Colton Mine
Environmental Management Plan 2
Assessment Report

July 2012
Geoff Penton & Kathie Fletcher
SWIFT NRM

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## EXECUTIVE SUMMARY 3

It is recommended that current best practices for the mining industry must not only be based on national and international industrial practices but also be informed by localised and regionalised knowledge and research.

The following document identifies that there are several issues of significant concern that may suggest the Project not proceed in its current form or at all. There are other matters raised in the report that would suggest improved management practices could improve the natural resource impact of the Project.

The issues of significant concern include:

- Contamination of Mary River, Susan River and an area of HEV of the Great Sandy Straits
- Noise impact that would suggest that compliance with exceedence limits is not possible
- Biodiversity impact on an area of significant BAMM corridor and across a possible area significantly larger than the footprint of the Project Site
- Dust levels dispersed across (sensitive receptors), houses, water storage facilities at levels that may cause human harm
- Catchment diversion of water both surface and groundwater from Susan River catchment into the Mary River catchment, changing the hydrology of the HEV catchment
- The Project’s greenhouse gas emissions will exceed NGER limits

A further set of issues that may be improved through adoption of better management practices include:

- Site overburden and interburden management
- Site rehabilitation
- Proposed monitoring
- Transport management
- Weed and pest management
1.0 Introduction

This report has been based on a detailed assessment of the Colton Mine Environmental Management Plan 2 (the EMP) and associated technical assessments, Appendices B, C, D, E, F, G, H, I, J, K, L, M and the Burnett-Mary NRM Group Regional NRM Plan.

This report forms the basis of a submission to the Department of Environment and Heritage Protection and any other relevant government departments seeking to ensure that this proposed development does not adversely impact on the ability of the Burnett –Mary NRM Group to meet the region’s NRM targets. The report also provides a basis for discussions and negotiations with Colton Coal Proprietary Limited seeking to achieve voluntary adoption of better practices.

2.0 Assessment of Environmental Management Plan and associated Appendices

2.1 Section 1.1. Scope (p.1)

2.1.1 Financial Assurance

It is recommended that Colton Coal Proprietary Limited (the proponent) should not be allowed to claim the commercial-in-confidence nature of financial assurance and should be required to disclose to regional communities how they will fulfil this obligation adequately. Financial assurance must adequately address, for example:

- Potential contamination to groundwater and surface water and sediments in the Susan and lower Mary River Catchments.
- The rehabilitation of the gilgai wetland habitat.
- Potential dust contamination of houses and Cassava water storage facilities.
- The full cost of rehabilitating all of the dam water and all dams.
- The impacts of climate change and variability on the project.
- Possible impacts caused by economic recession, both local and global.
- The restoration of the site and surrounding impact area to its pre-mining condition.

2.1.2 Royalties

Should the Project proceed, it is recommended that the Queensland Government needs to secure a significant bond or proportion of royalties from the Colton Mine Project (the Project) to safeguard against risk associated with the collapse or abandonment of mining projects by companies and/or the industry. This security must consider the loss of rates, and increase of costs to local governments for management of infrastructure, resources and services as a direct result of mining industry development. The security must also be considerate of the unique issues of smaller rural and residential holdings and the compounded impact to communities and natural resource values of the area. Additionally a pre-determined percentage of the royalties received from the mining and energy industry should be invested in natural resource management within the Burnett Mary region.
2.1.3 Plan of Operations (PoOps)

Should the Project proceed, it is recommended that the PoOps be fully assessed to ensure the proposed mining operations are best practice across spoil management, waste water management, vegetation and biodiversity protection, weed and pest management, soil conservation, dust management etc.

2.2. Section 2.1 Project Name and Location (p.3)

2.2.1 Dust impact and location of Project

Owing to the close proximity of the Project to a number of towns (Gympie, Maryborough, Aldershot, Takura, Torbanlea) that are quite heavily settled areas, the potential for dust contamination of homes, businesses and social infrastructure carries high health risks. The wind direction studies would suggest that there are several areas of sensitive receptors (homes in particular) at risk.

It is recommended that additional dust management strategies should be considered including a requirement to wash buildings/homes regularly, and to test water quality of rainwater tanks if used by sensitive receptors and other neighbouring properties, within a 20km plume in the direction of the prevailing wind (in an arch from the north to the west around to the south of the Project Site).

See also other recommendations on management strategies relevant to air quality monitoring outlined below at 2.5.

2.3.1 Section 2.6 Existing Land Disturbance (p.8)

2.3.1 Further research needed on historic coal mining operations

Insufficient information was provided in the EMP with regards to the impact of recent or historic land use and disturbance in order to differentiate between baseline current condition e.g. water quality and impact of this Project.

It is recommended that further investigation is conducted to ascertain whether, for example, there is an increased risk of hydrocarbon, aluminium and other metalloid contamination to surface and groundwater from previous coal exploration activities.

2.4 Section 2.4 Environmentally Sensitive Areas (p.8)

2.4.1 Poor standard of maps

The EMP states that “there is currently no Category A, B, C Environmentally Sensitive Locations within or immediately surrounding the Project boundary”. It is unclear from the EMP what investigations were conducted to inform this statement and the associated map at Figure 3 of the EMP. The assessment behind the mapping provided should be made available by the proponent.

The information provided on environmentally sensitive areas must be made available to a standard that increases knowledge on the site specific and cumulative impacts of this Project and all developments on the Burnett-Mary regional natural resource assets and regional communities, towns and cities.
Mapping presented in this EMP is generally of poor quality as it does not provide proper legends, metadata or data sources and currency. Standards must be raised so that all maps are provided with this sort of detail and using legends according to best practice cartography standards. Additionally all other information produced must be at a standard that can be readily used to assess the Project against identified key data sets, in order to:

- add to baseline data recording the Burnett-Mary region’s natural resource assets;
- identify current or potential risk and hazards to those assets from all proposed petroleum and mining projects;
- identify whether the projects in their entirety or certain activities or associated infrastructure pose unacceptable risks and environmental harm to those assets;
- assess level of cumulative impact on an asset and whether its threshold limit will have been reached.

It is recommended that the information produced by this EMP be required to meet a standard that facilitates better coordination of baseline data for the State government and the Burnett-Mary Regional NRM Group in order to address and fully account for cumulative impacts.

### 2.5 Section 3.1 Regional Climate (p.11)

Adequate analysis is not provided to fully address the impact of dust in relation to the prevailing winds and annual mean wind speed illustrated by wind roses in Figure 7 of the EMP. The level of particle pollution in the air in the region should be a major concern as there is increasing evidence that exposure to fine particles has the potential to affect human health, with no known safe level of exposure. Air pollution is known to have a negative effect on the respiratory system (lungs and airways) and on the cardiovascular system (heart function and blood circulation).

It is most likely that each individual and sensitive receptor will react differently to air pollution depending on their health status, the length of time spent outside, and the concentration of pollutants.

“Research suggests that air pollution is responsible for 2.3% of all deaths in Australia. It is estimated that air pollution causes 640 to 1400 premature deaths and almost 2000 hospitalisations per year in the Greater Sydney Metropolitan Region. Air pollution costs New South Wales around $4.7 billion dollars per year in health costs.”


It is recommended that a monitoring network be established that will consist of high-quality ambient air quality monitoring stations located in strategic locations around the Project development area and population centres to give accurate, quality assured and up-to-date data to the community on regional air quality.

The air quality data, as well as data on wind speed and direction, should inform an Air Quality Index (AQI) for reporting daily air quality and indicate how clean or polluted the air is, the associated health effects and the impact on sensitive groups.

The AQI should be designed to let local community members and company staff know:

- Air pollution levels in their community and work site
- Tomorrow’s air quality forecast - to help town residents and sensitive receptors plan their day
- Who is at risk from air pollution
- Simple steps people can take to protect themselves
This monitoring regime needs to go beyond the proposed monitoring which is largely associated with monitoring the operation of this specific Project. It must also be readily accessible to the neighbouring towns and their communities.

This information should therefore be up-dated on the EPH and other relevant government and community websites hourly to provide real time public access to a continuous information stream for community, company staff, industry and government.

It is recommended that the Project’s air quality monitoring regime provide a clear picture of the regional air quality which the general community can experience in real time as well as provide information that can be used to identify the cause of any change in air quality and to help identify the major sources of particles in the region.

