



NEW HOPE
GROUP

18. Health Safety and Risk

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18. Health, Safety and Risk

18.1. Introduction

This Chapter examines the health, safety and environmental risk issues associated with the revised Project by:

- outlining legislative requirements;
- identifying potential hazards, accidents, spillages, fire and abnormal events that may occur during the construction, operation and decommissioning;
- preparing a health, safety and environmental risk assessment for the construction, operation and decommissioning phases;
- outlining all hazardous substances to be used, stored, processed and produced at each phase of the revised Project;
- outlining the controls to be implemented to protect the health and safety of employees and the public; and
- details of emergency plans and emergency response capabilities.

18.2. Legislative Compliance

The relevant legislation and the regulatory requirements describing how the revised Project will achieve compliance are presented in **Table 18-1**.

Table 18-1 Legislative Compliance

Relevant Legislation	Legislative Requirements	Compliance
<i>Coal Mining Safety and Health Act 1999</i>	Sets obligations for the operator, designer, constructor, contractors and others on a coal mine.	Undertake the requirements in the Act, Regulation and Standards and by applying due diligence and taking reasonable precautions.
<i>Workplace Health and Safety Act 1995</i>	The objective of this Act is to prevent a person's death, injury or illness being caused by a workplace, by a relevant workplace area, by work activities, or by plant or substances for use at a workplace.	Coal mines are exempt from this Act, but are regulated under the <i>Coal Mining Safety and Health Act 1999</i> . Work practices during construction of the mine infrastructure will be in compliance with the requirements of the Act.
<i>Explosives Act 1999</i>	The Act sets out the requirements for the handling, storage, transport and manufacture of explosives.	Undertake storage and handling of explosive materials/substances in accordance with the requirements of the <i>Explosives Act 1999</i> .
<i>Dangerous Goods Safety Management Act 2001</i>	Sets the requirements for the transport and storage of substances and the systems to be adopted based on these substances.	Coal mines are exempt from this Act, but are regulated under the <i>Coal Mining Safety and Health Act 1999</i> .
<i>Radiation Safety Act 1999</i>	Sets the requirements for the handling of radioactive substances and the monitoring of persons exposed to the hazard.	Undertake the requirements of the Act including radiation monitoring and screening as required.

18.3. Dangerous Goods and Hazardous Substances

The principal dangerous goods by name, classification, raw and storage concentration, UN number, packaging group and purpose and indicative usage rates for the construction and operational phases of the revised Project are presented in **Table 18-2**. A comprehensive list of the dangerous goods and hazardous substances likely to be used by the revised Project is presented in **Appendix G.10.1**.

Table 18-2 Principal Dangerous Goods and Hazardous Substances Usage

Dangerous Goods and Hazardous Substances	DG Class	Raw conc. (wt%)	Storage conc. (wt%)	UN No.	Packaging group	Purpose/Use	Construction Phase Usage	Operational Phase Usage (7.5 Mtpa Case)
Diesel fuel oil	3 (Class C1)*	N/A	N/A	1202	III	Fuel for mobile equipment	3 - 4 ML/yr	38 ML/yr
Lubrication oils (hydraulic oil)	3 (Class C2)**	N/A	N/A	N/A	N/A	Lubricate plant and equipment	48 - 64 kL/annum	600 kL/yr
Grease	N/A	N/A	N/A	N/A	N/A	Plant and Equipment	7 t/yr	84 t/yr
Coolant	N/A	N/A	N/A	N/A	N/A	Plant and Equipment	5kL/yr	75 kL/yr
Solvents (eg acetone)	3	99.5	99.5	1090	II	Workshop degreasing agent		11 kL/yr
Hypochlorite solution (chlorine)	8	10-15%	10-15%	1791	II or III	Potable water treatment, sewage effluent treatment	1000L/yr	1000 L/yr
Paints	3	N/A	N/A	1263	III	Paint	300kg/yr	600 kg/yr
Sulphuric acid	8	15-51%	15-51%	2796	II	Batteries	14 batteries per year	160 batteries/yr
Ammonium nitrate	1.1D	N/A	N/A	0082	N/A	Blasting explosive	N/A	8,000 – 14,000 t/yr
Caustic soda (sodium hydroxide)	8	50	50	1823	II	Concrete degreasing agent	N/A	700 – 900 L/yr
Anionic flocculants (acrylamide/acrylate copolymer)	N/A	99.5	10	N/A	N/A	CHPP	N/A	46 t/yr
Cationic flocculant (polydimethyl diyl dimethyl ammonia chloride) (poly DADMAC)	N/A	40	40	N/A	N/A	CHPP	N/A	187 t/yr

*Class C1—a combustible liquid that has a flashpoint of 150°C or less.

**Class C2—a combustible liquid that has a flashpoint exceeding 150°C.

Material Safety Data Sheets (MSDSs) for Anionic flocculants (acrylamide/acrylate copolymer) and Cationic flocculant (polydimethyl diyl dimethyl ammonia chloride) (poly DADMAC) are located in **Appendix G.10.2**. Other MSDSs will be obtained and communicated to all site personnel involved in the storage, handling, use and disposal of dangerous and hazardous substances and materials.

MSDS information will be obtained and communicated to all site personnel involved in the storage, handling use and disposal of dangerous goods, hazardous substances and materials. The storage, handling and transport of these goods/substances will be in accordance with the current Australian Standards and industry codes of practice.

As shown in **Table 8-2**, the greatest use of dangerous goods/hazardous substances will involve diesel fuel oil. The approved separation distances will be maintained during the storage of these materials/substances as defined in *AS 1940-2004 The storage and handling of flammable and combustible liquids*.

There are hazards associated with the storage and handling of dangerous goods and hazardous substances for the construction and operational aspects of the revised Project. However, given the established management controls in place for all dangerous goods and hazardous substances currently utilised by the Mine, there is negligible risk to employees, adjacent land users, general public and the environment. Any impacts from potential incidents involving dangerous and hazardous substances are expected to be contained within the revised Project site. No new dangerous goods and/or hazardous substances are to be utilised for the revised Project than what are currently utilised at the Mine. In the event of a dangerous goods and/or hazardous substances fire, *EAG 02 16-GL01 – Response To Fire*, contained within the Emergency Management Plan will be engaged. The revised Projects Emergency Management Plan is located in **Appendix J.15**.

18.4. Revised Project Risk Assessment

This Section presents a risk assessment for the construction, operation and decommissioning phases of the revised Project to determine the health and safety risk profile and the environmental risk profile. It is important to note that additional risk assessment processes will be carried out throughout the revised Project's life cycle. In addition, comprehensive risk registers have been implemented for the existing operation and will be updated to include the revised Project.

