FOI 180401
Document 1

Dept. of the Sustainability, Water, Population and Communities AWD

REFERRAL DECISION BRIEF – COLTON COAL PROJECT, MARYBOROUGH, QLD (EPBC NO 2010/5625)

Public Affairs Consulted: No
DEWHA File: 2010/17164

For: Fiona Beynon
A/g AS, EAB

Deadline and reason: The statutory timeframe for a decision on this referral is 5 October 2010.

Recommended Decision	NCA ☒ NCA(pm) ☐ CA ☐
Person proposing the action	Northern Energy Pty Limited
Controlling Provisions triggered or matters protected by particular manner	World Heritage (s12 & s15A) Yes ☐ No ☒ No if PM ☐ National Heritage (s15B & s15C) Yes ☐ No ☒ No if PM ☐ Wetlands (Ramsar)(s16 & s17B) Yes ☐ No ☒ No if PM ☐ Threatened Species (s18 & s18A) Yes ☐ No ☒ No if PM ☐ Migratory Species (s20 & s20A) Yes ☐ No ☒ No if PM ☐ C'wealth marine (s23 & 24A) Yes ☐ No ☒ No if PM ☐ Nuclear actions (s21 & 22A) Yes ☐ No ☒ No if PM ☐ C'wealth land (s26 & s27A) Yes ☐ No ☒ No if PM ☐ C'wealth actions (s28) Yes ☐ No ☒ No if PM ☐ GBRMP (s24B & s24C) Yes ☐ No ☒ No if PM ☐ C'wealth heritage o/s (s27B & 27C) Yes ☐ No ☒ No if PM ☐
Public Comments	Yes ☐ No ☒
Ministerial Comments	Yes ☐ No ☒
Assessment Approach Decision	Yes ☐ No ☒
SPRAT	Has data been provided to SIS? Yes ☐ No ☒

Recommendations.

That you:

1. Consider the information in the referral at Attachment A — 1. Noted / Please discuss
2. Consider your legal obligations and supporting advice for decision-making at Attachment B — 2. Noted / Please discuss
3. Agree with the recommended decision — 3. Agreed / Not agreed
4. Sign the notice at Attachment E (which will be published if you make the recommended decision) — 4. Signed / Not signed
5. Sign the letters at Attachment F — 5. Signed / Not signed

s22

Fiona Beynon
A/g AS, EAB
/ 10 / 2010

Key Issues:

Sensitivities

- The proposed action lies 5 km, or 12.4 km in stream distance, from the Great Sandy Strait Ramsar site, in Queensland.
- On the 8 July, 2010 Minister received a letter from the Wide Bay Burnett Conservation Council Inc (C10/14824) prior to this Referral, raising concerns about a proposed open cut coal mine by Northern Energy Corporation and its proximity to the Ramsar Wetland.
- At this time the Qld Department of Environment and Resource Management (DERM) are of the view that the proposal would not require an EIS for State approval. However, DERM advised that Northern Energy Corporation would be required to submit an Environmental Management Plan (EMP) which would address water management issues.
- This Department discussed the issue with Northern Energy Corporation, who were of the opinion that they would not need to refer the proposal under the EPBC Act.

Significant impacts

- The proposed action is unlikely to have a significant impact on any EPBC listed Endangered Ecological Communities threatened and migratory species. Further details on matters of NES are provided at Attachment B.
- Advice from Wetlands section (Attachment C) states that it is not expected or likely that a significant impact on the ecological character of the Great Sandy Strait Ramsar site will occur as a result of the proposed action, provided that it is undertaken in accordance with Chapter 6.3 of the "*Colton Mine Project: Environmental Management Plan*".
- It is the view of the Mining Section Assessment Officers that the proposed action is not a controlled action as no significant impacts on MNES are likely. All water quality impacts (including potential impact on Ramsar site) will be avoided through implementation of an EMP which will be required by the State Government.

Background:

- The referral was received on 26 August 2010 (Attachment A). The action was referred by Northern Energy Corporation Pty Ltd who stated that the proposal **is not a controlled action** for the purposes of the EPBC Act.
- The proposed action is for the operation and construction of a coal mine (open cut) and associated infrastructure approximately 11km north of the township of Maryborough, QLD.
- It is proposed to mine an estimated 5.9 Million tonne (Mt) of coking coal reserves in the Burrum Coal Measures at a rate of approximately 1.00 Mt run of mine (ROM) coal per year, to produce an average of 0.50 Mt per annum (Mtpa) of product coal for export. Project production life is anticipated to be 8 to 10 years. Mining activities are expected to commence immediately following approval and construction in early 2011.
- The project site is 1023.6 ha, and the proposed disturbance footprint within the mine area is approximately 400 ha. Mine infrastructure will include: open-pit coal mining excavations; haul roads; ROM dump hopper and sizing stations; coal handling & processing plant (CHPP); product coal stockpile; train loading area; rail loop; plant reject material storage areas; heavy equipment workshop and vehicle servicing areas; warehouse; admin buildings; stores; parking; access roads; dams and pipelines; electrical power generators and a substation and distribution network.
- As mining progresses, groundwater inflow and surface rainfall are expected to increase above the project's demand. The excess water will be captured on site and managed through a combination of dams, bunds, and diversion drains. Excess water of acceptable water quality would be discharged into the Mary River via a proposed pipeline to a tidal area of the Mary River.
- Acceptable water quality would not exceed the National Water Quality trigger values, based Paper 4 of the National Water Quality Management strategy (NWQMS): Australian and New Zealand guidelines for fresh and marine water quality (http://www.mincos.gov.au/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality)
- Groundwater modelling indicates that the proposed mine will reduce groundwater levels up to 3km from the open cut mine pit. However, no registered water bores or groundwater dependant wetlands are located within the predicted zone of influence.
- The project would involve clearing approximately 382 ha of mixed Eucalypt and Melaleuca Woodlands. Although the vegetation may provide habitat for EPBC listed threatened and migratory species it is widespread within the project area and surrounding region.

- Flora and fauna surveys were timed with the conventional wet and dry seasons and considered adequate to determine the presence/absence of EPBC listed threatened and migratory species. No threatened or migratory species identified on the ERT report (5km) were recorded during the flora and fauna surveys.
- The ecological value of the project area was determined to be moderate and fauna observations were representative of species diversity of the region.
- The referral decision 'clock' was stopped on 21 September 2010 to request additional information on the amount of vegetation to be cleared; impacts on *Cyaca ophiolitica* and the Collared Delma (*Delma torquate),* and clarification on other EPBC listed terrestrial species. This additional information was received on 28 September, 2010. The Department contacted the proponent seeking clarification on one issue and further information was provided on the 29 September 2010. The Referral decision timeframe clock was restarted on 29 September 2010.

Submissions:

Public submissions

- The referral was published on the Department's website on 26 August 2010 for ten business days. The Department received no public submissions.

Comments from Commonwealth Ministers

- The then Minister for Climate Change, Energy Efficiency and Water, Senator the Hon Penny Wong, was informed of the referral by letter dated 26 August 2010 and invited to provide comment. No comments were received.
- The Minister for Resources and Energy, the Hon. Martin Ferguson MP, was informed of the referral by letter dated 26 August 2010 and invited to provide comment. No comments were received.

Comments from State /Territory Ministers

- The Queensland Department of Environment and Resource Management (DERM) wrote to this Department on 16 September 2010 advising that the Project will not be assessed for State approval using the EIS process in chapter 3 of the *Environmental Protection Act 1994* (Attachment D). However, the Environmental Management Plan for the project is currently being assessed by the DERMs regional office and will require approval before commencement.

s22

A/g Director
Mining
7 /10/2010

Primary Contact
s22
Tel. 6274 s22

Attachments:

A	Referral
B	Legal considerations, assessment of impacts on matters of NES and ERT report.
C	Advice form Wetlands
D	Letter from Department of Environment and Resources Management
E	Decision notice
F	Notification Letters

Attachment B: Legal Obligations and Supporting Advice – 2010/5625

Decision on Not a Controlled Action and Controlling Provisions

The Department has reviewed the information in the referral against the EPBC Act Policy Statement 1.1 *Significant Impact Guidelines – Matters of National Environmental Significance* (May 2006) and other relevant material. While this material is not binding or exhaustive, the factors identified are considered adequate for decision-making in the circumstances of this referral, and there is no reason to depart from this material or consider additional factors. Adequate information is available for decision making for this proposal.

Section 75
Under s75 of the EPBC Act, you must decide whether the action that is the subject of a proposal referred is a controlled action and which provisions of Part 3 (if any) are controlling provisions for the action. In making your decision you must consider all adverse impacts the action has, will have, or is likely to have on the matter protected by each provision of Part 3, and you must not consider any beneficial impacts on the matter.

You must also consider any comments received from responsible Commonwealth Ministers and appropriate State or Territory Ministers (s74) and agencies, to the extent that they are relevant. No comments were received from the Department of Climate Change, Department of Resources, Energy and Tourism or the New South Wales Department of Planning.

You must also consider any comments received from the public. The referral was made available for public comment on 27/08/2010 for 10 business days as required under the EPBC Act and no comments were received.In making your decision, you are required to take account of the precautionary principle (s391). The department has taken this principle into account in providing its advice.

Based on the available information, including the referral, the Department is of the view that the proposed action be determined **not a** controlled action, as it is **unlikely** to have a significant impact on matters of national environmental significance (NES).

Description of Proposed Action

- The proposed action is for a coal mine (open cut) and development of associated infrastructure approximately 11km north of the township of Marybrough, Queensland.
- The proposed area is approximately 1023.6 ha with a disturbance footprint of 400 ha. The estimated open cut coal reserve is approximately 5.9 Mts of Run of Mine coal from the Burrum Coal Measure in the Marybrough Basin.
- The project would include mining operations, construction of administration and workshop buildings, rail, road, water, and power infrastructure.
- The proposed action would clear approximately 382 ha of mixed Eucalypt and Melaleuca Woodlands habitat. This habitat is widely represented within the project area and surrounding region.
- As mining progresses, groundwater inflow and surface rainfall are expected to increase above the project's demand. The excess water will be captured on site and managed through a combination of dams, bunds, and diversion drains. Excess water of acceptable water quality would be discharged into the Mary River via a proposed pipeline to a tidal area of the Mary River.
- Acceptable water quality would not exceed the National Water Quality trigger values (based on the Paper 4 of the National Water Quality Management strategy (NWQMS): Australian and New Zealand guidelines for fresh and marine water quality (http://www.mincos.gov.au/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality)
- Groundwater modelling indicates that the proposed mine will reduce groundwater levels up to 3km from the open cut mine pit. However, no registered water bores or groundwater dependant wetlands are located within the predicted zone of influence.

Potential Impacts on Matters of National Environmental Significance

Listed threatened species and ecological communities

The Department's Environmental Reporting Tool (ERT) identified 28 listed threatened species with the potential to occur within 5km of the proposed project area.

The following table is the Department's assessment of the likelihood of significant impact on listed threatened species.

Table: Listed threatened species

Threatened species		
Species	**Discussion**	**Significant impact likely?**
Birds		
Red Goshwak *Erythrotriorchis radiatus* **Vulnerable**	The Red Goshawk occurs in coastal and sub-coastal areas in wooded and forested lands of tropical and warm-temperate Australia. This species prefers forest and woodland with a mosaic of vegetation types, large prey populations (birds), and permanent water. The vegetation types include eucalypt woodland, open forest, tall open forest, gallery rainforest, swamp sclerophyll forest, and rainforest margins. The Red Goshawk was not identified during the flora and fauna surveys. Habitat to be disturbed on the project area is representative of the surrounding landscape. Given the mobility of this species and the widespread availability of alternative foraging habitat in the locality, it is unlikely the project would have a significant impact on this species	No
Swift Parrot *Lathamus dicolor* **Endangered**	The Swift Parrot is endemic to south-eastern Australia. It breeds only in Tasmania, and migrates to mainland Australia in autumn. Swift Parrots prefer box-ironbark forests dominated by Box-gum and Ironbark assemblages. These tree species provide foraging and roosting habitat for the Swift Parrot. In Queensland this species is known to forage on Narrow-leaved Red Ironbark, Forest Red Gum forests and Yellow Box. The Referral states that the project area is located north of the species range species. It has not been detected during previous survey and based on is unlikely to occur. Preferred foraging habitat for this species does not occur within the project area. It is therefore unlikely that the project would have a significant impact on this species.	No
Australian Painted Snipe *Rostratula australis* **Vulnerable**	The Australian Painted Snipe has been recorded at wetlands in all states of Australia. It is most common in eastern Australia, where it has been recorded at scattered locations throughout much of Queensland, NSW, Victoria and south-eastern South Australia. The area of occupancy is suspected to be decreasing at the present time, particularly as the extent of wetlands is reduced. The Australian Painted Snipe is considered to occur in a single, contiguous breeding population. The project area contains suitable habitat for the Australian Painted Snipe. The Australian Painted Snipe was not recorded during the flora and fauna surveys. The project would remove approximately 77.1 ha of habitat for the Australian Painted Snipe; however, habitat within the project area is well represented in the surrounding landscape. It is unlikely the project would significantly impact the Australian Painted Snipe.	No

Threatened species		
Species	**Discussion**	**Significant impact likely?**
Black-breasted Button-quail *Turnix melanogaster* **Vulnerable**	The Black-breasted Button-quail is restricted to rainforests and forests, mostly in areas with 770-1200 mm rainfall per annum. They prefer drier low closed forests, particularly semi-evergreen vine thicket, low microphyll vine forest, araucarian microphyll vine forest and araucarian notophyll vine forest. They may also be found in low, dense acacia thickets and in littoral areas, in suitable vegetation behind sand dunes. Habitat for the Black-breasted Button-quail does not occur on the project area. It is unlikely the project would have a significant impact on this species.	No
Mammals		
Large-eared Pied Bat *Chlinobolus dwyeri* **Vulnerable**	The Large-eared Pied Bat is a medium-sized insectivorous bat. Little is known about the habitat and roosting requirements of this species but natural roosts may depend heavily on sandstone outcrops. This species has been recorded from a large range of vegetation types including: dry and wet sclerophyll forest; Cyprus-pine dominated forest; tall open eucalypt forest with a rainforest sub-canopy; sub-alpine woodland; and sandstone outcrop country. Relatively fertile valleys are likely to provide foraging habitat while sandstone escarpment are likely to support roost habitat. Because of its dependence on roost sites for shelter and breeding, the Large-eared Pied Bat is particularly vulnerable to threats that impact its roost sites. Individuals of this species are readily identifiable and have a distinct echolocation call. Habitat for the Large-eared Pied Bat does not occur within the project area. This species was not identified in the flora and fauna surveys. It is unlikely the project would have a significant impact on the Large-eared Pied Bat.	No
Northern Quoll *Dasyurus hallucatus* **Endangered**	The Northern Quoll occurs in most treed habitats within its distribution, and its preferred habitat is rocky escarpment, open forest and open woodland. They sometimes occur around human dwellings and campgrounds. It is most abundant in habitats within 150km of the coast. Dens are made in rock crevices, tree holes or occasionally termite mounds. Preferred trees for dens are eucalypts with reddish bark, such as the Darwin Woolybutt (*Eucalyptus miniata*). The Northern Quoll was not recorded on the project area during the flora and fauna surveys. The project area largely consists of foraging habitat for the Northern Quoll. Denning requirements within the project area are limited to hollow logs, tree hollows, as no rock crevices were recorded.Habitat for the Northern Quoll is representative of the surrounding landscape and alternative foraging habitat exist in the region.. The Northern Quoll was not recorded during the flora and fauna surveys. Given the habitat on the project area does not represent core habitat (in the absence of preferred den sites) it is unlikely that the project would have a significant impact on the Northern Quoll.	No
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) *Dasyurus maculatus*	The Spotted-tailed Quoll was previously widely distributed from south-east Queensland, eastern NSW, Victoria, south-east South Australia and Tasmania. The subspecies' mainland range has now been reduced by 50–90%. There are records of this subspecies in the Hunter Valley. This subspecies has been recorded from a wide range of habitats. Habitat in the project area largely consists of foraging habitat, as denning requirements are limited to hollow logs and tree hollows. This subspecies	No

Threatened species		
Species	**Discussion**	**Significant impact likely?**
maculatus (SE mainland population) **Endangered**	is wide ranging with home range estimates of 620–2560 ha for males, and 90–650 ha for females. The Project would remove approximately 382 ha of foraging habitat for this species. Given the availability of alternative foraging habitat in the project area and wide home range for this species and limited den habitat, it is unlikely the Project would have a significant impact on this species.	
Grey-headed Flying-fox *Pteropus poliocephalus* **Vulnerable**	The Grey-headed Flying-fox is known to occur across South Eastern Coastal Australia. The species is typically nomadic and the size of camps fluctuates in response to local food supplies. The Grey-headed Flying-fox was not recorded within the project area. No camp sites were recorded within the project area. The proposed action will result in the loss of approximately 382 ha hectares of potential foraging habitat of the species. Alternative foraging habitat for this species is widely distributed within the locality. It is not considered likely that the proposed action will have a significant impact on the Grey-headed Flying Fox.	No
Water Mouse *Xeromys myoides* **Vulnerable**	The water mouse typically occurs in coastal saltmarsh, mangroves and adjacent freshwater wetland habitats in Australia. The species distribution encompasses coastal areas of central and south-east Queensland from Proserpine south to the Queensland/New South Wales border. Although the project area does experience ephemeral wetlands after heavy rainfall events, suitable habitat for this species is not present on the project area (no coastal saltmarsh or mangrove vegetation occurs in the project area). Furthermore the Water Mouse was not recorded during the flora and fauna surveys. As the proposed action is unlikely to impact important, habitat it is unlikely the project would have a significant impact on the water Mouse.	**No**
Lungfishes		
Australian Lungfish *Neiceratodus forsteri* **Vulnerable**	The Australian Lungfish requires still or slow-flowing, shallow, vegetated pools with clear or turbid water in which to spawn and feed. The species is restricted to areas of permanent water and cannot live in saline waters or migrate through sea water. Water discharged from the mine will be released into the tidal water of the Mary River. Suitable habitat for the Australian Lung Fish does not occur at the discharge location or downstream. It is unlikely that the proposed action would have a significant impact on the Australian Lungfish.	No
Ray-finned fishes		
Mary River Cod *Maccullochella peelii mariensis* **Endangered**	The Mary River Cod prefers shaded pool habitats with abundant instream cover (ie. logs, log jams, rock ledges, boulders, undercut banks). The species occurs from high gradient upland streams to slow flowing lower catchment reaches. Submerged logs are thought to be used as nest sites. Individual cod may move long distances during periods of high water flow. Suitable freshwater habitat for this species does not occur at the discharge location or downstream. It is unlikely the proposed action would have a significant impact on the Mary River Cod.	No

Threatened species		
Species	**Discussion**	**Significant impact likely?**
Reptlies		
Collared Delma *Delma torquate* **Vulnerable**	The Collared Delma is endemic to south-east Queensland and is the smallest of the legless lizards. The species inhabits eucalypt or acacia dominated woodland and open forest where it is associated with suitable microhabitats (exposed rocky outcrops or a sparse understorey of tussock grass, shrubs or semi-evergreen vine thickets). Lemon-scented Gum (*Corymbia citriodora*) is typically the dominant canopy species with co-dominant canopy species of Narrow-leaved Ironbark (*Eucalyptus crebra*), Silver-leaved Ironbark (*E. melanophloia*), Moreton Bay Ash (*E. tessellaris*), Gum Top Box (*E. moluccana*), Tallowwood (*E. microcorys*), Forest Red Gum (*E. tereticornis*), *Angophora* sp. and Brigalow (*Acacia harpophylla*). The ground cover is predominantly native grasses such as Kangaroo Grass (*Themeda triandra*), Barbed-wire Grass (*Cymbopogon refractus*), Wiregrass (*Aristida* sp.) and Lomandra (*Lomandra* sp.). Introduced ground covers are often present as subdominant species and include Dwarf Lantana (*Lantana montividensis*). Leaf Litter appears to be an essential part of the microhabitat and is always present (typically 30–100 mm thick). This may be the limiting factor for the species recolonising recently burnt areas (Peck 2003, cited in Peck & Hobson 2007). This species was not recorded during the flora and fauna surveys. Suitable habitat does not occur within the project area. As such, it is unlikely the proposed action would have a significant impact on this species.	No
Loggerhead Turtle *Caretta caretta* **Endangered**	In Australia, Loggerhead Turtles nest on open, sandy beaches (Spotila 2004). Hatchlings enter the open ocean and begin feeding on small animals. Small Loggerhead Turtles live at or near the surface of the ocean and move with the ocean currents. Loggerhead Turtles require sandy beaches to nest. Sand temperatures between 25–33 °C are needed for successful incubation. Beaches free from light pollution are required to prevent disorientation, disturbance and to allow nesting females to come ashore. As mining progresses, groundwater inflow and surface rainfall are expected to increase above the project demand. The excess water of acceptable water quality would be discharged into the Mary River. Suitable habitat for this species does not occur near the discharge point or downstream. It is unlikely the project would have a significant impact on the Loggerhead Turtle.	No
Green Turtle *Chelonia mydas* **Vulnerable**	Green Turtles spend their first five to ten years drifting on ocean currents. Once Green Turtles reach 30 to 40 cm curved carapace length, they settle in shallow benthic foraging habitats such as tropical tidal and sub-tidal coral and rocky reef habitat or inshore seagrass beds. The shallow foraging habitat of adults contains seagrass beds or algae mats on which Green Turtles mainly feed. Nesting occurs in sand that is aerated (but not exposed), low in salt, high in humidity (but not flooded), and between 25°C and 33°C. Suitable habitat for this species does not occur near the water discharge point for the mine or downstream. It is unlikely the project would have a significant impact on the Green Turtle.	No

Threatened species		
Species	**Discussion**	**Significant impact likely?**
Leatherback Turtle *Dermochelys coriacea* **Endangered**	The Leatherback Turtle is a pelagic feeder, found in tropical, subtropical and temperate waters throughout the world. It has been recorded feeding in the coastal waters of all Australian States. Leatherback Turtles require sandy beaches to nest, with some evidence that coarser sand is more conducive to successful hatching than finer sand. Sand temperatures between 24–34 °C are needed for successful incubation. Beaches free from light pollution are required to prevent disorientation, disturbance and to allow nesting females to come ashore. No major nesting has been recorded in Australia, although scattered isolated nesting (one to three nests per annum) occurs in southern Queensland Suitable habitat for this species does not occur near the discharge point or downstream. It is unlikely the project would have a significant impact on the Leatherback Turtle.	No
Mary River Turtle *Elusor macrurus* **Endangered**	The Mary River Turtle is endemic to the Mary River in south-eastern Queensland. It occurs from Kenilworth, 262.8 km from the mouth of the river, to the area upstream of the Mary River Tidal Barrage at Tiaro, which is 59.3 km from the mouth of the river. The Mary River Tortoise occurs in flowing, well-oxygenated sections of streams. Its habitat consists of riffles (particularly productive parts of a river that are shallow with fast-flowing, aerated water) and shallow stretches alternating with deeper, flowing pools. Adults are usually found in areas with underwater shelter, such as sparse to dense macrophyte cover, submerged logs and rock crevices. They bask on logs and rocks. The Mary River Turtle is freshwater turtle with a tolerance for low levels of salt. Suitable habitat for the species exists upstream in the freshwater zone of the Mary River and some tributaries. It is possible that the turtle may temporarily enter the discharge zone if salinity levels were to drop (i.e. in the case of very high rainfall). However the proposed water discharge salinity levels are low and if a turtle were to enter the mixing zone it is unlikely that it would have a significant impact on the species . The proposed action is unlikely to have a significant impact on the Mary River Turtle.	No
Hawksbill Turtle *Eretmochelys imbricata* **Vulnerable**	Hawksbill Turtles spend their first five to ten years drifting on ocean currents. During this pelagic phase, they are often found in association with rafts of *Sargassum* (a floating marine plant that is also carried by currents). Once Hawksbill Turtles reach 30 to 40 cm curved carapace length, they settle and forage in tropical tidal and sub-tidal coral and rocky reef habitat. They primarily feed on sponges and algae They have also been found, though less frequently, within seagrass habitats of coastal waters, as well as the deeper habitats of trawl fisheries. Nesting occurs in the northern Great Barrier Reef and the Torres Strait between January and April. Turtle eggs must be buried in sand that is aerated (but not exposed), low in salt, high in humidity (but not flooded), and between 25° and 33° C (DEH 2005b). Suitable habitat for the Hawksskbill Turtle does not occur within the project area; as such it is unlikely the proposed action would have a significant impact on this species.	No

Threatened species		
Species	**Discussion**	**Significant impact likely?**
Olive Ridley Turtle *Lepidochelys olivacea* **Endangered**	Small juveniles through to adults reside in coastal zones along the northern coast of Australia and large immature and adult-sized Olive Ridleys are present all year round over soft bottomed habits of northern Australian continental shelf waters. Olive Ridley hatchlings disperse into offshore currents and have a pelagic phase of unknown length. Breeding in northern Australia occurs from March to October and seasonal breeding is tied to incubation conditions, hatchling dispersal and courtship. Nesting requires the sand temperature to be between 25–33 ºC Olive Ridley Turtles are known for their shallow nesting habits and in Australia suffer widespread loss of eggs to predation by dogs, dingoes, goannas and pigs. Post-hatchlings and small juvenile turtles occur in the surface waters of the open ocean. Foraging habitat can range from depths of several metres to over 100 m. However, most individuals captured by trawlers in the East Coast Otter Trawl fishery in Queensland were in depths of between 11–40 m. Trawling data from the east coast of Queensland indicate that this benthic foraging habitat supports turtles between 20 and 80 cm curved carapace length. Apart from one exception, Olive Ridley Turtles have not been recorded in coral reef habitat or shallow inshore seagrass flats. The Olive Ridley Turtle is a coastal species and commonly located along the North Coast of Australia. The project area is considered to be outside the species habitat and distribution range. Therefore the proposed action is unlikely to have a significant impact on the Olive Ridley Turtle.	No
Flatback Turtle *Natator depressus* **Vulnerable**	The Flatback Turtle is found only in tropical waters and inhabits soft bottom habitat over the continental shelf of northern Australia, Papua New Guinea and Irian Jaya. Nesting is confined to Australia and four genetic stocks are recognised (Limpus et al. 1981, 1983a; Limpus 2007). In eastern Queensland nesting occurs between Bundaberg in the south and northwards to Torres Strait. The main nesting sites occur in the southern Great Barrier Reef (GBR) at Peak, Wild Duck and Curtis Island. Minor nesting occurs at Mon Repos and the Mackay Region. Scattered aperiodic nesting occurs on mainland and inshore islands between Townsville and Torres Strait. Nesting habitat includes sandy beaches in the tropics and subtropics with sand temperatures between 25 °C and 33 °C at nest depth. Sand temperatures between 25 °C and 33 °C are needed for successful incubation. Beaches free from light pollution are required to prevent disorientation, disturbance, and to allow nesting females to come ashore. Hatchlings to subadult Flatback Turtles lack a pelagic life stage and reside in the Australian continental shelf. Flatback Turtles feed in turbid, shallow inshore waters north of latitude 25° S in depths from less than 10 m to depths of over 40 m. (Limpus 1995a). Suitable habitat does not occur at the mine water discharge location or immediately downstream. The proposed action is unlikely to have a significant impact on this species.	No

Threatened species		
Species	**Discussion**	**Significant impact likely?**
Plants		
Acacia attenuata **Vulnerable**	*Acacia attenunta* grows from just north of Bundaberg to Burleigh Heads on the Gold Coast, within 40 km from the coast. This species is restricted to heath ecotones growing in coastal, sandy, peaty soils that are often poorly drained. *Acacia attenuata* has been recorded growing in shrublands with *Leptospermum whitei* and *Baeckea frutescens*; in wallum with *Banksia aemula* and *Eucalyptus robusta*; in woodlands with *Corymbia trachyphloia, E. umbra* and *Banksia oblongifolia*; and in open forests of *E. umbra, E. racemosa* and *Melaleuca quinquenervia*. It has also been recorded on roadsides and in areas previously cleared of natural vegetation. Although *Acacia attenunta* was not recorded during the proponent's flora and fauna surveys, suitable habitat for this species is present within the project area. This habitat is widely represented in the region; therefore it is unlikely the project would have a significant impact on the *Acacia attenunta.*	No
Bosistoa selwynii Heart-leaved Bosistoa **Vulnerable**	The *Bosistoa selwynii* grows in lowland subtropical rainforest up to 300 m above sea level. In southern Queensland it is found in drier rainforest types ranging from Araucarian notophyll vine forest to semi-evergreen vines. *Bosistoa selwynii* has also been recorded growing on reddish loam over basalt rock, on a very steep slope in complex notophyll vine forest with emergent *Lophostemon confertus*. Associated canopy species include *Argyrodendron trifoliolatum, Caldcluvia paniculosa, Dysoxylum fraserianum, Sloanea woollsii* and *Syzygium francisii* . This species has been recorded on brown loamy soils on a hillside with *Excoecaria dallachyana* and *Dissiliaria baloghioides* (BRI collection records). Suitable habitat for the *Bosistoa selwynii* (as described above) does not occur within the project area. It is therefore unlikely the proposed action would have a significant impact on this species.	No
Bosistoa transversa Three-leaved Bosistoa **Vulnerable**	*Bosisto transversea* is found in north-eastern NSW and south-eastern Queensland from the Richmond River, NSW, northwards to Mount Larcom near Gladstone, Queensland. This species occurs within the North Coast Botanical Division of NSW and within the Port Curtis, Moreton and Wide Bay Pastoral Districts of Queensland (BRI collection records). *Bosisto transversea* grows in lowland subtropical rainforest up to 300 m asl. In southern Queensland it is found in drier rainforest types ranging from Araucarian notophyll vine forest to semi-evergreen vine thicket (W.J.F.McDonald 2001, pers. comm.). Suitable habitat for the *Bosistoa transversa* does not occur within the project area. It is therefore unlikely the proposed action would have a significant impact on this species.	No

Threatened species		
Species	**Discussion**	**Significant impact likely?**
Cryptocarya foetida Stinking Cryptocarya, Stinking Laurel **Vulnerable**	*Cryptocarya foetida* is restricted to coastal sands and areas then close to the coast, occurring in littoral rainforest on old sand dunes and subtropical rainforests over slate and occasionally on basalt to an altitude of 150 m. Associated species include *Acmena hemilampra, Acronychia imperforata, Cryptocarya triplinervis, Cupaniopsis anacardioides, Flindersia bennettiana, Lophostemon confertus* and *Syzygium luehmannii* (Quinn et al. 1995; Sheringham & Westaway 1995). Suitable habitat for the *Cryptocarya foetida* is not present within the project area. It is therefore unlikely the proposed action would have a significant impact on this species.	No
Cupaniopsis shirleyana Wedge-leaf Tuckeroo **Vulnerable**	The *Cupaniopsis shirleyana* is usually found in small populations within a variety of rainforest types, including vine thicket/dry rainforest communities on hillsides, stream beds and along riverbanks at altitudes up to 550 m. This species is also likely to occur on the margins/ecotones of vine thicket/dry rainforest communities. The known distribution of this species is restricted to disjunct communities between Brisbane and areas just north of Gladstone. Habitat for *Cupaniopsis shirleyana* does not occur within the project area. It is unlikely the Project would have a significant impact on this species	No
Cycas ophiolitica **Endangered**	*Cycas ophiolitica* is restricted to central-eastern Qld, between Marlborough and Rockhampton. It grows on hills and slopes in sparse, grassy open forest. Although this species reaches its best development on red clay soils near Marlborough it is more frequently found on shallow, stony, infertile soils which are developed on sandstone and serpentinite. The preferred open forest habitat on rocky slopes was not recorded within the project area. Given the lack of suitable habitat on the project area for *Cycas ophiolitica*, it is unlikely the proposed action would have a significant impact on this species.	No

Threatened species		
Species	**Discussion**	**Significant impact likely?**
Macrozamia pauli-guilielmi Pineapple Zamia **Endangered**	This species occurs in south-eastern Qld, in the Burnett, Darling Downs and western Morton districts, and also on Fraser Island. It is distributed from the Upper Noosa River, near Gympie, with intergrades extending into the far northeast of NSW around the town of Acacia Creek. *Macrozamia pauli-guilielmi* is found scattered in open woodland, almost always on siliceous sand deposits from old beach dunes.These sandy soils can become wet and spewy during the summer and autumn. Less commonly the species grows on low, gravelly or shaly ridges. Sites are on gently undulating plains to low hills on hillcrests, very gently to moderately inclined hillslopes and levees with variable aspect and at elevations between 10-100 m above sea level. The soils are generally well drained, greyish yellow to very dark reddish brown, or brownish black, sands, loamy sands, sandy loam to light clay with pH 4.9-5.9 and occasionally stony. The vegetation community is a layered very tall to tall open forest. The common canopy species are *Corymbia intermedia, Eucalyptus racemosa, C. citriodora, Angophora leiocarpa* and *E. acmenoides*. Other tree species occasionally present included: *C. trachyphloia, E. crebra, E. major, E. fibrosa, E. umbra, E. microcorys, E. pilularis, E. siderophloia, E. tindaliae* and *Lophostemon confertus*. Approximately 3 ha of suitable habitat for *Macrozamia pauli-guilielmi* on the project area occur within the heathland habitat. The heathland community occurs outside of the disturbance foortprint and will not be disturbed by the proposed action. As such is unlikely the Project would have a significant impact on *Macrozamia pauli-guilielmi.*	No
Phebalium distans Mt Berryman Phebalium **Critically Endangered**	*Phebalium distans* are found in semi-evergreen vine thicket on red volcanic soils or in communities adjacent to this vegetation type. The geology of the area in which this species occurs is deeply weathered basalt with undulating to hilly terrain. Soils range from red-brown earths to brown clays (derived from siltstone and mudstones), and lithosols to shallow, gravelly krasnozems (very dark brown loam), derived from the Main Range Volcanics of the Tertiary period. Vegetation associations in which *Phebalium distans* occur include microphyll to notophyll vine forest with or without *Araucaria cunninghamii* and low microphyll vine forest and semi-evergreen vine thicket with or without *Araucaria cunninghamii* which can be divided further into regional ecosystems depending on substrate, geography and associated vegetation species. Suitable habitat for *Phebalium distans* does not occur on the project area, and as such the project is unlikely to have a significant impact on this species.	No

Threatened species		
Species	**Discussion**	**Significant impact likely?**
Taeniophyllum muelleri Minute Orchid, Ribbon-root Orchid **Vulnerable**	*Taeniophyllum muelleri* is distributed from Bellingen in NSW, northward along the eastern coast into Cape York Peninsula in Northern Queensland. The preferred habitat of this species consists of rainforest and vine forest. *Taeniophyllum muelleri* is an epiphytic species and as such, is not directly dependant upon geological formations. However, the preferred habitat of this species consists of sheltered sites beneath a well developed canopy, directly adjacent to drainage lines in areas generally containing alluvial soils. *Taeniophyllum muelleri* has been documented to co-occur with *Araucaria cunninghamii*, *Argyrodendron trifolium*, *Dissiliaria baloghioides*, *Brachychiton discolour*, *Beilschmiedia obtusifolia*, *Diospyros pentamera*, *Grevillea robusta*, *Gmelina leichhardtii*, *Ficus macrophylla* and *Callistemom salignus* (Schell 2007) No suitable habitat for this species exists on the project area. Therefore, significant impact on this species is unlikely to occur as a result of the proposed action.	No

Listed migratory species

The Department's Environmental Reporting Tool (ERT) identified 20 listed migratory species with the potential to occur within 5km of the proposed project area.

The following table is the Department's assessment of the likelihood of significant impact on listed migratory species.

Migratory Terrestrial Species		
Species	**Discussion**	**Significant impact likely?**
White-bellied Sea-Eagle *Haliaeetus leucogaster*	These migratory species were identified in the Environment Report as potentially occurring within 5 km of the proposed action. No migratory species were recorded in the project area during the proponents flora and fauna surveys. These species have wide distributions across Australia and there is no evidence to suggest that the project area supports an 'ecologically significant' proportion of an important population of these migratory birds, significant impacts on these species are not expected or considered likely.	No
White-throated Needletail *Hirundapus caudacutus*		
Rainbow Bee-eater *Merops ornatus*		
Black-Faced Monarch *Monarcha melanopsis*		
Spectacled Monarch *Monarcha trivirgatus*		
Satin Flycatcher *Myiagra cyanoleuca*		

Migratory Wetland and/or Marine Species		
Great Egret *Ardea alba*	The Great Egret has been reported in a wide range of wetland habitats including swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels; salt pans and salt lakes; salt marshes; estuarine mudflats, tidal streams; mangrove swamps; coastal lagoons; and offshore reefs. The species usually frequents shallow waters. Habitat for the Great Egret is widely distributed across the Australian mainland. It is unlikely the project would have a significant impact on this species.	No
Latham's Snipe *Gallinago hardwickii*	Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000m above sea-level across Australia. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). The Referral states that Latham Snipe is unlikely to occur in the habitats of the project area. This species was not recorded during the proponents flora and fauna surveys. Suitable habitat for this species does not occur on the project area. It is therefore unlikely that the Project would have a significant impact on this species.	No
Cattle Egret *Ardea ibis*	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures. It is commonly associated with the habitats of farm animals, particularly cattle, but also pigs, sheep, horses and deer. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. Habitat for the Cattle Egret is widely distributed across the Australian mainland. It is unlikely the project would have a significant impact on this species.	No
Painted Snipe *Rostratula benghalensis s. lat*	The Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They may also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Water discharged from the mine will be released into the tidal water of the Mary River. Suitable freshwater habitat for this species does not occur at the discharge location or downstream. The Painted Snipe may fly over the project area however given the lack of preferred freshwater resources for this species it is unlikely to be dependant on the habitats within the project area. The project is therefore unlikely to have a significant impact on the Painted Snipe.	No

Fork-tailed Swift *Apus pacificus*	The Fork-tailed Swift occurs in a range of habitats including dry or open habitats, riparian woodland and tea-tree swamps, spinifex low scrub, treeless grassland sandplains, heathland, saltmarsh rainforests, wet sclerophyll forest or open forest, towns, urban areas and cities. They mostly occur in inland plains but sometimes above foothills or in coastal areas. They forage aerially, up to hundreds of metres above ground, but also less then 1 m above open areas or over water. Although this species was not recorded on the site, suitable habitat for the Fork-tailed Swift is present within the project area. Given the mobility of this species and availability of alternative foraging habitat in the locality, it is unlikely the project would have a significant impact on this species	No
Swift Parrot *Lathamus dicolor*	The Referral states that the project area is located north of the species range species. Preferred foraging habitat for this species does not occur on the project area. The Swift Parrot was not recorded during the proponents flora and fauna surveys. Given the lack of records and suitable foraging habitat within the project area, it is unlikely that the Project would have a significant impact on this species.	No
Australian Cotton Pygmy-goose *Nettapus coromandelianus albipennis*	The Australian Cotton Pygmy-goose occurs in terrestrial wetlands of coastal and subcoastal tropical eastern Australia. This species is almost entirely aquatic, preferring deep permanent fresh waters with abundant growth of floating and submerged aquatic vegetation, interspersed with open water. The Australian Cotton Pygmy-goose breed in tree-hollows in or near deep lagoons. In non-breeding season, roost in pairs or flocks in deep water among waterlilies or on fallen logs or mudbanks. Roost sites in breeding season are unknown, but the species inhabits deep water except when on a nest. Birds float in deep open water among floating vegetation or dabble in shallows The project area contains no wetland habitats, although the heathland community may provide limited habitat opportunities for this species within the project area. The heathland community will no be disturbed by the proposed action, and as such the project is unlikely to have a significant impact on the Australian Cotton Pygmy-goose.	No
Magpie Goose *Anseranas semialmata*	The Magpie Goose occurs on terrestrial wetlands in monsoonal regions. During the early wet season this species uses transient pools that are filled by rain, later nesting and feeding in extensive floodplain swamps. During the dry season the Magpie Goosed concentrates around deep permanent waterbodies, especially on floodplains which have an uneven floor, where water is retained in depressions. They use agricultural land, particularly on irrigated land where fresh green shoots are present, and also orchards. The Magpie Goose breeds in ephemeral swamps on floodplains of large rivers. Nests are built over water, supported by vegetation, which is added to if the water rises. Foraging habitats depend on the production of *Eleocharis* bulbs, grass seeds and grass foliage. Habitat for the Magpie Goose is not represented within the project area. This species was not recorded in the flora and fauna surveys. Given the lack of suitable habitat and site records it is unlikely that the proposed action would have a significant impact on the Magpie Goose.	No

Reptiles		
Loggerhead Turtle *Caretta caretta*	See above under threatened species.	No
Green Turtle *Chelonia mydas*		
Leatherback Turtle *Dermochelys coriacea*		
Hawksbill Turtle *Eretmochelys imbricata*		
Olive Turtle *Lepidochelys olivacea*		
Flatback Turtle *Natator depressus*		

Ramsar wetlands of international importance

The proposed action lies 5 km in direct distance, or 12.4 km instream distance, from the Great Sandy Strait Ramsar site. As mining progresses, groundwater inflow and surface rainfall are expected to increase above the project's demand. The excess water will be captured on site and managed through a combination of dams, bunds, and diversion drains. Excess water of acceptable water quality would be discharged into the Mary River via a proposed pipeline to a tidal area of the Mary River. Mine water discharge would be heavily diluted and monitored in accordance with DERMS regulation and the Australian and New Zealand guidelines for fresh and marine water quality.

Wetlands section advice (Attachment C) stated that the proposed action is not likely to destroy or substantially modify Ramsar wetland or impact on the habitat or life cycle of a native species dependant upon the wetland, providing the action is done in particular manner- in accordance with Chapter 6.3 of the "Colton Mine Project: Environmental Management Plan (EMP).

It is the view of the Mining Section Assessment Officers that NCA-PA decision is not suitable as:

- water discharge will be controlled and diluted;
- water quality impacts will be avoided through implementation of an EMP which will be required by the State Government; and,
- the proposed action is unlikely to have a significant impact on MINWES.

World Heritage properties

This action is not in the vicinity of any World Heritage Properties. The proposed action is not expected or likely to significantly impact on the values of these or any other World Heritage Area.

National Heritage places

This action is not in the vicinity of any places of National Heritage significance. The proposed action is not expected or likely to significantly impact on the values of these or any other National Heritage site.

Commonwealth marine environment

The Department's Environmental Reporting Tool did not identify any Commonwealth marine in the vicinity of the site.

Commonwealth Land

The Department's Environmental Reporting Tool did not identify any Commonwealth land in the vicinity of the site.

Commonwealth Action

The proposal is not being undertaken by a Commonwealth entity.

Nuclear actions

The proposed action is not a nuclear action as defined under the EPBC Act.

Great Barrier Reef Marine Park

The proposal is not taking place in the vicinity of the Great Barrier Reef Marine Park, and is not expected or likely to significantly impact on the Marine Park

Referral documents and other information sources

- Referral documentation.
- DEWHA Environmental Reporting Tool (ERT).
- Department of Environment and Heritage (2006) *EPBC Act Policy Statement 1.1: Significant Impact Guidelines – Matters of National Environmental Significance*.
- Advice provided by the Wetlands, Water Reform Division, of DSEWPaC

FOI 180401
Document 1b

Queensland Government

Enquiries s22
Telephone
Your reference 2010/5625
Our reference BNE 683-47

Department of
Environment and Resource Management

16th September 2010

s22 A/g Director
Mining Section
Environment Assessment Branch
Department of the Environment, Water, Heritage and the Arts
GPO Box 787
CANBERRA ACT 260I

Dear s22

Invitation to comment on referral – 2010/5625 – Colton Mine Project

I refer to your correspondence of 26th August 2010 requesting advice on whether the above action will be assessed in a manner described in Schedule I of the *Agreement between the Commonwealth of Australia and the State of Queensland* (the Bilateral Agreement) developed under Section 45 of the *Environment Protection and Biodiversity Conservation Act 1999*.

I advise the proposal will not be assessed using the EIS process in chapter 3 of the *Environmental Protection Act 1994*. However, the Environmental Management Plan for the project is currently being assessed by our regional officers who will make a decision about whether the application should proceed.

The Department of Infrastructure and Planning (DIP) has reviewed the referral documentation and advise that the Coordinator-General has not received a request for declaration of this proposal as a significant project under Part 4 of the *State Development and Public Works Organisation Act 1971*.

Also, the DIP has advised the proposed development is unlikely to meet the requirements for assessment under Chapter 9, Part 2 of the *Sustainable Planning Act 2009*.

400 George Street Brisbane
Queensland 4000 Australia
GPO Box 2454 Brisbane
Queensland 4001 Australia
Telephone (07) 3330 5598
Facsimile (07) 3330 5634
Website www.derm.qld.gov.au
ABN 46 640 294 485

Should you have any further inquiries regarding this letter, please contact s22 of the DERM on telephone (07) s22 or email s22 @derm.qld.gov.au .

Yours sincerely

s22

Jon Womersley
Director, Environmental Impact Assessments

FOI 180401
Document 2

From: Gomez Gane, Kylie
To: s22
Subject: RE: Colton Coal Project - Request for a reconsideration - Invitation to comment [SEC=UNCLASSIFIED]
Date: Tuesday, 7 March 2017 5:07:49 PM
Attachments: image002.png
image003.png
170307 Response to reconsideration request EPBC 2010 - 5625.pdf
161117 Colton Coal Land Court Recommendation.pdf
161215 Permit EPML00367613 Colton Coal Pty Ltd.pdf

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s22

Pls find attached response from Colton Coal Pty Ltd.

The attachments include the following documentation:

- Response to reconsideration request (Scanned version)
- Attachment A: Land Court Determination
- Attachment B: Environmental Authority

Pls note originals will be sent via mail to your attention at the following address:

Referrals Gateway
Department of the Environment and Energy
GPO Box 787
Canberra ACT 2601

Thanks and regards,

Kylie Gomez Gane
Manager Environment, Policy and Approvals
.....
New Hope Group | Corporate Office
T: +61 7 s47F **M:** +61 s47F
E: *kgomezgane@newhopeg u*
W: *newhopegroup.com.au*
.....

http://www.newhopegroup.com.au/files/images/Newsig0916.png

From: Butterfield, Lucy [mailto:Lucy.Butterfield@environment.gov.au]
Sent: Tuesday, 21 February 2017 2:16 PM
To: Gomez Gane, Kylie
Subject: RE: Colton Coal Project - Request for a reconsideration - Invitation to comment [SEC=UNCLASSIFIED]

Hello Kylie
We've had a few requests for extensions of time to provide comment, so if you need extra time

please let me know.
To date, I've provided extensions until the 10 March 2017, however if that is insufficient time for you to provide a response, please let me know and I'll seek clearance to extend further.

Regards

s22

Queensland Major Projects Section
Environmental Standards Division
Department of the Environment and Energy
s22 @environment.gov.au
Ph: (02) 6274 s22 | GPO BOX 787 Canberra ACT 2601

From: Gomez Gane, Kylie [mailto:kgomezgane@newhopegroup.com.au]
Sent: Friday, 17 February 2017 11:05 AM
To: s22 @environment.gov.au>
Subject: RE: Colton Coal Project - Request for a reconsideration - Invitation to comment [SEC=UNCLASSIFIED]

s22

Thanks for your email. We will respond in due course.

Regards,

Kylie Gomez Gane
Manager Environment, Policy and Approvals
.....
New Hope Group | Corporate Office
T: +61s47F **M:** +61s47F
E: *kgomezgane@newhopegroup.com.au*
W: *newhopegroup.com.au*
.....

http://www.newhopegroup.com.au/files/images/Newsig0916.png

From: s22 @environment.gov.au]
Sent: Friday, 17 February 2017 8:16 AM
To: Gomez Gane, Kylie
Subject: Colton Coal Project - Request for a reconsideration - Invitation to comment [SEC=UNCLASSIFIED]

Hello Kylie

Reconsideration request
Colton Coal Mine Project, Maryborough Queensland (EPBC 2010/5625)

As you are aware, the Minister for the Environment and Energy has received a request under section 78A of the EPBC Act to reconsider the 'not a controlled action' decision made on 6

October 2010 under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The request has been found to be valid and the request has been placed on the Department's website for public comment (http://epbcnotices.environment.gov.au/) and is also included with this letter for reference.

I invite you to provide comment on any matter you consider relevant to this request for reconsideration. In any correspondence, please quote the title of the action and EPBC reference as shown at the beginning of this letter. Comments must be provided within ten business days from the date of this letter and can be sent to:

by email: epbc.referrals@environment.gov.au

by letter: Referrals Gateway
Department of the Environment and Energy
GPO BOX 787
CANBERRA ACT 2601

Following the 10 day comment period, the Minister (or his delegate) will consider all relevant information and a decision will be made on whether to uphold the original decision, or to revoke the original decision and substitute a new decision.