**By 2031 the region will make an equitable contribution to state and national air quality targets and mitigation planning for climate change.**

2.6 Section 3.3 Soil and Land Suitability (p.20)

2.6.1 Section 3.3.1.1 Soil Analysis Results (p.23)

*Table 7* Dundathu - Contaminant Levels and *Table 8* Churchill – Contaminant Levels: Thresholds for contaminants in soils taken from EPA source dated 1998.

It is recommended that the information produced by this EMP be required to meet a standard and is required to be the most up to date as possible.

It is noted that throughout the EMP the proponent refers to how agriculture has led to significant modification of the environment. While this may be true, past negative environmental impacts caused by agriculture is not a justification for further impacts by a new development.

**By 2031 land condition will be maintained at, or improved over, the 2012 baseline.**

2.6.2 Section 3.3.1.2 Soil Management Actions (p.25)

The recommended measures for the mitigation for soil erosion require further scientific investigation. What science/research is informing these mitigation measures? Will the type of vegetation being cleared successfully rehabilitate and grow after the soil disturbance that is likely to occur. Are there studies to prove that the impact of stripping the types of soils in the project development area does not impede revegetation attempts?

Additionally the statement that rehabilitation “will aim” to return the land to the pre-mining suitability is not good enough. The current land condition is generally of high biodiversity value. The land suitability class for grazing would be a significant deterioration in overall land condition and is not supported. The land “suitability” classification system is an agricultural classification system and not appropriate for use in this Project. Twenty one flora species of conservation significance, for example, have been identified or potentially exist within the vicinity of the Project site. See *Table 11 at pp. 32 -33 of EMP*.

It is recommended that the proponent before it commences operations must be able to guarantee that rehabilitation “will” return land to the pre-mining condition for each land system/regional ecosystem that exists on the site. This guarantee needs to be also reflected in the proponent’s financial assurance.
By 2031 land condition will be maintained at, or improved over, the 2012 baseline.

2.6.3 Section 3.3.2 Acid Sulphate Soils (p.26)

It is recommended further investigation of SPP 2/02 may be required, particularly areas of the site covered by RE 12.5.9 and RE 12.5.4a. It is also important to review the PoOPs to check the claim that there will be no disturbance of material below 5m AHD. It is unclear from the EMP where the void sits in relation to the 5m AHD. It also appears Figure 14 of the EMP does not include all the necessary legend and metadata detail. It is recommended these details be provided by the proponent.

2.6.4 Section 3.3.3 Topsoil Stripping and Reuse (p.29)

It is recommended that the management of topsoil stockpiles must ensure there are no adverse impacts on water quality caused, for example, by:

- the erosion of stockpiles;
- surface water diversion and the diminished connectivity between water courses and wetlands;
- the modification of river, and stream flows caused by surface water diversions;
- salinity risks associated with run-off and/or the use of wastewater when for dust suppression, or irrigation of stockpiles and the damage increased salinity or other toxins may cause soils, farming land, creeks, rivers and wetlands; and
- run off and potential seepage of phosphate fertiliser to the surrounding soil and water courses.

By 2031 land condition will be maintained at, or improved over, the 2012 baseline.

2.6.5 Section 3.3.4 Land Use Suitability (p.30)

See above comments at 2.6.2

This site is of high biodiversity value and part of a BAMM regional corridor therefore the land suitability system should not be used.

By 2031 land condition will be maintained at, or improved over, the 2012 baseline.

2.7 Section 3.4 Flora and Fauna (p.31)

2.7.1 Section 3.4.3.1 Wetlands on the Project Site (p.48)

The Heathland Vegetation Community – Palustrine Wetland that is reliant on surface water and connection to groundwater will be significantly impacted by this Project. The Project will have a groundwater impact for a much larger area that the actual mine site as stated in the EMP, the impact will be a 2.9km radius from the pit. The draining of groundwater by a metre or more will have the effect of draining wetlands, drying out the surface and significantly increase fire risk, along with detrimental effect to fauna e.g. amphibians.

See comments on proposed mitigation strategies at 2.7.6 below.

By 2031 the management, protection and connectivity of the regional landscapes will be improved from the 2015 baseline
2.7.2 Section 3.4.3.2 Bioregional Terrestrial Corridor (p.51)

The argument that the location of mine is “dictated” by economics and “cannot be changed” is not acceptable and clearly highlights the need to assess the Project in accordance with ecological sustainable development principles.

Priority landscape scale regional ecosystems should be maintained or improved so that ecological processes and ecosystem linkages are increased in extent and abundance at priority catchment scales.

The decline in populations of ‘at risk’ flora and fauna species must be prevented. It should not be assumed fauna can be removed to another ecosystem if found where vegetation is to be cleared and that birds will simply fly away to somewhere else if disturbed by noise, dust or lighting. The Project must demonstrate a scientific understanding on the importance of remnant vegetation and the need to prevent further fragmentation or destruction of ecosystem corridors in Queensland.

Destroying habitat before equivalent habitat has been restored increases the risk of species extinction. Additionally, species need time to colonise a restored habitat, and too frequent a turnover of habitat may increase the risk of species extinction.

The long term conservation of biodiversity and the wellbeing of the region’s communities depend upon both the protection of natural assets and maintaining the integrity of the ecological processes that sustain them. A focus on process recognizes that ecosystems are temporally and spatially dynamic and that the components of ecosystems interact in complex and diverse ways that contribute to, and sustain biodiversity. Processes may also act as selective forces to which particular species are constantly adapting.

The proposed mitigation strategies do not demonstrate an understanding that modification or destruction of ecological processes, are in practice, often irreversible and an ecosystem will not necessarily rehabilitate to its prior function.

The EMP therefore fails to respond adequately to the complexities in the ways in which threats affect ecological processes and regional ecosystems. For example:

- Impacts may occur far from the location of the initial threat or disturbance.
- Threats that affect one species may have cascading effects on other species.
- Environmental responses to a threat are not necessarily directly proportional to the level of threat (i.e. a linear response). Non-linear responses mean there are critical thresholds where small increments of change can result in dramatic shifts in the state of the system.
- There is often a time delay, from days to decades, between alteration to an ecological process and its full effects on biodiversity.
- Threats may have a combined impact greater than their independent effects.
- Complexities in interrelationships among species and chance environmental variation may mean that often there will be uncertainty about the effects of a particular threat on processes.
Past research and study have proven that a fundamental tenet of regional ecosystems is recognition of the interaction between pattern and process. The identification and management of locations directly associated with a specific process is a practical way for the Project to protect regional ecological processes. Examples in the project development area could include:

- Protecting land adjacent to water courses to maintain lateral hydrological connectivity and the ecological benefits of periodic flooding.
- Maintaining continuous vegetation along elevational gradients to enhance opportunities for altitudinal migration or range shifts in a changing climate.
- Protecting key wetlands along the migration paths of waterbirds as critical stops for refuelling.
- Maintaining riparian vegetation to promote interactions between terrestrial and freshwater systems.
- Protecting “keystone” areas such as small ephemeral streams and wetlands to aid the re-establishment of ecological process in restoration.

However if clearing vegetation on this site is to occur the proponent has not identified how they will offset that loss in biodiversity value according to the State Government Offset Policy.

Anticipating that “the long term effects of the Project on the corridor will be minimal” illustrates that the proponent has not considered all impacts adequately e.g. all those listed above and others such as dust, noise, lighting, surface water diversion and erosion impacts on revegetation attempts, and groundwater extraction.

It is recommended that:

- the operations of the Project should not be permitted to impact on high-conservation areas or regional ecosystem types that will be very difficult to rehabilitate given the disturbance of the groundwater system (includes 12.5.4a and 12.5.9)
- additional land is allocated within the Project site for habitat connectivity to allow species to move as climate zones change
- the construction of infrastructure not be approved until a detailed site investigation is carried out and an official map modification is approved as per the Queensland Herbarium process giving accurate details of the regional ecosystem and its biodiversity
- the Project establishes a long term (for a period consistent with the rehabilitation duration of the site to return to pre development state), monitoring programme to measure environmental change to ensure regeneration occurs

**By 2031 the management, protection and connectivity of the regional landscapes will be improved from the 2015 baseline**

**2.7.3 Section 3.4.3 Fauna Results (p.51)**

Deeming “the overall ecological value of the Site” as only “moderate” flies in the face of describing regional ecosystems as “of concern” and “vulnerable” and fauna species as “vulnerable”, “endangered” or “rare”. Also the technical assessments of the site suggest that most of the site has high biodiversity condition, with little or no weeds, minimal pest, intact vegetation communities with good understory coverage and very little erosion.