18.4.1. Method

The risk assessment was carried out in accordance with the *AS/NZS ISO 31000:2009 Risk Assessment* and *HB436:2004 Risk Management Guidelines Companion to AS/NZS 4360:2004*. This International Standard and accompanying handbook provides the principles and guidelines for establishing the context, identification, analysis, treatment and monitoring of risk. The standard is generic, as it recognises that the design of the risk assessment will need to account for the objectives of the analysis, the needs of an organisation and its products and services, and the process and practices used by the organisation.

The risk assessment incorporates:

- all relevant hazards (minor and major);
- the possible frequency of the potential hazards, accidents, spillages and abnormal events occurring;
- indication of cumulative risk levels to surrounding land uses;
- life of any identified hazards;
- the effects and rate of usage of the hazardous substances to be used, stored, processed or produced by the revised Project; and
- the type of machinery and equipment used.

Potential incident scenarios resulting from the revised Project were identified through consideration of:

- the range of activities to be carried out and facilities likely to be present during the construction, operation and decommissioning phases of the revised Project. These include construction activities, energy supply, coal excavation and transport, handling and waste water management; and
- the range of potentially hazardous incidents that might be associated with each of the activities/facilities identified at the revised Project site.

After identifying the range of hazards likely to occur at the revised Project site, the following matters were considered for each hazard:

- appropriate controls and mitigation factors expected to be put in place for the management of each hazard. These may include prevention and response measures;
- the consequences of each of the hazardous incidents if they were to occur. Consequences may include direct impacts of incidents and the potential for propagation and secondary incidents. Assessment of the severity of the consequences takes into consideration the proposed mitigation measures listed;
- possible causes and the probability of these causes occurring and leading to the hazardous incident. The probability of each hazardous incident occurring takes into consideration the proposed controls. This information is then tabled to prioritise the risks and evaluate these levels against the concept of 'As Low As Reasonably Practical'; and
- where an extreme or high risk was identified, appropriate, controls and mitigation measures were identified and the hazardous incident reassessed with these controls in place.

In the preparation of the following risk assessments, NAC's *Risk Management Policy* and *Strategic and Corporate Risk Management Framework* were applied. The documents are provided in **Appendix J.16**.

18.4.2. Risk Analysis Criteria

The 'likelihood' is a qualitative estimate of the frequency at which the hazard incident may occur. A likelihood of occurrence was assigned to each identified hazard based on the definitions shown in **Table 18-3**. The contribution of the preventative and protective features were taken into account when assessing the likelihood of occurrence and potential consequence from each hazard. The risk levels presented in the risk assessment tables denote residual risk (risk level once proposed controls are in place).

Table 18-3 Likelihood of Occurrence for Hazardous Incidents

Probability rank	Descriptor	Description	Likelihood Factor
A	Almost certain	(1) Reasonably expected to occur within a month (2) Will likely occur in most circumstances	10:1
B	Likely	(1) Likely to occur within the next year (2) Probably occur in near future	1:1
C	Possible	(1) Likely to occur within next five to ten years (2) Might occur at some time	1:10
D	Unlikely	(1) Not specifically expected to occur but may occur sometime in future (2) May occur in exceptional circumstances	1:100
E	Rare	(1) Foreseeable but not normally expected to occur (2) Requires a chain of related unlikely events to occur	1:1,000

The consequences assessed include both threats to the natural environment and to health and safety of the site personnel and public based on definitions shown in **Table 18-4**. In addition, where a hazardous incident may have several outcomes, each potential outcome was assessed. The severity classes for health and safety type outcomes are based on *AS/NZS 4360:2004 Risk Management* while those for the threat to the natural environment are based on common environmental risk management consequence categories.

Table 18-4 Consequence Classes for Health and Safety and Environmental Losses

Rank	Description	Environment	Reputation	Capital Projects	Health and Safety
1	Insignificant	No unauthorised adverse impact on environment	Isolated complaints	Overrun on approvals schedule (1 month)	No injury or health effect
2	Minor	Temporary and minor unauthorised effect on environment – non reportable	Local community issue with limited stakeholder involvement	Overrun on approvals schedule (3 months)	First aid injury or temporary health effect
3	Moderate	Serious temporary or minor permanent unauthorised damage – reportable incident with local attention	Local community issue with political involvement. Local media coverage	Significant delay to approvals schedule (6 months)	Medical treatment, LTI, permanent partial disability or health effect
4	High	Significant unauthorised environmental harm - reportable incident with adverse national publicity	State/local community issue with key stakeholder attention. National Media coverage	Major delay to approvals schedule (1 year)	Single fatality or permanent total disability
5	Catastrophic	Major unauthorised event causing loss of company credibility with stakeholders and likely prosecution	Withdrawal of Stakeholder support e.g. Includes significant national or international media coverage	Project refused	Multiple fatalities

The risk assessment matrix, shown in **Table 18-5**, is based on a traditional “five by five” matrix assessing the likelihood of an event occurring, versus the consequences if that event occurred, to give an overall risk of that particular event. This describes a method for estimating risk by combining the “Likelihood” of a hazard or environmental impact occurring with the “Consequences” of a hazard or impact occurring, in terms of its effect on the surrounding environment.

The highest risk incidents are judged to have the highest priority for consideration of additional risk reduction options. Low risk incidents are subject to the normal, on-going improvement process and operational controls. The shading in the risk matrix in **Table 18-7** refers to the qualitative bands of risk level including ‘Extreme’, ‘High’, ‘Moderate’, and ‘Low’.

Table 18-5 Risk Assessment Matrix

		Consequence				
		1 Insignificant	2 Minor	3 Moderate	4 High	5 Catastrophic
Likelihood	A Almost certain	Medium	High	Extreme	Extreme	Extreme
	B Likely	Medium	Medium	High	Extreme	Extreme
	C Possible	Low	Medium	High	Extreme	Extreme
	D Unlikely	Low	Low	Medium	High	Extreme
	E Rare	Low	Low	Low	Medium	High

18.4.3. Risk Assessment

The risk assessment tables for construction, operational and decommissioning phases list:

- the issue (or hazard) that may impact on the environmental, health and safety;
- the proposed controls; and
- the Consequence (C), Likelihood (L) and Risk (R) that may impact on health and safety and the natural environment.

18.4.4. Construction Risk

The risk assessment presented in **Table 18-6** is focused on the potential health and safety and environmental issues for the revised Project during construction.