If you have any questions about the process, please contact me and quote the EPBC reference number shown at the beginning of this letter.

Yours sincerely

s22
Queensland Major Projects Section
Environmental Standards Division
Department of the Environment and Energy
s22 @environment.gov.au
Ph: (02) 6274 s22 GPO BOX 787 Canberra ACT 2601

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Northern Energy Corporation Limited

COLTON COAL PTY LTD
ABN: 33 140 768 636

YOUR REF:
OUR REF:

7 March 2017

Referrals Gateway
Department of the Environment and Energy
GPO BOX 787
CANBERRA ACT 2601,

RE: Reconsideration request - Colton Coal Mine Project, Maryborough Queensland (EPBC 2010/5625)

Colton Coal Pty Ltd (**Colton Coal**) is the Colton Coal Mine proponent and applicant for the project mining leases and environmental authority. Colton Coal submits that there has been no substantial change to the description of the Project since it was referred in 2010, and that the Project therefore remains unlikely to significantly impact any Matters of National Environmental Significance. The Colton Coal Mine Project's proposed design and scale of operation has not materially changed since referral to the Commonwealth for assessment under the EPBC Act in August 2010.

The Queensland Government issued the Environmental Authority (**EA**) for the project in December 2016.

The Request for Reconsideration has been made by the Mary River Catchment Co-ordinating Committee (**MRCCC**). The MRCCC request claimed that there is "*substantial new information available compared to when the referral was made in August 2010. Some aspects of the project relevant to Matters of National Environmental Significance have changed and new information has been made available*".

The Request for Reconsideration is purportedly made by MRCCC pursuant to section 78A of the *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**). The request invites the Minister to reconsider an earlier referral decision pursuant to section 78(1)(a) of the EPBC Act.

Section 78(1)(a) states as follows:

*"**78 Reconsideration of decision***

Limited power to vary or substitute decisions

*(1) The Minister may revoke a decision (the **first decision**) made under subsection 75(1) about an action and substitute a new decision under that subsection for the first decision, but only if:*

(a) The Minister is satisfied that the revocation and substitution is warranted by the availability of substantial new information about the impacts that the action:

(i) has or will have; or

(ii) is likely to have;

on a matter protected by a provision of Part 3; or

..."

Section 78(1)(a) of the EPBC Act is a **limited** power. It is quite properly a limited power given that reconsideration of an earlier decision involves re-opening that decision at a time after there has been reliance upon that earlier decision. A reconsideration decision gives rise to the potential for interference with a person's rights after that person has duly followed a formal process and acted upon a validly made decision.

The MRCCC request does not identify or refer to any independent expert evidence obtained by or on behalf of MRCCC to substantiate the allegations made in the request. The request contains a number of allegations with no source information and appears to be based on non-expert opinions.

MRCCC provides no new scientific information to substantiate the four matters asserted as being "Key new information related to releases to the Mary River". Scientific and technical studies pertaining to these matters were in the public domain in 2014 within Queensland Government formal processes. These and subsequent Joint Expert Reports were submitted for the Land Court of Queensland in 2015 and 2016. The availability of all documents for examination and the opportunity to participate in the public hearings and cross examination of all scientific and other witnesses appears to have been overlooked or foregone by MRCCC.

Additional information since 2010 has been generated by Colton Coal through extensive scientific and technical studies to assist the Queensland Department of Environment and Heritage Protection (**DEHP**) in its determination of appropriate Environmental Authority conditions, to establish scientific baseline data to support long term environmental performance monitoring and adherence to mandated approval conditions. None of this information suggests any material change of the proposal.

To the extent that MRCCC purport to found its allegations on the basis of information that was prepared on behalf of Colton Coal after referral of the Project pursuant to the EPBC Act, that material provides greater detail and reflects improved knowledge with respect to the Project as it has progressed through the State's approval process. The subsequent material confirms that the relevant potential impacts of the Project are the same or less, and not worse, than those anticipated at the time of the original referral of the Project pursuant to the EPBC Act. In these circumstances, Colton Coal submits that there is no basis on which the Minister could be satisfied that the revocation and substitution of the earlier decision is warranted.

Further, we note that the power granted to the Minister to revoke a decision made under section 75(1) about an action and substitute a new decision is ultimately discretionary.

This is a case where there are strong discretionary reasons why the Minister would not exercise the power even if it was available (which we submit it is not). Those factors include that:

- MRCCC elected not to avail itself of other formal avenues to raise, and have tested, the same concerns set out in the request;
- The earlier EPBC Act decision was made in October 2010. Since that time Colton Coal has relied upon that decision in good faith and the project has significantly advanced, including to a point where a number of key State approvals are in place;
- The majority of the information referred to in the MRCCC request dates back to 2014. The MRCCC request however was not made until December 2016 (shortly after the

Land Court determination was handed down in November 2016). This timing suggests that MRCCC are endeavouring to use the EPBC Act reconsideration process for an improper process and are endeavouring to re-agitate in an alternative forum arguments which were ultimately not accepted in the Land Court proceeding.

Project Background

The Project proposes open cut mining of an estimated 12.0 million tonne (Mt) coking coal reserve of the Burrum Coal Measures in the Maryborough Basin, South East Queensland, Australia. The Project is planned to mine up to 1.2 Mt of Run of Mine (ROM) coal per annum by open cut methods to produce an average of 0.5 million tonnes per annum (Mtpa) of product coal for export. Project production life is anticipated to be 8 - 10 years.

The Project applications to the Queensland Government were made in January and November 2010. Information describing the Project was available to the public in Company publications and on the website.

Colton Coal referred the Project to the Commonwealth Government for assessment under the EPBC Act in August 2010. On 6 October 2010, the Project was determined not to be a 'controlled action'. A request for additional information was issued by the Commonwealth in November 2014, due to a perception raised by parties unknown to Colton Coal that increasing the Run of Mine (ROM) volume from 1.0 Mt to 1.2 Mt per annum constituted a change in scope of the Project. Following Colton Coal's response to this request (see also Issue 1 in the Tabled following) the Commonwealth decided that the change in scope was not significant, and the determination that the Project would have no significant impact on MNES was confirmed.

In late 2011/early 2012 the Qld Department of Environment and Resource Management (**DERM**) advertised the project, seeking public comment. At the same time Colton Coal wrote to MRCCC offering a briefing and discussion about the project. MRCCC declined the invitation.

Copies of the comments received by DERM (with personal identifiers removed) were provided to Colton Coal. MRCCC was a commenter, thus formally placing its concerns about the Project at that time with the Department responsible for managing the environmental approvals. The comments made by MRCCC in 2012 are along the same lines as those in this Request for Consideration.

In mid 2014 the Qld Government allowed the Project applications to proceed to the Public Objections stage. Objections to the project were received from residents in the local Aldershot community with a substantial and comprehensive objection from an incorporated body, Aldershot And District Against Mining. MRCCC did not formally make any Objection, notwithstanding that this is the process provided for in Qld Legislation for project proponents and opponents to have their issues resolved prior to consideration and final decisions by the relevant Ministers.

The Objections triggered a process under the auspices of the Qld Land Court whereby independent experts for both the proponent and the opponents considered the objections and eventually reported to the Land Court on their technical and scientific validity. A staff member of MRCCC participated in this process by providing information for the primary expert for the opponents.

Hearings on the Objections were held in the Qld Land Court in August 2016. The Determination of the Court on the Applications was handed down in November 2016. The

Determination recommended that the Project Applications be approved. Copy of the Determination is attached to this response submission (attachment A).

It can be seen in the Determination that many, if not all, of the MRCCC issues in its Request for Reconsideration have already been addressed by the Court.

State Approvals

Following hearings in the Queensland Land Court in August and September 2016, approval of the Project Applications was recommended, with the Environmental Authority (**EA**) issued on 15 December 2016. A copy of the Environmental Authority is attached to this response for reference (attachment B).

The EA includes conditions with limits on the quality of water which can be discharge from the site to the Mary River, threshold fresh water inflow regimes in the Mary River below which water must not be discharged, and Mary River water quality monitoring requirements. These conditions were developed based on the assessment of river and discharge water quality, and Mary River modelling and dispersion studies, guided by expert scientific advice from the Queensland Department of Science, Information Technology and Innovation.

Throughout the Queensland approvals process, the original Environmental Management Plan (**EM Plan**) for the project was updated. An initial update addressed matters raised in the Assessment Report issued by DERM in September 2010, and to reflect mine planning and project developments since the original EM Plan was submitted. A second update in May 2014 included modifications to the previously submitted EM Plan, based on further information requests from, now, DEHP, consultation with DEHP staff and its advisory bodies, and changes in State Government guidelines and policy. The updates to the EM Plan did not propose any significant change to the footprint, mining methods, production rates or impacts of the Project.

Each of the issues raised in the MRCCC submission are addressed in detail in the following response report

In all the circumstances, it is submitted that there is no basis for the Minister to exercise the limited power under section 78(1)(a) of the EPBC Act because:

(a) the Minister could not be satisfied that revocation and substitution of the first decision is warranted; and
(b) in any event, there are a number of discretionary factors which tell against the exercise of the power.

Yours faithfully,

Kylie Gomez Gome

COLTON COAL PTY LTD

Information Response

The Request for Reconsideration submitted by the MRCCC included a table of issues, each of which is addressed here.

Issue 1

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
Mine will have Run of Mine (ROM) production of 1.0 MT tonne. Reserve was estimated at 5.9 million tonnes of coking coal (p2)	The 2014 EMP identifies an increase in ROM production by 0.2 MT/annum but no increase in the coal production – still at 0.5 Mtpa. Reserve has now doubled and is now estimated at 12 million tonnes.	The increased size of the reserve increases the chance that the mine will be expanded and bring with it increased impact on the terrestrial ecosystem and water quality of the Susan River and Great Sandy Strait. (see related point No 2 below)

Response: No Material Change

Colton Coal responded to this issue when it was raised by the Federal Government in November 2014. In the January 2015 response the Department noted that "*the alterations in footprint and extraction at the site are unlikely to constitute a substantial deviation from the previously considered action. In addition, the alterations are not considered to substantially increase the likelihood of significant impact on matters of national environmental significance.*"

The Colton Mine Project was described in 2010 as intended to mine approximately 1.0 Mtpa of ROM material to produce on average 0.5 Mtpa of product coking coal over an expected production life of 8-10 years, for total production of 5.0 Mt coal.

The Colton Mine Project is now described as mining up to 1.2 Mtpa ROM. This change from 1.0 Mt to 1.2 Mt is because of improved knowledge of the geological setting of the deposit. This has led to a better understanding of the proportion of product coal within the ROM stream feeding the processing plant. The proposed product rate of 0.5 Mtpa is unchanged. The difference between 1.0 Mt and 1.2 Mt simply means that whereas 0.2 Mt of material (containing some coal) would have previously been directed to the Project's waste dumps it is now instead directed to the process plant for washing before being transferred to the waste dump for disposal. We submit that this does not result in any material or substantial change to the Colton Mine Project.

Additional coal resources are contained in the Burrum Coal Measures in the Maryborough Basin, outside of the Colton Mine Project application area. At this time development of the additional resources outside the existing project footprint is not proposed, but may be considered in the future, following further exploration and resource development. This was confirmed by the Queensland Land Court, which accepted New Hope's evidence that the company "*have no plans for another application at this point in time*" and ruled that "*What is being considered by the Court is the proposal before it*". Any future stages of development would be the subject of new State approvals and new EPBC referrals to be considered at the time of application, and therefore these additional resources do not constitute a change to the Colton Mine Project.

Issue 2

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
There will be no cumulative impact. This Project is a standalone project. NEC will continue to explore for additional economic coal reserves within its surrounding exploration tenements. At the time of this application no plans to develop additional coal resources existed. (p3)	However, since the time of submission of the Referral the size of the reserve has more than doubled and the ROM production has increased by 20% (from 1.0MT/annum to 1.2 MT/annum) and yet the proposed level of production has not changed and remains at 0.5 million tonnes per annum, the limit above which an Environmental Impact Statement would have been required by the Queensland Government. According to the EHP Assessment Report New Hope had publicly signaled that there were interested in applying for a much larger project in the same area if this project were to be approved.	Given the discovery of a much larger reserve it seems highly probable that New Hope would pursue an expansion, especially given they publically expressed the potential for this. Cumulative impacts are therefore of concern. Waiting for an expanded proposal to trigger a controlled action when the proposed mine is already underway would represent a missed opportunity to protect the Ramsar site from much greater impact.

Response: No Material Change

The MRCCC submission is incorrect and misleading when it states that 0.5 Mt per annum of product is the limit above which an Environmental Impact Statement would be required by the Queensland Government. The Queensland DEHP Guideline "*Triggers for environmental impact statements under the Environmental Protection Act 1994 for mining and petroleum activities*" state that an EIS is required for new mining activities that would result in:

- the removal of two million tonnes/year (t/y) or more of run-of-mine (ROM) ore or coal;
- the removal of one million t/y or more of ROM ore or coal on or under a floodplain or in a coastal hazard area;
- the introduction of a novel or unproven resource extraction process, technology or activity.

The proposed mining rate of 1.2 Mtpa ROM is well below the applicable Environmental Impact Statement (EIS) trigger of 2 Mtpa. As described earlier, this change does not result in any material or substantial change to the Colton Mine Project, or to its potential to impact on MNES.

Additional coal resources are known to exist within the Burrum Coal Measures of the Maryborough Basin. These resources are outside the Colton Mine Project application area. In addressing similar concerns raised in the State approval process, the Queensland Land

Court ruled that "*What is being considered by the Court is the proposal before it*" and not possible future projects.

Should an economic resource be determined in the future, any new application would be the subject of new State approvals and new EPBC referrals, to be considered at the time of application.

Issue 3

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
Effects on the Great Sandy Strait are expected to be nil. This is a result of: (several points including) The discharge location is significant distance (8 – 12.5 km) from the entrance to the Great Sandy Strait.	The distance to the Ramsar site is what is of significance for the Referral. It is 8km.	This speaks to the credibility of the material provided in the original referral.

Response: No Material Change

The distance to the RAMSAR site boundary referred to in MRCCC's submission is incorrect and considered to be deliberately misleading. As illustrated in Figure 1 and Figure 2, the EPBC Protected Matters search tool shows that the boundary of the Great Sandy Straight Wetland is approximately 8 km from the discharge point in the horseshoe bend of the Mary River, but the boundary of the RAMSAR wetland is further east, at approximately 12.5 km.

The EM Plan and referral are accurate in their description of the distance to the RAMSAR site boundary.

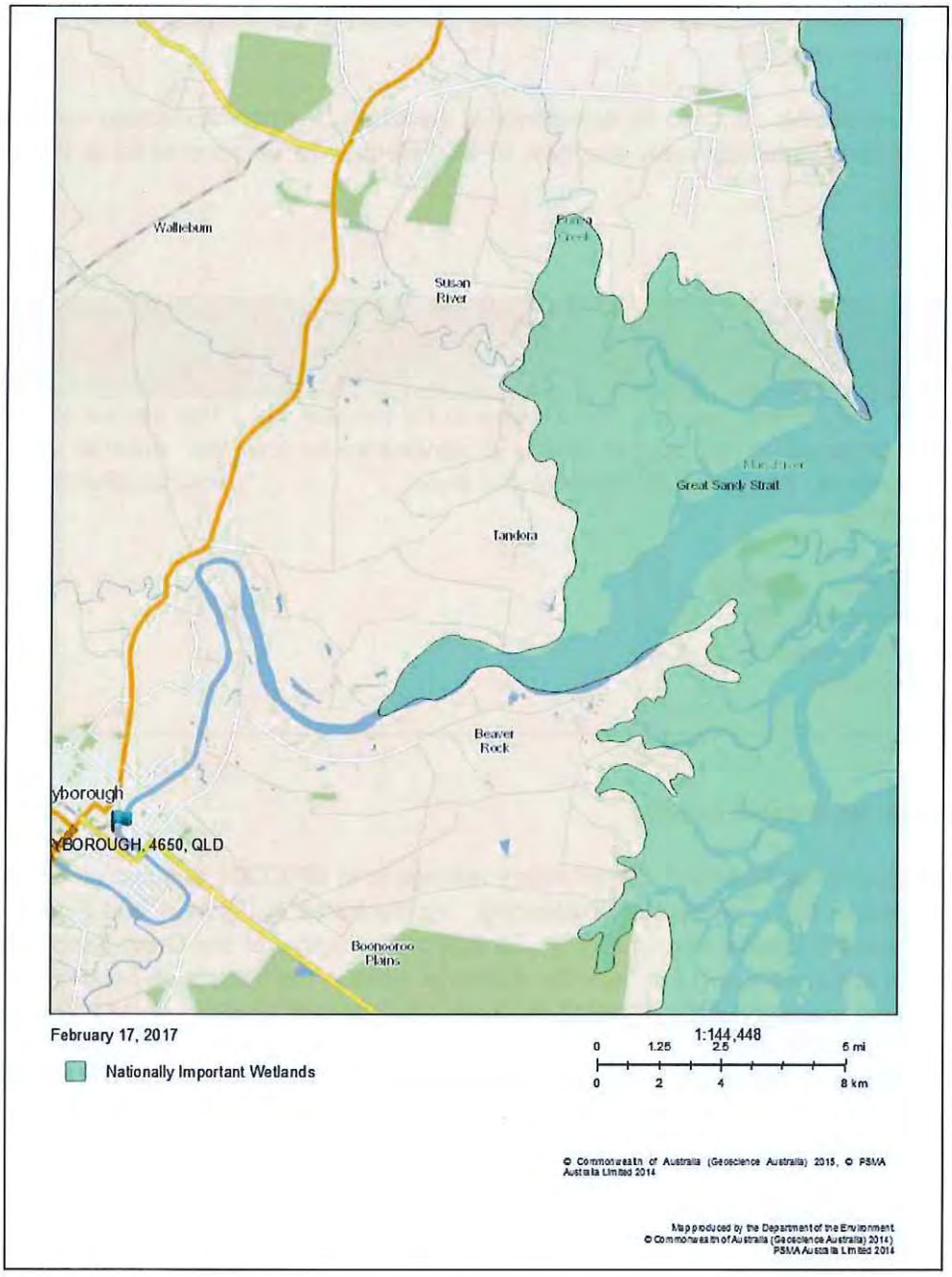

Figure 1 – Protected Matter Search Tool Extent of Great Sandy Strait Wetland

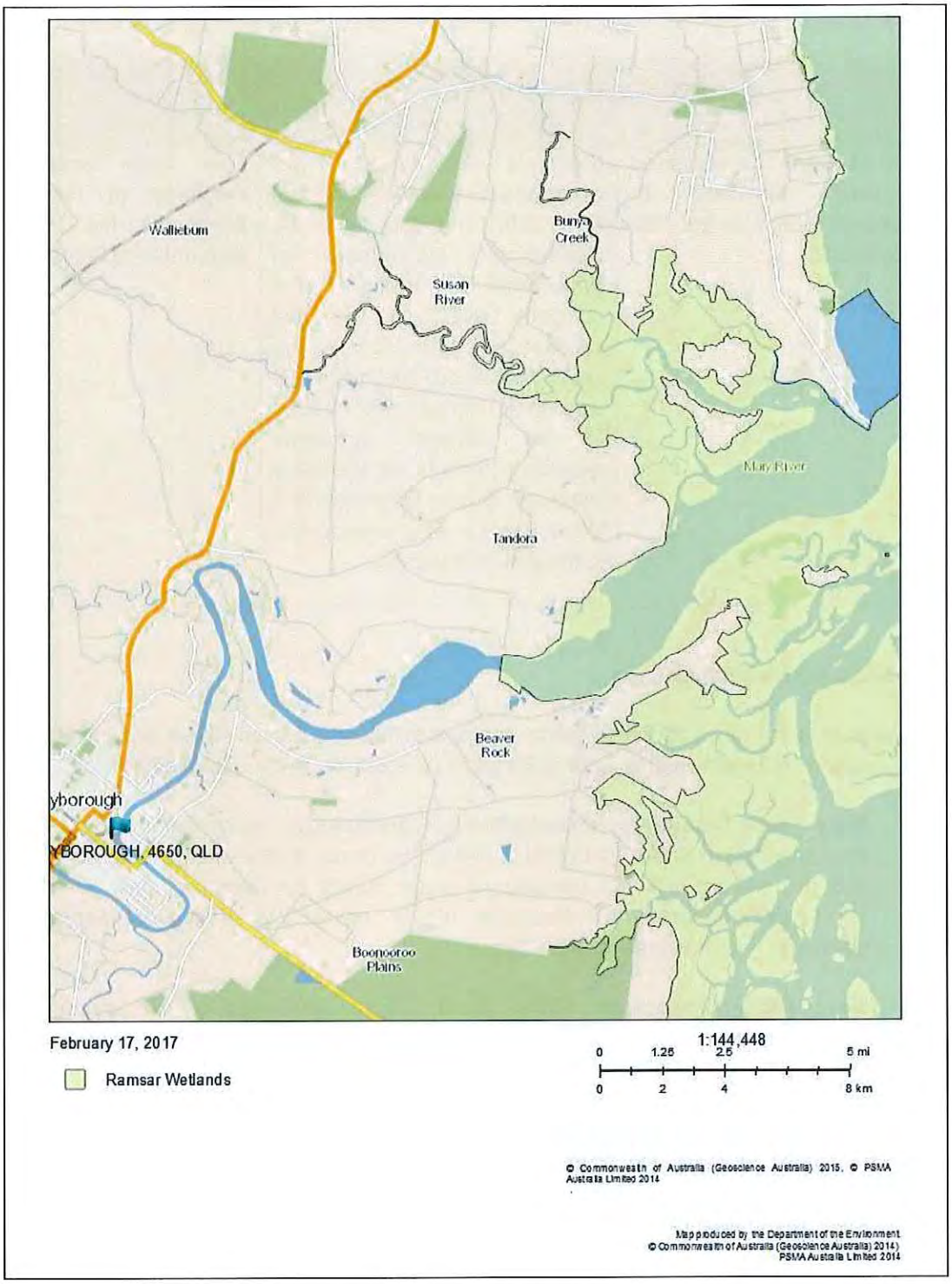

Figure 2 – Protected Matter Search Tool Extent of Ramsar Wetland

Issue 4

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
The EM Plan has been finalised and was submitted to Maryborough DERM on the 13th of August 2010.	EMP has been revised on two occasions (September 2011 and May 2014) in response to the Queensland Department of Environment telling the company (NEC in the first instance and New Hope in the second instance) that the EMP was non-compliant and needed to be revised. Concerns regarding impacts on the Mary River and Susan River (relevant to the Ramsar site) were central to the non-compliance.	This issue speaks to the credibility of the information provided to the Commonwealth as part of the 2010 Referral.

Response: No Material Change

With respect to the new information pertaining to the Mary and Susan Rivers and the Ramsar site, the following expert studies were undertaken for inclusion in the updated EM Plan:

- **Mary River Discharge Investigation (Hydrobiology)**, which combined scientific data provided by CSIRO and EGi to predict the concentrations in the mine discharge, and to compare with the background water quality conditions in Mary River and appropriate Queensland / Australian trigger values and to suggest appropriate discharge trigger values for the Project.

- **Mary River Dispersion Study (DHI)**, which developed a one dimensional hydrodynamic and advection dispersion model for the Mary River, and assessed the potential dilution of released mine water.

- **Site Water Management Assessment (WRM)**, which incorporated the outcomes of the above studies and assessed the potential impacts of the project on receiving surface waters, and proposed appropriate mitigation measures (the proposed site water management system) to manage these impacts.

The specific conclusions of these studies were as follows:

- a major reduction in contaminant concentrations is likely to occur within the mixing zone near the discharge point due to the significant dilution capacity in the river. The results of the analysis indicate that the Mary River, including the HEV area, has significant capacity to assimilate the expected concentrations of various contaminants in the mine water released from the Project.

- the increase in in-stream metal concentrations as a result of the mine water discharge is not significant compared to the background concentrations. Although

concentrations of some metals would potentially exceed HEV guideline values, background levels of these compounds are already well above the HEV guidelines

- The low flow triggers applied to guide the release of water from the mine, and subsequently included in the Project's Environmental Authority, maintain the water quality within acceptable levels.

Updated information in successive versions of the Project's EM Plan reflected these additional assessment and investigation results, as well as changing policy and guidelines. Conclusions of the additional assessment further substantiated the conclusions of previous versions and the EPBC Referral. As a result, further confidence is provided in the conclusion that the Project remains unlikely to significantly impact any Matter of National Environmental Significance.

Issue 5

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
The project and its entire associated infrastructure is not located on adjacent to any World Heritage properties. (p4)	The proposal is adjacent to a proposed World Heritage area. The wastewater from the Mine will flow into the proposed Great Sandy World Heritage area which is on the UNESCO World Heritage tentative list. The boundary for this area is the boundary of the Ramsar site 8km downstream from the discharge point. The nomination was submitted in January 2010 and was therefore active at the time of the Referral.	Progress of the mine may jeopardise the proposed listing due to the impact on the values for which the area would be listed.

Response: No Material Change

The statement made in the Project referral is correct – the Project is not on or adjacent to any existing World Heritage properties, nor is it on or adjacent to the proposed Great Sandy World Heritage Area. The boundary for the proposed area is the boundary of the Ramsar Wetland, which is approximately 12.5 km from the discharge point, not 8 km as stated in MRCCC's submission. This, again, speaks to the plausibility of the MRCCC claims.

The EPBC Act is designed to protect Matters of National Environmental Significance (MNES), which includes World Heritage Properties. The Australian Government proposed an extension to the existing Fraser Island World Heritage Area, named the Great Sandy World Heritage Area, in January 2010. Seven years after being listed, the proposal remains on UNESCO's Tentative List, which is the first stage in a five-stage nomination and review process. Proposed, tentative-listed World Heritage areas are not MNES, and should not be assessed as such.

As the project has remained materially unchanged, the level of the Project's impact on the Ramsar Wetland is also unchanged, regardless of the World Heritage status of the wetland.

Issue 6

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
The Project is anticipated to have no impact on water quality of the Mary River or Great Sandy Strait based on: • the large volume of water passing the discharge point relative to the proposed discharge (<0.01%); (p23)	Actual discharge is up to 5.8% of the daily flow. The maximum 5.8% equates to a 1 in 17.4 dilution. (pg 200, 2014 EMP) Each time the river flow meets the release trigger the proportion discharged will be 5.8%.	This volume of water is 580 times greater than indicated in the Referral. Such a significant increase in the volume of untreated wastewater being discharged represents potential for a much greater impact that would have been considered during the 2010 Referral assessment process.

Response: No Material Change

The information presented above is taken out of context and the comparisons are not representative of normal operating conditions for the proposed Colton Mine.

The 5.8% figure quoted above is from Section 4.8.7 of the 2014 EM Plan, which includes discussion of a potential "worst case scenario" for dissolved metal concentrations from mine dam water discharge to the Mary River – that is, the maximum volume allowable (8.6 ML/d), being released during the lowest flow at which discharge can occur (150 ML/d).

As part of the development and assessment of the Project's Water Management System, WRM (2014) concluded that because the Mary River flows will generally be well above the low flow triggers, the release will usually represent a significantly smaller proportion of flow than the maximum allowable 5.8%. If releases were made whenever they are allowed under the proposed conditions, the median ratio of mine release to freshwater inflow to the estuary would be 0.8%.

In reality, the behaviour of the site water management system and the magnitude and frequency of releases to the Mary River Estuary will be highly dependent on the weather conditions experienced over the project life. In practice, mine releases will not occur at all times that flow conditions allow. Generally, release will not be required during periods of low streamflow. The Site Water Management System is designed to retain mine-affected water on-site, with releases only required during and after significant rainfall events (which would generally coincide with high streamflow).

Discharge criteria, including water quality and flow conditions, are included in conditions F4 to F10 of the Project's Environmental Authority (Attachment B). Discharge from the mine water management system is only permitted during specified river flow conditions, and when the water meets specific quality criteria. These conditions were developed based on the results of surface water impact assessments undertaken on behalf of New Hope Group, and accepted

by the Department of Environment and Heritage Protection following further assessment and advice from the Queensland Department of Science, Information Technology and Innovation. These discharge criteria were also raised in the Queensland Land Court, who found no reason to alter them in the final EA, stating that "*evidence which has been provided to the Court establishes that the quality requirements imposed for the discharge of water into the Mary River are such that the release does not pose a threat of serious or irreversible environmental damage*".

Issue 7

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
The Project is anticipated to have no impact on water quality of the Mary River or Great Sandy Strait based on: • Calculations of predicted water quality data of the project; • The current water quality data of the Mary River. (p23)	To quote from the 2014 EMP: In the case of cadmium, cobalt, manganese, selenium and silver, the proposed mine discharge concentrations exceed the background concentrations in the Mary River. For the remaining compounds, the maximum modelled concentrations are the same as the background concentrations. (EMP 2014 pg 224) The behaviour of the estuary is complex due to the effect of tide and the influence of the channel geometry, which will affect the concentrations of mine water throughout the estuary. The time series of modelled releases was used in the Mary River Dispersion Study (DHI) to undertake statistical analysis of the potential impact of the release throughout the estuary, including the High Environmental Zone. Based on the results of Receiving Water Mixing Study (CSIRO, 2014) and the Mary River Dispersion Study (DHI, 2014), under these conditions, the release would see increases in concentrations of cadmium, cobalt, manganese, selenium and silver above existing background concentrations. Of these, only cadmium, cobalt and	It is clear from this analysis that the mine will increase concentrations of five different heavy metals in the river above background levels and that for three of these they will exceed the HEV guidelines. Therefore the statement made in the Referral that the project will have no impact on water quality is incorrect. The implications of these elevated levels of heavy metals for the estuarine ecosystem has not been considered. Instead the company argues that elevating these levels is not an issue because other parameters are already high. They also rely on precipitation to predict levels without providing details about assumption made and the potential for precipitated metals to be resuspended in the right conditions. The total load of metals is also important for the health the ecosystem, not only the concentration. Metals of course do not break down but change their form and can move between the water and sediment depending on conditions including salinity and pH. Ultimately they may end up in the food web through ingestion at low levels of the food chain.

	manganese concentrations would exceed HEV guideline values. (Appendix L – Colton Site Water Management Assessment (April 2014) pg 4) (Please note: In the 2014 EMP 80th percentile figures for the background concentrations in the River have been reported. This may lead to exaggerated interpretations of ambient conditions. A median (50% percentile) figure should be provided for a more representative comparison.)	Heavy metals released from the mine will accumulate in the Ramsar wetland over the life of the mine. (see Jezierska and Witeska, 20062 for an explanation of heavy metal accumulation in fish and Nieto et al 20073 for an example of the complexity of heavy metal dynamics and bioaccumulation in an estuary). Fraser Island is directly opposite the mouth of the Mary River and it makes the Great Sandy Strait a body of water with a high residence time reliant primarily on tidal action and river flow for water movement. The low movement of water in the Strait and Hervey Bay just to north is demonstrated by the fact that Hervey Bay and the Strait becomes hypersaline at times4. Relying on dilution to solve a pollution problem in this kind of system is inappropriate. Sediment flow patterns indicate that sediment from the Mary ends up on the western edge of Fraser Island – which is World Heritage listed. We suggest that due to the international and national significance of the Great Sandy Strait Ramsar site and the legislative requirement to adhere to HEV guidelines, the aim must be to improve water quality in this ecosystem, not knowingly allow it to further deteriorate.

Response: No Material Change

The comment above regarding omission of 50th percentile background concentrations in the EM Plan is incorrect. The EM Plan includes data on the mean, median and 80th percentile background concentrations in the Mary River. For the parameters where the background concentrations were above the QLD WQG or ANZECC/ARMCANZ trigger value, it was

recommended by Hydrobiology that the 80th percentile background concentration be used as the receiving water quality trigger value.

Updated information in the 2014 EM Plan is based on additional water quality assessments undertaken following the original submission, and further substantiate the conclusions regarding the low likelihood of significant impacts from the Project.

The low flow triggers and release water quality requirements included in the Project's Environmental Authority maintain the water quality within acceptable levels. The release would potentially see increases in concentrations of cadmium, cobalt, manganese, selenium and silver above existing background concentrations. Of these, only cadmium, cobalt and manganese concentrations would potentially exceed HEV guideline values; however, background levels of these compounds are already well above the HEV guidelines.

In their Mary River Dispersion Study, DHI concluded that the increase in in-stream metal concentrations as a result of the mine water discharge is not significant compared to the background concentrations. As such, the conclusion that the Project will have no significant impact on the environmental values of the Mary River, including the Ramsar wetland remains accurate. It also follows that if there is no adverse impact on the Ramsar wetland, there is likely to be no impact on Fraser Island, a further 4-5km offshore from the river mouth.

Issue 8

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
Discharge criteria and comprehensive monitoring program have been proposed to ensure no impact on receiving waters of the Mary River on the listed threatened species which possible inhabit it. (pg 25) In the 2010 EMP the discharge rules were based on three considerations: the flow in the river, the water quality in the river and the level of pollutants in the wastewater. (EHP Assessment Report pg 63)	The discharge criteria have been changed so that only one factor – the flow rate in the river is considered. The EMP 2014 says that the rules are now based on discharge during events. However the median daily flow rate at the discharge point is 685 ML/d. The term event typically refers to higher than median flow. And yet discharge can commence at a river flow rate of 150ML/d. The allowed discharge rate at this level is 100L/s which at 150ML/d is equal to 5.8% of the river flow. Once river flow reaches 300 ML/d the discharge of polluted wastewater can be increased to 200L/s which is 5.8% of the flow.	The modelling of wastewater quality and its behaviour in the estuary once released is a very complicated and uncertain process and many assumptions have been made. Now that there is no operational requirement to consider the actual water quality of the wastewater when determining release rates there is less protection of water quality from controlled releases than there was in the 2010 referral. The monitoring program cannot prevent the impact and may not even detect it until it is well advanced due to the complexity of the estuarine ecosystem. Furthermore there is no monitoring proposed of any threatened species in the estuary which would enable an impact on them to be

		ascertained. All of these factors point to the potential for a significant impact to occur as a result of cumulative effects over time that are not monitored.

Response: No Material Impact

The statement by MRCCC that there is "no operational requirement to consider the actual water quality of the wastewater when determining release rates" is incorrect and deliberately misleading as even a cursory glance at the EA will show.

Condition F4 of the Project's Environmental Authority states that "*The release of mine affected water … must not exceed the release limits stated in* ***Table F2 - Mine affected water release limits when measured at the monitoring points*** *… for each quality characteristic*".

Similarly, Condition F5 requires that "*the release of mine affected water …must be monitored at the locations specified in* ***Table F1 - Mine affected water release points, sources and receiving waters*** *for each quality characteristic and at the frequency specified in* ***Table F2 - Mine affected water release limits*** *and* ***Table F3 - Release contaminant trigger investigation levels, potential contaminants***".

The behaviour of the site water management system and the magnitude and frequency of releases to the Mary River Estuary will be highly dependent on the weather conditions experienced over the project life. In practice, mine releases will generally not be required during periods of low streamflow. The Site Water Management System is designed to retain mine-affected water on-site, with releases only required during and following significant rainfall events (which would generally coincide with higher streamflow).

As previously mentioned, discharge conditions were developed based on the results of surface water impact assessments undertaken on behalf of Colton Coal, and accepted by DEHP following further assessment and advice from the Queensland Department of Science, Information Technology and Innovation. The discharge criteria specify under what flow conditions and at what quality mine water can be released. These discharge criteria were also raised in the Queensland Land Court, which found that "*the quality requirements imposed for the discharge of water into the Mary River are such that the release does not pose a threat of serious or irreversible environmental damage".*

The approved discharge criteria were based on stronger technical inputs following the additional expert studies undertaken through the development of the updated EM Plan and present a higher level of confidence in the conclusions from the original submission that the Project will not have a significant impact on water quality in the Susan or Mary Rivers, including the Ramsar wetland.

Issue 9

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
The Mine Water Dam and Worked Water Dam are assessed to be High Hazard dams	Both dams are considered Significant Hazard which brings with it much less stringent design criteria. The details regarding this change were discussed at length above.	Reducing the stringency of the dam designs increases the likelihood of failure of the dam and of controlled overflow. The fact that the rating for the Mine Water Dam provided in the EMP is lower than recommended by the consultant in the relevant Appendix L is concerning.

Response; No Material Change

The MRCCC comment that "*that the rating for the Mine Water Dam provided in the EMP is lower than recommended by the consultant in the relevant Appendix L*" is incorrect. Both the EM Plan and the Site Water Management Plan (Appendix L) assign a preliminary Significant Consequence to the Mine Water Dam, and both reports acknowledge that, given its proximity to the mine pit, it is possible it will be assigned a High Consequence category for the dam break scenario. The 'stringency of dam design' has not been reduced – dams will be designed according to the risk they pose to the receiving environment.

The Structures Manual specifies the following containment requirements for Significant Consequence Dams (calculated assuming no catchment or storage losses):

- Storm Event Containment (ESS): 1:10 AEP 72hr duration
- Wet Season Containment (DSA): 1:20 AEP

The following table compares the Worked Water system dam design capacity with the ESS under both the "High" and "Significant" Category Dam design criteria. The table shows that the capacity of all dams significantly exceeds the ESS requirements of the "Dams Manual".

Dam	Capacity (ML)	ESS Volume (ML)	
		1 in 10 AEP (Significant Category)	1 in 100 AEP (High Category)
CHPP Dam	203	57	100
MIA Dam	188	54	94
Worked Water Dam	3,995	259	453

The table below compares the Worked Water system dam design capacity with the DSA calculated under both the "High" and "Significant" Category Dam design criteria. The table includes the catchment of the mine pit in the calculation (because water pumped from the pit would constitute a process input to the Worked Water Dam). The table shows that the

capacities of all dams exceed the DSA requirements for the "Significant" consequence category. As the Worked Water dam has minimal external catchment, its volume significantly exceeds its own DSA requirement. The total out-of-pit dam capacity also exceeds the total DSA for the "High" consequence category when shared across all dams (as allowed by the "Dams Manual" for integrated water management systems)

Dam	Capacity (ML)	DSA Volume (ML)	
		1 in 10 AEP (Significant Category)	1 in 100 AEP (High Category)
CHPP Dam	203	199	253
MIA Dam	188	187	238
Mine Pit	Excluded	2004	2556
Worked Water Dam	3,995	901	1144
Total	4386	3291	4191

The design of the Site Water Management System, including regulated structures, is based on industry best practice, with their hazard and consequence categories assessed against the relevant guidelines. Design of the system and structures has not significantly changed the scope of the Project or potential impact of the Project on MNES.

Issue 10

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
A Mine Water Management Dam will be constructed to capture runoff water from the operational areas around the mining pit and groundwater pumped from mine dewatering bores. Approximately 946 ML of excess water is proposed for discharge from the Mine Water Management Dam each year. This water will be comprised of approximately 27% groundwater and 73% surface water runoff. Suspended sediments will be allowed to settle and when the dam reaches a certain level it is proposed that excess water will be pumped to the Mary River for controlled discharge. The dam will not contain potentially contaminated water from the Plant Infrastructure area. Runoff from the plant infrastructure area will be	In the 2014 design, all dams will have water from them transferred into the Mine Water Dam (refer to Water Management Schematic on pg 206 of the 2014 EMP) and therefore any pollutants in these dams can reach the Mary River. Therefore the following statements made in 2010 are no longer the case: . the Mine Water Dam would "not contain potentially contaminated water from the Plant Infrastructure area" . the Worked Water Dam will not discharge into the environment	This means that hydrocarbon pollutants could be present in the Mine Water Dam because in the event of a spill these pollutants would be washed into one of the other dams which feed into the Mine Water Dam as required. These pollutants could therefore occur in wastewater discharged into the Mary River. This has not been considered at all in assessing the impacts of the project. The discussion above about the potential for dam failure and uncontrolled releases to the Susan River is also pertinent.

captured by the Worked Water Dam where it will be used for coal washing. This dam will not discharge to the environment (excluding significant rainfall events greater than the design criteria). (p19)		

Response: No Material Change

Updates to the Site Water Management System since the 2010 referral have resulted in a reduction in the predicted volume of release from 946 ML/a to a median of 445 ML/a. Water balance modelling based on the current design of the SWMS shows that extended periods of no release are interspersed with periods of release.

Transfer from the Worked Water Dam to the Mine Water Dam will only ever occur if the water in the Worked Water Dam meets the discharge quality criteria stipulated in the Project's EA. Water in the Mine Water Dam will only be discharged when it meets the quality criteria in the EA, and flow within the Mary River meets the flow criteria allowing discharge.

The dotted line from the Worked Water Dam in the schematic shown in Figure 3 was designed to illustrate that an optional discharge from the Worked Water Dam to the Mary River via the Mine Water Dam's discharge pipe could be installed, to discharge water in extreme rainfall events, and only when water quality is in compliance with the EA release conditions. There is no intention for this water to be routinely transferred into the Mine Water Dam.

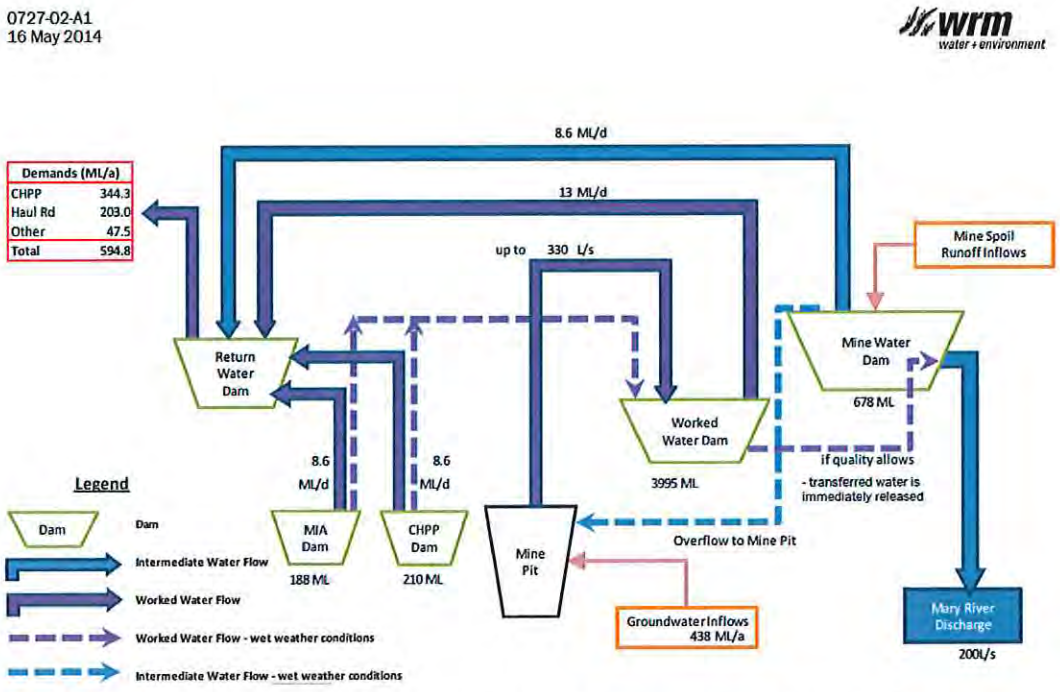

Figure 3 – Water System Schematic from Site Water Management Report

This issue was raised in the Queensland Land Court hearing, where the following details of the Site Water Management System were confirmed:

- No water will be released to the receiving environment unless it meets the release conditions specified in the EA, which have been developed to ensure the risk of impacts to the Mary River estuary is acceptable.

- The Worked Water containment system has been designed and assessed on the basis that no Worked Water is released from the site.

- In the unlikely event of an unplanned overflow from the Worked Water Dam (which has only its own surface area as catchment for rainfall), it would be directed to the mine pit. If the overflow was large, this could potentially result in interruptions to mine operations, but due to the relatively large in-pit storage capacity, would be very unlikely to result in any effect on the receiving environment.

Again, this water management system was included in the EM Plan presented to the Queensland Land Court. The expert's report submitted as evidence to the land Court contained an updated schematic (below), clearly showing that there would be no routine transfer of water from the Worked Water Dam to the Mine Water Dam.

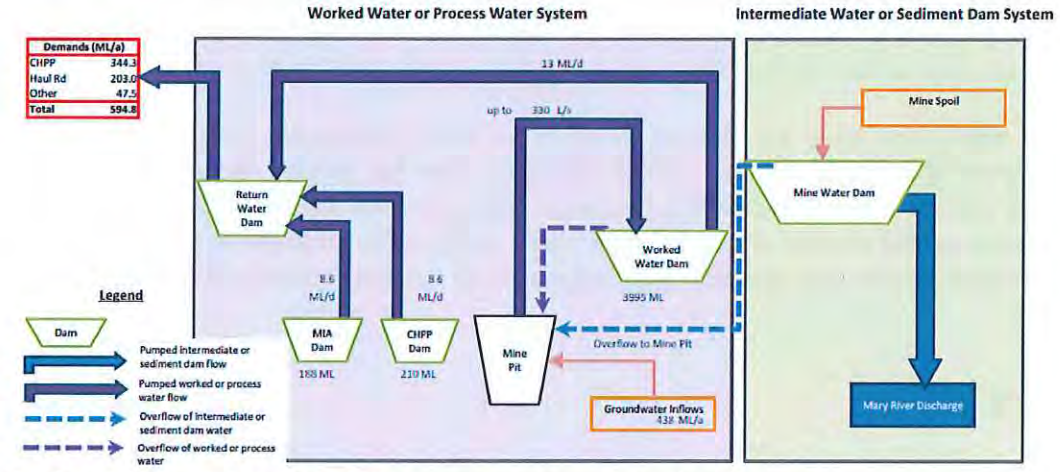

Figure 2.3 - Detailed schematic diagram of Colton Coal Mine water management system as adopted for model assessment

Figure 4 – Water System Schematic Updated for Land Court Evidence

Based on the evidence presented, the Land Court determined that "*the quality requirements imposed for the discharge of water into the Mary River are such that the release does not pose a threat of serious or irreversible environmental damage*". Therefore, the slightly altered surface water management system does not constitute a substantial change in Project description and does not increase the risk of impact to a MNES.

Issue 11

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
A detailed water quality monitoring program has been proposed and will be implemented throughout the life	The Receiving Environment Monitoring plan in the 2014 EMP includes no monitoring of the Susan River or unnamed	Lack of ongoing monitoring of the Susan River and of sediment in the Mary River means that two of the main

of the Project. Contaminant triggers and limits have been proposed to ensure the Project has no impact on receiving waters. Water treatment measures may be implemented prior to discharge if required. (p25 of the Referral) Sites in the Susan River catchment would be monitored and trigger levels developed for them (EPBC Matters Report, Pg 20) The 2010 EMP contained Receiving Stream Sediment Contaminant and Triggers levels (pg 242)	tributaries to which dams on the mine site would overflow. As mentioned in point 8 above, the water quality of the river and of the wastewater are no longer being taken into account when deciding whether to discharge wastewater into the river. In contrast the 2014 EMP requires no monitoring of receiving stream sediment either in the Mary River or Susan River and there are no contaminant and trigger levels for sediment.	mechanisms via which this project could impact on the Great Sandy Ramsar site are not being measured and therefore there is limited scope for detecting an impact. This has major implications for being able to avert a significant impact on the Great Sandy Strait from the project.

Response; Not a material change – Minor change only

The Site Water Management System has been designed to avoid discharge to the Susan River. Such discharge would only occur in the event of extreme rainfall causing overtopping of the containment structures on site, the risk of which is greatly reduced by the ability to transfer water between storages and into the mine pits. As such, routine monitoring of the Susan River is not required.

In the unlikely event of a discharge to the Susan River, monitoring of the receiving environment would be undertaken in accordance with the Project's Environmental Authority, which requires that the company must notify the Department of Environment and Heritage Protection, and provide a report detailing:

a) the reason for the release

b) the location of the release

c) the total volume of the release and which (if any) part of this volume was non-compliant

d) the total duration of the release and which (if any) part of this period was non-compliant

e) all water quality monitoring results (including all laboratory analyses)

f) identification of any environmental harm as a result of the non-compliance

g) all calculations

h) any other matters pertinent to the water release event.

The discharge and monitoring requirements in the EA for the Project, including the determination that sediment sampling is unnecessary, were developed with consideration of the results of additional water quality and impact studies, and following recommendations from the Queensland Department of Science, Information Technology and Innovation. The

issue of testing for sediment loads was also examined at length in the proceedings in the Land Court. The evidence drawn out in the Land Court clearly identified that Turbidity was a suitable and satisfactory default measure for sediment, was a far more practical control tool and is thus included in the EA conditions.