It is recommended that the overall ecological value of the Project site be reconsidered and rehabilitation requirements take account of current condition.
By 2031 the management, protection and connectivity of the regional landscapes will be improved from the 2015 baseline

2.7.4 Section 3.4.4.1.1 Amphibians (p.51)

Surface water diversions and ground drainage will impact on Amphibians. This impact will be significantly larger than the mine pit site, given the ground water impact will be at least a 2.9 km radius from the site and importantly the surface water will be discharged in another catchment, therefore impacting on surface water in a large area of Susan River catchment.

Adequate mitigation strategies are required to manage cane toads. The changes to the site and loss of habitat and ecosystem function will benefit the cane toad over other native species making it harder to rehabilitate the Site?

It is recommended that cane toad fencing be erected around all dams and trapping be conducted around any night lighting.

2.7.5 Section 3.4.4.3 Birds (p.54)

The statement that food sources on the Project Site are "generally restricted to nectar, seeds, insects and vertebrate prey items" minimises the importance of the existing ecosystems and habitat to provide essential food resources and the ecological importance or value of the Site to a range of species utilizing the regional corridor.

Information provided in the EMP and relevant Appendices as to why it is unlikely the Project will have a "significant impact" on the regional populations of the EPBC Listed species - the Rufous fantail, the Black-faced cuckoo-shrike and the White Bellied cuckoo-shrike needs further consideration, particularly given the area of ground water impact, the surface water discharge to another catchment, the contaminated water discharge to the Mary River, and the clearing impact on a significant regional corridor.

Contaminated discharge to the Susan and/or Mary River, with the assumption that contaminants would settle out in the sediment will increase the contamination potential for shore birds including the endangered migratory Eastern Curlew.

2.7.6 Section 3.4.5 Proposed Mitigation Strategies (p.57)

A possible mitigation strategy could be a biodiversity offset.

It would be recommended that the proponent be required to meet the requirements of the State Government Offset Policy, by way of rehabilitating an adjoining area of land (to the regional corridor) back to remnant status, to achieve a no net loss approach to the regional ecosystem.

By 2031 the management, protection and connectivity of the regional landscapes will be improved from the 2015 baseline

2.7.6.1 Section 3.4.5.1 Management of Native Flora and Fauna (p.57)

It is recommended that another mitigation strategy should include collecting seed from the extant native vegetation and raising seedlings to assist in the rehabilitation of the Site. This would ensure local provenance is maintained.
2.7.7 Section 3.4.5.2 Management of Vegetation Communities of Conservation Significance (p.58)

2.7.7.1 Area of hectares to be cleared

In order to assess the cumulative impact on regional ecosystems and biodiversity in both the state and the Burnett-Mary region it is essential to know what area of ha will be cleared for each vegetation community and not just the percentage of each at the Site.

It is recommended that the proponent provide this detail.

2.7.7.2 Clearing non-remnant vegetation

The claim that “no specific management strategies are required for non-remnant vegetation” See p.59 of EMP should not be accepted. It is well researched that the loss and fragmentation of natural forests and vegetation remains the main cause of biodiversity loss. Fragmentation reduces the available area of forest habitat, increases the isolation of forest patches and edge effects in these patches, all of which contribute to a higher risk of species extinction.

Forest fragments in the past were viewed as pockets of habitat surrounded by a barren matrix of non-habitat. Fischer and Lindenmayer (2006), suggest that suitable food, shelter, or climatic conditions may be found along gradients in the matrix, allowing dispersal and survival of fragment dwelling biota. This is referred to as the “continuum model” which shows how some matrix types can mitigate fragmentation effects (Ewers and Didham 2006; Kupfer et al. 2006).

*By 2031 the management, protection and connectivity of the regional landscapes will be improved from the 2015 baseline*

2.7.7.3 Section 3.4.5.3 Management of Fauna Species of Conservation Significance (p.59)

Although the proponent claims habitat clearance will be minimised any clearance equates to either a loss or fragmentation of ecologically significant habitats and their dependent species. Rehabilitation of habitat for the Wallum Froglet will be a major challenge.

It is recommended that the proponent conduct more research into the rehabilitation of habitat for the Wallum Froglet and other fauna to determine:

- How the time lag between the destruction of the habitat and its rehabilitation will impact on the Froglet and other fauna.
- What problems are likely to arise if the rehabilitation emphasis is on "like-for-like" or the intent to recreate as close as possible, what was lost, especially if the real "like-for-like" may not be achieved for a hundred or more years.(See presentation by Dr Phil Gibbons).
- Whether rehabilitation can be achieved, taking into account any potential irreversible shifts in the ecology of the system, such as inherent breakdown of soil structure or climate change; and
- What timeframes the rehabilitation strategy will apply to actions and commitments.

*By 2031 the management, protection and connectivity of the regional landscapes will be improved from the 2015 baseline*
2.7.7.4 Section 3.4.5.4 Management of the Bioregional Terrestrial Corridor (p.59)

It is recommended that more detail be provided on how disturbance areas will be minimised, including a more thorough analysis on the effect of stockpiling soil will have on the methodology to use species naturally endemic to area.

2.8 Section 3.5 Stream Ecology and Morphology (p.61)

2.8.1 Section 3.5.1 Watercourses Associated with the Project (p.61)

It is recommended that the proponent provide more information on whether studies have been conducted on the three “unnamed waterways” which flow east off the Project area and drain into the Susan River, for example, their flow regime, their water volume, their water quality, what is their ecosystem relationship/interconnection to groundwater?

2.8.2 Section 3.5.2 Stream Morphology (p.64)

As per the above recommendation the proponent needs to provide detailed information with regards to what role the unnamed waterways play in whole catchment.

Additionally no reference is provided to validate the claim that DERM have “confirmed that the waterways present do not constitute watercourses as defined by the Water Act 2000”. Should this be so it does not necessarily imply they have no ecological value.

2.8.3 Section 3.5.5 Summary and Recommendations (p.70)

It is recommended that it be made mandatory for the proponent to report to the Administering Authority and cease operating if metal concentrations downstream of mining activities are detected to be higher than the low or high trigger values. It is not acceptable that should this occur it is up to the company to decide if it is ‘necessary” to share the results of their investigation with the Department of Environment and Heritage Protection (EHP) (previously DERM).

2.8.4 Section 3.5.5.1 Mitigation Strategies (p.70)

It is recommended that mitigation strategies should include all “minor” land disturbances on the Project site because of the potential they have to create a cumulative impact which may result in a major disturbance.

By 2031 land condition will be maintained at, or improved over, the 2012 baseline.

2.9 Section 3.6 Groundwater (p.71)

2.9.1 Section 3.6.1 Environmental Values (p.71)

The claim and assumption that there is likely to be no mining beyond the Colton Mine and that because the surrounding area is under state land tenure it is “unlikely” to be utilised in near future is not accepted. This site is Crown land and still subject to a mining proposal.

It is recommended that these matters are investigated further.
2.9.2 Section 3.6.3.1 Physio-chemical Characteristics (p.73)

It is recommended that further investigation is needed to determine whether previous drilling activities have contaminated groundwater or soils in close location to drilling bores.

2.9.3 Section 3.6.3.2 Metals and Metalloids (p.73)

It is recommended that the proponent needs to provide further information to:

- Explain why aluminium was not included in the Saltwater Creek analysis
- Outline what potential health impacts to humans, fauna and flora may result because of metal and metalloid related exceedences in guideline values
- Explain why the drill log for lead sampling for NMB-026 is not “overly informative”
- Why conclusions are being based on assumptions that results are either true or false positives

It is recommended an independent peer review of results is needed. What is the best treatment to remove metal and other contaminants that exceed safety levels? What are the expected volumes of waste water expected? Will all dams become contaminated sites due to a cocktail of a range of metals, metalloids and other chemical compounds?

2.9.4 Section 3.6.3.6 Hydrocarbons (p.78)

It is recommended that the proponent that it is unlikely that “any hydrocarbons are associated with the coal being targeted by the Project” needs further investigation.

