authority Conditions: Schedule D – Noise

Noise limits

D1 The holder of this environmental authority must ensure that noise generated by the mining activities does not cause the criteria in Table D1a Summary of Noise Limits (Transitional Period) to be exceeded at a sensitive place or commercial place.

Table D1b Summary of Noise Limits (Revised Conditions) will replace Table D1a Summary of Noise Limits (Transitional Period) within 2 years of the commencement of construction activities on Mining Lease 50232.

Table D1a Summary of Noise Limits (Transitional Conditions)

Noise level dB(A) measured as	Monday to Saturday			Sundays and public holidays		
	7am - 6pm	6pm - 10pm	10pm - 7am	9am - 6pm	6pm - 10pm	10pm - 9am
	Noise measured at a 'Noise sensitive place'					
$L_{Ar,\ 1\ hour}$	50	45	40	50	45	40

Note: The method of measurement and reporting of noise levels must comply with the latest editions of the Environmental Protection Agency's Noise Manuals.

Table D1b Summary of Noise Limits (Revised Conditions)

Noise level dB(A) measured as	Monday to Saturday			Sundays and Public Holidays		
	7am - 6pm	6pm - 10pm	10pm - 7am	9am - 6pm	6pm - 10pm	10pm - 9am
	Noise measured at a 'Noise sensitive place'					
$L_{Aeq,adj,1\ hr}$	42	42	37	42	42	37

Note: The method of measurement and reporting of noise levels must comply with the latest editions of the Environmental Protection Agency's Noise Manuals.

Airblast overpressure nuisance

D2 The holder of this environmental authority must ensure that blasting does not cause the limits for peak particle velocity and air blast overpressure in Table D2 – Blasting noise and vibration limits to be exceeded at a sensitive place or commercial place.

Table D2 Blasting Noise and Vibration Limits

Blasting noise limits	Sensitive or commercial Blasting noise limits place limits			
	Monday – Friday	Saturday	Monday – Saturday	Sunday & Public Holidays
	7am – 6pm	9am – 1pm	6pm – 7am	
Air blast overpressure	115 db (Linear) Peak for 9 out of any 10 consecutive blasts initiated. Any single blast must not exceed 120 db (Linear) Peak.		No blasting	No blasting
Ground vibration peak particle velocity	5mm/s peak particle velocity for 9 out of 10 consecutive blasts Any single blast must not exceed 10mm/s		No blasting	No blasting

Monitoring and reporting

D3 If investigating a complaint, noise monitoring and recording must include the following descriptor characteristics and matters:

a) LAN,T (where N equals the statistical levels of 1, 10 and 90 and T = 1 hour)
b) background noise LA90
c) the level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels
d) atmospheric conditions including temperature, relative humidity and wind speed and directions
e) effects due to any extraneous factors such as traffic noise
f) location, date and time of monitoring
g) In the event of a complaint relating to low frequency noise, Max LpLIN,T and one third octave band measurements in dB(LIN) for centre frequencies in the 10 – 200 Hz range should be recorded.

D4 The holder of this environmental authority must monitor compliance with Table D1a Summary of Noise and Vibration Criteria and Table D2 – Blasting noise and vibration limits for all blasts undertaken on this site at the nearest sensitive place or commercial place.

END OF CONDITIONS FOR SCHEDULE D

3.6. Groundwater

3.6.1. Background

Five aquifers exist within the revised Project site; the Quaternary alluvial aquifer, the Tertiary basalt aquifer, the Walloon Coal Measures aquifer, and the deeper Marburg Sandstone and Helidon Sandstone aquifers.

The Quaternary Alluvial aquifer is limited in spatial extent and within the revised Project site may only exist within the westernmost part in association with Lagoon Creek, although investigations have shown that Lagoon Creek is very likely disconnected from the regional groundwater system. The alluvial aquifer is known to form a significant groundwater resource outside of the revised Project site, especially in association with Oakey Creek (and its tributary Doctors Creek) south of the revised Project site.

A review of surface geological mapping and bore logs from drilling undertaken as part of the revised Project baseline assessment demonstrates that there is only minor outcrop of the Tertiary Basalt aquifer in the northwestern and extreme southwestern sections of the revised Project site. The basalt is known to form a major aquifer immediately west of the revised Project site.

The Walloon Coal Measures aquifer outcrops over much of the revised Project site, and forms the main groundwater aquifer intersected by the revised Project. On a regional scale the Walloon Coal Measures is considered a confining unit of the GAB however on a local scale it is known to support significant groundwater extraction for stock and domestic use. Groundwater is dominantly held and transmitted within the coal seams, although testing has shown the interburden strata may also hold and transmit significant quantities of water.

The Marburg Sandstone and Helidon Sandstone aquifers are major aquifers of the Great Artesian Basin and are the deepest semi-confined to confined aquifers underlying the revised Project site. These aquifers lie at significant depth below the revised Project's mine pits and will not be affected by the revised Project. The Marburg Sandstone aquifer is separated from the revised Project's mine pits by at least 75 m of low permeability Walloon Coal Measures/Eurombah Formation aquitard-forming strata, and the Helidon Sandstone aquifer is separated from the Marburg Sandstone aquifer by around 200 m of Evergreen Formation, which is a recognised aquitard.

3.6.2. Groundwater quality

Groundwater quality in the area is classified as moderately to very saline (1600 to 6600 µS/cm), mildly alkaline, with varying proportions of cations and anions depending on the type of aquifer being tapped. Water associated with basalt tends to have Calcium (Ca^{2+}), Magnesium (Mg^{2+}) and Bicarbonate (HCO_3^-) as the major ions while water pumped from the coal measures tends to have Sodium (Na^+) and Chloride (Cl^-) as the main ions.

Groundwater quality data has been compared to the following guidelines based on the EVs of the revised Project site:

- ANZECC 2000 Guidelines;
- Queensland Water Quality Guidelines 2009 (QWQG); and
- Australian Drinking Water Guidelines 2011 (ADWG).

Generally, groundwater is suitable for stock watering but not for potable uses, except for groundwater obtained from the Basalt aquifer, which is used for potable water.

3.6.3. Groundwater use

Groundwater use in and adjacent the revised Project site is limited to landholders who draw on groundwater through bores for water supply purposes. Aquifers accessed by identified groundwater users include the Quaternary alluvium, Tertiary Basalt, Walloon Coal Measures and Marburg Sandstone. The current Mine uses groundwater from bores accessing the Tertiary Basalt aquifer as the main potable water supply, groundwater inflows to the mining pits from the Walloon Coal Measures aquifer for industrial purposes (dust suppression), and maintains access to the Marburg Sandstone and Helidon Sandstone aquifers as an emergency water supply for industrial purposes. In general, reliance on groundwater for industrial purposes has decreased significantly since the WWRF Pipeline was brought online in 2010. No Groundwater Dependant Ecosystems have been identified within or adjacent the revised Project site).

3.6.4. Potential Impacts on the Environmental Objectives

The potential impacts on groundwater during mine dewatering and operation are:

- the pressure head within aquifers surrounding the revised Project will reduce, which may result in an increased depth to water surface of bores located within the area of impact; and
- reduced pressure head within aquifers will potentially reduce the rate at which groundwater can be extracted from bores due to a reduced head of water above the pump.

The drawdown of the water table associated with the revised Project is unlikely to have an impact on the surrounding shallow aquifers as these aquifers are located well above and are poorly connected to the revised Project's deeper water supply aquifers.

The mining and dewatering operations are not expected to have a detrimental impact on the groundwater quality in the revised Project site. Potential sources of contamination to groundwater include tailings, rejects, waste rock and site environmental incidents, such as oil and chemical spills. These sources of contamination are more likely to have a localised impact at the surface with minimal depth penetration.

3.6.5. Performance Criteria

- Compliance with the requirements of the revised Projects' EA;
- No adverse changes to groundwater quality as a direct result of this project;
- Landholder concerns will be assessed and managed in a timely manner;
- Implement the control strategies as described in this GMIMP;
- The groundwater monitoring network will:
  - be installed and maintained by a person possessing appropriate qualifications and experience in the fields of hydrogeology and groundwater monitoring program design to be able to competently make recommendations about these matters;
  - be constructed in accordance with methods prescribed in the *"Minimum Construction Requirements for Water Bores in Australia"* (National Uniform Drillers Licensing Committee, 2012) by an appropriately qualified driller; and

– include a sufficient number of 'bores of compliance' that are located at an appropriate distance from potential sources of impact from mining activities and provide the following:

  - representative groundwater samples from the uppermost aquifer;

  - background water quality in hydraulically up-gradient or background bore(s) that have not been affected by any mining activities conducted by NAC; and

  - the quality of groundwater down gradient of potential sources of contamination.

3.6.6. Control Strategy - Groundwater

Groundwater will be managed and monitored by NAC's EMS based on the Groundwater Monitoring and Impact Management Plan (GMIMP) in the EIS, Appendix J5.

The groundwater monitoring program for the revised Project combines the current monitoring program for the existing Mine with an extended network of monitoring bores for the revised Project.

NAC will expand its existing groundwater monitoring network to encompass the revised Project's new operational areas. NAC's groundwater monitoring regime will continue its regular assessment of water levels and quality from strategic bores surrounding the revised Project site to help identify potential impacts from the revised Project and to confirm legitimate issues raised by surrounding groundwater users.

If a legitimate groundwater issue is identified by monitoring or complaint investigation and involves a drawdown of 5 m or greater, NAC will attempt to reach a mutually agreeable arrangement with all affected neighbouring groundwater users in a timely manner, which may involve the provision of alternative water supplies throughout the revised Project's life and following mine closure. NAC would be responsible for all reasonable costs associated with the provision of any alternative water supply arrangements. Possible alternative water supply options may include:

- installation of new pumps capable of extracting groundwater from greater depths or more efficiently within existing bores;
- refurbishment of existing bores to improve the efficiency of groundwater extraction;
- deepening of existing bores to target new and/or more reliable aquifers; or
- installation of a new bore at another location on the property.
- Construction and decommissioning activities are not expected to impact groundwaters.

3.6.7. Monitoring

Groundwater

The groundwater monitoring program for the revised Project combines the current monitoring program for the existing Mine with an extended network of monitoring bores for the revised Project. Data collected from the groundwater monitoring program will:

- be operated in accordance with the revised Project's approved EA, including adoption of suitable guideline criteria and temporal investigation;
- be used in the continued development and refinement of groundwater impact assessment criteria and investigation triggers;
- enable verification and refinement (where necessary) of the groundwater modelling predictions presented in this EIS; and
- be collated into a database that will be made available to the administering authority on request.

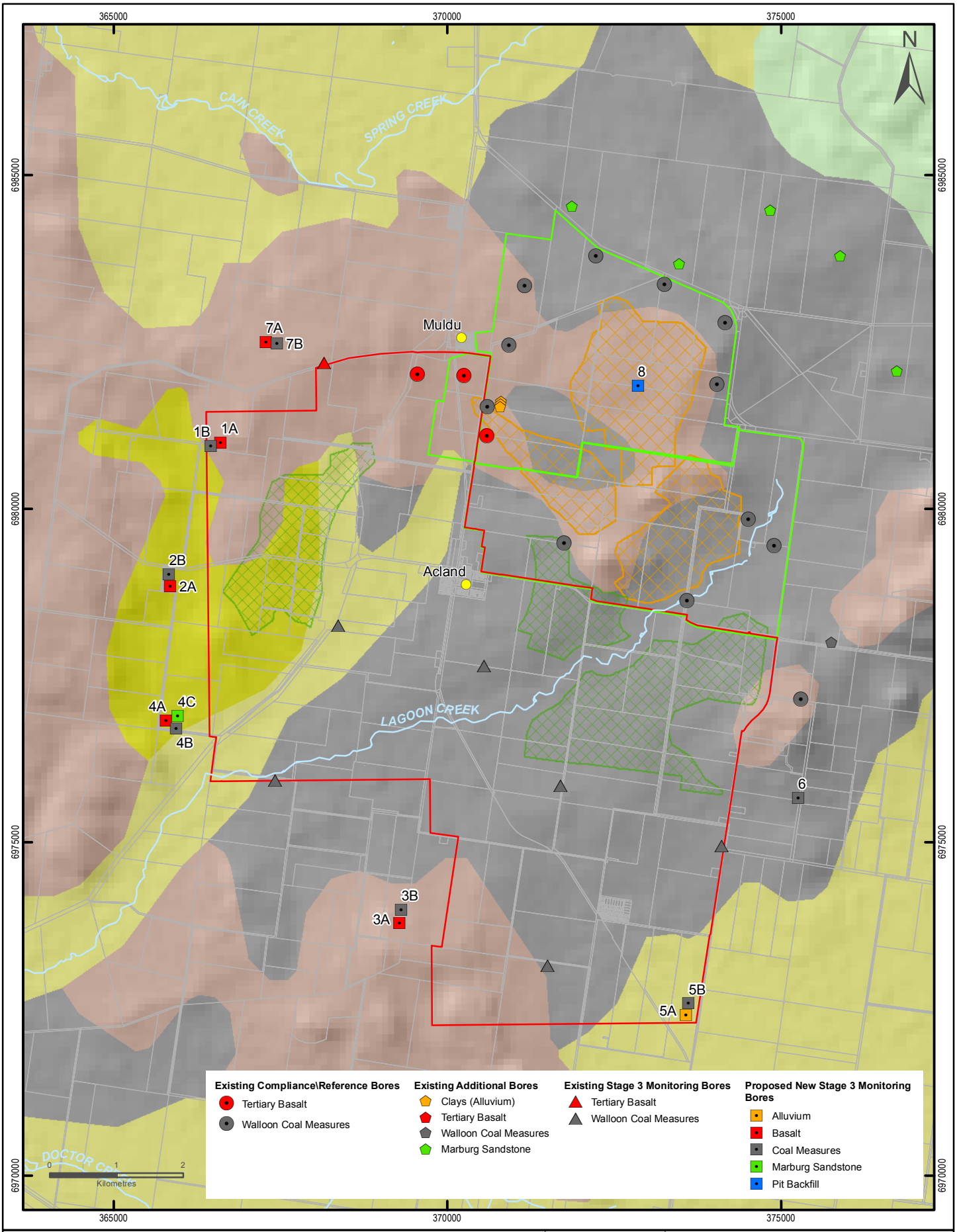
Table 3-12 summarises the bores that will be monitored, monitoring parameters, and frequency. The groundwater monitoring program combines the existing Mine monitoring bores together with the seven additional bores already installed around the revised Project site.

In addition, a further 14 bores will be added to the monitoring network, which brings the total number of bores included in the groundwater monitoring program to 36 (Figure 3-3). The monitoring program for new bores will be established prior to the commencement of mining to ensure there is sufficient baseline information on groundwater levels and quality for those bores.

Table 3-12 Groundwater Monitoring Schedule

Monitoring Point	Aquifer	Parameter and Monitoring Frequency
Bores monitored under current monitoring program (Compliance and Reference bores)		
2289P	Coal Measures	Groundwater levels: **monthly**. Groundwater quality: **six monthly** to include: Al, As, Ca, Se, Cl, Cu, F, Fe, Total N, K, Mg, Mn, Na, SO_4, HCO_3, TDS, EC, pH
2291P	Coal Measures	
18P	Coal Measures	
25P	Basalt	
26P	Coal Measures	
27P	Coal Measures	
28P	Coal Measures	
843	Basalt	
848	Coal Measures	
81P	Coal Measures	
82P	Coal Measures	
83P	Coal Measures	
84P	Basalt	
BMH1	Basalt	
CSMH1	Coal Measures	
Existing monitoring bores to be incorporated into the revised Project's monitoring program		
109P	Basalt	Groundwater levels: **monthly**. Groundwater quality: **six monthly** to include: Al, As, Ca, Se, Cl, Cu, F, Fe, Total N, K, Mg, Mn, Na, SO4, HCO3, TDS, EC, pH
112PGC	Coal Measures	
114P	Coal Measures	
116P	Coal Measures	
119PGC	Coal Measures	
120WB	Coal Measures	
121WB	Coal Measures	
Proposed additional monitoring points which will be monitored as part of the revised Project's monitoring program		
1A	Basalt	Groundwater levels: **monthly**. Groundwater quality: **six monthly** to include: Al, As, Ca, Se, Cl, Cu, F, Fe, Total N, K, Mg, Mn, Na, SO4, HCO3, TDS, EC, pH
1B	Coal Measures	
2A	Basalt	
2B	Coal Measures	
3A	Basalt	
3B	Coal Measures	
4A	Basalt	
4B	Coal Measures	
5A	Oakey Creek Alluvium	
5B	Coal Measures	
6	Coal Measures	
7A	Basalt	
7B	Coal Measures	
8	Mine Pit Backfill	

Aluminium (Al), Arsenic (As), Selenium (Se), Copper (Cu), Fluorine (F), Iron (F), Total Nitrogen (Total N), Manganese (Mn); Calcium (Ca), Chloride (Cl), Potassium (K), Magnesium (Mg), Sodium (Na), Sulfate (SO4), Bicarbonate (HCO3), Carbonate (CO3), Total Dissolved Solids (TDS), Electrical Conductivity (EC); Acidity/Alkalinity (pH).



LEGEND

- Towns and Localities
- Watercourse
- New Acland Coal Mine
- New Aland Coal Mine-Stage 3
- Existing Permission
- Stage 3 Pit Areas
- Cadastre

Dominant Geology

- Basalt (Tm)
- Alluvium (Qa)
- Colluvium (TQs)
- Walloon Subgroup (Jw)
- Marburg Sandstone (Jbm)

NEW HOPE GROUP

SINCLAIR KNIGHT MERZ SKM

NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 3-3 - Proposed Groundwater Monitoring Locations

Scale 1:75,000 on A4

Projection: Australian Geodetic Datum – Zone 56 (AGD84)

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3.6.8. Commitments

- The Proponent will implement the Groundwater Monitoring and Impact Management Plan.
- The frequency of monitoring and the suite of analyses sampled for will be sufficient to ensure early detection of contamination of local groundwater resources of the Great Artesian Basin and any associated groundwater dependent ecosystems.
- Groundwater monitoring, sampling and annual review of the monitoring data will be conducted by a suitably qualified and experienced professional.
- All substantiated groundwater-based complaints will be investigated and dealt with promptly using NAC's complaint handling procedure.
- Compliance with terms and conditions of any water licences.
- Trigger levels will be determined by the proponent before the commencement of mine operations.
- Make-Good Agreements will be entered in to with landowners, prior to de-watering for coal extraction, where it is predicted that mining will impact on the registered bores belonging to those landowners.

3.6.9. Proposed Environmental Authority Conditions: Schedule E - Groundwater

E1 Groundwater quality must be monitored at the locations and frequencies defined in Table – E1 Groundwater monitoring locations and frequency.

- E2 Groundwater monitoring, sampling and annual review of the monitoring data will be conducted in accordance with:
  - the current edition of the DEHP *Water Quality Sampling Manual*, or subsequent updated versions; and
  - the ASINZS 5667.11:1998 Australian/New Zealand Standard for water quality — sampling Part 11: guidance on sampling groundwater.

Table E1 Groundwater Monitoring Locations and Frequency

Monitoring Point	Aquifer	Location		Parameter and Monitoring Frequency
		Easting (GDA94 – Zone 56)	Northing (GDA94 – Zone 56)	
Bores monitored under current monitoring program (Compliance and Reference bores)				
2289P	Coal Measures	371159	6983345	Groundwater levels: **monthly**. Groundwater quality: **six monthly** to include: Al, As, Ca, Se, Cl, Cu, F, Fe, Total N, K, Mg, Mn, Na, SO4, HCO3, TDS, EC, pH
2291P	Coal Measures	374514	6979846	
18P	Coal Measures	370922	6982454	
25P	Basalt	374040	6981870	
26P	Coal Measures	374160	6982790	
27P	Coal Measures	373254	6983367	
28P	Coal Measures	372222	6983790	

Monitoring Point	Aquifer	Location		Parameter and Monitoring Frequency
		Easting (GDA94 – Zone 56)	Northing (GDA94 – Zone 56)	
843	Basalt	370592	6981096	
848	Coal Measures	370599	6981536	
81P	Coal Measures	374897	6979451	
82P	Coal Measures	373591	6978627	
83P	Coal Measures	371748	6979492	
84P	Basalt	370249	6982000	
BMH1	Basalt	369552	6982017	
CSMH1	Coal Measures	375298	6977149	
Existing Stage 3 monitoring bores to be incorporated into the revised Project's monitoring program				
109P	Basalt	368157	6982191	Groundwater levels: **monthly**. Groundwater quality: **six monthly** to include: Al, As, Ca, Se, Cl, Cu, F, Fe, Total N, K, Mg, Mn, Na, SO4, HCO3, TDS, EC, pH
112PGC	Coal Measures	370550	6977650	
114P	Coal Measures	371700	6975850	
116P	Coal Measures	374114	6974945	
119PGC	Coal Measures	371503	6973150	
120WB	Coal Measures	367417	6975928	
121WB	Coal Measures	368366	6978254	
Proposed additional monitoring points which will be monitored as part of the revised Project's monitoring program (locations are approximate)				
1A	Basalt	366500	6980900	Groundwater levels: **monthly**. Groundwater quality: **six monthly** to include: Al, As, Ca, Se, Cl, Cu, F, Fe, Total N, K, Mg, Mn, Na, SO4, HCO3, TDS, EC, pH
1B	Coal Measures	366500	6980900	
2A	Basalt	365900	6978900	
2B	Coal Measures	365900	6978900	
3A	Basalt	369300	6973900	
3B	Coal Measures	369300	6973900	
4A	Basalt	365800	6976800	
4B	Coal Measures	365800	6976800	
5A	Oakey Creek Alluvium	373600	6972500	
5B	Coal Measures	373600	6972500	
6	Coal Measures	375200	6975700	
7A	Basalt	367300	6982500	
7B	Coal Measures	367300	6982500	
8	Mine Pit Backfill	372900	6981800	

Aluminium (Al), Arsenic (As), Selenium (Se), Copper (Cu), Fluorine (F), Iron (F), Total Nitrogen (Total N), Manganese (Mn); Calcium (Ca), Chloride (Cl), Potassium (K), Magnesium (Mg), Sodium (Na), Sulphate (SO4), Bicarbonate (HCO3), Carbonate (CO3), Total Dissolved Solids (TDS), Electrical Conductivity (EC); Acidity/Alkalinity (pH).

Table E2 Groundwater quality triggers and limits

Parameter	Units	Contaminant Limits[1]	Monitoring Frequency
Al	mg/L	5.0	Half Yearly
As	mg/L	0.5	Half Yearly
Ca	mg/L	1,000	Half Yearly
Se	mg/L	0.02	Half Yearly
Cl	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
Cu	mg/L	1.0 [2]	Half Yearly
F	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
Fe	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
NO_3	mg/L	400	Half Yearly
NO_2	mg/L	30	Half Yearly
K	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
Mg	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
Mn	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
Na	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
SO_4	mg/L	1,000	Half Yearly
HCO_3	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
TDS	mg/L	5,000 [2,3]	Half Yearly
EC	µS/cm	7,460 [2,3,4]	Half Yearly
pH	unit	Criteria not defined in ANZECC (2000)	Half Yearly

Notes: 1. Based on Stockwater limits defined ANZECC (2000)
2. Defined for beef cattle based on landholder bore survey results
3. Existing bores 27P, 28P, 2289 and 118P background levels already exceed this limit prior to Mine operation
4. Based on EC to TDS conversion factor of 0.67 as per ANZECC (2000)

E3 Groundwater levels when measured at the monitoring locations specified in Table E1 -Groundwater monitoring locations and frequency must not exceed the groundwater level trigger change thresholds specified in Table E3 - Groundwater level monitoring below.

Table E3 Groundwater level monitoring

Monitoring location	Level trigger threshold
Bores monitored under current monitoring program (Compliance and Reference bores)	
2289P	TBA
2291P	TBA
18P	TBA
25P	TBA
26P	TBA
27P	TBA
28P	TBA
843	TBA
848	TBA
81P	TBA
82P	TBA
83P	TBA
84P	TBA
BMH1	TBA
CSMH1	TBA
Existing Stage 3 monitoring bores to be incorporated into the revised Project's monitoring program	
109P	TBA
112PGC	TBA
114P	TBA
116P	TBA
119PGC	TBA
120WB	TBA
121WB	TBA
Proposed additional monitoring points which will be monitored as part of the revised Project's monitoring program (locations are approximate)	
1A	TBA
1B	TBA
2A	TBA
2B	TBA
3A	TBA
3B	TBA
4A	TBA
4B	TBA
5A	TBA
5B	TBA
6	TBA
7A	TBA
7B	TBA
8	TBA

It should be noted that trigger levels for groundwater levels presented in Table E3 - Groundwater level monitoring are subject to ongoing refinement and will be reviewed and adjusted accordingly with the regular groundwater impact model review schedule (refer to Section 6.4.3 and Table 6-19 in Chapter 6 of the revised Project's EIS for further information).

Exceedance Investigation

E4 If quality characteristics of groundwater from compliance bores identified in Table E1 - Groundwater monitoring locations and frequency exceed any of the trigger levels stated in Table E2 - Groundwater quality triggers and limits or exceed any of the groundwater level trigger thresholds stated in Table E3 - Groundwater level monitoring, the holder of this environmental authority must compare the compliance monitoring bore results to the reference bore results and complete an investigation in accordance with relevant guidelines.

E5 Where alternative arrangements are in place with the owner of a bore, the groundwater limits in E4 do not apply for the bore for the duration for which the alternative arrangements are in place.

"Alternative arrangement" means a written agreement between the holder of this environmental authority and the owner or occupier (sensitive receptor) for a defined groundwater impact and may include an agreed period of time for which the arrangement is in place. An agreement for alternative arrangement is designed to ensure the defined groundwater impact is managed (e.g. compensated, offset or mitigated) to the satisfaction of the affected owner or occupier (sensitive receptor).

Bore construction and maintenance and decommissioning.

E6 The construction, maintenance and management of groundwater bores (including groundwater monitoring bores) must be undertaken in a manner that prevents or minimises environmental harm and ensures the integrity of the bores to obtain accurate monitoring.

END OF SCHEDULE E CONDITIONS

3.7. Surface Water Resources

3.7.1. Background

The revised Project site is located within the Lagoon Creek catchment of the greater Condamine River catchment. Lagoon Creek is an ephemeral creek, with a shallow, narrow poorly defined channel and wide floodplains. The creek has been moderately disturbed through past agricultural practices including a number of in-stream dams. NAC is not proposing to divert or alter the Lagoon Creek channel and has offset the revised Project's resource areas from the creek bank by approximately 150 m. Importantly, the 150 m operational offset includes a commitment by NAC to a 50 m 'no mining' buffer to promote the re-establishment of the creek's riparian zone. The buffer distance either side of Lagoon Creek within the Study area will be incorporated into the Mine's current conservation zone. This buffer distance is consistent with the requirements of the *Vegetation Management Act 1999*, which protects remnant vegetation growing within 50 m of a watercourse. In addition to this (Rutherfurd et al, 2001) recommends that offsets determined based on:

- A starting width of 5 m; plus
- A width not less than the height of the bank from bank toe to bank crest; plus
- A width equal to amount of bank migration expected to occur in the time it takes for vegetation to establish.

Rutherfurd, etal recommends widths of riparian vegetation are derived based on the 1993 study of contemporary rates of both channel widening and outside bend migration undertaken by Ian Drummond and Associated. This study identifies a maximum vegetation establishment time of 25 years and a bank erosion rate of 1 m/year. Therefore the recommended offset for Lagoon Creek would be in the order of 35 m. This indicates that the 50 m buffer and 150 m offset for Lagoon Creek is well in excess of the current industry standards.

NAC will expand the existing Lagoon Creek monitoring program as part of the Water Resource Management Plan (WRMP) for the revised Project.

3.7.2. Surface water quality

Historical water quality data for Lagoon Creek is limited. DNRM operate one regional water quality gauge on Oakey Creek at Fairview downstream of the confluence with Lagoon Creek. This gauge is located downstream of the Lagoon and Oakey Creek confluence and downstream of several towns, and agricultural areas. Water quality at this site is unlikely to be representative of that in Lagoon Creek as it is influenced by the water quality in Oakey Creek, which up until 2009 included the releases from the upstream WWRF. To this day releases from the WWRF occur on occasion dependant on the volume of water pumped through the Wetalla pipeline.

Water quality data was available from routine water monitoring conducted by NAC under its current environmental monitoring plan for the Mine and from two targeted monitoring events. The monitoring program assesses water quality at the locations outlined in Table 3-13 and illustrated in Figure 3-4.

Table 3-13 Water Quality Sampling Sites

Site Code	Description
LCU1	Monitoring site located on Lagoon Creek upstream of the existing mining operation. This site is monitored under the Mine's EA.
LCD1	Monitoring site located on Lagoon Creek downstream of the existing mining operation. This site is in the approximate location of the proposed Manning Vale East pit. This site is monitored under the Mine's EA.
LCD2	Monitoring site located on Lagoon Creek downstream of the existing mining operation. This site is downstream of the proposed Manning Vale East pit. This site is monitored under the Mine's EA.
Site 1, 3, 4 and 5	These 4 sites are located within 200 m of each other and are at the upstream boundary of the revised Project pit areas, insitu sampling was undertaken at this site in 2009 to support the revised Projects baseline activities.
Site 2	Located downstream approximately 5 kms downstream of the downstream boundary of the revised Project mining area (DS1), insitu sampling was undertaken at this site in 2009 to support the revised Projects baseline activities.
AH4	Aquatic ecology monitoring site 4, downstream of the existing mining operations and immediately adjacent to the northern extent of the Manning Vale East and Willeroo pits.
DS1	New water quality monitoring site located at the downstream boundary of the revised Project mining area.

Lagoon Creek water quality data are presented in Table 3-14. This table provides the median and ranges of water quality variables from the long term monitoring at the DNRM Oakey Creek at Fairview gauging station and NAC's existing EA monitoring. Table 3-14 also provides the physicochemistry values recorded during a period of no flow during the 2008 monitoring event.

Table 3-15 provides a summary of results for water quality monitoring during a flow event (2013), including physicochemical properties, concentrations of nutrients, major ions and dissolved metals. Full sets of water quality results are provided in EIS Appendix G.3.1.

Table 3-14 Water Quality Data

Site	Time/ Date	Temp (ºC)	Suspended Solids (mg/L)	Turbidity (NTU)	pH	DO (ppm)	Sulphate (mg/L)	EC (µS/cm)
		N/A	**N/A**	**<25**	**6.5-7.5**	**90-110%**	**<200**	**<500**
Regional Water Quality Sampling								
Oakey Creek at Fairview (DNRM)	1995 - 2012	20.50 5.9-34.8	N/A	**84 (10 – 999)**	**8.10 (5.4-10.4)**	1.2 to 17.8 (mg/L)^	43 (3 **- 269**)	**1018 (**159 – **3204)**
Environmental Authority Monitoring								
LCU1	2008-2013	22.40 (15.5-30.5)	18 (2-179)	N/A	7.46 (6.6-**8.4**)	N/A	2 (1-190)	210.0 (97-**590**)
LCD1	2008-2013	23.85 (17.9-29.6)	11 (1-335)	N/A	**7.80 (**7.3-**8.9)**	N/A	25 (3-220)	418.5 (176-**3900**)
LCD2	2008-2013	23.40 (19.3-29.6)	10 (2-353)	N/A	**7.80 (**7.4-**8.9)**	N/A	30 (1-200)	**596.0** (136-**1700**)
Insitu Sampling No Flow Event (January 2008)								
Lagoon Creek (Site 1)	23rd Jan 1325	31.42	N/A	**94.89**	**8.90**	**111.67**	N/A	**596.4**
Lagoon Creek (Site 2)	23rd Jan 1540	26.34	N/A	**33.35**	**8.91**	95.23	N/A	463.1
Lagoon Creek (Site 3)	23rd Jan 1730	25.99	N/A	3.15	**8.03**	94.73	N/A	**8 089.6**
Lagoon Creek (Site 4)	24th Jan 1430	26.89	N/A	20.45	**8.52**	**65.61**	N/A	**642.1**
Lagoon Creek (Site 5)	24th Jan 1520	30.93	N/A	16.95	**8.69**	92.10	N/a	**636.9**

*Note: Bold indicates exceedance of relevant guidelines, shaded cells indicate median exceeds relevant guidelines. ^ gauge only reports in mg/L

Table 3-15 Water quality monitoring during a period of flow (March 2013)

Water quality variable	Unit	Guideline	LCU1	LCD1	AE4	DS1
Flow		N/A	Yes	Yes	Yes	Yes
Temperature*	°C	N/A	23.9	25.9	21.9	21.6
Dissolved oxygen	%	90-110%	**15.0**	**51.8**	**44.3**	**46.0**
pH	pH Units	6.5-7.5	7.0	7.5	**7.6**	7.4
Electrical conductivity	µS/cm	<500	240	310	240	280
Turbidity	NTU	<25	8.6	**55**	19	10
Total nitrogen	mg/L	<0.25	**1.4**	**0.84**	**1.2**	**0.97**
Ammonia	mg/L	<0.010	**0.35**	**0.037**	**0.061**	**0.040**
Total phosphorus	mg/L	<0.030	**0.15**	**0.12**	**0.31**	**0.26**
Filterable reactive phosphorus	mg/L	<0.015	**0.052**	**0.059**	**0.18**	**0.17**
DIN	mg/L		**0.02**	**0.29**	**0.02**	<0.02
Sodium#	mg/L		12	32	15	15
Sulphate#	mg/L		1	20	4	5
Total hardness#	mg/L	Level 1 >150 Level2 > 200	95	84	98	110
Calcium*	mg/L		20	15	23	22
Magnesium*	mg/L		5.9	8.4	7.7	8.0
Potassium*	mg/L		10	6.0	12	11
Fluoride*	mg/L		<0.1	0.6	0.2	0.1
Chloride*	mg/L		9	26	10	13
Dissolved metals						
Arsenic (As)	µg/L	<0.013	2	1	2	2
Chromium, (Cr)	µg/L	<0.0027	btl (8.5)	btl (7.7)	btl (8.7)	btl (9.6)
Copper, (Cu)	µg/L	<0.0014	**2 (3.7)**	**3 (3.4)**	**4 (3.8)**	**3 (4.2)**
Manganese, (Mn)	µg/L	1.9	1	btl	22	1
Mercury (Hg)	mg/L	<0.00006	btl	btl	btl	btl
Nickel, (Ni)	µg/L	<0.011	**5 (29)**	**2 (26)**	**4 (30)**	**4 (24)**
Zinc (Zn)	µg/L	<0.008	**btl (21.3)**	**btl (19.2)**	**6 (21.9)**	**btl (24.1)**
Barium, (Ba)*	µg/L		39	28	69	61
Beryllium, (Be)*	µg/L		<1	<1	<1	<1
Cobalt, (Co)*	µg/L		<1	<1	<1	<1
Vanadium, (V)*	µg/L		2	4	8	5

Note - * indicates no guidelines currently available. # shows water quality indicator values used for protection of drinking water supply (for example the see the EPP (Water) Dawson River Sub-basin), all other indicator values apply to the protection of aquatic ecosystem. Values in brackets are the trigger values for dissolved metals that require a hardness correction (AWQG). Below detection limits (btl) indicates the variable was below detection limits of the laboratory analysis. Shaded and bold values indicate exceedance of the relevant guideline.