Table 18-6 Risk Assessment Table – Construction Phase

Hazard/Issue	Proposed controls	Risk Assessment		
		C	L	Risk
1. Dust from road and earthworks.	<ol style="list-style-type: none"> 1. Water trucks. 2. Speed limits. 3. Coarse rejects laid on haul roads (stabiliser). 	2	A	High
2. Traffic incidents on-site.	<ol style="list-style-type: none"> 1. Traffic management plan. 2. Safety inductions for workers. 3. Speed controls. 4. Proximity detection controls. 5. Principle Hazard Management Plans. 	2	C	Medium
3. Traffic incidents off-site (mine, CHPPs and rail loop).	<ol style="list-style-type: none"> 1. Traffic management plan including police escorts and public notices about the timing and likelihood of delays. 2. Driving distances to the mine will be monitored to ensure driver fatigue is managed. 3. Principle Hazard Management Plans. 	2	C	Medium
4. Slump of sloped ground or collapse of temporary open trenches.	<ol style="list-style-type: none"> 1. Rollover Protective Structures (ROPS) fitted to equipment. 2. Geotechnical investigation, design and controls. 3. Drainage Controls. 4. Principle Hazard Management Plans. 	2	C	Medium
5. Leaks of oil, fuel or chemicals from vehicles onto construction earthworks (mine, CHPPs and water supply pipeline).	<ol style="list-style-type: none"> 1. Refuelling in designated areas fitted with spill containment. 2. Storage and handling in accordance with AS1940 Section 5.8. 3. Material used in construction will be stored and used in an appropriate fashion to ensure containment. 4. Clean up, response procedures and training. 	3	C	High
6. Pests (weeds) brought to site by earthmoving equipment (mine and water supply pipeline).	<ol style="list-style-type: none"> 1. All vehicles must be washed down and inspected prior to arrival on site. 	3	C	High
7. Runoff from disturbed areas.	<ol style="list-style-type: none"> 1. Water Management Plan including: <ul style="list-style-type: none"> ■ Minimisation of disturbed areas; ■ Control of runoff at source; ■ Sediment dams; and ■ Recirculation of water in sediment dams. 	3	C	High

Hazard/Issue	Proposed controls	Risk Assessment		
		C	L	Risk
8. Release of treated effluent from sewerage treatment system	<ol style="list-style-type: none"> 1. Re-use in process water circuit or treatment in sewage treatment ponds. 2. Irrigation in bunded areas. 3. Monitoring of effluent quality. 4. Design to appropriate Equivalent Person. 	3	D	Medium
9. Air Quality and ecological impacts from above ground fire	<ol style="list-style-type: none"> 1. Relevant site staff will complete fire safety training during induction. 2. Approved fire alarm, detection, suppression and fighting system designed and installed in consultation with the relevant fire control authorities. 3. NHG will liaise with landowners and local authorities with respect to fire breaks and on-going maintenance programs to minimise the risk of bush fire. 4. Limit ignition sources around refuelling and fuel storage areas. 5. Emergency response procedures. 6. Coordination with external emergency services. 	2	C	Medium
10. Noise from construction activities exceeding authorised noise limits (e.g. mine equipment)	<ol style="list-style-type: none"> 1. Operate all equipment in line with manufacturer specifications. 2. Comply with the <i>Environmental Protection (Noise) Policy 2008</i> (EPP Noise). 3. Time limit restrictions. 4. Conduct regular noise monitoring. 	2	B	Medium
11. Cultural heritage - activities adversely affect cultural heritage sites or features	<ol style="list-style-type: none"> 1. Cultural Heritage Management Plan (CHMP). 2. Cultural heritage training for site personnel. 3. Permits to disturb in place. 	3	D	Medium
12. Unauthorised clearance of threatened flora and fauna	<ol style="list-style-type: none"> 1. Translocation Management Plan. 2. Pre-clearance surveys. 3. On-site, permit to disturb in place. 4. Contractor inductions (environmental awareness training). 5. Fauna spotters in place for clearing. 	3	D	Medium
13. Inadequate waste management practices	<ol style="list-style-type: none"> 1. Construction waste management plan. 2. Engaging accredited waste contractor. 	1	D	Low

18.4.5. Operational Risk

The risk assessment presented in **Table 18-7** is focused on the potential health and safety and environmental issues for the revised Project during operation.

Table 18-7 Risk Assessment Table – Operations Phase

Hazard/Issue	Proposed controls	Risk Assessment		
		C	L	R
1. Dust from mining activities exceeding air quality limits	<ol style="list-style-type: none"> 1. Air quality management plan. 2. Dust monitoring including real time monitors (e.g., TEOMs). 3. Water trucks. 4. Speed limits. 5. Coarse reject laid on haul roads (stabiliser). 6. Dust control on conveyor transfer points (i.e. water sprays). 7. Suppression sprays at locations in coal handling facilities where required. 8. Enclosed cabins on mining vehicles (trucks, excavators etc.) to minimise operator exposure. 9. Proactive management controls. 	3	C	High
2. Traffic incidents on-site	<ol style="list-style-type: none"> 1. Traffic Standard Operating Procedure. 2. Safety inductions for workers. 3. Speed controls. 4. Radio communications in vehicles. 5. Proximity detection controls. 6. Principle Hazard Management Plans. 	2	C	Medium
3. Slump of sloped ground	<ol style="list-style-type: none"> 1. Rollover Protective Structures (ROPS) fitted to equipment. 2. Geotechnical investigation, design and controls. 3. Drainage Controls – rills. 4. Principle Hazard Management Plans. 	2	C	High
4. Leaks of oil, fuel or chemicals from vehicles during site operations	<ol style="list-style-type: none"> 1. Major equipment maintenance to be conducted in dedicated facilities. 2. Refuelling in designated areas fitted with spill containment (Refuelling SOP). 3. Storage and handling in accordance with AS1940. 4. Material used in operation will be stored and used in an appropriate fashion to ensure containment. 5. Surface water management controls. 	3	D	Medium

Hazard/Issue	Proposed controls	Risk Assessment		
		C	L	R
5. Noise, Vibration and Fumes from blasting and explosives	<ol style="list-style-type: none"> 1. Explosive materials handled and used in compliance with AS 2187.2 and best environmental management practice. 2. Explosive materials will only be made by licensed contractor personnel as and when required. 3. Explosives will only be handled and used by licensed Contractor personnel. 4. Sources of ignition will be strictly controlled. 5. Blasting procedures including separation from the blast zone. 6. Storage of detonators shall be in accordance with the <i>Explosives Act 1999</i>, Part 4 Division 6. 7. Shot design. 8. Air blast overpressure and vibration monitoring. 9. Fume management zone. 10. Proactive landholder notification. 	3	C	High
6. Air Quality and ecological impacts from above ground fire.	<ol style="list-style-type: none"> 1. Relevant site staff will complete fire safety training during induction. 2. Approved fire alarm, detection, suppression and fighting system designed and installed in consultation with the relevant fire control authorities. 3. NHG will liaise with landowners and local authorities with respect on fire breaks and on-going maintenance programs to minimise the risk of bush fire. 4. Limit ignition sources around refuelling and fuel storage areas. 5. Emergency response procedures. 6. Coordination with external emergency services. 	2	C	High
7. Air Quality impacts from fires in coal stockpiles and handling facilities	<ol style="list-style-type: none"> 1. Design coal stockpiles to limit ignition sources. 2. Minimising storage times. 3. Stockpile inspections. 4. Provision of adequate fire fighting equipment and water. 5. Provision of training to personnel on how to deal with stockpile fires. 6. Fire suppression systems to be designed to Australian Standards. 7. Plant designed to limit ignition sources including non-smoking requirements. 8. Emergency Response Plan. 	3	D	Medium