2.9.5 Section 3.6.3.7 Dissolved Gases (p.78)

It is recommended that the proponent provide further information to explain why this sampling was not done, or have the sampling done as part of a supplementary EMP.

2.9.6 Section 3.6.4 Ground/Surface Water Interactions (p.78)

The information provided in this section of the EMP attempts to render ground and surface water interactions in the project development area as non-existent which is contradictory to the BAMM report on Groundwater Dependent Ecosystems (GDEs) Appendix. RE 12.5.4a, and RE 12.5.9 for example, are groundwater dependent ecosystem, ubiquitous occurrence of yabbies suggests a spring or wetland.

*Figure 19* and the BAMM report also provide information that contradicts the statement that “no perennial watercourses or surface water bodies exist within or in close proximity to the Project”. Indeed the Project expects to discharge to local creeks, Susan River and the Mary River.

It is recommended that lessons learnt from CSG drawdown thresholds by applied to this development. Applying knowledge gained from CSG would mean the drawdown limit for the Project for springs is 0.2m. The Project expects the draw down to be up to 1m and at a radius of to 2.9km from the open cut pit and this would not be supported.

*By 2031 water resources will be managed on a sustainable and total water cycle basis to meet consumptive needs, whilst protecting water-dependent ecosystems (taking account of and seeking to improve resilience to the effects of climate change).*
By 2031 the condition, extent and connectivity of terrestrial and freshwater ecosystems will be maintained at, or improved from the baseline

Appropriate water planning to reduce salt water contamination of groundwater

By 2031 the management, protection and connectivity of the regional landscapes will be improved from the 2015 baseline

2.9.7 Section 3.6.5 Groundwater Modelling (p.78)

It would be expected that ground water levels surrounding the mine site would be affected down to the depth of the mine pit. The ground water report suggests only 1m depth of impact. This needs further investigation.

Also the post mining water level recovery needs further investigation and an independent scientific peer review of the AGE (2010) report.

Offsite impacts of ground water draw down, refers to historic mines in Figure 20 of the EMP and the potential of subsidence a significant distance away from the project site. This definitely needs further investigation as this would suggest the area of impact of the Project may be much larger.

By 2031 water resources will be managed on a sustainable and total water cycle basis to meet consumptive needs, whilst protecting water-dependent ecosystems (taking account of and seeking to improve resilience to the effects of climate change).

By 2031 the condition, extent and connectivity of terrestrial and freshwater ecosystems will be maintained at, or improved from the baseline

Appropriate water planning to reduce salt water contamination of groundwater

2.9.8 Section 3.6.6 Groundwater Dependent Ecosystems (p.80)

It is clear that the Project will have an impact. An estimation of impact zone is a radius of 2.9km according to the proponent’s own studies.

It is recommended that there be mandatory monitoring of GDEs on and surrounding the site for up to 5 km.

By 2031 water resources will be managed on a sustainable and total water cycle basis to meet consumptive needs, whilst protecting water-dependent ecosystems (taking account of and seeking to improve resilience to the effects of climate change).

By 2031 the condition, extent and connectivity of terrestrial and freshwater ecosystems will be maintained at, or improved from the baseline

Appropriate water planning to reduce salt water contamination of groundwater
2.9.9 Section 3.6.7 Potential Impacts and Mitigation Options (p.80)

2.9.9.1 Section 3.6.7.1 Potential Impacts (p.80)

See comments above at 2.9.7

2.9.9.2 Section 3.6.7.2 Control Strategies (p.84)

The EMP recognises that there will be AMD generation. The EMP does not however outline whether contaminated groundwater will be treated before stored. Having no mitigation measures for groundwater depletion is not acceptable especially if it will take “100-150 years to reach equilibrium”.

It is recommended that the above issues be addressed and the associated control strategies be identified.

*By 2031 water resources will be managed on a sustainable and total water cycle basis to meet consumptive needs, whilst protecting water-dependent ecosystems (taking account of and seeking to improve resilience to the effects of climate change).*

*By 2031 the condition, extent and connectivity of terrestrial and freshwater ecosystems will be maintained at, or improved from the baseline *

*Appropriate water planning to reduce salt water contamination of groundwater*

2.9.10 Section 3.6.8 Groundwater Monitoring Plan (p.85)

It is recommended that the GWMP be designed with the purpose of detecting and preventing contamination. Several more monitoring bores are need to be situated out to the 2.9km predicted impact zone and further (up to 5 km’s) to ascertain whether radius of impact is correct.

The GWMP must both be informed by and help to develop best practices particularly because of the Project’s close proximity to human settlements. The site specific mine footprint is much bigger than the pit area it reaches all the way to the rail transport area.

*By 2031 water resources will be managed on a sustainable and total water cycle basis to meet consumptive needs, whilst protecting water-dependent ecosystems (taking account of and seeking to improve resilience to the effects of climate change).*

*By 2031 the condition, extent and connectivity of terrestrial and freshwater ecosystems will be maintained at, or improved from the baseline *

*Appropriate water planning to reduce salt water contamination of groundwater*

2.10 Section 3.7 Noise and Vibration (p.87)

The assessment states that “to achieve compliance at all locations would require a reduction of up to 10 dB(A). It is not considered practicable to achieve this level of noise reduction, as it would need to be achieved from fixed plant and mobile plant”.
If compliance cannot be met then the operation should not be allowed to proceed.

2.10.1 Section 3.7.6.1 Mining – Daytime (p.105)

It is recommended that the mine does not operate on days when there will be exceedences.

2.10.2 Section 3.7.6.3 Mining – Night-time (p.106)

It is recommended that the mine does not operate on nights when there will be exceedences.

2.10.3 Section 3.7.6.5 Blasting (p.106)

It is recommended that blasting parameters “must be” considered so that air blast limits are met.

2.10.4 Section 3.7.7.1 Exceedences (p.107)

Cladding of buildings is recommended but not addressed in detail in control strategies.

2.10.4 Section 3.7.7.2 Control Strategies (p.108)

It is recommended that the monitoring of impacts on fauna is required and that the control strategies outlined are adopted.

2.11 Section 3.8 Air Quality (p.109)

See comments above at 2.5

2.11.1 Section 3.8.2 Air Quality Environmental Values (p.112)

If the National Health and Medical Research Council National guidelines for control of emissions of air pollutants from new stationary sources were rescinded in 1999 are there other national or international guidelines that should be considered?

It is recommended that the proponent’s legal obligations under the Environmental Protection (Air) Policy 2008 and current legislation to control arsenic contamination of air be investigated further.

2.11.2 Section 3.8.3.2 Dust Deposition (p.114)

It is recommended the periodic plume potential needs further investigation.

2.11.3 Section 3.8.4 Meteorological Simulation (p.114)

It appears that the studies show that the plume is less readily dispersed in the area when there are more stable or neutral atmospheric conditions. If this is so the potential impact on humans is significant as that sort of weather encourages more outdoor activities.

It is recommended further studies be conducted to determine the numbers of people likely to be impacted and what control strategies should be implemented.

See comments above at 2.5
2.11.4 Section 3.8.5.1 Dust Sources and Control Measures (p.116)

Tables 30 & 31 do not read succinctly. It is difficult to comprehend the data provided and what is being predicted in relation to the findings.

It is recommended that this information be expressed in a manner that outlines the potential cumulative impact on human and fauna health, as well as the impact these levels of dust will have on water and soil quality and composition, and vegetation.

2.11.5 Section 3.8.5.2 Regional Impacts (p.118)

It is recommended further investigation is required to assess impact of dust on traffic passing by the Project Site on the Bruce Highway, surrounding waterways, fauna, flora, soil, human settlements, and Cassava water storage.

2.11.6 Section 3.8.5.3 Impacts at Sensitive Receivers (p.124)

The prediction that the Project may contribute 3.1% and 2.3% of the total deposited dust contaminated with arsenic to the Cassava water storage facilities is of serious concern.

It is recommended that this is investigated further to assess the impact on human health.

2.12 Section 3.9 Greenhouse Gas Assessment (p.126)

2.12.1 Section 3.9.4.2 Greenhouse Gas Summary (p.133)

It is recommended Scope 3 emissions are included in EMP. It is a significant concern that the Project will exceed NGER values.

2.12.2 Section 3.9.5.3 Carbon Sequestration (p.135)

It is unclear from the EMP what science or research has informed the proponent’s statement that there is unlikely to be any net gain or loss in the carbon sequestered within the Project area.