LEGEND

- Towns and Localities
- Sample Site
- Rail Spur
- Roads
- Creeks
- Mining Tenements
- Stage 3 Pit Areas

NEW HOPE GROUP

SKM

NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 3-4 - Water Quality Sample Sites

Scale 1:60,000 on A4
Projection: Australian Geodetic Datum – Zone 56 (AGD84)

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Lagoon Creek

Water in the Condamine catchment is generally high in concentrations of total phosphorus and in turbidity (CBWC, 1999) and is indicative of catchments that are affected by agriculture. The revised Project site has been impacted by land uses including grazing and dryland cropping. These land-use practices have affected the surrounding waterways including Lagoon Creek. The very high concentrations of nutrients in Lagoon Creek during the flow period indicate mobilisation of inorganic and organic forms of nitrogen and phosphorus from catchment run-off possibly related to agricultural activities.

The concentrations of dissolved oxygen during the period of flow were low and were possibly due to the decomposition of suspended and dissolved organic matter in the rainfall run-off. The turbidity in Lagoon Creek and Oakey Creek was low in comparison to other subcatchments of the Condamine River basin, where high turbidity has been identified as a major influencing and limiting factor for the EV's. The long term monitoring results of EC in Lagoon Creek indicate increased EC levels downstream of the Mine. While it is expected that the EC of Lagoon Creek may increase following controlled releases from the Mine, all releases are undertaken based on strict water quality targets.

It is noted that EC values are generally below guideline values at all sites. Furthermore, EC values immediately downstream of the Mine are significantly lower than the EC values at the DNRM monitoring site on Oakey Creek. This observation suggests that the EC values of the Lagoon Creek catchment are generally lower than the Oakey Creek catchment.

The water quality of the Lagoon Creek catchment is also impacted by the ephemeral nature of Lagoon Creek. Ephemeral waters are variable in their water quality primarily due to the irregularity and intensity of flow/rainfall events. The revised Project site experiences seasonal and highly variable rainfall. Large flow events will generally carry a large sediment load, which can be intensified by a long dry period. Flows and connectivity are also impacted by the numerous waterway barriers as a result of the construction of in-stream farm dams.

3.7.3. Existing surface water uses

Lagoon Creek is an ephemeral drainage system and in-stream farm dams provide the only permanent water source at intermittent stages along Lagoon Creek. Semi-permanent waterholes also exist along Lagoon Creek, but are small in number and moderately degraded.

3.7.4. Aquatic Ecology

No threatened or endangered aquatic flora or fauna (macroinvertebrates, turtles, fish etc.) were found to inhabit the waterways within the revised Project site or the surrounding water courses. Therefore, the likelihood of rare or threatened species occupying the revised Project site is very low.

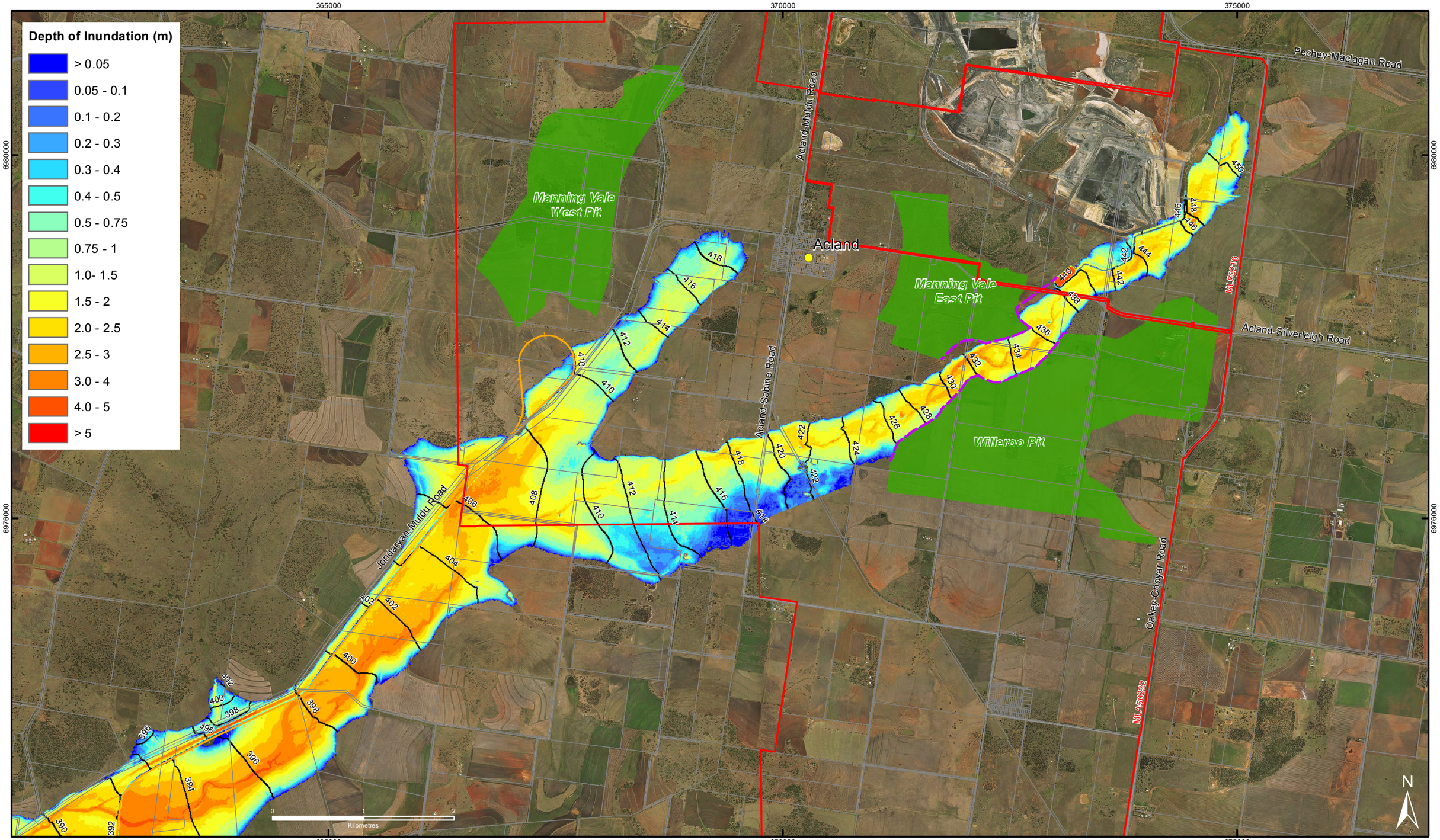
The drainage pathways are ephemeral waterways and the available aquatic habitat is poor in condition and of low quality due to previous and current land uses, which has resulted in the clearing of riparian vegetation, erosion and bank instability. The aquatic habitat in the revised Project site, although poor, provides habitat for a number of native aquatic species. Although the waterways are not permanent, they do provide a temporary habitat for certain aquatic flora and fauna species, such as small fish species.

3.7.5. Final Landform Flood Protection

NAC have committed to design the revised Project's final landform so that any depressions and or hills are located outside the PMF flood extent. Figure 3-5 illustrates the PMF flood extent in the vicinity of the revised Project. Figure 3-5 shows that the existing site is predominantly not affected by flooding in the PMF event. Similarly, the currently proposed

depressed landform locations are generally not affected by the PMF. Further refinement of the depressed landform locations through detailed design and mine planning will ensure that the depressed landform locations are not affected by the predicted PMF. As a result, there are no flood impacts predicted for the revised Project's final landform.

The final landform will contain water at its lowest point due to inflows from groundwater inflows. Modelling of the groundwater inflows including consideration for rainfall and evaporation is presented in the revised Projects' EIS Chapter 6. Chapter 6 also includes a discussion on water quality within the final landform. Water in the final landform will be located over 50 m below natural surface level and as a result there is no risk of contamination of other surface waters from groundwater inflows to the final landform.



LEGEND

- Towns and Localities
- Proposed Rail Spur
- Proposed Flood Levee
- Roads
- Water Surface Level (m AHD)
- Cadastre
- Mining Tenements
- Stage 3 Pit Areas

NEW HOPE GROUP

SINCLAIR KNIGHT MERZ SKM

NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 3-5 - Developed Peak Depth PMF

Scale 1:40,000 on A3
Projection: Australian Geodetic Datum – Zone 56 (AGD84)

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3.7.6. Environmental Values

Environmental water values to be protected, based on EIA information gathered and assessed, have been determined as:

- the biological integrity of a modified surface water aquatic ecosystem; and
- the quality suitability of surface water for agricultural use.

Draft environmental values for surface waters in the Condamine catchment have been released by the Condamine Alliance (2012) and were used to determine the environmental values for Lagoon Creek. The draft environmental values that apply to Lagoon Creek were those identified for the upper Oakey Creek sub-catchment (Condamine Alliance 2012) and are listed in Table 3-16.

Table 3-16 Draft environmental values and description identified for Lagoon Creek (Condamine Alliance 2012).

Environmental Value		Description
	**Aquatic Ecosystems**	A community of organisms living within or adjacent to water, including riparian or foreshore area. Levels of protection for aquatic ecosystems: ▪ High ecological/conservation value waters (HEV): waters in which the biological integrity is unmodified or highly valued ▪ Slightly to moderately disturbed (SMD): waters that retain biological integrity but are affected by human activity. ▪ Highly disturbed (HD): waters that are significantly degraded by human activity and have lower ecological value
	**Irrigation**	Suitability of water supply for irrigation-for example, irrigation of crops, pastures, parks, gardens and recreational areas.
	**Farm Water Supply**	Suitability of domestic farm water supply, other than drinking water. For example, water used for laundry and produce preparation.
	**Stock Watering**	Suitability of water supply for production of healthy livestock.
	**Human Consumers of Aquatic Foods**	Health of humans consuming aquatic foods-such as fish, crustaceans and shellfish (other than oysters) from natural waterways.
	**Visual Recreation**	Amenity of waterways for recreation which does not involve any contact with water-for example, walking and picnicking adjacent to a waterway.
	**Drinking Water**	Suitability of raw drinking water supply. This assumes minimal treatment of water is required-for example, coarse screening and/or disinfection.

3.7.7. Potential Impacts on the Environmental Values

The revised Project site is located within the Lagoon Creek catchment of the greater Condamine River catchment. Lagoon Creek is an ephemeral creek, with a shallow, narrow poorly defined channel and wide floodplains. The creek has been moderately disturbed through past agricultural practices including a number of in-stream dams. NAC is not proposing to divert or alter the Lagoon Creek channel and has offset the revised Project's

resource areas from the creek bank by approximately 150 m. Importantly, the 150 m operational offset includes a commitment by NAC to a 50 m 'no mining' buffer to promote the re-establishment of the creek's riparian zone. The buffer distance either side of Lagoon Creek will be incorporated into the Mine's current conservation zone,

NAC will expand the existing Lagoon Creek monitoring program as part of the WRMP for the revised Project. The WRMP is located in Appendix J.4.

The revised Project is not expected to have a significant impact on the existing flood regime. Impacts to flooding as a result of the proposed flood protection levee and railway crossing are largely located on land owned by the APC. Furthermore, the analysis indicates that there would not be additional flooding impacts at Jondaryan as a result of the revised Project.

Flood protection for the revised Project's resource areas will be provided through two flood levees designed to provide protection from a PMF flood event, which is well in excess of the current legislative requirements. In addition, NAC has committed to ensuring the revised Project's final landform is outside the existing PMF flood extent, and as a result, there are no flooding impacts on the key aspects of the proposed final landform (i.e. the depressed and elevated landforms).

No licenced surface water users were identified on Lagoon Creek with the closet downstream user located after the Oakey Creek confluence 19 km downstream of the revised Project site. Therefore, the impacts of the revised Project to downstream users and the environment are expected to be negligible.

NAC is not seeking any new water allocations. The majority of the revised Project water demands are provided from the WWRF through a pipeline constructed in 2009. This beneficial use of a waste water product ensures the revised Project possesses a sufficient and reliable water supply.

As part of NAC's water management system, runoff from disturbed areas will be captured and treated with an amount available for reuse by the revised Project's mining activities. In line with current industry guidelines, NAC's water management system will include a controlled release system to manage rainfall events and minimise adverse impacts to the downstream receiving environment. The ephemeral nature of Lagoon Creek means that controlled releases will occur on a minimal basis over the life of the revised Project, and as a result, are not expected to have a significant impact on water quality, aquatic ecology and downstream water users.

The potential impacts of the revised Project on water quality may result from:

- increased sediment load or chemical spillage during construction; and
- a reduction in water quality through controlled or uncontrolled releases from the mine water management system.
- clearing of vegetation and stripping of top soils;
- handling and storage of fuels during construction and operation and;
- any releases of water from the site and site sedimentation dams.

3.7.8. Proposed Environmental Protection Objectives

The revised Project's environmental protection objectives for surface water and groundwater are to ensure that beyond the revised Project's boundaries no significant adverse impacts are caused to the:

- water quality of the downstream receiving environment and the local groundwater aquifers;
- water levels (extractable quantity) of the local groundwater aquifers; and
- quantity of surface water normally available downstream.

The water quality guidelines adopted for the relevant water quality parameters within Lagoon Creek are presented in Table 3-17. The parameters are based on the AWQG's guideline values for the protection of aquatic ecosystems.

Table 3-17 Lagoon Creek Water quality guidelines for the protection of aquatic ecosystems

Water quality variable	Guideline Value	Water quality variable	Guideline Value
pH	6.5-7.5	Metals (Dissolved)	
EC (µS cm^{-1}) $	<500	Arsenic (As) (mg L-1)	<0.013
Turbidity (NTU)	<25	Cadmium (mg L-1)	<0.0002
Dissolved oxygen (DO) (% saturation (mg L^{-1})	90-110%	Chromium III (Cr) (mg L-1)	<0.0027
Total suspended solids (TSS) (mg L^{-1})	-	Copper (Cu) (mg L-1)*	<0.0014
Hardness ($CaCO_3$) (mg L^{-1})	-	Lead (mg L-1)*	<0.0034
Sulfate (SO_4)* (mg L^{-1})	-	Nickel (Ni) (mg L-1)*	<0.011
Ammonia (NH_3) (mg L^{-1})	<0.010	Zinc (Zn) (mg L-1)*	<0.008
Dissolved inorganic nitrogen (DIN) (mg L^{-1})	<0.015	Manganese (Mn) (mg L-1)	1.9
Total nitrogen (TN) (mg L^{-1})	<0.25	Mercury (Hg) (mg L-1)	<0.00006
Total phosphorus (TP) (mg L^{-1})	<0.030	Beryllium (Be) (mg L-1)**	*
Filterable reactive phosphorus (FRP) (mg L^{-1})	<0.015	Vanadium* (V) (mg L-1)**	*
TPH C6 - C9 Fraction* (mg L^{-1})	-	Cobalt* (Co) (mg L-1)**	*
TPH C10 - C36 Fraction* (mg L^{-1})	-	Barium* (Ba) (mg L-1)**	*

Notes: * indicates requirement for hardness correction of trigger values (TVs). (**) Indicates trigger values are not specified in AWQG. All trigger values derived from AWQG except for $ which is derived from the QWQG

In addition to the water quality objectives outlined in Table 3-17, water quality guidelines for the protection of drinking water supply (raw water) have additional water quality indicators and these values are presented in Table 3-18.

Table 3-18 Water Quality Objectives for the protection of drinking water supply

Indicator	**Water Quality Objective** EPP (Water) for the Dawson River sub-basin
Blue-green algae (cyanobacteria) *	< 5,000 cells/mL
Algal toxin	Level 1: 0.1 µg/L *Microcystin* * Level 2: 4 µg/L *Microcystin**
Cryptosporidium *	0 cysts
*Giardia**	0 cysts
Sodium*	30 mg L^{-1}
Sulfate*	200 mg L^{-1}
Colour*	Level 1: 50 Hazen Units No Level 2
Hardness*	Level 1 > 150 mg L^{-1} Level2 > 200 mg L^{-1}
E. coli	None specified for raw water (<10 cfu's for irrigation supply of raw human food crops)
pH	6.5-8.5
Turbidity	Level 1: 500 NTU Level 2: 1000 NTU
Conductivity	Level 1: > 400 µS cm^{-1} Level 2 same as Level 1 (no treatment options to remove salt)
Dissolved oxygen	Level 1: < 4 mg L^{-1} at surface No Level 2

Source: EPP (Water) Dawson River Sub-basin.

*indicates a WQO more stringent than for protection of aquatic ecosystem or one not covered by the aquatic ecosystem environmental value.

*Level 1 denotes Level 1 Hazard and Critical Control Point (HACCP) response rating, namely: treatment-plant-process-change required to ensure water quality and quantity to customers is not compromised.

*Level 2 denotes Level 2 Hazard and Critical Control Point (HACCP) response rating, namely: treatment-plant-process-change required but water quality and quantity to customers may still be compromised.

3.7.9. Performance Criteria

- Compliance with the requirements of the revised Projects's EA;
- Undertake surface water monitoring as described in the WRMP; and
- Implement the control strategies as described in the WRMP.

3.7.10. Control Strategy - Surface Water

Surface water will be managed by NAC's EMS based on the WRMP in the EIS, Appendix J4.

The following surface water management control strategies will continue to be implemented.

- construction work in creeks will be undertaken in dry weather and conditions of minimal or no flow;

- implementation of the Conservation Zone Management Plan (CZMP) (EIS Appendix J.6) within Lagoon Creek;
- weather conditions will be monitored so that work in creek crossings and erosion prone areas will not take place if rain and/or extreme weather (e.g. storms) are forecast;
- sedimentation fences and bunds will be used to contain fill or excavated material during construction;
- fill and excavated material will be stockpiled away from gully heads, active creek banks, bank erosion or other unstable areas;
- local runoff from disturbed areas will be routed clear of disturbed areas;
- assessment of the integrity and effectiveness of erosion control measures will be undertaken at regular periods and following significant rainfall events; and
- if required the erection of temporary waterway barriers during construction will include the provision to transfer flows from upstream of the works to the downstream channel without passing though the disturbed construction site.
- 'Clean' water runoff from undisturbed areas is diverted away from disturbed areas.
- Surface runoff from disturbed areas on-site is captured in sediment dams and preferentially used on-site for operational purposes to minimise the likelihood of discharge off site.
- Sedimentation dams are designed to capture the bulk of suspended sediment from runoff from disturbed areas prior to any discharge off site.
- Sediment from sediment dams is periodically removed to maintain design capacity.
- Flood bunding will be used to protect infrastructure and mining areas from flooding.
- All water management structures are designed and constructed using practical hydraulic parameters based on an appropriate risk based rainfall event, catchment size, slopes, surface profile and soil types. Water management structures locations are provided in Figure 3-6.
- Water stored in environmental and sediment dams is preferentially used as a supplemental water source for coal washing and dust suppression to minimise the likelihood of offsite water discharges.
- The revised Project's water management plan is designed to ensure all off site discharges do not exceed the defined discharge criteria/limits.
- Water from the TSFs is recycled efficiently as possible to reduce water consumption for coal washing purposes.
- All significant quantities of hydrocarbons and chemical products stored on-site are bunded (temporary or permanent). Fuels and oils will be stored in bunded areas in accordance with the applicable provisions of AS1940-2004.
- Spill capture and retention devices are installed in applicable areas as required (e.g. fuelling stations, etc.).

- Contaminated water containing oil or other hydrocarbon products is contained and collected using structures such as an oil-water separator. Captured oily water may be used on site or treated to reduce hydrocarbons to acceptable levels before release.
- Waste oil and other hydrocarbon products are collected and removed from the revised Project site by a licensed operator.
- Sedimentation dams (and supporting structures) to capture runoff water from disturbed areas are installed in a timely manner ahead of planned mining activities.
- Constructed drainage and discharge structures are designed not to alter the natural bed and bank profile.
- All machinery will be stored, refuelled and maintained outside the high banks of watercourses.
- Remedial response strategies will be developed in the event that an off-site release fails to meet the water quality objectives or environmental protection objectives. These actions may include:
  - conducting a rigorous environmental investigation into the incident, including if possible, development of a strategy and/or standard procedures to minimise the likelihood of a recurrence ;
  - repairing any damaged areas and re-establishing the banks or scoured areas, if excessive erosion has occurred;
  - supplying an alternate water source; and
  - removing excessive sediment built up from sensitive areas or where it may be causing problems.
- The current monitoring program for surface water will be initially expanded and periodically reviewed to keep pace with the dynamic nature of the revised Project's mine plan.
- Appropriate surface water monitoring data will continue to be collected for trend analysis, impact assessment and complaint investigation.

LEGEND

- Towns and Localities
- Existing Release Point
- Proposed Release Point

Existing Dam

- Environment Dam (ED)
- Raw Water (RW)
- Proposed Dams
- Roads
- Creeks
- Jondaryan-Muldu Road Diversion
- Mining Tenements
- Stage 3 Pit Areas

NEW HOPE GROUP

SKM

NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 3-6 - Location of Water Management Structures

Scale 1:62,000 on A4

Projection: Australian Geodetic Datum – Zone 56 (AGD84)

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3.7.11. Control Strategy - Sediment and Erosion

The following sediment and erosion control strategies will continue to be implemented.

- All areas of disturbance on site are kept to an operational minimum and are controlled by strict clearance protocols, involving detailed mine planning within pit areas and a 'permit to disturb' system for the rest of the site.
- Progressive rehabilitation is conducted to help keep exposed areas to an operational minimum.
- Bed and bank stability is managed to minimise erosion and reduce sedimentation.
- Machinery is appropriately selected for each activity to maximise efficiency and minimise site disturbance.
- Contour ripping is carried out immediately after topsoil placement to maximise infiltration and minimise the potential for erosion.
- Topsoil is salvaged for use in rehabilitation.
- As required, water management structures are appropriately protected to prevent scouring, particularly in areas of potential high or concentrated flow (e.g. drains, spillways, etc.).
- Traffic is confined to maintained tracks and roads.
- Water management structures (e.g. dams, waterways, diversion banks, etc.) are installed and upgraded as necessary to adequately manage and control water quality and quantity on the revised Project site.
- Sediment and erosion control strategies from the Best Practice Erosion and Sediment Control Guideline (BPESC Guideline) (IECA 2008) may be applied as required to specific issues as they arise (e.g. during construction near water courses).

3.7.12. Control Strategy – Levees

The existing levee constructed to the west of the Lagoon Creek within ML 50216 will be maintained to protect the South Pit from flooding. As required, new permanent and temporary levees will be constructed within ML 50232 to protect infrastructure and mining areas from future Lagoon Creek flood events. The design criteria for each new levee will be based on a strict risk management protocol for safety and environmental factors. Levee stabilisation (e.g. grass cover) and flood flow protection (e.g. rock armouring) will also be carefully considered, particularly for the design and operation of the revised Project's permanent levees.

3.7.13. Control Strategy - Sewage Effluent

The current package Sewage Treatment Plant (STP) 1, which has a capacity for 130 equivalent persons, will remain in operation for the existing mining area. Effluent from STP 1 drains to the existing on-site sediment dam (SD1). NAC's current EA allows for the use of water from SD 1 for dust suppression purposes. However, to date this practice has not been a common occurrence due to the minimal discharge from STP 1 and the normally low water levels of SD 1. A licensed contractor maintains STP 1.

The revised Project will require construction and operation of a new STP (STP 2) located within the infrastructure area on ML 50232. The capacity of STP 2 is expected to be 150-200 equivalent persons.

Any reuse or disposal of treated sewage effluent will continue to follow the conditions of NAC's current and future EA to ensure protection of the health and wellbeing of people on and off the revised Project site. The STPs will be properly maintained to ensure efficient and environmentally safe operation.

3.7.14. Control Strategy – Lagoon Creek Crossing

Conservation along Lagoon Creek will be managed by NAC's EMS and be based on the CZMP in the EIS, Appendix J 6.

A single road crossing will need to be established over Lagoon Creek to facilitate the transport of the RoM coal to CHPP 3 from the Willeroo mining area. The creek crossing will be kept to an operational minimum and will be appropriately engineered to ensure environmental protection and continuity of stream flow.

- The following outlines mitigation measures that will be implemented where practicable:
- Construction work in creeks will be undertaken in dry weather and conditions of minimal or no flow.
- The construction of temporary waterway barriers (if/as required) during construction and operation will include the provision to transfer flows from upstream of the crossing to the downstream channel with minimal disturbance from the construction site and crossing.
- Weather conditions will be carefully monitored prior and during construction activities. Activities within creek crossings and erosion prone areas will not take place if rain and/or extreme weather conditions are forecasted.
- Activities in watercourses will be completed as quickly as operationally possible.
- Sedimentation fences and bunds will be used to contain excavated material during construction. In addition, excavated material will be stockpiled away from gully heads, active creek banks, bank erosion or other unstable areas.
- Sediment traps will be installed to retain sediment generated by activities in order to minimise water turbidity and reduce sediment loads.
- Local runoff from undisturbed areas will be routed clear of disturbed areas.
- Assessment of the integrity and effectiveness of erosion control measures will be undertaken at regular periods. In the first year following construction, this assessment routine will include monthly inspections and inspections after heavy rainfall. Further rehabilitation maintenance will be taken as necessary if erosion of reinstated areas is identified.
- Any excess material that is excavated, and is not waste, will be spread evenly within the floodplain, bed and banks of the watercourse in a manner that does not interfere with the flow of water.
- All fill used within a watercourse will be clean and free from potential pollutants.

- Where practical, structures (if required) will be aligned perpendicular to the direction of water flow.
- Where practicable, cuttings (if required) in watercourse banks will be aligned in the downstream direction.
- Where possible, structures (if required) will be aligned and shaped to minimise the potential for scour.
- Where possible, structures (if required) will be positioned within relatively straight reaches of watercourses rather than on bends.
- The design of structures (if required) will consider the general hydrologic and hydraulic characteristics of the site and potential impacts resulting from the presence of the structure.
- Appropriate measures will be implemented to minimise interference with the flow of water during high flow events and to minimise the potential for changes to flood heights and flood flow paths (e.g. through the use of appropriate sized pipe culverts for a road crossing).
- Where appropriate, measures will be implemented to prevent potential migration of adverse impacts upstream or downstream of the structure.
- As required, erosion control and prevention measures will be implemented (e.g. rock protection works to prevent bank erosion).
- Where possible, new infrastructure (if required) will be located in previously disturbed areas.
- Where possible, existing crossings will be used for temporary access during the construction or maintenance of infrastructure.
- Sediment and erosion control strategies from the BPESC Guideline may be applied as required during the construction of the proposed creek crossing.

3.7.15. Monitoring

Surface Water

Water sampling will follow the DEHP *Water Quality Sampling Manual* and water samples will be analysed by a National Association of Testing Authorities (NATA) accredited laboratory.

Currently, NAC conducts routine water monitoring of:

- any water leaving the Mine to determine if downstream water users are adversely affected by the Mine's operation;
- on-site water management structures to provide a continuous evaluation of water quality issues; and
- a series of groundwater piezometers located in the Great Artesian Basin, Walloon Coal Measures and Basalt aquifers located within MLs 50170 and 50216 and on surrounding properties to identify potential impacts to drawdown levels and water quality in those aquifers.

Monitoring results are interpreted on receipt and action taken to address any adverse results. Substantiated complaints in relation to water issues are dealt with promptly using NAC's complaint handling procedure. The surface water and groundwater monitoring regime will be expanded to cover the revised Project's development. As is currently practised, the Mine's current Monitoring Plan will be updated to reflect changes to the monitoring regime.

NAC's WRMP will be periodically updated to incorporate the progression in mining over the life of the revised Project. NAC's WRMP is an accompanying document to the Plan of Operations, and as a minimum, includes a summary of water management, current monitoring locations, a site plan, a schematic of the main water management structures and water discharge points, and a description of water use/recycling practices. A monthly evaluation and annual reporting of water monitoring results will be undertaken to check the effectiveness of the revised Project's water management.

After mining has ceased and decommissioning and rehabilitation works are complete, NAC will seek to relinquish the revised Project's mining leases. Prior to relinquishment, NAC will undertake the necessary investigations to ensure there are no long-term or residual impacts on the local groundwater regime as a result of the revised Project's previous mining activities.

3.7.16. Commitments

- An operational separation distance of approximately 150 m will be maintained from the edge of the mining pits to Lagoon Creek, which will include a 50 m conservation buffer where no mining activities will be undertaken.
- The current conservation zone, 50 m either side of Lagoon Creek, from the Mine will be extended for the revised Project to promote the re-establishment of the riparian zone. No mining activities will occur within the proposed conservation zone.
- Sediment dams, environmental dams, pit water storage and other water management structures (e.g. bunds and drains) will be used appropriately by the revised Project as per the WRMP.
- The revised Project's water management will be based on the separation and management of clean and dirty water catchments.
- Water capture within the revised Project's clean areas will be diverted around operational areas and where practical, allowed to discharge off site as part of normal overland flow.
- Water from disturbed areas within the revised Project site will be diverted to sediment dams for treatment and possible reuse as a supplementary supply for the revised Project's water requirement.
- Surface runoff from the revised Project's potentially contaminated areas, such as infrastructure areas, will receive additional levels of treatment (e.g. oil-water separators and bunding). Water captured by these devices will be preferentially reused on site, while captured oil will collected for recycling by a licensed contractor.
- Progressive rehabilitation will be undertaken as the revised Project's operational areas become available to reduce the amount of disturbed areas.
- Fuel, dangerous goods and hazardous chemicals will be managed as outlined by current standards, guidelines and in compliance with statutory requirements.
- Refuelling locations and handling of fuels will be undertaken away from all waterways including creeks and drainage paths.

- NAC's existing SOP for spills and emergency response procedures will be expanded to incorporate the revised Project. Spill recovery and containment equipment will be available when working adjacent to sensitive drainage paths and within other areas, such as workshops.

- NAC will continue to commit to investigating all legitimate surface water complaints, and if a genuine problem is identified, conduct immediate remediation measures and establish standard operating procedures to minimise the possibility of a reoccurrence of the original issue.

- NAC's current water quality monitoring program will be expanded to incorporate the operational and decommissioning phases of the revised Project. The program is designed to ensure the WRMP is effective, to demonstrate compliance with the Mine's strict discharge limits, and to ensure the downstream water quality (physico-chemical parameters, at a minimum) is not being adversely impacted. In general, the monitoring program will include the following actions.

    - Water quality will be measured upstream and downstream of the revised Project site. Basic water quality indicators (i.e. Salinity, pH, DO, EC, temperature) will continue to be monitored on a monthly basis, or when water is present, and heavy metals, nutrients, anions and cations monitored twice annually.

    - During any release event, the receiving water will be monitored upstream (50 m to 100 m upstream of the release point) and downstream (200 m downstream of the release point) locations. Water quality variables will include basic water quality indicators, suspended solids, heavy metals, nutrients, anions and cations.

    - Fuel, dangerous goods, hazardous chemicals and work shop wastes will be managed to ensure compliance with current industry standards and guidelines for safety and environmental protection. These management actions will focus on handling, storage, spill containment, emergency response, establishment of 'standard operating procedures' for key operational aspects, and development of a responsibility matrix for operational and reporting matters.

3.7.17. Proposed Environmental Authority Conditions: Schedule F – Surface Water

Conditions F1 – F16 are proposed transitional conditions, and F17 – F34 the revised conditions that will take effect within 2 years of the commencement of construction activities on MLA 50232.

PROPOSED TRANSITIONAL CONDITIONS

Release to waters

F1 Contaminants must not be released from the mine to any waters or the bed and banks of any waters other than treated/settled stormwater from environmental dam(s) that is in accordance with the contaminant release limits in Table F1 End of Pipe contaminant release limits.

Table F1 End of Pipe contaminant release limits

Parameter	Units	Minimum	Maximum
pH		6.0	9.0
Electrical Conductivity	µS/cm	-	1500
Total Suspended Solids	mg/L	-	100

F2 Notwithstanding condition F1, the holder of the environmental authority is authorised to release contaminants to waters of Lagoon or Spring Creek as defined in the Water Resources Management Plan in a manner that will ensure the level of electrical conductivity within the receiving waters will not exceed 1500 µs/cm at any time, 50 metres downstream from the discharge point, as a result of the discharge. Any release to waters must only occur where there is an existing minimum flow in receiving waters upstream of the discharge point to provide adequate dilution such that 1500 µs/cm is not exceeded outside the 50 m mixing zone.

F3 The holder of this authority must undertake monitoring at regular intervals during any release to waters at a point 50 m downstream of the discharge, to ensure that the level of electrical conductivity does not exceed 1500 µs/cm at that point. If monitoring indicates that 1500 µs/cm is exceeded, release of wastewaters must cease immediately.