Hazard/Issue	Proposed controls	Risk Assessment		
		C	L	R
8. Release of treated effluent from sewerage treatment system.	<ol style="list-style-type: none"> 1. Re-use in process water circuit or treatment in sewage treatment ponds. 2. Irrigation bunded areas. 3. Monitoring of effluent quality. 4. Design to appropriate Equivalent Person. 	3	D	Medium
9. Chemical release – liquid from leaks, ruptures, over-flows, spillages or pooling. Release to atmosphere or ground systems	<ol style="list-style-type: none"> 1. All storage and handling facilities designed and operated to relevant Australian Standards. 2. Clean storm water is directed away from potentially contaminated areas. 3. Project site drainage system designed to capture and retain spills on site. 4. Hazard and Operability (HAZOP) reviews conducted during detailed design. 5. Personnel trained in appropriate storage, handling and incident response. 6. Monitoring to detect leaks or spills. 7. Material safety data sheets available on site. 8. Procedure for introduction of new chemicals. 9. Appropriate spill response/incident response equipment. 10. Chemical incidents included in Emergency Response Plan. 11. Preventative maintenance program. 	3	D	Medium
10. Runoff from disturbed areas	<ol style="list-style-type: none"> 1. Operational Water Management Plan including: <ul style="list-style-type: none"> ▪ Minimisation of disturbed areas; ▪ Control of runoff at source; ▪ Sediment dams; ▪ Recirculation of water in sediment dams; and ▪ Vegetation of disturbed areas. 	3	C	High
11. Off-site release of mine tailings	<ol style="list-style-type: none"> 1. In-pit tailing disposal. 2. Regular inspections. 3. Dams designed to appropriate standards. 4. Rehab of out-of-pit structures. 	4	D	High
12. Unexpected dam failure – release of mine water	<ol style="list-style-type: none"> 1. Dams designed and constructed to appropriate standards. 2. Levees designed and constructed to appropriate standards. 3. Regular inspections. 4. Emergency response plan. 5. Principle Hazard Management Plans. 	3	C	High

Hazard/Issue	Proposed controls	Risk Assessment		
		C	L	R
13. Traffic incidents off-site – movement of heavy equipment to site	<ol style="list-style-type: none"> Traffic management plan including police escorts and public notices about the timing and likelihood of delays. Driving distances to the mine will be monitored to ensure driver fatigue is managed. Implement Commuter Management Plan. Principle Hazard Management Plans. 	2	C	Medium
14. Noise in excess of authorised noise limits (blasting, CHPP, mine equipment)	<ol style="list-style-type: none"> Operate all equipment in line with manufacturer specs. Comply with the <i>Environmental Protection (Noise) Policy 2008</i> (EPP Noise). Time limit restrictions. Conduct regular noise monitoring. 	3	C	High
15. Inability to meet final landform criteria	<ol style="list-style-type: none"> Collect appropriate and valid geotechnical data. Selection of a technically and economically acceptable land use, supported by stakeholders. Design mine and structures in accordance with geotechnical criteria and Final Land Use Rehabilitation Plan. Use best practice stability models to predict long-term stability of the dumps. Implement Final Land Use Rehabilitation Plan. Implement Final Landform Management Plan. 	3	D	Medium
16. Lack of effective waste management	<ol style="list-style-type: none"> Operational waste management plan. Engaging accredited waste contractor. 	1	D	Low
17. Acid producing wastes	<ol style="list-style-type: none"> Collect appropriate and valid data in the monitoring program. Obtain representative sample and assess characteristics, leachate quality and kinetics. Static and kinetic testing to define potential leachate water quality. Routine Inspections. 	2	D	Low

Hazard/Issue	Proposed controls	Risk Assessment		
		C	L	R
18. Impacts on Lagoon Creek	<ol style="list-style-type: none"> 1. Conservation Management Plan. 2. Appropriate planning around creek crossings – design and approvals. 3. Buffer distances. 4. Water management (monitoring). 5. Best practice water management system. 6. Control sediment movement at source using Soil and Erosion Guideline methods. 	3	D	Medium
19. Unauthorised clearance of threatened flora and fauna	<ol style="list-style-type: none"> 1. Translocation Management Plan. 2. Pre-clearance surveys. 3. On-site, permit to disturb in place. 4. Contractor inductions (environmental awareness training). 5. Fauna spotters in place for clearing. 	3	D	Medium
20. Mining activities impact on groundwater resources	<ol style="list-style-type: none"> 1. Develop a groundwater model to understand potential impacts on mining. 2. Install Piezometers and measure groundwater flow and quality extensively across the revised Project site and Study area. 3. Make good provisions (deepening bores, compensation). 	4	D	High
21. Destruction/clearing of endangered regional ecosystems and threatened communities	<ol style="list-style-type: none"> 1. Offset program. 2. Conservation Management Plan. 3. Biodiversity Management Plan. 4. Threatened Species Relocation Management Plan. 5. Fenced areas. 	4	D	High
22. Pests and weeds introduced to site	<ol style="list-style-type: none"> 1. All vehicles must be washed down and inspected prior to arrival on site. 2. Site requirement to have weed free vehicles - condition of entry (contract conditions). 3. Weed Management Plan. 	3	C	High
23. Cultural heritage - activities adversely affect cultural heritage sites or features	<ol style="list-style-type: none"> 1. Cultural Heritage Management Plan (CHMP). 2. Cultural heritage training for site personnel. 3. Permits to disturb in place. 	3	D	Medium

18.4.6. Decommissioning Risk

The risk assessment presented in **Table 18-8** is focused on the potential health and safety and environmental issues for the revised Project during decommissioning.