It is recommended that, based on a carbon balance assessment the proponent be required to offset their emissions.

2.13 Section 3.10 Social Impact Assessment (p.136)

2.13.1 Section 3.10.2 Summary of Impacts (p.141)

Feasible alternatives to the Project have not been addressed. The Project does not apply a sustainable development analysis to its description of social impacts.

Challenges associated with economic growth created by the coal mining industry require more in depth economic analysis in relation to potential and long term impacts on natural resources, social infrastructure and local economies.

The claim that the Project will have a “positive impact on the state and national economy as well as providing a significant input into the local region and community” must be analysed further. Claims of positive impact and beneficial outcomes must fully consider the importance of valuing natural and social capital in its economic analysis. A full cost analysis needs to consider costs of road maintenance, water supply impacts, cost associated with delivering services to project staff, handling waste etc.
2.14 Section 3.13 Native Title & Indigenous Cultural Heritage (p.149)

The Project has restricted itself to an exclusive Native Title Aboriginal consultation, which denies some Aboriginal communities and Traditional Owner groups to exercise their unique and special relationship (physical and spiritual) with their Country.

If the Aboriginal communities and Traditional Owners in whose Country is in the Burnett-Mary region are to have a more meaningful involvement in the future decision-making, planning and management of the region’s natural resources then their voices must be directly recognized by the Project.

If the Project is to facilitate Aboriginal engagement and participation in its development, its integrity relies on recognizing spiritual values and connections with land that is not solely based on native title land tenure. Indeed by placing primary decision making powers and property rights to such tenure is denying opportunity and capacity for much wider Aboriginal engagement in the region.

It is recommended that a Cultural Heritage Plan be prepared in partnership with Native Title parties, Traditional Owners and Aboriginal communities from the Susan and Mary River catchments. The Cultural Heritage Plan must clearly highlight the cultural and natural resource management aspirations and goals of Aboriginal communities in the region and aim to provide further detailed direction to development in the region.

By 2031 Aboriginal people will have improved opportunities to maintain their cultural connections to country.

2.15 Section 4.0 Description of Mining Activities (p.150)

Figure 2 shows the mining tenements associated with the Project.

It is recommended that the proponent disclose any potential and/or planned future expansion projects associated with EPC 923 & 1082.

2.16 Section 4.3 Vegetation Removal and Topsoil Stripping (p.152)

See previous comments at 2.6.4.

2.17 Section 4.4 Mining (p.152)

2.17.1 Training

The EMP states that the Project relies on “competent skilled operators” and is sourcing its workforce from the local populations of Hervey Bay and Maryborough. However no commitment has been given by the proponent to provide or support any existing or future educational or training facilities to up-skill or train the local population to be competent in the operations of the Project.

It is recommended that a training and education strategy be designed and form part of a social impact management plan.
2.18 Section 4.5 Waste Characterisation (p.160)

2.18.1 Section 4.5.2 Analysis (p.160)

It is recommended that an independent scientific peer review be conducted.

2.18.2 Section 4.5.3.1 pH and EC (p.161)

It is recommended that the cumulative impact of salinity contamination from aquifers and pyrite oxidation is assessed.

2.18.3 Section 4.5.5 Summary (p.169)

There is a significant concern regarding the potential for over burden and inter burden to contain acidity and arsenic, therefore very clear description of how will over burden and inter burden that is PAF be measured and separated from NAF. Need certainty before operations commence and clearer description of content of materials e.g. most samples were above 5m depth.

Mandatory monitoring of any over burden and inter burden storage areas is recommended so that operations will be modified when necessary. This monitoring needs to be managed in a timely manner to respond if contaminated runoff is detected.

It is also recommended that it will be important to review Waste Material Characterisation Plan in PoOPS.

2.18.4 Section 4.5.6 Mitigation Strategies (p.170)

It is recommended that these strategies be reviewed against best practices according to national and international standards, for example:

- If NAF materials are to be placed over PAF is there a procedure to guarantee that is purely NAF material?
- How is PAF material prevented from being spread on roads if traffic compaction is the preferred compaction methodology?
- Acid neutralising materials “may need to be mixed into PAF material” – how and when will this be decided?
- The storage of overburden/interburden is a major risk, what is best practice with regards to the lining of areas where material will be stored?

2.19 Section 4.6 Waste Handling (p.172)

It is recommended that these best practices be reviewed against national and international standards.

Fine material rejects evaporation is another dangerous time for dust generation and distribution and should be investigated further.

2.20 Section 4.8 Water Management (p.180)

Water management should primarily prevent contamination and minimise disturbance and pollution to surface and ground water. Given the size of this project it would seem to be generating a lot of waste water. The design parameters for water storage are at 1:20 and should be significantly larger.
Overall it is recommended that waste water treatment (via reverse osmosis) be required for all water intending to be discharged into either Susan or Mary Rivers.

It is also recommended that water storages be designed for a 1:50 year event as a minimum and preferable 1:100.

2.20.1 Section 4.8.4 Contaminant Sources (p.185)

It is recommended that the water quality classification in Table 59 describe “intermediate” and “worked” water as contaminated water.

Descriptions in Table 60 are also entirely unacceptable – the water quality classification must not minimise or invisibilise the fact that the use of water should be restricted because of the contaminated nature of the water.

The releases of contaminated or saline water off site need to be investigated further as per previous comments.

It is recommended that the Project if it is a no release site requires a large holding dam with an RO plant. It is recommended that this be considered by the proponent and details of the proposed infrastructure and design be provided.

By 2031 water resources will be managed on a sustainable and total water cycle basis to meet consumptive needs, whilst protecting water-dependent ecosystems (taking account of and seeking to improve resilience to the effects of climate change).

Appropriate water planning to reduce salt water contamination of groundwater

2.20.2 Section 4.8.5 Mine Water Characteristics (p.187)

Table 61 highlights that the most likely scenarios show contamination exceedences.

2.20.3 Section 4.8.6 Mine Site Water Management System (p.189)

See previous comments at 2.20

2.20.4 Section 4.8.6.1 Water Management Principles (p.189)

It is recommended that no conditions should allow contaminated water with arsenic in it be discharged.

2.20.5 Section 4.8.6.2 Mine Water Management System (p.190)

See previous comments at 2.20

It is recommended that excess water not be released via a pipeline to the Mary River estuary. If releases are to occur than waste water should be treated and released to the Susan River to maintain natural flow regime.

2.20.6 Section 4.8.6.6 Dam Hazard Category Assessment (p.195)

Dam hazards are a major risk e.g. Mt Isa and Mt Morgan dam failure caused wide spread contamination and fish kill events.
Volume of water stored, the reliance on evaporation, proximity to Great Sandy Straits Ramsar wetland and the recreation and tourism values of this area makes dam hazards an unacceptable risk.

See below for recommendation.

2.20.7 Section 4.8.6.7 Sizing of Dams (p.199)

Sizing of dams to 1:20 event is unacceptable.

It is recommended that at a minimum all dams to be designed for 1:100 event.

2.20.8 Section 4.8.7 Site Water Balance Model (p.201)

2.20.9 Section 4.8.7.1 Modelling Approach (p.201)

No release scenario calculated. This was stated earlier in EMP that this was the preferred option.

It is recommended that details be provided to illustrate how legitimate a no-release scenario is for this Project.

2.20.10 Section 4.8.7.3 Behaviour of the Water Management System (p.204)

Need to take into account climate change and variability in rainfall events.

2.20.11 Section 4.8.7.4 Releases to the Mary (p.206)

Given the contamination of water with arsenic etc any release is unacceptable. It is of major concern that the proponent is claiming that without the Mary River release, the risk of wet weather interruptions and environmental harm is increased. Most releases are predicted to be in the summer months when there is higher human use of the Mary River and its estuary and Hervey Bay beaches.

Recent studies undertaken by Dr Ribbe of the University of Southern Queensland demonstrates that discharge from the Mary River hugs the shoreline heading north into Hervey Bay and travels right along all the major swimming beaches along Hervey Bay. Hervey Bay tourism industry relies heavily on the iconic humpback whales and Dugong, and Rigley’s Dolphin. The contaminated discharge has a significant potential to impact on biodiversity and human health.

By 2031 the condition and extent of coastal, estuarine and marine resources and habitat will be improved, or maintained, within limits of acceptable change.