F4 Monitoring of contaminant releases must be undertaken at the overflow from the environment dam(s) identified in Table F2 End of pipe monitoring locations and frequency and records kept, and comply with the quality characteristics and at the frequency specified in Table F1 End of Pipe contaminant release limits.

Table F2 End of pipe monitoring locations and frequency

Monitoring point		Latitude (GDA 94)	Longitude (GDA 94)	Monitoring Frequency	Monitoring parameters
ED1	Overflow point from Environmental Dam 1	27° 15' 40.56030" S	151° 41' 48.32659" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)
ED2	Overflow point from Environmental Dam 2	27° 16' 54.96167" S	151° 41' 36.83113" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	
ED3	Overflow point from Environmental Dam 3	27° 18' 29.40913" S	151° 42' 50.52694" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	
ED4	Overflow point from Environmental Dam 4	27° 17' 41.49436" S	151° 41' 33.60156" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	

Note: This does not apply to dams containing hazardous waste.
Note: Monitoring of receiving waters for discharges from Environmental Dams will be undertaken using Rising Stage Samplers where practical.

F5 Ambient water monitoring must be undertaken at locations and frequencies prescribed in Table F3 Receiving Water Monitoring Locations and Frequency and any mining activity release must comply with the contaminant limits defined in Table F1 End of Pipe contaminant release limits.

Table F3 Receiving Water Monitoring Locations and Frequency

Monitoring Point	Latitude (GDA 94)	Longitude (GDA 94)	Monitoring Frequency	Monitoring parameters
Lagoon Creek at a point upstream of mine (LCU1)	27º 17' 9.7728" S	151º 44' 23.136" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)
Lagoon Creek at two points downstream of mine (LCD1 & LCD2)	LCD1: 27º 18' 35.64" S	151º 43' 4.3536" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)
	LCD2: 27º 18' 37.36" S	151º 43' 1.8768" E		
Spring Creek at a point upstream of mine (SCU1)	27º 14' 18.7728" S	151º 41' 31.2864" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)
Spring Creek at a point downstream of mine (SCD1)	27º 14' 47.364" S	151º 40' 36.2028" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)
Downstream of Environmental Dam 2 and Environmental Dam 4 (AW20)	27° 17' 46.1228" S	151° 41' 16.0147" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)

Note 1: A monitoring point may also include a monitoring point requested by the administering authority in the event of release to waters.
Note 2: LCD1 is approx 70 m downstream of road (site AW4) and LCD2 is approx 50m downstream of LCD1.
Note 3: Receiving water monitoring points are shown on Figure 3-4.

Capacity of Tailings and Process Water Dams

F6 The design storage allowance on 1st November of each year for any dam containing hazardous waste constructed or operated within the operational land must comply with Table F4 Storage design for dams containing hazardous waste.

Table F4 Storage design[1] for dams containing hazardous waste

Dam Name	Design Storage Allowance[2] Critical Wet Period	Spillway Critical Design Storm[3]	Mandatory[4] Reporting Level
Tailings Storage Facility	0.1 AEP 4 month wet season plus process inputs for the 4 month wet season	0.001 AEP	0.01 AEP
Environmental Dam 2	*(Not Applicable[5])*	0.001 AEP	0.6 m below the spillway crest[6]
Inpit Tailings Storage Facility	0.1 AEP 4 month wet season plus process inputs for the 4 month wet season	0.001 AEP	0.01 AEP

NOTE: AEP means Annual Exceedance Probability.

1 Calculations are to be carried out in accordance with the "Site Water Management" guideline in the Technical Guidelines for Environmental Management of Exploration and Mining in Queensland – DME 1995.

2 The design storage allowance on 1st November of each year for any dam containing hazardous waste constructed within the operational land must be equivalent to the run-off from the critical wet period plus process inputs for the period. Process inputs refers to hazardous process waste and any water, which is being disposed of in the storage facility.

3 The critical storm has a duration that produces the peak discharge for the catchment

4 The level below spillway crest that can accommodate runoff from a 72 hour AEP storm, or the AEP wave allowance whichever level is lower.

5 The requirement for a design storage allowance for Environmental Dam 2 was removed by the administering authority following discussions with the project proponent on 22 August 2006.

6 This reporting level was nominated by the administering authority following discussions with the project proponent on 22 August 2006.

F7 The spillway for any dam containing hazardous waste, constructed within the operational land must be designed and maintained to withstand the peak flow from the spillway critical design storm in Table F4 Storage design for dams containing hazardous waste.

F8 The holder of the Environmental Authority must mark the mandatory reporting level defined in Table F4 Storage design for dams containing hazardous waste. on the spillway of all dams containing hazardous waste within the operational land.

F9 The holder of the Environmental Authority must notify the administering authority when the pondage level of the dam containing hazardous waste reaches the mandatory reporting level defined in Table F4 Storage design for dams containing hazardous waste.

F10 The holder of this Environmental Authority must implement measures to prevent access to any dams containing hazardous waste by all livestock and minimise access by native fauna.

F11 The base and walls of the Tailings Storage Facility, sediment dams and environmental dams must be constructed, installed and maintained:

(i) so as to minimise the likelihood of a release of contaminants through the bed or banks of the dam to any waters (including groundwater); and

(ii) so as to ensure the stability of the dam(s) construction.

F12 Construction of sediment dams other than any dams in the final rehabilitation landform must not occur on out of pit spoil dumps.

F13 Before construction of any dam containing hazardous waste, a person suitably qualified and experienced in dam engineering must: (a) prepare design plans which design the dam to an appropriate engineering standard; and (b) certify that the design plans meet an appropriate engineering standard and are consistent with the conditions in the environmental authority.

F14 Before construction of a dam containing hazardous waste, the holder of the environmental authority for the dam must submit the certified design plans to the administering authority, for review and comment.

F15 When the construction of the dam containing hazardous waste is complete, the holder of the environmental authority must: (a) obtain certification from a person suitably qualified and experienced in dam construction that the construction of the dam is either in accordance with or generally in accordance with the certified design plans; and (b) submit the construction certification to the administering authority.

F16 The holder of the environmental authority must construct and operate the dam in accordance with the certified: (a) design plans; (b) operational plans; and (c) conditions contained in the environmental authority, in order to prevent or minimise environmental harm.

PROPOSED REVISED CONDITIONS

Contaminant release

F17 Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters as a result of the authorised mining activities, except as permitted under the conditions of this environmental authority.

F18 Unless otherwise permitted under the conditions of this environmental authority, the release of mine affected water to waters must only occur from the release points specified in Table F5 - Mine affected water release points, sources and receiving waters.

Table F5 Mine affected water release points, sources and receiving waters

Release Point (RP)	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)	Mine Affected Water Source and Location	Monitoring Point	Receiving waters description
ED1	27° 15' 40.56030" S	151° 41' 48.32659" E	Environmental Dam 1	Overflow point from Environmental Dam 1	Spring Creek
ED2	27° 16' 54.96167" S	151° 41' 36.83113" E	Environmental Dam 2	Overflow point from Environmental Dam 2	Spring Creek
ED3	27 ° 18' 29.40913" S	151 ° 42' 50.52694" E	Environmental Dam 3	Overflow point from Environmental Dam 3	Lagoon Creek
ED4	27 ° 17' 41.49436" S	151 ° 41' 33.60156" E	Environmental Dam 4	Overflow point from Environmental Dam 4	Spring Creek
ED5	TBC	TBC	Environmental Dam 5	Overflow point from Environmental Dam 5	Lagoon Creek
ED6	TBC	TBC	Environmental Dam 6	Overflow point from Environmental Dam 6	Lagoon Creek
ED7	TBC	TBC	Environmental Dam 7	Overflow point from Environmental Dam 7	Lagoon Creek

F19 The release of mine affected water to waters in accordance with condition F2 must not exceed the release limits stated in Table F6 Mine affected water release limits when measured at the monitoring points specified in Table F5 Mine affected water release points, sources and receiving waters for each quality characteristic.

Table F6 Mine affected water release limits

Quality Characteristic	Release Limits	Monitoring Frequency	Comment
Electrical Conductivity (µS/cm)	1500	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
pH (pH unit)	6.0 (minimum) 9.0 (maximum)	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
Total Suspended Solids (mg/L)	100		

F20 The release of mine affected water to waters from the release points must be monitored at the locations specified in Table F5 Mine affected water release points, sources

and receiving waters at the frequency specified in Table F6 Mine affected water release limits. When circumstances prevent the monitoring required by conditions F3 and F4, during or following severe weather events, the administering authority must be notified within (48) hours.

Mine Affected Water Release Events

F21 The holder of the environmental authority is authorised to release contaminants to waters of Lagoon or Spring Creek in a manner that will ensure the level of electrical conductivity within the receiving waters will not exceed 1500 µs/cm at any time, 50 m downstream from the discharge point, as a result of the discharge. Any release to waters must only occur where there is an existing minimum flow in receiving waters upstream of the discharge point to provide adequate dilution such that 1500 µs/cm is not exceeded outside the 50 m mixing zone.

F22 The holder of this authority must undertake monitoring at regular intervals during any release to waters at a point 50 metres downstream of the discharge, to ensure that the level of electrical conductivity does not exceed the release limits shown in Table F7 - Mine affected water release during flow events. If monitoring indicates that 1500 µs/cm is exceeded, release of wastewaters must cease immediately.

Table F7 - Mine affected water release during flow events

Receiving Waters	Release Points	Gauging Station (GDA94)	Gauging Station (GDA94)	Receiving Water Flow Criteria for Discharge (ML/d)	Approx. % of Lagoon Creek Streamflow	Max. release rate	Electrical Conductivity Release Limits (µs/cm)
Lagoon Creek	ED3, ED5, ED6, ED7	27° 18' 29.40913" S TBC	151° 42' 50.52694" E TBC	Low Flow < 1.24 ML/d for a period of 28 days after natural flow events that exceed 4 ML/d	< 20%	<1.5 ML/d	700
				Medium Flow (low) > 4ML/d	> 20%	<1.5 ML/d	1,500
						<0.7 ML/d	2,500
						<0.5 ML/d	3,500
				Medium Flow (high) > 11.5 ML/d	> 40%	<4.2 ML/d	1,500
						<2 ML/d	2,500
						<1.3 ML/d	3,500
				High Flow > 35 ML/d	> 60%	<12.5 ML/d	1,500

Receiving Waters	Release Points	Gauging Station (GDA94)	Gauging Station (GDA94)	Receiving Water Flow Criteria for Discharge (ML/d)	Approx. % of Lagoon Creek Streamflow	Max. release rate	Electrical Conductivity Release Limits (µs/cm)
						<6 ML/d	2,500
						<6 ML/d	3,500
						<2.8 ML/d	4,500
						<1.7 ML/d	7,500
				Very High Flow > 66 ML/d	> 80 %	<4.5 ML/d	4,500

F23 The daily quantity of mine affected water released from each release point must be measured and recorded.

F24 Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build-up of sediment in such waters.

Notification of Release Event

F25 The environmental authority holder must notify the administering authority as soon as practicable and no later than 24 hours after commencing to release mine affected water to the receiving environment. Notification must include the submission of written advice to the administering authority of the following information:

a) release commencement date/time
b) details regarding the compliance of the release with the conditions of Department Interest: Water of this environmental authority (that is, contaminant limits, natural flow, discharge volume)
c) release point/s
d) release rate
e) release salinity
f) receiving water/s including the natural flow rate.

Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.

F26 The environmental authority holder must notify the administering authority as soon as practicable and nominally no later than 24 hours after cessation of a release event of the cessation of a release notified under Condition F25 and within 28 days provide the following information in writing:

a) release cessation date/time
b) natural flow rate in receiving water
c) volume of water released

d) details regarding the compliance of the release with the conditions of Department Interest; Water of this environmental authority (i.e. contaminant limits, natural flow, discharge volume)
e) all in-situ water quality monitoring results
f) any other matters pertinent to the water release event.

Note: Successive or intermittent releases occurring within 24 hours of the cessation of any individual release can be considered part of a single release event and do not require individual notification for the purpose of compliance with conditions F25 and F26, provided the relevant details of the release are included within the notification provided in accordance with conditions F25 and F26.

Notification of Release Event Exeedance

F27 If the release limits defined in Table F2 - Mine affected water release limits are exceeded, the holder of the environmental authority must notify the administering authority within 24 hours of receiving the results.

F28 The environmental authority holder must, within 28 days of a release that is not compliant with the conditions of this environmental authority, provide a report to the administering authority detailing:

a) the reason for the release
b) the location of the release
c) the total volume of the release and which (if any) part of this volume was non-compliant
d) the total duration of the release and which (if any) part of this period was non-compliant
e) all water quality monitoring results (including all laboratory analyses)
f) identification of any environmental harm as a result of the non-compliance
g) all calculations
h) any other matters pertinent to the water release event.

Receiving Environment Monitoring and Contaminant Trigger Levels

F29 The quality of the receiving waters must be monitored at the locations specified in Table F9 - Receiving water upstream background sites and downstream monitoring points for each quality characteristic and at the monitoring frequency stated in Table F8 - Receiving waters contaminant trigger levels.

Table F8 - Receiving waters contaminant trigger levels

Quality Characteristic	Trigger Level	Monitoring Frequency
pH	6.0 – 9.0	Daily during the release
Electrical Conductivity (µS/cm)	700	
Total Suspended solids (mg/L)	To Be Determined. Turbidity may be required to assess ecosystems impacts and can provide instantaneous results.	
Sulphate (SO_4^{2-}) (mg/L)	250 (Protection of drinking water Environmental Value)	

Table F9 - Receiving water upstream background sites and downstream monitoring points

Monitoring Point	Receiving Waters Location Description	Latitude (GDA 94)	Longitude (GDA 94)
Upstream Background Monitoring Points			
LCU1	Lagoon Creek at a point upstream of mine	27°18'9.7728"S	151°44'23.136"E
SCU1	Spring Creek at a point upstream of mine	27º 14'18.7728" S	151º 41' 31.2864" E
Downstream Monitoring Points			
LCD1 & LCD2	Lagoon Creek at two points downstream of mine	LCD1: 27^0 18' 35.64" S	151^0 43' 4.3536" E
		LCD2: 27^0 18' 37.36" S	151^0 43' 1.8768" E
SCD1	Spring Creek at a point downstream of mine	27º 14' 47.364" S	151º 40' 36.2028" E
AW20	Downstream of Environmental Dam 2 and Environmental Dam 4	27° 17' 46.1228" S	151° 41' 16.0147" E
AH2	Located approx. 5 km downstream of the downstream boundary of the revised Project mining area.	27° 21' 0.365" S	151° 38' 14.965" E
AE4	Located downstream of the existing mining operations and immediately adjacent to the northern extent of the Manning Vale East and Willeroo pits.	27°19'2.91"S	151°42'20.47"E
DS1	Located at the downstream boundary of the revised Project mining area.	27°19'26.68"S	151°41'7.02"E

Table F5 - Receiving water upstream background sites and downstream monitoring points notes:

a) The upstream monitoring point should be within 1km of the release point.
b) The downstream point should not be greater than 250m from the release point.
c) The data from background monitoring points must not be used where they are affected by releases from other mines.

F30 If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in Table F8 - Receiving waters contaminant trigger levels during a release event the environmental authority holder must compare the downstream results to the upstream results in the receiving waters and:

a) where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or

b) where the downstream results exceed the upstream results complete an investigation into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining

   1. details of the investigations carried out

   2. actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with F30 b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

Water reuse

F31 Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third party (with the consent of the third party).

Annual Water Monitoring Reporting

F32 The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format:

a) the date on which the sample was taken
b) the time at which the sample was taken
c) the monitoring point at which the sample was taken
d) the measured or estimated daily quantity of mine affected water released from all release points
e) the release flow rate at the time of sampling for each release point
f) the results of all monitoring and details of any exceedances of the conditions of this environmental authority
g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

Temporary Interference with waterways

F33 Destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Natural Resources and Mines (or its successor) Guideline – Activities in a Watercourse, Lake or Spring associated with Mining Activities.

END OF SCHEDULE F CONDITIONS

3.7.18. Proposed Environmental Authority Conditions: Schedule G – Sewage treatment

Sewage Effluent Control

G1 All effluent released from the treatment plant must be monitored at the frequency and for the parameters specified in Table G1 - Sewage effluent targets for dust suppression and irrigation.

Table G1 Sewage Effluent Quality Targets for Dust Suppression and Irrigation

Quality characteristics	Release limit	Units	Limit type	Monitoring frequency
5-day Biochemical Oxygen Demand (uninhibited)	<20	mg/L	max	Quarterly
pH	6.0 – 9.0		range	Quarterly
Faecal Coliforms, based on the average of a minimum of five samples collected	<1000 c.f.u.	Colonies per 100 mL	max	Quarterly

G2 Sewage effluent used for dust suppression or irrigation must not exceed sewage effluent release limits defined in Table G1 - Sewage Effluent Quality Targets for Dust Suppression and Irrigation.

G3 Sewage effluent used for dust suppression or irrigation must not cause spray drift or over spray to any sensitive place, other than the active mining areas within ML 50176, ML 50216 and other mining tenements regulated by this Environmental Authority.

G4 Subject to condition G5, sewage effluent from sewage treatment facilities must be reused or evaporated and must not be directly released from the sewage treatment plant to any water way or drainage line.

G5 In periods of wet weather or following wet weather, when no irrigation of effluent is reasonably practicable and when effluent storage ponds are full, the release of effluent to waters is permitted from the overflow point from Environmental Dam 2 and in accordance with the release limits in Table G1 - Sewage Effluent Quality Targets for Dust Suppression and Irrigation.

G6 The holder of this Environmental Authority must ensure that irrigation of effluent is carried out in such a manner that prevents and/or minimises environmental harm.

G7 The holder of this Environmental Authority is authorised to accept treated wastewater from the Wetalla Wastewater Reclamation Facility.

END OF SCHEDULE G CONDITIONS

3.8. Land Management

3.8.1. Background

The revised Project site has a history of grazing and small lot cropping. Allotment and paddock sizes are relatively small and access is generally restricted by a mosaic of boundary and paddock fencing. Nearby land uses include pig farming, dairying, grain storage and various rural homestead properties. Predominant land use patterns of the revised Project site have remained cash and forage cropping in addition to grazing of improved pastures.

Much of the revised Project site has long been cleared of its original vegetation due to agricultural production, although localised areas of original remnant vegetation remain alongside Lagoon Creek, relic alluvial plains and upland low hills. The revised Project site has been subject to long periods of continued dry years and unreliable rainfall since the early 1990's.

The following supporting documents should be used in conjunction with this EM Plan for detailed information relevant to this section:

- Topsoil Management Plan
- Final Land Use and Rehabilitation Plan
- Conservation Management Plan;
- Pest and Weed management Plan;
- Bluegrass Offset Management Plan; and
- Tailings Storage Facility Management Plans

Soils

Twelve soil types have been recorded within the revised project and surrounding area including two variants. The variants in this survey are for the high quality agricultural soil B1 and cover situations of reduced soil depth (shallow variant) or areas of increasing slope (upland variant). These variants are of minor occurrence but are noted as they have slightly reduced agricultural suitability.

All soils are considered to be suitable for grazing on improved pastures with the exception of some on the upper slopes where steeper soil types exist. Harris et al (1999) described the revised Project site as having a range of fertile soils with a desirable climate which is capable of growing a wide variety of crops and producing quality livestock.

It is extremely unlikely that the revised Project will be impacted by the effects of acid sulphate soils at any stage throughout its life. An ASS assessment in accordance with the QASSIT Technical Manual and the SPP has therefore not been completed for the revised Project.

Land Use and Suitability

It is anticipated that there will be a net reduction in the land suitability rating as a result of the revised Project. The suitability of post-mine features for cropping and grazing purposes is constrained by the slope angle, the nature of soil cover and altered moisture profile and subsoil quality. A return to grazing is entirely feasible for much of the revised Project site post-mining, as demonstrated by successful scientific grazing trials by APC on rehabilitated land.

All soils are considered to be suitable for grazing on improved pastures with the exception of some on the upper slopes where steeper soil types exist.

The surrounding area supports grazing industries for beef and dairy production. Grazing is predominately based on native pastures and also occurs on mixed farming enterprises combining grain and fodder production. A number of other minor industries including piggeries, horticulture, forage and cash cropping, and animal studs are present within the Study area due to the diversity of soils, proximity to markets and a favorable climate. Cropping for grain production is one of the largest agricultural land uses and industries within the broader Study area with cultivation for cropping and/or sown pasture carried out to some extent.

Cropping lands in suitability classes 1 to 3 are considered well suited to that particular use as the benefits should outweigh the inputs required to initiate and maintain production. Suitability class 4 is marginal for crops based on the extent of inputs required to initiate production. Suitability class 5 has severe limitations based on the inputs required and therefore would not justify a cropping use.

Suitability classes 1 to 3 for grazing are considered suitable for significant pasture improvement. While suitability class 4 offers marginal potential for pasture improvement, suitability class 5 is not suitable for improvement and is therefore restricted to grazing of native pastures with low productivity. Table 3-19 shows the suitability classification for non-irrigated crops and grazing for each soil type within the revised Project site.

Table 3-19 Major Limitations and Land Suitability Class – Pre Mining

	DRYLAND CROPPING		GRAZING	
Soil Type	**Major Limitations and severity**	**Suitability class**	**Major Limitations and severity**	**Suitability class**
A1	Plant water availability(2-3) Susceptibility to erosion(2) Soil physical factors(2) Salinity(2) Nutrient deficiency(2) Rockiness(1) Wetness(3) Flooding(1) Workability(2)	2	Plant water availability(2) Susceptibility to erosion(1) Soil physical factors(2) Salinity(2) Nutrient deficiency(1)	2
A2	Plant water availability(3-4) Susceptibility to erosion(2) Soil physical factors(3) Salinity(2) Nutrient deficiency(2) Rockiness(1) Wetness(2) Flooding(2) Workability(3)	3	Plant water availability(3) Susceptibility to erosion(2) Soil physical factors(2) Salinity(2) Nutrient deficiency(2)	3
A3	Plant water availability(5) Susceptibility to erosion(3) Soil physical factors(4) Salinity(2) Nutrient deficiency(3) Rockiness(1) Wetness(3) Flooding(2)	4	Plant water availability(4) Susceptibility to erosion(2) Soil physical factors(3) Salinity(2) Nutrient deficiency(2)	4

	DRYLAND CROPPING		GRAZING	
Soil Type	**Major Limitations and severity**	**Suitability class**	**Major Limitations and severity**	**Suitability class**
	Workability(3)			
A4	Plant water availability(5) Susceptibility to erosion(3) Soil physical factors(3) Salinity(2) Nutrient deficiency(3) Rockiness(2) Wetness(2) Flooding(2) Workability(2)	5	Plant water availability(4) Susceptibility to erosion(2) Soil physical factors(2) Salinity(2) Nutrient deficiency(2)	4
A5	Plant water availability(2) Topography(5) Susceptibility to erosion(2) Soil physical factors(1) Salinity(1) Nutrient deficiency(1) Wetness(4) Flooding(4) Workability(2)	5	Plant water availability(1) Susceptibility to erosion(2) Soil physical factors(1) Salinity(1) Nutrient deficiency(1)	2
B1 B1v (steeper & shallow variants)	Plant water availability(2) Susceptibility to erosion(2-3) Soil physical factors(1) Salinity(1) Nutrient deficiency(1) Rockiness(1) Wetness(1) Flooding(1) Workability(1)	B1 – 2 B1v - 3	Plant water availability(1) Susceptibility to erosion(2) Soil physical factors(1) Salinity(1) Nutrient deficiency(1)	2
B2	Plant water availability(2) Susceptibility to erosion(2) Soil physical factors(1) Salinity(1) Nutrient deficiency(1) Rockiness(1) Wetness(1) Flooding(1) Workability(1)	2	Plant water availability(1) Susceptibility to erosion(1) Soil physical factors(1) Salinity(1) Nutrient deficiency(1)	1
B3	Plant water availability(4) Susceptibility to erosion(3) Soil physical factors(2) Salinity(3) Nutrient deficiency(2) Rockiness(1) Wetness(1) Flooding(1) Workability(1)	4	Plant water availability(2) Susceptibility to erosion(2) Soil physical factors(1) Salinity(1) Nutrient deficiency(1)	2
B4	Plant water availability(4) Susceptibility to erosion(4) Soil physical factors(3) Salinity(2)	4	Plant water availability(3) Susceptibility to erosion(3) Soil physical factors(2) Salinity(1)	3

	DRYLAND CROPPING		GRAZING	
Soil Type	**Major Limitations and severity**	**Suitability class**	**Major Limitations and severity**	**Suitability class**
	Nutrient deficiency(2) Rockiness(1) Wetness(1) Flooding(1) Workability(1)		Nutrient deficiency(1)	
BA1	Plant water availability(1) Susceptibility to erosion(3) Soil physical factors(2) Salinity(2) Nutrient deficiency(1) Rockiness(1) Wetness(1) Flooding(1) Workability(1)	3	Plant water availability(1) Susceptibility to erosion(2) Soil physical factors(1) Salinity(1) Nutrient deficiency(1)	2
BA2	Plant water availability(2) Susceptibility to erosion(2) Soil physical factors(2) Salinity(1) Nutrient efficiency(1) Rockiness(2) Wetness(1) Flooding(1) Workability(1)	2	Plant water availability(1) Susceptibility to erosion(1) Soil physical factors(1) Salinity(1) Nutrient deficiency(1)	1
BA3	Plant water availability(5) Susceptibility to erosion(4) Soil physical factors(4) Salinity(1) Nutrient deficiency(2) Rockiness(3) Wetness(2) Flooding(1) Workability(5)	5	Plant water availability(3) Susceptibility to erosion(4) Soil physical factors(2) Salinity(1) Nutrient deficiency(1)	4

Good Quality Agricultural Land

The TRC Planning Scheme shows that the revised Project site is Good Quality Agricultural Land (GQAL) based on the classifications shown in Table 3-20.

Table 3-20 Agricultural Land Classification

Class	Description
Class A Crop land	Land suitable for current and potential crops with limitations to production which range from non to moderate levels.
Class B Limited Crop Land	Land that is marginal for current and potential crops due to severe limitations; and suitable for pastures. Engineering and/or agronomic improvements may be required before the land is considered suitable for cropping.
Class C Pasture Land	Land suitable only for improved or native pastures due to limitations, which preclude continuous cultivation for crop production; but some areas, may tolerate a short period of ground disturbance for pasture establishment. Sub categories are as follows: ▪ C1 Land suitable for improved pastures. In some circumstances may be considered as good quality agricultural land. ▪ C2 Land suitable for native pastures. ▪ C3 Land suitable for limited grazing of native pastures.
Class D Non-agricultural Land	Land not suitable for agricultural uses due to extreme limitations. This may be undisturbed land with significant habitat, conservation and/or catchment values or land that may be unsuitable because of very steep slopes, shallow soils, rock outcrop or poor drainage.

Source: DLGP and DPI, 1993

The revised Project will remove some areas of GQAL and will impact on Class A GQAL with existing cropping use. Class B GQAL will be impacted upon. However, Class B GQAL is considered to be marginal at best for cropping and more suited to grazing use. It should be noted that the scale of existing GQAL mapping is coarse.

In line with The Planning Guidelines (DLGP and DPI, 1993), the higher intensity information of this assessment has formed the basis for more detailed GQAL assessments as shown in Table 3-21.

Table 3-21 GQAL Categories for Each Soil Type

Soil map units	Cropping suitability class	Grazing suitability class	Major limitations	GQAL Land class	Area (ha)
A1	2	3	Plant water availability	Class A – cropping land	2,740
B1	2	2	Plant water availability Susceptibility to erosion		
B2	2	1	Plant water availability Susceptibility to erosion		
Ba1	3	2	Susceptibility to erosion Soil physical factors		
Ba2	2	1	Plant water availability Susceptibility to erosion		
A2	3	3	Plant water availability Soil physical factors	Class B – Limited crop land suitable to pastures	1,729
B3	4	2	Plant water availability Susceptibility to erosion Salinity		
B4	4	3	Plant water availability Susceptibility to erosion Soil physical factors		
A4	5	4	Plant water availability Soil physical factors Nutrient availability		
A3	4	4	Plant water availability Soil physical factors	Class C - Land suitable for improved or native pastures.	600
A5	5	2	Topography Wetness Flooding		
Ba3	5	4	Plant water availability Susceptibility to erosion Soil physical factors Rockiness / workability		

Site Contamination

During the Stage 2 EIS process, discussions were held with local landholders, the then QDPI and the former Rosalie Shire Council regarding the extent of known contaminated sites with the Study area. At the time, it was reported that there were no plunge animal dips present within the Study area as it had been free of ticks for decades.

The remains of the old underground coal mines at Acland and Balgowan are unlikely to be significantly contaminated as coal was hand sorted with no major coal washing facilities available at the time (Ison, 1999). However, localised contamination may exist below greasing points on old machinery installations. Contamination may have occurred in localised areas from agricultural chemicals such as herbicides stored for agricultural activities. However, it is unlikely that any contamination of this kind would be significant.

A search of the Queensland Environmental Management Register (EMR) and the Contaminated Land Register (CLR) has been conducted for the revised Project. The sites which are listed on the EMR are summarised in Table 3-22.

Table 3-22 EMR and CLR Search Results

Lot	Plan	EMR Result	Location and Description
62	AG2962	Landfill	Acland, former Acland Tip
1	SP162572	Petrol Product/Oil Storage	JRLF

Former Acland Tip

The former Acland Tip (the Tip) is located approximately 1.5 km east of Acland near the intersection of Acland Road and Wileroo Mine Road and was used as a tip from 1977 to 2008 and the majority of wastes disposed were non-putrescible, mainly comprising building waste and domestic waste. Wastes were disposed in pits which were excavated at the Tip on an as required basis. As wastes were disposed, they were progressively compacted and covered with soil.

Based on an investigation in 2009, the Tip contains approximately 61,500 m^3 of soil and waste material. Wastes observed were found to be mainly comprised of solid general waste such as plastics, glass, metal, textiles, construction/demolition waste (e.g. brick, wood, and concrete), and domestic waste. Regulated waste were observed infrequently and included asbestos cement sheeting, disused pesticide containers, empty fuel cans, tyres, and oily substances.

Groundwater and leachate was not encountered on the site during the investigation. Samples of cover material, soil and waste material and underlying natural ground were collected. The majority of samples had low concentrations of potential contaminants such as metals, petroleum based hydrocarbons, and pesticides.

1) In order to mine the resource beneath the Tip, the material will need to be relocated to an appropriate waste disposal facility. The preferred strategy for the remediation of the Tip is to relocate the soil and waste material to an engineered containment cell within one of the existing mine pits. If this strategy is not feasible, the soil and waste material will be disposed at an appropriate landfill facility.

3.8.2. Environmental Values

The revised Project's environmental values of the land that are to be protected or enhanced are:

- a beneficial post mining land use – grazing using a self-sustaining vegetation community comprising appropriate exotic/improved pasture species and local native tree, shrub and grass species; and
- a safe, stable, non-polluting landform able to support the agreed post mine land use.

3.8.3. Potential Impacts on the Environmental Value

The revised Project's activities with potential to impact on the environmental values of land are:

- land disturbance including clearing of vegetation, stripping and stockpiling of topsoil causing potential erosion and degradation of topsoil resources;
- general design and construction including the road diversion, rail loop, access tracks, haul roads, infrastructure, and elevated waste rock dumps;

- relocation of the Acland tip;
- disposal of rejects and tailings within a tailings dam or voids;
- creation of final voids; and
- potential land contamination from the spillage of hazardous materials (e.g. hydrocarbons).

Land Use and Suitability

Factors influencing changes in land suitability include changed physical, chemical and biological properties of soil, changes in the slope and slope length, changes in soil depth and the quality of the underlying spoil. Given that the revised Project will involve open cut mining, the potential to affect land suitability is significant. However, a return to previous uses such as cropping or grazing are feasible providing final landforms and surface treatments align with such uses sufficient for a sustainable basis and the designated post-mining land use option.

Based on a conservative assessment, it is anticipated that there will be a significant net reduction in the land suitability rating as a result of the revised Project. The underlying objectives of the revised Project's rehabilitation program (Section 3.9) are aimed at ensuring:

- a beneficial post-mining land use;
- stable landforms; and
- the preservation of downstream water quality.

3.8.4. Proposed Environmental Protection Objective

The objectives to protect the environmental values of the mined land are to work towards rehabilitation and decommissioning (see Section 3.9) by:

- providing a stable, non-polluting landform;
- providing an agreed beneficial post mining land use such as grazing using a self-sustaining vegetation community comprising appropriate exotic/improved pasture species and local native tree, shrub and grass species;
- controlling the introduction and spread of declared plants and major environmental weeds; and
- protecting remnant and non-remnant native vegetation outside planned operational areas within the revised Project's boundaries.

3.8.5. Performance Criteria

The performance criteria for land management are:

- compliance with the requirements of the amended EA No. EPML00335713;
- no unauthorised off-site impacts; and
- development of stable, non-eroding landforms within the former mined land.

3.8.6. Control Strategies

Land will be managed by NAC's EMS based on the Topsoil Management Plan in EIS, Appendix J3, CZMP in EIS Appendix J6, and the Pest and Weed Management Plan in EIS, Appendix J9.

Topsoil Management

Suitable topsoil will be stripped for use in the rehabilitation program. The topsoil will either be stockpiled until suitable re-contoured areas are available, or directly returned immediately across the areas to be rehabilitated.

There is a sufficient volume of topsoil available for rehabilitation activities at the revised Project site. Topsoil stripping is necessary wherever land is to be mined, required for out-of-pit dumps or required for infrastructure such as haul roads, hardstands and/or access roads. The topsoil volume required for salvage is dependent on the quality and depth of the resource and the intended final land use of the rehabilitated areas. The actual depth of stripping is dependent on the particular soil types within a given area.

Overall, the revised Project site includes large reserves of topsoil that may be used in mine rehabilitation programs. Table 3-23 provides summary of the soil types present on the revised Project site and their topsoil strip depth. In general, all soils used in rehabilitation should be applied to no less than 250 mm. This measure provides sufficient depth for re-ripping, should follow-up maintenance work be required.