Table 18-8 Risk Assessment Table – Decommissioning Phase

Hazard/Issue	Proposed controls	Risk Assessment		
		C	L	R
1. Uncertain of hydrologic behaviour post-mining	<ol style="list-style-type: none"> Detail hydrology post mining and design using 'lessons learned'. Mine Closure Plan. Surface Water Management Plan. 	3	D	Medium
2. Post Mine land contamination	<ol style="list-style-type: none"> As above – land contamination. Tailings Controls. Final Landform criteria. 	3	D	Medium
3. Eroding mining land forms	<ol style="list-style-type: none"> Appropriate data collection and design of land form. Rehabilitation plan is correctly documented (including trials and studies – establish using on-site trials). Facilitate rehab of ex-pit dump. Final Land Use Rehabilitation Plan. 	3	D	Medium
4. Failure of rehabilitation	<ol style="list-style-type: none"> Determine swell factors of all materials; estimate compaction on placement; estimate settlement after placement. Facilitate rehab of ex-pit dump. 	3	D	Medium
5. Vegetative cover fails	<ol style="list-style-type: none"> Source seed for revegetation from the immediate region to enhance local endemic species development. Appropriate sampling and mapping of soils and geochemistry. 	3	D	Medium
6. Revegetation not best practice	<ol style="list-style-type: none"> Source seed for revegetation from the immediate region. Consult regulators. 	3	D	Medium
7. Rehabilitation criteria not acceptable	<ol style="list-style-type: none"> Best practice criteria developed from ACARP studies. Ecosystem Function Analysis or similar methods using ecological indicators for native vegetation and fauna habitat re-establishment. Consult regulators. 	3	D	Medium

Hazard/Issue	Proposed controls	Risk Assessment		
		C	L	R
8. Cannot prove that depressions will contain good quality water	<ol style="list-style-type: none"> 1. Post-mining water quality model to show management strategies that ensure the depressions will contain good quality water. 2. Shaping of the final depressions during mine planning to maximise possibility of good water quality. 	3	D	Medium
9. Government requires that depressions be backfilled	<ol style="list-style-type: none"> 1. Model water quality and test various scenarios (waste placement, leachate data, final void design) to show that final void water quality can be acceptable. 	3	D	Medium
10. Landform designs unproven	<ol style="list-style-type: none"> 1. Undertake appropriate site-specific investigations, modelling and design. 2. Facilitate rehab of ex-pit dump. 3. Designs need to be 'proven' to be maintenance-free for the very long term. 	3	D	Medium

18.4.7. Risk Assessment Conclusion

The information contained in **Table 18-6** to **Table 18-8** shows that the health and safety risk profile for the revised Project is generally 'Low' or 'Moderate' with the exception of noise generation, dust, groundwater management, runoff, hydrocarbon leaks, weed & pest management, safety risks from slumping, fire, run off from tailings, dam failure, and clearing of rare and endangered ecosystem have been assessed as having a 'High' risk. These risks are common to all open cut mining operations and are subject to the controls contained in the *Coal Mining Safety and Health Regulations 2001*.

The information contained in **Table 18-6** to **Table 18-8** shows that the environmental risk profile for the revised Project is generally 'Low' to 'Moderate'.

Noise has been identified as a high risk for the revised Project due to its proximity to sensitive receptors. **Chapter 11** identifies these receptors along with appropriate mitigation measures and proactive monitoring to ensure the revised Project meets all regulatory requirements.

18.5. Cumulative Risk

The revised Project will be an extension to the activities currently being undertaken at the Mine with the following key elements proposed to be carried out as part of the revised Project:

- Increasing the coal production rate from 4.8 Mtpa up to 7.5 Mtpa;
- Extending the life of mine for an additional 12 years;
- Construction period commencing 2015 and being completed in 2017 (road realignment, water management structures, CHPP module, upgrading of existing infrastructure and provision of a new 8 km rail spur and balloon loop and associated TLF);
- Peak construction workforce of approximately 260 persons; and

- Increase in total operational workforce numbers from the current 300 persons to approximately 435 at a peak production of 7.5 Mtpa.

The majority of revised Project risk is likely to occur during the construction period. All site personnel will undergo comprehensive site inductions, regular 'tool box talks'. The risks identified in this Chapter will be communicated, audited and regularly reviewed to ensure applicability.

All identified risks to the community and surrounding environment will be assessed and mitigated as far as reasonably practicable. Mitigation measures will be developed in consultation with the relevant stakeholders. The Mine is located in a rural setting with no other industrial or mining activities in the vicinity. A cumulative assessment for the revised Project is presented in **Chapter 20**.

Risk assessments for the construction, operational and decommissioning phases of the revised Project are provided **Section 18.3**.

18.6. Health and Safety

18.6.1. Description of Public Health and Safety Community Values

There are a number of existing community values that relate to public health and safety that may be affected by the revised Project. Health and safety values within the community and amongst mine personnel are important aspects that need to be protected through management, monitoring and auditing. The health and safety values have been identified through community consultation and are assessed as part of the Social Impact Assessment and addressed in the Social Impact Management Plan provided in **Chapter 16** and **Appendix J.14** respectively.

Current community health and safety values that may be impacted by the revised Project are:

- a safe and healthy living environment;
- community health and wellbeing;
- quality of life; and
- the health and safety of employees during the construction, operation and decommissioning of the revised Project.

The area is rural in nature and the potentially affected places are primarily residential properties and rural infrastructure. **Chapter 9** details the potential impacts of air emissions at sensitive receptors that may be caused by the revised Project's operations. **Chapter 11** details the potential impacts of noise and vibration emissions at sensitive receivers that may be caused by the revised Project's operations.

18.7. Potential Impacts and Mitigation Measures

18.7.1. Description of Potential Impacts

The revised Project is unlikely to impact on community health, safety and quality of life, over and above what is currently occurring from the Mine. Notwithstanding this, the following have the potential to impact on community health, safety and quality of life in the following ways:

Health

- contamination of water bodies due to contaminant discharge;
- contamination of surface and groundwater resources due to ineffective waste management; and
- uncontrolled breeding of disease vectors, such as mosquitoes and biting midges.

Safety

- traffic incidents with mine vehicles off-site;
- ineffective security and site demarcation leading to access to site by the public; and
- workplace health and safety impacts to employees during construction, operation and decommissioning.

Quality of Life

- nuisance caused by air emissions, dust, light and noise.

18.7.2. Mitigation Measures

A summary of the potential public health risks to the sensitive receivers is presented in **Table 18-9**. The potential impacts are based on the consultation undertaken with the community and the risk assessment undertaken for the revised Project. These points all relate to the overall health and safety impacts of the revised Project on the surrounding community, mine personnel on-site and the environment.