The EA for the Project includes requirements for a Receiving Environment Monitoring Program (**REMP**), which will be sufficient to identify adverse impacts to the Mary River as a result of mine release. The monitoring program extends downstream to the boundary of the Ramsar site to ensure its protection. The highly-regulated release regime, combined with surface water monitoring, is considered sufficient for detection of any impact.

The improved monitoring regime does not constitute a substantial change in Project description and does not increase the risk of adverse impact to a MNES.

Issue 12

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
Based on the above, the project will therefore have no identifiable impact on the flow regime or water quality of the Great Sandy Strait or its associated ecosystems. (p4)	In addition to the comments made about water quality in the Mary River, the EMP 2014 identifies that the mine infrastructure will reduce flowrates in the Susan River by 4%.	Impacts of this reduction of freshwater flow on levels of salinity in the Susan River and associated implications for fish breeding in this important fish habitat and Ramsar site has not been taken into account.

Response: No Material Change

The EM Plan makes no claim about reduced flow rates in the Susan River. The total area of the mining leases is 1027.5 ha (10.275 km^2), representing approximately 3% of the 335 km^2 Susan River catchment area. Further, the infrastructure area which will be captured as part of the Site Water Management System covers an area of approximately 7.9 km^2, representing just over 2% of the Susan River catchment area.

As there are no flow gauges on the Susan River or within its catchment, the surface water regime in the catchment is difficult to characterise. That is, it is unknown how much rainfall becomes runoff in the catchment. However, as the more environmentally sensitive reaches of the Susan River (including the HEV Zone) are tidal, it was concluded that the change to surface runoff inflows to the Susan River estuary would be relatively minor in significance, and that flow patterns would likely remain within normal levels of variation.

The information presented above is consistent with in the original referral and subsequent EM Plans and experts' reports. The project description remains materially unchanged from that presented in the referral, and there has been no increased risk of impact to MNES.

Issue 13

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
A combined total of 45 vertebrate fauna species were identified on the Project Site during the seasonal surveys, comprising one amphibian, five reptiles, 11 mammals, and 28 birds. (p6)	The amphibian recorded in the first survey was the cane toad. Subsequent surveys found 8 native frog species which were missed in the original survey (pg 51 of the EMP 2014). In addition 7 reptiles, 30 birds, 9 mammals including three feral animals.	The failure to detect any species other than the cane toad in the original survey brings into question the quality of the survey conducted. This survey was the basis of documents provided in the Referral. Essential habitat of the Crinia tinnula occurs on the site. This frog is one of four frogs considered in the Wallum Frogs Recovery Plan. The only mitigation action proposed is an education program for staff working at the mine.

Response: No Material Change

In the dry season survey, conducted by qualified and experienced ecologists in August 2008, after just 4.4mm of rain in the preceding two weeks, the only amphibian present on the survey sites was the Cane Toad. Additional surveys, undertaken in more favourable climatic conditions identified the 8 additional native frog species on the site.

MRCCC's comment refers to the Wallum Froglet (*Crinia tinnula*), which was one of the eight amphibian species encountered in wet season surveys. This species is not EPBC listed, so does not form the basis of any assessment under the EPBC Act.

This comment from MRCCC does not identify any change to the project or to the conclusions of the ecology assessment. There is no increased likelihood of significant impacts to MNES.

Issue 14

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
Wallum Sedge Frog (Litoria olongburensis) - unlikely to occur and unlikely to be impacted (pg 10)	As mentioned in point 13, a survey conducted after the Referral found wallum froglet (Crinia tinnula) which shares some habitat with the Wallum	It is unclear on what basis the presence of the Wallum Sedge Frog was ruled out. It is inappropriate to assume

	Sedge Frog. The vegetation type which they share with the Wallum Froglet (RE 12.3.5 - Melaleuca quinquenervia Riparian Woodland) is on the mine site.	they are unlikely to occur and unlikely to be impacted. Instead, new information available suggests they may occur, and if present they will certainly be impacted.

Response: No Material Change

Information provided by MRCCC in this comment is incorrect – RE 12.3.5 is classified as *Melaleuca quinquenervia open forest on coastal alluvium*, primarily associated with palustrine wetlands, not "Melaleuca quinquenervia Riparian Woodland"

In addition to the dry and wet season surveys listed above, an additional survey was undertaken by an amphibian expert, specifically targeted for amphibian searches. Conditions leading up to this survey were conducive for amphibian identification. A total of 50.6 mm of rainfall was recorded in the weeks preceding the survey.

The field investigation involved active species searches, and an assessment of general values for terrestrial fauna was undertaken within each habitat type present throughout the study area. A particular focus was on species of conservation significance as obtained from database searches, and any currently recognised areas of essential or critical habitat, areas considered particularly sensitive (e.g. wetlands) and areas considered important as movement corridors (e.g. riparian vegetation). Specific survey techniques for amphibians included:

- active diurnal searches of ground layer, low vegetation and under bark for amphibians, reptiles, bats, and animal signs (e.g. scats, feeding remnants, remains and tracks);
- call census and active searching via spotlight for amphibians;

The Wallum Sedge Frog was "ruled out" because, even during this targeted survey undertaken by an ecologist with expertise in amphibian ecology, during ideal conditions, and in accordance with the Commonwealth government's survey guidelines for the species, it was not encountered.

The project description remains materially unchanged from that presented in the referral. There has been no substantial change and no increased risk of impact to MNES, including the Wallum Sedge Frog.

Issue 15

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
Impact on Pineapple Zamia listed as unlikely (p7)	Pineapple macrozamia were found within the footprint during	This highlights another EPBC matter which was not considered in the original

	subsequent surveys.	referral.

Response: No Material Change

No occurrence of the Pineapple Zamia was found in the surveys undertaken prior to submission of the EPBC referral in 2010. In September 2011, one individual Pineapple Zamia was discovered on the Project site.

In response, Colton Coal arranged for a targeted survey which was conducted in November 2011. The survey included searches of known (expected) habitat and random meander. The search was by all-terrain buggy, and on foot. Each traverse was conducted at a walking pace, to enable the identification of the target species. No other Pineapple Zamia plants were discovered during this survey.

Colton Coal has continued observations of the project site since then and has not found any more plants. It is considered that the Colton population of Pineapple Zamia consists of the one individual only within the Project Site.

According to the Significant Impact Guidelines 1.1, an action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population
- reduce the area of occupancy of the species
- fragment an existing population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of a population
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
- introduce disease that may cause the species to decline, or
- interfere with the recovery of the species.

Considering the population of the species on the Project is probably limited to one individual, the Project is considered unlikely to have a significant impact on this species of National Environmental Significance.

Issue 16

Referral statement (2010)	New Information available in 2016	Likely impact/consequences
Indo Pacific Humpback dolphin – species or species habitat	Please refer to points 7 and 11 above which show that the project will increase both	As mentioned there is no proposed testing or monitoring of these estuarine species or

may occur. No migratory species associated with the Great Sandy Strait are predicted to be impacted on by the project, although two species (Orcaella brevirostir – Irrawaddy Dolphin and Sousa chinensis – Indo Pacific Humpback Dolphin have been known to migrate to the area potentially affected by the discharge. The potential for the project to impact on the Great Sandy Strait is nil... as a result no impact on the Irrawaddy Dolphin or the Pacific Humpback Dolphin is anticipated (Pg 15 of the Referral)	concentrations of three heavy metals in the estuary and total loads of 14 heavy metals and that there has been no monitoring of sediment to assess impact on benthic organisms that form the basis of the food web on which the dolphin depends. There is also no monitoring of the sediment proposed if the mine commences operation. These dolphins are estuarine dwelling species that are high up the food chain and therefore at risk of bioaccumulation of metals and the impacts of direct toxicity and bioaccumulation on their food source.	benthic organisms and ecosystems. Therefore impacts of the project on this ecosystem could go unnoticed until they reach such a magnitude that the community notices significant changes in the environment. This situation is not consistent with the intent of the EPBC Act.

Response: No Material Change

Indo-Pacific Humpback Dolphins inhabit shallow coastal, estuarine, and occasionally riverine habitats, in tropical and subtropical regions. The species usually occurs close to the coast, generally in depths of less than 20 m, but they have been seen 55 km offshore in shallow water (Corkeron et al. 1997, Jefferson 2000).

Feeding may occur in a variety of habitats, from mangroves to sandy bottom estuaries and embankments to rock and/or coral reefs. Feeding primarily occurs in shallow waters (<20 m depth) and may incorporate beaching behaviour on sandbanks. This species may inhabit areas downstream from the discharge site and was therefore classed as 'possible' in the Project's assessment of MNES impacts.

The determination that the project would have no impact on the Irrawaddy Dolphin and Indo Pacific Humpback dolphin was based on assessment of:

1. The predicted water quality of the discharge;
2. The large volume of receiving water relative to the volume of the discharge;
3. The distance of the Project to the Great Sandy Strait (8 – 12.5 km); and
4. The current water quality of the receiving waters.

The low flow triggers applied to guide the release of water from the mine, and included in the Project's Environmental Authority, were determined by EHP, with advice from the Queensland Department of Science, Information Technology and Innovation, to maintain the water quality within acceptable levels. Although the release could see increases in concentrations of some metals above existing background concentrations, only cadmium, cobalt and manganese concentrations would potentially exceed HEV guideline values. However, background levels of these compounds are already well above the HEV guidelines.

DHI concluded that the increase in in-stream metal concentrations as a result of the mine water discharge is not significant compared to the background concentrations. As such, the conclusion that the Project will have no significant impact on MNES, including on the Indo-Pacific Humpback Dolphin remains accurate and consistent with the referral.

Attachment A: Land Court Determination

LAND COURT OF QUEENSLAND

CITATION:	*Colton Coal Pty Ltd v Aldershot and District Against Mining Inc. & Ors* [2016] QLC 73
PARTIES:	**Colton Coal Pty Ltd** (applicant) v **Aldershot and District Against Mining Inc.** (objector) and **Max Adlam, Jim Blackmore, Jane Jones, William McKillop, Colin Reynolds, Suzanne Reynolds, Christine Rodhouse, Philip Martin Rodhouse, John Sharp, Marilynn Sharp, Michael Ward, Peter Ward and Shirley Ward** (objectors) and **Chief Executive, Department of Environment and Heritage Protection** (statutory party)
FILE NO/s:	MRA499-14 & EPA500-14 (MLA50273) (Colton A) MRA501-14 & EPA502-14 (MLA50274) (Colton B) MRA503-14 & EPA504-14 (MLA50280) (Colton C)
DIVISION:	General Division
PROCEEDING:	Hearing of application for grant of mining leases under s 268 of the *Mineral Resources Act 1989* and objections decision hearing under s 220 of the *Environmental Protection Act 1994*
DELIVERED ON:	17 November 2016
DELIVERED AT:	Brisbane
HEARD ON:	15, 16, 17, 18 August & 13 September 2016
HEARD AT:	Brisbane
MEMBER:	WA Isdale

ORDER/S:

1. **In accordance with s 269 of the *Mineral Resources Act 1989*, the Court recommends to the Honourable the Minister administering the *Mineral Resources Act 1989* that the applications be granted in whole.**
2. **In accordance with s 222(1)(b) of the *Environmental Protection Act 1994*, the Court recommends to the Honourable the Minister administering the *Environmental Protection Act 1994* that the application be granted, but on stated conditions that are different to the conditions in the draft environmental authority issued on 1 September 2014 to the extent that Table D1 – Noise limits referred to in Condition D1 be replaced with the following revised table:**

Table D1 – Noise limits

Noise level dB(A) measured as:	Monday to Saturday			Sunday and Public Holidays		
	7am – 6pm	6pm – 10pm	10pm – 7am	9am – 6pm	6pm – 10pm	10pm – 9am
Noise Measured at Location M1 (latitude -25° 25' 4.55 ", longitude 140° 38 ' 8.27 ")						
$L_{Aeq\ adj.\ 15\ mins}$	58	51	46	58	51	46
$L_{A1\ adj.\ 15\ mins}$	63	56	51	63	56	51
Noise Measured at Location M2 (latitude -25° 27' 6.72", longitude 140° 39 ' 59.66 ")						
$L_{Aeq\ adj.\ 15\ mins}$	47	45	40	47	45	40
$L_{A1\ adj.\ 15\ mins}$	52	50	45	52	50	45
Noise Measured at Location M3 (latitude -25° 26' 23.02", longitude 140° 42 ' 44.30 ")						
$L_{Aeq\ adj.\ 15\ mins}$	41	39	39	41	39	39
$L_{A1\ adj.\ 15\ mins}$	46	44	44	46	44	44

CATCHWORDS: ENERGY AND RESOURCES – MINERALS – MINING FOR MINERALS – ENVIRONMENTAL PROTECTION LEGISLATION – where there is an objection to the grant of the mining tenures being applied for – where there are objections to the draft environmental authority – where the Court hears the objections – where the Court makes recommendations to the Ministers concerning the mining tenures and the draft environmental authority

Mineral Resources Act 1989, s 265, s 268, s 269
Environmental Protection Act 1994, s 220, s 222, s 223

Adani Mining Pty Ltd v Land Services of Coast and Country Inc. & Ors [2015] QLC 48

De Lacey & Anor v Kagara Pty Ltd (2009) 30 QLCR 57
Endocoal Limited v Glencore Coal Queensland Pty Ltd and Department of Environment and Heritage Protection [2014] QLC 54
Xstrata Coal Queensland Pty Ltd & Ors v Friends of the Earth - Brisbane Co-Op Ltd & Ors (2012) 33 QLCR 79

APPEARANCES: D O'Brien QC instructed by HopgoodGanim for the applicant
G Houen for the respondents
S Barclay and KM Clayton for the statutory party

Background

[1] The applicant wishes to mine coking coal at a 1,025.1264 ha site about 10 km to the north of Maryborough. Approximately 5 million tons of coal are in prospect of being extracted by open-cut mining of about 350 ha. The coal is planned to be prepared on site and then transported by railway to Gladstone for export. About 770 ha will be disturbed by the project. It is proposed that there would be one train per day carrying around 2,200 tons of payload.

[2] Aldershot is a township of about 1,050 residents and, Mr Houen submitted, around 500 homes. In her objection, exhibit 11, Jane Jones states that there are 1,042 people and 285 homes. In exhibit 51, Brian Linforth says there are about 1,150 people in about 245 residences. The township is about 10 km north of Maryborough off the Bruce Highway and around 2 km from the boundary of the proposed mine. The spoil dump will be the part of the mine nearest the residents. Some of the residents have formed the respondent incorporated body, Aldershot and District Against Mining Inc., (AADAM) which, as a corporation, is a legal person and an objector.

[3] One matter which was referred to in the hearing was that there is no reticulated water provided in the community and the residents rely on rainwater stored in tanks. The case presented to the Court on behalf of AADAM did not specify how many rainwater storage tanks may potentially be affected by the dust from the proposed mine.

[4] Only AADAM objects to the mining lease applications, MLA 50273 (860.7 ha), MLA 50274 (162.9 ha) and MLA 50280 (1.5264 ha), known as Colton A, B and C respectively. It also objects to the draft Environmental Authority (EA). The applicant and the statutory party are in favour of the applications and EA.

[5] In the case of the draft EA for the proposed project, the other objectors are a number of individuals who have chosen to rely on their written objections made in the process. They have chosen not to give or call evidence at the hearing but to rely on the concerns which they have already expressed. These persons are Max Adlam (exhibit 16), Jim Blackmore (exhibit 12), Jane Jones (exhibit 11), William McKillop (exhibit 16), Colin Reynolds and Suzanne Reynolds (exhibit 10), Philip Martin Rodhouse and Christine Rodhouse (exhibit 15), John Sharp and Marilynn Sharp (exhibit 13), Michael Ward, Shirley Ward and Peter Ward (exhibit 14).

[6] The chief executive of the environmental regulator, the Department of Environment and Heritage Protection, which is the statutory party, was represented by counsel at the hearing. The applicant was represented by Queen's Counsel and AADAM was represented by Mr G Houen, agent.

This Court's role in the process

[7] The Land Court performs an administrative function in the present proceedings. It does not decide a dispute but instead is permitted by law to make recommendations. The decision-making power rests with the relevant Minister.

Mineral Resources Act 1989

[8] In the case of applications for mining tenures, the *Mineral Resources Act 1989* (MRA) provides, in section 265, that objections are to be referred to the Court. That process was followed and under s 268(1) of the MRA the Court is required to hear the applications and objections. Under s 269 the Court is required to forward the objections, the evidence adduced at the hearing, any exhibits and the Court's recommendation to the Minister. The section sets out what the recommendation must consist of and what the Court must consider. It is useful to set out s 269 in full since it is central to what the Court is required to do.

> **269 Land Court's recommendation on hearing**
>
> (1) Upon the hearing by the Land Court under this part of all matters in respect of an application for the grant of a mining lease, the Land Court shall forward to the Minister—
>
> (a) any objections lodged in relation thereto; and
>
> (b) the evidence adduced at the hearing; and
>
> (c) any exhibits; and
>
> (d) the Land Court's recommendation.
>
> *Note—*
>
> For other relevant provisions about forwarding documents, see section 386O.

(2) For subsection (1)(d), the Land Court's recommendation must consist of—

(a) a recommendation to the Minister that the application be granted or rejected in whole or in part; and

(b) if the application relates to land that is the surface of a reserve and the owner of the reserve has not consented to the grant of a mining lease over the surface area, the following—

(i) a recommendation to the Minister as to whether the Governor in Council should consent to the grant over the surface area;

(ii) any conditions to which the mining lease should be subject.

(3) A recommendation may include a recommendation that the mining lease be granted subject to such conditions as the Land Court considers appropriate, including a condition that mining shall not be carried on above a specified depth below specified surface area of the land.

(4) The Land Court, when making a recommendation to the Minister that an application for a mining lease be granted in whole or in part, shall take into account and consider whether—

(a) the provisions of this Act have been complied with; and

(b) the area of land applied for is mineralised or the other purposes for which the lease is sought are appropriate; and

(c) if the land applied for is mineralised, there will be an acceptable level of development and utilisation of the mineral resources within the area applied for; and

(d) the land and the surface area of the land in respect of which the mining lease is sought is of an appropriate size and shape in relation to—

(i) the matters mentioned in paragraphs (b) and (c); and

(ii) the type and location of the activities proposed to be carried out under the lease and their likely impact on the surface of the land; and

(e) the term sought is appropriate; and

(f) the applicant has the necessary financial and technical capabilities to carry on mining operations under the proposed mining lease; and

(g) the past performance of the applicant has been satisfactory; and

(h) any disadvantage may result to the rights of—

(i) holders of existing exploration permits or mineral development licences; or

(ii) existing applicants for exploration permits or mineral development licences; and

(i) the operations to be carried on under the authority of the proposed mining lease will conform with sound land use management; and

(j) there will be any adverse environmental impact caused by those operations and, if so, the extent thereof; and

(k) the public right and interest will be prejudiced; and

(l) any good reason has been shown for a refusal to grant the mining lease; and

(m) taking into consideration the current and prospective uses of that land, the proposed mining operation is an appropriate land use.

(5) Where the Land Court recommends to the Minister that an application for the grant of a mining lease be rejected in whole or in part the Land Court shall furnish the Minister with the Land Court's reasons for that recommendation.

(6) If—

(a) the application is for the grant of a coal mining lease; and

(b) under section 318BA, a preference decision is required;

the Land Court can not recommend that the lease not be granted so as to give preference to petroleum development.

An inspection or view

[9] Section 268(4) of the MRA provides that the Court "may direct an inspection or view of the land the subject of the application". There was imaging and mapping of this area provided in the evidence. There was also imaging and mapping of areas beyond the land the subject of the applications for mining tenures. On behalf of AADAM it was submitted that with the aid of a boat and helicopter or by road the Court should carry out an inspection. It was suggested that the applicant ought to bear the costs associated with this. The applicant was not prepared to do this and there was no support for the idea of an inspection or view from the applicant or the statutory party. The Court was not prepared to order an inspection in the existing circumstances. It urged the parties to make good use of maps and photographs, including overhead imagery, and indicated that the application for a site visit could be renewed as evidence progressed if an improved case for such an order could be shown. The Court indicated that it wanted agreement from the parties about what ought to be inspected in order to avoid an unstructured activity which could involve considerable waste of time and money. No agreement was ever reached.

[10] The Court put time aside for hearing evidence at Maryborough and potentially conducting a view in conjunction with that. As the case proceeded, no party had any witness whose evidence needed to be heard at Maryborough and the submission on the part of AADAM, although repeated, did not improve. In the circumstances of the case, the Court did not direct an inspection or view as it was not satisfied that this was necessary to carry out its tasks.

Environmental Protection Act 1994

[11] Under the *Environmental Protection Act 1994* (the EP Act), the administering authority acted in accordance with the EP Act and referred the objections to the Court. The hearing under the MRA and the EP Act were conducted at the same time.

[12] The EP Act sets out the nature of the objection decisions and what the Court must consider. These sections are in the following terms:

> **222 Nature of objections decision**
>
> (1) The objections decision for the application must be a recommendation to the EPA Minister that—
>
> (a) the application be granted on the basis of the draft environmental authority for the application; or
>
> (b) the application be granted, but on stated conditions that are different to the conditions in the draft; or
>
> (c) the application be refused.
>
> (2) However, if a relevant mining lease is, or is included in, a significant project and, under section 210, Coordinator-General's conditions were included in the draft, any stated conditions under subsection (1)(b)—
>
> (a) must include the Coordinator-General's conditions; and
>
> (b) must not be inconsistent with a Coordinator-General's condition.
>
> (3) The Land Court must, as soon as practicable after the decision is made, give a copy of the decision to each of the following—
>
> (a) the MRA Minister;
>
> (b) if a relevant mining lease is, or is included in, a significant project—the State Development Minister.
>
> **223 Matters to be considered for objections decision**
>
> In making the objections decision for the application, the Land Court must consider the following—
>
> (a) the application documents for the application;
>
> (b) any relevant regulatory requirement;
>
> (c) the standard criteria;
>
> (d) to the extent the application relates to mining activities in a wild river area—the wild river declaration for the area;
>
> (e) each current objection;
>
> (f) any suitability report obtained for the application;
>
> (g) the status of any application under the Mineral Resources Act for each relevant mining tenement.

Level 1 Objectors

[13] The objectors who are natural persons chose to rely on their written objection only and to not participate in the Court process. These are Level 1 Objectors as referred to in Land Court Practice Direction 3 of 2015.

[14] All of the material provided by these objectors was considered by the Court. Their concerns covered noise, dust on solar panels and dust getting into tank water and its potential for respiratory and toxic effects.

[15] Although these objectors did not give or call evidence, the evidence which was provided to the Court was considered in the light of their concerns.

The hearing – witnesses, exhibits and an e-trial

[16] The hearing of evidence took place in Brisbane and this occupied four days of Court time. Written submissions and oral submissions came later. The applicant called five witnesses. These were:

1. Mr Shane Elkin, regarding noise impacts.
2. Mr Simon Welchman, concerning air quality.
3. Mr Michael Batchelor, a mining engineer.
4. Mr Stephen Charles Eames, Director, Colton Coal.
5. Dr John Thorogood, regarding water ecology.

[17] AADAM called one witness, Mr Max Winders, an engineer.

[18] Further, on behalf of AADAM, Mr Brian Linforth provided an affidavit, exhibit 118, confirming his witness statement. Ms Aileen Harrison confirmed her witness statement by affidavit which became exhibit 117. There was no challenge to their statements, which were exhibits 51 and 52 respectively.

[19] The statutory party called Mr Timothy Mervyn Brain, a compliance delivery manager of the statutory party.

[20] There were 126 exhibits, some consisting of many pages. The material was provided in electronic form so that it could be easily and quickly accessed in Court. This shortened the time needed to conduct the hearing as documents could be quickly displayed to the parties and the Court.

[21] In exhibit 51, Mr Linforth states, as has been noted, that Aldershot is home to about 1,150 people in about 245 residences. He refers to matters regarding dust, noise, rainwater tanks and the Mary River. The contents of his statement were not disputed before the Court. In it he explains that AADAM is not against all mining but is against mining that would have significant negative impacts.

[22] In exhibit 52, Aileen Harrison explains the effects of the New Acland coal mine on her and her family and their business and health. None of this was disputed. It is noted that Mr Linforth states in exhibit 51 that no agricultural land would be directly affected by the proposed project.

[23] The hearing focused on the areas where the parties were in dispute. A consideration of the evidence in the light of the matters which the Court must address enables all of the objections to be considered together in their context.

The applicant's case

[24] The applicant pointed out that historically there have been small mines in the Burrum coal fields in this area. What is proposed is a relatively small open cut mine, as compared to the size of other open-cut coal mines. Probably about 5 million tons of coking coal will be mined. The closest residence is about 2 km from the boundary of the proposed lease. The pit will start about 4 km from the closest house and, after about 10 years, be 3 km away. The spoil dumping area will be the closest source of dust.

[25] It was submitted that any water discharged into the Mary River would be "chemically benign" and could only be discharged, because of conditions in the draft EA, when there is significant flow in the river and when the water to be discharged meets the standard set for it. It was stressed that the water used for washing the coal is not to be discharged. What may be discharged is the rainwater that falls onto the site and which is stored in a dam. It is recognised that the ground will be disturbed by the mining activities so there will be sediment which the dam will catch. The three tenures sought are all part of the one project and may usefully be considered together. There is only one objection, from AADAM, to the applications for the mining tenures.

The witnesses called on behalf of the applicant

[26] Mr Shane Robert Elkin was called on behalf of the applicant. He produced a report, exhibit 35, a response report, exhibit 39, and a joint expert report, exhibit 110. Mr Elkin is a mechanical engineer and a registered professional engineer in Queensland. He has considered the potential airborne noise impacts of the proposed mine. His opinion is that, with the use of appropriate site-based management measures, acceptable noise levels can be achieved at neighbouring noise-sensitive locations. He is an acoustic consultant with relevant experience and believes that the acoustic quality objectives are appropriate.

[27] There is only one matter of disagreement between Mr Elkin and Mr Paul King, a mechanical engineer who is the respondent's expert. Mr King is of the opinion that real-time noise monitoring should be installed prior to commencement of mining operations and continued throughout the mining. Mr Elkin disagrees and is of the view that non-real-time noise monitoring should be used. If non-compliance with noise limits becomes an issue, real-time monitoring should be used to manage the adverse impacts of noise.[1]

[28] The predominant wind direction is from the south-south-west, which is away from the sensitive receptors, the people of Aldershot. Mr Elkin made clear in cross-examination that real-time monitoring available on the internet would be likely to trigger a lot of false positives and that the information needs to be analysed and interpreted by a professional before being published.[2]

[29] Mr Simon John Welchman was called on behalf of the applicant. His report became exhibit 33. His response report is exhibit 36 and his joint report with Mr Paul King dated 15 October 2015 is exhibit 108. These experts have no areas of disagreement.[3] The joint report is succinct and it is worth setting out its substance. The report is in the following form:

> "**INTRODUCTION**
>
> 1. In accordance with the Order of the Court, Mr King and Mr Welchman met on 1 October 2015 to discuss whether the air quality issues associated with the Colton Coal Project can be resolved, in whole or in part.

---

1 Ex 110, pages 7 and 8.
2 T 2-25, lines 10-31.
3 Ex 108, pages 5, para 17.

2. On 28 January 2010, Colton Coal applied for the grant of ML 50273 and 50274 principally for the purpose of open cut coal extraction. On 2 November 2010, Colton Coal applied for ML 50280 for the principal purpose of providing tenure for part of the rail infrastructure that is required to service the mine.

3. The Colton Project is located in the Fraser Coast Regional Council area in southern Queensland approximately 10 km north of Maryborough and 300 km north of Brisbane. The project will consist of the development of a 5 million tonne inferred coking coal resource of the Burrum coal measures. The project is planned to mine up to 1.2 million tonnes per annum (Mtpa) of run of mine coal by open cut methods to produce on average 0.5 Mtpa of product metallurgical coal for export. The project production life is estimated to be 8 to 10 years.

4. The Colton Coal Project is proposed to be an open cut coal mine using excavators, bulldozers, trucks and other equipment for overburden and interburden removal. Coal will be mined using small excavator type machinery, trucks and other equipment.

5. The Department of Environment and Heritage Protection (EHP) issued a draft Environmental Authority (EA) including conditions dated 1 September 2014. The draft EA was the subject of public notification and a number of submissions were made in respect of it.

6. Objections have been lodged by the following parties:

   - Aldershot and District Against Mining Inc.;
   - John and Marilyn (sic) Sharpe;
   - Phillip (sic) Martin Rodhouse and Christine Rodhouse;
   - Colin Reynolds and Suzanne Reynolds;
   - William McKillop and Max Adlam;
   - Michael Ward, Shirley Ward and Peter Ward;
   - Jim Blackmore; and
   - Jane Jones.

DOCUMENTS RELIED UPON

7. In preparing this Joint Expert Report we have primarily relied upon the following documents:

   - Colton Coal Mine Project Environmental Management Plan, prepared for Colton Coal Pty Ltd by AARC, May 2014 (EM

Plan)

- Mining Lease Application numbers 50273, 50274, 50280
- Two detailed air quality assessments were prepared for the Colton Coal Project, namely:
    - Colton Mine Project, Air Quality Impact & Greenhouse Gas Assessment, prepared for AARC, ASK Consulting Engineers Pty Ltd, 16 August 2011 (ASK AQ Report, Annexure J of the EM Plan)
    - Colton Coal Mine, Supplementary Air Quality Assessment, prepared for AARC, ASK Consulting Engineers Pty Ltd, 1 April 2015 (ASK Supplementary AQ Report). The ASK Supplementary AQ Report is attached as Annexure 'B' to this Statement of Evidence
- Statements of Evidence prepared by Simon Welchman and dated 1 May 2015 and 3 September 2015
- Statement of Evidence prepared by Mr Paul King and dated 13 July 2015
- The reasons for objection of the submitters
- The draft Environmental Authority issued by EHP dated 1 September 2014.

OBJECTIONS

8. Mr King and Mr Welchman agree that the reasons for objection of the submitters can be summarised as follows:
    - Adverse impact on tank water
    - Air quality assessment is inadequate
    - Heavy metals associated with coal
    - Draft EA fails to properly address proximity to Aldershot.

AREAS OF AGREEMENT

9. Mr King and Mr Welchman agree that the air quality assessment studies conducted by ASK Consulting Engineers Pty Ltd and supplemented by peer review and dispersion modelling conducted by Katestone Environmental Pty Ltd (Katestone) show compliance with the relevant air quality objectives.

10. Mr King and Mr Welchman agree that the air quality assessment study conducted by Katestone was conducted appropriately and in accordance with regulatory requirements. Mr King and Mr Welchman agree that the assessment has been correctly made against the appropriate air quality objectives, which are detailed in Mr Welchman's First Statement of Evidence at Table 2.

11. Mr King and Mr Welchman agree that the air quality assessments (ASK, Katestone and MWA Review) demonstrate that it is possible to undertake the Colton Coal Project and, at the same time, manage dust emissions to achieve compliance with regulatory air quality requirements, and on this basis not result in adverse impacts on the sensitive receptors in the surrounding area including those sensitive receptors at Aldershot.

12. Mr King and Mr Welchman agree that the grounds of objection are not supported by the air quality assessment studies that they have conducted. In particular, Mr King and Mr Welchman agree on the basis of the air quality studies conducted, that:

    - The air quality assessments of the Colton Coal Project have assessed appropriate air quality indicators and provide a reliable basis for determining appropriate conditions of approval

    - The dust associated with the Colton Coal Project is not likely to adversely affect tank water at existing sensitive receptors

    - The metals associated with the Colton Coal Project are not likely to adversely affect air quality at existing sensitive receptors

    - The dust associated with the Colton Coal Project is not likely to adversely affect the operation of solar panels at existing sensitive receptors in Aldershot

    - The dust associated with the Colton Coal Project is not likely to adversely affect the operation and maintenance of swimming pools at existing sensitive receptors

    - The gaseous emissions associated combustion engine related emissions from the Colton Coal Project are not likely to adversely affect air quality at existing sensitive receptors

    - The gaseous emissions associated with blasting have not been assessed in detail through the various studies, albeit the ASK reporting identified appropriate strategies to manage such emissions to acceptable levels

    - The Draft EA conditions relating to air quality are appropriate given the scale of the project and the proximity of nearest sensitive receptors.

13 Mr King and Mr Welchman agree that the indicative air quality controls identified in the EM Plan and in the reporting of ASK and Katestone provide a reasonable basis to achieve the air quality objectives. The preparation of a formal Air Quality Management Plan will inform operators of their day to day responsibilities and actions in managing air quality impacts.

14. Mr King and Mr Welchman agree that additional reduction in dust levels could be achieved, if it was required e.g. due to particularly adverse conditions (such as unusual weather), by modifying key dust producing activities. Mr Welchman's Second Statement of Evidence investigated reducing the intensity of overburden haulage during the night and offsetting such a reduction with increased daytime haulage. Mr Welchman found that the peak 24-hour average concentration of PM_{10} was significantly reduced by this operational amendment. Whilst such a variation in activities was not found to be necessary at all times for the project to appropriately and adequately manage its dust emissions and to achieve compliance with the air quality objectives, the investigation shows that there is additional scope to reduce dust emissions in adverse circumstances.

15. Mr King and Mr Welchman agree that the compliance monitoring regime required in the Draft EA conditions is adequate to inform the operators of ongoing air quality impacts such that the mine operators manage activities to not cause elevated levels of PM_{10} and $PM_{2.5}$. Mr King and Mr Welchman agree that the PM_{10} and $PM_{2.5}$ objectives have been formulated such that if a mining activity achieves compliance with the objective for PM_{10}, compliance with the $PM_{2.5}$ objective will also be achieved.

16. Mr King and Mr Welchman agree that Colton Coal should develop an Air Quality Management Plan for its operations. An Air Quality Management Plan is a necessary tool for mine operators to manage day to day operations to mitigate the potential for air quality impacts. The Air Quality Management Plan would be subject to regular review and amendment as the mine operations progress. The Air Quality Management Plan should include ongoing dust monitoring, a complaints receipt and response handling procedure, and a suite of potential air quality emission mitigation measures to inform and assist mine operator as to the actual measures that may be implemented.

AREAS OF DISAGREEMENT

17. There are no areas of disagreement.

DECLARATION

18. The Experts acknowledge that they have read and understood relevant extracts of the Land Court Rules 2010 (Qld) and the Uniform Civil Procedure Rules 1999 (Qld). The Experts acknowledge that they have an overriding duty to assist the Court and have discharged that duty. The Experts have not received any instructions to accept, adopt or reject any particular opinion in preparing this joint report.

19. The Experts confirm that:

(a) The factual matters stated in this report are, as far as we are aware, true

(b) We have made all the enquiries that we consider appropriate

(c) The opinions in this report are genuinely held by the Experts

(d) The report contains references to all matters that we consider are significant."

[30] Mr Welchman made clear in cross-examination that he and Mr King concluded that the proposed "activity can be controlled to avoid adverse impacts"[4] and that the "draft EA conditions were adequate to manage the activity."[5]

[31] When questioned about whether the rainwater-based water supply of the Aldershot residents was in danger of contamination from heavy metals in dust he stated that "the levels are not likely to go anywhere near drinking water guidelines."[6] In Mr Welchman's expert opinion "the data says it won't occur and I can't see how it would occur."[7] This expert evidence is not contradicted by Mr King.

[32] In cross-examination by Mr Houen, in relation to this important matter of drinking water safety, the following exchange occurred:[8]

> "Would it be – am I right in thinking that a lot of it would depend on the nature of the overburden at the particular site?---I – based on my calculations for Colton Coal and in that – in the instance of Colton Coal, I don't believe that the – the – there is a likelihood that overburden dust landing on peoples' roofs and – and being transported into tanks would cause water contamination. I – I don't believe that's the case.
>
> Can you understand that if you're – that, from the people who live in Aldershot – that that isn't going to satisfy them because they're well aware that there will be dust from the mine on their roofs and getting washed into the tanks? That - - -?---I – I can understand a concern exists. Based on my calculations and the work that was done, those concerns aren't founded on any – on – on – on the data. They're not supported by the data.
>
> And as to the extent that you're involved as a consultant and an expert and perhaps advisor to Colton Coal, you wouldn't support a – a – baseline testing of the rainwater tanks, followed by some monitoring to establish that your conclusion is right?---No, I wouldn't support that. No.

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4 T 2-40, line 23.
5 T 2-40, line 24.
6 T 2-42, lines 8-9.
7 T 2-42, lines 15-16.
8 T 2-44, lines 1-35.

No. Notwithstanding that it's a matter of great concern to them as residents?---I understand it's a matter of concern. I don't believe the concern is – is warranted, given my assessment.

Can you appreciate that, taking that on its merits – your assurance – that doesn't satisfy them?---Well, I – I don't know their opinion. I – I take it from you, that doesn't satisfy them?

Absolutely?---Right. Okay. I understand that.

Do you see any – any merit in a precautionary principle being adopted in that if Colton is the one that's definitely going to have an effect on their rainwater tanks, that they be given the benefit of baseline testing and some monitoring to establish that in fact your opinion is correct?---I – I've – I think I've covered this already. I – my attitude is that the results of my assessment show that those concerns aren't warranted. So I – that's – that's my attitude."

[33] Mr Michael James Batchelor was called on behalf of the applicant. Mr Batchelor is an engineer with particular expertise in minesite water management. His report is exhibit 40 and his joint report with Mr Winders is exhibit 111. Exhibit 40 is a report in response to Mr Winders' report. The parts of the joint report, exhibit 111, which set out the areas in which these two experts agree and disagree is most instructive and worth setting out. The experts report in the following terms:

"**Introduction**:

i. This appeal relates to the conditions set by the State in its draft Environmental Authority (EPML00367613) for the Colton Coal Project at Maryborough.

ii. Matters of relevance to this JER relate to mine water management, which includes provision for the discharge of water into the Mary River via a submerged outfall.

iii. Both experts have prepared individual reports for the court outlining their opinions on relevant issues as well as areas of disagreement between the two experts.

iv. Recognising the complexity of some issues, the intent of this JER is to establish a basis of 'common ground' upon which the parties can subsequently jointly consider and resolve more specific issues that may be in dispute.

Areas of agreement:

Management of water from different mine site sources

1 It is good practice for a mine water management system (WMS) to separate water from different sources according to their expected chemical and physicochemical properties. For example, water which has had low level contact with

mining operations (leading to minor changes to chemical and physicochemical properties) should be separated from water which has had notable changes in water quality.

Effect of source of release water on the results of site water balance modelling

2. The Site Water Management Assessment report (WRM, April 2014) includes the results of water balance modelling to simulate the behaviour of the WMS. The modelling was used to assess:

   - The likelihood of uncontrolled releases from the Worked Water System (WWS);
   - The frequency and duration of releases from the Intermediate Water System (IWS) to the Mary River.

3. The water balance modelling was based on the assumption that only IWS surface runoff captured in the Mine Water Dam would be released, but water captured in the WWS would not.

4. The release of water to the receiving environment will not be authorised from either water management sub-system unless the release conditions specified in the draft Environmental Authority (EA) are satisfied.

5. If water stored in the WWS meets the release conditions in the EA, Colton Coal may opt to release it to the Mary River via the pipeline at the Mine Water Dam.

6. If the Site Water Management Assessment assumed Colton Coal did regularly release water to the Mary River from the WWS as well as from the IWS, the likely effect on the water balance modelling would be to:

   - Increase the estimated frequency and duration of releases to the Mary River.
   - Reduce the estimated volumes of water accumulating in the WWS.

Storage containment capacity of WWS

7. Colton Coal proposes that water captured in the WWS would be stored in the various WWS dams for later reuse in meeting site water demands.

8. Mine water containment systems are generally designed and operated to achieve two outcomes following prolonged heavy rainfall:

   1. enable the active pits to be dewatered so that operations can continue;
   2. reduce the risk of uncontrolled discharge to the receiving environment to an acceptable level.

Areas of Disagreement:

Quality of water captured in the WWS and IWS

9. **MW** states that no evidence has been provided that modelling of water quality, within the storages comprising the mine water management system and of the released water to and from those storages, has been simulated over the life of the mine. As a realistic risk assessment of the impact of releasing mining-sourced waters into the Mary River should include simulation of the above variations in relevant water quality parameters, as well as variations in the volumes of water likely to be released with such water quality variations, MW considers that insufficient simulation has been undertaken and reported upon to clearly demonstrate that the proposed water management plan will protect currently-recognised environmental values and water quality objectives of the Mary River estuary.

10. **MW** considers that, if water quality modelling had been included in the risk assessment, it would have shown that the resultant risks to the environment could have been further minimized by simulating practical revisions of the water management plan.

11. **MW** points out that simulation of water quality within the water management system should be a fundamental part of the monitoring and review process required to be undertaken to satisfy relevant conditions in the draft environmental authority. Accordingly, MW considers that presentation of the results of simulating the water quality variations within and out of the currently-proposed system should be a pre-requisite to the Court's consideration of the adequacy or otherwise of the water quality conditions included within the current draft environmental authority.

12. **MB** acknowledges that variations in the concentrations of potential contaminants in the dams making up the MWS are to be expected. However, he believes that modelling of water quality within the storages comprising the MWS would not materially change the outcomes of the design and impact assessment of the project for the following reasons:

    - Water captured in the WWS will present the highest potential risk of harm to the receiving environment. The WWS has already been designed on the basis that the water it contains may not be suitable for release and will therefore require full containment without release. Hence the modelling of the WMS does not include releases from the WWS.

- The draft EA release conditions have been set to ensure that when water is released, the Environmental Values of the receiving environment are protected. If the water quality does not meet this standard, its release will not be permitted. If this was the case, the outcome would be to reduce estimated frequency and duration of releases to the Mary River and to reduce the potential impacts on the River.
- The likely geochemical properties of runoff from the overburden dump were characterised in the Mary River Discharge Investigations (Hydrobiology, May 2014), based on laboratory testing of the overburden material by EGi and CSIRO. That report concluded that metal concentrations (with the possible exception of Cd and Se) in the Mine Water Dam were unlikely to exceed the ANZECC trigger values. As a result, water in the IWS would not be expected to present a risk of harm to the receiving environment. This is consistent with experience at other coal mines, where overburden runoff is typically suitable for release if erosion and sediment control measures are properly implemented. It is therefore unlikely that releases to the Mary River from the IWS would be significantly limited by exceedance of the draft EA water quality conditions.

13. **MB** agrees that during operations, process simulation of water quality undertaken as part of monitoring and review would be useful in ensuring the relevant conditions in the draft environmental authority can always be met.

Release of water from the IWS

14 **MW** States that Colton Coal's proposed release of water from the WMS to the Mary River via a pipeline is one option for managing water in the Mine Water Dam. Another option would be for the Mine Water Dam to instead serve the function of a sediment dam, with water being allowed to flow to the nearby headwater tributaries of the Susan River.

15 **MB** responds that this alternative arrangement is possible, and was considered during conceptual design of the WMS, but the Mary River pipeline option was preferred because the dilution offered by Mary River flows would reduce impacts on the receiving waters.

Release of Water from the WWS

16 **MW** states that Colton Coal is likely to routinely transfer water from the WWS to the Mine Water Dam – ultimately for release. This greatly increases the complexity of the water management system, and could result in the release of acid mine drainage water to the Mary River.

17 **MB** responds that the system has not been designed to operate in this way. The clearly stated aim of the proposed water management system is to separate the WWS and IWS. Transferring water from the WWS to the Mine Water Dam would be entirely inconsistent with this aim.

18 **MB** further responds that:

- the WWS storage capacity was sized so that WWS water could be contained on site;
- while the draft EA does not preclude the release of water to the Mary River, Colton Coal would need to carefully test water in the receiving environment and the WWS to be confident the release would be compliant. Releases are likely to occur only under exceptional circumstances;
- in the event that potentially acid-forming overburden material generated highly acidic water in the WWS, its release would be prohibited by the pH release limit in condition F4 of the draft EA.

Consequence Category

19 **MW** is of the opinion that the Mine Water Dam should be assigned a "High" Consequence Category due to:

- the Environmental Values of the Mary River receiving waters;
- the potential for transferring WWS water to the Mine Water Dam and to the Mary River;
- the potential for the Mine Water Dam to contain acid mine drainage water;
- the harm that the release water may therefore cause to the Environmental Values of the Mary River.

20 **MB responds that:**

- The Environmental Values of the Mary River and the consequent impacts of releases are being addressed by other experts.
- It is not envisaged that (in the event that it was released) WWS water would be discharged into the Mine Water Dam, it would instead be pumped directly to the inlet of the Mary River pipeline.
- Water could only be released if it was compliant with the EA release conditions. In which case the

criteria for "High Consequence" dams would not be triggered.

- Based on the geochemistry of the out-of-pit overburden, the Mine Water Dam is unlikely to contain acid mine drainage water.
- The draft EA release conditions include a limit on pH (which would prevent acid water from being released).

Water Reuse

21 **MW** is of the opinion that the site water management system should have been designed such that:

- releases are not made to the Mary River, and
- water captured in the WWS should be used as part of a beneficial reuse scheme.

22 **MB** responds that he is aware that Colton Coal has attempted to pursue reuse opportunities with other parties, but that at this stage such an option is not part of the project to which the draft EA applies."

[34] Mr Batchelor's evidence was that the worked water system, if operated as specified, would not result in an overflow into the Susan River under all historical rainfall conditions since 1890.[9]

[35] Cross-examination of Mr Batchelor was attended by some issues of relevance.[10] It was established that, if acid sulphate soil impacted the quality of the water being considered for release, it would not be allowed to be released if it was outside of the EA release conditions.[11] The pipeline, about 5.5 km in length, is not required to be purged before a sample is taken[12] so it was suggested that a sample might not be valid, if taken at the discharge point, until some time had elapsed.[13]

[36] This point focuses on sampling at the discharge point. According to item (ii) of the introduction to exhibit 111, the discharge point into the Mary River is "a submerged outfall". Item F10 of exhibit 9, the draft EA, refers to mine-affected water "when measured at the monitoring points specified in Table F1".[14] That Table shows "MRP1". The Monitoring Point is described in Table F1 as "Sampling point

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9 T 2-54, lines 12-28.
10 T 2-60, lines to T 44-61 lines 1-2.
11 T 2-62, lines 12-18.
12 T 2-65, lines 35-40.
13 T 2-65, lines 37.
14 Ex 9, page 18, F10.

drawing water out of Mary River discharge pipeline".[15] It does not appear that there is any requirement to measure at the submerged outfall, with the resultant problem introduced by the length of the pipe. Mr Batchelor said there could be a sample taken at the pipe inlet.[16] It seems that a sample point drawing water out of the pipeline near its inlet is both contemplated and suitable. The point made about sampling at the outlet point has no force.

[37] Mr Stephen Charles Eames was called on behalf of the applicant. He is now the general manager of corporate development of the parent company New Hope Corporation Limited and a director of Colton Coal Pty Ltd. In cross-examination, Mr Eames was asked whether there is an intention to follow the present application, if it is approved, with a further application for a much enlarged Colton Coal mine. Mr Eames said that there are no plans for another application "at this point in time."[17]

[38] Dr John Anthony Thorogood was called on behalf of the applicant. He is an aquatic ecologist. He has prepared a report, exhibit 32, response reports, exhibits 37 and 41, and a joint report with Mr Winders, exhibit 107. The joint expert report, exhibit 107, sets out the areas of agreement and disagreement and it is useful to set out the principal parts of it. It is in the following terms:

> "**Introduction**
>
> i. This appeal relates to the conditions set by the State in its draft Environmental Authority (EPML00367613) for the Colton Coal Project at Maryborough.
>
> ii. Matters of relevance to this JER relate to the proposed discharge of water from the mine to the Mary River.
>
> iii. Recognising the complexity of some issues, the intent of this preliminary JER is to establish a basis of 'common ground ' upon which we can subsequently jointly consider and resolve more specific issues.
>
> **We agree that**
>
> iv. the development of the proposed mine should be considered within an ecologically sustainable framework.
>
> v. the receiving environment should be protected through integrated management that is:
>
> - underpinned by an understanding of the receiving environment and the establishment of environmental objectives,

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15 Ex 9, page 14, Table F1.
16 T 2-66, lines 20-23.
17 T 2-76, lines 45-46.