Table 3-23 Topsoil Stripping Summary

Soil Type	Description	Recommendations and Comments	Typical Topsoil Strip depth
A1	Old Alluvial Plains of dark grey brown deep well-structured cracking clays over dark grey brown heavy clay subsoil	These soils are heavy with good fertility. Stripping depth may extend to 70 cm however most sites show increasing salt by 60 cm depth. Magnesium dominates calcium in the cation exchange and ESP's are usually in the slightly to moderately dispersive range so they are not suited to application on sloping sites due to a high erosion potential. However these soils have very high moisture storage potential and readily germinate and support both grasses and native trees.	50 cm
A2	Deep Grey brown uniform clay over hard yellowish brown alkaline subsoils	These soils are lighter clays than A1 with greater proportions of silt and fine sand. Fertility is quite good and the medium clay will facilitate good water holding capacity. As with A1, high salinity occurs after 50 cm depth, magnesium dominates the cations, sodic dispersion potential is high and mechanical dispersion tests (R1) suggest structural problems. Stripping depth should not exceed 50 cm and they are not suited to application on sloping sites due to a high erosion potential. These soils can benefit rehabilitation works if used such that erosion potential is	40 cm

Soil Type	Description	Recommendations and Comments	Typical Topsoil Strip depth
		minimised.	
A3	Old thin sandy alluvial plain on alkaline coarse structured dark brown subsoil.	Similar to A2 but with better physical conditions as calcium dominates the exchange capacity over magnesium. Also clay content is higher but ESP is considered 'dispersive'. As with other alluvial soils, its use in rehabilitation should be confined to lower sloping areas to avoid excessive erosion.	40 cm
A4	Fine thin dark brown sandy loam over hard reddish brown clay subsoil.	Poor soil with a restricted reuse potential on rehabilitation. The hard setting fine sandy loam A horizon has reuse potential but the high fine sand content in addition to 23% clay will cause sealing, low infiltration leading to water shedding. The soil also has low fertility. The clayey subsoil is very poorly structured and highly dispersive and should be avoided completely. Care should be taken not to include the B horizon into stripped topsoil. It is recommended that stripping of this soil be avoided in favour of deeper stripping on other better soils if possible.	10 – 15 cm
A5	Recent brown alluvia on Lagoon Creek	Minor unit but can be stripped to at least 40 cm to a possible maximum of 60 cm.	50 cm
B1 and variants	Deep, dark grey brown well structured, self-mulching and cracking softwood scrub soils on undulating plains.	These soils are very well structured medium clays with no real problems to 90 cm depth (or parent rock encountered). The entire profile is non-saline or sodic, calcium dominated cation exchange and desirable pH range. Fertility is high and particle size distribution is such that good infiltration and water holding capacity will occur. Stripping depth can exceed 70 cm up to a maximum of 100 cm. These soils are high quality suited to all areas of minesite rehabilitation.	70 - 90 cm
B2	Dark brown cracking self-mulching Brigalow and Belah clays over firm red brown clay sub soils	These soils are similar to B1 in that they are good quality and highly productive. The main difference is elevated salt in the red clay B horizon and, depending on the depth to this horizon; they may be saline below 40 cm depth. The surface layer is very well structured sandy medium clay with no significant physical problems. Fertility is high and particle size distribution is such that good infiltration and water holding capacity will occur. Stripping depth should not exceed 40 cm unless further conductivity tests indicate otherwise. The surface 40 cm are high quality suited to all areas of minesite rehabilitation.	40 cm

Soil Type	Description	Recommendations and Comments	Typical Topsoil Strip depth
B3	Thin dark cracking and duplex dark grey soils over hard yellowish brown alkaline subsoils on sandstone.	These soils can be managed in an identical manner to B2 in that the surface 40 cm is high quality clay but increasing salinity and dispersion potential occurs below this depth. The surface layer is a light sandy medium clay with only minor significant physical problems and fertility is quite good. Stripping depth should not exceed 40 cm unless further conductivity tests indicate otherwise. The surface 40 cm is suited to all areas of minesite rehabilitation.	40 cm
B4	Thin red brown sandy clay loam or light clays on hard alkaline red brown clay subsoil on mixed sediments.	These soils may have a tendency to set hard and seal (due to high fine sand content in association with moderate clay content) and fairly low fertility. Soils are non-saline or sodic throughout showing strong basaltic influence. When used on rehabilitation, consideration to the sealing tendency and high erosion potential on sloping land should be considered.	40 cm
BA1	Fine brown light clay over well-structured red brown medium clays over hard brown clay or weathered basalt	Highly productive good quality soil. The whole soil profile to weathered basalt may be used in rehabilitation programs. The lighter textured surface horizon would be better suited to more sloping areas of rehabilitation than heavier clays such as BA2.	70 – 90 cm
BA2	Thick black cracking and mulching medium clay on fresh and weathered basalt	As for BA1 except clay content is higher in the upper soil layer. May be stripped to the basalt bedrock if necessary.	60 – 70 cm
BA3	Shallow generally basaltic rocky upland areas	Any soil that can be physically stripped is suitable however quantities are low and usually very rocky.	0 – 10 cm

As the mine pits expand, there will be more opportunity to strip topsoil and apply it directly to re-contoured areas, thus avoiding topsoil stockpiling. Freshly stripped and placed topsoil retains more viable seed, micro-organisms and nutrients than stockpiled soil. Vegetation establishment is generally improved by the direct return of topsoil and is considered 'best practice' topsoil management.

Stockpiles will be managed so that:

- storage time is minimised;
- soil types with significantly different properties will be stockpiled separately;
- locations are recorded using GPS and data recorded relating to the soil type and volume; and

- stockpile surfaces are ripped and seeded (if natural revegetation does not provide adequate cover).

Erosion Control

Progressive rehabilitation will be undertaken to stabilise disturbed areas as quickly as practical and to limit erosion. The design parameters for the construction of erosion control work such as rock armoured or grass lined waterways will be in accordance with established principles for engineering and soil conservation earthworks. A number of variables are included such as time of concentration, rainfall intensity, erosivity, gradient, scour velocities and flow estimations. Sediment and hydraulic controls covered in Section 3.7.10 also apply to Land.

The erosion control measures to be employed throughout the life of the revised Project are summarised in Table 3-24.

Table 3-24 Erosion Causes and Control

Area	Control Measure
Cleared Land	▪ restrict clearing to areas essential for the works ▪ windrow vegetation debris along the contour ▪ minimise length of time soil is exposed ▪ divert run-off from undisturbed areas away from the works ▪ direct run-off from cleared areas to sediment dam
Exposed Subsoils	▪ minimise length of time subsoil is exposed ▪ direct run-off from exposed areas to sediment dam(s)
Active Pit	▪ divert run-off from undisturbed areas away from pit ▪ pump rainfall run-off from pit only to the environmental dams for future water recycling purposes or use directly from a sump for dust suppression purposes
Active Waste Rock dump	▪ direct all run-off from dumps to sediment dams ▪ avoid placement of sodic waste material on final external batters ▪ control surface drainage to minimise the formation of active gullies
Rehabilitation	▪ recontour waste rock dumps progressively to landform criteria ▪ install drainage control works ▪ replace topsoil, rip on the contour and seed ▪ direct run-off from rehabilitated areas to sediment dams
Infrastructure	▪ provide protection in drains (e.g. rip rap, grass) where water velocity may cause scouring ▪ confine traffic to maintained tracks and roads ▪ install sediment traps, silt fences and or hay bales where necessary to control sediment ▪ rehabilitate disturbed areas around construction sites promptly

Weed Management

Weed management is discussed under Nature Conservation in Section 3.11.11 of this EM Plan.

Land Contamination

The following land contamination management control strategies will be implemented to achieve the environmental protection objectives. The strategies focus on good management practices for the storage, handling and use of fuels, oils and chemicals that can result in land contamination.

The new mine workshop and fuel storage areas are recognised as having the potential to contaminate land through hydrocarbon spills. Potential for land contamination from the spilling of hydrocarbons will be minimised through the use of the existing standard operating procedures for the transport, handling and storage of hydrocarbons.

All hydrocarbons will be stored and handled in accordance with the bunding requirements (Section 5.8 Bunds and Compounds) of AS 1940:2004: 'The Storage and handling of combustible and flammable liquids'. Chemical storage areas will be suitably bunded and constructed to minimise the potential for leaks to occur. All chemicals will be stored, handled and used according to provisions in their Material Safety Data Sheet (MSDS).

To minimise the risk associated with fuel oil leaking during tanker unloading, the following measures will be implemented:

- A program of regular equipment inspection and testing will be implemented to ensure reliable performance.
- Operators will be trained in the safe operation of the system and emergency procedures in the event of fuel oil leakage.
- Spill containment equipment will be available at the unloading pad for use in the event of spillage.
- A sump will be provided to collect any spillage and allow recovery.
- Ignition sources will be strictly controlled and limited to avoid a fire.
- Appropriate fire fighting materials and equipment will be available to suppress fires.
- An approved fire protection system will be installed around hydrocarbon storage areas.

The following measures will be taken to minimise the potential for the leakage of fuel oil from storage tanks:

- Adequate bunding will be constructed to contain potential spills, in accordance with AS 1940:2004.
- Tank level indicators will be installed on fuel oil tanks for monitoring of fuel oil levels.
- Maintenance of fuel oil tanks will be undertaken, to ensure safe and effective operation of all components.
- Tanks will be designed in accordance with AS 1692:2006: 'Steel tanks for flammable and combustible liquids' to minimise the potential for failure.

Acland Tip

In consultation with regulatory authority, NAC will develop a specific management plan for the transfer of the general waste from the Acland Tip to a general waste disposal cell within the revised Project site. In general, the contents of the former Acland Tip, which have been identified as general waste, will be progressively excavated and relocated to an appropriately sized clay lined cell within the revised Project's active in-pit waste rock dump area. This general waste disposal cell will be constructed above the groundwater table. The transport of the excavated waste material will be conducted in a manner that prevents its loss along the transport route (i.e. from the former Tip to the general waste disposal cell). On completion of the waste transportation phase, the general waste disposal cell will be clay capped ready for

final rehabilitation. Final rehabilitation of the general waste disposal cell site will be conducted as part the final rehabilitation phase of the associated waste rock dump. Details of the site will be formally lodged with the DEHP for entry on the EMR. Prior to mine closure, NAC will submit a suitable long term site-based management plan for the site (i.e. as required under the EP Act).

3.8.7. Commitments

The revised Projects mitigations measures and commitments for land resources are presented in Table 3-25.

Table 3-25 Summary of Mitigation Measures and Commitments

Activity	Mitigation Measures/Commitment
Stock Routes	▪ NAC will consult with the DEHP in relation to the realignment of the Jondaryan-Muldu Road and will ensure continuity and operability of the stock route.
Road Openings and Closures	▪ NAC will liaise with the DEHP and other relevant government agencies (e.g DTMR) to gain all relevant approvals in relation to the opening and closing of roads (including roads which are stock routes) and in land dealings relating to changes in land tenure.
Fire Breaks and Maintenance Programs	▪ NAC will liaise with landowners and local authorities with respect to fire breaks and on-going maintenance programs.
Off Site Water Discharges	▪ An assessment of the likelihood of offsite water discharges during the revised Project's operation was undertaken for the revised Projects' EIS and the findings of this assessment demonstrate that the risk of discharge from the revised Project is low. NAC will continue to evaluate and manage this risk over the life of the revised Project.
Land Management and Monitoring Programs	▪ NAC will expand its current monitoring programs and grazing trials to incorporate the applicable rehabilitation success criteria to guide its rehabilitation management and to collect the necessary data to demonstrate: o the geotechnical stability of the constructed landform; o the successful establishment of a suitable vegetative cover to support the final land use and minimise the potential for erosion; and o the productivity of the vegetative cover for grazing (beef production).
Contaminated Sites	▪ NAC will undertake further management of these contaminated sites as the revised Project progresses and ensure all requirements of the EP Act are completed.
Rail Loop	▪ NAC will assess whether this infrastructure will remain at the end of the revised Project's life in consultation with the relevant stakeholders. ▪ A decommissioning plan will be developed as part of the mine closure process.
Dams	▪ NAC will consult with the APC Manager as part of the mine closure process to determine which dams will be retained. If retained, each

Activity	Mitigation Measures/Commitment
	dam will be subject to a general inspection to ensure it is handed over in the best possible condition. ▪ As part of the mine closure process, a decommissioning plan will be developed for all dams not to be retained.
Tailings Storage Facilities	▪ NAC will continue to operate all TSFs in accordance with the relevant statutory requirements (including their management plans). ▪ As a statutory requirement, all TSFs will be rehabilitated as defined by a decommissioning plan. In general, each TSF will be capped with inert material, topsoiled and vegetated. ▪ NAC will ensure these sites are recorded on the EMR and possess a suitable site based management plan as part of the mine closure process.
General Waste Disposal Cell	▪ NAC will develop a specific management plan for the transfer of general waste from the Acland Tip to a general waste disposal cell within the revised Project site. ▪ Prior to mine closure, NAC will submit a suitable long term site-based management plan for the site (i.e. as required under the EP Act).
Levees	▪ All levees will be retained post mining to minimise the risk of flooding of the depressed landforms. The stability of these structures will be assessed as part of the mine closure process, and as required, maintenance works will be completed. ▪ NAC will ensure all statutory requirements for these structures are completed over the life of the revised Project.
Offset Strategy	▪ NAC will establish a suitable legal mechanism connected to the underlying land title to protect the Dichanthium sericeum based grassland offset in perpetuity. This legal agreement will also include a long term management plan for preservation of the Dichanthium sericeum based grassland offset.
Fossils	▪ NAC will take all reasonable and practical measures to identify and prevent impacts to significant fossil specimens during the construction and operational phase of the revised Project. In the event of a significant fossil find, NAC will liaise with the Queensland Museum about strategies to protect the find.

3.8.8. Proposed Environmental Authority Conditions: Schedule H – Land

The land management proposed conditions are listed under Section 3.10.8 in the following Rehabilitation and Decommissioning section.

Buffer Zone – ML 50216 and MLA 50232

H1 The holder of the environmental authority must not cause any disturbance within 50 metres of the high bank of Lagoon Creek (buffer zone) as shown on Figure 3-7 (Lagoon Creek buffer and levee) unless in accordance with condition H2 and H3.

H2 The holder of the environmental authority is authorised to construct and maintain a flood protection levee and access road for inspection purposes, with the toe of the levee being

no closer than 50 metres from the high bank of Lagoon Creek as shown on Figure 3-7 (Lagoon Creek buffer).

H3 The holder of the environmental authority is authorised to access the 50 metre buffer zone as shown on Figure 3-7 (Lagoon Creek buffer), for the purposes of maintaining the integrity of the flood protection levee, fire management, riparian conservation and weed management purposes.

H4 The holder of the environmental authority is authorised to construct and maintain an appropriately engineered haul road crossing of Lagoon Creek as part of the access route for coal haulage and other purposes from the Willeroo mining area (within MLs 50216 and 50232) to the Mine Industrial Area (within ML 50170). The haul road crossing structure within Lagoon Creek must not significantly impede the ephemeral flow regime or create a barrier for fish movement during periods of flow within the creek.

H5 The final design level of the levee crest must be above the predicted 1,000 year ARI event flood level.

H6 Any section of the outside face of the levee must be treated with cover material and grass seeded (unless rock armoured) within three months of completion of the earthworks for that section of the outside face of the levee.

H7 The condition of the levee must at a minimum be assessed:

(a) By the environmental authority holder within 1 week of any storm of such intensity that greater than 25mm of rain falls in less than 3 hours; and

(b) By a suitably qualified and experienced person at least once per year between the months of May and October inclusive (i.e. during the 'dry' season and before the onset of the 'wet' season).

H8 Remedial works identified as necessary during assessments conducted under condition H7 must be commenced within 30 days unless delayed by inclement weather.

H9 Any actions and incidents on site that may impact upon the integrity of the levee bank must be notified to the administering authority in accordance with condition A10.

Additional Schedule H proposed conditions are provided in Section 3.10.8.

LEGEND

- Towns and Localities
- Proposed Rail Spur
- Roads
- Stage 3 Pit Areas
- Mining Tenements
- Lagoon Creek Buffer Zone

NEW HOPE GROUP

SINCLAIR KNIGHT MERZ SKM

NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 3-7 - Lagoon Creek Buffer Zone

Scale 1:43,000 on A4

Projection: Australian Geodetic Datum – Zone 56 (AGD84)

Produced: 20/09/2013 Path: I:\QENV2\Projects\QE06644\Spatial\ArcGIS\01_Figures\01_SEIS\J_19_EnvironmentalManagementPlan130920_NewHope_J19MgtPlan_Figure3-7_LagoonCkBufferZone.mxd

3.10. Rehabilitation and Decommissioning

This section of the EM Plan should be read in conjunction with the current Final Land Use and Rehabilitation Plan (FLURP) which is designed to provide NAC's long term rehabilitation management strategy for its mining activities. NAC has also produced a number of additional documents that support or complement the FLURP and this section of the EM Plan that include topsoil management, final landform design and nature conservation.

The revised Project's general rehabilitation areas comprise the greater part of the active mining areas, the out-of-pit dumps, the final voids and mine infrastructure. The general rehabilitation areas for the revised Project equate to approximately 2,030 ha and have been designated to be returned to a final land use of 'grazing with scattered areas of native tree species for shade, ecological and aesthetic purposes'. The rehabilitation strategy will allow a majority of the former revised Project site to be re-incorporated into APC's agricultural activities. The return of the revised Project land to grazing is consistent with the current land uses practised within the region and is considered a long term sustainable outcome for the revised Project.

3.10.1. Background

Post Mining Land Use

The overriding principle for the rehabilitation program at the Mine and revised Project is that the land should be returned to a post-mine land use that will be stable, self-sustaining and will only require maintenance commensurate with the proposed final land use.

The proposed post-mine land use for disturbed areas for the Mine and revised Project will be grazing, using native and pasture (exotic) grass species combined with smaller areas of local native tree and shrub species. This nominated land use will ensure that the land remains agriculturally productive, is consistent with the surrounding land uses, and can be re-incorporated into AGC's business.

Rehabilitation will be conducted progressively behind the active mine path as areas become operationally available. Progressive and final rehabilitation requirements will be further guided by the outcomes of this EIS process.

Post Mine Land Form

The primary design objective is the creation of stable final landforms that are compatible with the proposed final land use. NAC will use experience gained at the Mine and other NHG mines, specialist consultants and relevant research findings to meet this design objective.

Stable landforms will continue to be progressively established as part of the mining process using integrated mine planning and proven earthmoving techniques. The final slopes will be engineered to ensure geotechnical stability and designed to incorporate the required water management structures to manage storm runoff. Established topsoil and revegetation techniques will be applied to create a self-sustaining vegetation community cable of supporting grazing. A regular monitoring regime and grazing trial program will be implemented to demonstrate rehabilitation success, guide maintenance activities and to develop a long term management regime.

The proposed final landform will require rehabilitation of the following main disturbance areas:

- the out-of-pit waste rock dumps (elevated landforms) associated with the North, South, Manning Vale West and Willaroo Pits;

- the in-pit waste rock dumps at the North, Centre, South, Manning Vale East, Manning Vale West and Willeroo Pits;
- the out-of-pit tailings storage facility (TSF), west of the North Pit;
- the in-pit TSFs within the North and Centre Pits;
- dams not required by the background landowner; and
- infrastructure areas not required by the background landowner.

The Mine's proposed final voids will be backfilled by the existing mining operations or progression of the revised Project. The Central Pit's waste rock material will backfill the North Pit's final void. The Centre Pit's final void will be backfilled by tailings from the CHPP. While the South Pit's final void will be backfilled with waste rock material from the revised Project's Manning Vale East Pit and coarse rejects from the CHPP.

The revised Project's final voids will be reshaped to depressed landforms to ensure they can support the proposed final land use of grazing. NAC has produced a *Final Landform Management Report (SKM 2013)* that outlines the methodology behind the development of the depressed landforms. The *Final Landform Management Report (SKM 2013)* is provided as an Appendix for the *New Acland Coal Mine Stage 3 Project – Environmental Impact Statement (SKM 2013)*.

Rehabilitation Strategy

The knowledge gained so far from the existing mining activities will be adapted and used in rehabilitation programs for continuation of the Mine and implementation of the revised Project.

Rehabilitation strategies for the Mine and revised Project will include all areas of disturbance and will be reviewed on a regular basis in order to take into account any changes to mine operations, changes in legislative requirements, results of on-going studies and monitoring and/or through the introduction of future innovations in rehabilitation techniques.

NAC's rehabilitation strategy for the revised Project is designed, as a minimum:

- to create a final landform that is stable and self-sustaining;
- not impacting on water qualities of the downstream receiving environment;
- possesses maintenance requirements commensurate with the final land use; and
- longer term achieves statutory compliance for eventual surrender of the associated mining tenure.

The management requirements for general rehabilitation areas within the Mine (Stages 1, 2 and the proposed Stage 3) are specified within NAC's Final Land Use and Rehabilitation Plan (FLURP).

The FLURP (SKM, 2013) is a comprehensive planning document that details rehabilitation matters, such as rehabilitation goals/objectives, progressive rehabilitation, topsoil management, revegetation techniques, maintenance, decommissioning, rehabilitation acceptance criteria (development and application), monitoring and reporting. In addition, NAC is also exploring the possibility of trialling native grass species within the general rehabilitation areas.

In general, there will be a loss of land capability as a result of mining across the revised Project site. However, following successful rehabilitation, agricultural production will remain possible post mining, in the form of grazing.

NAC's rehabilitation strategy for the revised Project is based on:

- expanding and updating the existing rehabilitation strategy for the Mine's general disturbance areas;
- undertaking progressive rehabilitation; and
- implementing a range of specialised revegetation management practices for the revised Project's designated conservation zones and environmental offset areas.

NAC documents that are relevant to the rehabilitation strategy are listed in Section 3.10.7.

Jondaryan Rail Loadout Facility

In February 2012, the NHG announced a commitment to move the JRLF to a location on the new ML providing approval is given for the revised Project. An assessment has been conducted for the revised Project to quantify potential impacts for the new rail spur and balloon loop and associated infrastructure.

Subject to all statutory approvals being received in 2015, the new rail spur and balloon loop, TLF and MHF will be constructed over an estimated two year period with completion in approximately 2017. Therefore, decommissioning of the JRLF will commence in 2018 and is expected to be completed in 2019. The existing JRLF site will be returned to its original land use, namely grazing.

Decommissioning

The decommissioning and final rehabilitation of the revised Project site will occur on a staged basis over several years. A contaminated site assessment will be carried out as part of the Final/Progressive Rehabilitation Report required for full or partial surrender of the revised Project's EA and mining leases. Section 3.10.6 provides information on the proposed decommissioning control strategies.

3.10.2. Environmental Values

The revised Project's environmental values of the land that are to be protected or enhanced are:

- a beneficial post mining land use – grazing using a self-sustaining vegetation community comprising appropriate exotic/improved pasture species and local native tree, shrub and grass species; and
- a safe, stable, non-polluting landform able to support the agreed post mine land use.

3.10.3. Potential Impacts on the Environmental Value

In additional to the impacts provided under Land Management in Section 3.8.3, the potential impacts to environmental values for rehabilitation and decommissioning include the following:

- Ineffective or insufficient decommissioning of infrastructure;
- Ineffective rehabilitation of landform including waste material management; and

- Low revegetation survival rate.

3.10.4. Proposed Environmental Protection Objective

NAC plan to return the revised Project site back to a landform that is consistent with the pre-mine disturbance land use, in accordance with the Rehabilitation requirements for mining projects Guideline (DEHP 2012), and aligned to the following general rehabilitation goals:

- Safe to humans and wildlife;
- Non-polluting;
- Stable; and
- Able to sustain an agreed post-mining land use. Progressive rehabilitation will be undertaken throughout the life of mine as land becomes available.

To achieve this, the following objectives will be regularly reviewed and revised according to mine planning, rehabilitation and decommissioning progress, revegetation trial results, and potential changes to agreed final land:

- Infrastructure is decommissioned and removed/buried as agreed with the Administering Authority during closure planning, except features (such as dams and/or roads), that landowners may request to remain;
- Remaining voids are formed with either low gradients or public and livestock access is permanently prevented;
- The surface water and groundwater leaving the revised Project site is expected to be of a similar quality prior to mining activities, and will remain this way without on-going management; and
- Revegetation cover will match local analogue sites where required, reduce erosion and be self-sustaining. Information on the description and selection of appropriate analogue sites is provided in the FLURP.

Rehabilitation Domains

Domains are rehabilitation areas that require similar activities to be return to a pre-mining state. Four rehabilitation domains have been determined for the revised Project:

- Solid waste rock disposal areas (spoil, waste rock dumps, reject disposal areas);
- Tailings dams;
- Infrastructure areas; and
- Linear Infrastructure areas.

These four areas will generally receive similar rehabilitation treatment, such as tailings emplacements will be capped with mine spoil then, topsoiled and seeded. Once the tailings areas are capped with mine spoil they will receive a similar treatment to other areas of mine spoil/waste dumps, etc. Mine and linear infrastructure areas will generally not require spoil placement or capping but receive topsoil and seeding treatments similar to the solid waste disposal and capped tailings dams.

Goals for these domains are shown in Table 3-26.

Table 3-26 Strategies to Achieve Rehabilitation Goals

Domain	Rehabilitation Goals			
	Safe	**Non-Polluting**	**Stable landform**	**Sustains Agreed Land Use**
Solid Waste Rock Disposal	Structurally safe (geotechnically stable). No hazardous materials (geochemically benign).	Minimise erosion through adequate vegetation cover. Runoff and seepage controlled by selective placement and water management (e.g. dams).	Place wastes selectively above and below original ground level to the agreed slopes. Establish adequate vegetation cover.	Return to previous use (grazing)
Tailings Dams	Structurally safe (geotechnically stable). Adequate capping.	Adequately capped. Minimise erosion through adequate vegetation cover. Runoff and seepage controlled by water management.	Stored both in pits below natural surface level and in dams above natural surface. Establish adequate vegetation cover.	Return to previous use (grazing)
Mine Infrastructure areas	Hazardous materials removed.	Remediate contamination so that runoff and seepage are of good quality.	Remove infrastructure or allow continued use of useful infrastructure. Establish adequate vegetation cover.	Return to previous use (grazing)
Linear Infrastructure areas	Structurally safe (geotechnically stable).	Runoff and seepage controlled by water management (e.g. dams). .	Remove infrastructure rip reshape and revegetate or allow continued use of useful infrastructure	Return to previous use (grazing)

The proposed final landform for the revised Project is shown in Figure 2-5.

3.10.5. Performance Criteria

Proposed rehabilitation acceptance criteria have been developed to monitoring the progress of rehabilitation efforts for the revised Project. The key criteria used to determine rehabilitation success are:

- Vegetation cover – measured as a percentage;
- Species diversity – determined from analogue sites;
- Slope;
- Erosion status;

- Absence of declared plants (weeds);
- Exchangeable Sodium Percentage (ESP) – as a measure of soil dispersion;
- Cation Exchange Capacity (CEC) – as a measure of nutrient availability;
- Downstream water quality; and
- Root Zone Salinity (RZS).

Vegetation cover, species diversity, slope angle, erosion status and the absence of declared weeds have been incorporated into the proposed acceptance criteria in Table 3-27. Exchangeable Sodium Percentage ESP, CEC and RZS have been incorporated into the monitoring and reporting framework provided in the FLURP.

Table 3-27 and

Table 3-30 illustrate the proposed rehabilitation acceptance criteria for all areas disturbed by mining. The acceptance criteria does not apply to conservation zone areas within the Mine and revised Project as these are covered separately in the CZMP, which is provided in Appendix J.6.

Table 3-27 Proposed Rehabilitation Acceptance Criteria – Grazing Lands

Land Suitability Class	Acceptance Criteria – Grazing Land						
	Non-polluting	Stability and Sustainable Land Use					
	Active Rill/Gully Erosion	Vegetation Cover [1]	Native and Exotic Grass Species Diversity (sp./ha) [2]	Slopes [3]	Geotechnical Stability	Active Rill/Gully Erosion	Declared Weeds
2	absence	= or > 50%	= or > 4	8.5°-17°	stable	absence	absence
3	absence	= or > 50%	= or > 4	8.5°-17°	stable	absence	absence
4	absence	= or > 50%	= or > 4	8.5°-17°	stable	absence	absence
5	absence	= or > 50%	= or > 4	8.5°-17°	stable	absence	absence

Note:

1) Vegetation covers at analogue sites with a Land Suitability Class of 4 & 5 were the highest at 45% and 56% respectively (page 42). As most post-mining land will be class 4 & 5, an average of the higher vegetation covers in classes 4 & 5 (50%) were included across all land suitability classes
2) This criteria is the highest diversity value found at only 1 of the 4 analogue sites (page 42), however it has been added to all land suitability classes in the acceptance criteria
3) This criterion has been developed separately from experience at the Mine (i.e. demonstrated geotechnical stability). Slope will be designed from 8.5° to 17° (15% to 30%) but consideration will be given to the lower slope angles. Further information can be located in the Final Landform Management Report (SKM 2013) that accompanies New Acland Coal Mine Stage 3 Project – Environmental Impact Statement (SKM 2013).

Table 3-28 Proposed Rehabilitation Acceptance Criteria – Treed Areas (generally <5%)

Land Suitability Class	Acceptance Criteria – Grazing Land Treed Areas						
	Non-polluting	Stability and Sustainable Land Use					
	Active Rill/Gully Erosion	Vegetation Cover (incl. tree/shrub canopy) [1]	Native Tree/shrub & Native/Exotic Grass Species Diversity (sp./ha) [2]	Slopes [3]	Geotechnical Stability	Active Rill/Gully Erosion	Declared Weeds
2-5	absence	= or > 50%	Eucalyptus sp. = or >2 Acacia sp. = or >2 Other tree/shrub sp. = or >2 Grass = or > 3	8.5°-17°	stable	absence	absence

Note:

1) This criteria is an average from analogue sites.
2) The majority of the rehabilitated land will be returned to grazing with exotic pastures established. Where pockets of trees/shrubs have been established the diversity criteria will apply taking into account the limited diversity of some remnant communities near the mine.
3) This criteria has been developed separately from experience at the Mine (i.e. demonstrated geotechnical stability). Slope will be designed from 8.5° to 17° (15% to 30%) but consideration will be given to the lower slope angles. Further information can be located in the Final Landform Management Report (SKM 2013) that accompanies New Acland Coal Mine Stage 3 Project – Environmental Impact Statement (SKM 2013).

3.10.6. Control Strategies

Rehabilitation and Decommissioning will be managed by NAC's EMS based on the FLURP in EIS Appendix J2 and, towards the end of mining, by a dedicated Mine Closure Management Plan.

To date, rehabilitation at the Mine has demonstrated that conventional rehabilitation on a range of materials mined has been successful. The knowledge gained will be used to further develop rehabilitation strategies for the revised Project. The FLURP provides information on which the following is based.

The rehabilitation strategy at the revised Project consists of the following integrated measures:

- appropriate pre-disturbance preparation, such as a topsoil management plan and integrated mine planning to efficiently coordinate mining activities;
- implementation of practical landform designs to prevent erosion and establish long term geotechnical stability;
- identification of an appropriate post-mine land use consistent with local environmental constraints;
- avoiding the placement of sodic/dispersive materials near the surface of the dumps or within the plant root zone;

- appropriate management of the final TSF waste, including capping with benign waste rock, revegetation to form a stable cover to resist erosion and establishment of a long term site based management plan;
- revegetation trials for selection of appropriate revegetation species and methodologies and development of a long term management regime;
- progressive rehabilitation of disturbed areas using appropriate rehabilitation procedures;
- a rehabilitation monitoring program to assess rehabilitation success against accepted performance indicators; and
- a corrective action program to address areas of substandard rehabilitation.

Progressive Rehabilitation

A progressive rehabilitation program will continue to be implemented for the Mine and revised Project and will be administered by each Plan of Operations. Progressive rehabilitation will commence as soon as possible when areas become available within the operational land.

The main features of the progressive rehabilitation process are:

- construction of waste dumps in 10 m lifts on external dump faces, with a maximum working dump lift height of 30 m;
- development of a stable slope design that incorporates appropriate water management structures (e.g. contour banks, etc.);
- use of suitable topsoil, which will either be stockpiled until recontoured areas are available or respread immediately across available recontoured areas;
- contour ripping to water promote infiltration and minimise run off;
- seeding with an appropriate seed mix (grass, shrub and tree species) prior to the commencement of the wet season to maximise the benefits of subsequent rainfall;
- application of appropriate fertiliser or other soil ameliorants for plant establishment if required; and
- the battering down of final void slopes to create depressed landforms that can safely support the proposed final land use.

The projected progression of mining activities and the conceptual final topography of the site will be further defined by the on-going planning process for the mine expansion. This information will further guide proposed rehabilitation activities.

The Mine area will possess an approximate total disturbance footprint of 425 ha (i.e. as originally planned). The revised Project site will possess an approximate total disturbance footprint of 2,030 ha (Table 3-29). An indicative rehabilitation schedule for the Mine and revised Project in Table 3-30.

Table 3-29 Total disturbance over the life of the revised Project

Type of Disturbance	Disturbance Area (Ha)
Mining Areas	921
Elevated Landforms	314
Depressed Landforms	621
Mine Infrastructure	174
Total	**2,030**

Table 3-30 Cumulative Indicative Rehabilitation Targets – Mine and revised Project

Production Year	Rehabilitated Area (ha)	Cumulative Area Rehabilitated (ha)
To Date	N/A	507
2014-15	100	607
2016-17	112	719
2018-19	234	952
2020-21	241	1,193
2022-23	233	1,426
2024-25	146	1,572
2026-27	156	1,728
2028-29	142	1,870
>2030	886	2,756
Total	2,249	2,756

Design of Final Landforms

As an important component of the planning phase for the revised Project, NAC has developed a feasible mining methodology to eliminate unusable post-mined land for the revised Project. The main driver for this approach was to ensure the final out-of-pit dumps (elevated landforms) and final voids (depressed landforms) are battered down to a safe and stable angle to allow the sustainable application of the revised Project's proposed final land use. A conceptual final land use plan for the revised Project is shown in Figure 2-5.The number of elevated landforms and their respective locations within the revised Project's final landform design have been influenced by the mining sequence and the number of pits operating at any moment in time.