Table 18-9 Summary of Risks to Community Health, Safety and Quality of Life

Potential Impact	Risk to Nearby Receptors	Comment
Odour	Low	No major odour sources, site Sewage Treatment Plant (STP) not likely to produce odours if managed properly.
Dust and particulates	High	No major gas/vapour sources. Air dispersion modelling for the revised Project has predicted air quality will meet the EPP (Air) at 38 of the 44 sensitive receptors. The implementation of adaptive air quality management predicted no exceedances of the EPP (Air) objective (except at sensitive receptor 3). NAC are currently negotiating to relocate the current tenant at sensitive receptor 3 to another location with reduced potential for air quality impacts from the revised Project. This is addressed in Chapter 9.
Noise	High	By implementing noise management and mitigation measures including reduced night time operation (only two pits operating at night as required) and using attenuated equipment (noise attenuating noisier equipment including excavators, track dozers, loaders and rear dump trucks), the predicted noise levels from the mining operation will meet the EPP Noise LAeq,adj,1 hr daytime, evening and night time criteria during both neutral and worst case temperature inversion conditions at all noise sensitive receivers over the life of the revised Project except noise sensitive receiver 3, a NAC property. This is addressed in Chapter 11 .
Pests	High	No increase in pests due to construction or operations.
Waste	Low	Construction, operational and decommissioning waste streams are manageable through established methods.
Chemicals	Low	Construction, operational and decommissioning chemicals are manageable through established methods.
Groundwater quality	Extreme	Low potential for acid mine drainage. Low likelihood of changes in groundwater quality outside of the mining pits and final voids, as mining areas/voids form a groundwater sink with groundwater flow towards, not away from them, in the long term. Very low likelihood of chemical and waste spills infiltrating to groundwater.
Surface water quality	Low to High	Low potential for acid mine drainage. Mine water discharges restricted to flood conditions. Very low likelihood of chemical or wastewater spills to waterways.
Traffic	Medium	Existing low traffic area, dedicated mine access road.
Light	Low	Night activities from the lighting of the mining face, CHPP and vehicles moving around the mining area. Implementation of a Lighting Management Plan.

Current and on-going monitoring of the above potential impacts is outlined within the EM Plan provided in **Chapter 21** and **Appendix J.19**.

Pest Management

The revised Project is not expected to lead to an increase in the number of pests, including mosquitos, during construction, operations or decommissioning. Appropriate waste management strategies will limit any pest impacts. A Pest and Weed Management Plan are currently in place for the Mine and have been updated for the revised Project. The Pest and Weed Management Plan for the revised Project site is provided in **Appendix J.9**. This plan will be implemented during construction, operation and decommissioning phases of the revised Project.

Water Resources

The Mine sources potable water for its operations from basalt aquifers and from licensed groundwater bores and is treated by a Reverse Osmosis Water Treatment Plant on-site.

The potential for impacts to surface water quality is assessed in **Chapter 5**. In summary, the risk posed to surface water quality is low, as there is a low potential for acid mine drainage along with a low likelihood for chemical spills or waste water to be discharged into waterways. Mine water discharges to waterways will be restricted to emergency discharges during extreme rainfall/flood conditions, thus discharges (if required) would be significantly diluted with flood waters. Chemical spills will be minimised as outlined above. All sewage will be treated on-site at the STP and treated effluent drains to an on-site sediment dam. No sewage effluent will be discharged to waterways.

Driver Fatigue

The revised Project will result in modest increases in traffic demands along the Warrego Highway and other council controlled roads, with no reduction in the Level of Services observed along these roads in the area, as presented in detail within **Chapter 13**. However, it should be noted that preliminary intersection assessment have been undertaken for Jondaryan Sabine Road/ Warrego Highway intersection, which indicate that the background traffic growth at this intersection without the revised Project traffic demands will trigger a capacity upgrade. NAC will ensure that all road intersections required for the revised Project are adequate to safely cater for the construction and operational traffic volumes. However, given that Jondaryan Sabine Road/ Warrego Highway intersection as currently planned would operate outside DMR's standard DoS thresholds in 2027 irrespective of the additional development traffic, TMR and TRC should take an active role in consultation with NAC in determining the appropriate intersection design.

In addition, a detailed Australian Level Crossing Assessment Model (ALCAM) has been undertaken to assess the key level crossings that are impacted by the revised Project, as presented within **Appendix G.8.4**. The ALCAM report provides a detailed analysis of the key level crossings, the safety assessment undertaken, the expected outcomes of the ALCAM assessment, best practice requirements and mitigation measures that should be undertaken in consultation with the relevant road and rail authorities to ensure the existing level crossing are safe to operate with the modest increase in traffic demands from the revised Project. NAC will ensure that appropriate discussions are undertaken with the relevant road and rail authorities to ensure an appropriate mitigation measures are implemented based on the proposed design considerations outlined within the ALCAM Report.

NAC implement a driver fatigue policy on-site, and this is communicated to all site personnel during the routine site induction. It is recognised by NAC that all site personnel commute to site from surrounding regional towns, such as Toowoomba, Dalby, Jondaryan and Oakey. On average, the daily commuting distances to the revised Project site will be 30 to 40 minutes. NAC's *Fitness for Work – Fatigue Management* is provided in **Appendix A.4**.

18.8. Emergency Response

Designated first aid and emergency rescue facilities and equipment will be available during the construction, operational and decommissioning phases, as is the case with the existing operation. Appropriately trained personnel will be on-site throughout the life of the revised Project to provide first aid and to respond to on-site emergencies. First aid response and provision will be included in the site induction training that will be provided to all staff members.

The Mine has a fire brigade approved fire response/fighting system and will be utilised for the revised Project. All fire fighting facilities and equipment will be appropriately installed, serviced, maintained and inspected by a certified body. First aid and fire fighting equipment (hand held extinguishers and fire hoses) will be installed at strategic points within each building. Fire fighting equipment and exit locations will be suitably signed. All work areas will be within the required distance to reach emergency exits.

Induction training will include fire response techniques. The revised Project site will have a fire truck or suitably equipped water truck or trailer that can support fire response requirements. Site fire fighting capabilities are also addressed in the Emergency Management Plan. Fire drills will continue to be undertaken on a regular basis. Permanent facilities, such as fuel storage areas, will have a dedicated fire alarm, suppression and fire fighting systems.

NAC has developed emergency and evacuation planning and response procedures in consultation with state and regional emergency service providers. NAC have considered the response capabilities of the Queensland Fire and Rescue Service (QFRS) in developing emergency and evacuation planning and response procedures. NAC will continue to liaise with QFRS, Queensland Ambulance Service (QAS), local State Emergency Services, local ambulance, local hospital services and local Police throughout all stages of the revised Project. NAC will continue to conduct periodic emergency simulation drills with its regional emergency service providers over the life of the revised Project. In addition, NAC will liaise with Queensland Health at the appropriate time regarding emergency management procedures for the revised Project. The industrial paramedic will provide initial on-site care in an emergency and is also involved in health promotion and safety training for NAC personnel. Should an evacuation via helicopter be required, no restriction on suitable landing areas exists within the revised Project site.

The Mine currently sources potable water for the site from basalt aquifers and is sourced from licensed groundwater bores on-site and treated by a Reverse Osmosis Water Treatment Plant. In the event that this water supply becomes contaminated, the system can be isolated and water will be sourced from Toowoomba or Dalby and trucked to site for consumption.

18.9. Emergency Management Plan

An Emergency Management Plan is currently implemented at the Mine and has been updated for the revised Project. The Emergency Management Plan for the revised Project is located in **Appendix J.15**.