- based on the development and implementation of appropriate management strategies, and
- accountable.

vi. whilst a uniform standard of environmental protection may be applied across an industry, the unique circumstances of each project should be reflected in the management strategies applied to achieve this standard.

vii the proposed release point is approximately 9 km upstream of waters designated as having High Ecological Value, the upstream boundary of the Great Sandy Strait Marine Park, and the upstream boundary of the Susan River Fish Habitat Area.

viii the proposed release point lies within the mid-reaches of the Mary River estuary, where waters are described in the Environmental Protection (Water) Policy 2009: Mary River environmental values and water quality objectives (July 2010) as 'moderately disturbed'.

ix the draft Environmental Authority prescribes the conditions (of river flow) under which mine water may be released and the minimum quality of water that may be released, and that the release of mine water must be monitored and reported on.

x the draft Environmental Authority prescribes that the release of excess mine water may only occur during periods of significant natural flow within the river (>150 ML/day).

We disagree on the following matters:

A Risk-based Approach to Environmental Management

xi JT considers that a risk-based approach (where the likelihood and consequence of various potential impacts are objectively considered) is appropriate to assessing the likely impacts associated with, and managing, the regulated discharge of water from the Colton Coal project. A risk-based approach to environmental management underpins the approach taken by every Australian state and the Commonwealth (see Appendix A).

xii MW considers that the risk-based approach of the proposed water management plan, which would allow untreated mine water discharge to be frequently discharged into the Mary River estuary, while possibly suitable for existing mines discharging into inland streams of lesser ecological value, is inappropriate in this instance.

xiii JT responds that the draft Environmental Authority specifies the conditions (of river flow) under which mine water may be released and the minimum quality of the water to be released.

Uncertainty in Impact Assessment

xiv JT considers that some degree of uncertainty is acceptable (expected) in impact assessment, and must be reflected in a project's environmental management strategies. This view is consistent with the State's *Environmental Protection Act (1994)*, the National Water Quality Management Strategy and ANZECC Guidelines. Monitoring is considered an integral

element of environmental management (under the *Act*), reflecting a clear acceptance of a degree of uncertainty with respect to impact assessment.

xv MW disagrees that uncertainty is acceptable in this instance as the proposed water quality management plan could be revised to remove uncertainty from the impact assessment.

Adaptive Management

xvi JT considers that adaptive management allows monitoring to support changes in practices where required, allowing best practice environmental management to be implemented as technologies evolve. Department of Environment and Heritage Protection policies support this view, advising that an adaptive management approach 'allows for best practice environmental management to be implemented as technologies develop over time ' and that under a regimen of adaptive management, 'environmental licences issued to operators can be changed to take into account new research, monitoring or modelling which suggests the potential for unintended or unexpected impacts on the environment. '

xvii MW disagrees that adaptive management is appropriate for the protection of the estuary's ecological values and that the water management plan, as currently stated, should be upgraded to ensure that the need for adaptive management is minimal.

xviii JT responds that the draft Environmental Authority specifies the conditions (of river flow) under which mine water may be released and the minimum quality of that water. That is, it is the Environmental Authority, not the mine's 'water management plan' that determines the nature of impact (if any) of the release of mine water to the Mary River.

xix MW also considers that the Receiving Waters Monitoring Plan is unlikely to identify the likely need for adaptive management as it is limited to looking for changes in specific water quality parameters and not aimed at identifying adverse changes to ecological values of the estuary which may prove to be long-term or irreversible.

xx JT responds that 'adaptive management' may be broadly applicable to the management of the proposed mine. It may for example, be applied to the length of time water is held in the Mine Water Sediment Dam prior to release (to facilitate the settling of suspended solids). It may also be applied to the Receiving Environment Monitoring Program (REMP) prescribed in the draft Environmental Authority. The REMP reflects an understanding that any impact relating to the release of mine water, to flora and fauna, must (logically) be mediated via water quality. The REMP does not proscribe the monitoring of 'ecological values' and in fact states that 'the REMP should encompass any sensitive receiving waters or environmental values downstream .....'. Environmental Values ascribed to the mid-reaches of the Mary River estuary include 'aquatic ecosystems '. Colton Coal has yet to finalise a REMP design document.

Environmental Authority

xxi While it is agreed that an Environmental Authority should take into account the nature of the proposed activity, the values, sensitivities and resilience of the receiving environment, and the regulations, policies and objectives articulated by government, MW considers that the regulations, policies and objectives articulated by government need to be considered for relevance on a site-specific basis. Of particular relevance in this case are the interpretation of policies for the release of mine waters into inland streams and the environmental values of the Mary River estuary and the Great Sandy Region, which are quite different to those of inland streams.

xxii MW considers that the draft environmental authority (EA) is deficient in that it is based upon applying a generic policy, developed for the adaptive management of existing and expanding mines discharging large volumes of contaminated water into inland river systems, to a new mine discharging into an estuary with readily identifiable environmental values.

xxiii JT responds that the draft Environmental Authority, whilst reflecting the industry-wide application of policy (the Department of Environment and Heritage Protection's 'Model Water Conditions for Coal Mines in the Fitzroy Basin' provide an obvious example) also reflects the specific nature of the proposed activity and the specific values, sensitivities and resilience of the receiving environment. The Environmental Authority appropriately reflects the characteristics of the proposed mine and the receiving waters.

xxiv MW considers that the draft EA is also deficient in that its conditions only require post-flood event water quality monitoring as a basis for identifying the need or otherwise for the adaptive management of releases of pollutants into an estuary for which recent government policies and regulations are seeking improvements in both water and sediment quality.

xxv JT responds that MW's contention is not supported by a careful reading of the draft Environmental Authority. The draft Environmental Authority reads, (extracted from condition F19), ' this must include monitoring the effects of the mine periodically (under natural flow conditions) and while mine effected water is being discharged from the site'. Under the draft Environmental Authority, mine (effected) water may be discharged at any time there is a rate of flow greater than 150 ML/day over the Mary River and Tinana barrages.

xxvi MW considers that the draft EA is incorrect in allowing the mine to be regularly dewatered through a submerged outfall in a location already impacted upon by a sub-standard sewage treatment plant's outfalls into an estuary where current government policies require further reductions in the pollutant loads discharged from urban, agricultural and mining sources to protect seagrass and coral - seagrass being the more significant in this instance.

xxvii JT responds that both the proposed means of discharge and the draft Environmental Authority reflect the Environmental Values and Water Quality Objectives of the mid-reaches of the Mary River and downstream. The release of mine water in accordance with the draft Environmental Authority will not adversely impact seagrasses or corals.

xxviii JT considers that the release of 0.2 m^3/s of uncontaminated waters to the Mary River during periods of significant natural flow (>300 ML/day) would not result in environmental harm.

Bioaccumulation and Environmental Flows

xxix JT considers that the risk of bioaccumulation cannot be increased where introduced water contains contaminants at lower concentrations than the receiving waters.

xxx JT considers that environmental flows cannot be detrimentally impacted where introduced water is less contaminated than the receiving waters."

[39] Dr Thorogood was asked about the four hour inspection of the Mary River estuary by boat that Mr Winders made on 7 December 2015 and which is reported in exhibit 57. Asked about the value, if any, of that inspection without instrumentation Dr Thorogood said:

> "Well, to be blunt, I think it really has no scientific basis and, therefore, no scientific merit."[18]

[40] In cross-examination, Dr Thorogood said that:

> "... it is entirely reasonable to expect that the water being discharged will typically be less turbid than the water that is discharged to."[19]

[41] In relation to the concept of using reverse osmosis to treat the water before it is discharged into the Mary River, Dr Thorogood said:

> "I have no background or particular expertise in the treatment of water per se. The only further comment I would make is that in as much as using a sledgehammer to crack a proverbial walnut would seem to be excessive, using reverse osmosis to remove the essentially benign concentration of metals from the water that's proposed to be discharged would be excessive and if – you know, I'm not a lawyer either but if we turn to the EP Act, you can see that it very clearly encourages an appropriate management response to identified threats and the application of reverse osmosis simply wouldn't be appropriate to a threat this negligible."[20]

[42] In relation to the testing of discharge water, Dr Thorogood said:

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18 T 3-14, lines 30-34.
19 T 3-16, lines 26-27.
20 T 3-32, line 41 to T 3-33, line 2.

> "...in practical circumstances the testing would normally be expected to be undertaken at the – at the start of the pipe rather than the end because the end is literally underwater in the Mary River."[21]

[43] He said that:

> "The discharge from Colton Coal will have negligible nutrients and, typically, very low suspended solids."[22]

[44] Dr Thorogood said that if, as a precaution, it is desired to have the discharge water diluted and dispersed as quickly as possible, it would be done under conditions of significant natural flow. This strategy of discharge to a flowing river has been adopted because it has been seen to work in the Fitzroy River.[23]

AADAM's case

[45] AADAM called one witness, Mr Maxwell Francis Winders. The exhibits associated with Mr Winders are numbered 49, 57, 58, 59, 60, 107, 109, 111 and 115. Exhibit 49, attachment 3, is the report of Mr Arunakumaren, principal hydrological modelling engineer. The report, provided to Mr Winders, modelled the effectiveness of the proposed water management system. It notes that the suspended solids are usually reddish brown in colour at low concentration and blackish at high concentrations. The Court notes that the clarity of a liquid is referred to as its turbidity. Exhibit 124 illustrates that. Exhibit 126 shows that Mr Winders is a mechanical engineer and that his registration with the Board of Professional Engineers Queensland lapsed on 30 June 2016. Mr Winders is a very experienced engineer and the Court draws no adverse inference from the lapse of his registration, which he said was a "complete surprise" to him.[24] In submissions, the Court was informed that the registration of Mr Winders has been restored.

[46] Mr Winders was of the opinion that:

> "... the draft EA is deficient in not specifying total suspended solids to be equivalent to that which applies to the middle estuary."[25]

[47] Mr Winders describes himself as an environmental engineer.[26] He took part in three expert conclaves, meeting with Dr Andrew McCowan, Dr Thorogood and Mr Batchelor. Dr McCowan, an expert on water flow and mixing, was, by agreement

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21 T 3-29, lines 35-37.
22 T 3-25, lines 20-21.
23 T 3-31, line 35 to T 3-32, line 6.
24 T 4-33, line 35.
25 T 3-44, lines 13-14.
26 T 3-47, line 17.

of the parties, not called. There are no issues regarding his opinions. Mr Winders claimed that he was expert in the same areas as the opposing experts. His curriculum vitae begins at page 38 of exhibit 49. He is, as has been noted, a mechanical engineer by training.[27]

[48] Mr Winders is of the opinion that the proposed dams should be constructed to meet the applicable requirements where their failure would have a high consequence.[28] He is of the view that this Court should decide on the applicability of this standard to the proposed dams.[29] He does however agree that a registered engineer will need to be involved in the design process and will have to assess the relevant consequence category at that time.[30]

[49] Mr Winders is of the opinion that turbidity limits on the discharge water do not adequately deal with the issue of sedimentation, a matter on which he and Dr McCowan did not reach any agreement.[31] He did not raise the issue of sediment with Dr McCowan[32] and it was suggested in cross-examination that it is actually not an issue at all.[33] Mr Winders said that the matter was not about science but about satisfying community values.[34] When cross-examined about suspended sediment and sedimentation, Mr Winders was unable to point to anywhere in his reports where he expressed the concerns which he put to the Court in his evidence.[35]

[50] Mr Winders agreed that turbidity is easy to measure.[36] The unit of measurement is Nephelometric Turbidity Units (NTU) and measurement can be done on-site.[37] Measuring total suspended solids is more complicated and usually has to be done off site.[38] He agreed that he failed to raise this in the joint expert report process with Dr Thorogood.[39]

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27 T 3-47, lines 29-30
28 T 3-52, lines 23-25.
29 T 3-54, lines 14-15.
30 T 3-53, lines 23-25.
31 T 3-58, lines 8-9.
32 T 3-62, lines 27-28.
33 T 3-62, line 30 to T 3-63, line 2.
34 T 3-64, lines 17 to T 3-65, line 11.
35 T 3-68, lines 35-36.
36 T 4-3, lines 45-46.
37 T 4-5, lines 3-5.
38 T 4-5, lines 11-12.
39 T 4-13, lines 18-36.

[51] Mr Winders agreed that total suspended solids is unlikely to be a concern in assessing whether or not water could be released.[40] He was of the view that compliance with the 50 NTU limit would not exclude a concern of potential environmental harm.[41] He was of the opinion that the impact of the mine is going to be on total suspended solids but could not point to any data actually supporting that.[42]

[52] As well as agreeing that sedimentation had not been brought up until he came to the witness box,[43] Mr Winders introduced another point which he described as "critical", well into his cross-examination.[44] He said that the river flow limits for water release are not appropriate.[45] Mr Winders is an experienced expert witness and was questioned about why he had not raised these matters earlier.[46] He was squarely challenged on the basis that his evidence was false.[47]

[53] Mr Winders acknowledged that in exhibit 107 at page 2, item (x) he had agreed with Dr Thorogood that the draft EA provides that minewater may only be released during periods of "significant natural flow" in the river. He accepted that this was directly contrary to the evidence he had just given in Court.[48]

[54] Mr Winders pointed out that he had to address three opposing experts.[49] This is so, although producing the expert reports took place over time and he had the choice of whether or not to seek to cover the range of expertise required. Mr Winders is experienced as an expert witness[50] so it is hard to believe that matters which he might regard as important would be likely to first enter his head when he is in the witness box.

[55] In the same category of late changes of opinion is Mr Winders' view that the outfall into the Mary River is "completely unnecessary".[51] This was initially raised on the second day of his cross-examination. It sits alongside his statement, made only

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40 T 4-15, lines 19-46.
41 T 4-16, lines 4-8.
42 T 4-17, lines 38-46.
43 T 4-23, lines 14-16.
44 T 4-23, lines 30-44.
45 T 4-23, lines 38-39.
46 T 4-23, line 46 to T 4-25, line 22.
47 T 4-25, line 18.
48 T 4-26, lines 30-36.
49 T 4-24, lines 20-21.
50 T 4-23, line 46 to T 4-24, line 2 to T 3-70, lines 23-24.
51 T 4-31, lines 40-43.

seconds before, that the need for a condition that the minewater dam be "high consequence", which he did raise in exhibit 111, was "... the nub of – everything I'm involved with here is concerned with that ..."[52] If a river outfall was completely unnecessary, it is impossible to believe that it would not have been raised in the reporting process in which the experts engaged. The Court cannot accept this evidence, for the reasons which have been given.

[56] Mr Winders did not find any seagrass in the middle estuary area that he inspected.[53] As a result of his inspection, he does not assert that the discharge point, mapped as in the mid-estuary, has the water quality characteristics of the lower estuary.[54] He was of the opinion that the water quality objectives for the lower estuary should be applied to the mid-estuary location at the point of the proposed discharge from the mine[55] "because the fish move up and down".[56] Mr Winders eventually agreed that the water characteristics at the discharge point reflect the mid-estuary characteristics of the Mary River, not those of the lower estuary.[57] The exchange in this cross-examination illustrates an argumentative approach by Mr Winders rather than the approach of an expert. Additionally, the argument advanced was without any merit. Mr Winders was under no illusions about being argumentative and he said:

> "That's the whole thrust of the argument I'm trying to ... put to the court."[58]

[57] Mr Winders did not support using reverse osmosis water treatment as part of the proposed project.[59]

[58] The Court had the advantage of carefully observing this witness when he gave evidence. The Court formed the view that he failed to be convincing in raising matters in Court and attaching importance to them when they had not been prominent in the substantial process prior to the hearing. The witness' manner was defensive in cross-examination and he was unable to give a convincing explanation why matters raised in Court for the first time were not expressed earlier if they were significant. The Court is unable to be satisfied that the concerns first raised in Court are actually matters of importance, for the reasons which have been given.

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52 T 4-31, lines 37-38.
53 T 4-44, lines 1-2 to T 4-44, lines 30-33.
54 T 4-46, lines 32-37.
55 T 4-47, lines 7-11.
56 T 4-47, lines 13-14.
57 T 4-47, line 7 to T 4-49, line 5 to T 4-50 lines 3-13.
58 T 4-53, lines 1-3.
59 T 4-57, lines 37-40.

The statutory party's case

[59] The statutory party called one witness, Mr Timothy Mervyn Brain. He is a manager with the Department of Environment and Heritage Protection. He was the delegate of the administering authority who had the authority to decide applications made to it. His affidavit material became exhibits 86 to 104.

[60] In cross-examination by Mr O'Brien QC, Mr Brain was shown exhibit 110, the joint expert report by the mechanical engineers, Mr Elkin and Mr King, in relation to noise.

[61] Mr Brain agreed that these experts' jointly proposed revised noise conditions for the EA should be adopted in place of those in the draft EA.

[62] The Court accepts that this is appropriate and recommends that the draft EA be amended accordingly. The revised table, which appears on page 4 of exhibit 110, is in the following form:

Table 1 – Revised EA Noise Conditions: Table D1 – Noise Limits

Noise level dB(A) measured as:	**Monday to Saturday**			**Sunday and Public Holidays**		
	7am – 6pm	6pm – 10pm	10pm – 7am	9am – 6pm	6pm – 10pm	10pm – 9am
Noise Measured at Location M1 (latitude -25° 25' 4.55 ", longitude 140° 38 ' 8.27 ")						
$L_{Aeq\ adj,\ 15\ mins}$	58	51	46	58	51	46
$L_{A1\ adj,\ 15\ mins}$	63	56	51	63	56	51
Noise Measured at Location M2 (latitude -25° 27' 6.72", longitude 140° 39 ' 59.66 ")						
$L_{Aeq\ adj,\ 15\ mins}$	47	45	40	47	45	40
$L_{A1\ adj,\ 15\ mins}$	52	50	45	52	50	45
Noise Measured at Location M3 (latitude -25° 26' 23.02", longitude 140° 42 ' 44.30 ")						
$L_{Aeq\ adj,\ 15\ mins}$	41	39	39	41	39	39
$L_{A1\ adj,\ 15\ mins}$	46	44	44	46	44	44

[63] When cross-examined by Mr Houen, Mr Brain explained that the limits that are used in the draft EA for water discharges are all limits that can be measured with a meter "so that you can get an immediate result".[60] Turbidity is included to enable a quick measurement and a quick decision about whether the water is compliant with release

60 T 4-75, line 47 to T 4-76, line 2.

criteria or not.[61] Turbidity criteria was chosen on the advice from "our scientific advisers".[62] Mr Brain said that the current version of the model mining conditions "might include total suspended solids".[63] This matter was not pursued before the Court. Submissions not seen by Mr Brain when he made his decision were provided to the Court and became exhibit 72.

[64] Mr Brain said that, in respect of noise and dust at mines, the department would typically respond to complaints and would not proactively set up noise monitoring equipment itself, although it could do so.[64] The monitoring required by the draft EA is not required to be routinely sent to the department but is commonly viewed when inspections are carried out.[65] The submission that the statutory party's Assessment Report, exhibit 82, should have been made publicly available, as it might have resulted in more objections, is not a matter upon which this Court can take any action.

[65] The draft EA, exhibit 9, sets out requirements for dust and particulate monitoring. The respondent is asking for continuous air quality monitoring.[66] Mr Brain stated that there is dust deposition monitoring. Exhibit 9 page 5, condition B2, requires compliance with AS 3580.10.1, Methods for sampling and analysis of ambient air. Condition B3 requires monitoring in accordance with one or other Australian Standard Methods set out in B3, with sampling once every 6 days with a 24 hour sampling period. The sampling locations are specified. The modelling done for this project indicated that dust should not be a problem.[67]

[66] Concerning dust contaminating rainwater tanks, that was a matter considered in relation to dust and there are requirements for dust deposition and air monitoring.[68]

The Land Court's recommendation under s 269 of the MRA

[67] Section 269(4) of the MRA requires that when making a recommendation to the Minister that an application for a mining lease be granted in whole or in part, the Court shall take into account and consider a number of specified matters. These will

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61 T 4-76, lines 4-14.
62 T 4-76, line 23.
63 T 4-76, lines 20-21.
64 T 4-76, lines 35-46.
65 T 4-77, lines 1-11.
66 T 4-80, lines 40-42.
67 T 4-81, lines 44-45 to T 4-82, lines 12-13 to T 4-83, lines 6-14.
68 T 4-83, lines 9-14.

be dealt with seriatim, taking into account all of the material before the Court and the preceding consideration herein. Exhibit 29, the affidavit of Mr Eames, makes detailed reference to these matters.

Section 269(4)(a) – Whether the provisions of the MRA have been complied with

[68] An examination of the material before the Court demonstrates that all of the provisions of the MRA have been complied with. There was no submission to the contrary.

Section 269(4)(b) – Whether the areas of land applied for are mineralised or the other purposes for which the leases are sought are appropriate

[69] There is coal in this area and the parent company of the applicant is a coal mining company. It was not suggested that there is no coal here. The Court is satisfied that the land applied for is mineralised. In exhibit 29, Mr Eames, a mining engineer, explains in paragraph 42 that over 100 core samples have been drilled in and around the mining lease areas, which are located in the Burrum coalfields. Historically, small scale coal mining was carried out in numerous places in this area of coalfields, Mr Eames states. Where the lease area is sought for infrastructure such as the rail link and coal preparation plant, these are appropriate purposes for the proposed project.

Section 269(4)(c) – Whether there will be an acceptable level of development and utilisation of the mineral resources within the areas applied for

[70] Exhibit 29, paragraph 50 shows that there is an anticipated 5 million tons of product coal to be extracted at a rate of half a million tons per annum by open-cut mining. The planned operation, with coal preparation and rail facilities, would be an acceptable level of development and utilisation.

Section 269(4)(d) – Whether the land and the surface area of the land in respect of which the mining leases are sought are of an appropriate size and shape in relation to –

(i) the matters mentioned in paragraphs (b) and (c); and

(ii) the type and location of the activities proposed to be carried out under the leases and their likely impact on the surface of the land

[71] The evidence before the Court shows that the land is a sufficiently regular shape and size in relation to the specified matters and the type and location of the proposed activities and their likely impact on the surface. There was no suggestion to the contrary at the hearing.

Section 269(4)(e) – Whether the term sought is appropriate

[72] There was no suggestion to the contrary. The 20 year term sought for Colton A, B and C is appropriate for the preparation, mining and rehabilitation which would be required to be carried out.

Section 269(4)(f) – Whether the applicant has the necessary financial and technical capabilities to carry on mining operations under the proposed mining leases

[73] Exhibit 29, the affidavit of Mr Eames, indicates that the applicant has the necessary means. There was no challenge to this at the hearing.

Section 269(4)(g) – Whether the past performance of the applicant has been satisfactory

[74] Exhibit 29, paragraphs 116 and 117, explain that the applicant does not have a history of performance. The applicant was incorporated for the purpose of the proposed project.

Section 269(4)(h) – Whether any disadvantage may result to the rights of—
(i) holders of existing exploration permits or mineral development licences; or
(ii) existing applicants for exploration permits or mineral development licences

[75] Exhibit 29, paragraphs 118 and 119 explain that the only affected tenure holder, Blue Energy, has consented to the grant of the tenures sought.

Section 269(4)(i) – Whether the operations to be carried on under the authority of the proposed mining leases will conform with sound land use management

[76] The terms of the proposed mining lease and EA will have to be complied with. The operations to be carried on would conform with sound land use management if the conditions imposed are adhered to. It is noted that in cross-examination Mr Eames said:

> "At this stage I can just reaffirm we have no plans for another application at this point in time."[69]

[77] What is being considered by the Court is the proposal before it. Exhibit 29, paragraphs 70 to 74 under the hearing "Possible future expansion", set out possible future applications. What distinction there may be between plans and these possibilities was not explored with Mr Eames by any party.

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69 T 2-76, lines 45-46.

Section 269(4)(j) – Whether there will be any adverse environmental impact caused by those operations and, if so, the extent thereof

[78] There will be an adverse environmental impact caused by a coal mine. The extent will be managed and minimised by the EA. The objections decision relating to environmental matters which is below should be read in this regard.

Section 269(4)(k) – Whether the public right and interest will be prejudiced

[79] Exhibit 29, paragraph 123, states that the value of coal production from this project is estimated to be in the order of $80 million per annum for total coal production valued in the order of $800 million over the life of the project. Up to 120 employees would be required for construction and up to 120 full-time staff at full production. Recruitment is expected to be from the local area. Wages cost during construction is estimated to be $32 million. Annual royalty to the State is projected to be approximately $6.7 million, on average, from 2019. Annual payroll tax is estimated to be $600,000. Taxes and charges paid to Federal, State and Local Governments are estimated to be in excess of $17.5 million per annum on average. Direct investment in construction and mining equipment is estimated to be up to $250 million. Fixed infrastructure will be about 60% of this. Up to $100 million of construction expenditures is expected to be sourced from domestic suppliers. Rail and port services expenditure are expected to exceed $13 million per annum on average. There was no challenge made at the hearing to any of this. It does not appear that the public right and interest will be prejudiced. Significant public benefit is in prospect.

Section 269(4)(l) – Whether any good reason has been shown for a refusal to grant the mining leases

[80] The consideration of the material put before the Court by the parties at the hearing does not indicate the presence of any good reason for a refusal to grant the mining leases.

Section 269(4)(m) – Whether, taking into consideration the current and prospective uses of that land, the proposed mining operation is an appropriate land use

[81] Exhibit 29 sets out that the land is unallocated state land, a road reserve without a constructed road and a railway reserve without a rail line. This was not contradicted.

The prospective uses of the land would be likely to be unchanged from current uses were it not for the proposed mining operation. The Court is satisfied that the proposed mining operation is an appropriate land use. No other use was supported in the evidence put before the Court. Historically, the area has supported logging and coal mining.

Conclusion

[82] The Court recommends to the Minister that the applications be granted in whole.

Objections decision under the EP Act

[83] The Court has considered the matters set out in s 223 of the EP Act, which is applicable due to s 683 of that Act. It is noted that no activities are contemplated in a wild river area and the status of the applications under the MRA has already been considered: they are the subject of the recommendation that they be granted in whole. The application documents and objections are before the Court, as are the reports and evidence of the witnesses. The regulatory requirements were considered in the evidence heard over four days and have been referred to in the consideration above of the evidence produced at the hearing. What was put before the Court at the hearing was not compartmentalised as the MRA and EP Act hearings were conducted together, which provided efficiencies. The Court has considered the *Environmental Protection (Water) Policy 2009*, the Mary River environmental values and water quality objectives for basin no 138, including all tributaries of the Mary River, exhibit 125. Also considered were the Model Mining Conditions, version 5, exhibit 105. The Court also had the benefit of a comparison of the Colton Coal Environmental Authority Conditions for Water with the Model Mining Conditions and the Model Water Conditions for Coal Mines in the Fitzroy Basin, exhibit 119.

The standard criteria

[84] The Court is required to consider the standard criteria. Before turning to this, it is useful to refer to section 3 of the EP Act, which sets out the objective of the Act and section 4, which states how that objective is to be achieved. Those sections state:

> **3 Object**
>
> The object of this Act is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (***ecologically sustainable development***).

4 How object of Act is to be achieved

(1) The protection of Queensland's environment is to be achieved by an integrated management program that is consistent with ecologically sustainable development.

(2) The program is cyclical and involves the following phases—

(a) phase 1 — establishing the state of the environment and defining environmental objectives;

(b) phase 2 — developing effective environmental strategies;

(c) phase 3 — implementing environmental strategies and integrating them into efficient resource management;

(d) phase 4 — ensuring accountability of environmental strategies.

[85] The standard criteria are defined in Schedule 4 in the following way:

standard criteria means—

(a) the principles of ecologically sustainable development as set out in the 'National Strategy for Ecologically Sustainable Development'; and

(b) any applicable environmental protection policy; and

(c) any applicable Commonwealth, State or local government plans, standards, agreements or requirements; and

(d) any applicable environmental impact study, assessment or report; and

(e) the character, resilience and values of the receiving environment; and

(f) all submissions made by the applicant and submitters; and

(g) the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows—

(i) an environmental authority;

(ii) a transitional environmental program;

(iii) an environmental protection order;

(iv) a disposal permit;

(v) a development approval; and

(h) the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument; and

(i) the public interest; and

(j) any applicable site management plan; and

(k) any relevant integrated environmental management system or proposed integrated environmental management system; and

(l) any other matter prescribed under a regulation.

[86] The National Strategy for Ecologically Sustainable Development is defined in Schedule 4 as follows:

National Strategy for Ecologically Sustainable Development means the 'National Strategy for Ecologically Sustainable Development' endorsed by the Council of Australian Governments on 7 December 1992.

[87] In *Endocoal Limited v Glencore Coal Queensland Pty Ltd and Department of Environment and Heritage Protection*[70] at [42], Member Smith, referring to his decision in *De Lacey & Anor v Kagara Pty Ltd*[71] said:

> "The National Strategy for Ecologically Sustainable Development of December 1992 contains the following statement of Australia's goal, core objectives and guiding principles for the Strategy:
>
> > **'The Goal is:**
> > Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.
> >
> > **The Core Objectives are**:
> > - to enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations
> > - to provide for equity within and between generations
> > - to protect biological diversity and maintain essential ecological processes and life-support systems
> >
> > **The Guiding Principles are**:
> > - decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations
> > - where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
> > - the global dimension of environmental impacts of actions and policies should be recognised and considered
> > - the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised
> > - the need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised
> > - cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms
> > - decisions and actions should provide for broad community involvement on issues which affect them
> >
> > These guiding principles and core objectives need to be considered as a package. No objective or principle should predominate over the others. A balanced approach is required that takes into account all these objectives and principles to pursue the goal of ESD.'
> >
> > From the precautionary principle perspective, the key is the second bullet point to the guiding principles in the paragraph above, which sets out in a lengthened form what is currently

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70 [2014] QLC 54.
71 (2009) 30 QLCR 57.

> referred to as the precautionary principle – that is, 'where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation."

[88] In *Xstrata Coal Queensland Pty Ltd & Ors v Friends of the Earth - Brisbane Co-Op Ltd & Ors*[72] President MacDonald considered the Goal, Core Objectives and Guiding Principles and said, at [256]:

> "The precautionary principle is encapsulated in the second principle above. That is, where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation."

[89] In *Adani Mining Pty Ltd v Land Services of Coast and Country Inc & Ors*[73] President MacDonald said:

> "*Precautionary principle*
>
> [36] The first respondent submitted that the precautionary principle was engaged in this case in relation to the DSC, the black-throated finch and the waxy cabbage palm. The application of the precautionary principle was discussed in detail in Telstra Corporation Ltd v Hornsby Shire Council, where Preston CJ said:
> "The application of the precautionary principle and the concomitant need to take precautionary measures is triggered by the satisfaction of two conditions precedent or thresholds: a threat of serious or irreversible environmental damage and scientific uncertainty as to the environmental damage. These conditions or thresholds are cumulative. Once both of these conditions or thresholds are satisfied, a precautionary measure may be taken to avert the anticipated threat of environmental damage, but it should be proportionate."
>
> [37] His Honour went on to say that
>
> - determining the existence of a threat of serious irreversible environmental damage does not involve, at the stage of assessing the first condition precedent, any evaluation of the scientific uncertainty of the threat. If there is not a threat of serious or irreversible environmental damage, there is no basis upon which the precautionary principle can operate.
>
> - The second condition precedent required to trigger the application of the principle is that there be a "lack of full scientific certainty". The uncertainty is as to the nature and scope of the threat of environmental damage. Full scientific certainty is not required. If there is no, or not considerable scientific uncertainty, the second condition precedent is not satisfied and even

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72 (2012) 33 QLCR 79 at [255].
73 [2015] QLC 48.

though there is a threat of serious or irreversible environmental damage (that is, the first condition precedent is satisfied) the precautionary principle will not apply. The threat of serious irreversible environmental damage can be classified as relatively certain because it is possible to establish a causal link between an action or event and environmental damage, to calculate the probability of their occurrence, and to insure against them. Measures will still need to be taken but these will be preventative measures to control or regulate the relatively certain threat of serious or irreversible environmental damage, rather than precautionary measures which are appropriate in relation to uncertain threats.

- If each of the two conditions precedent is satisfied the precautionary principle will be activated. At this point the evidentiary burden of proof shifts. A decision–maker must assume that the threat of serious or irreversible environmental damage is no longer uncertain but is a reality. The burden of showing that the threat does not exist or is negligible reverts to the proponent of the development. The rationale for requiring this shift of the burden of proof is to ensure preventative anticipation; to act before scientific certainty of cause and effect is established. The preference is to prevent environmental damage rather than to remediate it.

- The function of the precautionary principle is, therefore to require the decision-maker to assume that there is or there will be a serious or irreversible threat of environmental damage and to take this into account, notwithstanding that there is a degree of scientific uncertainty about whether the threat exists.

- There is nothing in the formulation of the precautionary principle which requires the decision-maker to give the assumed factor (the serious or irreversible environmental damage) overriding weight compared to the other factors required to be considered, such as social and economic factors, when deciding how to proceed. The effect of the shift in the evidentiary burden of proof simply means that, in making the final decision, the decision-maker must assume that there will be serious or irreversible environmental damage. That factor must be taken into account in the calculus which decision-makers are instructed to apply under environmental legislation.

- The precautionary principle should not be used to try to avoid all risks. Rationality also dictates that the precautionary principle and any preventative measure cannot be based on a purely hypothetical approach to the risk, founded on mere conjecture which has not been scientifically verified.

- The type and level of precautionary measures that will be appropriate will depend on the combined effect of the degree of seriousness and the irreversibility of the threat and the degree of uncertainty. This involves assessment of risk, namely the probability of the event occurring and the seriousness of the consequences should it occur. The more significant and more uncertain the threat, the greater the degree of caution required.

- Prudence also suggests that some margin for error should be retained until all the consequences of the decision to proceed with the development are known. One means of retaining a margin for error is to implement a step-wise or adaptive management approach, whereby uncertainties are acknowledged and the area affected by the development plan, program or project is expanded as the extent of uncertainty is reduced. An adaptive management approach might involve the following core elements:

    - monitoring impacts of management or decisions based on agreed indicators;
    - promoting research, to reduce key uncertainties;
    - ensuring periodic evaluation of the outcomes of implementation, drawing lessons, and review or adjustment, as necessary, of the measures or decisions adopted;
    - establishing an efficient and effective compliance system.

- The precautionary principle embraces the concept of proportionality, that is that measures should not go beyond what is appropriate and necessary in order to achieve the objectives in question. A reasonable balance must be struck between the stringency of the precautionary measures, which may have associated costs, such as financial, livelihood and opportunity costs and the seriousness and irreversibility of the potential threat.

- The precautionary principle, where triggered, does not necessarily prohibit carrying out the development plan, program or project until full scientific certainty is attained. The solution is to assess the risk-weighted consequences of various options and select the option that affords the appropriate degree of precaution for the set of risks associated with the option.

- The precautionary principle is but one of the sets of principles of ecologically sustainable development. It should not be viewed in isolation, but rather as part of the package. This means that the precautionary measures that should be selected must not only be

> appropriate having regard to the precautionary principle itself, but also in the context of the other principles of ecologically sustainable development, including inter-generational and intra-generational equity and the conservation of biological diversity and ecological integrity.

Intergenerational equity

[38] In relation to the principles of equity, Preston CJ said that there is a need for inter-generational equity and intra-generational equity. He explained that inter-generational equity means that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for future generations. This is the definition contained in s.3.5.2 in the Schedule to the IGAE. Preston CJ said that intra-generational equity involves considerations of equity within the present generation, such as uses of natural resources by one nation-state (or sectors or classes within a nation-state) needing to take account of the needs of other nation-states (or sectors or classes within a nation-state).

Conservation of biological diversity and ecological integrity

[39] In *Bentley v BGP Properties Pty Ltd* Preston CJ said:

> "Maintaining ecological integrity involves maintaining ecosystem health. Ecosystems become unhealthy if their community structure (species richness, species composition or food web architecture) or ecosystem functioning (productivity, nutrient dynamics, decomposition) has been fundamentally upset by human pressures ...
>
> The conservation of threatened species is an essential action in the conservation of species diversity, and hence of biological diversity and ecological integrity." (citations omitted)

[90] In the present case, the evidence which has been provided to the Court establishes that the quality requirements imposed for the discharge of water into the Mary River are such that the release does not pose a threat of serious or irreversible environmental damage. There is therefore no basis upon which the precautionary principle could operate in this case. The Court has not accepted the evidence of Mr Winders in relation to the matters already referred to so this conclusion is inevitable on the basis of the remaining evidence. No evidence was led in regard to inter or intra-generational equity beyond the concerns already addressed. The reference to fisheries resources by Mr Winders was based on exhibit 58, the letter dated 13 December 2015 from the Queensland Seafood Industry Association. It states that the mining operation would put the fisheries resource at risk. It does not contain

scientific evidence to advance the claim made. Matters of biological diversity and ecological integrity, also first raised by Mr Winders in Court, are not accepted for the same reasons as his other items of oral evidence, first raised in Court.

[91] The matters set out in (b), (c), and (e) of the standard criteria have been considered in the evidence given at the hearing to the extent to which the parties directed attention to them. This may be found principally in the oral evidence and the implications of these matters were explored in that evidence. There was no environmental impact study in this case.

[92] The character, resilience and values of the receiving environment were considered in the evidence which has been referred to above. All of the submissions have been taken into account and best practice environmental management is incorporated into the draft EA.

[93] In *Adani Mining Pty Ltd v Land Services of Coast and Country Inc. & Ors,*[74] President MacDonald considered the adaptive management approach. That approach is incorporated into the draft EA. The learned President considered that approach warranted in the case before her. The learned President said:[75]

> "Preston CJ said, in *Telstra*, such an approach might involve the following core elements:
>
> - monitoring impacts of management or decisions based on agreed indicators;
> - promoting research to reduce any uncertainties;
> - ensuring periodic evaluation of the outcomes of implementation, drawing lessons and review or adjustments of the measures or decisions adopted;
> - establishing an efficient and effective compliance system."

[94] The monitoring of management decisions will be based on compliance with the draft EA conditions. There is a compliance system which, if operated efficiently and effectively, is capable of properly supervising compliance. ADAAM submitted that there ought to be a condition that the applicant provides reports that it may have from time to time to the statutory party, and that the statutory party approve designs. This differs from the regulatory regime that has been adopted by the statutory party. The Court is not able to be satisfied by evidence that this is likely to lead to any improved outcomes so is not satisfied that such a condition should be recommended.

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74 [2015] QLC 48.
75 Ibid, [268].

ADAAM has, in submissions, provided a number of amendments that it suggests be included in the EA in the event that the proposed project is to proceed. The proposed amendments reflect the areas of concern dealt with at the hearing. They are not supported by the other parties. In no case was a proposed condition, when foreshadowed to a witness whose evidence the Court has accepted, agreed to by the witness as being necessary. Since the evidence before the Court did not demonstrate that the draft EA is deficient, except in relation to the need for some revised noise conditions, the Court is not satisfied that there is a need for any other amendments to the draft EA. The Court is accordingly unable, on the basis of the evidence, to recommend any of these amendments.

[95] The evidence is that the financial implications of the regulatory regime would not be beyond the resources of the proponent of the project, in view of its position in its corporate structure.

[96] The public interest, as the learned President pointed out *in Adani Mining Pty Ltd v Land Services of Coast and Country Inc. & Ors*:

> "... involves a discretionary balancing exercise of the widest import confined only so far as the subject matter and the scope and purpose of the statute may enable."[76] (citations omitted)

[97] The economic benefits of the proposed mine have been referred to, and they are considerable. Weighing against this is the evidence presented to the Court by the experts. The evaluation of that evidence shows that the precautionary principle does not apply and there is no acceptable evidence upon which to base a rational concern that would weigh against the benefits of the proposed project when properly regulated.

[98] The planned development and management of the project site and the environmental management system reflected in the draft EA have been taken into account. The Court has not been referred to any other matter prescribed under a regulation which would call for consideration beyond the examination which has been conducted. The evidence does not support a need for sampling and testing of rainwater tanks or for real-time noise monitoring.

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76 [2015] QLC 48, [43].

Conclusion

[99] As has already been referred to, the noise limits in Table D1 of the draft EA need to be revised. They should follow Table 1 on page 4 of exhibit 110, which was set out in [62] above.

[100] In accordance with section 222(1)(b) of the EP Act, the Court recommends to the EPA Minister that the application be granted, but on stated conditions that are different to the conditions in the draft.

ORDERS:

1. **In accordance with s 269 of the *Mineral Resources Act 1989*, the Court recommends to the Honourable the Minister administering the *Mineral Resources Act 1989* that the applications be granted in whole.**

2. **In accordance with s 222(1)(b) of the *Environmental Protection Act 1994*, the Court recommends to the Honourable the Minister administering the *Environmental Protection Act 1994* that the application be granted, but on stated conditions that are different to the conditions in the draft environmental authority issued on 1 September 2014 to the extent that Table D1 – Noise limits referred to in Condition D1 be replaced with the following revised table:**

Table D1 – Noise limits

Noise level dB(A) measured as:	**Monday to Saturday**			**Sunday and Public Holidays**		
	7am – 6pm	6pm – 10pm	10pm – 7am	9am – 6pm	6pm – 10pm	10pm – 9am
Noise Measured at Location M1 (latitude -25° 25' 4.55 ", longitude 140° 38 ' 8.27 ")						
$L_{Aeq\ adj,\ 15\ mins}$	58	51	46	58	51	46
$L_{A1\ adj,\ 15\ mins}$	63	56	51	63	56	51
Noise Measured at Location M2 (latitude -25° 27' 6.72", longitude 140° 39 ' 59.66 ")						
$L_{Aeq\ adj,\ 15\ mins}$	47	45	40	47	45	40
$L_{A1\ adj,\ 15\ mins}$	52	50	45	52	50	45
Noise Measured at Location M3 (latitude -25° 26' 23.02", longitude 140° 42 ' 44.30 ")						
$L_{Aeq\ adj,\ 15\ mins}$	41	39	39	41	39	39
$L_{A1\ adj,\ 15\ mins}$	46	44	44	46	44	44

WA ISDALE
MEMBER OF THE LAND COURT

FOI 180401
Document 2c

Permit[1]

Environmental Protection Act 1994

Environmental authority EPML00367613 – Colton Coal Mine

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Permit[1] number: EPML00367613

Environmental authority takes effect on grant of tenure

The first annual fee is payable within 20 business days of the effective date.

The anniversary date of this environmental authority is the same day each year as the effective date. An annual return and the payment of the annual will be due each year on this day.

Environmental authority holder(s)

Name	Registered address
Colton Coal Pty Ltd	3/22 Magnolia Drive BROOKWATER QLD 4300

Environmentally relevant activity and location details

Environmentally relevant activity(ies)	Location(s)
Environmental Protection Regulation 2008, Schedule 2A: **ERA 13** Mining black coal	ML50273 ML50274 ML50280

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority is issued is a restatement of the ERA as defined by legislation at the time the approval is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an environmental authority as to the scale, intensity or manner of carrying out an ERA, then the conditions prevail to the extent of the inconsistency.

An environmental authority authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the authority specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

[1] Permit includes licences, approvals, permits, authorisations, certificates, sanctions or equivalent/similar as required by legislation

Contaminated land

It is a requirement of the EP Act that if an owner or occupier of land becomes aware a notifiable activity (as defined in Schedule 3 and Schedule 4) is being carried out on the land, or that the land has been, or is being, contaminated by a hazardous contaminant, the owner or occupier must, within 22 business days after becoming so aware, give written notice to the chief executive.

Signature	Date
	15 DECEMBER 2016

Tony Baker
Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:
Business Centre (Coal)
Department of Environment and Heritage Protection
PO Box 3028
EMERALD QLD 4720
Phone: (07) 4987 9320
Email: CRMining@ehp.qld.gov.au

A4	The holder of this environmental authority must: a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority; b) maintain such measures, plant and equipment in a proper and efficient condition; c) operate such measures, plant and equipment in a proper and efficient manner; d) ensure all instruments and devices used for the measurement or monitoring of any parameter under any condition of this environmental authority are properly calibrated.
A5	**Monitoring** Except where specified otherwise in another condition of this environmental authority, all monitoring records or reports required by this environmental authority must be kept for a period of not less than **5 years**.
A6	**Financial assurance** The activity must not be carried out until the environmental authority holder has given financial assurance to the administering authority as security for compliance with this environmental authority and any costs or expenses, or likely costs or expenses, mentioned in section 298 of the *Environmental Protection Act 1994*.
A7	The amount of financial assurance must be reviewed by the holder of this environmental authority when a plan of operations is amended or replaced or the authority is amended.
A8	**Risk management** The holder of this environmental authority must develop and implement a risk management system for mining activities which mirrors the content requirement of the Standard for Risk Management (ISO31000:2009), or the latest edition of an Australian standard for risk management, to the extent relevant to environmental management, within **three (3) months** of this environmental authority taking effect.
A9	**Notification of emergencies, incidents and exceptions** The holder of this environmental authority must notify the administering authority by written notification within **24 hours**, after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with, the conditions of this environmental authority.
A10	Within **10 business days** following the initial notification of an emergency or incident, or receipt of monitoring results, whichever is the latter, further written advice must be provided to the administering authority, including the following: a) results and interpretation of any samples taken and analysed; b) outcomes of actions taken at the time to prevent or minimise unlawful environmental harm; c) proposed actions to prevent a recurrence of the emergency or incident.

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319);
- duty to notify environmental harm (section 320-320G);
- offence of causing serious or material environmental harm (sections 437-439);
- offence of causing environmental nuisance (section 440);
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG); and
- offence to place contaminant where environmental harm or nuisance may be caused (section 443).

Conditions of environmental authority

The environmentally relevant activity(ies) conducted at the location as described above must be conducted in accordance with the following site specific conditions of approval.

Agency interest: General	
Condition number	**Condition**
A1	This environmental authority authorises environmental harm referred to in the conditions. Where there is no condition or this environmental authority is silent on a matter, the lack of a condition or silence does not authorise environmental harm.
A2	In carrying out the mining activity authorised by this environmental authority, disturbance of land: a) may occur in the areas marked 'A'; b) must not occur in the areas marked 'B'; c) may occur in the areas marked 'C' on the map that is **Figure 1** attached to this environmental authority, but only in accordance with **Condition A3**.
A3	Any disturbance within the areas marked 'C' on the map that is **Figure 1** attached to this environmental authority: a) is only authorised to the extent reasonably necessary for a road, fence, underground service, low-impact telecommunications facility, electrical sub-station, transmission grid works and supply network works, storage depots, similar minor infrastructure and ancillary facilities for any of the above minor infrastructure; b) any disturbance within areas marked 'A' or 'C' is not to impact adversely on areas marked 'B'.

A11	**Complaints** The holder of this environmental authority must record all environmental complaints received about the mining activities including: a) name, address and contact number for of the complainant; b) time and date of complaint; c) reasons for the complaint; d) investigations undertaken; e) conclusions formed; f) actions taken to resolve the complaint; g) any abatement measures implemented; h) person responsible for resolving the complaint.
A12	The holder of this environmental authority must, when requested by the administering authority, undertake relevant specified monitoring within a reasonable timeframe nominated or agreed to by the administering authority to investigate any complaint of environmental harm. The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures, where implemented, must be provided to the administering authority within **10 business days** of completion of the investigation, or no later than **10 business days** after the end of the timeframe nominated by the administering authority to undertake the investigation.
A13	**Third-party reporting** The holder of this environmental authority must: a) within **one (1) year** of the commencement of this environmental authority, obtain from an appropriately qualified person a report on compliance with the conditions of this environmental authority; b) obtain further such reports at regular intervals, not exceeding **3 yearly** intervals, from the completion of the report referred to above; and c) provide each report to the administering authority within **90 days** of its completion.
A14	Where a condition of this environmental authority requires compliance with a standard, policy or guideline published externally to this environmental authority and the standard is amended or changed subsequent to the issue of this environmental authority, the holder of this environmental authority must: a) comply with the amended or changed standard, policy or guideline within **2 years** of the amendment or change being made, unless a different period is specified in the amended standard or relevant legislation. b) until compliance with the amended or changed standard, policy or guideline is achieved, continue to remain in compliance with the corresponding provision that was current immediately prior to the relevant amendment or change.

Agency interest: Air	
Condition number	**Condition**
B1	The environmental authority holder must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the dust and particulate matter emissions generated by the mining activities do not cause exceedances of the following levels when measured at any sensitive or commercial place: a) Dust deposition of 120 milligrams per square metre per day, averaged over 1 month, when monitored in accordance with the most recent version of Australian Standard AS3580.10.1 Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method. b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometres (PM_{10}) suspended in the atmosphere of 50 micrograms per cubic metre over a 24-hour averaging time, for no more than 5 exceedances recorded each year, when monitored in accordance with the most recent version of either: 1. Australian Standard AS3580.9.6 Methods for sampling and analysis of ambient air — Determination of suspended particulate matter —PM_{10} high volume sampler with size-selective inlet – Gravimetric method; or 2. Australian Standard AS3580.9.9 Methods for sampling and analysis of ambient air — Determination of suspended particulate matter — PM_{10} low volume sampler — Gravimetric method. c) A concentration of particulate matter suspended in the atmosphere of 90 micrograms per cubic metre over a 1 year averaging time, when monitored in accordance with the most recent version of AS/NZS3580.9.3 Methods for sampling and analysis of ambient air — Determination of suspended particulate matter—Total suspended particulate matter (TSP) – High volume sampler gravimetric method
B2	**Dust, particulate and meteorological monitoring** Monitoring of levels of dust deposition must be undertaken at a minimum of **four (4)** locations around the mining lease areas relevant to the environmental authority in accordance with AS 3580.10.1 Methods for sampling and analysis of ambient air - Determination of particulate matter - Deposited matter - Gravimetric method. Sample collection and subsequent determination of the dust deposition rate must be undertaken every **30 days** at the location(s) shown in **Table 2** and in **Figure 2**.