The revised Project's elevated landforms have been designed such that the average angle on the face of the dumps will be 10 degrees on average. This slope is based on the current out of pit dumps angles that have successfully been constructed within the existing ML50170 (Stage 1) and ML50216 (Stage 2). An average batter of 10 degrees is believed to be safe and sustainable, and there is evidence at the Mine that this batter is geotechnically stable. The general design parameters for the revised Project's elevated landforms are provided in Table 3-31.

Slopes up to 13 degrees occur naturally within the vicinity of the revised Project site. Three examples of natural local landforms have been included for comparison purposes as presented in Table 3-32. In general, the revised Project's elevated landforms (in terms of physical dimensions) are relatively commensurate with the surrounding local topography.

Table 3-31 General Design Parameters for Elevated Landforms

Elevated landforms	Height (m)	Volume (Mm^3)	Area (footprint) (ha)	Proposed slope (degrees)	Longest slope length (m)
Manning Vale East Pit	45	23.4	67	8.5-17	300
Manning Vale West Pit	45	25.6	137	8.5-17	300
Willeroo Pit	45	23.5	108	8.5-17	300

Table 3-32 Local Topographic Features in the Study area

Local topographic features	Height (m)	Area (footprint) (Ha)	Slope (degrees)	Longest Slope Length (m)
Bottle Tree Hill	56	150	11	700
Radar Hill	65+	450+	7	1,000
Surrounding Ridgeline	80+	NA	>20	>2,000

Use of Spoil Material

The spoil associated with the revised Project consists of weathered and fresh overburden having slightly higher clay content than the interburden and floor material. This material is generally geochemically benign, with negligible acid generation potential. During the initial phases of operation, and continuing throughout life of mine, it is proposed to carry out analysis of overburden and tailings material to confirm its geochemical characteristics, and if necessary, implement a series of mitigation measures as outlined above.

Overall, the material tested is likely to be suitable for revegetation. Topsoil will also be used as a surface treatment prior to revegetation to minimise any effects from sodic spoil.

Revegetation

The revegetation methods for all the revised Project's types of disturbed land will normally consist of the following:

- Respreading stockpiled or freshly stripped topsoil;
- Contour ripping;
- Application of appropriate fertiliser for plant establishment, after soil chemical analysis, if required; and
- Seeding with an appropriate seed mix in a one-pass operation.

Competent materials such as basalt may be placed on steeper slopes to aid stability. Contour ripping is used to improve infiltration and reduce mechanical impedance for tree root establishment. This action is normally undertaken immediately after surface preparation and before revegetation. A seed mix containing native and pasture (exotic) grass and local native shrub and tree species is used to establish a sustainable vegetation cover in a one-pass operation.

Revegetation will normally occur prior to the commencement of the wet season (October-December) to maximise the benefits of subsequent rainfall or following the heat of Summer (February-March) – this practice occurs at the existing operations.

Seed Mix

Example seed mixes for the Grazing Lands and Treed Areas are included in Table 3-33 and Table 3-34.

The seed mixes will be modified over time as species suitability/success and seeding rates are monitored and assessed. Further information is available in the FLURP.

Table 3-33 Example Seed Mix – Grazing Lands

Botanical Name	Common Name	Seeding rate (kg/ha)
Cynodon dactylon	Green Couch	2.0
Chloris gayana	Katambora Rhodes Grass	5.0
*Echinochloa utilus**	Japanese Millet	3.0
Panicum coloratum	Bambatsii Panic	3.0
Panium maximum	Gatton Panic	4.0

Note: * denotes exotic/weed species

Table 3-34 Example Seed Mix – Treed Areas

Botanical Name	Common Name	Seeding rate (kg/ha)
Angophora costata spp costata	Smoothbark Apple	0.3
Allocasuarina littoralis	Black She-Oak	0.3
Casuarina cristata	Belah	0.3
Eucalyptus crebra	Narrow Leaf Ironbark	0.3
Eucalyptus melanophloia	Silver-leaf Ironbark	0.3
Eucalyptus orgadophylla	Mountain Coolabah	0.3
Alphitonia excelsa	Red Ash	0.2
Geijera parviflora	Wilga	0.3
Acacia leiocalyx	Black Wattle	0.2
Acacia salicina	Sally Wattle	0.2
Acacia stenophylla	River Cooba	0.2
Acacia harpophylla	Brigalow	0.2
Senna artemisiodes	Silver Cassia	0.2
Dodonaea viscosa	Sticky-hop Bush	0.2
Cynodon dactylon	Green Couch	1.0
Bothriochloa decepiens	Pitted Blue Grass	2.0
Bothriochloa bladhii	Forest Blue Grass	2.0
Dicanthium sericeum	Qld Blue Grass	2.0
*Echinochloa utilus**	Jap Millet	2.0

Note: * denotes exotic/weed species

Rehabilitation Maintenance

Rehabilitated areas will be monitored in order to identify any areas in need of maintenance. Rehabilitated areas that have not achieved the designated acceptance criteria will be repaired.

Supplementary plantings or seeding may be used to increase species diversity and/or groundcover. Maintenance work will be performed to repair any areas exhibiting excessive

soil erosion. If problem areas occur, they will be investigated to determine the reason for substandard rehabilitation and to identify appropriate methods for repair.

Grazing Trials

NAC is currently undertaking a formal long term grazing trial within a rehabilitate area of the North Pit's Elevated Landform on ML 50170 at the Mine. This grazing trial includes slope areas and will involve a comparison process with an analogue site in the vicinity of the Mine. The grazing trial program is being managed by the APC and will involve a formal study and report by a professional third party agricultural consultancy and local university. This grazing trial program will be a continuous process with new areas progressively added to the original trial area each year.

The grazing trial program will be expanded to include the revised Project's rehabilitation areas designated for grazing. Further information on the grazing trial is available in the FLURP.

Decommissioning

A Life of Mine (LoM) Plan has been developed for New Acland Coal Mine (including the revised Project). The LoM Plan will be continuously revised based on economic, geological and engineering factors. In addition, this LoM Plan will be used to guide the day-to-day operational activities (i.e. to guide medium and short term mine planning).

The decommissioning and final rehabilitation of the revised Project will occur on a staged basis over several years. On the completion of mining, infrastructure will be treated as follows:

- mine roads will be left behind for use as farm roads or if not required, rehabilitated;
- water dams will remain if required by the relevant landowner and approved by regulators, otherwise, they will be rehabilitated;
- buildings, plant and equipment will be removed and the surface rehabilitated, including the CHPP, workshop, offices, storage tanks and material handling facility and train loadout facility;
- concrete pads will be covered with benign waste rock, topsoiled and revegetated or removed and disposed to the nearest landfill;
- contaminated land management will be completed as required under the Environmental Protection Act 1994;
- all TSFs will possess a competent final cover system; and
- the final voids remaining at the end of the mine life will be battered down to form depressed landforms to support the proposed final land use.

The final void remaining at the end of the mine life at the South and Centre Pits will cover approximately 50 ha with a maximum depth of approximately 60 m. A bund and fence will be constructed around the crest of the pit to prevent access to the final void.

3.10.7. Commitments

The following commitments encompass the Land Management and Rehabilitation and Decommissioning aspects of the revised Project:

- A FLURP has been drafted and will be regularly updated to capture project and rehabilitation changes;
- Progressive rehabilitation of disturbed areas using appropriate rehabilitation procedures;
- A rehabilitation monitoring program to assess rehabilitation success and a corrective action program to address areas of failed rehabilitation;
- Final voids will be managed to ensure they are safe, stable and non-polluting. The following management plans that will be implemented and regularly reviewed and are relevant to land management and rehabilitation and decommissioning include:
  - Final Land Use and Rehabilitation Plan;
  - Topsoil Management Plan;
  - Conservation Zone Management Plan;
  - Threatened Species Translocation Plan;
  - Bluegrass Offset Management Plan; and
  - Pest and Weed management Plan.
- NAC will demonstrate in a scientifically rigorous manner the success of the revised Project's rehabilitation to allow future surrender of the associated mining leases.
- NAC will consult with government and community on a regular basis over the life of the revised Project to report on the progress of rehabilitation and other matters.
- NAC is committed to maximising the revised Project's rehabilitation success to ensure the APC can function as a competitive agribusiness. NAC will also continue to draw on the APC's expertise to assist and enhance rehabilitation management.
- NAC will use experience gained at the Mine and other mines in Queensland to meet its stable landform objective. Stable landforms will be established following mining, using soils capable of supporting vegetation communities adapted to the local environment. The stability of the post-mine landform will be achieved by applying sound rehabilitation practices. The disturbed land will be rehabilitated to a condition that is self-sustaining or to a condition where the maintenance requirements are consistent with the post-mining land use.
- NAC will use the existing grazing trial:
  - to assess the success of the current rehabilitated area in relation to the performance of cattle growth (beef production);
  - to evaluate current rehabilitation practices from a final land use perspective; and
  - as required, to develop new rehabilitation strategies to improve rehabilitation and long term grazing performance.
- Longer term, the APC will also use this information to develop appropriate land management plans for NAC's former mined land within both the current Mine and the revised Project site.

Mine Closure Plan

A Mine Closure Plan will be submitted to the Regulatory Authority at least five years prior to the proposed surrender of New Acland Coal Mine's environmental authority and associated mining tenure. The Mine Closure Plan will be a dynamic document updated on an annual basis, and will be implemented via the revised Projects' Plan of Operations.

Major stakeholders including the DEHP, other relevant government departments and agencies, as well as the public will be consulted as part of the mine closure process.

A Final Rehabilitation Report and Environmental Audit Statement will be produced as a statutory requirement of the surrender process for the EA and the associated mining lease relinquishments.

3.10.8. Proposed Environmental Authority Conditions: Schedule H – Land

Rehabilitation

H10 Land disturbed by mining must be rehabilitated in accordance with Table H1 - Rehabilitation requirements.

Table H1 - Rehabilitation requirements

Mine Domain	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
Solid Waste Rock Disposal	Safe	Site safe for humans and animals	Structurally safe & shallow slopes (geotechnically stable). No hazardous materials (geochemically benign).	Monitoring/observation demonstrates safe site.
	Non-polluting	No environmental harm attributed to adverse chemical conditions within the waste rock dumps	Minimise erosion through selective placement of mine waste, adequate vegetation cover. Runoff and seepage controlled by water management (e.g. dams).	Return to previous use (grazing) Discharge water meets specified limits.
	Stable	Minimise erosion	Place wastes selectively above and below original ground level to the agreed slopes. Establish adequate vegetation cover.	Return to previous use (grazing)
	Self-sustaining	To return to agreed grazing land capability	Slope and other landform design criteria achieved. Establish adequate vegetation cover.	Refer **Table 3-27** and **Table 3-28**
Tailings Dams	Safe	Site safe for humans and animals	Structurally safe (geotechnically stable). Adequate capping. Accessibility to voids is permanently removed	Monitoring/observation demonstrates safe site.

Mine Domain	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
	Non-polluting	Acid mine drainage will not cause environmental harm	Adequately capped. Minimise erosion through adequate vegetation cover. Runoff and seepage controlled by water management.	Monitoring meeting release limits. Return to previous use (grazing)
	Stable	Minimise erosion	Stored both in pits below natural surface level and in dams above natural surface. Establish adequate vegetation cover.	Monitoring demonstrates revegetation success. No structural erosion present. Return to previous use (grazing)
	Self-sustaining	To return to agreed grazing land capability	Monitoring demonstrates successful revegetation	Refer **Table 3-27** and **Table 3-28**
Mine Infrastructure areas	Safe	Site safe for humans and animals	Hazardous materials removed.	Monitoring/observation demonstrates safe site.
	Non-polluting	Undertake contaminated land assessment	Remediate contamination so that runoff and seepage are of good quality.	Monitoring meeting release limits
	Stable	Minimise erosion	Remove infrastructure or allow continued use of useful infrastructure. Establish adequate vegetation cover.	Slope will be designed from 8.5° to 17° (15% to 30%) but consideration will be given to the lower slope angles.
	Self-sustaining	To return to agreed grazing land capability	Return to previous use(grazing). Establish adequate groundcover	Refer **Table 3-27** and **Table 3-28**
Linear Infrastructure areas	Safe	Site safe for humans and animals	Structurally safe (geotechnically stable).	Monitoring/observation demonstrates safe site.
	Non-polluting	No environmental harm attributed to adverse chemical conditions within the rehabilitation areas	Runoff and seepage controlled by water management (e.g. dams).	Monitoring meeting release limits
	Stable	Minimise erosion	Remove infrastructure rip reshape and revegetate or allow continued use of useful infrastructure	Return to previous use (grazing)
	Self-sustaining	To return to agreed grazing land capability		Refer **Table 3-27** and **Table 3-28**

H11 Rehabilitation must commence progressively in accordance with the Plan of Operations.

Dams Containing Hazardous Waste

H12 The construction and operation of any dam containing hazardous waste within the operational land must comply with Table H2 – Size and purpose of dams containing hazardous waste.

Table H2 - Size and Purpose of Dams Containing Hazardous Waste

Name of Dam Containing Hazardous Waste	Maximum surface area of contents in dam (ha)	Maximum volume of dam		Maximum depth of dam (m)	Purpose of Dam
		ML	Mm^3		
Tailings Storage Facility 1 and 2	65	2975	3.0	16	Containment of Tailings from a coal washery plant
Environmental Dam 2	9	232	0.2	4.5	Capture of overland flow from undisturbed areas - Backup for Tailings Dam
IPTD 1 and 2	15		1.4	40	Containment of Tailings from a coal washery plant
IPTD 3	TBA	3,800	3.8	55	Containment of Tailings from a coal washery plant
IPTD 4	TBA	7,900	7.9	TBA	Containment of Tailings from a coal washery plant
Centre Pit Void	TBA	8,600	8.6	TBA	Containment of Tailings from a coal washery plant
TOTAL Estimated Storage		21,700	21.7	TBA	

H13 Any dam containing hazardous waste constructed or operated within the operational land must be located within the polygonal area defined by the points defined in Table H3 – Location of dams containing hazardous waste. Refer also to Figure 3-8.

Table H3 - Location of dams Containing Hazardous Waste

Name of Dam Containing Hazardous Waste	Latitude (GDA94)[1]	Longitude (GDA94)[1]
Tailings Storage Facility and Environmental Dam[2]	270 17' 16.7031402" S 270 17' 10.9622837" S 270 16' 51.1028709" S 270 16' 27.2791954" S 270 16' 29.1169479" S 270 17' 08.8291088" S	1510 42' 27.3833932" E 1510 42' 28.4233861" E 1510 42' 31.8627267" E 1510 42' 03.7029825" E 1510 41' 39.1178177" E 1510 41' 31.8175509" E
IPT1	27° 16' 39.5932809" S 27° 16' 33.3110450" S 27° 16' 40.9107864" S 27° 16' 34.6002752" S	151° 42' 49.4645845" E 151° 42' 48.3367815" E 151° 42' 23.1909360" E 151° 42' 29.5557786" E
IPT2A	27° 16' 45.56" S 27° 17' 05.72" S 27° 17' 05.34" S 27° 17' 56.25" S 27° 16' 45.55" S	151° 42' 22.13" E 151° 42' 28.00" E 151° 42' 40.75" E 151° 42' 49.98" E 151° 42' 43.66" E
IPT2B	27° 17' 04.7973072" S 27° 16' 56.2475766" S 27° 16' 56.9219634" S 27° 17' 05.2765077" S	151° 42' 37.4263170" E 151° 42' 37.0886266" E 151° 42' 25.6604935" E 151° 42' 29.4918417" E
IPT3	TBC	TBC
IPT4	TBC	TBC
IPT5	TBC	TBC

Note 1: A minimum of 3 points is required to constrain the location of all activities associated with the dam containing hazardous waste. Additional infrastructure which forms part of any dam containing hazardous waste may include appurtenant works consisting of tailings discharge pipelines, seepage collection systems, runoff diversion bunds, containment systems, pressure relief wells, decant and recycle water streams.
Note 2: The location polygon defined in Table H3 – Location of dams containing hazardous waste encloses both the Tailings Storage Facility and Environmental Dam 2.

Inspection of Dams

H14 The holder of the environmental authority must design, construct and operate all high-hazard dams containing hazardous waste in accordance with the Code of Environmental Compliance for Environmental Authorities for High Hazard Dams Containing Hazardous Waste.

H15 The holder of the environmental authority must design, construct and operate all low-hazard dams containing hazardous waste and non-hazardous dams in accordance with the criteria outlined in Appendix B of the Code of Environmental Compliance for Mining Lease Projects.

H16 High hazard dams containing hazardous waste shall be inspected by a Registered Professional Engineer (RPEQ) on or about 1st October but definitely before 1st November each year or at any time if alarming, unusual or otherwise unsatisfactory conditions are observed.

H17 For each inspection, the engineer shall assess the condition of the dam and its foundations, determine the hydraulic adequacy of the dam and assess the adequacy of the works with respect to dam safety.

H18 For each inspection, two copies of the engineer's report and any recommendations as to measures to be taken to ensure the integrity of the dam shall be furnished to the administrating authority within 28 days of the inspection.

Hazardous Dam Embankment Monitoring

H19 During the operational life of the storage the holder of the environmental authority must regularly monitor and record the standing water levels in three monitoring wells, which will be located in a line through the highest section of the embankment.

Decommissioning of Dams – Documentation and Compliance

H20 Dams containing hazardous waste must not be abandoned, must be decommissioned to a situation where water can no longer be stored in the dams and the dams and their contained waste(s) are stable, whereafter the dams are no longer dams and they become landforms on the operational land and must comply with the rehabilitation requirements of the Environmental Authority.

H21 Decommissioning activities for dams must be documented in detail in the plan of operations under which the activities are to occur. Where the detailed documentation is not already contained in the Design Plan for the dam, the detailed documentation is considered to be an amendment to the design plan and must be submitted as an amendment to the design plan required by the Code of Environmental Compliance for Environmental Authorities for High Hazard Dams Containing Hazardous Waste.

Infrastructure

H22 All infrastructure, constructed by or for the Environmental Authority holder during the mining activities including water storage structures, must be removed from the site prior to mining lease surrender, except where agreed in writing by the post mining land owner / holder.

NOTE: This is not applicable where the landowner/holder is also the Environmental Authority holder.

Contaminated Land

H23 Before applying for surrender of a mining lease, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the mining lease which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use.

H24 Before applying for progressive rehabilitation certification for an area, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the area the subject of the application which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use under condition H1.

H25 All reasonable management actions must be taken to minimise the potential for contamination of land by hazardous contaminants.

END OF SCHEDULE H CONDITIONS

LEGEND

- Towns and Localities
- Mining Tenements
- In-pit Tailings Storage Facility
- Roads

NEW HOPE GROUP

SKM

NEW ACLAND COAL MINE STAGE 3 PROJECT

Figure 3-8 - Location of In-Pit Tailings Storage Facilities (ITSF)

Scale 1:40,000 on A4

Projection: Australian Geodetic Datum – Zone 56 (AGD84)

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3.11. Nature Conservation

3.11.1. Background

The Study area has a long history of vegetation clearing and grazing, which has caused:

- significant fragmentation and losses of remnant vegetation;
- suppression of natural regeneration;
- loss of topsoil through erosion including the loss of productive seed banks;
- a reduction in native shrub and groundcover diversity and abundance; and
- weed invasion.

Most of the original vegetation has been cleared in the Study area for agriculture, grazing and mining operations, with the remaining remnant vegetation generally located within road reserves, hills and ridgelines some remnant woodland present in association with Lagoon Creek. Approximately 10 % of the Study area contains vegetation communities which can be classified as remnant or regrowth examples of specific regional ecosystem types. The balance comprises improved pasture, scattered clumps of trees and individual paddock trees.

Terrestrial flora, fauna and biodiversity studies have occurred at various times over the past 13 years, up to the most recent results of the 2013 surveys.

The Wildnet database and EPBC Protected Matters Search Tool identities the species listed in Table 3-35 as possibly occurring on the revised Project site. Table 3-35 describes the preferred habitat for these species and whether the species have been located on the revised Project site.

Table 3-35 Species possibly found in the vicinity of the Study area

Scientific Name/Common Name	NC Act Status	EPBC Act Status	Preferred Habitat	Presence in revised Project area
Birds				
Erythrotriorchis radiates - Red Goshawk	-	E	Occurs over woodland and forested areas in tropical and warm temperate Australia. They prefer mosaic landscapes with a large population of prey (birds) and permanent water. Preferred habit is open forest to allow for fast attacks and manoeuvring in flight.	Not present – habitat throughout the revised Project is highly disturbed and there is a lack of permanent water bodies and with very little area of forest or woodland. Species or nests have not been located following surveys consistent with DotE survey guidelines.
Geophaps scripta scripta - Squatter Pigeon	V	V	This species prefers open forests to sparse, open woodlands. The species forages in well drained, gravelly, sandy and loamy soils that support open forest to woodland communities.	Not present – while grasslands with surrounding woodlands observed in the vicinity of the revised Project, the species has not been recorded during the surveys completed over past 13 years.

Scientific Name/Common Name	NC Act Status	EPBC Act Status	Preferred Habitat	Presence in revised Project area
				Species has not been located following surveys consistent with DotE survey guidelines.
Lathamus discolor - Swift Parrot	E	E	In Queensland known to occur in ironbark, red gum and yellow box woodlands and forests on which they feed on nectar in flowers.	Not present – species is known to have high level of site fidelity, and as no previous records of the species are known from the revised Project area, it is reasonable to conclude that this species is not present.
Neochmia ruficauda ruficauda - Star Finch (eastern)	E	E	Occurs in grassland and grassy woodland near permanent water. Population believed to be between Bowen, Winton and Wowan – north of the Study area.	Not present - revised Project site is outside the range of the Star Finch.
Ninox strenua	V	-	Occurs along the Great dividing Range and adjacent inland slopes. Prefers tall, wet eucalypt forests.	Not present, lack of tall, wet forests in the vicinity of the revised Project area.
Poephila cincta cincta - Black-throated Finch (southern)	E	E	Prefers grassy open woodlands and forests dominated by Eucalyptus, Corymbia and Melaleuca. Usually associated with riparian vegetation.	Not present – revised Project area is in the “may occur” part ofd the species modelled distribution, however the revised Project area does not encompass habitat that is likely to be inhabited by the species.
Rostratula australis - Australian Painted Snipe	V	V	Favours shallow fresh waterbodies inundated or waterlogged grasslands. Sites usually include rank emergent tussocks of grass sedges and rushes	Not present – areas of poor quality vegetation along Lagoon Creek. Species has not been located following surveys consistent with DotE survey guidelines.
Turnix melanogaster - Black-breasted Button-quail	V	V	Prefers vine thickets and rainforests that are periodically water-stressed.	Not present – very small area of isolated semi-evergreen vine thicket located on eastern edge of in the revised Project site. Species has not been located following surveys consistent with DotE survey guidelines.
Xanthomyza phrygia - Regent Honeyeater	-	E	They use the moister fertile sites in dry box-ironbark woodland and forests such as creekflats and river valleys.	Not present – preferred habitat not present on Project site. Species has not been located following surveys consistent with DotE survey guidelines.

Scientific Name/Common Name	NC Act Status	EPBC Act Status	Preferred Habitat	Presence in revised Project area
Mammals				
Chalinolobus dwyeri - Large-eared Pied Bat	V	V	Has been recorded in sandstone gorges in tall eucalypt forests, dry sclerophyll woodlands and forests and rainforests and wet sclerophyll forests. They prefer a combination of sandstone cliffs to provide roosting habitat that are adjacent to higher fertility areas such as box gum woodlands and river/rainforest corridors that can be used for foraging. The species also favours habitat with a canopy.	Not present –This species is highly dependent on sandstone caves for roosting, which do not occur in the revised Project area. Hollow roosting sites available in the revised Project area are only provide opportunistic habitat if the species was flying over the area.
Dasyurus hallucatus - Northern Quoll	-	E	Habitat includes rocky areas in eucalypt forest/woodlands, rainforest, beach scrubs. Eucalypt forests and woodland communities usually have a high level of structural diversity. Typically habitat includes some form of high relief rocky area, surrounded by vegetation for uses as dens.	Not present – The Northern Quoll has only been recorded as far south as the Sunshine Coast, approximately 150 km to the north-east of the Project area (DSEWPaC, 2011a). Additionally, the revised Project area is highly fragmented and moderately suitable patches of denning habitat are disconnected from fauna movement corridors and subject to predation by predatory pests.
Nyctophilus corbeni - South-eastern Long-eared Bat	-	V	Occurs in larger remnants with a well-developed understorey. Throughout inland Queensland, the habitat for this species is dominated by various eucalypt and bloodwood species and various types of tree mallee with it being most abundant in vegetation with a distinct canopy and a dense cluttered shrub layer.	Not present – The Project area lacks suitable habitat for this species. There are no patches of vegetation with a distinct canopy and a dense cluttered shrub layer in the Project area.
Petrogale penicillata - Brush-tailed Rock-wallaby	V	V	Prefers rock faces with large tumbled boulders, ledges and caves. Known to occur in a variety of the vegetation types such as dense rainforest wet sclerophyll forest vine thicket and dry sclerophyll forest.	Not present - no large tumbled boulders, ledges or caves located within the project site. Vegetation communities are highly fragmented and of low structural diversity.
Potorous tridactylus tridactylus - Long-nosed Potoroo (SE	V	V	Prefers dense understorey vegetation such as coastal heathlands and sclerophyll forests, with dense ground cover. Also prefers sandy soils	Not present – The Project area lacks suitable habitat for this species. There are no patches of vegetation with dense undergrowth in the Project area.

Scientific Name/Common Name	NC Act Status	EPBC Act Status	Preferred Habitat	Presence in revised Project area
Mainland			where it is able to dig for food resources (fungi).	The Project area supports high numbers of the predatory pests Foxes (*Vulpes vulpes*) and Feral Cats (*Felis catus*) which prey on this species and have contributed to its decline.
Pteropus poliocephalus - Grey-headed Flying-fox	-	V	This species feeds in a variety of habitats including rainforests, forests and woodlands communities, urban areas and gardens and orchards. It roosts in trees located neat water such as lakes rivers and the coast.	Known – has been recorded in the vicinity of the revised Project area. (Black Flying-fox were recorded foraging and sheltering within the revised Project area.)
Reptiles				
Anomalopus mackayi - Five-clawed Worm-skink	E	V	This species occurs in woodland and grasslands, including bluegrass grasslands, poplar box and brigalow communities. In modified areas, the species has been found sheltering under sheet metal, timber and hay bales.	Not present – bluegrass, poplar box and brigalow communities are found within the revised Project site. The species has not been recorded during the surveys completed over past 13 years.
Delma torquata - Collared Delma	V	V	This species is found in poplar box, lemon-scented gum and ironbark forests on stony soils and rocky ridges in southern Queensland. These communities usually have an understorey of grasses and lantana that produce thick leaf litter. The species seeks the protection of fallen timber and stones.	Not present – potentially suitable habitat in poplar box and brigalow communities. Eucalypt communities along rocky ridge lines have been recorded during surveys and these areas provide possible habitat. The species has not been recorded during the surveys completed over past 13 years.
Egernia rugosa - Yakka Skink	V	V	The Yakka Skink is known to occur in brigalow communities, as well as poplar box woodlands. The species has been found in cavities around buried rocks stumps and logs, it also seeks refuge in hollow logs and to burrow tunnels. In cleared areas, the species is known to find shelter under log piles, erosion gullies and rabbit warrens.	Not present – no burrow systems or latrine sites have been identified. The species has not been recorded during the surveys completed over past 13 years.
Furina dunmalli - Dunmall's Snake	V	V	This species is very rare and secretive. There are few records of its occurrence. It has been recorded at sites in brigalow, cypress pine and sheoak communities, on black alluvial cracking soils. The	Not present – habitat occurring in brigalow communities. The species has not been recorded during the surveys completed over past 13 years.

Scientific Name/Common Name	NC Act Status	EPBC Act Status	Preferred Habitat	Presence in revised Project area
			species has been found sheltering under fallen timber and ground litter, it could make use of cracks in clay soils.	
Paradelma orientalis - Brigalow Scaly-foot	V	V	This species has been recorded in a variety of open woodland communities and soils types. Specific habitat preferred by the species, relevant to the Study area includes brigalow/belah open forest and mountain coolibah open woodland. Its preferred micro habitat includes sandstone slabs, logs, fallen bark, leaf litter and grass tussocks. The species is known to be able to persist in areas that have been cleared and disturbed.	Not present – preferred habitat of brigalow/belah open forest and mountain coolibah open woodland recorded within the revised Project site. The species has not been recorded during the surveys completed over past 13 years.
Tympanocryptis pinguicolla - Grassland Earless Dragon	-	E	Occurs in naturally treeless native tussock grassland on black or brown clay loams. It prefers ungrazed or lightly grazed paddocks with a slight slope dominated by wallaby grasses, spear grasses, tussocks grasses and kangaroo grasses. They are known to shelter under rocks and sometimes in insect holes. The species has been collected from Brookstead, Pittsworth and Toowoomba	Very unlikely –grasslands present within the revised Project area. The species has not been recorded during the surveys completed over past 13 years.
Plants				
Bothriochloa biloba - Lobed Blue-grass	-	V	This species is from the Darling Downs and northern NSW. It grows in in cleared eucalypt forests and relict grassland often dominated by other grasses such as Queensland Blue-grass. It prefers heavy textured soils – black and brown clays.	Known
Cadellia pentastylis - Ooline	V	V	Occurs in dry rainforest, semi-evergreen vine thickets and dry sclerophyll communities.	Unlikely – preferred habitat is not present or in a very degraded condition within the revised Project site.
Clematis fawcettii - Stream Clematis	V	V	Occurs on loamy soils growing in the gaps of canopies in dry rainforests near streams and semi-evergreen vine thicket, usually near watercourses.	Unlikely – the only semi-evergreen vine thicket doesn't occur near a stream
Dichanthium	V	V	Occurs in black cracking clay in	Possible – in blue grass

Scientific Name/Common Name	NC Act Status	EPBC Act Status	Preferred Habitat	Presence in revised Project area
queenslandicum - King Blue-grass			tussock grasslands mainly in association with other species of blue grass.	grasslands throughout the revised Project site.
Digitaria porrecta - Finger Panic Grass	NT	E	Occurs in grassland on basaltic plains and in undulating woodlands and open forests. Usually occurs on dark and fine textured soils with some degree of seasonal cracking. It persists in disturbed locations. It is found in vegetation communities dominated by mountain coolibah and poplar box.	Known
Haloragis exalata subsp. *velutina* - Tall Velvet Sea-berry	V	V	This species occurs in rainforest and rainforest margins, including dry rainforests. It is often found in damp areas near watercourses.	Unlikely – no suitable habitat within the revised Project site. Nearest record is from the Bunya Mountains.
Homopholis belsonii - Belson's Panic	E	V	Found in poor soils in dry woodlands of belah, poplar box and sometimes brigalow. It typically prefers light to moderate shade.	Known
Lepidium peregrinum - Wandering Pepper-cress	-	E	This species was thought to be extinct until recently rediscovered in near Clifton in northern NSW. Was found in open riparian forest growing in sandy alluvium.	Unlikely – no suitable sandy soils observed within the revised Project area.
Picris evae - Hawkweed	V	V	Occurs in Eucalypt open woodlands with grassy understory composed of Dichanthium species. The species has be found growing along roadsides and in cultivated areas, on black, dark grey or red-brown soils and clay loam soils.	Possible – in grassland and brigalow communities.
Rhaponticum australe - Austral Cornflower	V	V	Occurs in eucalypt open forest with grassy understorey on roadsides and in road reserves.	Known, has been found adjacent to the rail spur alignment.
Sarcochilus weinthalii - Blotched Sarcochilus	E	V	Found growing in trees of rainforests and dry scrubs.	Unlikely – no suitable habitat recorded within the revised Project area.
Streblus pendulinus - Siah's Backbone	-	E	This species grows mainly along watercourses in well-developed rainforest, gallery forest or drier rainforests.	Unlikely - no suitable habitat recorded within the revised Project area.
Thesium australe - Austral Toadflax	V	V	Occurs in grasslands and grassy woodlands. Commonly associated with kangaroo grass.	Possible – grassland and grassy woodland habitat occurs within the revised Project area.

3.11.2. Terrestrial Flora

The Study area has a reduced 'conservation significance' due to historic clearing for cropping and pasture improvement for grazing. Isolated patches of woodland exist amongst grazing and cropping areas as well as narrow strips retained along road reserves. The condition of the remnant vegetation is variable, with most areas being subjected to long-term grazing impacts, and as a consequence, present a moderate to low diversity of native flora. Native grasslands occur in road reserves and paddocks not subject to regular ploughing, cropping or grazing. The better quality examples occur in lightly grazed areas.

Three endangered regional ecosystems were found in the Study area and are listed in Table 3-36 for State classification, (Table 3-37 for Commonwealth listings), and shown in Figure 3-9.