2.20.12 Section 4.8.8 Discharge and Dispersion Investigation (p.210)

See comments below at 2.43 & 2.44

Given the types and nature of the contaminants the discharge and dispersion methods as proposed are unacceptable.

By 2031 the condition and extent of coastal, estuarine and marine resources and habitat will be improved, or maintained, within limits of acceptable change.
2.20.13 Section 4.8.8.3 Summary (p.214)

See previous comments. One contamination could do many years of damage.

By 2031 the condition and extent of coastal, estuarine and marine resources and habitat will be improved, or maintained, within limits of acceptable change.

2.21 Section 4.9 Potable Water Supply (p.216)

The impact on Maryborough residents especially in climate change scenarios and drought has not been seriously considered.

2.22 Section 4.10 General Waste (p.217)

It is recommended that at a minimum all dams to be designed for 1:100 event

2.23 Section 4.12 Fuel and Chemical Storage (p.218)

The proponent has not provided adequate detail with regards to storage of fuels and chemicals.

It is recommended detail is provided outlining design of storage infrastructure and mitigation strategies relevant to potential risks such as flooding, fire, human error etc.

2.24 Section 4.17 Road Transport (p.223)

2.24.1 Section 4.17.6 Impact Mitigation (p.229)

It is recommended that a Transport Management Plan be provided and be available for public consultation in order that all relevant transport and roading issues are addressed e.g. total impact on wear and tear on roads.

This is often an area where the impact is underestimated and often the combination of volume of traffic and the tonnage loads impacts on a wider radius of roads than estimated.

2.25 Section 5.0 Rehabilitation (p.233)

2.26 Section 5.1 Rehabilitation Hierarchy (p.233)

It is recommended that the hierarchy only go to point 4. Points 5 and 6 are not acceptable.

2.27 Section 5.2 Rehabilitation Goals (p.234)

It is recommended that another goal should include reinstating soil layers as they were removed or stripped.

2.28 Section 5.3 Rehabilitation Objectives (p.234)

2.28.1 Section 5.3.1 Site Objectives (p.235)

It is recommended that bullet point 3 should read: Prior to closure remediate “all” contaminated land
2.29 Section 5.6 Post Mining Land Use (p.242)

The statement that the final void will be allowed to fill with water and will remain as a permanent water body for local wildlife and/or potential commercial users ignores the fact that the void is likely to be contaminated as per the proponent's statements throughout the EMP.

It is recommended that this statement be questioned and the safety of the void for wildlife and human use be investigated further. The proponent should be required to treat so it is safe for such proposed activities and that no contaminants be disposed of in the pit.

2.30 Section 5.7 Topsoil Management (p.243)

See previous comments at 2.6.2 & 2.6.4

*By 2031 land condition will be maintained at, or improved over, the 2012 baseline.*

2.31 Section 5.9 Domain Specific Rehabilitation Techniques (p.245)

2.31.1 Section 5.9.1 Exploration Areas (p.245)

It is recommended that all contaminated materials are removed from sumps and not just buried.

*By 2031, the area of severe acidification (pH<5.5) will be expected to be reduced by 50% with improved management*

*By 2031 land condition will be maintained at, or improved over, the 2012 baseline.*

2.31.2 Section 5.9.4.1 In Pit Dumping (p.247)

It is recommended that this is likely to cause an unacceptable risk of contamination to groundwater and therefore should not be permitted.

*By 2031, the area of severe acidification (pH<5.5) will be expected to be reduced by 50% with improved management*

2.31.3 Section 5.9.4.2 Out of Pit Spoil Dumps (p.247)

See previous comments above.

*By 2031, the area of severe acidification (pH<5.5) will be expected to be reduced by 50% with improved management*

2.32 Section 5.9.5 Final Void (p.250)

It is recommended that the rehabilitation of the final void requires further investigation, for example, whether it can be filled with uncontaminated material such as overburden from other sites.

*By 2031, the area of severe acidification (pH<5.5) will be expected to be reduced by 50% with improved management*
By 2031 land condition will be maintained at, or improved over, the 2012 baseline.

2.33 List of Figures

2.33.1 Figure 3 Environmentally Sensitive Areas Map (DERM, 2010) (p.9)
No legend or metadata is attached. See recommendations at 2.4.1

2.33.2 Figure 7 Wind Roses Measured at Maryborough Weather Station (p.15)
Dust impacts need to be addressed adequately. See comments at 2.5

2.33.3 Figure 13 Areas of the Colton Project below AHD 20m (p.28)
The final void measurement is not included. See comments at 2.6.3

2.33.4 Figure 14 Acid Sulphate Soils - Maryborough Area (NRM 2002) (p.29)
There is an absence of legend/metadata detail. See comments at 2.6.3

By 2031, the area of severe acidification (pH<5.5) will be expected to be reduced by 50% with improved management

2.33.5 Table 7 Dundathu – Contaminant Levels (p.25)
See comments at 2.6.1

By 2031, the area of severe acidification (pH<5.5) will be expected to be reduced by 50% with improved management

2.33.6 Table 8 Churchill – Contaminant Levels (p.25)
See comments at 2.6.1

By 2031, the area of severe acidification (pH<5.5) will be expected to be reduced by 50% with improved management

2.34 Appendix B: Soil and Land Suitability Assessment

The EMP statement that there are “no significant barriers, regarding land use and soil characteristics, to the development of the Colton Coal Project (p.12)” is not acceptable especially if there is a lack of data to provide certainty. The EMP states, for example, that a “review of the Department of Natural Resources and Water database indicates that no detailed mapping of soils and land suitability for the Colton Coal Project area has been carried out. The CSIRO’s land system map at a scale of 1:1,150,000 covers the site; however, this scale does not provide sufficient detail to compare with this investigation (p.18)”.

The EMP also states that the “Queensland Government mapping shows that the Colton Project area is considered to have a low probability of ASS occurrence (Figure 8) (NRM 2002)”. However the map states the site is a limited field investigation. It would be a major concern if the Project Site has not been thoroughly investigated and assessed.
It is recommended that the methodology to assess land suitability should also be looking at assessing land suitability for biodiversity value, and the rehabilitation of the REs. RE 12.3.5 is listed as ‘of concern’ under the QEPA Biodiversity Status and REs 12.5.9, 12.3.11 and 12.3.12 are listed as ‘Of Concern’ under both the QEPA Biodiversity Status and VM Act.

The proponent’s argument that clearing of vegetation is of limited impact because the REs of concern in the project development area are all regional ecosystems identified to be “relatively widespread in the local area” is not supported. The nature of the Project requires some clearing of these communities within the bounds of the MLA. Mitigation strategies that have been proposed to minimise the impacts do not fully consider the difficulties associated with rehabilitation and the ongoing impact of development on fauna e.g. dust, noise, lighting. The proponent shows a lack of understanding with regards to the biodiversity and conservation challenges in the region. Although lands described on the Project site may be distributed throughout the region, the statement that they are “not unique in nature” fails to appreciate the importance of small patches of vegetation and biodiversity.

The assumption that disturbance will be limited to the project area, and impact mitigation measures are adequate and therefore, it will be unlikely vegetation communities will be significantly impacted on a regional scale is not supported by current research. Indeed the statement that “No flora species, nor fauna species, of conservation significance were identified on or around the Project site” is contradicted by other information offered by the Flora and Fauna Assessment Appendix C.

The statement that “the Project site contains limited pre-mining conservation values, some of which are potentially incapable of being effectively restored post mining” raises concern. Mitigation strategies outlining how the area could “be restored to provide a stable form of use which does not impact on surrounding conservation values” have not been outlined.

**By 2031 land condition will be maintained at, or improved over, the 2012 baseline.**

**By 2031, the area of severe acidification (pH<5.5) will be expected to be reduced by 50% with improved management**

**By 2031 the management, protection and connectivity of the regional landscapes will be improved from the 2015 baseline.**

2.35 Appendix C: Flora and Fauna Assessment

Overall issues this Assessment raises are as follows:

- Assumption fauna will move to another area
- EPBC fauna not recognised
- Queensland Offset policy not addressed
- Rehabilitation undermined
- In the middle of BAAM corridor the Project will cause major fragmentation of QEPA 2007 SEQ biodiversity and planning assessment bioregional corridor
- Many of species identified are unlikely to traverse such a large fragmentation disturbance
- None of the surveys were conducted in two of the ecosystems, RE12.5.9 and RE 12.3.12
- Although no EPBC listed and endangered species were detected this is highly likely because of the vegetation types not being assessed. The two regional ecosystems that were not assessed are the 2 closest associated with wetlands.
- The area immediately downstream from the mine site contains an area of Ramsar wetlands for migratory birds including the Eastern Curlew, is habitat for the iconic humpback whales and is essential habitat for Dugong and Rigley's Dolphin that rely on estuary food sources.