Emergency planning has been based on the following components:

- an analysis of the key incidents likely to take place for each operational area;
- an assessment of the degree of impact likely to occur;
- an assessment of what constitutes an emergency for the particular operation;
- an on-site plan to handle incidents;
- an off-site plan with reference to emergency services needed;
- communication, emergency responsibilities, control centre establishment;
- post emergency procedures, including recovery, debriefing and review of plan; and
- testing of plan under emergency-like conditions.

General guidance for preparing emergency plans can be obtained from the Department of Community Safety. Generic elements and response procedures are outlined in **Table 18-10**.

Table 18-10 Emergency Plan Elements for Related Emergencies

Event	Level of emergency	Emergency services required	Resources needed	Organisational aspects	Damage control actions
Natural disaster (Fire, flood, earth quake, cyclone).	Local/Site	Local fire brigade, Police, Ambulance and State Emergency Service on alert.	Ambulance. Fire fighting trucks and water tankers. Plans and maps. Site emergency response team.	Evacuation of affected workers.	Fire containment Shutdown of affected operations. Evacuation from around sensitive areas such as the fuel oil tanks.
	Potential external alert			Evacuation notice. Communications to emergency services.	
Vehicle collision.	Local/Site	Ambulance, Police, Fire Crew	Rescue, Fire fighting capability, Fuel containment materials.	People control, Evacuation of immediate area.	Stabilise situation, Contain fuel spillages, Control ignition sources.
Falls and impact incidents	Local	Ambulance, Rescue	Site rescue equipment	Communication Evacuation of immediate area.	Stabilise, isolate source of incident.
Spontaneous combustion	Site	Site fire fighting team	Dozer, fire truck and/or water truck.	Communication Evacuation from area.	Extinguish/cool heat source.

Event	Level of emergency	Emergency services required	Resources needed	Organisational aspects	Damage control actions
Coal fire in coal handling system	Local and Site	Local fire crew Maintenance staff	Fire fighting equipment Fire snuffing facilities.	Production personnel shutdown.	Shutdown procedures Containment of fire spread and extinguish.
Mechanical and electrical failure	Local/Site External	Local maintenance staff	Replacement or standby equipment.	Major failure requires external communication Internal communication to maintenance groups from production.	Isolation and possible shutdown.
Drinking water contamination	Local and Site	Ambulance, Department of Health/ Western Downs Regional Council	Replacement or standby equipment.	Communications to Health authorities and potentially emergency services.	Isolation and possible shutdown.

18.10. Aviation Hazard Management Plan

The revised Project is located approximately 11 km in a south south-eastern direction to the Department of Defence, Oakey Airbase and the Army Aviation Training Centre. The Department of Defence has raised concerns regarding the potential impacts on their operations as follows:

- potential impact on instrument landing procedures;
- maintaining a minimum safe altitude up to 21 km away from the runway;
- dust impacts;
- lighting on night operations and in particular use of night vision equipment; and
- impact of vibration from the revised Project impacting on equipment at the Oakey aviation base.

To address the Department of Defence concerns regarding the listed items, an Aviation Hazard Management Plan has been developed in consultation with the Department of Defence and is located in **Appendix J.17**.

18.11. Impacts for local businesses

As part of the risk assessment, an additional review has been undertaken to determine revised Project risks which could potentially impact on businesses.

To inform the assessment of the likelihood of the risk occurring, an assessment has been undertaken to determine the type of impact, specifically direct or indirect. For example, a direct impact could include exposure to a fire hazard for which the consequence could be financial distress impacting on business viability, while an indirect impact may include loss of trade for suppliers to the revised Project which could be associated with (for example) delays to the capital works or operations, which also has consequences for business viability.

Based on the examples above, it is evident that direct impacts would mostly affect businesses if they are located in close proximity to the revised Project site and/or emergency affected area. Therefore, an initial review process was undertaken to determine the proximity of businesses to the revised Project site, which indicated that the closest businesses to the revised Project site are located in Jondaryan and Oakey, which are approximately 14 and 12 kilometres away from the revised Project site respectively. Therefore it is unlikely that there will be any direct impacts arising for local businesses from risks associated with the revised Project. It is also noted however that direct impacts may occur for external suppliers / contractors to the revised Project (for example, from traffic incidents), and there are also agricultural businesses in the region which could be affected by some risks / hazards.

In this regard, the risk assessment for local businesses considers what the impact and consequence would be for local businesses if the risks identified in this chapter were realised, and the likelihood of occurrence based on proximity to the affected areas. For indirect impacts, the likelihood is determined based on the likelihood identified in the full risk assessment.

Table 18-11 provides an assessment of impact types for local businesses, including consequences for the hazards and risks identified in this chapter, noting that mitigation strategies have already been provided to address all risks outlined.

Table 18-11 Impact on local businesses

Revised Project Risk	Project Phase	Impact Type	Consequence	Likelihood	Action
Dust from road and earthworks	Construction	Direct impact for local businesses	<ul style="list-style-type: none"> ■ Staff fatigue / illness impacting on business viability ■ Amenity impacts causing loss of trade impacting on business viability 	Very unlikely due to proximity of local businesses	Not assessed further
Traffic incidents on-site	Operations	Direct impact for external suppliers / contractors	Injury or death to external suppliers / subcontractors impacting on business viability	Possible	Appropriate mitigation strategies / controls have been provided which address the identified risk
Traffic incidents off-site (mine, CHPPs and rail loop)	Construction,	Direct impact for external suppliers / contractors	Injury or death to external suppliers / subcontractors impacting on business viability	Possible	Appropriate mitigation strategies / controls have been provided which address the identified risk
Slump of sloped ground or collapse of temporary open trenches	Construction	Indirect impact for external suppliers / contractors	Potential delays in project construction or operations which could result in delays to the revised Project schedule and impact on supplier business viability	Possible	Appropriate mitigation strategies / controls have been provided which address the identified risk

Revised Project Risk	Project Phase	Impact Type	Consequence	Likelihood	Action
Leaks of oil, fuel or chemicals from vehicles onto construction earthworks (mine, CHPPs and water supply pipeline).	Construction, Operations	Indirect impacts for external suppliers / contractors	Potential delays in project construction or operations which could result in delays to the revised Project schedule and impact on supplier business viability	Possible	Appropriate mitigation strategies / controls have been provided which address the identified risk
Pests (weeds) brought to site by earthmoving equipment (mine and water supply pipeline).	Construction	No impact for local businesses			Not assessed further
Runoff from disturbed areas	Construction, Operations	Direct impact for local businesses	<ul style="list-style-type: none"> ■ Staff fatigue / illness impacting on business viability ■ Amenity impacts causing loss of trade impacting on business viability 	Very unlikely due to proximity of local businesses	Not assessed further
Release of treated effluent from sewerage treatment system	Construction, Operations	Direct impact for local businesses	<ul style="list-style-type: none"> ■ Staff fatigue / illness impacting on business viability ■ Amenity impacts causing loss of trade impacting on business viability 	Very unlikely due to proximity of local businesses	Not assessed further
Air Quality and ecological impacts from above ground fire	Construction, Operations	Direct impact for local businesses	<ul style="list-style-type: none"> ■ Staff fatigue / illness impacting on business viability ■ Amenity impacts causing loss of trade impacting on business viability 	Very unlikely due to proximity of local businesses	Not assessed further
Noise from construction	Construction	Direct impact for	<ul style="list-style-type: none"> ■ Staff fatigue / illness impacting 	Very unlikely due to	Not assessed further