Table 3-36 Regional Ecosystems Observed

Regional Ecosystem Code	VM Act Status	Description
11.3.1	Endangered	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains
11.3.2	Of concern	*Eucalyptus populnea* woodland on alluvial plains
11.3.17	Of concern	Eucalyptus populnea woodland with Acacia harpophylla and/or Casuarina cristata on alluvial plains
11.3.21	Endangered	*Dichanthium sericeum* and/or *Astrebla* spp. grassland on alluvial plains. Cracking clay soils
11.8.11	Of concern	*Dichanthium sericeum* grassland on Cainozoic igneous rocks
11.8.3	Of concern	Semi-evergreen vine thicket on Cainozoic igneous rocks. Steep hillsides
11.8.5; 11.8.5a	Least concern	*Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks
11.9.5	Endangered	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks
11.9.10	Of concern	*A. harpophylla*, *E. populnea* open forest on Cainozoic fine-grained sedimentary rocks
11.9.13	Of concern	*Eucalyptus moluccana* or *E. microcarpa* open forest on fine grained sedimentary rocks

Table 3-37 EPBC Threatened Ecological Communities of the Study area

Threatened Ecological Community	EPBC status	Description
Brigalow (*Acacia harpophylla*) dominated and co-dominated community (RE 11.3.21 and 11.8.11)	Endangered	This community occurs as scattered patches along Lagoon Creek and within the Manning Vale West pit. There are small isolated patches across the southern part of the Study area, outside the mine footprint. This community is around 15 metres in height and comprises a canopy with *Acacia harpophylla* and *Casuarina cristata*. The understorey includes *Geijera parvifolia* and *Eremophila mitchellii*. There are moderate weed infestations present (up to 20%) in some patches, including African boxthorn and Mayne's pest and tree pear.
Bluegrass dominant grasslands of the Brigalow Belt Bioregions (North and South) (RE 11.3.1 and 11.9.5)	Endangered	Scattered patches of the community are located along Lagoon Creek, in the western part of the Study area, within the Manning Vale West Pit and along road sides.
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (RE 11.8.3)	Endangered	This community occurs in one area in the Study area - to the west of the Manning Vale West pit. The SEVT community does not fall within the mine footprint of the revised Project.

3.11.3. Weeds

Significant environmental weed species and declared pest plants noted within the Study area include Mother of Millions (*Bryophyllum delagoense*), Prickly pear (*Opuntia stricta*), Velvet Tree Pear (*Opuntia tomentosa*), Noogoora burr (*Xanthium pungens*), Bathurst burr (*Xanthium spinosum*) and African Boxthorn (*Lycium ferocissimum*).

3.11.4. Terrestrial Fauna and Avifauna

A total of 149 vertebrate fauna species have been recorded within the Study area to date, comprising 23 mammals, 92 bird species, 25 reptiles and 9 frog species. Comprehensive fauna surveys within the Study area to date have recorded a total of three vertebrate fauna species of conservation significance.

Overall, the habitat in the study area for the fauna species targeted in this report, and other native species generally, is of poor quality. The site has previously undergone significant clearing for cultivation and grazing and is heavily disturbed and mostly comprised of cleared land and access tracks. The small patches of remnant vegetation that remain are generally associated with Lagoon Creek and farm houses. As a result, these small patches are highly fragmented, isolated and subject to edge effects. Consistent with a landscape in this condition, the area is heavily invaded by introduced pest species such as the Feral Cat (*Felis catus*) and Wild Dog (*Canis familiaris*), Indian Mynas (*Acridotheres tristis*), Red Fox (*Vulpes vulpes)* and European Rabbits (*Oryctolagus cuniculus*), and weeds including Velvet Tree Pear (*Opuntia tomentosa*) and Rhodes Grass (*Chloris gayana*).

3.11.5. Pest Species

A total of ten introduced species were recorded within the Study area, including one amphibian, two birds and seven mammals. The introduced species include the cane toad, house mouse, fox, feral cat, black rat and European hare.

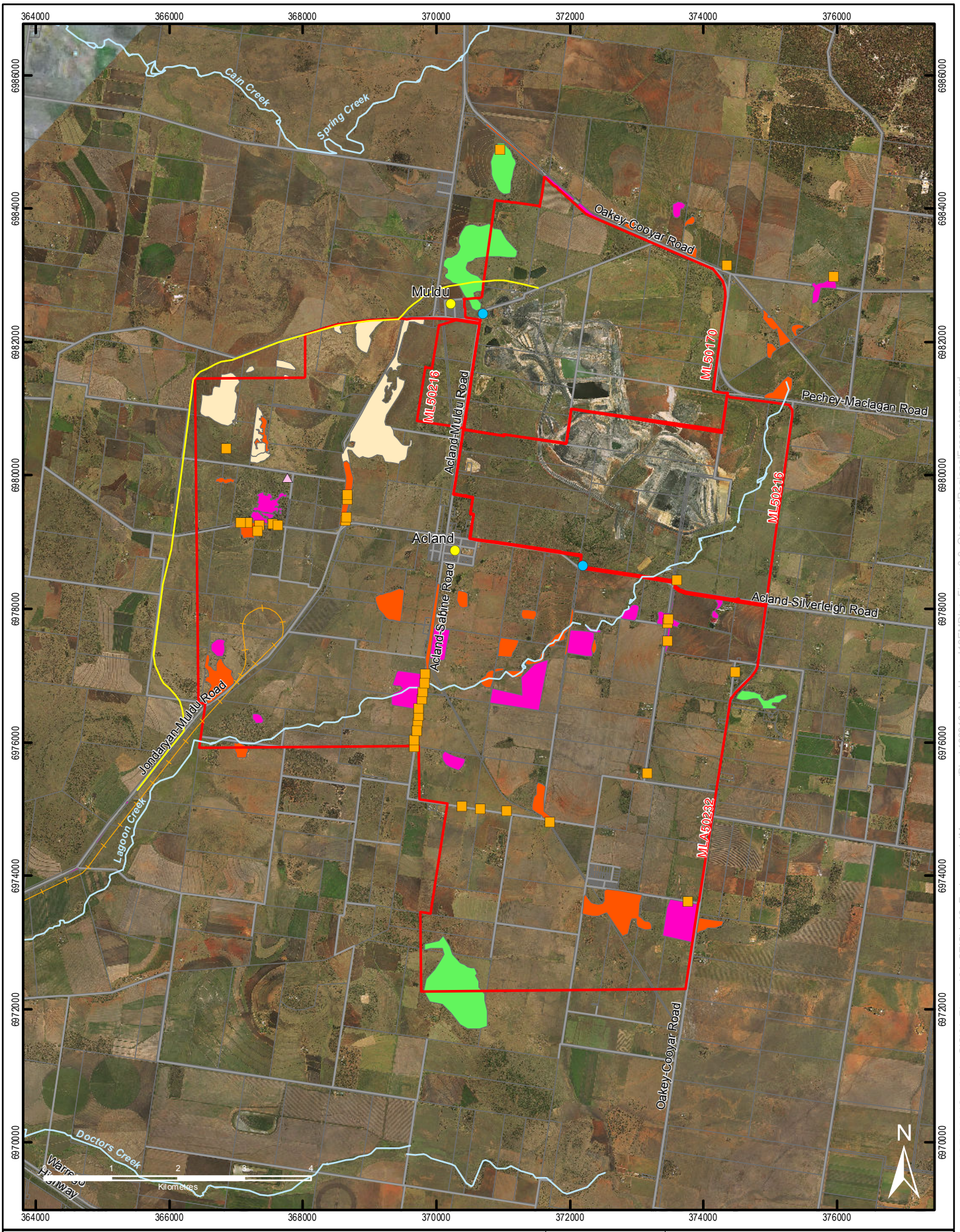
3.11.6. Aquatic Flora and Fauna

Aquatic flora and fauna surveys were undertaken between 2008 and 2013 within the Study area and no threatened or endangered aquatic flora or fauna (macroinvertebrate, turtles and fish) could be found inhabiting the waterways within the Study area or the surrounding water courses.

The existing aquatic habitat along Lagoon Creek, while categorised in poor condition, provides a habitat for a number of native aquatic species. Although this section of Lagoon Creek is not a permanent waterway it does provide a degree of temporary habitat for aquatic species. Ephemeral waterways can provide areas for colonisation, and as a result, certain fish and invertebrate species may utilise these habitats for dispersion, breeding and juvenile stages of development.

3.11.7. Environmental Values

The environmental values to be protected or enhanced are the terrestrial and aquatic flora and fauna of the highly disturbed ecosystems in the vicinity of the revised Project.



LEGEND

- Towns and Localities
- Rail Spur
- Roads
- Creeks
- Jondaryan-Muldu Road Diversion
- Cadastre
- Mining Tenements

Threatened Flora

- Bothriochloa biloba
- Digitaria porrecta
- Homopholis belsonii
- Rhaponticum australe

Status

- Endangered
- Of Concern
- Not Of Concern
- Least Concern

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Figure 3-9 - Observed Regional Ecosystems

Scale 1:75,000 on A4

Projection: Australian Geodetic Datum – Zone 56 (AGD84)

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3.11.8. Potential Impacts on Terrestrial Flora and Fauna

Vegetation Clearing

There are three Commonwealth Threatened Ecological Communities present within the Study area. (Bluegrass grassland, Brigalow woodland and Semi-evergreen vine thicket). Non-remnant (regrowth) Bluegrass grassland and Brigalow woodland will be subject to some disturbance and/or loss. There will be no clearing of Semi-evergeen vine thicket.

The Bluegrass ecological community is extensively distributed across the Study area. However, only a proportion is in adequate condition to be classified as "remnant" under the VM Act. A total of 40.1 ha of remnant Bluegrass grassland will be disturbed.The revised Project will result in the clearing of 24.6 ha of Brigalow woodland.

One EPBC Act listed fauna species has been recorded from the Study area, the Grey-headed Flying Fox (*Pteropus poliocephalus*). The revised Project will result in the temporary reduction in foraging habitat at a local level, potentially adversely impacting on the foraging behaviour of members of the local Flying Fox population. The Koala has been confirmed within the revised Project site and makes use of the poplar box woodland as habitat, 4.5 ha of which will be cleared for the revised Project.

Fragmentation

Fragmentation has two primary effects. First, it creates new edges between remnants and cleared or disturbed land leading to 'edge' effects. These consequences include physical changes to the remnant in the border region, such as different levels of exposure to the sun and wind and changes in water cycles and local air temperature. Biotic changes include invasion by opportunistic species with good dispersal or colonising abilities such as weeds and feral animals. Second, it isolates and creates barriers between remnants.

A review of current RE mapping demonstrates that the vegetation within the Study area is already highly fragmented to the point where there are no large patches of vegetation remaining and those that do remain are poorly connected. Fragmentation impacts associated with the proposal are expected to be minimal.

The revised Project will result in the clearing of native vegetation and habitat. As previously described, vegetation and habitat across the revised Project site is already highly fragmented, disconnected from adjacent areas of habitat and scattered cleared farming country.

Fragmentation of vegetation and habitat will occur in patches to the west and east of the Manning Vale Pit and to habitat along Lagoon Creek.

While the revised Project will lead to clearing of 142 ha of remnant vegetation, there will be 281 ha of native vegetation and habitat unaffected by the revised Project. Vegetation along Lagoon Creek will be retained and continue to provide habitat connectivity.

Weed Proliferation

A suite of weed species already occur within the Study area, and as a consequence, there is potential that these may be spread into new areas as a result of construction traffic and bulk earthworks. However, using established weed management practices, the revised Project is not expected to introduce new weed species or cause significant weed infestations.

Feral Animal Species

Feral animal species have been sited within the Study area and include the Cat, European Red Fox, Rabbit, Hare, Pig and Cane Toad. The revised Project will not contribute to an

increase in populations of any of these species through the implementation of appropriate management measures.

3.11.9. Potential Impacts on Aquatic Flora and Fauna

Activities with the potential to affect aquatic flora and fauna are:

- the alteration of hydrological regimes and stream water quality on-site; and
- release of water from the Study area.

3.11.10. Proposed Environmental Protection Objective

The environmental protection objective is to manage the terrestrial and aquatic flora and fauna within the Study area and to minimise the risks to flora and fauna outside the immediate Study area.

3.11.11. Control Strategies

Nature conservation will be managed by NAC's EMS based on the CZMP, TSTP, PWMP, BOMP, and FLURP.

Mitigation measures intended to reduce the potential impacts of the revised Project on flora and fauna values of the Study area are described below.

All areas to be cleared will have their boundaries surveyed and clearly marked by tape, pegs or other means. All site clearance will conform to the limits of the current mine plan. Particular attention will be paid to defining the boundaries of clearing where endangered and of concern regional ecosystems are present.

All vegetation clearance will be restricted to what is required for safe operations. A plan for dealing with fauna during clearing and construction will be prepared to outline protocols for dealing with injured wildlife and other necessary actions relating to fauna.

The conservation value of previously disturbed or cleared sections of the Study area which are outside the proposed mining area, will be managed to reduce fragmentation of vegetation and to meet existing commitments and statutory requirements.

The existing flora and fauna monitoring program will be continued and expanded as required to protect flora and fauna of 'conservation significance' within and surrounding the Study area. The monitoring program will be broadened as required for the revised Project and will continue until decommissioning and final rehabilitation.

NAC will also investigate the possibility of avoiding one of the identified areas of significant vegetation located in the vicinity of the planned infrastructure area (Brigalow and Poplar Box). Future detailed design and construction planning will help confirm the likelihood of this outcome. If feasible, possible options for the long term protection of the area of significant vegetation would be enclosure in a dedicated protection zone and incorporation into the CZMP.

3.11.12. Threatened Species Translocation Plan

NAC intends to transplant all threatened/protected species endangered by the revised Project's activities to a new suitable location for long term protection. This approach will require detailed planning and preparation, and as minimum involve:

- better defining of all threatened/protected species that may be impacted by the revised Project's activities (i.e. at an appropriate scale);
- identification of suitable locations for the recovered plants (i.e. based on plant numbers, habitat requirements, avoiding possible future revised Project activities, etc.);
- collection of propagules (e.g. seeds, etc.) prior to transplanting for propagation to protect against genetic loss from potential establishment failure; and
- implementation of the TSTP.

The TSTP will include the transplantation management goals/objectives, site details, a propagule collection and propagation strategy, planned transplantation techniques (e.g. site preparation, transplanting methods, timing, watering regime - pre and post transplantation, etc.), transplantation success criteria, a monitoring and reporting regime, a maintenance regime for weeds and poor establishment, and a comprehensive long term management regime. The TSTP would require Commonwealth and State approvals under the *Environment Protection and Biodiversity Protection Act 1999* and *Environmental Protection Act 1994*, respectively.

3.11.13. Bluegrass Offset Management Plan

The revised Project will clear 40.1 hectares of Queensland Bluegrass (*Dichanthium sericeum*) grassland community, which is classified as a significant vegetation community by the Commonwealth and State governments. As a result, NAC is proposing to develop a biodiversity offset for the 40.1 hectares of *Dichanthium sericeum* grassland community. The proposed biodiversity offset will be located on land owned and controlled by APC, and comprise an area in the order of approximately 90 ha.

To gain acceptance from SEWPaC for its biodiversity offset, NAC is proposing to conduct a trial during the approvals and construction phase of the revised Project to demonstrate that a Bluegrass grassland community comprising the appropriate species can be developed. If acceptable, NAC will commence a trial during 2014,

The Bluegrass Offset Management Plan (BOMP) (EIS Appendix J.8) has outlined the methodology for establishing and managing a Bluegrass grassland community.

3.11.14. Weed Management

A Pest and Weed Management Plan (PWMP) has been prepared for the revised Project and is presented in Appendix J.9. Ongoing pest control will occur on an as needs basis to ensure population numbers are kept low. Thereby, minimising the potential impacts on native flora and fauna with in the revised Project site.

3.11.15. Monitoring

Routine ecological monitoring is currently undertaken for the Mine. This monitoring is set to be expanded to incorporate the Study area, for example, the monitoring requirements of the proposed new vegetation related management plans. To ensure consistency with baseline data, monitoring will be scheduled to follow significant regional rainfall.

Other issues that will be considered in the monitoring program include:

- monitoring the protection of *'endangered'* and *'of concern'* vegetation through pre-clearing checks and delineating vegetation to be retained;
- monitoring the revegetation of '*endangered*' and *'of concern'* regional ecosystems;

- establishment of a wildlife monitoring program using appropriate survey techniques and population indices to monitor the impacts on target species and to determine level of use of regeneration areas and disturbed habitats; and
- weed monitoring in conservation and buffer zones.

3.11.16. Proposed Environmental Authority Conditions: Schedule I – Nature Conservation

No specific EA conditions are proposed for nature conservation.

3.12. Community

3.12.1. Background

The consultation program implemented by NAC, as described in this section, reflects both the formal consultation activities carried out specifically for the revised Project and the existing community and stakeholder engagement activities undertaken as part of NAC's on-going community consultation program for the Mine.

A comprehensive community stakeholder engagement program has been undertaken as part of the EIS assessment. Consultation with all key stakeholders will continue throughout the life of the revised Project. During the consultation period, more than 627 contacts were made with the revised Project team via the revised Project contact points, community information sessions, CRG meetings, individual meetings and discussions during visits to the New Hope Community Information Centre since the announcement of the revised Project in November 2012.

A summary of the top five key feedback topics raised by stakeholders through all engagement activities is provided in Table 3-38.

Table 3-38 Detail of Key Feedback Topics

No.	Times Topic Raised	Key Feedback Topic	Feedback Detail	Proposed mitigation
1	105	Engagement activities	Requests for information about community information sessions, site tours and stakeholder briefings contributed to the amount of times this feedback topic was raised as it was used to capture general engagement activities. Advisory agencies were also interested in hearing about engagement activities.	NAC will continue to provide proactive stakeholder engagement activities about the revised Project and notify the community about these.
2	97	Sponsorship and donation	Requests for and discussions about current NHG sponsorships are included here. A number of stakeholders also wanted to know more about which organisations NHG sponsored.	NHG will continue to contribute sponsorships and donations to support schools, sporting groups and not-for-profit organisations in the local region.
3	93	Employment opportunities	The general community raised interest in employment opportunities as part of the revised Project – these primarily came from people attending the New Hope Community Information Centre.	Revised Project to provide an additional 135 jobs, and 260 jobs during construction.

No.	Times Topic Raised	Key Feedback Topic	Feedback Detail	Proposed mitigation
			Many were supportive of additional jobs for the community and pleased most workers were expected to be from the local region.	NAC has a local employment policy, where possible. These concerns have also been addressed in Chapter 16.
4	78	Community partnerships	Discussions about and requests for community partnerships with NHG, including attendance at the CareFlight events, education partnerships, career expos, and Oakey Chamber of Commerce meetings.	NHG has established a Community Investment Fund to identify and support additional community projects that promote the community's cultural, social, health or environmental wellbeing.
5	56	EIS	Feedback was received in response to information provided to stakeholders and advisory bodies regarding the EIS. Comments include: "Thanks for the information. When do you think the EIS will go in to the Mines Department for approval?" "Thanks…please let us know if there is anything we can do to assist in support of your EIS application."	NAC will continue to inform stakeholders about the approvals process and provide proactive engagement activities to seek feedback on the revised Project.

Stakeholder comments regarding the revised Project have been generally supportive with 64% of contacts with stakeholders recorded as being positive, particularly regarding the changes NAC made to develop the revised Project plan, indicating these revisions have addressed key concerns about the original proposal. Just 6% of contacts with stakeholders were recorded as negative since announcement of the revised Project in November 2012.

There has been a general view that the revised Project is an opportunity for the local area to gain additional employment, training, sponsorship, community investment and business opportunities for Oakey and the surrounding communities.

3.12.2. Environmental Value

The environmental values that are to be protected and enhanced are the 'lifestyle of the local community', including the wealth, health, safety, and wellbeing of the community surrounding the revised Project site.

3.12.3. Potential Impacts on the Environmental Value

Mining activities have the potential for the following impacts (positive and negative) on community environmental values:

- dust;

- noise;
- ground vibration;
- water level and quality impacts;
- downstream water quality;
- lighting;
- traffic;
- airblast overpressure;
- community lifestyle; and
- local economy.

3.12.4. Proposed Environmental Protection Objective

The revised Project's environmental protection objective is to minimise environmental nuisance to neighbours from mining and associated activities and to respond to concerns expeditiously.

3.12.5. Commitments

- NAC will continue to consult with relevant stakeholders using a variety of communication mechanisms to ensure that the local community is continually engaged about the revised Project. NAC will also continue to ensure its neighbours are properly consulted in relation to revised Project.
- NAC will continue its current policy of informing near neighbours in advance of each blast event on site. NAC will continue to consult with local authorities and/or relevant State government departments in relation to mining related issues.
- The revised Project has an established and operational complaints procedure that includes:
  - maintenance of a register of complaints held on-site;
  - a process for receiving, handling, investigating and documenting complaints;
  - investigation follow up and a response as soon as practicable to the complainant; and
  - a commitment to resolving legitimate complaints in an amicable and timely manner.

3.12.6. Proposed Environmental Authority Conditions: Schedule J - Community

No specific EA conditions are proposed for community.

3.13. Visual Amenity and Lighting

3.13.1. Background

The undulating nature of the revised Project site generally provides for extensive views of a predominately rural landscape with a medium degree of visual amenity. Apart from the

Mine, the revised Project site is dominated by interspersed vegetated landscapes with unobtrusive residential developments.

In its initial stages, the revised Project would be a visually prominent feature within the landscape and, to an extent, will conflict with the existing nature of the visual environment. The nature of the works will initially alter the existing visual environment through excavation of a predominately rural landscape and the removal of vegetation.

As is common with the broader region, residential dwellings surrounding the revised Project site are sparsely located and it is considered that approximately eight of the 23 sensitive receptors would have an expansive view of the various works being undertaken for the revised Project.

Primarily, traffic on Oakey-Cooyar would have the highest level of visibility over the revised Project site. However, as the traffic is considered as a temporary receptor, impacts are considered to be minor. Sensitive receptors within Acland would also have views of the revised Project site due to its proximity, but suitable mitigation measures such as vegetation screening will minimise visual impacts.

3.13.2. Environmental Value

The environmental values of the visual amenity and lighting environment to be enhanced or protected under this EM Plan are the qualities of the visual amenity and lighting environment that support the safety, lifestyle, general living and wellbeing of humans.

3.13.3. Potential Impacts on the Environmental Value

Through the clearing of vegetation, the excavation of the mine pit areas and the establishment of out-of-pit spoil dumps, the revised Project will alter the local visual environment and landscape character throughout the life of the mining operations.

Visual Amenity

During construction, operation and decommissioning of the revised Project, aspects that would be most visible from the nearby sensitive receptors include:

- out-of-pit spoil dumps;
- mine pit areas and voids located close to the boundaries of the revised Project site and the sensitive receptors;
- the rail spur and TLF;
- the MHF; and
- the realignment of Jondaryan-Muldu Road.

The relatively undulating topography surrounding the revised Project site provides for both expansive and limited views. Although, some higher points within the landscape provide for significant views of the revised Project, the presence of vegetation on localised hills and ridgelines limits views from other vantage points.

Motorists travelling along Oakey-Cooyar Road would have extensive views of the mine pit areas and out-of-pit spoil dumps due to both the expansive views to the west from this road and its proximity to the revised Project site.

Acland is expected to experience visual impacts due to both the proximity of the revised Project and expansive views to the west.

Visual impacts on the western side of the revised Project site would generally be confined to the rail spur and re-alignment of Jondaryan-Muldu Road. A ridgeline running along the western boundary of the revised Project site would limit views of mining activities.

Sensitive receptors located to the north and north-east of the revised Project site are expected to experience limited visual impacts due to the fact that existing operations at the Mine would offset impacts. Rehabilitation such as re-vegetation has occurred in these areas, limiting views of the existing mining activities.

Lighting

Night lighting is expected to create a glow in the night sky that will be visible from the surrounding region and nearby residences. Permanent lighting around the CHPP precinct, MHF, TLF and mining areas will contribute to a general glow in the night sky, as well as in-pit machinery, mobile equipment and mining vehicles. Lighting for the revised Project has the potential to cause impacts to the operations of the Oakey Airbase and Training Centre. The Aviation Hazard Management produced for the revised Projects' EIS (Appendix J.17) of this outlines the mitigation measures that will be implemented for the revised Project.

However, as the Mine already provides some luminance in the night sky, it is unlikely that the revised Project will substantially increase the existing visual impact of night time glow. The CHPP will be upgraded at its current location and as such, only slight changes in night lighting would be experienced. Furthermore, the light emitted from the new TLF area is expected to be reduced by comparison to the current JRLF.

The impacts on fauna from night lighting are expected to be minimal due to the location and extent of remnant vegetation.

3.13.4. Proposed Environmental Protection Objective

NAC will ensure that light from the revised Project does not cause a nuisance to any nearby light sensitive receptors (e.g. nearby residents or drivers using roadways adjacent to the Mine).

3.13.5. Control Strategies

NAC will continue to implement the following light pollution control strategies for the revised Project.

- Legitimate light complaints will be dealt with promptly using NAC's complaint handling procedure. Appropriate control strategies will be implemented as necessary in order to address the cause(s) of legitimate complaints and to otherwise ensure compliance is maintained.
- As currently practised, near neighbours to the revised Project will be provided with afterhours contact numbers to allow prompt response to complaints, such as noise and light.
- As required, light sources at the revised Project will be fitted with shielding devices (e.g. glare shields and screens) to reduce and remove light pollution.
- Where possible, lighting required for the revised Project site will be oriented inwards, carefully focussed on the areas requiring illumination and screened from the outside.

3.13.6. Proposed Environmental Authority Conditions: Schedule K - Light

No specific EA conditions are proposed for Light.

3.14. Cultural Heritage

3.14.1. Background

Indigenous and non-indigenous cultural heritage places and values have been recorded as part of cultural heritage investigations conducted over the revised Project site at various times.

Further information on the non-indigenous and indigenous cultural heritage over the Study area is available in revised Project EIS Chapter 12 Cultural Heritage.

3.14.2. Non-indigenous Cultural Heritage

Under the Queensland Heritage Register, one registered item exists within the Study area – the Acland Mining Museum or former Acland No. 2 Colliery. The significance of the Acland Mining Museum from a heritage perspective is that it provides an insight into the development of mining technology and methodologies over the long period.

The township of Acland, which is now largely owned by NAC, is located within the Manning Vale resource area and will be closed and removed before mining commences. The 'Acland Heritage Precinct Committee' has been formed to manage the relocation of significant items within the township to a 'Heritage Precinct' off-site for tourism and other commemorative purposes. NAC will take all reasonable and practical measures to ensure the closure and removal of significant items is conducted in an appropriate manner and to the satisfaction of all stakeholders involved in the process.

3.14.3. Indigenous Cultural Heritage

From archaeological records, the Acland area was an important route for Aboriginal people travelling to the bunya nut festivals in the Bunya Mountains. This triennial festival with its social, economic and spiritual associations had a major significance for the tribes of southeast Queensland and northern New South Wales.

A number of artefact scatters and sites have been found within the revised Project site during surveys and a greater number of indigenous sites were located in proximity to artefact reduction sites and quarries. (Refer to Chapter 12 Cultural Heritage). The Aboriginal people either camped within the Acland area en-route to the bunya nut harvests, or utilised its resources.

NAC has a legal agreement with the Traditional Owner Group - Western Wakka Wakka and has a Cultural Heritage Management Plan (CHMP) in place.

3.14.4. Environmental Value

The cultural and scientific significance of European and Aboriginal occupation in the vicinity of the revised Project.

3.14.5. Potential Impacts on the Environmental Value

Potential impacts on cultural heritage values include loss of and/or damage to artefacts and places of European and Aboriginal significance without proper assessment, collection and/or relocation.

3.14.6. Proposed Environmental Protection Objective

The revised Project's environmental protection objective is to preserve the cultural heritage values (Indigenous and Non-Indigenous) of the revised Project site.

3.14.7. Performance Criteria

- The performance criteria for cultural heritage management are:
- compliance with requirements of the *Aboriginal Cultural Heritage Act 2003* (ACH Act) and the revised Projects' CHMP;
- conformance with the Acland Colliery Conservation Management Plan (ACCMP) (Appendix J.12) and Acland Management Strategy (Chapter 3);
- avoidance of all cultural heritage sites wherever possible; and
- cultural heritage clearance processes prior to ground disturbance.

3.14.8. Control Strategies - Non-indigenous Cultural Heritage

Acland Management Strategy

In developing the Acland Management Strategy, the following guiding principles were adopted:

- remove dysfunctional buildings and infrastructure in a state of disrepair;
- tidy up and maintain land;
- retain items of local historical or heritage significance;
- enhance amenity of Tom Doherty Park and the Acland Community Hall; and
- meet legal obligations.

The Acland Management Strategy outlining the property types and structures in Acland currently owned by the NHG is provided in Chapter 3.

Acland Colliery Conservation Management Plan

To satisfy its obligations as an owner of a Queensland Heritage listed site, the NHG has developed the Acland Colliery Conservation Management Plan (ACCMP) for the Acland No.2 Colliery, and is provided in EIS Appendix J.12. The purpose of the ACCMP is to set out an agreed framework for the management, preservation and maintenance of the listed structures within the former Acland No.2 Colliery site.

As a Queensland Heritage listed site, the significance of the former Acland No.2 Colliery requires that the following general commitments are undertaken.

- The historical mine site, including all built, moveable and landscape features should be maintained and conserved within their original setting, particularly where possible elements of moderate and high rankings of significance;
- Significant elements should be maintained;
- Intrusive elements should be removed;

- Development on or immediately adjoining the site should be avoided or if necessary only undertaken with full consideration of the cultural heritage significance of the site; and
- The scale, form and setting of the place should be respected and any proposed management or use options should be sympathetic to its historic use.

The ACCMP provides an overview of the statutory and non-statutory requirements for the listed items including inspection and maintenance schedules and associated record-keeping requirements. A total of twenty-one management commitments have been included in the ACCMP to ensure the former Acland No.2 Colliery receives a high standard of management and is protected for future generations.

3.14.9. Control Strategies - Indigenous Cultural Heritage

NAC has an existing CHMP with members of the Western Wakka Wakka which meets duty of care standards set by the ACH Act. NAC is legally bound to implement and maintain the legal agreements and CHMPs with the Western Wakka Wakka Traditional Owners. NAC will ensure all of its cultural heritage responsibilities are met.

3.14.10. Control Strategies - Fossils

If fossils are located during the development and operation phases of the revised Project, NAC will advise the Queensland Museum.

3.14.11. Commitments

NAC will ensure the following:

- All employees and contractors will undertake cultural heritage awareness training; and
- All indigenous cultural heritage management will be in accordance with the revised Projects' CHMP.

3.14.12. Proposed Environmental Authority Conditions

No specific EA conditions are proposed with respect to cultural heritage.

4. Environmental Management

4.1. Monitoring

4.1.1. Background

Environmental monitoring is performed in accordance with the EA to provide data to measure the impact of the revised Project on the surrounding environment and to measure the efficiency/effectiveness of the various environmental impact control strategies.

The current Environmental Monitoring Plan will be updated to incorporate the expanded requirements of the revised Project. The monitoring program will outline the environmental monitoring to be undertaken, including monitoring sites, parameters and their frequency of measurement and will also make reference to monitoring procedures and records. The Environmental Monitoring Plan will be made available to the administering authority on request.

The monitoring will include rehabilitation success, surface water quality, groundwater quality and level, air quality (PM_{10} particulate and dust deposition levels), noise, blasting (air blast over-pressure and vibration), and as required, light. Commitments and EA conditions have been included in the relevant sections of the EM Plan.

Environmental monitoring data will be collected for the various monitoring parameters, stored for a period of at least five years in a suitable accessible format, and reported internally to key personnel on at least a monthly basis, and externally to the DEHP on an as required basis.

4.2. Reporting

4.2.1. Internal

All environmental incidents will be recorded, and as require, investigated.

4.2.2. External

NAC aims to provide timely, relevant and appropriately presented information to government authorities, the local community and the general public on the environmental performance of the revised Project.

Reporting commitments under the EA and other legislation will be complied with and includes:

- preparing an Annual Return, as required under the EP Act;
- submitting the annual National Pollutant Inventory (NPI) report;
- reporting incidents that may potentially compromise compliance with the EA immediately to the administering authority; and
- preparing reports as required under other legislation, for example, the National Greenhouse and Energy Reporting System (NGERS) and Energy Efficiency Opportunities.

4.3. Environmental Management System

The revised Project operations will take place under NHG's EMS, which is consistent with ISO 14001. The EMS will be the cornerstone of the operation's due diligence approach to environmental management and encompasses the measures used to identify, prevent or minimise environmental harm, ensure compliance and promote continuous improvement. It will encompass legal and other requirements such as the EA for the revised Project and also risks and opportunities that this EM Plan defines.

4.4. Research

NAC supports research in mining and has committed support to the Australian Coal Association Research Program (ACARP). As required NAC will commission the necessary research to address any outstanding environmental or rehabilitation issues identified in relation to operation of the revised Project.

NAC also contributes to the COAL21 fund which aims at fully realising the potential of advanced technologies to reduce or eliminate greenhouse gas emissions associated with the use of coal.

4.5. Roles and Responsibilities

All revised Project and existing Mine staff have a responsibility to work under a General Duty of Care of the EP Act, and must implement requirements in an EMS based on agreed plans and procedures outlined in this EM Plan and other supporting environmental management plans to be administered through each Plan of Operations.

The General Manager will hold ultimate responsibility for environmental compliance and implementation of NAC's Environmental Policy in accordance with Sections 492 and 493 of the EP Act.

The responsibility of NAC, at a minimum is outlined below:

- Implement and monitor requirements in the EMS;
- Provide suitable environmental training/instruction in line with the EMS;
- Ensure regular EMS reviews are undertaken;
- Ensure that appropriate and adequate resources are provided to enable the requirements of the EMS and the corresponding EA; and
- Any major environmental incidents are reported in a timely and appropriate manner to the relevant internal and external bodies.
- External contractors responsibilities, as a minimum, shall:
- Understand and comply with the EMS and the corresponding EA;
- Undergo relevant site inductions and environmental awareness training/instruction to understand their responsibilities while on site under this EMS;
- Ensure environmental safeguards are in place to avoid environmental harm;
- Ensure all equipment used is in good service and all precautions in place to avoid environmental harm;

- Regularly inspect and monitor activities for environmental compliance and proactive environmental management; and
- Report all environmental incidents to the NAC Environmental representative or manager within 24 hours.