B3	Monitoring of particulate matter with an aerodynamic diameter of less than 10 micrometre (µm) (PM_{10}) suspended in the atmosphere must be undertaken in accordance with *either:* 1. Australian Standard AS3580.9.6 Methods for sampling and analysis of ambient air — Determination of suspended particulate matter — PM_{10} high volume sampler with size-selective inlet – Gravimetric method; or 2. Australian Standard AS3580.9.9 Methods for sampling and analysis of ambient air — Determination of suspended particulate matter — PM_{10} low volume sampler — Gravimetric method. Sampling of the particulate matter with an aerodynamic diameter of less than 10 micrometre (µm) (PM_{10}) suspended in the atmosphere must be performed once every six days, with a sampling period of **24 hours**, at the location(s) shown in **Table 2** and in **Figure 2**.
B4	A permanent automatic weather station for continuous, real time monitoring and recording of wind speed, wind direction, temperature, relative humidity and rainfall must be installed at the location(s) shown in **Table 2** and in **Figure 2**. The station must be installed, managed, and monitoring conducted in accordance with relevant Australian Standards, including, Australian Standard AS 3580.14 - Methods for sampling and analysis of ambient air, Part 14: Meteorological monitoring for ambient air quality monitoring applications.
B5	The holder must record, compile and keep all monitoring records obtained from the automatic meteorological station.
B6	Dust and particulate monitoring required under **Conditions B2** and **B3** must be conducted in accordance with the standards and at the locations, specified in **Table 2** and shown in **Figure 2**.

Table 2 (Dust and Particulate Monitoring Locations)

Air Quality Determination	Monitoring Standard	Monitoring Point Description	Approximate Monitoring Point Location	
			Latitude (GDA94)	Longitude (GDA94)
Dust deposition	AS 3580.10.1	D1 – Deposition gauge	-25.4069°	152.6449°
		D2 – Deposition gauge	-25.4430°	152.6706°
		D3 – Deposition gauge	-25.4420°	152.7102°
		D4 – Deposition gauge	-25.4238°	152.7113°
PM_{10}	AS 3580.9.6	HV1 – High volume PM_{10} sampler location	Must be located within the vicinity of the township of Aldershot, inside the area indicated for high volume sampler location shown in **Figure 2**.	
Meteorological data including wind speed, wind direction, temperature, humidity, and precipitation.	AS 3580.14	WS1 – Weather Station	Must be located within the mining lease areas, at a site that complies with siting requirements specified under AS 3580.14.	

Agency interest: Waste	
Condition number	**Condition**
C1	General waste generated by mining activities must be removed to a facility that is lawfully able to accept the waste under the *Environmental Protection Act 1994*.
C2	Unless otherwise permitted by the conditions of this environmental authority or with prior approval from the administering authority and in accordance with a relevant standard operating procedure, waste must not be burnt.
C3	The holder of this environmental authority may burn vegetation cleared in the course of carrying out mining activities provided the activity does not cause environmental harm at any sensitive or commercial place.

C4	**Tailings disposal** Tailings must be managed in accordance with procedures contained within the current plan of operations. These procedures must include provisions for: a) containment of tailings; b) the management of seepage and leachates both during operation and the foreseeable future; c) the control of fugitive emissions to air; d) a program of progressive sampling and characterisation to identify acid producing potential and metal concentrations of tailings; e) maintaining records of the relative locations of any other waste stored within the tailings; f) rehabilitation strategy; g) monitoring of rehabilitation, research and/or trials to verify the requirements and methods for decommissioning and final rehabilitation of tailings, including the prevention and management of acid mine drainage, erosion minimisation and establishment of vegetation cover.
C5	**Acid sulphate soils** Treat and manage acid sulphate soils in accordance with the latest edition of the Queensland Acid Sulfate Soil Technical Manual.

Agency interest: Noise	
Condition number	**Condition**
D1	**Noise limits** The holder of this environmental authority must ensure that noise generated by the mining activities does not exceed the levels identified in **Table D1 – Noise limits** at the locations specified between the boundary of the site and the surrounding sensitive or commercial places as shown on **Figure 3 – Location of noise limit locations**.

Table D1 – Noise limits

Noise level dB(A) measured as:	Monday to Saturday			Sunday and Public Holidays		
	7am - 6pm	6pm - 10pm	10pm - 7am	9am - 6pm	6pm - 10pm	10pm - 9am
Noise measured at location M1 (latitude -25 ° 25 ' 4.55 ", longitude 140 ° 38 ' 8.27 ")						
$L_{Aeq\ adj,15\ mins}$	58	51	46	58	51	46
$L_{A1\ adj,\ 15\ mins}$	63	56	51	63	56	51
Noise measured at location M2 (latitude -25 ° 27 ' 6.72 ", longitude 140 ° 39 ' 59.66 ")						
$L_{Aeq\ adj,15\ mins}$	47	45	40	47	45	40
$L_{A1\ adj,15\ mins}$	52	50	45	52	50	45
Noise measured at location M3 (latitude -25 ° 26 ' 23.02 ", longitude 140 ° 42 ' 44.30")						
$L_{Aeq\ adj,15\ mins}$	41	39	39	41	39	39
$L_{A1\ adj,15\ mins}$	46	44	44	46	44	44

D1A	In the event of a complaint being made by the owner of the property described as Lot 73 on Plan LX435 at Colton Road, Colton QLD 4650, the holder of this environmental authority must ensure that noise generated by the mining activities does not exceed the levels identified in **Table D1A – Noise limits at Lot 73 on Plan LX435** at the sensitive place located on Lot 73 on Plan LX435 at Colton Road, Colton QLD 4650.

Table D1A – Noise limits at Lot 73 on Plan LX435

Noise level dB(A) measured as:	Monday to Saturday			Sunday and Public Holidays		
	7am - 6pm	6pm - 10pm	10pm - 7am	9am - 6pm	6pm - 10pm	10pm - 9am
$L_{Aeq\ adj,\ 15\ mins}$	40	39	35	40	39	35
$L_{A1\ adj,\ 15\ mins}$	45	44	38	45	44	38

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

Table D2 – Blasting noise limits

Blasting noise limits	Sensitive or commercial place blasting noise limits	
	7am to 6pm	6pm to 7am
Airblast overpressure	115 dB (Linear) Peak for 9 out of 10 consecutive blasts initiated and not greater than 120 dB (Linear) Peak at any time	No Blasting
Ground vibration peak particle velocity	5mm/second peak particle velocity for 9 out of 10 consecutive blasts and not greater than 10 mm/second peak particle velocity at any time	No Blasting

D3	**Low frequency noise nuisance** Emission of any low frequency noise must not exceed the following limits in the event of a complaint about low frequency noise being made to the Administering Authority and it is subsequently determined by the Administering Authority to be a valid complaint: a) 60dB(C)($L_{eq, 15min}$) measured outside the sensitive or commercial place; and b) The difference between the internal A weighted and C weighted noise levels is no greater than 20dB or; c) 50dB(z)($L_{eq, 15min}$) measured inside the sensitive or commercial place; and d) The difference between the internal A weighted and Z weighted noise levels is no greater than 15dB.
D4	**Monitoring and reporting** Noise monitoring and recording must include the following descriptor characteristics and matters: a) $L_{AN,T}$ (where $_N$ equals the statistical levels of 1, 10 and 90 and T = 15 mins); b) background noise L_{A90}; c) the level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels; d) atmospheric conditions including temperature, relative humidity and wind speed and directions; e) effects due to any extraneous factors such as traffic noise; f) location, date and time of monitoring; g) if the complaint concerns low frequency noise, Max $Lp_{LIN,T}$ and one third octave band measurements in dB(LIN) for centre frequencies in the 10 – 200 Hz range.

D5	The holder of this environmental authority must develop and implement a blast monitoring program to monitor compliance with **Table D2 – Blasting noise limits** for: a) at least 100% of all blasts undertaken on this site in each year at the nearest sensitive place or commercial place. b) all blasts conducted during any time period specified by the administering authority at the nearest sensitive place or commercial place.

Agency interest: Groundwater	
Condition number	**Condition**
E1	**Contaminant release** The holder of this environmental authority must not release contaminants to groundwater.
E2	**Monitoring and reporting** All determinations of groundwater quality and biological monitoring must be performed by an appropriately qualified person.
E3	Groundwater quality and levels must be monitored at the locations and frequencies defined in **Table – E3 Groundwater monitoring locations and frequency** and **Figure 4 – Groundwater Bore Monitoring Locations)** for quality characteristics identified in **Table E4 – Groundwater quality triggers and limits**.

Table E3 – Groundwater monitoring locations and frequency

Monitoring Point	Location		Surface RL [2] (mAHD)	Bore Depth (m)	Monitoring Frequency	Lithology Monitored	Comment
	Latitude (GDA94, decimal degrees)	Longitude (GDA94, decimal degrees)					
Reference Bores [3]							
RB-1	25.41872814	152.6918421	To be provided when bores are installed. Monitoring bores to be installed must allow sampling of groundwater that reflects the background groundwater quality for aquifers impacted by mining activities.		Quarterly	To be provided when bores are installed. Monitoring bores to be installed must allow sampling of groundwater that reflects the background groundwater quality for aquifers impacted by mining activities.	
RB-2	25.39888363	152.6610721			Quarterly		
Compliance Bores[1]							
NMB-041	25.4389873	152.6936504	19.20	51.38	Quarterly	Coal Seams	Nested bore installation
NMB-042	25.43897827	152.6936504	19.22	21.00	Quarterly	Claystone/ minor sandstone	
NMB-043	25.43707982	152.6758632	28.27	49.48	Quarterly	Clays, sandstone, mudstone	Nested bore installation
NMB-044	25.43708885	152.6758632	28.12	24.92	Quarterly	Sandstone	
NMB-045	25.41711496	152.6724761	31.05	56.22	Quarterly	Claystone with minor coal seams	Nested bore installation
NMB-046	25.41711498	152.6724861	31.05	12.35	Quarterly	Clay and coal	
NMB-047	25.42822377	152.6897296	20.09	60.70	Quarterly	Claystone with minor coal seams	Nested bore installation
NMB-048	25.42821474	152.6897297	20.09	30.60	Quarterly	Claystone, sandstone, mudstone with coal	

[1] Monitoring is not required where a bore has been removed as a direct result of the mining activity.

[2] RL must be measured to the nearest 5cm from the top of the bore casing.

[3] Reference sites must:

(a) have a similar flow regime;

(b) be from the same bio-geographic and climatic region;

(c) have similar geology, soil types and topography; and

(d) not be so close to the test sites that any disturbance at the test site also results in a change at the reference site.

Table E4 – Groundwater quality triggers and limits

Parameter	Units	Contaminant Triggers Level	Contaminant Limit	Trigger Level and Limit Type
pH	pH Units	6.5 – 8.0	6.0 – 9.0	Minimum and maximum range
Electrical Conductivity	mS/cm	20	25	Maximum
Total Dissolved Solids	mg/L	14000	17000	Maximum
Acidity	Equivalent $CaCO_3$ in mg/L	NA	NA	NA
Alkalinity (bicarbonate, carbonate, hydroxide and total)	Equivalent $CaCO_3$ in mg/L	600	700	Maximum
Chloride	mg/L	7000	10000	Maximum
Fluoride	mg/L	1.6	2	Maximum
Sulphate	mg/L	800	1000	Maximum
Calcium	mg/L	NA	NA	NA
Magnesium	mg/L	NA	NA	NA
Potassium	mg/L	NA	NA	NA
Sodium	mg/L	NA	NA	NA
Total Nitrogen	mg/L	10	12	Maximum
Nitrate	Equivalent N in mg/L	8	10	Maximum
Aluminium	mg/L	4	5	Maximum
Arsenic (Total)	mg/L	0.4	0.5	Maximum
Barium	mg/L	0.7	1	Maximum
Boron	mg/L	4	5	Maximum
Cadmium	mg/L	0.004	0.01	Maximum
Chromium (III)	mg/L	0.8	1	Maximum

Chromium (IV)	mg/L	0.8	1	Maximum
Cobalt	mg/L	0.8	1	Maximum
Copper	mg/L	0.8	1	Maximum
Iron	mg/L	NA	NA	NA
Lead	mg/L	0.044	0.1	Maximum
Manganese	mg/L	1.9	2.5	Maximum
Nickel	mg/L	0.8	1	Maximum
Selenium	mg/L	0.016	0.02	Maximum
Zinc	mg/L	0.12	1	Maximum

Note: The contaminant limit listed in the Table will not apply to a groundwater monitoring bore where an investigation in accordance with **Condition E5** has been conducted and the contaminant level in the bore is shown to be below the background levels as determined by the reference bore results.

E4	Groundwater levels when measured at the monitoring locations specified in **Table E3 - Groundwater monitoring locations and frequency** must not exceed the groundwater level change trigger thresholds specified in **Table E5 - Groundwater level monitoring below**.

Table E5 – Groundwater level monitoring

Monitoring Point	Location		Groundwater level change trigger thresholds (m)
	Latitude (GDA94, decimal degrees)	Longitude (GDA94, decimal degrees)	
RB-1	25.41872814	152.6918421	na
RB-2	25.39888363	152.6610721	na
NMB-041	25.4389873	152.6936504	5
NMB-042	25.43897827	152.6936504	5
NMB-043	25.43707982	152.6758632	5
NMB-044	25.43708885	152.6758632	5
MB_1	25.41404112	152.6551632	2
MB_2	25.4279623	152.6612891	2

E5	**Exceedance Investigation** If quality characteristics of groundwater from compliance bores identified in **Table E3 - Groundwater monitoring locations and frequency** exceed any of the groundwater level change trigger thresholds stated in **Table E4 - Groundwater quality triggers and limits** or exceed any of the groundwater level trigger threshold stated in **Table E5 - Groundwater level monitoring**, the holder of this environmental authority must compare the compliance monitoring bore results to the reference bore results and complete an investigation in accordance with the ANZECC and ARMCANZ 2000.
E6	Results of monitoring of groundwater from compliance bores identified in **Table E3 - Groundwater monitoring locations and frequency**, must not exceed any of the limits defined in **Table E4 - Groundwater quality triggers and limits**.
E7	**Bore construction and maintenance and decommissioning** The construction, maintenance and management of groundwater bores (including groundwater monitoring bores) must be undertaken in a manner that prevents or minimises impacts to the environment and ensures the integrity of the bores to obtain accurate monitoring.

Agency interest: Water	
Condition number	**Condition**
F1	**Contaminant release** Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters as a result of the authorised mining activities, except as permitted under the conditions of this environmental authority.
F2	Unless otherwise permitted under the conditions of this environmental authority, the release of mine affected water to waters must only occur from the release points specified in **Table F1 - Mine affected water release points, sources and receiving waters** and depicted in **Figure 5** attached to this environmental authority.
F3	The release of mine affected water to internal water management infrastructure installed and operated in accordance with a water management plan that complies with condition F25 is permitted.

Table F1 – Mine affected water release points, sources and receiving waters

Release Point (RP)	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)	Mine Affected Water Source and Location	Monitoring Point	Receiving waters description
MRP1	25° 28.033'S	152° 43.796'E	Mine Water Dam at Mary River pipeline off take.	Sampling point drawing water out of Mary River discharge pipeline	Mary River at end of discharge pipeline at Churchill Mines Rd, approximate AMTD 26.5km

F4	The release of mine affected water to waters in accordance with condition F2 must not exceed the release limits stated in **Table F2 – Mine affected water release limits** when measured at the monitoring points specified in **Table F1 – Mine affected water release points, sources and receiving waters** for each quality characteristic.

Table F2 – Mine affected water release limits

Quality Characteristic	Release Limits	Monitoring Frequency
Electrical Conductivity (µS/cm)	4000	Daily during release (the first sample must be taken within 2 hours of commencement of release)
pH (pH Unit)	6.5 (minimum) 9.0 (maximum)	Daily during release (the first sample must be taken within 2 hours of commencement of release)
Turbidity (NTU)	50	Daily during release (the first sample must be taken within 2 hours of commencement of release)
Dissolved Oxygen (mg/L)	4 (minimum)	Daily during release (the first sample must be taken within 2 hours of commencement of release)

F5	The release of mine affected water to waters from the release points must be monitored at the locations specified in **Table F1 - Mine affected water release points, sources and receiving waters** for each quality characteristic and at the frequency specified in **Table F2 - Mine affected water release limits** and **Table F3 - Release contaminant trigger investigation levels, potential contaminants**. *Note: the administering authority will take into consideration any extenuating circumstances prior to determining an appropriate enforcement response in the event **Condition F5** is contravened due to a temporary lack of safe or practical access. The administering authority expects the environmental authority holder to take all reasonable and practicable measures to maintain safe and practical access to designated monitoring locations.*

Table F3 - Release contaminant trigger investigation levels, potential contaminants

Quality Characteristic	Trigger Levels	Comment on Trigger Level	Monitoring Frequency
Aluminium (µg/L)	55	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	**Prior to commencement of release and thereafter weekly during release**
Arsenic (µg/L)	13	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	
Boron (µg/L)	370	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	
Cadmium (µg/L)	0.2	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	
Chromium (µg/L)	1.0	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	
Cobalt (µg/L)	1.0	*ANZECC aquatic ecosystem protection, marine, slightly to moderately disturbed*	
Copper (µg/L)	2	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed, however ICMS LOR limits to 2 µg/L*	
Iron (µg/L)	300	*ANZECC section 8.3.7.1 for metals and metalloids*	
Lead (µg/L)	3.4	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	
Manganese (µg/L)	200	*For aquatic ecosystem protection, based on WHO 2005*	
Mercury (µg/L)	0.2	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed however LOR for Cold Vapour FIMS is 0.2 µg/L*	
Nickel (µg/L)	11	*ANZECC aquatic ecosystem protection, freshwater 95% species protection for SMD*	
Selenium (µg/L)	10	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed, however LOR for ICP-MS is 10 µg/L*	
Silver (µg/L)	1	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed, however ICMS LOR limits to 1 µg/L*	
Vanadium (µg/L)	100	*ANZECC aquatic ecosystem protection, marine, slightly to moderately disturbed*	
Zinc (µg/L)	8.0	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	
Sulphate (SO_4^{2-}) (mg/L)	770	*Based on expected acceptable mine water quality*	
Total Nitrogen (µg/L)	300	*Mary River WQO for Mary River mid estuary*	

Ammonia (µg/L)	10	*Mary River WQO for Mary River mid estuary*	
Nitrate (µg/L)	10	*Mary River WQO for Mary River mid estuary*	
Total Phosphorus (µg/L)	25	*Mary River WQO for Mary River mid estuary*	
Total Petroleum hydrocarbons (C6-C9) (µg/L)	20	*ANZECC Section 8.3.7.21 and EHP model Fitzroy water conditions*	
Total Petroleum hydrocarbons (C10-C36) (µg/L)	100	*ANZECC Section 8.3.7.21 and EHP model Fitzroy water conditions*	

Notes:
1. All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Trigger levels for metal/metalloids apply if dissolved results exceed trigger.
*2. The quality characteristics required to be monitored as per **Table F3 - Release contaminant trigger investigation levels, potential contaminants** can be reviewed once the results of 2 years monitoring data is available, or if sufficient data is available to adequately demonstrate negligible environmental risk, and it may be determined that a reduced monitoring frequency is appropriate or that certain quality characteristics can be removed from **Table F3 - Release contaminant trigger investigation levels, potential contaminants** by amendment.*
3. SMD – slightly moderately disturbed level of protection, guideline refers ANZECC & ARMCANZ (2000).
4. LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical method required to achieve LOR.

F6	If quality characteristics of the release exceed any of the trigger levels specified in **Table F3 - Release contaminant trigger investigation levels, potential contaminants** during a release event, the environmental authority holder must, for the parameters which are exceeded, complete an investigation into the potential for environmental harm and provide a written report to the administering authority within 90 days of receiving the result, outlining (i) details of the investigations carried out, including a comparison of the results to monitoring in the receiving environment (ii) actions taken to prevent environmental harm. *Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with **F6** of this condition, no further reporting is required for subsequent trigger events for that quality characteristic that occur during the period of investigation.*
F7	If an exceedance in accordance with **Condition F6** is identified, the holder of the environmental authority must notify the administering authority in writing within **24 hours** of receiving the result.
F8	**Mine Affected Water Release Events** The holder must ensure a stream flow gauging station/s is installed, operated and maintained to determine and record stream flows at the locations and flow recording frequency specified in **Table F4 - Mine affected water release during flow events**.
F9	Notwithstanding any other condition of this environmental authority, the release of mine affected water to waters in accordance with **Condition F2** must only take place during periods of natural flow in accordance with the receiving water flow criteria for discharge specified in **Table F4 - Mine affected water release during flow events** for the release point(s) specified in **Table F1 - Mine affected water release points, sources and receiving waters**.
F10	The release of mine affected water to waters in accordance with **Condition F2** must not exceed the Maximum Release Rate for each receiving water flow criterion for discharge specified in **Table F4 - Mine affected water release during flow events** when measured at the monitoring points specified in **Table F1 - Mine affected water release points, sources and receiving waters**.

Table F4 - Mine affected water release during flow events

Receiving waters/ stream	Release Point (RP)	Gauging station(s)	Gauging Station Latitude (Decimal degrees, GDA94)	Gauging Station Longitude (Decimal degrees, GDA94)	Receiving Water Flow Recording Frequency	Receiving Water Flow Criteria for discharge	Maximum release rate (for all combined release point flows) m^3/s
Mary River	MRP1 – Discharge pipeline release point	GS1 Sunwater Mary Barrage	25.58806	152.62360	Daily	Total Flow <150 ML/day	No Release allowed
						Total Flow >150 ML/day	0.1
		GS2 Sunwater Tinana Barrage	25.56917	152.71917		Total Flow >300 ML/day	0.2

F11	The daily quantity of mine affected water released from each release point must be measured and recorded.
F12	Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build-up of sediment in such waters.
F13	**Notification of Release Event** The environmental authority holder must notify the administering authority as soon as practicable and no later than **24 hours** after commencing to release mine affected water to the receiving environment. Notification must include the submission of written advice to the administering authority of the following information: a) release commencement date/time; b) details regarding the compliance of the release with the conditions of Department Interest: Water in this environmental authority (that is, contaminant limits, natural flow, discharge volume); c) release point; d) release rate; e) release salinity; f) receiving water including the natural flow rate.

F14	The environmental authority holder must notify the administering authority as soon as practicable and nominally no later than **24 hours** after cessation of a release event of the cessation of a release notified under **Condition F13** and within **28 days** provide the following information in writing: a) release cessation date/time; b) natural flow rate in receiving water; c) volume of water released; d) details regarding the compliance of the release with the conditions of **Schedule F – Water** of this environmental authority (i.e. contaminant limits, natural flow, discharge volume); e) all in-situ water quality monitoring results; f) any other matters pertinent to the water release event. Note: Successive or intermittent releases occurring within **24 hours** of the cessation of any individual release can be considered part of a single release event and do not require individual notification for the purpose of compliance with **Conditions F13** and **F14**, provided the relevant details of the release are included within the notification provided in accordance with **Conditions F13** and **F14**.
F15	**Notification of Release Event Exceedance** If the release limits defined in **Table F2 - Mine affected water release limits** are exceeded, the holder of the environmental authority must notify the administering authority within **24 hours** of receiving the results.
F16	The environmental authority holder must, within **28 days** of a release that is not compliant with the conditions of this environmental authority, provide a report to the administering authority detailing: a) the reason for the release; b) the location of the release; c) the total volume of the release and which (if any) part of this volume was non-compliant; d) the total duration of the release and which (if any) part of this period was non-compliant; e) all water quality monitoring results (including all laboratory analyses); f) identification of any environmental harm as a result of the non-compliance; g) all calculations; h) any other matters pertinent to the water release event.
F17	**Receiving Environment Monitoring Program (REMP)** The quality of the receiving waters as part of the REMP must be monitored at the locations specified in **Table F6 - Receiving water monitoring points** and depicted in **Figure 5** attached to this environmental authority.

Table F6 - Receiving water monitoring points

Monitoring Point	Receiving Waters Location Description	Latitude (Decimal degree, GDA 94)	Longitude (Decimal degree, GDA 94)
Upstream Background Monitoring Points (noting that Mary River at point of discharge is tidal)			
W1	Mary River Queens Park Boat Ramp	25.539115°	152.706977°
W2	Mary River Upstream of Dundathu	25.487129°	152.738037°
Downstream Monitoring Points (noting that Mary River at point of discharge is tidal)			
W3	Mary River Downstream of Dundathu	25.486601°	152.747454°
W4	Mary River HEV Zone boundary	25.507081°	152.782611°
W5	Mary River Beaver Rock Boat Ramp	25.500707°	152.835815°
W6*	Mary River Power Island	25.450681°	152.882649°

* *Note: the location of monitoring point W6 is not shown correctly in* ***Figure 5*** *attached to this environmental authority.*

F18	All determinations of water quality and biological monitoring must be performed by an appropriately qualified person.
F19	The environmental authority holder must develop and implement a Receiving Environment Monitoring Program (REMP) to monitor, identify and describe any adverse impacts to surface water environmental values, quality and flows due to the authorised mining activity in accordance with the latest version of the Department's Receiving Environment Monitoring Program (REMP) Guideline. This must include monitoring the effects of the mine on the receiving environment periodically (under natural flow conditions) and while mine affected water is being discharged from the site. For the purposes of the REMP, the receiving environment is the waters of the Mary River and connected or surrounding waterways within 5 km of the release. The REMP should encompass any sensitive receiving waters or environmental values downstream of the authorised mining activity that will potentially be directly affected by an authorised release of mine affected water. As a minimum, monitoring points should include those specified in **Table F6 - Receiving water monitoring points** and all parameters specified in **Table F2 - Mine affected water release limits** and **Table F3 - Release contaminant trigger investigation levels, potential contaminants**.
F20	A REMP Design Document that addresses the requirements of the REMP must be prepared and made available to the administering authority upon request.

F21	A report outlining the findings of the REMP, including all monitoring results and interpretations must be prepared annually and made available on request to the administering authority. This must include an assessment of background reference water quality, the condition of downstream water quality compared against water quality objectives, and the suitability of current discharge limits to protect downstream environmental values.
F22	**Water Reuse** Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third party (with the consent of the third party).
F23	**Annual Water Monitoring Report** The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format: a) the date on which the sample was taken; b) the time at which the sample was taken; c) the monitoring point at which the sample was taken; d) the measured or estimated daily quantity of mine affected water released from all release points; e) the release flow rate at the time of sampling for each release point; f) the results of all monitoring and details of any exceedances of the conditions of this environmental authority; g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.
F24	**Temporary Interference with Waterways** Destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Natural Resources and Mines (or its successor) *Guideline – Activities in a Watercourse, Lake or Spring associated with Mining Activities*.
F25	**Water Management Plan** A Water Management Plan must be developed by an appropriately qualified person and implemented.
F26	**Stormwater and Water Sediment Controls** An Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of stormwater.

F27	Stormwater, other than mine affected water, is permitted to be released to waters from: a) erosion and sediment control structures that are installed and operated in accordance with the Erosion and Sediment Control Plan required by **Condition F26** b) water management infrastructure that is installed and operated, in accordance with a Water Management Plan that complies with **Condition F25**, for the purpose of ensuring water does not become mine affected water.

Agency interest: Sewage Treatment	
Condition number	**Condition**
G1	The only contaminant permitted to be released to land is treated sewage effluent in compliance with the release limits stated in **Table G1 - Contaminant release limits to land.**

Table G1 - Contaminant release limits to land

Contaminant	Unit	Release limit	Limit type	Frequency
5 day Biochemical oxygen demand (BOD)	mg/L	20	Maximum	Monthly
Total suspended solids	mg/L	30	Maximum	Monthly
Nitrogen	mg/L	30	Maximum	Monthly
Phosphorus	mg/L	15	Maximum	Monthly
E-coli	Organisms/100ml	1000	Maximum	Monthly
pH	pH units	6.0 – 9.0	Range	Monthly

G2	Treated sewage effluent may only be released to land in accordance with the conditions of this approval at the following locations: a) within the designated effluent irrigation area(s); b) other land for the purpose of dust suppression and/or firefighting.
G3	The application of treated effluent to land must be carried out in a manner such that: a) vegetation is not damaged; b) there is no surface ponding of effluent; c) there is no run-off of effluent.
G4	If areas irrigated with effluent are accessible to employees or the general public, prominent signage must be provided advising that effluent is present and care should be taken to avoid consuming or otherwise coming into unprotected contact with the effluent.

G5	All sewage effluent released to land must be monitored at the frequency and for the parameters specified in **Table G1 - Contaminant release limits to land.**
G6	The daily volume of effluent release to land must be measured and records kept of the volumes of effluent released.
G7	When circumstances prevent the irrigation or beneficial reuse of treated sewage effluent such as during or following rain events, waters must be directed to a wet weather storage or alternative measures must be taken to store/lawfully dispose of effluent.
G8	A minimum area of **3650m^2** of land, excluding any necessary buffer zones, must be utilised for the irrigation and/or beneficial reuse of treated sewage effluent.
G9	Treated sewage effluent must only be supplied to another person or organisation that has a written plan detailing how the user of the treated sewage effluent will comply with their general environmental duty under section 319 of the Act whilst using the treated sewage effluent.

Agency interest: Land and rehabilitation	
Condition number	**Condition**
H1	Land disturbed by mining must be rehabilitated in accordance with **Table H1 - Rehabilitation Requirements.**

Table H1 - Rehabilitation Requirements

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
Final Voids	Void	Safe	The final voids will be safe for humans and animals on decommissioning and into the foreseeable future.	Presence of permanent safety barriers and signage around the final void.	Evidence in rehabilitation report that signage and safety barriers have been installed to limit access to the final void. Safety barriers are consistent with the *Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland – Open Pit Rehabilitation* (DME 1995) or equivalent guidelines relevant at the time of rehabilitation). Safety signage is consistent with the requirements of the *Coal Mining, Safety and Health Act 1999* or equivalent legislation at the time of mine rehabilitation.
				Safety assessment of the final void to ensure there is no risk to humans or animals in the event of a failure.	Certification that the final void is safe and stable now and for the foreseeable future.

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
		Non-Polluting	The final voids will not be a source of environmental harm to the receiving environment on decommissioning and into the foreseeable future.	Void water body water quality monitoring.	Water quality within the final void water body maintains environmental values required for the defined sustainable land use.
				Downstream surface waters and groundwater receiving waters monitoring.	Environmental values of receiving surface waters are not impacted by water from the mine void. Water quality of receiving surface waters remains consistent with upstream/reference site data Post-mining, water quality of the surrounding groundwater aquifers shall remain consistent with baseline and reference data.
				Monitoring water level in the final void & hydraulic modelling to predict long term water levels.	Evidence in the rehabilitation report that the final void has a low risk of overtopping (as detailed in the Post Mine Land Use Plan) on decommissioning and for the foreseeable future.
		Stable	Very low probability of wall failure, slippage or rock falls that will cause significant environmental harm	Geotechnical studies of the final void.	Geotechnical evidence/report supporting a very low probability of failure or slippage causing environmental harm.
				Past record of slope failure during mining.	Evidence in rehabilitation report that appropriate control measures are in place to prevent recurrence.
			Landform design meets criteria.	Slope angle and length.	Slopes in 'competent rock' to a maximum of 65 degrees and in 'incompetent rock' to a maximum of 45 degrees.
			Low probability of significant erosion.	Visual evidence of erosion.	Evidence in rehabilitation report that erosion is being managed with the required contour banks, interceptor channels and drains in place and functioning to divert water away from the highwall face.
		Sustainable land use	Establish a water body that is safe for native fauna and is consistent with the end land use of native habitat.	Water quality monitoring.	Water quality in the final void shall remain within ANZECC livestock drinking water limits.

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
Dams	Regulated Dams	Safe	Site is safe for all humans and animals on decommissioning and for the foreseeable future.	Dams are decommissioned and rehabilitated in full accordance with the decommissioning requirements specified in the operational plan for the structure.	Certification from a suitably qualified person that the structure has been decommissioned and rehabilitated in full accordance with the decommissioning requirements specified in the operational plan for the structure.
				Contaminated land site investigation.	The land has either been removed from the environmental management register or the land has a site management plan approved.
		Non-polluting	Hazardous material adequately managed, presenting a low risk of environmental harm.	Contaminated land site investigations.	The land has either been removed from the environmental management register or the land has a site management plan approved.
				Water quality monitoring.	Post-mining, water quality of the receiving surface water courses should meet water quality limits described in the EA, or should remain consistent with upstream / reference site data where the limits of the EA are otherwise exceeded due to other contributing sources (natural or otherwise). Post-mining, water quality of the surrounding groundwater aquifers shall remain consistent with baseline and/or reference data.
		Stable	Vegetative cover to minimise erosion.	Percentage ground cover.	Evidence that the percentage ground cover of the rehabilitated areas is statistically equivalent to analogue sites.
		Sustainable land use	Vegetation and habitat established consistent with agreed post mine land use.	Monitoring of vegetation type, density and rejuvenation.	Evidence that the vegetation species richness/composition and vegetation cover/density of the rehabilitated areas is statistically equivalent to analogue sites and is self-sustaining over time.
			Soil properties support desired land use.	Soil nutrient testing.	Evidence that soil nutrient levels are statistically equivalent to analogue sites.
	Other site dams and sediment and surface-water control infrastructure	Safe	Site is safe for all humans and animals on decommissioning and for the foreseeable future.	Soil testing in potentially contaminated areas.	The land has either been removed from the environmental management register or the land has a site management plan approved.

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
		Non-polluting	Hazardous material adequately managed, presenting a low risk of environmental harm.	Water quality monitoring.	Post-mining water quality of the receiving surface water courses should meet water quality limits described in the EA, or should remain consistent with upstream / reference site data where the limits of the EA are otherwise exceeded due to other contributing sources (natural or otherwise). Post-mining water quality of the surrounding groundwater aquifers shall remain consistent with baseline and/or reference data.
		Stable	Vegetative cover to minimise erosion.	Percentage ground cover.	Evidence that the percentage ground cover of the rehabilitated areas is statistically equivalent to analogue sites.
		Sustainable land use	Vegetation and habitat established consistent with agreed post mine land use.	Monitoring of vegetation type and density.	Evidence that the vegetation species richness/composition and vegetation cover/density of the rehabilitated areas is statistically equivalent to analogue sites.
			Soil properties support desired land use.	Soil nutrient testing.	Evidence that soil nutrient levels are statistically equivalent to analogue sites.
			Establish self-sustaining natural vegetation.	Monitoring of species composition, species richness, and weed abundance.	Evidence that vegetation species composition, richness and weed abundance of rehabilitated areas is statistically equivalent to analogue sites.
Infrastructure	Buildings; Roads, Exploration Areas; CHPP; Rail Loop, Load-out Facility; Hardstand Areas; ROM Pad; Stockpile Areas; Chemical and Fuels Storages.	Safe	Site is safe for humans and animals on decommissioning and for the foreseeable future.	Infrastructure removed or retained by agreement.	Evidence in the rehabilitation report that adequate safety measures are in place for all infrastructure retained by agreement.
		Non-polluting	Hazardous material adequately managed, presenting a low risk of environmental harm.	Contaminated land site investigation.	The land has either been removed from the environmental management register or the land has a site management plan approved

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
				Water quality monitoring.	For a period of 3 consecutive years post-mining, water quality of the receiving surface water courses should meet water quality limits described in the EA, or should remain consistent with upstream / reference site data where the limits of the EA are otherwise exceeded due to other contributing sources (natural or otherwise). For a period of 3 consecutive years post-mining, water quality of the surrounding groundwater aquifers shall remain consistent with baseline and/or reference data.
		Stable	Vegetative cover to minimise erosion.	Percentage ground cover.	Evidence that the percentage ground cover of the rehabilitated areas is statistically equivalent to analogue sites.
		Sustainable land use	Vegetation and habitat established consistent with agreed post mine land use.	Monitoring of vegetation type and density	Evidence that the vegetation species richness/composition and vegetation cover/density of the rehabilitated areas is statistically equivalent to analogue sites.
			Soil properties support desired land use.	Soil nutrient testing.	Evidence that soil nutrient levels are statistically equivalent to analogue sites.
			Establish self-sustaining natural vegetation	Monitoring of species composition, species richness, and weed abundance.	Evidence that vegetation species composition, richness and weed abundance of rehabilitated areas is statistically equivalent to analogue sites.
Waste Disposal	Spoil Dumps (both In-pit and Out-of-pit)	Safe	The spoil dumps will be safe for humans and animals on decommissioning and into the foreseeable future.	Safety assessment of slopes that are >30 degrees and > 5 metres in height.	Certification in rehabilitation report that slopes have been assessed as safe and are expected to remain so for the foreseeable future. Safety signage is consistent with the requirements of the *Coal Mining, Safety and Health Act 1999* or equivalent legislation at the time of mine rehabilitation.
		Non-polluting	Hazardous material adequately managed.	Engineering supervision and design.	Certification in the rehabilitation report that the specified minimum cover thickness is in place.

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
			The spoil dumps will not be a source of serious environmental harm to the receiving environment on decommissioning and into the foreseeable future.	Downstream surface water and groundwater monitoring.	For a period of 3 consecutive years post-mining, water quality of the receiving surface water courses should meet water quality limits described in the EA, or should remain consistent with upstream / reference site data where the limits of the EA are otherwise exceeded due to other contributing sources (natural or otherwise). For a period of 3 consecutive years post-mining, water quality of the surrounding groundwater aquifers shall remain consistent with baseline and reference data.
		Stable	Minimal probability of slope slippage that will cause significant environmental harm.	Geotechnical studies of the spoil dumps.	Geotechnical evidence/report supporting a very low probability of failure or slippage causing environmental harm.
				Past record of slope failure during mining.	Evidence in rehabilitation report that appropriate control measures are in place to prevent recurrence.
			Landform design meets criteria.	Slope angle and length.	A maximum angle of 9.5 degrees (1V:6H) is achieved for all dump slopes above natural surface.
			Vegetative cover to minimise erosion.	Percentage ground cover.	Evidence that the percentage ground cover of the rehabilitated areas is statistically equivalent to analogue sites.
			Low probability of significant erosion.	Visual observations of erosion.	Evidence in rehabilitation report that required contour banks, interceptor channels and drains are in place and functioning to divert catchment and manage surface runoff.
		Sustainable land use	Vegetation and habitat established consistent with agreed post mine land use.	Monitoring of vegetation type and density.	Evidence that the vegetation species richness/composition and vegetation cover/density of the rehabilitated areas is statistically equivalent to analogue sites.
			Soil properties support desired land use.	Soil nutrient testing.	Evidence that soil nutrient levels are statistically equivalent to analogue sites.
			Establish self-sustaining natural vegetation.	Monitoring of species composition, species richness, and weed abundance.	Evidence that vegetation species composition, richness and weed abundance of rehabilitated areas is statistically equivalent to analogue sites.

H2	Rehabilitation must commence progressively in accordance with the plan of operations.
H3	**Contaminated Land** Before applying for surrender of a mining lease, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the mining lease which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use.
H4	Before applying for progressive rehabilitation certification for an area, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the area the subject of the application which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use under **Condition H1**.
H5	Minimise the potential for contamination of land by hazardous contaminants.

Agency interest: Biodiversity Offsets	
Condition number	**Condition**
J1	The holder of this environmental authority must take all reasonable and practicable measures to firstly avoid and then minimise impacts on any *State Significant Biodiversity Value*.
J2	The holder of this environmental authority must provide an *environmental offset* for at least, but not limited to, the *significant residual impacts* on the *State Significant Biodiversity Values* shown in **Table J1 - Details of relevant State Significant Biodiversity Values** below.

Table J1 - Details of relevant State Significant Biodiversity Values

State Significant Biodiversity Value	Likely extent impacted by mining activities (ha)	Form of offset delivery required
Remnant – Of Concern Regional Ecosystem 12.3.11; Essential Habitat – Koala; Watercourse (Stream Order1).	11.03	Land Based Offset, Offset Payment, or combination of Land Based Offset and Offset Payment
Essential Habitat – Pineapple Zamia in Regional Ecosystem 12.3.11	2.65	
Remnant – Of Concern Regional Ecosystem 12.5.9	8.7	
Wetland Vegetation Management Act 1999; Essential Habitat – Pineapple Zamia in Regional Ecosystem 12.5.9	3.03	
Remnant – Of Concern Regional Ecosystem 12.5.9a	2.58	
Essential Habitat – Wallum Froglet; Essential Habitat – Koala; Watercourse (Stream Order 1) in Regional Ecosystem 12.3.5	39.52	
Essential Habitat – Pineapple Zamia in Regional Ecosystem 12.3.5	15.02	
Essential Habitat – Wallum Froglet; Essential Habitat – Koala in Regional Ecosystem 12.5.4a	483.1	
Essential Habitat – Pineapple Zamia in Regional Ecosystem 12.5.4a	25.46	
Essential Habitat – Pineapple Zamia in Regional Ecosystem 12.5.4	103.85	
Connectivity in all Remanet Regional Ecosystem areas	1013	
Vulnerable Species Habitat under *Nature Conservation Act 1992* - Wallum Froglet in Regional Ecosystem 12.3.5 / 22a	39.52	Legally Secured Land Based Offset
Vulnerable Species Habitat under *Nature Conservation Act 1992* - Wallum Froglet in Regional Ecosystem 12.3.12 / 21a	483.1	

Note: Offsets for different *State Significant Biodiversity Values* may be co-located on the same land where the associated *State Significant Biodiversity Values* are provided for.

J3	The holder of this environmental authority must deliver the offset in the form specified in **Table J1 - Details of relevant State Significant Biodiversity Values** for at least, but not limited to the *State Significant Biodiversity Values* shown.

J4	**Staging of offset** The holder of this environmental authority is permitted to deliver the offset required in stages in accordance with a **biodiversity offset plan** that meets the requirements of **Conditions J5** and **J7**.
J5	**Biodiversity Offset Plan** The holder of this environmental authority must submit a **biodiversity offset plan** to the administering authority for review no less than three months before the commencement of any stage requiring delivery of an offset. The holder of this environmental authority must consider any comment provided by the administering authority in relation to the **biodiversity offset plan**, and must incorporate the comments within the plan as soon as practicable.
J6	The holder of this environmental authority must not commence any mining activities that require an offset to be delivered (other than minor early works or any works otherwise authorised under an environmental authority held for exploration activities) for any stage until the **biodiversity offset plan** for the stage meets the requirements of **Conditions J5** and **J7**.
J7	The **biodiversity offset plan** must: a) identify each proposed stage of the project that may impact State Significant Biodiversity Values; b) ensure that an assessment for each stage is undertaken by an appropriately qualified person to identify the presence, type, and extent of any likely impacts to State Significant Biodiversity Values; c) include an assessment using the ecological equivalence methodology undertaken in accordance with the Ecological Equivalence Methodology Guideline – V1 October 2011 or an alternative approach approved by the administering authority. *NOTE: The holder of this environmental authority may apply to change the Biodiversity Offset Plan at any time, by submitting a new Biodiversity Offset Plan or an amendment to the plan to the administering authority for approval.*
J8	**Biodiversity offset strategy** Where the **biodiversity offset plan** identifies that the proposed mining activities for a stage of the project will potentially impact on State Significant Biodiversity Values, the holder of the environmental authority must develop a **biodiversity offset strategy** for the proposed stage of mining. *NOTE: The holder of this environmental authority may apply to change the biodiversity offset strategy for a mining stage, by submitting a new Biodiversity Offset Strategy or amendment to the strategy to the administering authority for approval.*

J9	The holder of this environmental authority must submit the **biodiversity offset strategy** required under **Condition J8** to the administering authority for review no less than **one (1) month** before the commencement of any stage requiring delivery of an offset, (other than minor early works or any works otherwise authorised under an environmental authority held for exploration activities). The holder of this environmental authority must consider any comment provided by the administering authority in relation to the **biodiversity offset strategy**, and must incorporate the comments within the **biodiversity offset strategy** as soon as practicable.
J10	The **biodiversity offset strategy** for the proposed stage of mining required under **Condition J8** must: a) quantify the offset requirement for that stage of mining and include a detailed description of the surveyed locations of State Significant Biodiversity Values, as assessed in the **biodiversity offset plan** required under **Condition J7**; and b) identify the required form of delivery for the offset requirement for that stage (as a legally secured land based offset, an offset payment, or combination of both); and c) for land based offset components, identify the land within the South East Queensland bioregion (including the land on which the relevant mining activity is carried out) or on other land in the State which may have the relevant State Significant Biodiversity Values and identify the proposed process by which that land will be: i. investigated, including provision for an ecological equivalence assessment of the impacted area and offset area(s) to be undertaken in accordance with the methodology outlined in the *Ecological Equivalence Methodology Guideline – V1 October 2011* or an alternative approach approved by the administering authority; and ii. legally secured; and d) for legally secured offset components to be delivered via an offset transfer, indicate the level of the offset delivery for which the offset transfer is proposed and the proposed process for entering into an agreement with an offset broker; and e) for any offset payment component, detail the type and extent of the State Significant Biodiversity Values (in hectares) for which the offset payment is proposed.
J11	**Delivery of offsets** The holder of this environmental authority must **legally secure** the component of the offset for the stage for the State Significant Biodiversity Values for the stage specified in **Table J1 - Details of relevant State Significant Biodiversity Values**, and any other State Significant Biodiversity Values that are subsequently identified as being delivered as a Legally Secured Land Based Offset, using a **legally binding mechanism** within **12 months** of submitting the biodiversity offset strategy for the stage.
J12	The holder of this environmental authority must provide the administering authority with a legally executed contractual arrangement with an offset broker for the delivery of any offset transfer proposed for a stage, no less than **one (1) month** before the commencement of any stage of the mining activities for which an offset transfer is proposed.

J13	The holder of this environmental authority must enter into an agreement with the administering authority for the delivery of offset transfers prior to commencement of any stage of the mining activities proposing an offset transfer.
J14	The holder of this environmental authority must ensure that any offset transfer proposed is secured within **12 months** of commencement of the signing of the agreement required in **Condition J13**, and must provide financial assurance to cover any failure to secure the required offset. The financial assurance must be in the form of an unconditional bank guarantee for the value identified to be delivered as an offset transfer for the stage in **Condition J10**.
J15	The holder of this environmental authority must pay any component of the offset that will be delivered as an offset payment: a) for the amount in full as calculated in accordance with **Condition J16**; and b) in accordance with any commitment given in the **biodiversity offset strategy** for the stage; and c) to the offset account administered by the administering authority within **4 months** of submitting the **biodiversity offset strategy** for the stage
J16	The holder of this environmental authority must calculate any component of the offset that will be delivered as an offset payment in accordance with the following calculation: Offset payment = Land value + Administration costs + Management costs **Where** Land value = area impacted (ha) x 5 x $32,000 Administration costs = $60,000 x percentage multiplier for impacted area (ha) taken from Table J1 - Administrative costs area based percentage multiplier Management costs = (area impacted (ha) x 5 x $7000) + $21,000

Table J1 – Administrative costs area based percentage multiplier

Area impacted (ha)	Percentage multiplier
Five hectares or less	25%
Over five hectares but less than 20 hectares	50%
20 hectares but less than 50 hectares	75%
Over 50 hectares	100%

J17	**Offset area management plan** The holder of this environmental authority must develop an **offset area management plan** for the management of legally secured land based offset areas.

J18	The **offset area management plan** must contain the following information: a) management and environmental objectives and outcomes, performance criteria and monitoring requirements; b) an analysis of the risks to achieve the objectives and outcomes; actions to minimise the risks and remedial action that will be undertaken if any of the risks occur; c) any restrictions imposed on the use of the offset area, including the management/control of weeds, stock and site access; d) the activities that will be undertaken to achieve the objectives and outcomes, including the management/control of weeds, site access, erosion and sediment and fire management; e) a map that shows spatially the areas subject to the offset area management plan; and f) a monitoring and reporting programme.
J19	The environmental authority holder must submit the **offset area management plan** to the administering authority for review no later than **three (3) months** after the land has been legally secured under **Condition J11**. The holder of this environmental authority must consider any comment provided by the administering authority in relation to the offset area management plan, and must incorporate the comments within the plan as soon as practicable.
J20	The environmental authority holder must manage all land legally secured under **Condition J11** in accordance with the **offset area management plan**.