Revised Project Risk	Project Phase	Impact Type	Consequence	Likelihood	Action
activities exceeding authorised noise limits (e.g. mine equipment)		local businesses	on business viability <ul style="list-style-type: none"> ■ Amenity impacts causing loss of trade impacting on business viability 	proximity of local businesses	
Cultural heritage - activities adversely affect cultural heritage sites or features	Construction, Operations	Indirect Impact for local businesses	Loss of trade for tourism businesses	Very unlikely due to proximity of local businesses	Not assessed further
Unauthorised clearance of threatened flora and fauna	Construction, Operations	No impact for local businesses			Not assessed further
Inadequate waste management practices	Construction, Operations	Direct impact for local businesses	<ul style="list-style-type: none"> ■ Staff illness impacting on business viability ■ Amenity impacts causing loss of trade impacting on business viability 	Very unlikely due to proximity of local businesses	Not assessed further
Dust from mining activities exceeding air quality limits	Operations	Direct impact for local businesses	<ul style="list-style-type: none"> ■ Staff fatigue / illness impacting on business viability ■ Amenity impacts causing loss of trade impacting on business viability 	Very unlikely due to proximity of local businesses	Not assessed further
Air Quality impacts from fires in coal stockpiles and handling facilities	Operations	Direct impact for local businesses	<ul style="list-style-type: none"> ■ Staff fatigue / illness impacting on business viability ■ Amenity impacts causing loss of trade impacting on business viability 	Very unlikely due to proximity of local businesses	Not assessed further
<ul style="list-style-type: none"> ■ Noise, Vibration and 	Operations	Direct impact for	<ul style="list-style-type: none"> ■ Staff fatigue / illness impacting 	Very unlikely due to	Not assessed further

Revised Project Risk	Project Phase	Impact Type	Consequence	Likelihood	Action
Fumes from blasting and explosives ■ Noise in excess of authorised noise limits (blasting, CHPP, mine equipment)		local businesses	on business viability ■ Amenity impacts causing loss of trade impacting on business viability	proximity of local businesses	
Chemical release – liquid from leaks, ruptures, over-flows, spillages or pooling. Release to atmosphere or ground systems	Operations	Direct impact for local businesses	■ Staff fatigue / illness impacting on business viability ■ Amenity impacts causing loss of trade impacting on business viability	Very unlikely due to proximity of local businesses	Not assessed further
Off-site release of mine tailings	Operations	No impact for local businesses			Not assessed further
Unexpected dam failure – release of mine water	Operations	Direct impact for local businesses	Flooding of local businesses impacting on business viability	Very unlikely due to proximity of local businesses	Not assessed further
		Indirect impact for external suppliers / contractors	Flooding of mine site causes schedule delays impacting on business viability for external suppliers / contractors	Possible	Appropriate mitigation strategies / controls have been provided which address the identified risk
Inability to meet final landform criteria	Operations	Indirect impact for external suppliers / contractors	Schedule delays impacting on business viability for external suppliers / contractors	Possible	Appropriate mitigation strategies / controls have been provided which address the identified risk
Acid producing wastes	Operations	No impact for local businesses			Not assessed further

Revised Project Risk	Project Phase	Impact Type	Consequence	Likelihood	Action
Impacts on Lagoon Creek	Operations	No impact for local businesses			Not assessed further
Mining activities impact on groundwater resources	Operations	Indirect impact for local agricultural businesses	Potential business viability issues for local agricultural businesses if water supply is constrained	Unlikely	Appropriate mitigation strategies / controls have been provided which address the identified risk
Uncertain of hydrologic behaviour post-mining	Decommissioning	No impact for local businesses			Not assessed further
Post Mine land contamination	Decommissioning	Indirect impact for future agricultural businesses	Potential impacts on viability of agricultural businesses after mine closure	Unlikely	Appropriate mitigation strategies / controls have been provided which address the identified risk
Eroding mining land forms post Mine	Decommissioning	Indirect impact for future agricultural businesses	Potential impacts on viability of agricultural businesses after mine closure	Unlikely	Appropriate mitigation strategies / controls have been provided which address the identified risk
Failure of rehabilitation	Decommissioning	Indirect impact for future agricultural businesses	Potential impacts on viability of agricultural businesses after mine closure	Unlikely	Appropriate mitigation strategies / controls have been provided which address the identified risk
Vegetative cover fails	Decommissioning	Indirect impact for future agricultural businesses	Potential impacts on viability of agricultural businesses after mine closure	Unlikely	Appropriate mitigation strategies / controls have been provided which address the identified risk

Revised Project Risk	Project Phase	Impact Type	Consequence	Likelihood	Action
					risk
Revegetation not best practice	Decommissioning	Indirect impact for future agricultural businesses	Potential impacts on viability of agricultural businesses after mine closure	Unlikely	Appropriate mitigation strategies / controls have been provided which address the identified risk
Rehabilitation criteria not acceptable	Decommissioning	Indirect impact for future agricultural businesses	Potential impacts on viability of agricultural businesses after mine closure	Unlikely	Appropriate mitigation strategies / controls have been provided which address the identified risk
Cannot prove that depressions will contain good quality water	Decommissioning	Indirect impact for future agricultural businesses	Potential impacts on viability of agricultural businesses after mine closure	Unlikely	Appropriate mitigation strategies / controls have been provided which address the identified risk
Government requires that depressions be backfilled	Decommissioning	No impact for local businesses; represents a financial risk for NAC			Not assessed further
Landform designs unproven	Decommissioning	Indirect impact for future agricultural businesses	Potential impacts on viability of agricultural businesses after mine closure	Unlikely	Appropriate mitigation strategies / controls have been provided which address the identified risk
Uncontrolled breeding of disease vectors, such as mosquitoes and biting midges	Decommissioning	Indirect impact for future agricultural businesses	Potential impacts on viability of agricultural businesses after mine closure	Low	Appropriate mitigation strategies / controls have been provided which address the identified risk

Revised Project Risk	Project Phase	Impact Type	Consequence	Likelihood	Action
		Direct impact for local businesses	Staff illness impacting on business viability Amenity impacts causing loss of trade impacting on business viability	Very unlikely due to proximity of local businesses	Not assessed further
Ineffective security and site demarcation leading to access to site by the public	Decommissioning	No impact for local businesses			Not assessed further