4.6. Staff Training

NAC will ensure that all employees, contractors and visitors receive appropriate environmental awareness training. This action is achieved through a variety of methods including induction training, formal presentations and impromptu meetings.

Specifically, NAC requires that employees, contractors and visitors are aware of:

- their roles and responsibilities (including environmental incident reporting);
- the environmental impacts, potential or actual, of their activities on-site;
- natural hazards such as poisonous and venomous animals;
- the potential consequences of poor environmental performance; and
- site emergency procedures

Employees and contractors required to undertake work on-site must undergo an environment, health and safety induction. Records of training content and attendance are maintained. Relevant environmental matters for inductions and training may include:

- environmental policy;
- duty of care and duty to notify;
- hazard and incident reporting;
- environmental awareness;
- risk management;
- chemicals and hydrocarbon management;
- land management;
- water management; and
- waste management.

4.7. Communications

4.7.1. Internal

Internal communications will be continued as per existing mine operations, including the following activities:

- Environmental reporting in weekly/monthly reports;
- Environmental items regularly discussed at toolbox meetings;

- Complaints reported, recorded and managed;
- Environmental risk assessment incorporated into pre-start and JSEA checklists; and
- Regular environmental communiques via email, noticeboards, etc.

4.7.2. External

External communications will include:

- Statutory environmental reporting including Annual Returns, environmental incidents, and breaches of the EA;
- NPI and NGERS reporting;
- Complaints.

4.8. Documentation

All relevant environmental documentation will be maintained within the existing EMS on-site, and will be maintained as required under the EA.

4.9. Environmental Auditing and Review

Environmental audits will be undertaken to assess site compliance with the EA, the EP Act, and any other relevant legislation as required. Audits shall also be undertaken to assess the performance of the sites' EMS.

An environmental auditing program will be implemented for the revised Project. The program will include:

- internal environmental audits – frequency decided by risk, as required by NAC's EMS;
- environmental management system review – frequency decided by risk, as required by NAC's EMS;
- Plan of Operations audits – with each Plan of Operations (usually annually); and
- administering authority audits – at a frequency determined by the DEHP.

4.9.1. Evaluation of Compliance

Evaluation of compliance will be achieved through the use of an environmental auditing program as discussed above.

4.9.2. Non-conformity, Corrective Action and Preventive Action

A Register of non-conformances and corrective actions will be kept to proactively manage and prevent future incidents or non-conformances. A level of severity will be recorded, and according to this level, the issue will be dealt with in one of several ways:

- Root cause analysis conducted;
- Actions to address the non-conformance including:
  - Remediation actions;

- Prevention of repeat non-conformances; and/or
- Changes to process, systems or design;

- Person(s) responsible to address, manage and close-out non-conformance; and
- Time-frame to complete process.

4.9.3. Control of Records

All reports, meeting minutes, incidents, complaints, non-conformance register(s), and associated environmental communications will be maintained on-site and available when required by auditors, Administering Authority or other relevant party.

All environmental monitoring data and supporting information managed within the EMS will be held on-site using a centralised data management system.

4.9.4. Internal and External Audits

NAC will conduct environmental audits to assess compliance with regulatory requirements and the performance of the EMS.

The objectives of the environmental auditing and review programs are to:

- To demonstrate that the revised Project is operated in accordance with its Environmental Authority;
- Monitor and report on compliance with statutes, EMS commitments and Plan of Operations, environmental policy, company standards, best practice guidelines and signatory codes;
- Monitor the EMS for consistency with the principles of ISO14001; and
- Ensure a senior management review of performance, via consideration of the audit reports.

4.10. Management Review

During development of the revised Project, management review will be undertaken with the contract review process and annually once the revised Project is operational.

Documentation to be prepared for a Management Review includes:

- Audit/compliance results;
- Contractor environmental performance history;
- Non-conformance status and progress of listed items;
- Management of changes in mine operation, legislation, or organisational structure; and
- Recommendations for improvement.

This review process should be an iterative one which provides workable recommendations to the management of the mine.

4.11. Management Plans and Monitoring Programs

There are 18 management plans that support the revised Project development and its environmental approvals application. These management plans have all been drafted for submission with the EIS. They will be revised to suit practical implementation and will be regularly reviewed and updated as changes occur to the revised Project. The list of management plans, (all of which were appended to the EIS submission as Appendix J), is provided below:

J.1 ITSF Management Plan

J.2 Final Land Use and Rehabilitation Plan

J.3 Topsoil Management Plan

J.4 Water Resource Management Plan

J.5 Groundwater Monitoring & Impact Management Plan

J.6 Conservation Zone Management Plan

J.7 Threatened Species Translocation Plan

J.8 Bluegrass Offset Management Plan

J.9 Pest and Weed Management Plan

J.10 Air Quality Management Plan

J.11 Noise and Vibration Management Plan

J.12 Acland Colliery Conservation Management Plan

J.13 Waste Management Plan

J.14 Social Impact Management Plan

J.15 Emergency Management Plan

J.16 Strategic and Corporate Risk Management Framework

J.17 Aviation Hazard Management Plan

J.18 Local Stakeholder Management Plan

4.12. Proposed Environmental Authority Conditions

Environmental monitoring will occur in accordance with the requirements of the EA and is addressed in the relevant Schedule Conditions above.

5. References

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Ison Environmental Planners 1999, DRAFT Impact Assessment Statement, Acland Mine, Power Station and Water Supply, Shell Coal Pty Ltd (December 1999).

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Queensland Department of Environment and Heritage Protection (DEHP) 2012. Guideline Mining – Rehabilitation requirements for mining projects. Document EM1122, August 2012 Version 1.

Queensland Department of Environment and Heritage Protection (DEHP) 2013. Guideline Mining – Model Mining Conditions. Document EM944, June 2013 Version 4.

Appendix A Proposed Environmental Authority Conditions

A.1 Proposed Conditions

Proposed Environmental Authority Conditions: Schedule A – General Conditions

A1 This environmental authority authorises environmental harm referred to in the conditions. Where there is no condition or this environmental authority is silent on a matter, the lack of a condition or silence does not authorise environmental harm.

A2 In carrying out the mining activity authorised by this environmental authority, the holder of this environmental authority must comply with Figure 1 (Revised Project Overview—Mine Area).

A3 The holder of this environmental authority must:

a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority
b) maintain such measures, plant and equipment in a proper and efficient condition
c) operate such measures, plant and equipment in a proper and efficient manner
d) ensure all instruments and devices used for the measurement or monitoring of any parameter under any condition of this environmental authority are properly calibrated.

Monitoring and Inspection

A4 Except where specified otherwise in another condition of this environmental authority, all monitoring records or reports required by this environmental authority must be kept for a period of not less than 5 years.

A5 Upon request from the administering authority, copies of monitoring records and reports will be made available and provided to the administering authority's nominated office within 10 business days or an alternative timeframe agreed between the administering authority and the holder.

A6 Any management or monitoring plans, systems or programs required to be developed and implemented by a condition of this environmental authority should be reviewed for effectiveness in minimising the likelihood of environmental harm on an annual basis, and amended promptly if required, unless a particular review date and amendment program is specified in the plan, system or program.

Financial assurance

A7 All environmental monitoring and investigations and hazardous dam/levee design, certification and inspections must be conducted by appropriately qualified persons..

A8 New activities that may cause either significant harm or nuisance or may influence financial assurance must not be conducted until the environmental authority holder has lodged a commensurate amount of financial assurance with the administering authority as security for compliance with this environmental authority and any costs or expenses, or likely costs or expenses, mentioned in section 292 of the Act.

A9 The amount of financial assurance must be reviewed by the holder of this environmental authority when a plan of operations is amended or replaced or the authority is amended.

Risk management

A10 The holder of this environmental authority must develop and implement an environmental risk management system for mining activities which mirrors the content requirement of the Standard for Risk Management (ISO31000:2009), or the latest edition of an Australian standard for risk management, to the extent relevant to environmental management, by <<Insert date 3 months from date of issue>>

Notification of emergencies, incidents and exceptions

A11 The holder of this environmental authority must notify the administering authority by written notification within 24 hours, after becoming aware of any or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with, the conditions of this environmental authority.

A12 Within 10 business days following the initial notification of an emergency or incident, or receipt of monitoring results, whichever is the latter, further written advice must be provided to the administering authority, including the following:

a) results and interpretation of any samples taken and analysed
b) outcomes of actions taken at the time to prevent or minimise unlawful environmental harm
c) proposed actions to prevent a recurrence of the emergency or incident.

Complaints

A13 The holder of this environmental authority must record all environmental complaints received about the mining activities including:

a) name, address and contact number for of the complainant
b) time and date of complaint
c) reasons for the complaint
d) investigations undertaken
e) conclusions formed
f) actions taken to resolve a reasonable and legitimate complaint
g) any abatement measures implemented
h) person responsible for resolving the complaint.

A14 The holder of this environmental authority must, when requested by the administering authority, undertake relevant specified monitoring within a reasonable timeframe nominated or agreed to by the administering authority to investigate any complaint of environmental harm or nuisance. The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures, where required and implemented, must be provided to the administering authority within 10 business days of completion of the investigation, or no later than 10 business days after the end of the timeframe nominated by the administering authority to undertake the investigation.

A15 Where a condition of this environmental authority requires compliance with a standard, policy or guideline published externally to this environmental authority and the

standard is amended or changed subsequent to the issue of this environmental authority, the holder of this environmental authority must:

a) comply with the amended or changed standard, policy or guideline within 2 years of the amendment or change being made, unless a different period is specified in the amended standard or relevant legislation, or where the amendment or change relates specifically to regulated structures referred to in condition XX, the time specified in that condition
i) until compliance with the amended or changed standard, policy or guideline is achieved, continue to remain in compliance with the corresponding provision that was current immediately prior to the relevant amendment or change.

END OF CONDITIONS FOR SCHEDULE A

Proposed Environmental Authority Conditions: Schedule B – Air

Conditions B13 and B14 will take effect within 2 years of the commencement of construction activities on ML 50232. Conditions B1-B12 as listed below will only apply until this time.

Transitional conditions

Dust Nuisance

B1 Subject to Conditions B2 and B3 the release of dust or particulate matter or both resulting from the mining activity must not cause an environmental nuisance, at any sensitive place.

B2 When requested by the administering authority, dust and particulate monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive place, and the results must be notified within 14 days to the administering authority following completion of monitoring.

Dust Deposition Monitoring

B3 If the Environmental Authority holder can provide evidence through monitoring that the following limits are not being exceeded then the holder is not in breach of B1:

a) Dust deposition of 120 milligrams per square metre per day, averaged over one month, when monitored in accordance with AS 3580.10.1 Methods for sampling and analysis of ambient air - Determination of particulates - Deposited matter - Gravimetric method of 1991; and

j) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (μm) (PM10) suspended in the atmosphere of 150 micrograms per cubic metre over a 24 hour averaging time, at a sensitive place downwind of the operational land, when monitored in accordance with:

k) Particulate matter - Determination of suspended particulate PM10 high-volume sampler with size-selective inlet - Gravimetric method, when monitored in accordance with AS 3580.9.6 Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM (sub) 10 high volume sampler with size-selective inlet - Gravimetric method of 1990; or

l) Any alternative method of sampling PM10, which may be permitted by the 'Air Quality Sampling Manual' as published from time to time by the administering authority.

NOTE: You must propose which monitoring method is appropriate in accordance with condition B3 (a) or (b) or both.

B4 If monitoring indicates exceedence of the relevant limits in Condition B3, then the Environmental Authority holder must:

- address the complaint including the use of appropriate dispute resolution if required; or

- as soon as practicable or at the request of the administering authority, implement dust abatement measures so that emissions of dust from the activity do not result in further environmental nuisance.

B5 Rehabilitation must be carried out in such a manner as to minimise releases of wind-blown dust and erosion.

B6 Dust emissions from mining activities must be suppressed by the use of water or treated in any other suitable manner to prevent a dust nuisance at a sensitive place.

B7 All sealed traffic areas must be cleaned as necessary to minimise the release of dust and particulate matter to the atmosphere.

B8 Trafficable areas must be sealed with bitumen or an equivalent hard surface, or otherwise maintained to the satisfaction of the administering authority, in a condition which minimises the release of windblown or traffic generated dust.

B9 Temporary roads used for material haulage must be watered or treated in any other suitable manner, to minimise wind-blown or traffic generated dust.

Odour nuisance

B10 Subject to condition B11, the release of noxious or offensive odour(s) or any other noxious or offensive airborne contaminant(s) resulting from the mining activity must not cause an environmental nuisance at any sensitive or commercial place.

B11 When requested by the administering authority, odour monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.

B12 If monitoring indicates Condition B10 is not being met then the environmental authority holder must:

a) address the complaint including the use of appropriate dispute resolution if required; or

b) immediately implement odour abatement measures so that emissions of odour from the activity do not result in further environmental nuisance.

Conditions after 2 years

Dust and particulate matter monitoring

B13 The Proponent shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the dust and particulate matter emissions generated by the mining activities do not cause exceedances of the following levels if measured at any sensitive or commercial place:

a) Dust deposition of 120 milligrams per square metre per day, averaged over 1 month, when monitored in accordance with the most recent version of Australian Standard AS3580.10.1. Methods for sampling and analysis of ambient

air—Determination of particulate matter—Deposited matter – Gravimetric method.

b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometres (PM10) suspended in the atmosphere of 50 micrograms per cubic metre over a 24-hour averaging time, for no more than 5 exceedances recorded each year, if monitored in accordance with the most recent version of either:

1. Australian Standard AS3580.9.6 Methods for sampling and analysis of ambient air Determination of suspended particulate matter—PM 10 high volume sampler with size-selective inlet – Gravimetric method; or

2. Australian Standard AS3580.9.9 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM 10 low volume sampler—Gravimetric method.

c) A concentration of particulate matter suspended in the atmosphere of 90 micrograms per cubic metre over a 1 year averaging time, if monitored in accordance with the most recent version of AS/NZS3580.9.3:2003 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—Total suspended particulate matter (TSP)—High volume sampler gravimetric method.

END OF CONDITIONS FOR SCHEDULE B

Proposed Environmental Authority Conditions: Schedule C – Waste Management

C1 Unless otherwise permitted by the conditions of this environmental authority or with prior approval from the administering authority and in accordance with a relevant standard operating procedure, waste must not be burnt.

C2 The holder of this environmental authority may burn vegetation cleared in the course of carrying out extraction activities provided the activity does not cause environmental harm at any sensitive place or commercial place.

C3 The holder of this environmental authority may dispose of inert waste (packing material) associated with blasting into open pits, buried in a manner such that it will not impede saturated aquifers.

Disposal of Tyres

C4 Where practicable, scrap tyres resulting from the mining activities can be disposed of into open pits provided tyres are placed as deeply in the spoil as reasonably possible and this practice does not cause an unacceptable fire risk or compromise mine safety.

C5 Scrap tyres resulting from the mining activities disposed within the operational land must not impede saturated aquifers or compromise the stability of the consolidated landform.

Waste Rock Management

C6 Subject to the release limits defined in Schedules E and F, all reasonable and practicable measures must be implemented to prevent hazardous leachate being directly or indirectly released or likely to be released as a result of the activity to any groundwater or watercourse.

Tailings disposal

C7 Suitable tailings storage facility management plans must be implemented for the construction, operation and decommissioning of all in-pit and out-of-pit tailings storage facilities within Mining Leases 50170, 50216 and 50232 (New Acland Coal Mine) to reasonably prevent unauthorised environmental harm to the downstream receiving environment (i.e. land, surface water and groundwater).

END OF CONDITIONS FOR SCHEDULE C

Proposed Environmental Authority Conditions: Schedule D – Noise

Noise limits

D1 The holder of this environmental authority must ensure that noise generated by the mining activities does not cause the criteria in Table D1a Summary of Noise Limits (Transitional Period) to be exceeded at a sensitive place or commercial place.

Table D1b Summary of Noise Limits (Revised Conditions) will replace Table D1a Summary of Noise Limits (Transitional Period) within 2 years of the commencement of construction activities on Mining Lease 50232.

Table D1a Summary of Noise Limits (Transitional Conditions)

Noise level dB(A) measured as	**Monday to Saturday**			**Sundays and public holidays**		
	7am - 6pm	**6pm - 10pm**	**10pm - 7am**	**9am - 6pm**	**6pm - 10pm**	**10pm - 9am**
	Noise measured at a 'Noise sensitive place'					
$L_{Ar,\ 1\ hour}$	50	45	40	50	45	40

Note: The method of measurement and reporting of noise levels must comply with the latest editions of the Environmental Protection Agency's Noise Manuals.

Table D1b Summary of Noise Limits (Revised Conditions)

Noise level dB(A) measured as	Monday to Saturday			Sundays and Public Holidays		
	7am - 6pm	6pm - 10pm	10pm - 7am	9am - 6pm	6pm - 10pm	10pm - 9am
	Noise measured at a 'Noise sensitive place'					
$L_{Aeq,adj,1\ hr}$	42	42	37	42	42	37

Note: The method of measurement and reporting of noise levels must comply with the latest editions of the Environmental Protection Agency's Noise Manuals.

Airblast overpressure nuisance

D2 The holder of this environmental authority must ensure that blasting does not cause the limits for peak particle velocity and air blast overpressure in Table D2 – Blasting noise and vibration limits to be exceeded at a sensitive place or commercial place.

Table D2 Blasting Noise and Vibration Limits

Blasting noise limits	Sensitive or commercial Blasting noise limits place limits			
	Monday – Friday	Saturday	Monday – Saturday	Sunday & Public Holidays
	7am – 6pm	9am – 1pm	6pm – 7am	
Air blast overpressure	115 db (Linear) Peak for 9 out of any 10 consecutive blasts initiated. Any single blast must not exceed 120 db (Linear) Peak.		No blasting	No blasting
Ground vibration peak particle velocity	5mm/s peak particle velocity for 9 out of 10 consecutive blasts Any single blast must not exceed 10mm/s		No blasting	No blasting

Monitoring and reporting

D3 If investigating a complaint, noise monitoring and recording must include the following descriptor characteristics and matters:

a) LAN,T (where N equals the statistical levels of 1, 10 and 90 and T = 1 hour)
b) background noise LA90
c) the level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels
d) atmospheric conditions including temperature, relative humidity and wind speed and directions
e) effects due to any extraneous factors such as traffic noise
f) location, date and time of monitoring
g) In the event of a complaint relating to low frequency noise, Max LpLIN,T and one third octave band measurements in dB(LIN) for centre frequencies in the 10 – 200 Hz range should be recorded.

D4 The holder of this environmental authority must monitor compliance with Table D1a Summary of Noise and Vibration Criteria and Table D2 – Blasting noise and vibration limits for all blasts undertaken on this site at the nearest sensitive place or commercial place.

END OF CONDITIONS FOR SCHEDULE D

Proposed Environmental Authority Conditions: Schedule E - Groundwater

E1 Groundwater quality must be monitored at the locations and frequencies defined in Table – E1 Groundwater monitoring locations and frequency.

- E2 Groundwater monitoring, sampling and annual review of the monitoring data will be conducted in accordance with:
  - the current edition of the DEHP *Water Quality Sampling Manual*, or subsequent updated versions; and
  - the ASINZS 5667.11:1998 Australian/New Zealand Standard for water quality — sampling Part 11: guidance on sampling groundwater.

Table E1 Groundwater Monitoring Locations and Frequency

Monitoring Point	Aquifer	Location		Parameter and Monitoring Frequency
		Easting (GDA94 – Zone 56)	Northing (GDA94 – Zone 56)	
Bores monitored under current monitoring program (Compliance and Reference bores)				
2289P	Coal Measures	371159	6983345	Groundwater levels: **monthly**. Groundwater quality: **six monthly** to include: Al, As, Ca, Se, Cl, Cu, F, Fe, Total N, K, Mg, Mn, Na, SO4, HCO3, TDS, EC, pH
2291P	Coal Measures	374514	6979846	
18P	Coal Measures	370922	6982454	
25P	Basalt	374040	6981870	
26P	Coal Measures	374160	6982790	
27P	Coal Measures	373254	6983367	
28P	Coal Measures	372222	6983790	
843	Basalt	370592	6981096	
848	Coal Measures	370599	6981536	
81P	Coal Measures	374897	6979451	
82P	Coal Measures	373591	6978627	
83P	Coal Measures	371748	6979492	
84P	Basalt	370249	6982000	
BMH1	Basalt	369552	6982017	
CSMH1	Coal Measures	375298	6977149	
Existing Stage 3 monitoring bores to be incorporated into the revised Project's monitoring program				
109P	Basalt	368157	6982191	Groundwater levels: **monthly**. Groundwater quality: **six monthly** to include: Al, As, Ca, Se, Cl, Cu, F, Fe, Total N, K, Mg, Mn, Na, SO4, HCO3, TDS, EC, pH
112PGC	Coal Measures	370550	6977650	
114P	Coal Measures	371700	6975850	
116P	Coal Measures	374114	6974945	
119PGC	Coal Measures	371503	6973150	
120WB	Coal Measures	367417	6975928	
121WB	Coal Measures	368366	6978254	
Proposed additional monitoring points which will be monitored as part of the revised Project's monitoring program (locations are approximate)				
1A	Basalt	366500	6980900	Groundwater levels: **monthly**.
1B	Coal Measures	366500	6980900	

Monitoring Point	Aquifer	Location		Parameter and Monitoring Frequency
		Easting (GDA94 – Zone 56)	Northing (GDA94 – Zone 56)	
2A	Basalt	365900	6978900	Groundwater quality: **six monthly** to include: Al, As, Ca, Se, Cl, Cu, F, Fe, Total N, K, Mg, Mn, Na, SO4, HCO3, TDS, EC, pH
2B	Coal Measures	365900	6978900	
3A	Basalt	369300	6973900	
3B	Coal Measures	369300	6973900	
4A	Basalt	365800	6976800	
4B	Coal Measures	365800	6976800	
5A	Oakey Creek Alluvium	373600	6972500	
5B	Coal Measures	373600	6972500	
6	Coal Measures	375200	6975700	
7A	Basalt	367300	6982500	
7B	Coal Measures	367300	6982500	
8	Mine Pit Backfill	372900	6981800	

Aluminium (Al), Arsenic (As), Selenium (Se), Copper (Cu), Fluorine (F), Iron (F), Total Nitrogen (Total N), Manganese (Mn); Calcium (Ca), Chloride (Cl), Potassium (K), Magnesium (Mg), Sodium (Na), Sulphate (SO4), Bicarbonate (HCO3), Carbonate (CO3), Total Dissolved Solids (TDS), Electrical Conductivity (EC); Acidity/Alkalinity (pH).

Table E2 Groundwater quality triggers and limits

Parameter	Units	Contaminant Limits[1]	Monitoring Frequency
Al	mg/L	5.0	Half Yearly
As	mg/L	0.5	Half Yearly
Ca	mg/L	1,000	Half Yearly
Se	mg/L	0.02	Half Yearly
Cl	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
Cu	mg/L	1.0 [2]	Half Yearly
F	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
Fe	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
NO_3	mg/L	400	Half Yearly
NO_2	mg/L	30	Half Yearly
K	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
Mg	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
Mn	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
Na	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
SO_4	mg/L	1,000	Half Yearly
HCO_3	mg/L	Criteria not defined in ANZECC (2000)	Half Yearly
TDS	mg/L	5,000 [2,3]	Half Yearly
EC	µS/cm	7,460 [2,3,4]	Half Yearly
pH	unit	Criteria not defined in ANZECC (2000)	Half Yearly

Notes: 1. Based on Stockwater limits defined ANZECC (2000)
2. Defined for beef cattle based on landholder bore survey results
3. Existing bores 27P, 28P, 2289 and 118P background levels already exceed this limit prior to Mine operation
4. Based on EC to TDS conversion factor of 0.67 as per ANZECC (2000)

E3 Groundwater levels when measured at the monitoring locations specified in Table E1 -Groundwater monitoring locations and frequency must not exceed the groundwater level trigger change thresholds specified in Table E3 - Groundwater level monitoring below.

Table E3 Groundwater level monitoring

Monitoring location	Level trigger threshold
Bores monitored under current monitoring program (Compliance and Reference bores)	
2289P	TBA
2291P	TBA
18P	TBA
25P	TBA
26P	TBA
27P	TBA
28P	TBA
843	TBA
848	TBA
81P	TBA
82P	TBA
83P	TBA
84P	TBA
BMH1	TBA
CSMH1	TBA
Existing Stage 3 monitoring bores to be incorporated into the revised Project's monitoring program	
109P	TBA
112PGC	TBA
114P	TBA
116P	TBA
119PGC	TBA
120WB	TBA
121WB	TBA
Proposed additional monitoring points which will be monitored as part of the revised Project's monitoring program (locations are approximate)	
1A	TBA
1B	TBA
2A	TBA
2B	TBA
3A	TBA
3B	TBA
4A	TBA
4B	TBA
5A	TBA
5B	TBA
6	TBA
7A	TBA
7B	TBA
8	TBA

Definition of trigger levels for groundwater bore levels is subject to ongoing work relating to the review of groundwater modelling results, which will be available by 31 October 2013.

It should be noted that trigger levels for groundwater levels presented in Table E3 - Groundwater level monitoring are subject to ongoing refinement and will be reviewed and adjusted accordingly with the regular groundwater impact model review schedule (refer to Section 6.4.3 and Table 6-19 in Chapter 6 of the revised Project's EIS for further information).

Exceedance Investigation

E4 If quality characteristics of groundwater from compliance bores identified in Table E1 - Groundwater monitoring locations and frequency exceed any of the trigger levels stated in Table E2 - Groundwater quality triggers and limits or exceed any of the groundwater level trigger thresholds stated in Table E3 - Groundwater level monitoring, the holder of this environmental authority must compare the compliance monitoring bore results to the reference bore results and complete an investigation in accordance with relevant guidelines.

E5 Where alternative arrangements are in place with the owner of a bore, the groundwater limits in E4 do not apply for the bore for the duration for which the alternative arrangements are in place.

"Alternative arrangement" means a written agreement between the holder of this environmental authority and the owner or occupier (sensitive receptor) for a defined groundwater impact and may include an agreed period of time for which the arrangement is in place. An agreement for alternative arrangement is designed to ensure the defined groundwater impact is managed (e.g. compensated, offset or mitigated) to the satisfaction of the affected owner or occupier (sensitive receptor).

Bore construction and maintenance and decommissioning.

E6 The construction, maintenance and management of groundwater bores (including groundwater monitoring bores) must be undertaken in a manner that prevents or minimises environmental harm and ensures the integrity of the bores to obtain accurate monitoring.

END OF SCHEDULE E CONDITIONS

Proposed Environmental Authority Conditions: Schedule F – Surface Water

Conditions F1 – F16 are proposed transitional conditions, and F17 – F34 the revised conditions that will take effect within 2 years of the commencement of construction activities on MLA 50232.

PROPOSED TRANSITIONAL CONDITIONS

Release to waters

F1 Contaminants must not be released from the mine to any waters or the bed and banks of any waters other than treated/settled stormwater from environmental dam(s) that is in accordance with the contaminant release limits in Table F1 End of Pipe contaminant release limits.

Table F1 End of Pipe contaminant release limits

Parameter	Units	Minimum	Maximum
pH		6.0	9.0
Electrical Conductivity	µS/cm	-	1500
Total Suspended Solids	mg/L	-	100

F2 Not withstanding condition F1, the holder of the environmental authority is authorised to release contaminants to waters of Lagoon or Spring Creek as defined in the Water Resources Management Plan in a manner that will ensure the level of electrical conductivity within the receiving waters will not exceed 1500 µs/cm at any time, 50 metres downstream from the discharge point, as a result of the discharge. Any release to waters must only occur where there is an existing minimum flow in receiving waters upstream of the discharge point to provide adequate dilution such that 1500 µs/cm is not exceeded outside the 50 metre mixing zone.

F3 The holder of this authority must undertake monitoring at regular intervals during any release to waters at a point 50 metres downstream of the discharge, to ensure that the level of electrical conductivity does not exceed 1500 µs/cm at that point. If monitoring indicates that 1500 µs/cm is exceeded, release of wastewaters must cease immediately.

F4 Monitoring of contaminant releases must be undertaken at the overflow from the environment dam(s) identified in Table F2 End of pipe monitoring locations and frequency and records kept, and comply with the quality characteristics and at the frequency specified in Table F1 End of Pipe contaminant release limits.

Table F2 End of pipe monitoring locations and frequency

Monitoring point		Latitude (GDA 94)	Longitude (GDA 94)	Monitoring Frequency	Monitoring parameters
ED1	Overflow point from Environmental Dam 1	27º 15' 40.56030" S	151° 41' 48.32659" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)
ED2	Overflow point from Environmental Dam 2	27º 16' 54.96167" S	151° 41' 36.83113" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	
ED3	Overflow point from Environmental Dam 3	27º 18' 29.40913" S	151° 42' 50.52694" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	
ED4	Overflow point from Environmental Dam 4	27º 17' 41.49436" S	151° 41' 33.60156" E	As soon as practical prior to, at least daily during and immediately after any release to waters from this point.	

Note: This does not apply to dams containing hazardous waste.

Note: Monitoring of receiving waters for discharges from Environmental Dams will be undertaken using Rising Stage Samplers where practical.

F5 Ambient water monitoring must be undertaken at locations and frequencies prescribed in Table F3 Receiving Water Monitoring Locations and Frequency and any mining activity release must comply with the contaminant limits defined in Table F1 End of Pipe contaminant release limits.

Table F3 Receiving Water Monitoring Locations and Frequency

Monitoring Point	Latitude (GDA 94)	Longitude (GDA 94)	Monitoring Frequency	Monitoring parameters
Lagoon Creek at a point upstream of mine (LCU1)	27º 17' 9.7728" S	151º 44' 23.136" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)

Monitoring Point	Latitude (GDA 94)	Longitude (GDA 94)	Monitoring Frequency	Monitoring parameters
Lagoon Creek at two points downstream of mine (LCD1 & LCD2)	LCD1: 270 18' 35.64" S	151° 43' 4.3536" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)
	LCD2: 270 18' 37.36" S	151° 43' 1.8768" E		
Spring Creek at a point upstream of mine (SCU1)	27º 14' 18.7728" S	151º 41' 31.2864" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)
Spring Creek at a point downstream of mine (SCD1)	27º 14' 47.364" S	151º 40' 36.2028" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)
Downstream of Environmental Dam 2 and Environmental Dam 4 (AW20)	27° 17' 46.1228" S	151° 41' 16.0147" E	At least once every 6 months and as soon as practical prior to, at least daily during and immediately after any release to waters.	pH, total suspended solids (mg/L), electrical conductivity µS/cm, sulphate (SO4) (mg/L), time of day, water temperature, flow rate (m/s)

Note 1: A monitoring point may also include a monitoring point requested by the administering authority in the event of release to waters.

Note 2: LCD1 is approx 70 m downstream of road (site AW4) and LCD2is approx 50m downstream of LCD1.

Note 3: Receiving water monitoring points are shown on Figure 3-4.

Capacity of Tailings and Process Water Dams

F6 The design storage allowance on 1st November of each year for any dam containing hazardous waste constructed or operated within the operational land must comply with Table F4 Storage design for dams containing hazardous waste.

Table F4 Storage design[1] for dams containing hazardous waste

Dam Name	Design Storage Allowance[2] Critical Wet Period	Spillway Critical Design Storm[3]	Mandatory[4] Reporting Level
Tailings Storage Facility	0.1 AEP 4 month wet season plus process inputs for the 4 month wet season	0.001 AEP	0.01 AEP
Environmental Dam 2	*(Not Applicable[5])*	0.001 AEP	0.6 metres below the spillway crest[6]
Inpit Tailings Storage Facility	0.1 AEP 4 month wet season plus process inputs for the 4 month wet season	0.001 AEP	0.01 AEP

NOTE: AEP means Annual Exceedence Probability.

1 Calculations are to be carried out in accordance with the "Site Water Management" guideline in the Technical Guidelines for Environmental Management of Exploration and Mining in Queensland – DME 1995.

2 The design storage allowance on 1st November of each year for any dam containing hazardous waste constructed within the operational land must be equivalent to the run-off from the critical wet period plus process inputs for the period. Process inputs refers to hazardous process waste and any water, which is being disposed of in the storage facility.

3 The critical storm has a duration that produces the peak discharge for the catchment

4 The level below spillway crest that can accommodate runoff from a 72 hour AEP storm, or the AEP wave allowance whichever level is lower.

5 The requirement for a design storage allowance for Environmental Dam 2 was removed by the administering authority following discussions with the project proponent on 22 August 2006.

6 This reporting level was nominated by the administering authority following discussions with the project proponent on 22 August 2006.

F7 The spillway for any dam containing hazardous waste, constructed within the operational land must be designed and maintained to withstand the peak flow from the spillway critical design storm in Table F4 Storage design for dams containing hazardous waste.

F8 The holder of the Environmental Authority must mark the mandatory reporting level defined in Table F4 Storage design for dams containing hazardous waste. on the spillway of all dams containing hazardous waste within the operational land.

F9 The holder of the Environmental Authority must notify the administering authority when the pondage level of the dam containing hazardous waste reaches the mandatory reporting level defined in Table F4 Storage design for dams containing hazardous waste.

F10 The holder of this Environmental Authority must implement measures to prevent access to any dams containing hazardous waste by all livestock and minimise access by native fauna.

F11 The base and walls of the Tailings Storage Facility, sediment dams and environmental dams must be constructed, installed and maintained:

(i) so as to minimise the likelihood of a release of contaminants through the bed or banks of the dam to any waters (including groundwater); and

(ii) so as to ensure the stability of the dam(s) construction.

F12 Construction of sediment dams other than any dams in the final rehabilitation landform must not occur on out of pit spoil dumps.

F13 Before construction of any dam containing hazardous waste, a person suitably qualified and experienced in dam engineering must: (a) prepare design plans which design the dam to an appropriate engineering standard; and (b) certify that the design plans meet an appropriate engineering standard and are consistent with the conditions in the environmental authority.

F14 Before construction of a dam containing hazardous waste, the holder of the environmental authority for the dam must submit the certified design plans to the administering authority, for review and comment.