- Rehabilitation of the site is documented as a management strategy. Rehabilitation is of significant concern given the impact on groundwater systems given the impact of the open cut mining. Rehabilitation of spoil into the pit in a manner that re-establishes the lithology may be required if the rehabilitation of these REs is to be achieved.

It is recommended that disturbances to RE12.5.9 and RE 12.3.12 are avoided, however given the nature of the mining activity to drain water they are still likely to be highly impacted. An offset approach has not been documented as a strategy. This is either because finding equivalent habitat that is not protected is highly unlikely given its RE status or re-establishment would be technically challenging. Our recommendation that is that in order to achieve a no net loss and achieving target of biodiversity in regional NRM plan is that either those REs are excluded from development plan or proponent is required to develop somewhere else.

It is recommended an offset management strategy be provided to address all vegetation and biodiversity disturbance and impact.

2.36 Appendix D: Stream Sediment and Morphology Assessment

The Assessment suggests that currently there are mostly low levels of metals etc impacting on water quality including sediment (except Aluminium). This means that any elevation of these levels in the future will most likely be mine related. Changes in catchment hydrology from Susan River could result in higher concentrations of contaminants.

It is recommended that the streams on the site should be excluded from project impact area. The recognition that "measures should be taken not to significantly increase volumes and flow velocity of water being diverted", highlights therefore that greater holding capacity is needed onsite and treated discharge should be into the Susan River, not the Mary River.

Overall several reports point to this site being of high quality habitat, no weeds, few pests, good water quality, intact habitat, diversity of species.

Event based monitoring is needed to assess any impact of high flow and dam overflow discharges, including on site, both rivers, and river health parameters, not just chemical monitoring.

2.37 Appendix E: Hydrogeological Study

The zone of influence, as indicated by the 1m drawdown contour, will extend about 2.9 km from the open cut pit. An anomaly exists in this hydrogeological study surrounding the depth of groundwater impact as you would assume for at least some distance the groundwater will be impacted upon at the same depth as the pit.

Additionally given the history of underground mining in the area that was believed to have significant issues with water intrusion it is a concern that the hydrogeological assessment has underestimated the underground water impact and the groundwater production that will become contaminated discharge.
The acknowledgement that the “poor recovery in the pumping and observation bores” indicates an aquifer of limited extent with low recharge rates from overlying and underlying zones in the formation should be investigated further with regards to groundwater and surface water interaction. The shallow observation bores recorded “a continual drainage of water from the overlying zones to the deeper aquifer to replace water removed during the pumping test”.

Total petroleum hydrocarbon screening was performed by ALS on samples collected from bores NMB-041, NMB-045 and NMB-050 during the December 2008 sampling event. No hydrocarbons were detected in these bores which all intersect coal seams. The EMP assumes that it is unlikely that any hydrocarbons are associated with the coal being targeted by the Project. If this is correct any future hydrocarbons detected would relate to drilling and other mining activities.

No dissolved gas samplings were undertaken, even when hydrogen sulphide was evident in holes NMB-017, NMB-019, and NMB-041/042.

The belief that because the soils on site consisting predominantly of clay with occasional localised silty-sand lenses, the non-perennial watercourses or water holes on-site do not have a significant link to groundwater is contradictory to the observed aquifer interactions with surface water within the bores.

It is stated that “there is some possibility that on occasion groundwater may locally discharge to watercourses on site” following periods of high rainfall which have recharged near surface localised aquifers in sand lenses or on ferruginous gravel.

The EMP further states that “(G)roundwater discharge may also occur under similar circumstances where the coal measures outcrop or subcrop near surface and a sufficient hydraulic gradient exists”. The report states that such groundwater discharges have not been observed or reported to the best of the proponent’s knowledge by any persons involved with the Project. It is the responsibility of the proponent to investigate such matters.

Kinetic net acid generation (NAG) testing by EGI indicated that PAF materials are likely to be fast reacting, producing acid within weeks of exposure to atmospheric oxidation conditions. Uncontrolled, acid, metalliferous and saline drainage can present serious risks to environmental values including aquatic ecosystems, vegetation and water resources, if not appropriately managed.

As the area outside the Project site is naturally vegetated and significant drawdown in water levels are expected outside the Project site (e.g. up to 15 m), there was some concern as to whether the drawdown in groundwater may affect the ability of the vegetation to access groundwater. Advice was sought from NEC’s consultant AustralAsian Resource Consultants (AARC) who sought advice from the Queensland Herbarium. The following advice was provided by AARC and is pertinent to all of the species listed which occur on site:

- Roots grow generally within 30 cm of surface (feeding roots), a deeper root system occurs which is a supporting system. Damaging soils within top 30 cm will have fatal impact (Pers. com. Qld Herbarium).
- *Melaleuca quinquenervia* – closely related to *M viridiflora* (Qld Herbarium) *M. quinquenervia* is a hardy plant which can tolerate many types of soils (Australian Native Plant Society) It tolerates poorly drained soils of very low fertility but only low levels of salinity (Australian Government Species Bank) A surface water thriving plant, grows on sand and swampy grounds (DERM, Coastal Sand Dunes and Their Environment).
- *Melaleuca viridiflora* – very hardy, tolerates droughts (Qld Herbarium). Occurs in sandy surface soils in coastal lowland areas, thrives off groundwater close to the surface or surface water (Plants of Central Queensland) Stands of this species may indicate a clay subsoil and poor drainage (Trees and Shrubs of NW Qld).

- *Eucalyptus intermedia* – occurs on waterlogged habitat, deeply leached soils and coastal lowland (Maroochy Biodiversity Strategy).

- Further investigation may be warranted to determine the groundwater dependence or otherwise of the vegetation.

- The volume of groundwater removed by way of bores or in-pit sumps should form part of the water accounting regime of the site and be recorded for each facility on a weekly basis and include the location / details of its end use. The frequency of monitoring may need to be increased should variations in level occur.

### 2.38 Appendix F: Noise and Vibration Assessment

The report recommended that consideration should be given to cladding the CHPP with the intent of achieving the noise limits for all mining year scenarios and all meteorological conditions at Location L1.

The EMP states that it is only if noise complaints are received and the noise limits exceeded, then noise mitigation measures are to be investigated. Noise needs to be monitored regularly and mitigation designed accordingly including stopping operations until compliance can be achieved.

Again ongoing and regular monitoring must be conducted to ensure compliance and not just if noise complaints are received from nearby residents as a result of mining activities, then additional attended noise monitoring should be conducted.

It is recommended that noise monitoring to determine compliance or otherwise should be conducted over a minimum 7 day period and longer and during different atmospheric conditions.

### 2.39 Appendix G: Geochemical Assessment of Overburden and Interburden from the Colton Coal Project

Coal washing will occur on site, and it is planned that tailings will be de-watered and combined with rejects for placement with overburden. The Geochemical Assessment states that stockpiling of washery wastes would be minimal. However more information is needed to assess the impact of washery wastes on surface and ground water.

Examination of the core shows that pyrite appears to occur “throughout the mine stratigraphic sequence”. The assessment makes assumption of risk based on general observations of quantity of pyrite and the belief that “the acid generation potential from pyrite in overburden and interburden is likely to be mostly offset by the common presence of reactive acid neutralising calcitic/dolomitic carbonate”.

It is acknowledged that “oxidation control during operations will be particularly important for PAF materials placed in pit to limit generation and storage of ARD products prior to ultimate inundation by the water table”.

“Pyritic materials (as indicated by S results) are preferentially associated with coal seams, and results suggest that coal seams, seam roof, seam floor, rejects and tailings are likely to be mainly PAF”.

It is therefore recommended that the EMP describe clearly the oxidation control methods the Project will use to ensure there is no contamination caused by PAF materials.
2.40 Appendix I: Air Quality Impact and Greenhouse Gas Assessment

Arsenic was determined to be a limiting factor for compliance and was assessed further within this report. The other pollutants Cadmium, Lead, Manganese, Nickel and Vanadium were not considered further.