Agency interest: Structures	
Condition number	**Condition**
X1	**Assessment of hazard category** The **consequence category** of any structure must be **assessed** by a **suitably qualified and experienced person** in accordance with the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635) at the following times: a) prior to the design and **construction** of the **structure,** if it is not an **existing structure**; or b) if it is an existing structure, prior to the adoption of this schedule; or c) prior to any change in its purpose or the nature of its stored contents.
X2	A **consequence assessment** report and **certification** must be prepared for each **structure assessed** and the report may include a consequence assessment for more than one structure.
X3	Certification must be provided by the **suitably qualified and experienced person** who undertook the assessment, in the form set out in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635).*

X4	**Design and construction[1] of a regulated structure** All **regulated structures** must be designed by, and **constructed**[2] under the supervision of, a **suitably qualified and experienced person** in accordance with the requirements of the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635).*
X5	Construction of a regulated structure is prohibited unless the environmental authority holder has submitted a **consequence category assessment** report and certification to the administering authority has been **certified** by a **suitably qualified and experienced person** for the **design** and **design plan** and the associated operating procedures in compliance with the relevant condition of this **authority**.
X6	Certification must be provided by the suitably qualified and experienced person who oversees the preparation of the design plan in the form set out in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)*, and must be recorded in the Regulated Dams/Levees register.
X7	**Regulated structures** must: a) be designed and constructed in accordance with and conform to the requirements of the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)*; b) be designed and constructed with due consideration given to ensuring that the design integrity would not be compromised on account of: (i) floodwaters from entering the regulated dam from any watercourse or drainage line; and (ii) wall failure due to erosion by floodwaters arising from any watercourse or drainage line.
X8	**Certification** by the **suitably qualified and experienced person** who supervises the construction must be submitted to the administering authority on the completion of **construction** of the regulated **structure**, and state that: a) the 'as constructed' drawings and specifications meet the original intent of the design plan for that regulated **structure**; b) construction of the regulated structure is in accordance with the design plan;

[1] Construction of a dam includes modification of an existing dam — refer to the definitions.
[2] Certification of design and construction may be undertaken by different persons.

X9	**Operation of a regulated structure** Operation of a **regulated structure** is prohibited unless: a) the environmental authority holder has submitted to the administering authority: (i) one paper copy and one electronic copy of the design plan and **certification** of the 'design plan' in accordance with **Condition X8**, and (ii) a set of 'as constructed' drawings and specifications, and (iii) certification of those 'as constructed drawings and specifications' in accordance with **Condition X8**, and (iv) where the regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the Design Storage Allowance (DSA) volume across the system, a copy of the certified system design plan; (v) the requirements of this environmental authority relating to the construction of the regulated structure have been met; (vi) the environmental authority holder has entered the details required under this authority, into a Register of Regulated Structures; and (vii) there is a current operational plan for the regulated structures.
X10	Each **regulated structure** must be maintained and operated, for the duration of its operational life until decommissioned and rehabilitated, in a manner that is consistent with the current operational plan and, if applicable, the current design plan and associated certified 'as constructed' drawings.
X11	**Mandatory reporting level** **Conditions X12** to **X15** inclusive only apply to Regulated Structures which have not been certified as low consequence category for 'failure to contain – overtopping'.
X12	The **Mandatory Reporting Level** (the **MRL**) must be marked on a **regulated dam** in such a way that during routine inspections of that **dam**, it is clearly observable.
X13	The environmental authority holder must, as soon as practical and within **forty-eight (48) hours** of becoming aware, notify the administering authority when the level of the contents of a **regulated dam** reaches the **MRL**.
X14	The environmental authority holder must, immediately on becoming aware that the **MRL** has been reached, act to prevent the occurrence of any unauthorised discharge from the **regulated dam**.
X15	The environmental authority holder must record any changes to the **MRL** in the Register of Regulated Structures.
X16	**Design storage allowance** The environmental authority holder must assess the performance of each regulated dam or linked containment system over the preceding November to May period based on actual observations of the available storage in each regulated dam or linked containment system taken prior to 1 July of each year.

X17	By **1 November** of each year, storage capacity must be available in each regulated dam (or network of linked containment systems with a shared **DSA** volume), to meet the **DSA** volume for the dam (or network of linked containment systems).
X18	The environmental authority holder must, as soon as possible and within forty-eight (48) hours of becoming aware that the regulated dam (or network of linked containment systems) will not have the available storage to meet the **DSA** volume on **1 November** of any year, notify the administering authority.
X19	The environmental authority holder must, immediately on becoming aware that a regulated dam (or network of linked containment systems) will not have the available storage to meet the **DSA** volume on 1 November of any year, act to prevent the occurrence of any unauthorised discharge from the regulated dam or linked containment systems.
X20	**Annual inspection report** Each **regulated structure** must be inspected each calendar year by a **suitably qualified and experienced person**.
X21	At each annual inspection, the condition and adequacy of all components of the **regulated structure** must be assessed and a **suitably qualified and experienced person** must prepare an **annual inspection report** containing details of the assessment and include recommended actions to ensure the integrity of the **regulated structure.**
X22	The **suitably qualified and experienced person** who prepared the **annual inspection report** must certify the report in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)*.
X23	The environmental authority holder must: a) Within **20 business days** of receipt of the annual inspection report, provide to the administering authority: (i) The recommendations section of the annual inspection report; and (ii) If applicable, any actions being taken in response to those recommendations; and b) If, following receipt of the recommendations and (if applicable) actions, the administering authority requests a full copy of the annual inspection report from the environmental authority holder, provide this to the administering authority within 10 business days of receipt of the request.
X24	**Transfer arrangements** The environmental authority holder must provide a copy of any reports, documentation and certifications prepared under this authority, including but not limited to any Register of Regulated Structures, consequence assessment, design plan and other supporting documentation, to a new environmental authority holder on transfer of this **authority**.

X25	**Decommissioning and rehabilitation** Dams must not be abandoned but be either: a) decommissioned and rehabilitated to achieve compliance with **Condition X26**; or b) be left in-situ for a beneficial use(s) provided that: (i) it no longer contains contaminants that will migrate into the environment; and (ii) it contains water of a quality that is demonstrated to be suitable for its intended beneficial use(s); and (iii) the administering authority, the holder of the environmental authority and the landholder agree in writing that the dam will be used by the landholder following the cessation of the environmentally relevant activity(ies).
X26	After decommissioning, all significantly disturbed land caused by the carrying out of the environmentally relevant activity(ies) must be rehabilitated to meet the following final acceptance criteria: a) the landform is safe for humans and fauna; b) the landform is stable with no subsidence or erosion gullies for at least **three (3) years**; c) any contaminated land (e.g. contaminated soils) is remediated and rehabilitated; d) not allowing for acid mine drainage; or e) there is no ongoing contamination to waters (including groundwater); f) rehabilitation is undertaken in a manner such that any actual or potential acid sulfate soils on the area of significant disturbance are treated to prevent or minimise environmental harm in accordance with the *Instructions for the treatment and management of acid sulfate soils (2001)* g) all significantly disturbed land is reinstated to the pre-disturbed soil suitability class; h) for land that is not being cultivated by the landholder: a. groundcover, that is not a declared pest species is established and self-sustaining b. vegetation of similar species richness and species diversity to pre-selected analogue sites is established and self-sustaining, and c. the maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance caused by carrying out the environmentally relevant activity(ies). i) for land that is to be cultivated by the landholder, cover crop is revegetated, unless the landholder will be preparing the site for cropping within **3 months** of environmentally relevant activity(ies) being completed.
X27	**Register of Regulated Dams** A **Register of Regulated Dams** must be established and maintained by the environmental authority holder for each **regulated dam**.

X28	The environmental authority holder must provisionally enter the required information in the **Register of Regulated Dams** when a design plan for a **regulated dam** is submitted to the administering authority.
X29	The environmental authority holder must make a final entry of the required information in the **Register of Regulated Dams** once compliance with **Condition X8** has been achieved.
X30	The **holder** must ensure that the information contained in the **Register of Regulated Dams** is current and complete on any given day.
X31	All entries in the **Register of Regulated Dams** must be approved by the chief executive officer for the holder of this authority, or their delegate, as being accurate and correct.
X32	The environmental authority holder must, at the same time as providing the annual return, supply to the administering authority a copy of the records contained in the Register of Regulated Dams, in the electronic format required by the administering authority.

END OF CONDITIONS

Definitions

Words and phrases used throughout this environmental authority are defined below. Where a definition for a term used in this environmental authority is not provided within this environmental authority, but is provided in the Environmental Protection Act 1994 or subordinate legislation, the definition in the EP Act or subordinate legislation must be used.

'acid mine drainage' means any contaminated discharge emanating from a mining activity formed through a series of chemical and biological reactions, when geological strata is disturbed and exposed to oxygen and moisture.

'affected person' is someone whose drinking water can potentially be impacted as a result of discharges from a dam or their life can be put at risk due to dwellings or workplaces being in the path of a dam break flood.

'airblast overpressure' means energy transmitted from the blast site within the atmosphere in the form of pressure waves. The maximum excess pressure in this wave, above ambient pressure is the peak airblast overpressure measured in decibels linear (dBL).

'annual inspection report' means an assessment prepared by a suitably qualified and experienced person containing details of the assessment against the most recent consequence assessment report and design plan (or system design plan);

a) against recommendations contained in previous annual inspections reports;
b) against recognised dam safety deficiency indicators;
c) for changes in circumstances potentially leading to a change in consequence category;
d) for conformance with the conditions of this authority;
e) for conformance with the 'as constructed' drawings;
f) for the adequacy of the available storage in each regulated dam, based on an actual observation or observations taken after 31 May each year but prior to 1 November of that year, of accumulated sediment, state of the containment barrier and the level of liquids in the dam (or network of linked containment systems);
g) for evidence of conformance with the current operational plan.

'annual exceedance probability' or **'AEP'** the probability that at least one event in excess of a particular magnitude will occur in any given year.

'appropriately qualified person' means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relating to the subject matter using the relevant protocols, standards, methods or literature.

'assessed and assessment' by a suitably qualified and experienced person in relation to a consequence assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit of the assessment:

a) exactly what has been assessed and the precise nature of that determination;
b) the relevant legislative, regulatory and technical criteria on which the assessment has been based;
c) the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
d) the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

'associated works' in relation to a dam, means:

a) operations of any kind and all things constructed, erected or installed for that dam; and

b) any land used for those operations.

'authority' means an environmental authority or a development approval.

'background', with reference to the water schedule means the average of samples taken prior to the commencement of mining from the same waterway that the current sample has been taken.

'blasting' means the use of explosive materials to fracture:

a) rock, coal and other minerals for later recovery; or
b) structural components or other items to facilitate removal from a site or for reuse.

'certification' means assessment and approval must be undertaken by a suitably qualified and experienced person in relation to any assessment or documentation required by the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)*, including design plans, 'as constructed' drawings and specifications, construction, operation or an annual report regarding regulated structures, undertaken in accordance with the Board of Professional Engineers of Queensland Policy Certification by RPEQs (ID: 1.4 (2A)).

'certifying, certify or certified' have a corresponding meaning as 'certification'.

'chemical' means:

a) an agricultural chemical product or veterinary chemical product within the meaning of the *Agricultural and Veterinary Chemicals Code Act 1994 (Commonwealth)*; or
b) a dangerous good under the Australian Code for the Transport of Dangerous Goods by Road and Rail approved by the Australian Transport Council; or
c) a lead hazardous substance within the meaning of the Workplace Health and Safety Regulation 1997;
d) a drug or poison in the Standard for the Uniform Scheduling of Drugs and Poisons prepared by the Australian Health Ministers' Advisory Council and published by the Commonwealth; or
e) any substance used as, or intended for use as:
   (i) a pesticide, insecticide, fungicide, herbicide, rodenticide, nematocide, miticide, fumigant or related product; or
   (ii) a surface active agent, including, for example, soap or related detergent; or
   (iii) a paint solvent, pigment, dye, printing ink, industrial polish, adhesive, sealant, food additive, bleach, sanitiser, disinfectant, or biocide; or
   (iv) a fertiliser for agricultural, horticultural or garden use; or
   (v) a substance used for, or intended for use for mineral processing or treatment of metal, pulp and paper, textile, timber, water or wastewater; or
   (vi) manufacture of plastic or synthetic rubber.

'commercial place' means a workplace used as an office or for business or commercial purposes, which is not part of the mining activity and does not include employees' accommodation or public roads.

'consequence' in relation to a structure as defined, means the potential for environmental harm resulting from the collapse or failure of the structure to perform its primary purpose of containing, diverting or controlling flowable substances.

'consequence category' means a category, either low, significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)*.

'construction' or 'constructed' in relation to a dam includes building a new dam and modifying or lifting an existing dam, but does not include investigations and testing necessary for the purpose of preparing a design plan.

'dam' means a land-based structure or a void that contains, diverts or controls flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and **associated works**.

'dam crest volume' means the volume of material (liquids and/or solids) that could be within the walls of a dam at any time when the upper level of that material is at the crest level of that dam. That is, the instantaneous maximum volume within the walls, without regard to flows entering or leaving (eg via spillway).

'design plan' is a document setting out how all identified consequence scenarios are addressed in the planned design and operation of a regulated structure.

'design storage allowance' or 'DSA' means an available volume, estimated in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)* published by the administering authority, must be provided in a dam as at 1 November each year in order to prevent a discharge from that dam to an annual exceedance probability (AEP) specified in that manual.

'designer' for the purposes of a regulated dam, means the certifier of the design plan for the regulated dam.

'development approval' means a development approval under the *Integrated Planning Act 1997* or the *Sustainable Planning Act 2009* in relation to a matter that involves an environmentally relevant activity under the *Environmental Protection Act 1994*.

'disturbance' of land includes:

a) compacting, removing, covering, exposing or stockpiling of earth;
b) removal or destruction of vegetation or topsoil or both to an extent where the land has been made susceptible to erosion;
c) carrying out mining within a watercourse, waterway, wetland or lake;
d) the submersion of areas by tailings or hazardous contaminant storage and dam/structure walls;
e) temporary infrastructure, including any infrastructure (roads, tracks, bridges, culverts, dam/structures, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be removed after the mining activity has ceased; or
f) releasing of contaminants into the soil, or underlying geological strata.

However, the following areas are not included when calculating areas of 'disturbance':

a) areas off lease (e.g. roads or tracks which provide access to the mining lease);
b) areas previously disturbed which have achieved the rehabilitation outcomes;
c) by agreement with the administering authority, areas previously disturbed which have not achieved the rehabilitation objective(s) due to circumstances beyond the control of the mine operator (such as climatic conditions);
d) areas under permanent infrastructure. Permanent infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dam/structures, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be left by agreement with the landowner.
e) disturbance that pre-existed the grant of the tenure.

'EC' means electrical conductivity.

'effluent' treated waste water released from sewage treatment plants.

'emergency action plan' means documentation forming part of the operational plan held by the holder or a nominated responsible officer, that identifies emergency conditions that sets out procedures and actions that will be followed and taken by the dam owner and operating personnel in the event of an emergency. The actions are to minimise the risk and consequences of failure, and ensure timely warning to downstream communities

and the implementation of protection measures. The plan must require dam owners to annually update contact details that are part of the plan, and to comprehensively review the plan at least every five years.

'extreme storm storage' – means a storm storage allowance determined in accordance with the criteria in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)* published by the administering authority

'flowable substance' means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

'hazard' in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

'hazard category' means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in *Manual for Assessing Hazard Categories and Hydraulic Performance of Dams(EM635).*

'holder' means any person who is the holder of, or is acting under, that environmental authority.

'hydraulic performance' means the capacity of a regulated dam to contain or safely pass flowable substances based on the design criteria specified for the relevant consequence category in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635).*

'infrastructure' means water storage dams, levees, roads and tracks, buildings and other structures built for the purpose of the mining activity.

'land' in the 'land schedule' of this document means land excluding waters and the atmosphere, that is, the term has a different meaning from the term as defined in the *Environmental Protection Act 1994*. For the purposes of the *Acts Interpretation Act 1954*, it is expressly noted that the term 'land' in this environmental authority relates to physical land and not to interests in land.

'land use' means the selected post mining use of the land, which is planned to occur after the cessation of mining operations.

'leachate' means a liquid that has passed through or emerged from, or is likely to have passed through or emerged from, a material stored, processed or disposed of at the operational land which contains soluble, suspended or miscible contaminants likely to have been derived from the said material.

'Legally binding mechanism' may include one of the following:

- declaration of an area of high conservation value under the *Vegetation Management Act 1999*
- a covenant under the *Land Act 1994; Land Title Act 1994*
- gazettal as a protected area under the *Nature conservation Act 1992*, such as a nature refuge
- another mechanism administered and approved by the State.

'legally secure(d)' means an offset area that is:

- provided protection from clearing through the use of a legally binding mechanism
- supported by an offset area management plan that identifies the actions required to ensure an offset area is managed to meet the objectives of the offset area
- registered on title, certified or gazetted as required by the legally binding mechanism

'levee' means an embankment that only provides for the containment and diversion of stormwater or flood flows from a contributing catchment, or containment and diversion of flowable materials resulting from releases from other works, during the progress of those stormwater or flood flows or those releases; and does not store any significant volume of **water** or **flowable substances** at any other times.

'licensed place' means the mining activities carried out at the mining tenements listed on page 1 of this environmental authority.

'low consequence dam' means any dam that is not a high or significant consequence category as assessed using the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635).*

'm' means metres.

'mandatory reporting level' or 'MRL' means a warning and reporting level determined in accordance with the criteria in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)* published by the administering authority.

'manual' means the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)* published by the administering authority.

'measures' includes any measures to prevent or minimise environmental impacts of the mining activity such as bunds, silt fences, diversion drains, capping, and containment systems.

'mine affected water':

a) means the following types of water:
   (i) pit water, tailings dam water, processing plant water;
   (ii) water contaminated by a mining activity which would have been an environmentally relevant activity under Schedule 2 of the Environmental Protection Regulation 2008 if it had not formed part of the mining activity;
   (iii) rainfall runoff which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated, excluding rainfall runoff discharging through release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan to manage such runoff, provided that this water has not been mixed with pit water, tailings dam water, processing plant water or workshop water;
   (iv) groundwater which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated;
   (v) groundwater from the mine's dewatering activities;
   (vi) a mix of mine affected water (under any of paragraphs i)-v) and other water.
b) does not include surface water runoff which, to the extent that it has been in contact with areas disturbed by mining activities that have not yet been completely rehabilitated, has only been in contact with:
   (i) land that has been rehabilitated to a stable landform and either capped or revegetated in accordance with the acceptance criteria set out in the environmental authority but only still awaiting maintenance and monitoring of the rehabilitation over a specified period of time to demonstrate rehabilitation success; or
   (ii) land that has partially been rehabilitated and monitoring demonstrates the relevant part of the landform with which the water has been in contact does not cause environmental harm to waters or groundwater, for example:
      a. areas that are been capped and have monitoring data demonstrating hazardous material adequately contained with the site;

b. evidence provided through monitoring that the relevant surface water would have met the water quality parameters for mine affected water release limits in this environmental authority, if those parameters had been applicable to the surface water runoff; or

(iii) both.

'minor early works' means preconstruction surveying, establishment of work site security arrangements (including signs, fences, safety barriers and temporary security personnel facilities), demolition and removal of structures and required public utility works up to the boundary of construction sites, but does not include any vegetation clearing associated with these activities.

'modification' or 'modifying' (see definition of 'construction')

'mS/cm' means milli-Siemens per centimetre.

'NATA' means National Association of Testing Authorities, Australia.

'natural flow' means the flow of water through waters caused by nature.

'non polluting' means having no adverse impacts upon the receiving environment.

'operational plan' includes:

a) normal operating procedures and rules (including clear documentation and definition of process inputs in the DSA allowance);
b) contingency and emergency action plans including operating procedures designed to avoid and/or minimise environmental impacts including threats to human life resulting from any overtopping or loss of structural integrity of the regulated structure.

'peak particle velocity (ppv)' means a measure of ground vibration magnitude which is the maximum rate of change of ground displacement with time, usually measured in millimetres/second (mm/s).

'protected area' means – a protected area under the *Nature Conservation Act 1992*; or

a) a marine park under the *Marine Parks Act 1992*; or
b) a World Heritage Area.

'receiving environment' in relation to an activity that causes or may cause environmental harm, means the part of the environment to which the harm is, or may be, caused. The receiving environment includes (but is not limited to:

a) a watercourse;
b) groundwater; and
c) an area of land that is not specified in the table of activities at the start of this environmental authority.

The term does not include land that is specified in the table of activities at the start of this environmental authority.

'receiving waters' means the waters into which this environmental authority authorises releases of mine affected water.

'Register of Regulated Dams' includes:

a) Date of entry in the register;
b) Name of the dam, its purpose and intended/actual contents;
c) The consequence category of the dam as assessed using the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)*;
d) Dates, names, and reference for the design plan plus dates, names, and reference numbers of all document(s) lodged as part of a design plan for the dam;

e) Name and qualifications of the suitably qualified and experienced person who certified the design plan and 'as constructed' drawings;
f) For the regulated dam, other than in relation to any levees –
   (i) The dimensions (metres) and surface area (hectares) of the dam measured at the footprint of the dam;
   (ii) Coordinates (latitude and longitude in GDA94) within five metres at any point from the outside of the dam including its storage area
   (iii) Dam crest volume (megalitres);
   (iv) Spillway crest level (metres AHD).
   (v) Maximum operating level (metres AHD);
   (vi) Storage rating table of stored volume versus level (metres AHD);
   (vii) Design storage allowance (megalitres) and associated level of the dam (metres AHD);
   (viii) Mandatory reporting level (metres AHD);
g) The design plan title and reference relevant to the dam;
h) The date construction was certified as compliant with the design plan;
i) The name and details of the suitably qualified and experienced person who certified that the constructed dam was compliant with the design plan;
j) Details of the composition and construction of any liner;
k) The system for the detection of any leakage through the floor and sides of the dam;
l) Dates when the regulated dam underwent an annual inspection for structural and operational adequacy, and to ascertain the available storage volume for 1 November of any year;
m) Dates when recommendations and actions arising from the annual inspection were provided to the administering authority;
n) Dam water quality as obtained from any monitoring required under this authority as at 1 November of each year.

'regulated dam' means any dam in the significant or high consequence category as assessed using the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)* published by the administering authority.

'regulated structure' includes land-based containment structures, levees, bunds and voids, but not a tank or container designed and constructed to an Australian Standard that deals with strength and structural integrity.

'rehabilitation' the process of reshaping and revegetating land to restore it to a stable landform

'release event' means a surface water discharge from mine affected water storages or contaminated areas on the licensed place.

'RL' means reduced level, relative to mean sea level as distinct from depths to water.

'representative' means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

'saline drainage' The movement of waters, contaminated with salts, as a result of the mining activity.

'sensitive place' means:

a) a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
b) a motel, hotel or hostel; or
c) an educational institution; or
d) a medical centre or hospital; or
e) a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 1992* or a World Heritage Area; or

f) a public park or gardens.

Note: The definition of 'sensitive place' and 'commercial place' is based on Schedule 1 of EPP Noise. That is, a sensitive place is inside or outside on a dwelling, library & educational institution, childcare or kindergarten, school or playground, hospital, surgery or other medical institution, commercial & retail activity, protected area or an area identified under a conservation plan under *Nature Conservation Act 1992* as a critical habitat or an area of major interest, marine park under *Marine Parks Act 2004*, park or garden that is outside of the mining lease and open to the public for the use other than for sport or organised entertainment. A commercial place is inside or outside a commercial or retail activity.

A mining camp (i.e., accommodation and ancillary facilities for mine employees or contractors or both, associated with the mine the subject of the environmental authority) is not a sensitive place for that mine or mining project, whether or not the mining camp is located within a mining tenement that is part of the mining project the subject of the environmental authority. For example, the mining camp might be located on neighbouring land owned or leased by the same company as one of the holders of the environmental authority for the mining project, or a related company. Accommodation for mine employees or contractors is a sensitive place if the land is held by a mining company or related company, and if occupation is restricted to the employees, contractors and their families for the particular mine or mines which are held by the same company or a related company.

For example, a township (occupied by the mine employees, contractors and their families for multiple mines that are held by different companies) would be a sensitive place, even if part or all of the township is constructed on land owned by one or more of the companies.

'significant residual impact' means an adverse impact, whether direct or indirect, of the mining activities on all or part of *State Significant Biodiversity Value* that—

- remains, or will or is likely to remain, (whether temporarily or permanently) despite on-site mitigation measures for the mining activities; and
- is, or will or is likely to be, significant.

'spillway' means a weir, channel, conduit, tunnel, gate or other structure designed to permit discharges from the dam, normally under flood conditions or in anticipation of flood conditions.

'structure' means dam or levee.

'suitably qualified and experienced person' in relation to regulated structures means a person who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the *Professional Engineers Act 2002*, and has demonstrated competency and relevant experience:

- for regulated dams, an RPEQ who is a civil engineer with the required qualifications in dam safety and dam design.
- for regulated levees, an RPEQ who is a civil engineer with the required qualifications in the design of flood protection embankments.

Note: It is permissible that a suitably qualified and experienced person obtain subsidiary certification from an RPEQ who has demonstrated competence and relevant experience in either geomechanics, hydraulic design or engineering hydrology.

'system design plan' means a plan that manages an integrated containment system that shares the required DSA and/or ESS volume across the integrated containment system.

'the Act' means the *Environmental Protection Act 1994*.

'void' means any constructed, open excavation in the ground.

'watercourse' has the meaning in Schedule 4 of the *Environmental Protection Act 1994* and means a river, creek or stream in which water flows permanently or intermittently—

a) in a natural channel, whether artificially improved or not; or
b) in an artificial channel that has changed the course of the watercourse.

Watercourse includes the bed and banks and any other element of a river, creek or stream confining or containing water.

'water quality' means the chemical, physical and biological condition of water.

'waters' includes all or any part of a river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water in natural or artificial watercourses, bed and banks of a watercourse, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater.

'water year' means the 12-month period from 1 July to 30 June.

'wet season' means the time of year, covering one or more months, when most of the average annual rainfall in a region occurs. For the purposes of DSA determination this time of year is deemed to extend from 1 November in one year to 31 May in the following year inclusive.

END OF DEFINITIONS

Figure 1 – Map of land disturbance categories

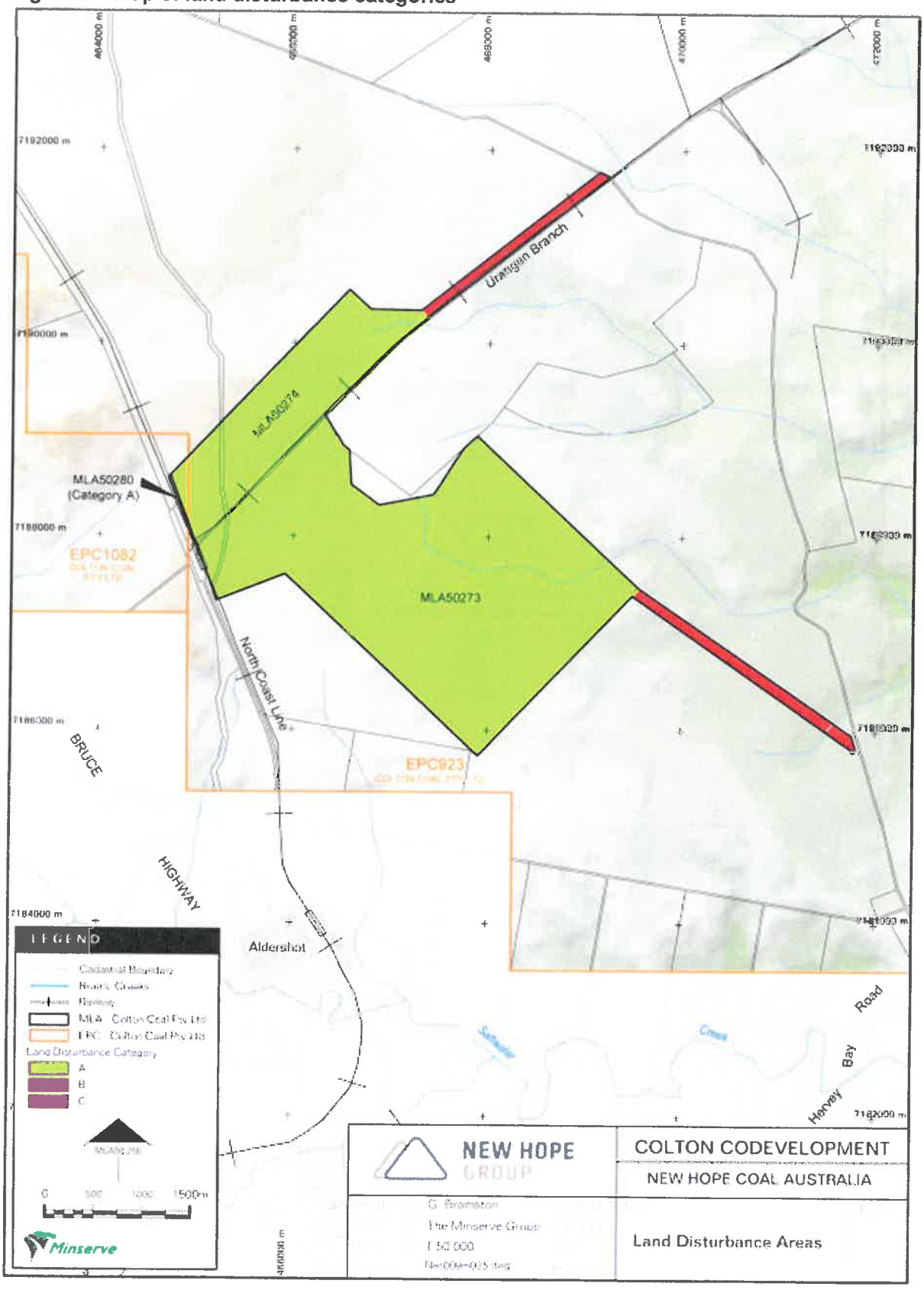


Figure 2 – Location of air monitoring

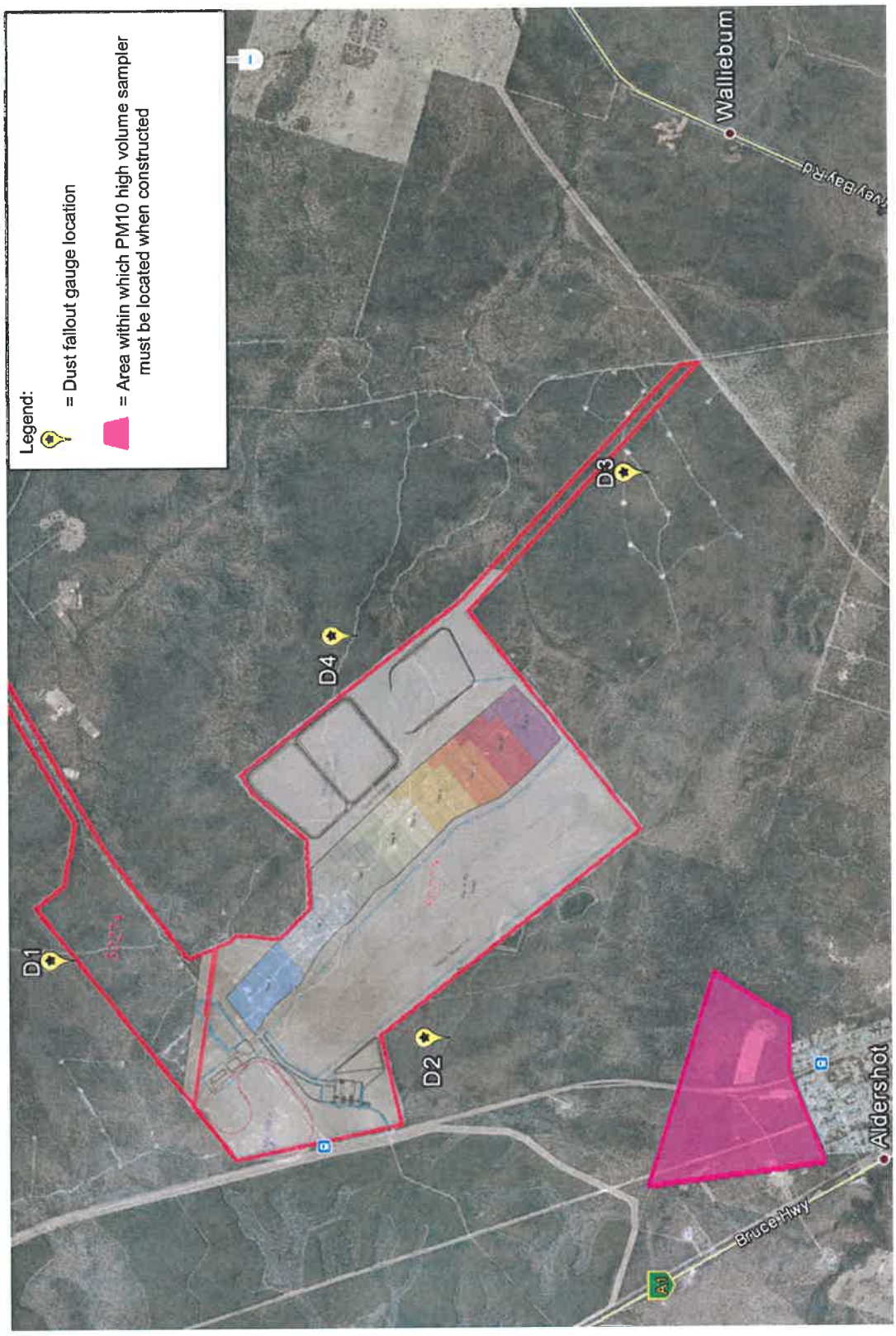


Figure 3 – Location of noise limit locations

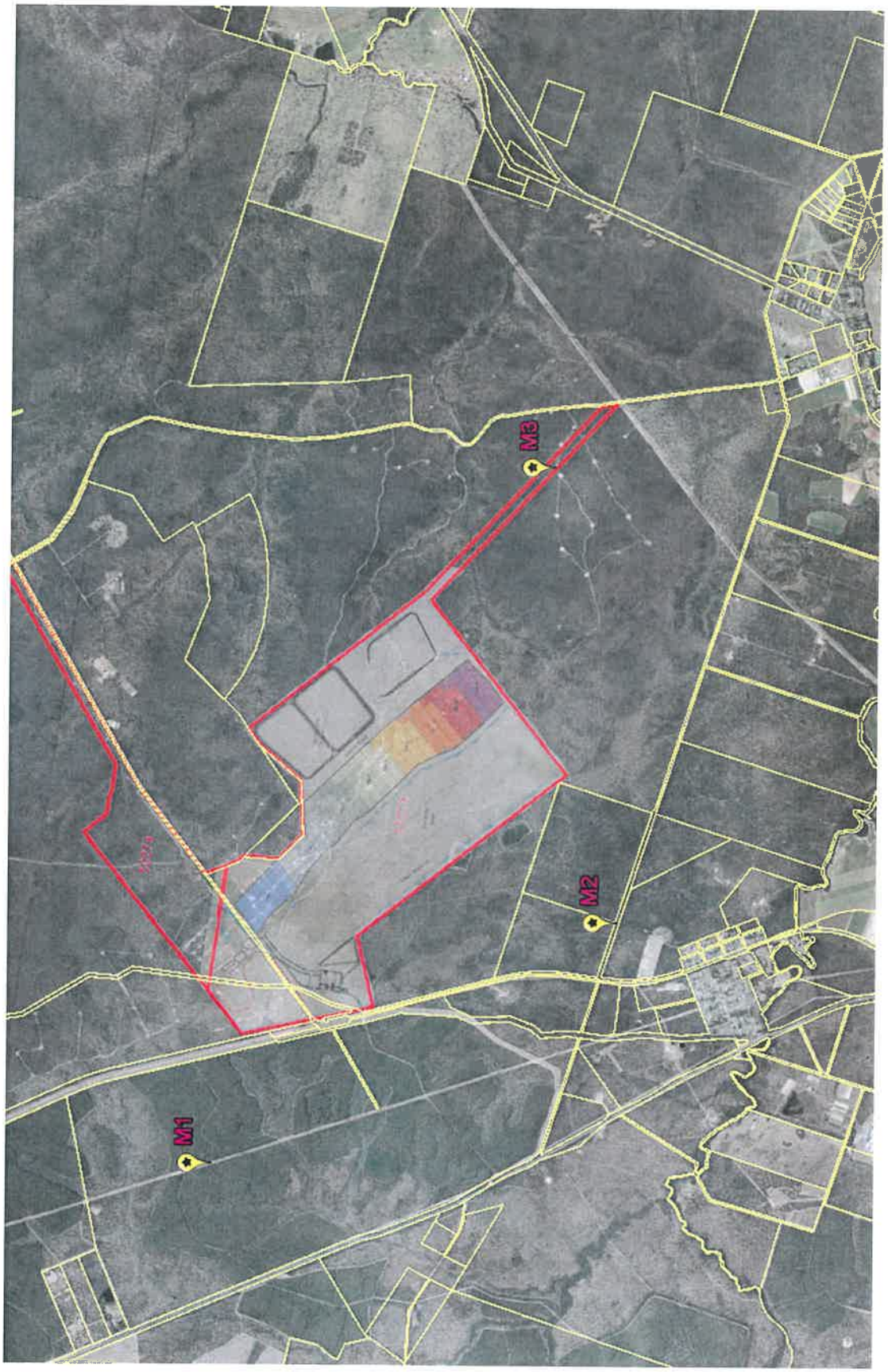


Figure 4 - Location of groundwater monitoring bores

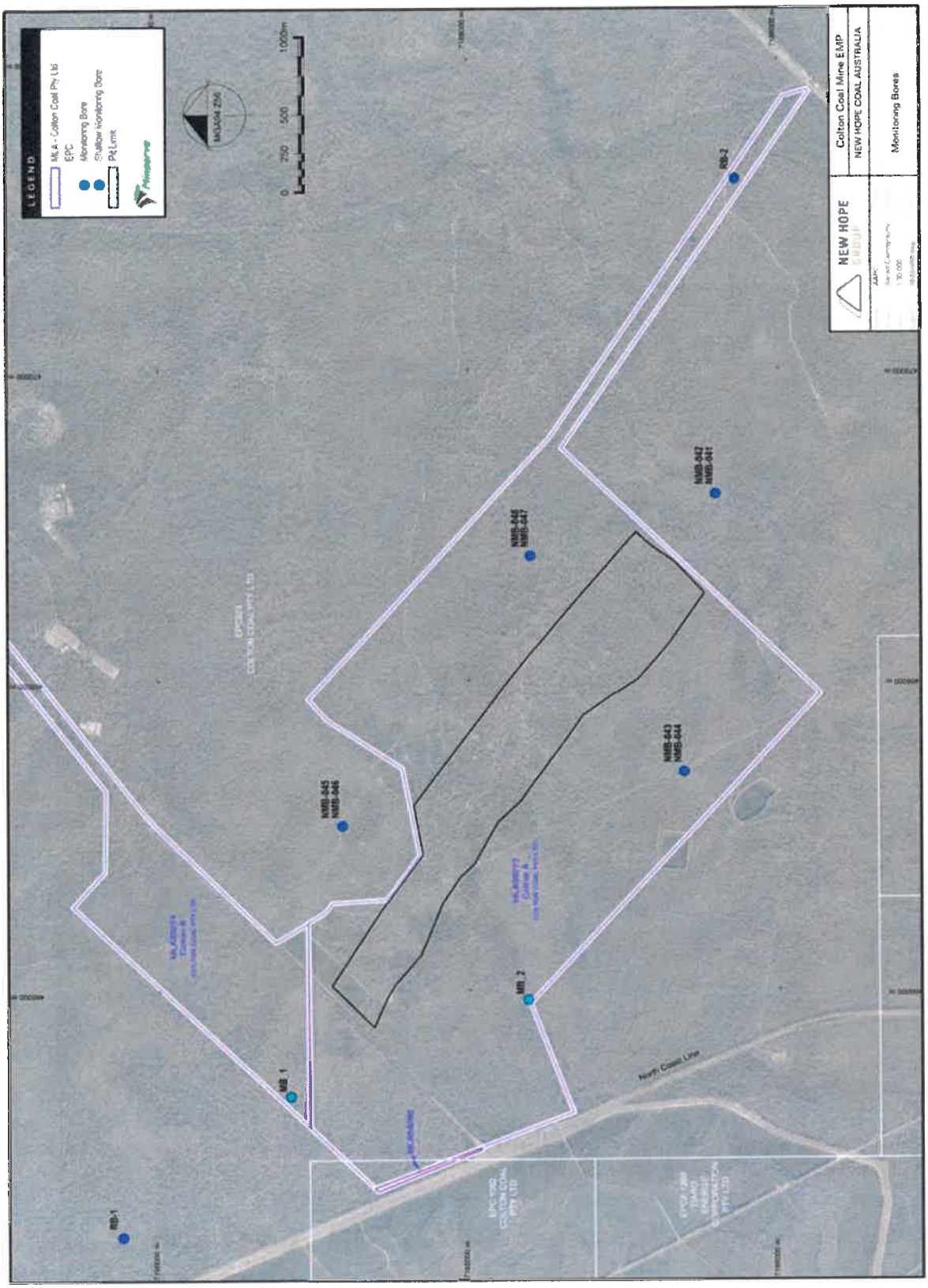
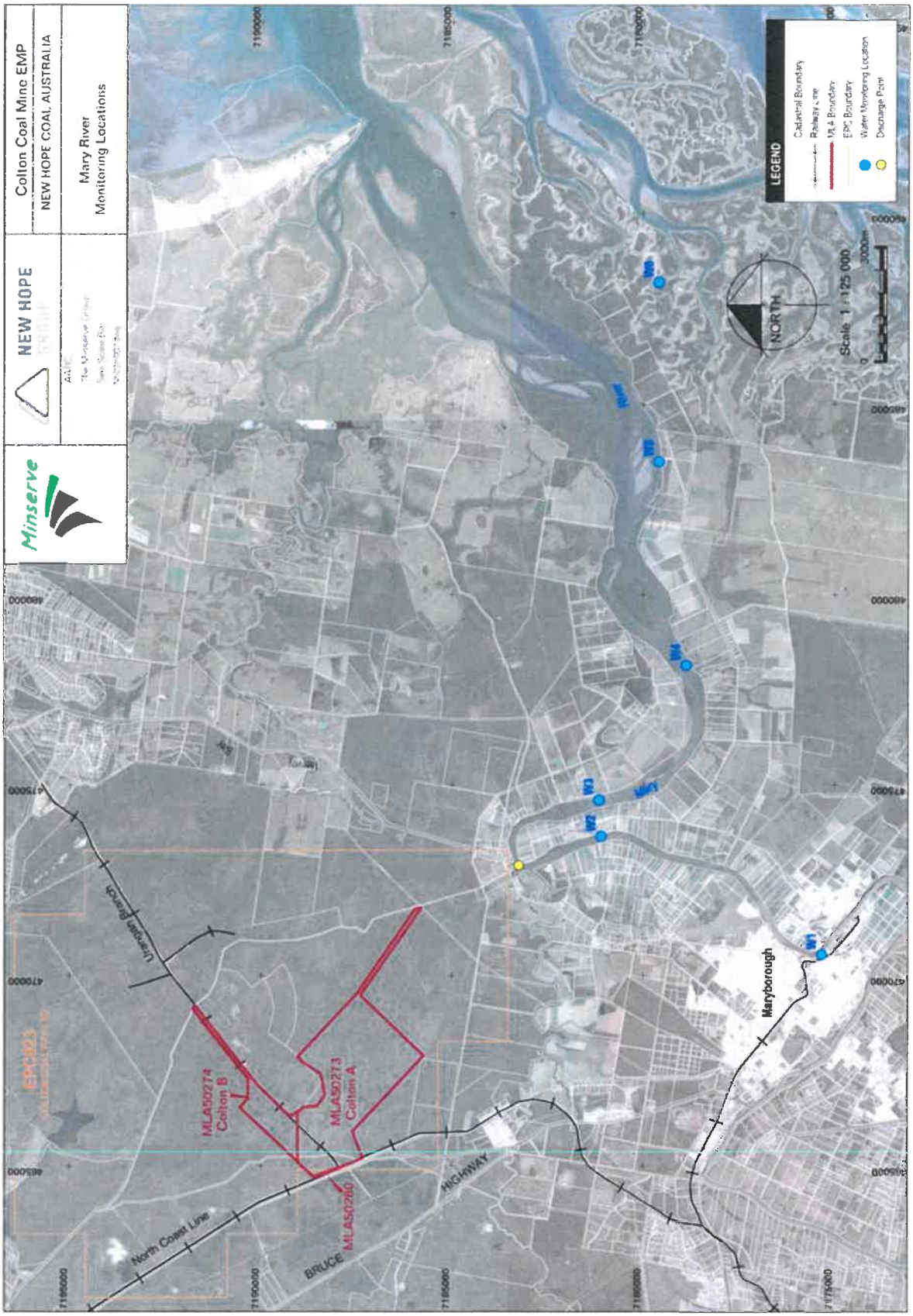


Figure 5 – Location of Mine affected water release points and receiving waters



END OF ENVIRONMENTAL AUTHORITY




Colton Mine Project

Pineapple Zamia Targeted Survey Report

Prepared for:
Northern Energy Corporation Limited

December 2011

aarc
AustralAsian Resource Consultants

Document History and Status

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF PHOTO PLATES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ºC	-	Degrees Celsius
%	-	Percent
AARC	-	AustralAsian Resource Consultants Pty Ltd
BOM	-	Bureau of Meteorology
DEEDI	-	Department of Employment, Economic Development and Innovation
DERM	-	Department of Environment and Resource Management
DSWEPC	-	Department of Sustainability, Environment, Water, Population and Communities
EPBC Act	-	*Environment Protection and Biodiversity Conservation Act 1999*
GPS	-	Global Positioning System
ha	-	Hectare(s)
km	-	Kilometre(s)
LP Act	-	*Land Protection (Pest and Stock Route Management) Act 2002*
MLA	-	Mining Lease Application
m^2/ha	-	Square metres per hectare
mm	-	Millimetre(s)
NC Act	-	*Nature Conservation Act 1992*
NCWR	-	*Nature Conservation (Wildlife) Regulation 2006*
NEC	-	Northern Energy Corporation Limited
QEPA	-	Queensland Environmental Protection Agency
RE	-	Regional Ecosystem
REDD	-	Regional Ecosystem Description Database
ROM	-	Run-of-mine
t	-	Tonne(s)
VM Act	-	*Vegetation Management Act 1999*

VMR - *Vegetation Management Regulation 2000*

EXECUTIVE SUMMARY

AustralAsian Resource Consultants Pty Ltd (AARC) was commissioned by Northern Energy Corporation Limited (NEC) to conduct a targeted survey for the endangered plant species *Macrozamia pauli-guilielmi* (Pineapple Zamia) on the proposed Colton Mine Project.

Background

One individual Pineapple Zamia was recorded during cultural heritage surveys of the Project Site in September 2011. The location of this individual was recorded by GPS and a sample was sent to the Queensland Herbarium for verification. The sample was confirmed as *Macrozamia pauli-guilielmi* (Pineapple Zamia), which is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* and the *Nature Conservation (Wildlife) Regulation 2006*. A high-visibility barrier was erected around the plant.

Methodology

The survey was conducted over three days from the 15th to the 17th November, 2011. The sampling technique employed for this targeted search was the random meander technique. This involved traversing the entire Project Site by 4x4 vehicle, all-terrain buggy, and on foot. Each traverse was conducted at a walking pace, to enable the identification of the target species.

Results

No further *Macrozamia pauli-guilielmi* (Pineapple Zamia) individuals were recorded during the targeted surveys of the Project Site.

It is considered that the Colton population of Pineapple Zamia consists of the one individual only within the Project Site.

Recommendations & Conclusion

The preferred method of protection for this individual would be to prevent any disturbance to the plant or its surrounding habitat. However, in its current location, the plant may potentially be impacted upon by mining activities once the operational phase has begun. Therefore, it is recommended that the plant be translocated to either a) an area of the site guaranteed to be subject to no disturbance or b) a nearby national park or other protected area, such as Poona National Park to the south of Maryborough, or Vernon Conservation Park to the north. Owing to the integral relationship of this species and its insect pollinators, it is recommended that it be translocated to an area where there are other Pineapple Zamia are present. This will reduce the risk of mortality and assist the diversity of the local gene pool.