F15 When the construction of the dam containing hazardous waste is complete, the holder of the environmental authority must: (a) obtain certification from a person suitably qualified and experienced in dam construction that the construction of the dam is either in accordance with or generally in accordance with the certified design plans; and (b) submit the construction certification to the administering authority.

F16 The holder of the environmental authority must construct and operate the dam in accordance with the certified: (a) design plans; (b) operational plans; and (c) conditions contained in the environmental authority, in order to prevent or minimise environmental harm.

PROPOSED REVISED CONDITIONS

Contaminant release

F17 Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters as a result of the authorised mining activities, except as permitted under the conditions of this environmental authority.

F18 Unless otherwise permitted under the conditions of this environmental authority, the release of mine affected water to waters must only occur from the release points specified in Table F5 - Mine affected water release points, sources and receiving waters.

Table F5 Mine affected water release points, sources and receiving waters

Release Point (RP)	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)	Mine Affected Water Source and Location	Monitoring Point	Receiving waters description
ED1	27° 15' 40.56030" S	151° 41' 48.32659" E	Environmental Dam 1	Overflow point from Environmental Dam 1	Spring Creek
ED2	27° 16' 54.96167" S	151° 41' 36.83113" E	Environmental Dam 2	Overflow point from Environmental Dam 2	Spring Creek

Release Point (RP)	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)	Mine Affected Water Source and Location	Monitoring Point	Receiving waters description
ED3	27 ° 18' 29.40913" S	151 ° 42' 50.52694" E	Environmental Dam 3	Overflow point from Environmental Dam 3	Lagoon Creek
ED4	27 ° 17' 41.49436" S	151 ° 41' 33.60156" E	Environmental Dam 4	Overflow point from Environmental Dam 4	Spring Creek
ED5	TBC	TBC	Environmental Dam 5	Overflow point from Environmental Dam 5	Lagoon Creek
ED6	TBC	TBC	Environmental Dam 6	Overflow point from Environmental Dam 6	Lagoon Creek
ED7	TBC	TBC	Environmental Dam 7	Overflow point from Environmental Dam 7	Lagoon Creek

F19 The release of mine affected water to waters in accordance with condition F2 must not exceed the release limits stated in Table F6 Mine affected water release limits when measured at the monitoring points specified in Table F5 Mine affected water release points, sources and receiving waters for each quality characteristic.

Table F6 Mine affected water release limits

Quality Characteristic	Release Limits	Monitoring Frequency	Comment
Electrical Conductivity (µS/cm)	1500	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
pH (pH unit)	6.0 (minimum) 9.0 (maximum)	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
Total Suspended Solids (mg/L)	100		

F20 The release of mine affected water to waters from the release points must be monitored at the locations specified in Table F5 Mine affected water release points, sources and receiving waters at the frequency specified in Table F6 Mine affected water release limits. When circumstances prevent the monitoring required by conditions F3 and F4, during or following severe weather events, the administering authority must be notified within (48) hours.

Mine Affected Water Release Events

F21 The holder of the environmental authority is authorised to release contaminants to waters of Lagoon or Spring Creek in a manner that will ensure the level of electrical conductivity within the receiving waters will not exceed 1500 µs/cm at any time, 50 metres downstream from the discharge point, as a result of the discharge. Any release to waters

must only occur where there is an existing minimum flow in receiving waters upstream of the discharge point to provide adequate dilution such that 1500 µs/cm is not exceeded outside the 50 metre mixing zone.

F22 The holder of this authority must undertake monitoring at regular intervals during any release to waters at a point 50 metres downstream of the discharge, to ensure that the level of electrical conductivity does not exceed the release limits shown in Table F7 - Mine affected water release during flow events. If monitoring indicates that 1500 µs/cm is exceeded, release of wastewaters must cease immediately.

Table F7 - Mine affected water release during flow events

Receiving Waters	Release Points	Gauging Station (GDA94)	Gauging Station (GDA94)	Receiving Water Flow Criteria for Discharge (ML/d)	Approx. % of Lagoon Creek Streamflow	Max. release rate	Electrical Conductivity Release Limits (µs/cm)
Lagoon Creek	ED3, ED5, ED6, ED7	27° 18' 29.40913" S TBC	151° 42' 50.52694'' E TBC	Low Flow < 1.24 ML/d for a period of 28 days after natural flow events that exceed 4 ML/d	< 20%	<1.5 ML/d	700
				Medium Flow (low) > 4ML/d	> 20%	<1.5 ML/d	1,500
						<0.7 ML/d	2,500
						<0.5 ML/d	3,500
				Medium Flow (high) > 11.5 ML/d	> 40%	<4.2 ML/d	1,500
						<2 ML/d	2,500
						<1.3 ML/d	3,500
				High Flow > 35 ML/d	> 60%	<12.5 ML/d	1,500
						<6 ML/d	2,500
						<6 ML/d	3,500
						<2.8 ML/d	4,500
						<1.7 ML/d	7,500
				Very High Flow > 66 ML/d	> 80 %	<4.5 ML/d	4,500

F23 The daily quantity of mine affected water released from each release point must be measured and recorded.

F24 Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build-up of sediment in such waters.

Notification of Release Event

F25 The environmental authority holder must notify the administering authority as soon as practicable and no later than 24 hours after commencing to release mine affected water to the receiving environment. Notification must include the submission of written advice to the administering authority of the following information:

a) release commencement date/time
b) details regarding the compliance of the release with the conditions of Department Interest: Water of this environmental authority (that is, contaminant limits, natural flow, discharge volume)
c) release point/s
d) release rate
e) release salinity
f) receiving water/s including the natural flow rate.

Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.

F26 The environmental authority holder must notify the administering authority as soon as practicable and nominally no later than 24 hours after cessation of a release event of the cessation of a release notified under Condition F25 and within 28 days provide the following information in writing:

a) release cessation date/time
b) natural flow rate in receiving water
c) volume of water released
d) details regarding the compliance of the release with the conditions of Department Interest; Water of this environmental authority (i.e. contaminant limits, natural flow, discharge volume)
e) all in-situ water quality monitoring results
f) any other matters pertinent to the water release event.

Note: Successive or intermittent releases occurring within 24 hours of the cessation of any individual release can be considered part of a single release event and do not require individual notification for the purpose of compliance with conditions F25 and F26, provided the relevant details of the release are included within the notification provided in accordance with conditions F25 and F26.

Notification of Release Event Exeedance

F27 If the release limits defined in Table F2 - Mine affected water release limits are exceeded, the holder of the environmental authority must notify the administering authority within 24 hours of receiving the results.

F28 The environmental authority holder must, within 28 days of a release that is not compliant with the conditions of this environmental authority, provide a report to the administering authority detailing:

a) the reason for the release
b) the location of the release
c) the total volume of the release and which (if any) part of this volume was non-compliant
d) the total duration of the release and which (if any) part of this period was non-compliant
e) all water quality monitoring results (including all laboratory analyses)
f) identification of any environmental harm as a result of the non compliance
g) all calculations
h) any other matters pertinent to the water release event.

Receiving Environment Monitoring and Contaminant Trigger Levels

F29 The quality of the receiving waters must be monitored at the locations specified in Table F9 - Receiving water upstream background sites and down stream monitoring points for each quality characteristic and at the monitoring frequency stated in Table F8 - Receiving waters contaminant trigger levels.

Table F8 - Receiving waters contaminant trigger levels

Quality Characteristic	Trigger Level	Monitoring Frequency
pH	6.0 – 9.0	Daily during the release
Electrical Conductivity (µS/cm)	700	
Total Suspended solids (mg/L)	To Be Determined. Turbidity may be required to assess ecosystems impacts and can provide instantaneous results.	
Sulphate (SO_4^{2-}) (mg/L)	250 (Protection of drinking water Environmental Value)	

Table F9 - Receiving water upstream background sites and downstream monitoring points

Monitoring Point	Receiving Waters Location Description	Latitude (GDA 94)	Longitude (GDA 94)
Upstream Background Monitoring Points			
LCU1	Lagoon Creek at a point upstream of mine	27°18'9.7728"S	151°44'23.136"E
SCU1	Spring Creek at a point upstream of mine	27º 14'18.7728" S	151º 41' 31.2864" E
Downstream Monitoring Points			

Monitoring Point	Receiving Waters Location Description	Latitude (GDA 94)	Longitude (GDA 94)
LCD1 & LCD2	Lagoon Creek at two points downstream of mine	LCD1: 27^0 18' 35.64" S	151^0 43' 4.3536" E
		LCD2: 27^0 18' 37.36" S	151^0 43' 1.8768" E
SCD1	Spring Creek at a point downstream of mine	27º 14' 47.364" S	151º 40' 36.2028" E
AW20	Downstream of Environmental Dam 2 and Environmental Dam 4	27° 17' 46.1228" S	151° 41' 16.0147" E
AH2	Located approx. 5 km downstream of the downstream boundary of the revised Project mining area.	27° 21' 0.365" S	151° 38' 14.965" E
AE4	Located downstream of the existing mining operations and immediately adjacent to the northern extent of the Manning Vale East and Wileroo pits.	27°19'2.91"S	151°42'20.47"E
DS1	Located at the downstream boundary of the revised Project mining area.	27°19'26.68"S	151°41'7.02"E

Table F5 - Receiving water upstream background sites and downstream monitoring points notes:

a) The upstream monitoring point should be within 1km of the release point.
b) The downstream point should not be greater than 250m from the release point.
c) The data from background monitoring points must not be used where they are affected by releases from other mines.

F30 If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in Table F8 - Receiving waters contaminant trigger levels during a release event the environmental authority holder must compare the downstream results to the upstream results in the receiving waters and:

a) where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or
b) where the downstream results exceed the upstream results complete an investigation into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining

1. details of the investigations carried out
2. actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with F30 b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

Water reuse

F33 Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third party (with the consent of the third party).

Annual Water Monitoring Reporting

F34 The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format:

a) the date on which the sample was taken
b) the time at which the sample was taken
c) the monitoring point at which the sample was taken
d) the measured or estimated daily quantity of mine affected water released from all release points
e) the release flow rate at the time of sampling for each release point
f) the results of all monitoring and details of any exceedances of the conditions of this environmental authority
g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

Temporary Interference with waterways

F35 Destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Natural Resources and Mines (or its successor) Guideline – Activities in a Watercourse, Lake or Spring associated with Mining Activities.

END OF SCHEDULE F CONDITIONS

Proposed Environmental Authority Conditions: Schedule G – Sewage treatment

Sewage Effluent Control

G1 All effluent released from the treatment plant must be monitored at the frequency and for the parameters specified in Table G1 - Sewage effluent targets for dust suppression and irrigation.

Table G1 Sewage Effluent Quality Targets for Dust Suppression and Irrigation

Quality characteristics	Release limit	Units	Limit type	Monitoring frequency
5-day Biochemical Oxygen Demand (uninhibited)	<20	mg/L	max	Quarterly
pH	6.0 – 9.0		range	Quarterly
Faecal Coliforms, based on the average of a minimum of five samples collected	<1000 c.f.u.	Colonies per 100 mL	max	Quarterly

G2 Sewage effluent used for dust suppression or irrigation must not exceed sewage effluent release limits defined in Table G1 - Sewage Effluent Quality Targets for Dust Suppression and Irrigation.

G3 Sewage effluent used for dust suppression or irrigation must not cause spray drift or over spray to any sensitive place, other than the active mining areas within ML 50176, ML 50216 and other mining tenements regulated by this Environmental Authority.

G4 Subject to condition G5, sewage effluent from sewage treatment facilities must be reused or evaporated and must not be directly released from the sewage treatment plant to any water way or drainage line.

G5 In periods of wet weather or following wet weather, when no irrigation of effluent is reasonably practicable and when effluent storage ponds are full, the release of effluent to waters is permitted from the overflow point from Environmental Dam 2 and in accordance with the release limits in Table G1 - Sewage Effluent Quality Targets for Dust Suppression and Irrigation.

G6 The holder of this Environmental Authority must ensure that irrigation of effluent is carried out in such a manner that prevents and/or minimises environmental harm.

G7 The holder of this Environmental Authority is authorised to accept treated wastewater from the Wetalla Wastewater Reclamation Facility.

END OF SCHEDULE G CONDITIONS

Proposed Environmental Authority Conditions: Schedule H – Land

Buffer Zone – ML 50216 and MLA 50232

H1 The holder of the environmental authority must not cause any disturbance within 50 metres of the high bank of Lagoon Creek (buffer zone) as shown on Figure 3-7 (Lagoon Creek buffer and levee) unless in accordance with condition H2 and H3.

H2 The holder of the environmental authority is authorised to construct and maintain a flood protection levee and access road for inspection purposes, with the toe of the levee being no closer than 50 metres from the high bank of Lagoon Creek as shown on Figure 3-7 (Lagoon Creek buffer).

H3 The holder of the environmental authority is authorised to access the 50 metre buffer zone as shown on Figure 3-7 (Lagoon Creek buffer), for the purposes of maintaining the integrity of the flood protection levee, fire management, riparian conservation and weed management purposes.

H4 The holder of the environmental authority is authorised to construct and maintain an appropriately engineered haul road crossing of Lagoon Creek as part of the access route for coal haulage and other purposes from the Willaroo mining area (within MLs 50216 and 50232) to the Mine Industrial Area (within ML 50170). The haul road crossing structure within Lagoon Creek must not significantly impede the ephemeral flow regime or create a barrier for fish movement during periods of flow within the creek.

H5 The final design level of the levee crest must be above the predicted 1,000 year ARI event flood level.

H6 Any section of the outside face of the levee must be treated with cover material and grass seeded (unless rock armoured) within three months of completion of the earthworks for that section of the outside face of the levee.

H7 The condition of the levee must at a minimum be assessed:

(a) By the environmental authority holder within 1 week of any storm of such intensity that greater than 25mm of rain falls in less than 3 hours; and

(b) By a suitably qualified and experienced person at least once per year between the months of May and October inclusive (i.e. during the 'dry' season and before the onset of the 'wet' season).

H8 Remedial works identified as necessary during assessments conducted under condition H6 must be commenced within 30 days unless delayed by inclement weather.

H9 Any actions and incidents on site that may impact upon the integrity of the levee bank must be notified to the administering authority in accordance with condition A10.

Rehabilitation

H10 Land disturbed by mining must be rehabilitated in accordance with Table H1 - Rehabilitation requirements.

Table H1 - Rehabilitation requirements

Mine Domain	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
Solid Waste Rock Disposal	Safe	Site safe for humans and animals	Structurally safe & shallow slopes (geotechnically stable). No hazardous materials (geochemically benign).	Monitoring/observation demonstrates safe site.
	Non-polluting	No environmental harm attributed to adverse chemical conditions within the waste rock dumps	Minimise erosion through selective placement of mine waste, adequate vegetation cover. Runoff and seepage controlled by water management (e.g. dams).	Return to previous use (grazing) Discharge water meets specified limits.
	Stable	Minimise erosion	Place wastes selectively above and below original ground level to the agreed slopes. Establish adequate vegetation cover.	Return to previous use (grazing)
	Self-sustaining	To return to agreed grazing land capability	Slope and other landform design criteria achieved. Establish adequate vegetation cover.	Refer **Table 3-27** and **Table 3-28**
Tailings Dams	Safe	Site safe for humans and animals	Structurally safe (geotechnically stable). Adequate capping. Accessibility to voids is permanently removed	Monitoring/observation demonstrates safe site.
	Non-polluting	Acid mine drainage will not cause environmental harm	Adequately capped. Minimise erosion through adequate vegetation cover. Runoff and seepage controlled by water management.	Monitoring meeting release limits. Return to previous use (grazing)
	Stable	Minimise erosion	Stored both in pits below natural surface level and in dams above natural surface. Establish adequate vegetation cover.	Monitoring demonstrates revegetation success. No structural erosion present. Return to previous use (grazing)
	Self-sustaining	To return to agreed grazing land capability	Monitoring demonstrates successful revegetation	Refer **Table 3-27** and **Table 3-28**
Mine Infrastructure areas	Safe	Site safe for humans and	Hazardous materials removed.	Monitoring/observation demonstrates

Mine Domain	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
		animals		safe site.
	Non-polluting	Undertake contaminated land assessment	Remediate contamination so that runoff and seepage are of good quality.	Monitoring meeting release limits
	Stable	Minimise erosion	Remove infrastructure or allow continued use of useful infrastructure. Establish adequate vegetation cover.	Slope will be designed from 8.5° to 17° (15% to 30%) but consideration will be given to the lower slope angles.
	Self-sustaining	To return to agreed grazing land capability	Return to previous use(grazing). Establish adequate groundcover	Refer **Table 3-27** and **Table 3-28**
Linear Infrastructure areas	Safe	Site safe for humans and animals	Structurally safe (geotechnically stable).	Monitoring/observation demonstrates safe site.
	Non-polluting	No environmental harm attributed to adverse chemical conditions within the rehabilitation areas	Runoff and seepage controlled by water management (e.g. dams).	Monitoring meeting release limits
	Stable	Minimise erosion	Remove infrastructure rip reshape and revegetate or allow continued use of useful infrastructure	Return to previous use (grazing)
	Self-sustaining	To return to agreed grazing land capability		Refer **Table 3-27** and **Table 3-28**

H11 Rehabilitation must commence progressively in accordance with the Plan of Operations.

Dams Containing Hazardous Waste

H12 The construction and operation of any dam containing hazardous waste within the operational land must comply with Table H2 – Size and purpose of dams containing hazardous waste.

Table H2 - Size and Purpose of Dams Containing Hazardous Waste

Name of Dam Containing Hazardous Waste	Maximum surface area of contents in dam (ha)	Maximum volume of dam		Maximum depth of dam (m)	Purpose of Dam
		ML	Mm^3		
Tailings Storage Facility 1 and 2	65	2975	3.0	16	Containment of Tailings from a coal washery plant
Environmental Dam 2	9	232	0.2	4.5	Capture of overland flow from undisturbed areas - Backup for Tailings Dam
IPTD 1 and 2	15		1.4	40	Containment of Tailings from a coal washery plant
IPTD 3	TBA	3,800	3.8	55	Containment of Tailings from a coal washery plant
IPTD 4	TBA	7,900	7.9	TBA	Containment of Tailings from a coal washery plant
Centre Pit Void	TBA	8,600	8.6	TBA	Containment of Tailings from a coal washery plant
TOTAL Estimated Storage		21,700	21.7	TBA	

H13 Any dam containing hazardous waste constructed or operated within the operational land must be located within the polygonal area defined by the points defined in Table H3 – Location of dams containing hazardous waste. Refer also to

Figure 3-8.

Table H3 - Location of dams Containing Hazardous Waste

Name of Dam Containing Hazardous Waste	Latitude (GDA94)[1]	Longitude (GDA94)[1]
Tailings Storage Facility and Environmental Dam[2]	270 17' 16.7031402" S 270 17' 10.9622837" S 270 16' 51.1028709" S 270 16' 27.2791954" S 270 16' 29.1169479" S 270 17' 08.8291088" S	1510 42' 27.3833932" E 1510 42' 28.4233861" E 1510 42' 31.8627267" E 1510 42' 03.7029825" E 1510 41' 39.1178177" E 1510 41' 31.8175509" E
IPT1	27° 16' 39.5932809" S 27° 16' 33.3110450" S 27° 16' 40.9107864" S 27° 16' 34.6002752" S	151° 42' 49.4645845" E 151° 42' 48.3367815" E 151° 42' 23.1909360" E 151° 42' 29.5557786" E
IPT2A	27° 16' 45.56" S 27° 17' 05.72" S 27° 17' 05.34" S 27° 17' 56.25" S 27° 16' 45.55" S	151° 42' 22.13" E 151° 42' 28.00" E 151° 42' 40.75" E 151° 42' 49.98" E 151° 42' 43.66" E
IPT2B	27° 17' 04.7973072" S 27° 16' 56.2475766" S 27° 16' 56.9219634" S 27° 17' 05.2765077" S	151° 42' 37.4263170" E 151° 42' 37.0886266" E 151° 42' 25.6604935" E 151° 42' 29.4918417" E
IPT3	TBC	TBC
IPT4	TBC	TBC
IPT5	TBC	TBC

Note 1: A minimum of 3 points is required to constrain the location of all activities associated with the dam containing hazardous waste. Additional infrastructure which forms part of any dam containing hazardous waste may include appurtenant works consisting of tailings discharge pipelines, seepage collection systems, runoff diversion bunds, containment systems, pressure relief wells, decant and recycle water streams.
Note 2: The location polygon defined in Table H3 – Location of dams containing hazardous waste encloses both the Tailings Storage Facility and Environmental Dam 2.

Inspection of Dams

H14 The holder of the environmental authority must design, construct and operate all high-hazard dams containing hazardous waste in accordance with the Code of Environmental Compliance for Environmental Authorities for High Hazard Dams Containing Hazardous Waste.

H15 The holder of the environmental authority must design, construct and operate all low-hazard dams containing hazardous waste and non-hazardous dams in accordance with the criteria outlined in Appendix B of the Code of Environmental Compliance for Mining Lease Projects.

H16 High hazard dams containing hazardous waste shall be inspected by a Registered Professional Engineer (RPEQ) on or about 1st October but definitely before 1st November each year or at any time if alarming, unusual or otherwise unsatisfactory conditions are observed.

H17 For each inspection, the engineer shall assess the condition of the dam and its foundations, determine the hydraulic adequacy of the dam and assess the adequacy of the works with respect to dam safety.

H18 For each inspection, two copies of the engineer's report and any recommendations as to measures to be taken to ensure the integrity of the dam shall be furnished to the administrating authority within 28 days of the inspection.

Hazardous Dam Embankment Monitoring

H19 During the operational life of the storage the holder of the environmental authority must regularly monitor and record the standing water levels in three monitoring wells, which will be located in a line through the highest section of the embankment.

Decommissioning of Dams – Documentation and Compliance

H20 Dams containing hazardous waste must not be abandoned, must be decommissioned to a situation where water can no longer be stored in the dams and the dams and their contained waste(s) are stable, whereafter the dams are no longer dams and they become landforms on the operational land and must comply with the rehabilitation requirements of the Environmental Authority.

H21 Decommissioning activities for dams must be documented in detail in the plan of operations under which the activities are to occur. Where the detailed documentation is not already contained in the Design Plan for the dam, the detailed documentation is considered to be an amendment to the design plan and must be submitted as an amendment to the design plan required by the Code of Environmental Compliance for Environmental Authorities for High Hazard Dams Containing Hazardous Waste.

Infrastructure

H22 All infrastructure, constructed by or for the Environmental Authority holder during the mining activities including water storage structures, must be removed from the site prior to mining lease surrender, except where agreed in writing by the post mining land owner / holder.

NOTE: This is not applicable where the landowner/holder is also the Environmental Authority holder.

Contaminated Land

H23 Before applying for surrender of a mining lease, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the mining lease which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use.

H24 Before applying for progressive rehabilitation certification for an area, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the area the subject of the application which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use under condition H1.

H25 All reasonable management actions must be taken to minimise the potential for contamination of land by hazardous contaminants.

END OF SCHEDULE H CONDITIONS

A.2 EA Condition Definitions

Words and phrases used throughout this licence are defined below except where identified in the *Environmental Protection Act 1994* or subordinate legislation. Where a word or term is not defined, the ordinary English meaning applies, and regard should be given to the Macquarie Dictionary.

"µg/L" means micrograms per litre.

"administering authority" means the Environmental Protection Agency or its successor.

"airblast overpressure" is the energy transmitted from the blast site within the atmosphere in the form of pressure waves, consisting of both audible (noise) and inaudible (concussion) energy. The maximum excess pressure in this wave is the peak airblast overpressure measured in decibels linear (dB).

"ambient (or total) noise" at a place, means the level of noise at the place from all sources (near and far), measured as the Leq for an appropriate time interval.

"annual exceedance probability" means the probability that the given event will be exceeded within a one year period.

"appropriately qualified person" means a person or body possessing appropriate experience and qualifications to perform these tasks.

"ARD" means acid rock drainage and refers to the low pH, high heavy metal pollutant typical of sulphidic mine wastes, and most commonly associated with the production of ferrous iron and sulphuric acid through the oxidation of sulphide minerals.

"authority" means Environmental Authority under the *Environmental Protection Act 1994*.

"background noise level" means noise, measured in the absence of the noise under investigation, as either:

- L A90,T being the A-weighted sound pressure level exceeded for 90 percent of the time period of not less than 15 minutes, using Fast response, or
- L LAbg,T being the arithmetic average of the minimum readings during a representative time period of not less than 15 minutes, using Fast response.

"blasting" means the use of explosive materials to fracture-

a) rock, coal and other minerals for later recovery; or

b) structural components or other items to facilitate removal from a site or for reuse.

"commercial place" means a place used as an office or for business or commercial purposes, other than a place within the boundaries of the operational land.

"construction" in relation to tailings dams includes building a new dam and modifying or lifting an existing dam.

"dam" means a containment or proposed containment whether permanent or temporary, which is designed to contain, divert or control flowable substances. However this does not include a fabricated or manufactured tank or container designed to a recognised standard.

"dB (Linear) Peak" is the maximum reading in decibels (dB) obtained using the "P" time – weighting characteristic as specified in AS 1259.1 – 1990 with all frequency – weighted networks inoperative.

"design plan" - in the context of a dam design is the documentation required under the "Code of Environmental Compliance for High Hazard Dams Containing Hazardous Waste" to describe the physical dimensions of the dam, the materials and standards to be used for construction of the dam, the procedures and criteria to be used for operating the dam and the decommissioning and rehabilitation objectives in terms procedures, works and outcomes at the end of dam life. The documents can include design and investigation reports, drawings, specifications and certifications.

"design plan in the context of a dam design" is the documentation required under the Code of Environmental Compliance for High Hazard Dams Containing Hazardous Waste to describe the physical dimensions of the dam, the materials and standards to be used for construction of the dam, the procedures and criteria to be used for operating the dam and the decommissioning and rehabilitation objectives in terms procedures, works and outcomes at the end of dam life, The documents can include design and investigation reports, drawings, specifications and certifications.

"design storage allowance" as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

"declared pest plant" means a plant that has been declared under the *Land Protection (Pest and Stock Route Management) Act 2002.*

"environmental authority holder" means the holder of this environmental authority.

"environmental nuisance" is unreasonable interference or likely interference with an environmental value caused by:

a) noise, dust, odour, light; or

b) an unhealthy, offensive or unsightly condition because of contamination; or

c) another way prescribed by regulation.

"EP Act" means the Environmental Protection Act 1994.

"flowable substance" means matter or mixture of materials which can be forced to or otherwise flow under any conditions possible in a situation. It includes water, other liquids or a mixture that includes water or any other liquid or suspended solids.

"foreseeable future" is the period used for assessing the total risk of an event occurring. Permanent structures and ecological sustainability should be expected to still exist at the end of a 150 year foreseeable future with an acceptable risk of failure before that time.

"hazardous waste" means any substance, whether liquid, solid or gaseous, derived by or resulting from, the processing of minerals that tends to destroy life or impair or endanger health.

"high hazard dam" means a dam defined as high hazard in the DERM Information Sheet on Determining Dams Containing Hazardous Waste.

"infrastructure" means water storage dams, roads and tracks, buildings and other structures built for the purpose of mining activities but does not include facilities required for the long terms management of mining impacts or the protection of potential resources. Such facilities include dams containing hazardous waste, waste rock dumps, voids, or ore stockpiles and buildings or other structures whose ownership can be transferred and which have a residual beneficial use for the next owner of the operational land or the background land owner.

"LAmax adj,T" means the average maximum A-weighted sound pressure level, adjusted for noise character and measured over a time period of not less than 15 minutes, using Fast response.

"$L_{Ar,\,1\,hour}$" means the specific noise level measured as the A-weighted equivalent continuous noise level (L_{Aeq}) plus any adjustment for the character of the noise (tonal and/or impulsive) determined over a reference time period of one hour.

"land" in the "land Schedule 2" of this document means land excluding waters and the atmosphere.

"land capability" as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

"land suitability" as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

"land use" term to describe the selected post mining use of the land, which is planned to occur after the cessation of mining operations.

"leachate" means a liquid that has passed through or emerged from, or is likely to have passed through or emerged from, a material stored, processed or disposed of at the operational land which contains soluble, suspended or miscible contaminants likely to have been derived from the said material.

"mandatory reporting level" the volume below the spillway crest, equivalent to the lower of the AEP, 72 hour storm or the AEP wave allowance (AEP is the annual exceedance probability).

"maximum" means that the measured value of the quality characteristic or contaminant must not be greater than the release limit stated.

"MaxLpA,T" means the maximum A-weighted sound pressure level measured over a time period of not less than 15 minutes, using Fast response.

"median" means the middle value, where half the data are smaller, and half the data are larger. If the number of samples is even, the median is the arithmetic average of the two middle values.

"mg/kg" means milligrams per kilogram.

"mg/L" means milligrams per litre.

"minimum" means that the measured value of the quality characteristic or contaminant must not be less than the release limit stated.

"ng/L" means nanograms per litre.

"noise sensitive place" means:

- a legal dwelling, caravan park, residential marina or other residential premises; or
- a motel, hotel or hostel; or
- a kindergarten, school, university or other educational institution; or
- a medical centre or hospital; or

- a protected area; or
- a public park or gardens.

and includes the curtilage of any such place.

"noxious" means harmful or injurious to health or physical well being, other than trivial harm.

"offensive" means causing unreasonable offence or displeasure; is unreasonably disagreeable to the sense; disgusting, nauseous or repulsive, other than trivial harm.

"peak particle velocity (ppv)" is a measure of ground vibration magnitude and is the maximum instantaneous particle velocity at a point during a given time interval in mms-1. (Peak particle velocity can be taken as the vector sum of the three component particle velocities in mutually perpendicular directions).

$$\text{"percent slope"} = \frac{\text{height difference (metres)}}{\text{horizontal difference (metres)}} \times 100$$

"protected area" means:

- a protected area under the *Nature Conservation Act 1992*; or
- a marine park under the *Marine Parks Act 2004*; or
- a World Heritage Area.
- "progressive rehabilitation" means rehabilitation (defined below) undertaken progressively OR a staged approach to rehabilitation as mining operations are ongoing.

"range" means that the measured value of the quality characteristic or contaminant must not be greater than the higher release limit stated nor lower than the lower release limit stated.

"rehabilitation" means the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria set out in this Environmental Authority and, where relevant, includes remediation of contaminated land.

"representative" means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

"residual void" means an open pit resulting from the removal of ore and/or waste rock, which will remain following the cessation of all mining activities and completion of rehabilitation processes.

"sediment dam" means a structure for the capture and treatment of stormwater runoff contaminated only by sediments from disturbed areas and which discharge off-site once full.

"self sustaining" means an area of land which has been rehabilitated and has maintained the required acceptance criteria without human intervention for a period nominated by the administering authority.

"sensitive place" [e.g. odour and dust] has the same meaning as and includes a noise sensitive place and a commercial place.

"significant disturbance" – includes land

a) if it is contaminated land; or

b) it has been disturbed and human intervention is needed to rehabilitate it.

   i. to a state required under the relevant environmental authority; or

   ii. if the environmental authority does not require the land to be rehabilitated to a particular state – to its state immediately before the disturbance.

   Some examples of disturbed land include:

   – areas where soil has been compacted, removed, covered, exposed or stockpiled;
   – areas where vegetation has been removed or destroyed to an extent where the land has been made susceptible to erosion; (vegetation & topsoil)
   – areas where land use suitability or capability has been diminished;
   – areas within a watercourse, waterway, wetland or lake where mining activities occur;
   – areas submerged by tailings or hazardous contaminant storage and dam walls in all cases;
   – areas under temporary infrastructure. Temporary infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be removed after mining activities have ceased; or
   – areas where land has been contaminated and a suitability statement has not been issued.

   However, the following areas are not included:

   – areas off lease (e.g. roads or tracks which provide access to the mining lease);
   – areas previously significantly disturbed which have achieved the rehabilitation outcomes;
   – by agreement with the DERM, areas previously significantly disturbed which have not achieved the rehabilitation objective(s) due to circumstances beyond the control of the mine operator (such as climatic conditions);
   – areas under permanent infrastructure. Permanent infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc), which is to be left by agreement with the landowner. The agreement to leave permanent infrastructure must be recorded in the Landowner Agreement and lodged with the DERM;
   – disturbances that pre-existed the grant of the tenure unless those areas are disturbed during the term of the tenure.

"spillway" means the passage or outlet from the dam through which surplus water flows.

"spillway crest" means the highest point (elevation) of the spillway, above which water will flow along the spillway and discharge from the dam if the flow rate is sufficient.

"stable" means land form dimensions are or will be stable within tolerable limits now and in the foreseeable future. Stability includes consideration of geotechnical stability, settlement and consolidation allowances, bearing capacity (traffic ability), erosion resistance and geochemical stability with respect to seepage and contaminant generation.

"suitably qualified and experienced person" in relation to dams means a person who is a Registered Professional Engineer of Queensland under the provisions of the *Professional Engineers Act 2002* or a Corporate Member of the Institution of Engineers Australia or holds equivalent professional qualifications and has the following: (a) knowledge of engineering principles related to the structures, geomechanics, hydrology, hydraulics, chemistry and environmental impact of dams; and (b) at least a total of five years of suitable experience and demonstrated experience in at least four of the following areas: investigation, design, or construction of dams, operation and maintenance of dams, geomechanics with particular emphasis on stability, geology and geochemistry, hydrology with particular reference to flooding, estimation of extreme storms, water management or meteorology, hydraulics with particular reference to sediment transport and disposition, erosion control, beach processes, and hydrogeology with particular reference to groundwater, solute transport processes and monitoring thereof; and dam safety.

"the holder" means the holder of this Environmental Authority.

"tolerable limits" means that a range of values could be accepted to achieve an overall environmental management objective (eg a range of settlement of a tailing capping could still meet the objective of draining the cap quickly, preventing pondage and limiting infiltration and percolation).

"waters" - includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water in natural or artificial watercourses, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater or any part-thereof.