The report stated that “(F)rom a regional airshed perspective, there are no significant air quality issues relevant to the proposed mining activities apart from dust. Unlike an urban airshed, the region's air quality is not significantly affected by anthropogenic emissions of products of combustion or air toxics”.

It is recommended that this statement be refuted and these issues be reassessed.

The estimated emissions from the Project exceed both the CO2-e and energy consumption thresholds for reporting as an individual facility. The facility alone also exceeds the reporting thresholds for a corporate group.

Additionally the predicted contribution of dust deposition is a significant risk to the region’s airshed.

2.41 Appendix J: Groundwater Dependent Ecosystems Report

This report describes the watercourse within the Site as a “major creek line” which “dissects the study area running in a west to east direction and exiting the site mid-way along the eastern boundary. The study area is located approximately five (5)km from the Mary River.

The report suggests that potential management responses could include actions that prevent lateral movement of shallow groundwater into the pit and other mine areas, therefore preventing drawdown.

The report also acknowledges the groundwater dependence of RE 12.5.4a and suggests irrigating RE 12.5.4a during drought periods when vegetation condition is suffering from the lack of access to groundwater. “This reactive measure could only be implemented if the quality (salinity) of the groundwater is acceptable”.

“Examination of the ecological indicators of ecosystem function within the Colton Coal study area suggests that areas of RE 12.5.4a have formed due to waterlogged conditions and the condition of this community may be at least partially maintained by the persistence of shallow ground water. Dewatering of the proposed mine area has the potential to affect the health of this community particularly during periods of drought.”

“Monitoring of vegetation community condition and agreed responses to detected declines in vegetation condition may be required in order to prevent unacceptable impacts on this community”.

“The degree of protection afforded to the condition of this community should be a balance between the ecological importance of maintaining the health of these communities and the need for development in accordance with ecological sustainable development principles.”

Clearly the report recognises that the Project may have an unacceptable impact on the regional ecosystems associated with the site.

These concerns are not reflected adequately in the EMP.
2.42 Appendix K: Colton Project Site Water Management

It is recommended that the following issues are of significant concern:

- All of the report is based on modelling and not actual monitoring, so the report contains a lot of assumptions.
- One piece of modelling identifies that in 1:111 year simulation the Susan River overflows of mine water from dams would occur 19 times with a maximum overflow of 1570 Ml.
- The above is coupled with the fact that the average daily flow of Susan River would result in the river being primarily mine waste water during those flows.
- Modelling that assumed releases to Mary River are not constrained by flow or quality in the Mary River estuary estimated that releases to the Mary River would occur 50% of the time, with occasional extended periods of continuous release.
- Modelling shows spill-over to the Susan River and discharge to the Mary River.
- Water quality estimates in estuary are reliant on co-precipitation which means contaminant will be in the sediment, leading to contamination of the mollusc breeding zone from contaminants entering in food chain from sediments.
- No sediment monitoring is proposed. This should be mandatory.
- No public access to monitoring data. This should be mandatory.
- The potential to have a 5 year long discharge of 13,000 Ml releasing contaminated water makes the Project too risky when only 5 km away from a HEV zone; to mitigate this would be to require the onsite holding dams to be built to 1:50 or 1:100 year capacity and require all discharge water to be treated by RO treatment process.
- Taking surface and groundwater water from Susan catchment and discharging to Mary Catchment is not acceptable. The drainage area of the project site is proposed to be discharged into another catchment therefore reducing the flow regime in the Susan River catchment. This flow impact has not been assessed fully.
- Our calculations show diversion of 3% of surface water from the Susan catchment and a larger area of groundwater based on the assessed impact zone (2.9 km radius) into the Mary River Catchment through the proposed discharge regime.
- Our view is this catchment diversion may be a significant impact on the HEV zone.

2.43 Appendix L: Mary River Dispersion Study

It is noted that more information was requested by DERM, now EHP on:

- the contaminant loadings from overburden and waste rock storage areas;
- the quality of water that will be contained (and released from) the main mine dam;
- the likely timing of discharges;
- the likely quality of discharges;
- the resulting salt and metal concentrations within the Mary River when it is receiving discharges from the mine; and
- if the discharge will meet the water quality objectives for the Mary River that will ensure protection of its Environmental Values.

This illustrates that these are key matters that the proponent had not fully considered and suggest a lack of regard for the long term cumulative impacts the project may have, it also illustrates that the proponent is relying on the Mary River to have a significant capacity to assimilate contaminants from the Project.
It is recommended that the following issues are of significant concern:

- The assumption that the Mary River can assimilate carcinogenic chemicals such as arsenic and chromium.
- The Project assumes the region’s communities accept that the Mary River can assimilate carcinogenic chemicals such as arsenic and chromium without them persisting in sediment and the food chain.
- The model relied to determine dispersal is based on an assumption the contaminants will be fully dispersed however dispersion depends on real life parameters such as the diffuser technology used and the type of outlet dispersed to.
- Ongoing discussions are being held with Wide Bay Water so it is unknown what other information is relevant to the Dispersion study, what the outcomes of these discussions may be and their opinion of the modelling used by the proponent.
- Sensitivity tests undertaken highlighted the variability in results primarily depending on the density differences between the mine water and the receiving waters. The results can also vary depending on the exit velocity and location of the outlet pipe.
- An investigation of the potential near field mixing was undertaken using the Cormix modelling package developed by the US EPA. Where there is significant vertical stratification of the flow, due to either, mixing between seawater and freshwater, or due to release of significantly buoyant discharges, Cormix results should be taken with caution due to the dynamic nature of the flow.
- Hydrobiology also conducted ADCP measurements of the velocity and discharge over the period from December 7th to December 9th at seven transects (see Figure 4). It was not possible to collect data at one of the transects (Transect 7) due to difficult field conditions. The recorded discharge and velocity data is not continuous over the three day period; for some transects it was possible to collect only one data point.
- A time series of concentrations at the upstream end of the HEV reach of the Mary River estuary was extracted from the model. The proponent is claiming that the results of the analysis indicate that the Mary River has significant capacity to assimilate the expected concentrations of various elements in the mine water released from the proposed Colton Mine. Aluminium and cobalt exceed the water quality guidelines provided for periods ranging from several hours to several months. During the time that exceedences do occur they can impact the reach of the river between the discharge point and potentially into the HEV reach of the lower estuary.
- The number of exceedences of the guideline values for aluminium and cobalt were considered high.
- When aluminium exceedences do occur they are typically acute events.
- The fate of compounds that undergo processes like degradation, sorption or bioaccumulation cannot be assessed without the addition of other modules such as ECO Lab. This assessment should be deemed absolutely necessary but is not by the proponent.
- Due to the one dimensional modelling approach, results are based on the assumption that a given compound is instantaneously mixed across the river and throughout the water column.
- The monitoring campaign has shown that significant flows are able to be generated by catchment run off during major rainfall events. No flows have been included from Saltwater Creek and the Susan River. These flows are however expected to have a minor influence when compared to the flows in the Mary River.
- The values of individual metal concentrations expected to be in the mine water (see Table 6-1) are estimated values and are based on a limited sample set. The methodology chosen has been conservative by assuming the entire concentration of a particular metal is available within the water column and no other processes such as flocculation have occurred.
This modelling approach has focused solely on the directly attributable impact on the Mary River from the proposed Colton Mine water discharge. Background concentrations from other sources have not been simulated but may be significant when assessing the assimilative capacity of the receiving waters. The major reduction in tracer concentration occurs at the discharge point when the tracer is diluted across the river. The magnitude of the dispersion coefficient does not affect the percentage reduction in concentration significantly. This means that the tracer concentration at the discharge location is practically the same as the concentration at the start of the HEV.

The study suggests there may be the case of negatively buoyant releases, where the discharged water sinks to the bottom and is very slowly dispersed.

These issues are of significant concern.

2.44 Appendix M: Mary River Discharge Investigation

It is recommended that the following issues are significant concerns:

- Hydrobiology Mary River discharge investigations (2011) at page v states the modelling shows chronic exceedences will occur
- Arsenic exceeded freshwater guidelines
- Of 14 metals tested chromium, nickel and mercury were found in concentrations above ISQG
3 References

Date viewed, July 2012

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