Before translocation is attempted, it is recommended that the advice of an experienced and suitably qualified expert is sought. Translocation should only be attempted after relevant approvals are in place.

Considering the population of the species on the Project is limited to one individual and assuming that recommendations for protection of this individual are put in place, the Project is considered unlikely to have a significant impact on this species of National Environmental Significance.

1.0 INTRODUCTION

AustralAsian Resource Consultants Pty Ltd (AARC) was commissioned by Northern Energy Corporation Limited (NEC) to conduct a targeted survey for the endangered plant species *Macrozamia pauli-guilielmi* (Pineapple Zamia) on the proposed Colton Mine Project. The 1,026 hectare (ha) Project Site is located approximately 15 kilometres (km) to the north of Maryborough, Queensland.

One individual Pineapple Zamia was recorded during cultural heritage surveys of the Project Site in September 2011. The location of this individual was not previously recorded in Queensland (despite multiple flora surveys having been undertaken on the Project Site). The location of this individual was recorded by GPS and a sample was sent to the Queensland Herbarium for verification.

The sample was confirmed as *Macrozamia pauli-guilielmi* (Pineapple Zamia), which is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* and the *Nature Conservation (Wildlife) Regulation 2006*. A high-visibility barrier was erected around the plant.

AARC was then commissioned by NEC to conduct a targeted survey for this species across the entire Project Site, to ascertain whether any more Pineapple Zamia individuals inhabit the Project.

1.1 SPECIES DESCRIPTION

Macrozamia pauli-guilielmi (Pineapple Zamia) is a small cycad with an underground ovoid trunk and spiral leaves (DSEWPC, 2010) (Photo Plate 1). In total there are five species of *Macrozamia*, characterised by strongly spirally twisted leaves with narrow, deeply concave leaflets, but the Pineapple Zamia is separated within this group by its very narrow, pale green leaflets. Beneath the surface, the Pineapple Zamia has a non-branching trunk as well as 1–3 parsnip like roots. Like all cycads, this species has a number of specialised roots known as coralloid roots that can be seen protruding above the surface of the earth.

Photo Plate 1 ***Macrozamia pauli-guilielmi* (Pineapple Zamia), recorded within the Project Site**

1.2 SCOPE OF STUDY

To perform the aforementioned targeted survey, AARC undertook the following scope of works:

- A review of the Queensland Herbarium Database to identify the known density and distribution of the target species in the area;
- Standard field survey methodologies to determine the presence or absence of the target species within the Project Site;

- Preparation of a report to NEC describing the results of the targeted survey, and outlining possible management strategies to eliminate any foreseeable impacts on the target species associated with the proposed project.

2.0 PROJECT AND SITE DESCRIPTION

2.1 PROJECT LOCATION

The Project Site is located in southern Queensland, approximately 15 km north of Maryborough. The proposed Project Site is approximately 20 km inland, and 250 km north of Brisbane, as shown in Figure 1. Access to the Project Site is via Churchill Mine Road which connects to the Maryborough Hervey Bay Road.

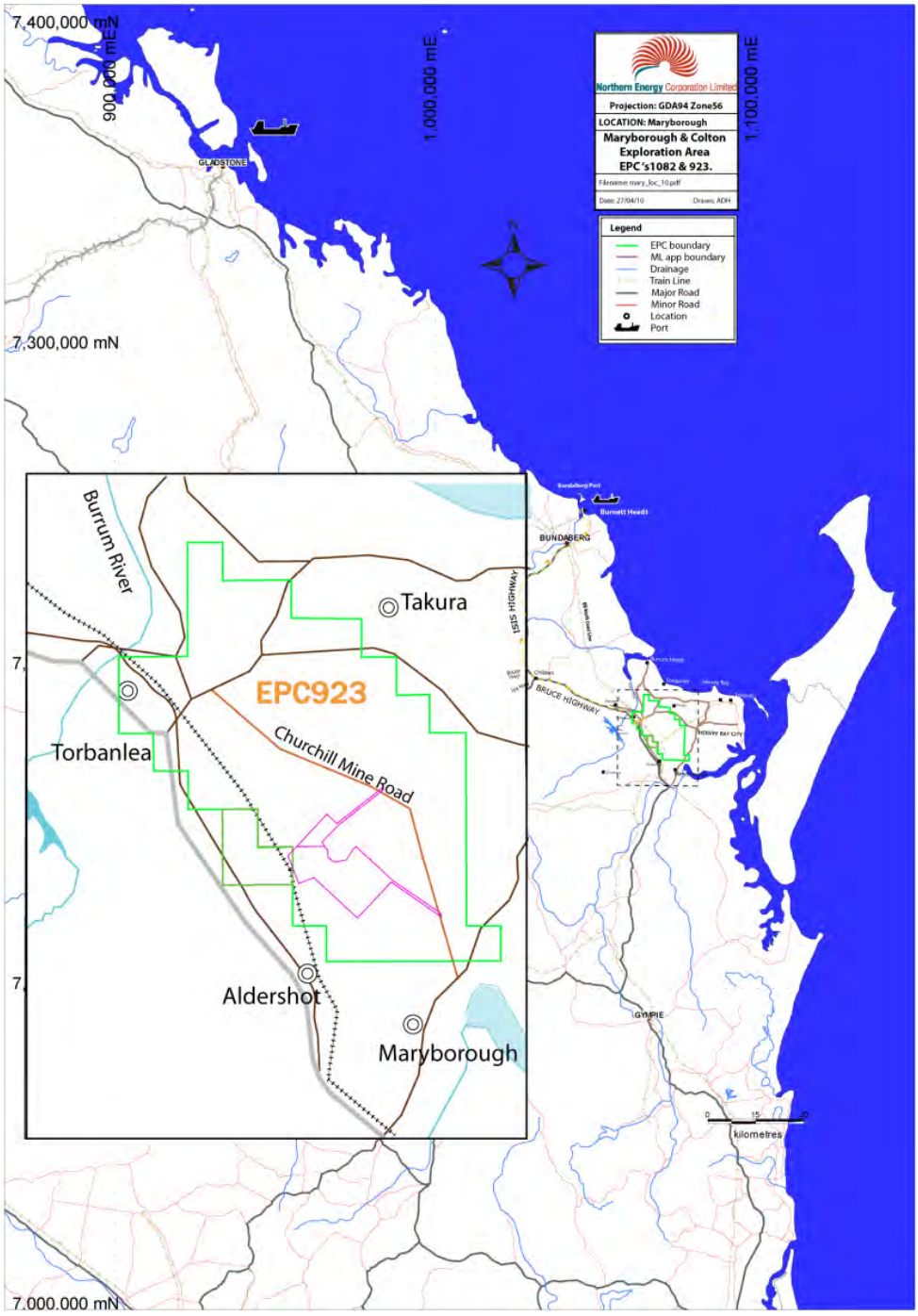

Figure 1 **Regional Location of the Project**

2.2 LOCAL GEOLOGY AND TOPOGRAPHY

The region is based on marine and alluvial sediments of the Maryborough Basin (Sattler & Williams, 1999). Geological mapping of the area at a scale of 1:100 000 describes two predominant categories on the Project Site.

- Mesozoic labile sandstone, mudstone, siltstone, shale and conglomerate; and
- Cainozoic duricrusted old land surface with ferricrete, silcrete and indurated palaeosoils at the top of a deep weathering profile, indicated by the geology code Td/Kb.

In addition, Quaternary alluvial sediments are present in a narrow corridor along an unnamed waterway on the site.

2.3 LOCAL WATER RESOURCES

The Project Site is located within the Mary River Drainage Basin which flows in an easterly direction to the Pacific Ocean.

Two small, unnamed waterways flow east off of the Project Site and drain into the Susan River approximately 8 km upstream. The Susan River meanders east and empties into the Great Sandy Straight at the mouth of the Mary River.

Within the Project Site, the small creek lines are characterised by narrow sandy channels in parts varying to broad depressions with no defined channel. The flow of the ephemeral creeks on the Project Site are restricted to heavy rainfall events, which can occur all year round but are more common between the months of November to April (wet season).

Figure 2 below shows the location of the waterways on the Project Site and those in the immediate vicinity.

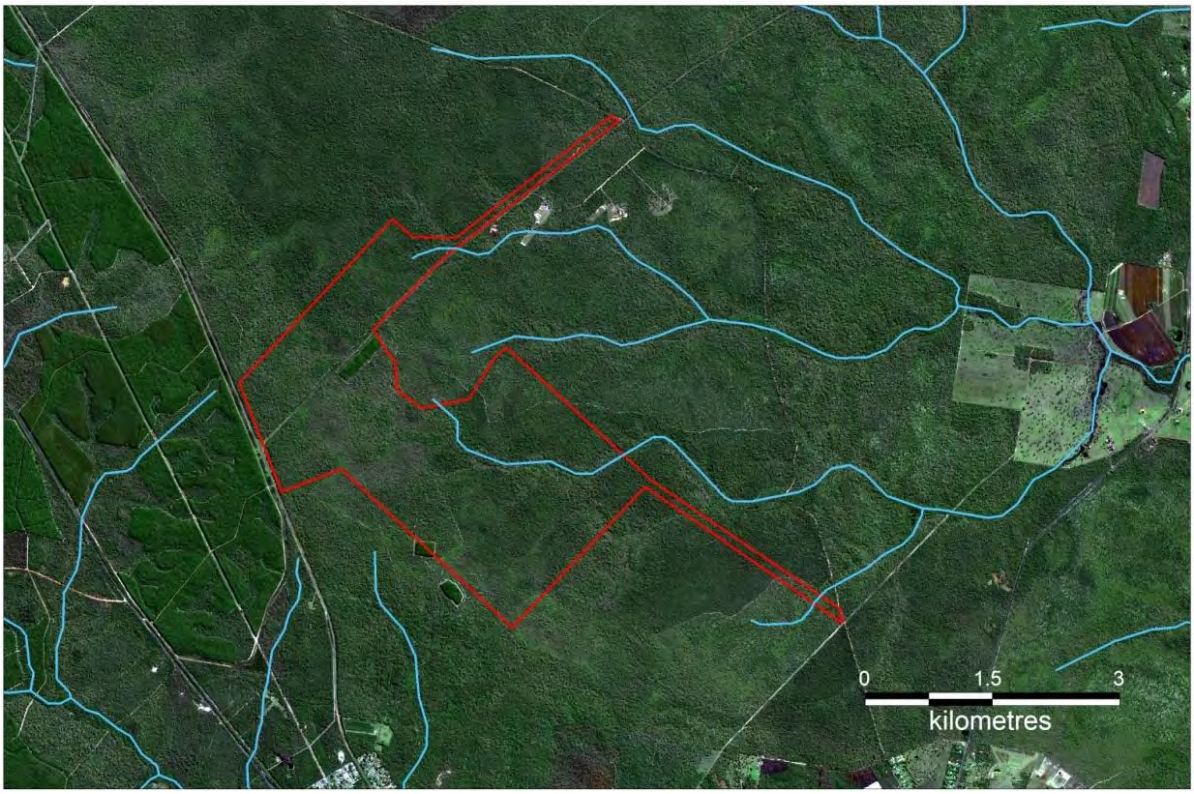

Figure 2 **Watercourses on the Project Site**

2.4 REGIONAL CLIMATE

The following section provides a climatic description of the Project region, compiled using data from the Australian Bureau of Meteorology (BOM). Data has been sourced from the BOM weather monitoring station located in Maryborough (152.72° E, 25.52° S), approximately 15km south of the Colton Project area. The data series available from the Maryborough weather station ranges from 1870 to present, so provides long-term representation of the prevailing climatic conditions.

The coldest period of the year occurs in July (mean minimum 8.6 degrees Celsius (ºC), mean maximum 22.0 ºC). The warmest month of the year is January (average minimum 20.6 ºC, average maximum 30.7 ºC).

Information from the Maryborough weather station indicates that the mean annual rainfall for the region is approximately 1148 millimetres (mm). Rainfall in the Maryborough region can occur year round, typically with the driest period of the year between the months of July and September (average 45.3 mm per month) and the wettest period between December and March (average 155.1 mm per month), although it is not uncommon for significant rainfall events to occur all year round.

2.5 CURRENT LAND USES

The Project Site is situated on unallocated State land. Recent land use within the Project Site includes selective logging and coal exploration. Associated infrastructure on the Project Site includes access tracks and clearing for drill pads.

2.6 PROPOSED MINING ACTIVITIES

The Colton Mine Project proposes open cut coal mining of the Burrum Coal Measures in the Maryborough Basin. A 1.5 million tonne (Mt) coking coal resource has been estimated within multiple thinly bedded seams. Mining will take place over approximately eight years at a rate of 850,000 – 950,000t per annum of run-of-mine (ROM) coal.

Removal of overburden and mining resources will be via truck and excavators. Drilling and blasting of overburden may be required. A modular coal handling and preparation plant, with a capacity of 200t per hour throughput of coal material, and other associated infrastructure, will also be constructed on the Project Site. A dry disposal method will be employed to dispose of de-watered by-product from the process plant without the need for a Tailings Storage Facility. Product coal is expected to be hauled by train to the Port of Gladstone.

3.0 RELEVANT LEGISLATION

Legislation relevant to the assessment of the Endangered Pineapple Zamia on the Project Site is discussed below.

3.1 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), an action will require approval from the Federal Environment Minister if the action has, will have, or is likely to have, a significant impact on a matter of National Environmental Significance, where matters of National Environmental Significance are:

- World Heritage properties;
- RAMSAR wetlands of international importance;
- Listed Threatened species and communities;
- Migratory species protected under international agreements;
- National Heritage Places;
- Nuclear Actions; and
- Commonwealth marine areas.

Of the above matters of National Environmental Significance, the one relevant to the discovery of the target species on the Project Site is:

- Listed Threatened species and communities.

Consequently, if a Project is considered to have potential for significant impact on a matter of National Environmental Significance, the Project should be referred to the Department of Sustainability, Environment, Water, Population and Communities for a "Controlled Action" decision.

.

3.2 NATURE CONSERVATION ACT 1992

The most relevant portions of the *Nature Conservation Act 1992* (NC Act) to the survey are the sections pertaining to Wildlife and Habitat Conservation. The classes of wildlife[1] to which the NC Act applies includes protected wildlife, which is defined as:

- Extinct in the wild wildlife;
- Endangered wildlife;
- Vulnerable wildlife;
- Rare wildlife;
- Near Threatened Wildlife; and
- Least Concern Wildlife.

Species listed under the above classes are published in the associated *Nature Conservation (Wildlife) Regulation 2006* (NCWR).

The NC Act defines ‗threatening processes' as:

a) Threatening the survival of any protected area, area of major interest, protected wildlife, community of native wildlife or native wildlife habitat; or

b) Affecting the capacity of any protected area, area of major interest, protected wildlife, community of native wildlife or native wildlife habitat to sustain natural processes.

The NC Act is relevant to the Project as *Macrozamia pauli-guilielmi* (Pineapple Zamia) is listed as an Endangered species under Schedule 2 of the NCWR.

[1] Under the *Nature Conservation Act 1992*, Wildlife is defined to be any taxon of an animal, plant, protista, procaryote or virus.

4.0 DATABASE SEARCH AND LITERATURE REVIEW

A review of the Queensland Herbarium HERBRECS database provided information on the location and density of known populations of Pineapple Zamia in the vicinity of the Project Site. The results (which include the newly discovered individual on the Project Site) are provided in Appendix A, and represented below in Figure 3.

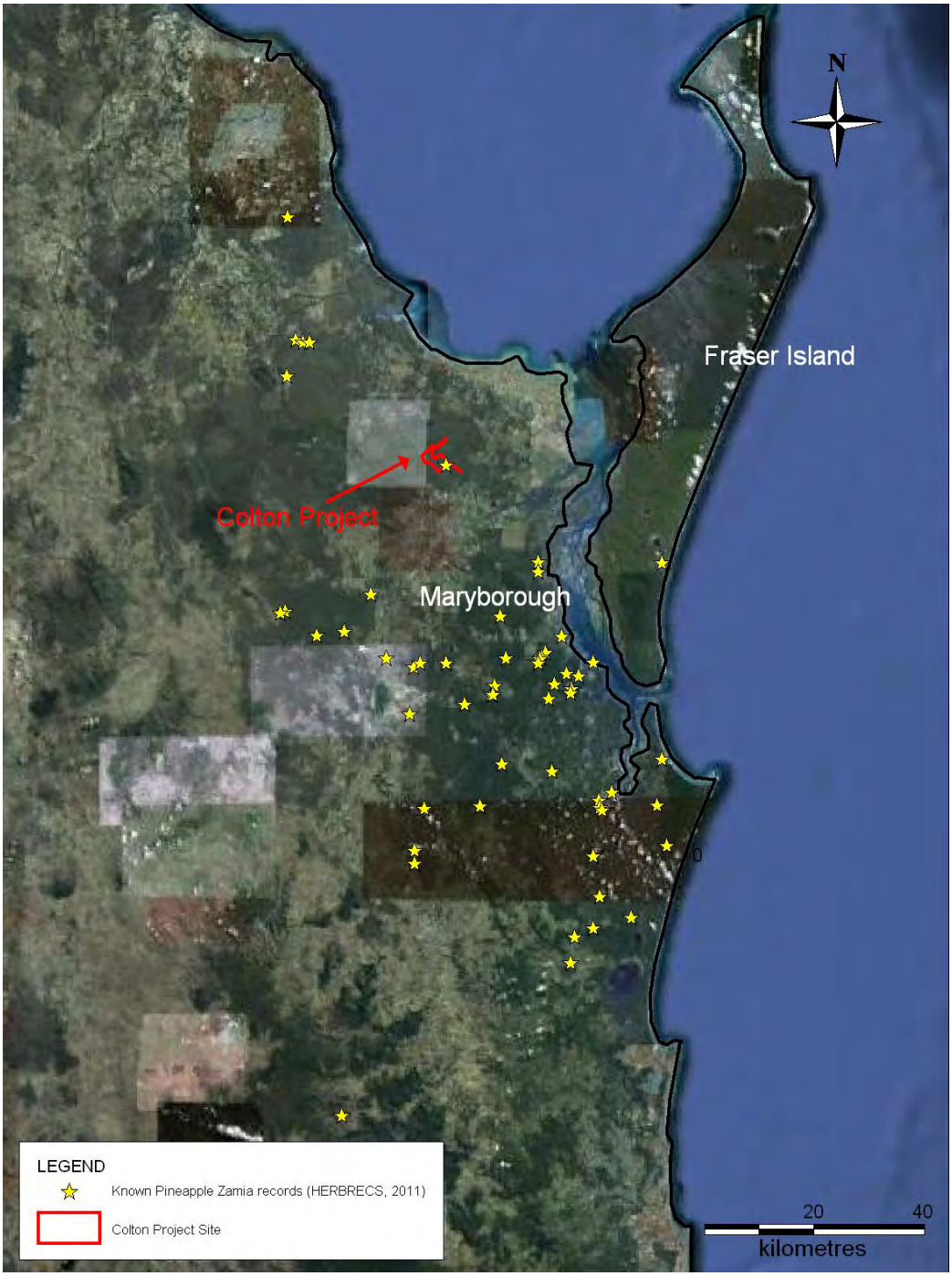

Figure 3 **Distribution of recorded populations of *Macrozamia pauli-guilielmi* (Pineapple Zamia) in relation to the Project Site**

5.0 FIELD SURVEY METHODOLOGY

5.1 TIMING

The targeted survey was carried out from the 15th to the 17th November, 2011. The survey team consisted of a qualified and experienced ecologist and one field assistant.

5.2 CONDITIONS

The weather conditions prior to and during the survey were fine, with temperatures ranging from a minimum of 16.2ºC (recorded on the 15th November) to a maximum of 31.9ºC (recorded on the 16th November). No rain fell during the survey, and only 0.2mm fell in the two weeks prior. These conditions facilitated access across the entire site, enabling maximum coverage and visibility.

5.3 SURVEY METHODS

The assessment included species familiarisation, followed by a three day targeted field survey based on the random meander technique. Specifically the following was undertaken;

- Research of the life form and function of the targeted species;
- Review of habitat preferences of the target species;
- Observation of herbarium specimens and available photography;
- Visual observation of the species from known locations in the field; and
- Traversing the entire Project Site by 4x4 vehicle, all-terrain buggy, and on foot in search for the species. Each traverse was conducted at a walking pace, to enable the identification of the target species.

The target species occurs within a wide altitude range (5-230m), in a number of vegetation communities including open forest, woodland (wallum), shrubland and heathland, with no preferred aspect (Qld CRA/RFA 1998). Every effort was made to sample as much of the site as possible, with adequate coverage of each vegetation community, soil type, and topographical variation. The Colton Project Flora and Fauna Assessment Report (AARC, 2011) was used to stratify the survey effort with respect to these variables where required. Particular effort was concentrated in the section of the site where the existing Pineapple Zamia was recorded or where similar habitat existed. Figure 5 shows the locations of each traverse.

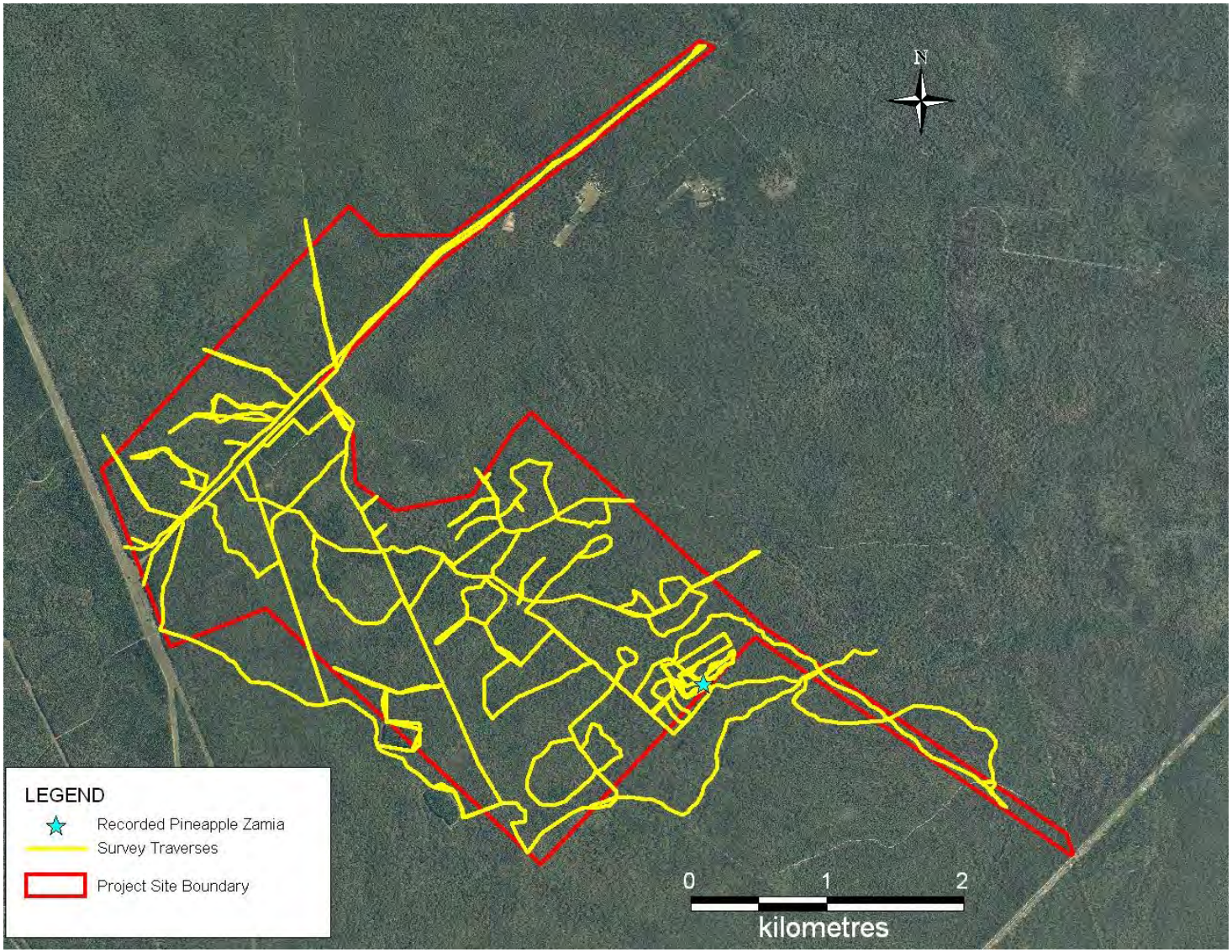

Figure 4 **Survey Effort**

6.0 RESULTS AND DISCUSSION

No further *Macrozamia pauli-guilielmi* (Pineapple Zamia) individuals were recorded during the targeted surveys of the Project Site.

It is considered that the Colton population of Pineapple Zamia consists of the one individual only in the south of the Project Site. This assessment takes into account the recent targeted survey, as well as the findings of previous flora and fauna surveys conducted on the site. Both of these surveys comprise extensive walk-through techniques likely to facilitate the identification of this species, if present.

Figure 4 shows the distribution of all known records of Pineapple Zamia in the region (taken from the HERBRECS search conducted November 2011). The distribution of this species is concentrated to the south of the Project Site, with only five populations to the north. All previously recorded individuals occur at least 25km from the Project Site.

There are 27 known populations of the Pineapple Zamia, ranging from single plants up to 3600 individuals (Queensland Herbarium 2007), therefore it is not unusual for this species to occur as a single individual.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The proposed Project has the potential to adversely impact upon the single individual Pineapple Zamia discovered inhabiting the south of the Project Site. As it is considered unlikely that the population comprises any other individuals, the following recommendations are aimed at ensuring the protection of this plant during operations and into the future.

The preferred method of protection for this species would be to prevent any disturbance to the plant or its surrounding habitat. However, in its current location, the plant may potentially be impacted upon by mining activities once the operational phase has begun. Therefore, it is recommended that the plant be translocated to either a) an area of the site guaranteed to be subject to no disturbance or b) a nearby national park or other protected area, such as Poona National Park to the south of Maryborough, or Vernon Conservation Park to the north. Owing to the integral relationship of this species and its insect pollinators, it is recommended that it be translocated to an area where there are other Pineapple Zamia are present. This will reduce the risk of mortality and assist the diversity of the local gene pool.

Before translocation is attempted, it is recommended that the advice of an experienced and suitably qualified expert is sought. Translocation should only be attempted with relevant approvals in place.

Considering the population of the species on the Project is limited to one individual and assuming that recommendations for protection of this individual are put in place, the Project is considered unlikely to have a significant impact on this species of National Environmental Significance.

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Appendix A HERBRECS Search Results




Colton Mine Project

Terrestrial Flora & Fauna Assessment

Prepared for:
Northern Energy Corporation Limited

July 2011

arc
AustralAsian Resource Consultants

Document History and Status

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PHOTO PLATES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ºC	-	Degrees Celsius
%	-	Percent
AARC	-	AustralAsian Resource Consultants Pty Ltd
BOM	-	Bureau of Meteorology
CHPP	-	Coal Handling and Processing Plant
DEEDI	-	Department of Employment, Economic Development and Innovation
DERM	-	Department of Environment and Resource Management
EPBC Act	-	*Environment Protection and Biodiversity Conservation Act 1999*
GPS	-	Global Positioning System
ha	-	Hectare(s)
km	-	Kilometre(s)
LP Act	-	*Land Protection (Pest and Stock Route Management) Act 2002*
MLA	-	Mining Lease Application
m^2/ha	-	Square metres per hectare
mm	-	Millimetre(s)
NC Act	-	*Nature Conservation Act 1992*

NCWR	-	*Nature Conservation (Wildlife) Regulation 2006*
NEC	-	Northern Energy Corporation Limited
QEPA	-	Queensland Environmental Protection Agency
RE	-	Regional Ecosystem
REDD	-	Regional Ecosystem Description Database
ROM	-	Run-of-mine
t	-	Tonne(s)
VM Act	-	*Vegetation Management Act 1999*
VMR	-	*Vegetation Management Regulation 2000*

EXECUTIVE SUMMARY

AustralAsian Resource Consultants Pty Ltd undertook a Terrestrial Flora and Fauna Assessment of the proposed Colton Mine Project. The Colton Mine Project is located approximately 11 kilometres to the north of Maryborough, Queensland, and is approximately 1,026 hectares in size.

Five ecological surveys have been undertaken within the MLA, to ensure variations with seasonality were captured. These surveys consisted of one immediately following the wet season, from the 21st – 29th April, 2008, proceeded by a dry season survey, from the 11th – 17th August 2008. The third survey was conducted in the dry season, from 18th – 22nd September and an additional, fourth, site visit was undertaken on the 21st of January 2010 to ensure completeness of the floristic inventory. A fifth and final site visit was undertaken in November 2010 by an amphibian expert from Biodiversity Assessment and Management (BAAM). Conditions leading up to this survey were considered to be conducive for amphibian identification.

To assess the environmental values of flora and fauna communities on the Colton Mine Project Site AustralAsian Resource Consultants Pty Ltd undertook the following scope of works:

- A literature and database review to identify species of conservation significance known from the region. This enabled these species to be targeted during the field survey components of the study;
- Standard field survey methodologies to determine the composition of species and vegetation communities inhabiting the Project Site. Species of conservation significance were targeted; and
- Preparation of a report to Northern Energy Corporation Limited describing significant ecological factors and outlining possible management strategies to reduce any foreseeable impacts associated with the proposed activities.

Flora

Despite targeted searches being conducted, no flora species of conservation significance were identified on or around the Project Site during any of the seasonal surveys.

Six vegetation communities were described on the Project Site. These communities and their Regional Ecosystem equivalents are listed below:

Table 1 **Vegetation Communities within the Project Site**

Vegetation Community	Regional ecosystem equivalents	VMA (1999) status	QEPA Biodiversity status	EPBC Status	Proportion of Project Site
Mixed Eucalypt Woodland on Tertiary Surface	12.5.4	Least Concern	No Concern at Present	Not Listed	28%
Melaleuca quinquenervia Riparian Woodland	12.3.5 (85%)	Least Concern	Of Concern	Not Listed	4.6%
	12.3.11 (15%)	Of Concern	Of Concern	Not Listed	
Melaleuca quinquenervia Mixed Woodland on Tertiary Plains	12.5.4a	Least Concern	No Concern at Present	Not Listed	64.5%
Melaleuca viridiflora Woodland on Alluvial Plains	12.3.12	Of Concern	Of Concern	Not Listed	1.7%
Heathland	12.5.9	Of Concern	Of Concern	Not Listed	0.3%
Non-remnant Vegetation	No RE Equivalent	Not listed	Not Listed	Not Listed	1.1%

Regional Ecosystem 12.3.5 is listed as 'Of Concern' under the Department of Environment and Resource Management Biodiversity Status and Regional Ecosystems 12.3.11, 12.3.12 and 12.5.9 are listed as 'Of Concern' under both the Department of Environment and Resource Management Biodiversity Status and *Vegetation Management Act 1999*. All Regional Ecosystems are designated this status due to their limited remaining pre-clearing extent in Queensland.

Field surveys and targeted assessment concluded that an area of wetland exists on the Project site, as defined by the Agreed Definition of a Wetland, in the 'Wetland Mapping and Classification Methodology – Overall Framework' document (EPA, 2005). The area of wetland is classed as a Palustrine wetland and was found to hold ponded surface water for short periods following rainfall. The wetland is fed by rainfall and surface flow only with groundwater investigations determining no connection with any groundwater aquifer.The soil profile within the wetland (to <1 m deep) was observed to remain damp or saturated for prolonged periods following significant rainfall. The anaerobic conditions created by the soil saturation is thought to influence to vegetation composition of the wetland, however, it is noted that soil dampness is insufficient to support wetland dependant / characteristic species in the ground layer. No flora species of conservation significance or wetland dependant species were found to inhabit the wetland.

The nature of the Project requires clearing of vegetation communities within the bounds of the Mining Lease Application area, which lies within the bounds of a Bioregional Corridor as defined by the South

East Queensland Biodiversity Assessment. Mitigation strategies have been proposed to minimise the impacts of the Project, including:

- Appropriate erosion and sediment controls to maintain the integrity of vegetated land and prevent sediment deposition;
- Controlled vegetation removal, conducted only after target areas have been clearly delineated to both equipment operators and supervisors, and erosion / sediment controls are in place;
- Stockpiling of topsoil, to ensure the seed bank is preserved;
- Recreation of landforms considering the sites' low-lying features and drainage capacity;
- In the event that abandoned, injured, rare or unusual fauna is found at any stage of the Project the Site Supervisor and other relevant personnel should be notified and the situation managed to prevent further injury;
- A segment of the Staff Induction Program allocated to informing staff of the conservation values on the Project Site; and
- A rehabilitation strategy as part of the Environmental Management Plan. Appropriate species for rehabilitation include *Eucalyptus tereticornis, Eucalyptus latisinensis, Corymbia intermedia, Melaleuca quinquenervia, Grevillea banksii* and *Allocasuarina littoralis.*

In addition to these mitigation strategies a number of specific measures have been detailed for protection of particular vegetation communities and other conservation values. Assuming disturbance is limited to the Project area, and impact mitigation measures are put in place, it is unlikely that vegetation will be significantly impacted on a regional scale.

Fauna

A combined total of 62 vertebrate fauna species were identified on the Project Site during the seasonal surveys, comprising 9 amphibians, 7 reptiles, 15 mammals, and 31 birds. Of the 62 species identified, only one, the Wallum Froglet (*Crinia tinnula)* was listed as of conservation significance.

The Wallum Froglet was identified in abundance on the Project Site and in surrounding habitat. The species is listed as Vulnerable under the *NC Act* (*Wildlife Regulation 2006*) with habitat loss considered the predominant threat to species numbers. National populations of the Wallum Froglet appear relatively stable within protected habitats. Habitat within the Project site varies, and includes heathland, sedgeland and Melaleuca swamp, (Hines et al. 1999). Development of the Colton Mine Project requires clearing of Wallum Froglet habitat. This report details specific management strategies recommended to minimise impacts of the Project.

The Rufous Fantail, (*Rhipidura rufifrons*) was identified within the Project Site. This species is listed as Marine and Migratory under the EPBC Act. The distribution of the Rufous Fantail is widespread throughout eastern and northern Australia, and the local population on the Project site is unlikely to constitute an 'ecologically significant proportion' of the total population of the species. Furthermore, the Project site is not at the limit of the species' range, nor is the species considered to be declining within the region. The species can reside in numerous different habitat types, ranging from rainforest to paperbark forests, mangroves to gardens (Pizzey and Knight 2001), and the habitat within the Project Site that is utilised by the species is well-represented and extensive in the surrounding area.

Therefore, it is unlikely the Project will have a significant impact on the regional populations of this species, and as a result the Project does not need to be referred under the EPBC Act.

The Black-faced cuckoo-shrike (*Coracina novehollandiae*) and the White Bellied cuckoo-shrike (*Coracina papuensis*) were also identified on the Project site. These species are listed as Marine under the EPBC Act. Like the Rufous Fantail, these Cuckoo-Shirke species are not listed as threatened and populations are not considered to be at risk. Furthermore, the species distribution of the Cuckoo-Shrikes extends well beyond the boundary of the Project throughout mainland Australia. Both species occupy a wide range of habitats including forests, woodlands, watercourses, parks and gardens (Pizzey and Knight 2001). It is unlikely the Project will have a significant impact on the regional populations of these species, and as a result the Project does not need to be referred under the EPBC Act.

The overall ecological value of the Project Site was considered to be moderate with species richness and abundances typical of the broader region.

Two introduced species, listed as pest species under the *Land Protection (Pest and Stock Route Management) Act 2002*, were detected on the Project Site. These pest species included:

1. Dingo / Wild Dog, listed as a Class 2 pest; and

2. Feral Pig, listed as a Class 2 pest.

Management strategies have been developed for each listed pest species, as well as for the Cane Toad. The Cane Toad was frequently observed on the Project Site and is considered to be a serious environmental pest, although is not declared under the *Land Protection (Pest and Stock Route Management) Act 2002*.

Additionally, the introduced House Mouse (not declared under the *Land Protection (Pest and Stock Route Management) Act 2002*) was observed within the Project Site. There is no legal requirement to control non-declared animals, however as they can cause ecological damage, their control is recommended.

Although habitat within the Project Site is well-represented in the wider region, every effort should be made to keep proposed disturbance areas to a minimum. Suggested strategies to minimise the impacts on native fauna are outlined below:

- Native vegetation removal should be conducted only after inspection of vegetation to be disturbed prior to clearing to ascertain whether any fauna is present.

- It is recommended that the methodologies for the rehabilitation / re-vegetation works for the proposed Project use native species endemic to the area. Such methodologies would include habitat-matching and would encourage the return of native fauna.

- Infrastructure planning should avoid the creation of permanent, shallow water areas, such as septic and other tank overflows that form a permanent seep. Such areas create an artificial environment that encourage pest species (such as Cane Toads) that alter the existing eco-balance;

- In the event that abandoned, injured, rare or unusual fauna are found at any stage of the Project the Site Supervisor and other relevant personnel should be notified and the situation managed to prevent further injury. Local wildlife care groups or experts such as Queensland Parks and

Wildlife should be informed and arrangements made to care for the animal. The species and location of the fauna should be noted and include an account of the events preceding the incident;

- A segment of the Staff Induction Program should be allocated to informing staff of the conservation values on the Project Site, to increase their awareness of the species present;
- A rehabilitation strategy, as part of the Environmental Management Plan is required. This strategy should aim to recreate existing habitat values of the site.

In addition to these mitigation strategies a number of specific measures have been detailed to minimise impact on the Wallum Froglet.

1.0 INTRODUCTION

AustralAsian Resource Consultants Pty Ltd (AARC) was commissioned by Northern Energy Corporation Limited (NEC) to conduct a Terrestrial Flora and Fauna Assessment for a Mining Lease Application (MLA) of the proposed Colton Mine Project. The 1,026 hectare (ha) Project Site is located approximately 15 kilometres (km) to the north of Maryborough, Queensland.

Five ecological surveys have been undertaken within the MLA, to ensure variations with seasonality were captured. These surveys consisted of one immediately following the wet season, from the 21st – 29th April, 2008, proceeded by a dry season survey, from the 11th – 17th August 2008. The third survey was conducted in the dry season, from 18th – 22nd September and an additional, fourth, site visit was undertaken on the 21st of January 2010 to ensure completeness of the floristic inventory. A fifth and final site visit was undertaken in November 2010 by an amphibian expert from Biodiversity Assessment and Management (BAAM). Conditions leading up to this survey were considered to be conducive for amphibian identification.

1.1 SCOPE OF STUDY

To assess the environmental values of flora and fauna communities on the Project Site, AARC undertook the following scope of works:

- A literature and database review to identify species of conservation significance known from the region. This enabled these species to be targeted during the field survey components of the study;
- Standard field survey methodologies to determine the composition of dry season and wet season flora and fauna species inhabiting the Project Site, particularly species of conservation significance[1]; and
- Preparation of a report to NEC describing significant ecological features and outlining possible management strategies to reduce any foreseeable impacts associated with the proposed activities.

[1] References to "Species of Conservation Significance" or "Threatened Species" in this report refer to those species listed as Rare, Vulnerable, Endangered, or Critically Endangered under the Nature Conservation Wildlife Regulation 2006 or Environment Protection and Biodiversity Conservation Act 1999.

2.0 PROJECT AND SITE DESCRIPTION

2.1 PROJECT LOCATION

The Project Site is located in southern Queensland, approximately 15 km north of Maryborough. The proposed Project Site is approximately 20 km inland, and 250 km north of Brisbane, as shown in Figure 1. Access to the Project Site is via Churchill Mine Road which connects to the Maryborough Hervey Bay Road.

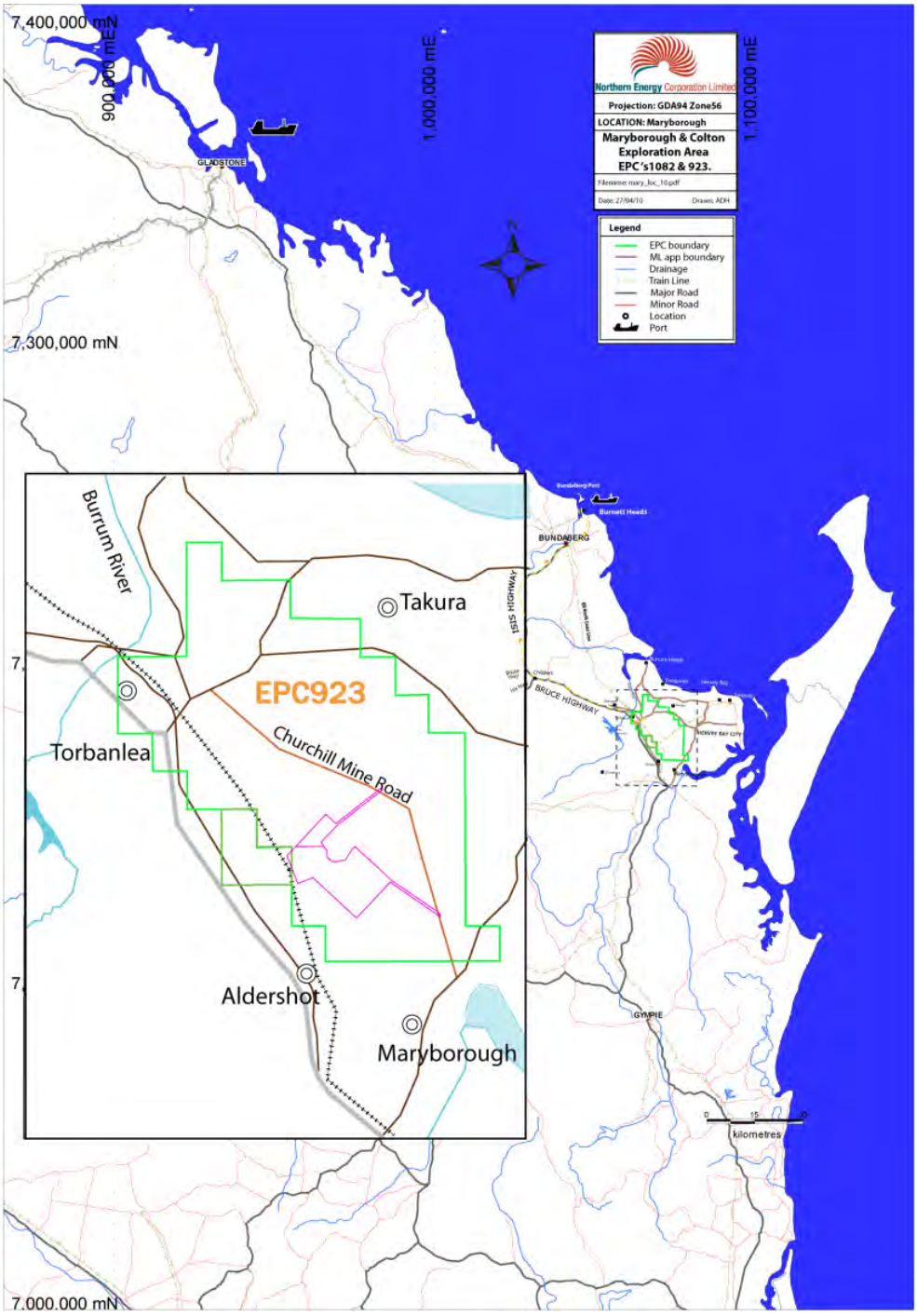

Figure 1 **Regional Location of the Project**

2.2 LOCAL GEOLOGY AND TOPOGRAPHY

The region is based on marine and alluvial sediments of the Maryborough Basin (Sattler & Williams, 1999). Geological mapping of the area at a scale of 1:100 000 describes two predominant categories on the Project Site.

- Mesozoic labile sandstone, mudstone, siltstone, shale and conglomerate; and
- Cainozoic duricrusted old land surface with ferricrete, silcrete and indurated palaeosoils at the top of a deep weathering profile, indicted by Td/Kb.

In addition, Quaternary alluvial sediments are present in a narrow corridor along an unnamed waterway on the site.

2.3 LOCAL WATER RESOURCES

The Project Site is located within the Mary River Drainage Basin which flows in an easterly direction to the Pacific Ocean.

Two small, unnamed waterways flow east off of the Project Site and drain into the Susan River approximately 8 km upstream. The Susan River meanders east and empties into the Great Sandy Straight at the mouth of the Mary River.

Within the Project Site, the small creek lines are characterised by narrow sandy channels in parts varying to broad depressions with no defined channel. The flow of the ephemeral creeks on the Project Site are restricted to heavy rainfall events, which can occur all year round but are more common between the months of November to April (wet season).

Figure 2 below shows the location of the waterways on the Project Site and those in the immediate vicinity.

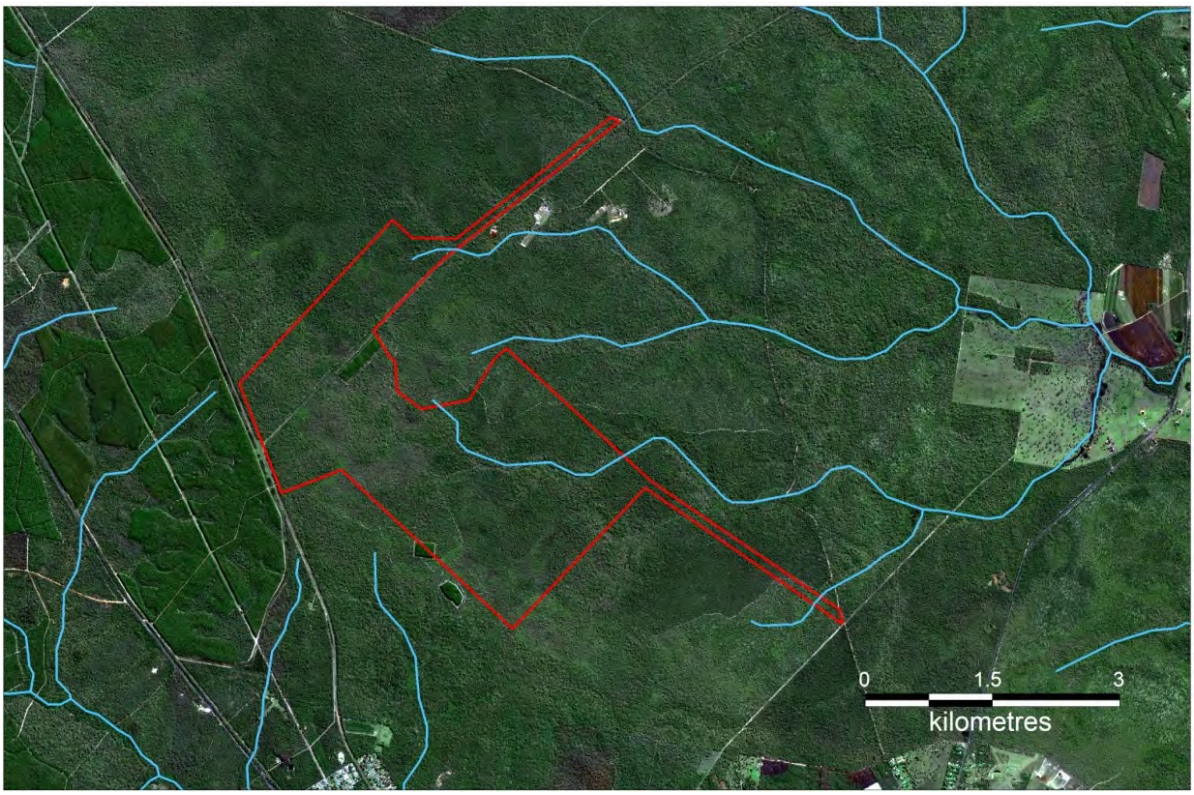

Figure 2 **Watercourses on the Project Site**

2.4 REGIONAL CLIMATE

Seasonal surveys are imperative for a methodical and scientifically valid ecological assessment. Complementing wet season and dry season surveys are conducted to ensure species that are migratory, transient or responsive to particular environmental conditions are captured, in addition to identifying seasonal variation in both species diversities and abundances.

The following section provides a climatic description of the Project region, compiled using data from the Australian Bureau of Meteorology (BOM). Data has been sourced from the BOM weather monitoring station located in Maryborough (152.72° E, 25.52° S), approximately 15km south of the Colton Project area. The data series available from the Maryborough weather station ranges from 1870 to present, so provides long-term representation of the prevailing climatic conditions.

The coldest period of the year occurs in July (mean minimum 8.6 degrees Celsius (ºC), mean maximum 22.0 ºC). The warmest month of the year is January (average minimum 20.6 ºC, average maximum 30.7 ºC).

Information from the Maryborough weather station indicates that the mean annual rainfall for the region is approximately 1148 millimetres (mm). Rainfall in the Maryborough region can occur year round, typically with the driest period of the year between the months of July and September (average 45.3 mm per month) and the wettest period between December and March (average 155.1 mm per month), although it is not uncommon for significant rainfall events to occur all year round.

2.5 CURRENT LAND USES

The Project Site is situated on unallocated State land. Recent land use within the Project Site includes selective logging and coal exploration. Associated infrastructure on the Project Site includes access tracks and clearing for drill pads.

2.6 PROPOSED MINING ACTIVITIES

The Colton Mine Project proposes open cut coal mining of the Burrum Coal Measures in the Maryborough Basin. A 1.5 million tonne (Mt) coking coal resource has been estimated within multiple thinly bedded seams. Mining will take place over approximately eight years at a rate of 850,000 – 950,000t per annum of run-of-mine (ROM) coal.

Removal of overburden and mining resources will be via truck and excavators. Drilling and blasting of overburden may be required. A modular coal handling and preparation plant, with a capacity of 200t per hour throughput of coal material, and other associated infrastructure, will also be constructed on the Project Site. A dry disposal method will be employed to dispose of de-watered by-product from the process plant without the need for a Tailings Storage Facility. Product coal is expected to be hauled by train to the Port of Gladstone.

Activities and infrastructure associated with the coal preparation and handling facilities include the following:

- ROM hopper coal receival – trucks, dozers, front-end-loaders;
- ROM coal crushing, conveying, blending and feeding to the preparation plant;
- Coal handling and processing plant (CHPP);
- CHPP product transfer and stockpiling including stockpile bases;
- Product coal stockpile reclamation and loading;
- Disposal of dry rejects;
- Return of water recovered from rejects emplacements to the process circuit;
- Power, pumping and instrumentation requirements; and
- Reticulation of services and lighting within plant and relevant adjacent areas.

General infrastructure that is proposed for the Project includes:

- Workshops and administration buildings;
- Fuel and oil storage;
- Other chemical storage facilities;
- Borrow pits for road construction;
- Sediment dams; and

- General rubbish disposal site.

Figure 3 details the proposed conceptual mining and infrastructure layout for the Project.

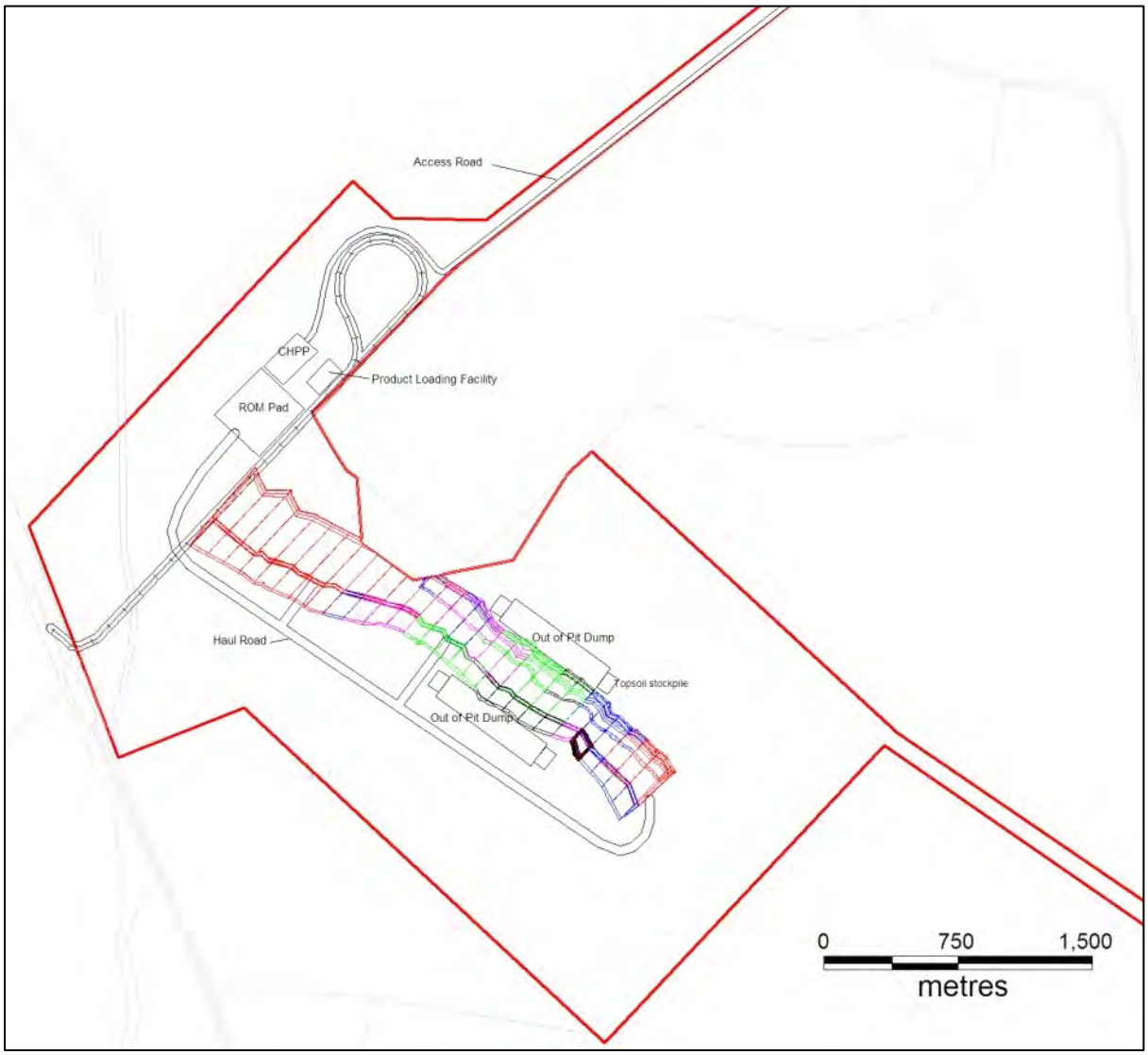

Figure 3 **Colton Mine Proposed Mining and Infrastructure Layout**

3.0 RELEVANT LEGISLATION

Legislation relevant to the assessment of flora, fauna and biodiversity on the Project Site is discussed below.

3.1 NATURE CONSERVATION ACT 1992

The most relevant portions of the *Nature Conservation Act 1992* (NC Act) to the Project Site are the sections pertaining to Wildlife and Habitat Conservation. The classes of wildlife[2] to which the NC Act applies includes protected wildlife, which is defined as:

- Extinct in the wild wildlife;
- Endangered wildlife;
- Vulnerable wildlife;
- Rare wildlife;
- Near Threatened Wildlife; and
- Least Concern Wildlife.

Species listed under the above classes are published in the associated *Nature Conservation (Wildlife) Regulation 2006* (NCWR).

The NC Act defines 'threatening processes' as:

a) Threatening the survival of any protected area, area of major interest, protected wildlife, community of native wildlife or native wildlife habitat; or

b) Affecting the capacity of any protected area, area of major interest, protected wildlife, community of native wildlife or native wildlife habitat to sustain natural processes.

The NC Act is relevant to the Project Site should any flora or fauna species of conservation significance (as detailed in the NCWR) be found there.

3.2 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), an action will require approval from the Federal Environment Minister if the action has, will have, or is likely to have, a significant impact on a matter of National Environmental Significance, where matters of National Environmental Significance are:

[2] Under the *Nature Conservation Act 1992*, Wildlife is defined to be any taxon of an animal, plant, protista, procaryote or virus.

- World Heritage properties;
- RAMSAR wetlands of international importance;
- Listed Threatened species and communities;
- Migratory species protected under international agreements;
- National Heritage Places;
- Nuclear Actions; and
- Commonwealth marine areas.

Of the above matters of National Environmental Significance, only two are relevant to the Project Site:

- Listed Threatened species and communities; and
- Migratory species protected under international agreements.

Consequently, were any species / communities listed as Threatened or Migratory found on the Project Site, the Project would be assessed under guidelines provided in the EPBC Act. These guidelines have been produced to assist industry and the public in interpreting the EPBC Act. These can be viewed on the Department of Environment, Water, Heritage and the Arts web-site (http://www.environment.gov.au/epbc/guidelines-policies.html).

In addition, the EPBC Act provides for the identification and listing of key threatening processes.

3.3 VEGETATION MANAGEMENT ACT 1999

The *Vegetation Management Act 1999* (VM Act) was proclaimed in 2000 as part of a planning framework for the management of native vegetation across Queensland. The *Vegetation Management Regulation 2000* (VMR) prescribes the status of each Regional Ecosystem (RE) occurring in Queensland.

Although the VM Act does not apply to the clearing of vegetation on the Project Site, the scientific basis for biodiversity conservation is still valid and can be used to assess the conservation significance of the vegetation communities on the Project Site. This includes the conservation status categories of REs under the VM Act which are listed below, as is the definition of Remnant Vegetation:

Endangered Regional Ecosystems:

- <10 percent (%) of pre-clearing extent remaining; and
- 10-30% of the pre-clearing extent remaining and remnant <10,000ha.

Of Concern Regional Ecosystems:

- 10-30% of its pre-clearing distribution remains; and
- 30% of the pre-clearing extent remains and the remnant vegetation remaining is <10,000ha.

Not Of Concern Regional Ecosystems:

- >30% of the pre-clearing distribution remains and remnant vegetation remaining is >10,000ha.

Remnant Vegetation:

'Remnant Vegetation' for an area of Queensland for which there is no RE map or remnant vegetation map, means any vegetation where the predominant canopy:

- Covers more than 50% of the undisturbed predominant canopy;
- Averages more than 70% of the vegetation's undisturbed height; and
- Is composed of species characteristic of the vegetation's undisturbed predominant canopy.

3.4 LAND PROTECTION (PEST AND STOCK ROUTE MANAGEMENT) ACT 2002

The objectives of the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) are to consolidate, amend and provide laws for the management, control, prohibition, and regulation of the introduction, spread and keeping of certain plants and animals declared under the Act. The LP Act is relevant to the Project Site in regards to the control and management of declared pest plant (weed) and animal species.

Classes of Pest described in the LP Act include:

- *Class 1* – one that is not commonly present in Queensland, and if introduced would cause an adverse economic, environmental or social impact;
- *Class 2* – one that is somewhat established in Queensland and has, or could have, a substantial adverse economic, environmental or social impact; and
- *Class 3* – extensive in Queensland and has, or could have, an adverse economic, environmental or social impact.

3.5 QUEENSLAND ENVIRONMENTAL PROTECTION AGENCY BIODIVERSITY STATUS

The Department of Environment and Resource Management (DERM) Biodiversity Status is the status assigned by the DERM to REs to assist with biodiversity planning in Queensland. Unlike the status of REs under the VM Act, the DERM Biodiversity Status is based on an assessment of the condition of

remnant vegetation in addition to the pre-clearing and extent of a regional ecosystem. It takes into account other threatening processes in addition to land clearing. Such processes include:

- The reduction in biodiversity within the REs;
- Weed invasion;
- Grazing pressures;
- Inappropriate fire management;
- Fragmentation; and
- Infrastructure development.

4.0 DATABASE SEARCH AND LITERATURE REVIEW

Database searches collate information on habitat values of a region, flora and fauna species identified in the region from previous surveys, community records and other sources. A review of such databases facilitates the formulation of specific field survey techniques for certain flora and fauna species known from the region.

Database searches reviewed prior to the field survey include:

- EPBC Act Online Database: The search includes species if their distribution overlaps the broader Project region and it is likely that suitable habitat is nearby. The database only pertains to species listed under the EPBC Act. The Project Site was included in the search zone, plus a 25km buffer;
- Wildlife Online Database (DERM): This database uses records collected from previous surveys, including the Queensland Museum surveys as well as records from the public. A 25km search radius was used to cover the Project Site and the surrounding areas;
- Regional Ecosystems and Essential Habitats mapping: By allocating either a Lot and Plan number or central coordinate for the area of interest, this database provides mapping of the REs and Essential Habitat within and surrounding the Project Site;
- WetlandInfo mapping (DERM): This database provides information as to where wetlands are located and their physical, chemical and biological attributes. A search of the Maryborough / Pialba region was conducted, to cover the Project Site and the surrounding area;
- Birds Australia catalogue; this database allows you to access records of birds identified within a given area, using a central co-ordinate; and
- Queensland Museum database records of amphibians, reptiles, birds and mammals.

4.1 FLORA

Review of the EPBC Act Online Database, DERM Wildlife Online Database and HERBREC Database indicated that 21 flora species of conservation significance have been identified or potentially exist within in the vicinity of the Project Site (refer to Table 2 below).

To ensure the AARC survey team were familiar with these species, research into the growth form, ecology and appearance was undertaken prior to the field survey.

Table 2 **Potential Rare and Threatened Flora of the Project Site**

Botanical Name	Common Name	Conservation Status		Habitat Description
		EPBC Act (1999)	NCWR (2006)	
Acacia attenuata	-	Vulnerable	-	Mimosaceae: Eucalypt open forest and woodland, heathland, and wallum (coastal lowland) (Thomas & McDonald 1989).
Acacia baueri subsp. baueri	-	-	Vulnerable	Mimosaceae: Wet sandy lowlands, heathlands, shrublands and open woodlands.
Bosistoa selwynii	Heart-leaved Bosistoa	Vulnerable	-	Rutaceae: Subtropical closed forest / rainforest, seasonal dry closed forest / rainforest (Thomas & McDonald 1989).
Bosistoa transversa	Three-leaved Bosistoa	Vulnerable	-	Rutaceae: Subtropical closed forest / rainforest (Thomas & McDonald 1989).
Cossinia australiana	Cossinia	Endangered	Endangered	Sapindaceae: Seasonal dry closed forest / rainforest (Thomas & McDonald 1989).
Cryptocarya foetida	Stinking Laurel	Vulnerable	Vulnerable	Lauraceae: Subtropical and unspecified closed forest / rainforest (Thomas & McDonald 1989).
Cupaniopsis shirleyana	Wedge-leaf Tuckeroo	Vulnerable	Vulnerable	Sapindaceae: Subtropical closed forest / rainforest, seasonal dry closed forest / rainforest (Thomas & McDonald 1989).
Cycas megacarpa	-	Endangered	-	Cycadaceae: Wet Eucalypt forest / rainforest (Royal Botanic Gardens Web Resource 2008).
Eucalyptus hallii	Goodwood Gum	Vulnerable	Vulnerable	Myrtaceae: *Eucalyptus* sp. woodland and open woodland (Thomas & McDonald 1989).
Fontainea rostrata	--	Vulnerable	Vulnerable	Subtropical closed forest / rainforest (Thomas & McDonald 1989).
Habenaria harroldii		-	Endangered	Orchidaceae: Coastal Melaleuca wetlands, swamps (QEPA Web Resource 2008).
Macrozamia pauli-guilielmi	Pineapple Zamia	Endangered	Endangered	Zamiaceae: Unspecified open woodland (Royal Botanic Gardens Web Resource 2008).
Marsdenia hemiptera	Rusty Vine	-	Rare	Apocynaceae: Littoral and sub-tropical rainforest (Royal Botanic Gardens Web Resource 2008).

Botanical Name	Common Name	Conservation Status		Habitat Description
		EPBC Act (1999)	NCWR (2006)	
Melaleuca cheelii	-	-	Rare	Myrtaceae: Wallum (coastal lowlands) (Thomas & McDonald 1989).
Parsonsia sankowskyana	-	-	Endangered	Apocynaceae: Littoral rainforest otherwise unspecified.
Phaius australis	Lesser Swamp Orchid	Endangered	Endangered	Orchidaceae: Wallum (coastal lowlands) (Thomas & McDonald 1989).
Prasophyllum exilis	-	-	Rare	Orchidaceae: Wet grassy sclerophyll forest, woodland and wallum communities (Royal Botanic Gardens Web Resource 2008).
Quassia bidwillii	Quassia	Vulnerable	Vulnerable	Simaroubaceae: Subtropical closed forest / rainforest, seasonal dry closed forest / rainforest: Fringing closed forest / rainforest (Thomas & McDonald 1989).
Senna acclinis	-	-	Rare	Caesalpiniaceae: littoral subtropical and dry rainforest (Department of Environment and Climate Change NSW Web Resource 2008)
Taeniophyllum muelleri	Minute Orchid	Vulnerable	-	Orchidaceae: Mainly riparian, epiphytic on trees and shrubs (Stanley & Ross 1983).
Xanthostemon oppositifolius	Penda	Vulnerable	Vulnerable	Myrtaceae: Subtropical closed forest / rainforest (Thomas & McDonald 1989).

Review of the Regional Ecosystems Data Mapping indicated five REs with an Of Concern status under the VM Act and / or the DERM Biodiversity Status within a 2 km radius of the Project Site boundary. No Endangered REs were highlighted within the RE mapping. These REs are provided in Table 3 below.

Table 3 **Potential of Concern Regional Ecosystems of the Project Site Region**

Regional Ecosystem	Description	EPBC Act Status	VM Act Status	DERM Biodiversity Status
12.3.11	*Eucalyptus tereticornis, Eucalyptus siderophloia*, and *Corymbia intermedia* open forest on alluvial plains near coast	Not Listed	Of Concern	Of Concern
12.3.12	*Eucalyptus latisinensis* or *Eucalyptus exserta*, and *Melaleuca viridiflora* woodland on alluvial plains	Not Listed	Of Concern	Of Concern
12.3.5	*Melaleuca quinquenervia* open forest on coastal alluvial plains	Not Listed	Not Of Concern	Of Concern
12.3.13	Closed heathland on seasonally waterlogged alluvial plains near coast	Not Listed	Of Concern	Of Concern
12.5.9	Heathland in low lying areas on complex of remnant Tertiary surface and Tertiary sedimentary rocks	Not Listed	Of Concern	Of Concern

4.2 FAUNA

The DERM Wildlife Online Database, EPBC Act Online Database, Birds Australia catalogue and Queensland Museum records were used to identify threatened fauna species known to occur within the Project region. Eleven species were identified as having the potential to be found within the broader region surrounding the Project Site (Table 4). These species are further described in Section 7.5.

Table 4 **Potential Rare and Threatened Fauna of the Project Site**

Scientific Name	Common Name	Conservation Status	
		EPBC Act (1999)	NCWR (2006)
Erythrotriorchis radiatus	Red Goshawk	Vulnerable	Endangered
Lathamus discolor	Swift Parrot	Endangered	Endangered
Rostratula benghalensis	Australian Painted Snipe	Vulnerable	Vulnerable
Turnix melanogaster	Black-breasted Button-quail	Vulnerable	Vulnerable
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Rare
Dasyurus hallucatus	Northern Quoll	Endangered	-
Dasyurus maculatus maculatus (south east mainland population)	Spotted-tail Quoll	Endangered	Vulnerable
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	-
Xeromys myoides	False Water Rat	Vulnerable	Vulnerable
Nannoperca oxleyana	Oxleyan Pygmy Perch	Endangered	Vulnerable
Neoceratodus forsteri	Australian Lungfish	Vulnerable	-
Litoria olongburensis	Wallum Sedge Frog	Vulnerable	Vulnerable
Crinia tinnula	Wallum Froglet	-	Vulnerable
Litoria Freycineti	Wallum Rocket Frog	-	Vulnerable

In addition to the above threatened species, The EPBC Act Protected Matters Search Tool identified the following migratory and marine overfly species:

Table 5 **Migratory and Marine Overfly Species of the Region**

Scientific Name	Common Name	EPBC Act Listing
Ardea alba	Great Egret	Migratory, Marine Overfly
Ardea ibis	Cattle Egret	Migratory, Marine Overfly
Gallinago hardwickii	Latham's Snipe	Migratory, Marine Overfly
Heteroscelus brevipes	Grey-tailed Tattler	Migratory, Marine Overfly
Limosa lapponica	Bar-tailed Godwit	Migratory, Marine Overfly
Nettapus coromandelianus albipennis	Australian Cotton Pygmy-goose	Migratory, Marine Overfly
Numenius madagascariensis	Eastern Curlew	Migratory, Marine Overfly
Numenius phaeopus	Whimbrel	Migratory, Marine Overfly
Pluvialis fluva	Pacific Golden Plover	Migratory, Marine Overfly
Pluvialis squatarola	Grey Plover	Migratory, Marine Overfly
Rostratula benghalensis s. lat	Painted Snipe	Migratory, Marine Overfly
Tringa nebularia	Common Greenshank	Migratory, Marine Overfly
Xenus cinereus	Terek Sandpiper	Migratory, Marine Overfly
Merops ornatus	White-bellied Sea Eagle	Migratory, Marine Overfly
Monarcha melanopsis	Black-faced Monarch	Migratory, Marine Overfly
Monarcha trivirgatus	Spectacled Monarch	Migratory, Marine Overfly
Myiagra cyanoleuca	Satin Flycatcher	Migratory, Marine Overfly
Anseranas semipalmata	Magpie Goose	Marine Overfly
Apus pacificus	Fork-tailed Swift	Marine Overfly
Charadrius mongolus	Lesser Sand Plover	Migratory, Marine Overfly
Hirundapus caudacutus	White-throated Needletail	Migratory, Marine Overfly
Lathamus discolor	Swift Parrot	Marine Overfly
Sterna albifrons	Little Tern	Marine Overfly
Merops ornatus	Rainbow Bee-eater	Migratory, Marine Overfly

4.3 ESSENTIAL HABITAT

In addition to the fauna species listed above, Essential Habitat for the Koala (*Phascolarctos cinereus*) and the Wallum Froglet (*Crinia tinnula*) was identified on the Project Site. Both the species are listed as Vulnerable under the NC Act and are not listed under the EPBC Act.

Essential Habitat mapping was created specifically for use under the VM Act for assessing applications to clear. Although the VM Act does not apply to the Project these species were included in the potential rare and threatened fauna list and are further described in Section 7.5.

4.4 WETLAND HABITAT

4.4.1 Strategy for Conservation and Management of Queensland's Wetlands (1999)

Wetlands are not easily defined and current environmental management practice incorporates number of different definitions and classifications. The principal wetland definition used in Queensland comes from the Strategy for Conservation and Management of Queensland's Wetlands (1999) and is based on those used in the Ramsar Convention on Wetlands (1971):

> *Areas of permanent or periodic/ intermittent inundation, whether natural or artificial, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6m.*

4.4.2 Queensland Wetland Program

The Queensland Wetland Program wetland mapping provides detailed 1:50,000 (coastal) – 1:100,000 (inland) scale mapping of wetlands in Queensland. This program is considered to be of most relevance to the Project site due to the mapping methodology, scale of mapping, and the practice of regularly updating data.

The definition of wetlands used by the Queensland Wetland Program is taken from the 'Wetland Mapping and Classification Methodology – Overall Framework document (EPA, 2005). This definition is consistent with Strategy for Conservation and Management of Wetlands (1999) but includes additional points of further clarification:

> *Wetlands are areas of permanent of periodic/intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed 6 metres. To be classified as wetland, the area must have one or more of the following attributes:*
>
> *i. At least periodically, the land supports plants or animals that are adapted to and dependant on living in wet conditions for at least part of their life cycle, or*
> *ii. The substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or*
> *iii. The substratum is not soil and is saturated with water, or covered by water at some time.*

For the purposes of this report the definition of a wetland is as per the above definition from the Queensland Wetland Program. In addition, wetland classifications (e.g. palustrine, riverine) are also taken from the Queensland Wetland Program.

The Queensland Wetland Program mapping (as accessed through the *Wetlandinfo Website,* DERM 2010) showed that two areas of palustrine wetland (i.e. vegetated swamp) are located within the southern portion of the Project Site. Palustrine wetlands can provide nesting sites for birds, roosting sites for bats, food sources for migratory species, and filtration of the water moving through them by removing contaminants and nutrients. These wetlands were targeted for assessment of conservation values during the field surveys.

4.4.3 Referrable Wetlands

The *Sustainable Planning Regulation 2009* defines a Referable Wetland as

> *An area shown as a wetland on 'Map of referable wetlands'*

The current map of Referable Wetlands in Queensland was derived from the RE mapping. It's primary function is as a tool used to trigger the DERM's advice agency role under the *Sustainable Planning Act 2009*. The current map of Referable Wetlands includes areas dominated by wetlands but also other areas where RE mapping indicates that the area may only contain a minor proportion of wetlands. Wetlands mapping conducted as part of the Queensland Wetland Program (Section 4.4.2) is considered to provide a more detailed (better scale) and more accurate indication of wetlands over the Project site.

In addition, environmental approval for level 1 mining projects is obtained through a process described in the *Environmental Protection Act 1994*. The application process is administered by DERM and is not subject to the same referral processes as applications under the *Sustainable Planning Act 2009*. As a result, Referable Wetlands are not considered further in this report.

4.5 SOUTH EAST QUEENSLAND BIODVERSITY PLANNING ASSESSMENT

Biodiversity Planning Assessments, based on Biodiversity Assessment and Mapping Methodology (2002), provide a mechanism for assessment of biodiversity values at the landscape scale in Queensland. This is achieved using vegetation mapping data generated by the Queensland Herbarium as a basis.

Biodiversity Planning Assessments are generally used by regulators, government departments, and members of the public as a tool in the planning and decision making process.

In developing the South East Queensland Biodiversity Planning Assessment, Expert Panels adopted the following corridor functions and principles for identifying Bioregional Terrestrial Corridors in Queensland. Such corridors:

- Maintain long term evolutionary/genetic processes that allow the natural change in distributions of species and connectivity between populations of species over long periods of time;
- Maintain landscape/ecosystems processes associated with geological, altitudinal and climatic gradients, to allow for ecological responses to climate change; and
- Maintain large scale seasonal/migratory species processes and movement of fauna; Maximising connectivity between large tracts/patches of remnant vegetation; Identifying key areas for rehabilitation and offsets.

Mapping of Bioregional Terrestrial corridors is based primarily on mapping undertaken by the Queensland Herbarium. Line work for terrestrial bioregional corridors was predominantly derived to provide the 'best fit' with respect to remnant vegetation displayed in the Herbarium Regional Ecosystem Mapping Version 5.0 (December 2005). The centre lines of terrestrial corridors were mapped initially and for the majority of Terrestrial Corridors, a buffer width of 2.5 km from the centre line of the corridor was applied.

The following principles were used in development of the terrestrial corridors in Queensland:

- Terrestrial corridors should complement (i.e. minimise overlap and maximise connectivity) riparian landscape corridors;
- Follow major watershed/catchments and/or coastal boundaries;
- Incorporate major altitudinal/geological/climatic gradients;
- Include and maximise connectivity between large tracts/patches of remnant vegetation; Include and maximise connectivity between remnant vegetation in good condition.

Acknowledgement is given to the Environmental Protection Agency for the use of the following datasets; Flora and Fauna Database (including HEBRECS, CORVEG, WildNet); Regional Ecosystem Mapping 2005 Version 5.0 (December 2005); and incorporating updated decisions from the SEQ Expert Panels: - North Flora (October 2006), South Flora (August 2006), North Landscape (October 2006), South Landscape (September 2006) and Fauna (August 2006).

The South East Queensland Biodiversity Planning Assessment (2007) was incorporated within desktop review of the Colton Project area. The assessment identified a Bioregional Terrestrial Corridor partially underlying the proposed Project Boundary see Figure 4.

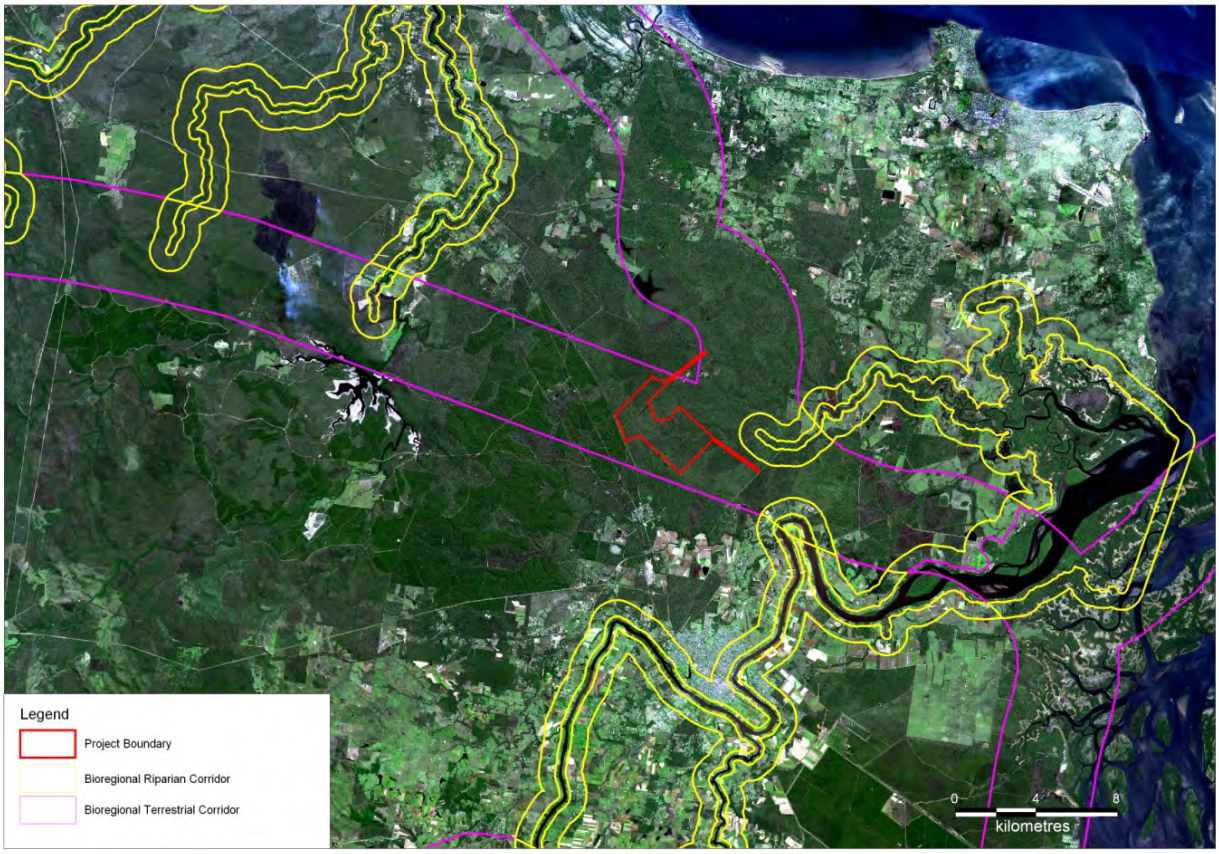

Figure 4 **Location of Project in relation to South East Queensland Biodiversity Planning Assessment - Bioregional Corridors (QEPA 2007)**

Potential impacts of the Project on the identified corridor and specific mitigation strategies are detailed in Sections 6.10.

5.0 FIELD SURVEY METHODOLOGY

5.1 CONDITIONS PRIOR TO AND DURING THE SURVEY

Surveys were timed in accordance with the conventional 'wet' and 'dry' seasons, however more importantly, they were timed to ensure an accurate assessment of the ecological values of the Project Site during different climatic conditions. Timing of the surveys was considered to be adequate to achieve a comprehensive flora and fauna species catalogue, in combination with highlighting seasonal variation in habitat values.

The first survey was conducted from the 21st to the 29th of April, 2008, following the conventional 'wet season'. Temperatures during the weeks leading up to the survey were normal for this time of year with a mean minimum of 14.8ºC and a mean maximum of 27.3ºC. A total of 10.2 mm of rain was recorded in the two weeks leading up to the survey and 5.6 mm of precipitation occurred during the survey period.

The second survey was conducted from the 11th to the 17th of August, 2008, during the conventional 'dry season'. Temperatures for the weeks leading up to the survey were slightly cooler than the average for this time of year with a mean minimum of 5.4ºC and a mean maximum of 21.9ºC. A total of 4.4 mm of rain was recorded in the two weeks preceding the survey and no rainfall occurred during the survey period.

The third survey was conducted from the 18th to the 22nd of September 2009. Conditions during this dry season survey included temperatures ranging from 10.4ºC to 30ºC. A total of 0.2 mm of rain was recorded as falling on the 21st of September by the BOM weather station in Maryborough.

The forth, site visit was undertaken on the 21st of January 2010 to conduct additional flora sampling within selected vegetation communities, and to ensure completeness of the floristic inventory. A total of 42.4mm of rainfall was recorded for the two weeks preceding the survey.

A fifth and final site visit was undertaken in November 2010 by an amphibian expert from BAMM. The purpose of this survey was to undertake targeted searches for amphibians. Conditions leading up to this survey were considered to be conducive for amphibian identification. A total of 50.6 mm of rainfall was recorded in the weeks preceding the survey.

5.2 INITIAL SITE SCOPING

Site scoping was conducted using two methods. Firstly, aerial photography and satellite imagery of the Project Site was reviewed to gain an overall perspective of the vegetation distribution.

Secondly, the Project Site was broadly surveyed from a vehicle. This enabled survey transects to be located in areas that maximised the sampling of representative vegetation types and fauna habitats. This also allowed for the targeting of habitats potentially occupied/utilised by species of conservation significance.

5.3 FLORA

The flora sampling regime was designed to best describe all species and communities present on the Project Site. Flora transects were replicated in seasonal surveys to account for variation in species assemblages throughout the year.

Methods used were in accordance with those recommended in the New South Wales Threatened Species Survey & Assessment Guidelines (2001) and the Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. (Neldner *et. al* .2005).

Four levels of sampling are recognised by the Queensland Herbarium for vegetation mapping:

- *Primary* – Transects consist of permanently marked plots where individual tree and shrub species are marked to allow for individual monitoring. This technique is only used for monitoring or research;

- *Secondary* – Transects consist of 20 x 50 metre plots. Data recorded in these sites includes a list of all species observed from all the major layers of vegetation. Species that fall outside the plot but are typical of the community are also listed. In addition, abundance for individual species in each strata is recorded, including density and foliage projection cover and height for the tree and shrub layers;

- *Tertiary* – Transects consist of 20 x 50m plots in which all of the woody species in the plot are recorded. Data collected includes limited structural information, e.g. heights and basal area; and

- *Quaternary* or observation sites – These plots include Global Positioning System (GPS) location, the dominant species in the characteristic layer with some landform and structural data. An intuitive classification of the vegetation is also recorded. These plots are commonly used in the ground-truthing of mapping previously completed for the local area.

5.3.1 Regional Ecosystem Mapping

A survey of all REs on the Project Site was undertaken. Consequently, the following methods were used:

- A number of representative *Secondary* transects (50 x 20 metre plot) in each vegetation type were selected and a detailed floristic inventory was undertaken. In addition, species density, foliage projection cover and height was recorded. *Secondary* plots were positioned in vegetation representative of the community as a whole. Figure 5 shows the location of *Secondary* transects on the Project Site;

- In addition to the *Secondary* transects, a number of *Quaternary* transects were surveyed in order to assist with the mapping of REs;

- An assessment of the condition of the vegetation type with regard to integrity, fauna habitat value and conservation value was undertaken at each transect; and

- The mapping of the REs was undertaken through the use of aerial photographs, geological maps, and spatial data collected in the field.

5.3.2 Surveys for Species of Conservation Significance

When a habitat suitable for a species of conservation significance was located, a specific survey for that species was undertaken. This specific search involved the use of methods discussed in the draft

New South Wales Threatened Species Survey and Assessment Guidelines (New South Wales National Parks and Wildlife Service 2001).

The method that was used in this survey was the random meander technique. As the name suggests, this technique involves traversing areas of suitable habitat in no set pattern whilst searching for the particular plant species. If there was any uncertainty in identifying the species, a specimen was collected for confirmation by the Queensland Herbarium.

5.3.3 Plant and Regional Ecosystem Identification

All encountered plants were identified using a number of taxonomic keys and other reference material for plants in south east Queensland. All REs were described in accordance with the Queensland Regional Ecosystem Description Database (REDD) (DERM, 2011) and Sattler and Williams (1999).The use of the terms 'Remnant' and 'Non-remnant Vegetation' are as per the definitions of the VM Act.

For any plant species that could not be identified in the field, a sample was collected and sent to the Queensland Herbarium.

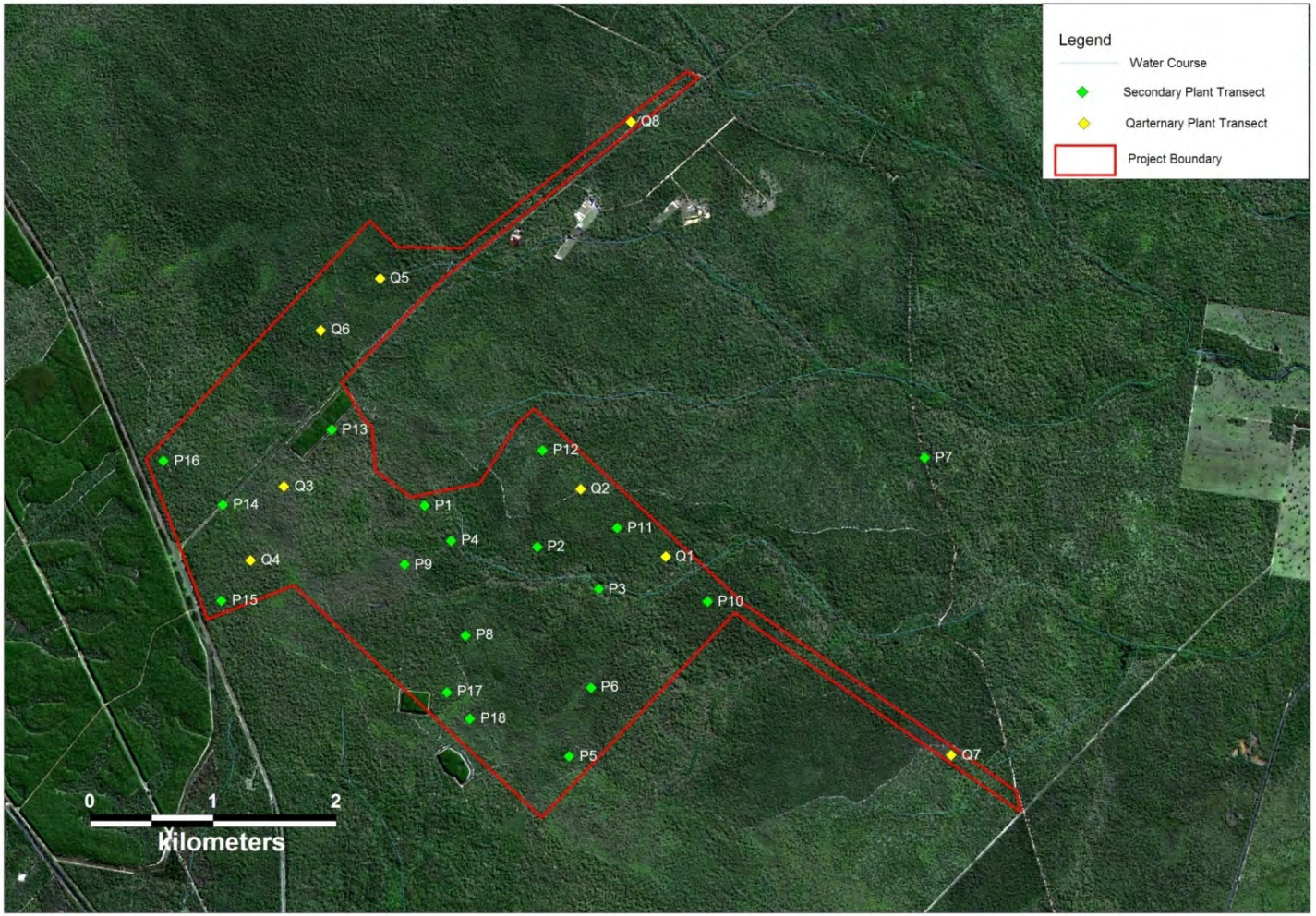

Figure 5 **Flora Transect Locations**

5.3.4 Mixed Polygons

On vegetation and RE maps, a polygon usually denotes a discrete area of one type of vegetation community. The scale at which an RE map is produced dictates the minimum area of continuous vegetation type that can be represented by one polygon. This is known as the "minimum mappable area". If distinct vegetation communities are smaller than this minimum area, then vegetation communities are put together in "mixed polygons". This has the consequence of when RE maps are produced, mixed polygons containing more than one RE can occur. Where mixed polygons are represented on an RE map, all REs represented within the polygon are denoted.

5.4 FAUNA

The fauna sampling methodology for the Project Site was based on standard survey techniques that are used to sample terrestrial vertebrate fauna. Sampling of fauna was conducted primarily along transects established in each of the major vegetation communities and at additional secondary sites. These secondary transects provide important information on fauna species associated with preferred habitat, as well as increasing the chances of finding species of conservation significance. Their inclusion in the assessment provides a more robust survey methodology and greater survey coverage. With the exception of Fauna Transect 4, transect locations were replicated throughout the dry and wet season surveys to identify seasonal variation in species diversities and abundances. Fauna Transect 4 was replaced with Fauna Transect 5 in the August 2008 survey due to difficulties with site access. The location of fauna transects are displayed in Figure 6.

Observations of species outside the specific study locations were noted as incidental observations.

5.4.1 Nomenclature

Many fauna species, particularly frogs and reptiles, do not have widely accepted common names. Where possible, the accepted common names of wildlife are used preferentially in this report, with scientific names stated on all other occasions.

Taxonomy within this report follows the following references:

- Cogger (2000) for amphibians;
- Wilson (2005) for reptiles;
- Morcombe (2002) for birds; and
- Menkhorst and Knight (2001) for mammals.

5.4.2 Detection Methods

A description of the techniques employed to survey the fauna occurring on the Project Site is provided below. Direct trapping techniques were conducted at four established transects for a total of six nights in the wet season survey and a total of five nights in the initial dry season survey. Traps were closed periodically and repositioned within the transect locations half way through each survey. The location of fauna transects is presented below in Figure 6.

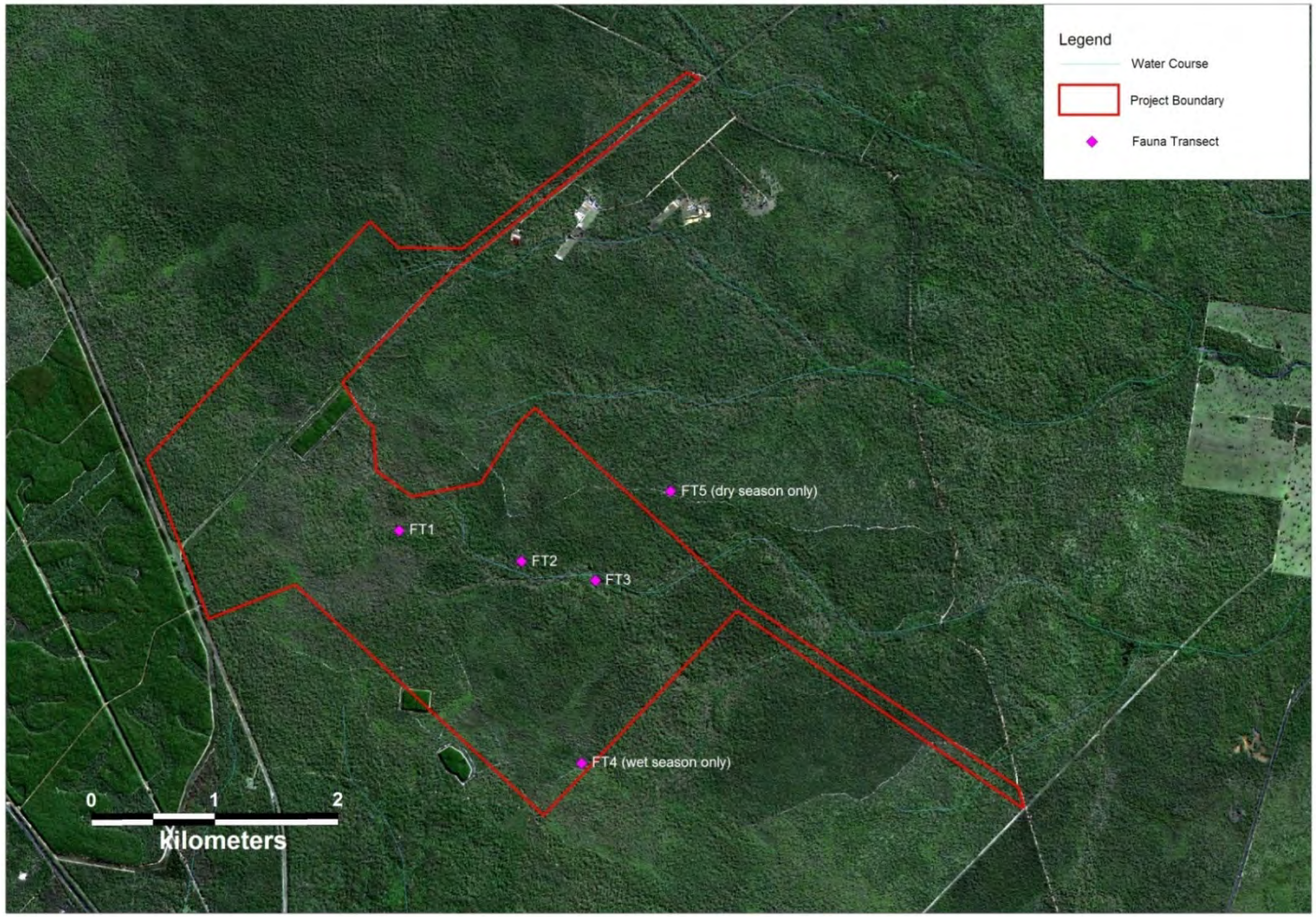

Figure 6 **Fauna Transect Sampling Locations**

Elliott trapping

Type A Elliott traps were used to target small ground-dwelling mammals inhabiting the Project Site. Traps were baited with a mixture of honey-soaked oats and peanut butter. A small portion of bait was placed at the entrance of each trap to entice target species and improve capture rates. At each of the transects, Ten Elliott traps were strategically positioned at each fauna transect. As transects were operational for a total of six nights during the wet season survey and a total of five nights during the initial dry season survey, the overall survey effort was 440 Elliott trap nights.

Pitfall trapping

A pitfall trap-line was established at each transect to target small ground-dwelling fauna (reptiles, mammals and amphibians). Each line consisted of a 20 centimetre tall wire-mesh drift fence running along the ground and crossing the middle of five 10 litre buckets buried flush with the soil surface. The bottoms of the drift fences were buried slightly to guide target animals towards a bucket. A small amount of soil, vegetation litter and a damp sponge were placed in the bottom of each bucket to provide shelter and moisture for captured wildlife. Trap-lines were checked each morning and evening. As pitfall traps were operational for a total of six nights during the wet season survey and a total of five nights during the initial dry season survey, the overall survey effort was 220 pitfall trap nights.

Micro-bat surveying

Micro-bats (Microchiropterans) form an extremely diverse group of wildlife and the identification of individual species requires the use of specialised survey methods due to the superficial similarity of many species, their small size, and largely inaudible calls.

In order to navigate and hunt at night, micro-bats use high frequency echolocation calls, most of which are above the frequency range audible to humans (i.e. ultrasound). These echolocation calls provide an opportunity to unobtrusively survey and identify micro-bats through the use of a specialised electronic bat call recorder called ANABAT. The ANABAT recorder was used to record micro-bat calls at specific sites determined to be potential bat habitat. Recordings were sent to an expert ANABAT call analyst (Mr Greg Ford – Toowoomba, Queensland) for species identification. A total of three ANABAT survey nights were analysed.

Bird surveying

A dedicated search for diurnal birds was conducted visually and aurally on each morning of the survey in the immediate vicinity of each transect. In addition, opportunistic diurnal searches were also conducted on foot in areas considered likely to have high avian diversity (e.g. vegetated watercourses), or to contain cryptic or threatened bird species.

Spotlighting

Spotlighting was carried out at night in various sections of the Project Site in an attempt to observe nocturnal wildlife not likely to be detected by other survey methods, such as owls and arboreal mammals. Two spotlighting techniques were employed:

1. **Walk searches**: Various habitats within the Project Site were selected for spotlighting on foot, especially those considered likely to have high wildlife diversity or to contain cryptic or threatened species. These areas were randomly traversed by two ecologists with headlamps and hand torches. Where possible, rock fissures, bark crevices and tree hollows were investigated. A slow walking speed (approximately 1 km per hour) was maintained to facilitate intensive listening and thorough visual searching. While this technique improves the likelihood

of detecting small cryptic species, it is a time consuming activity that does not permit the coverage of large areas. A total of 10 spotlight hours were undertaken on foot within the Project Site during the surveys.

2. **Vehicle searches**: Spotlighting was also conducted from a slow-moving vehicle where established roads / tracks permitted driving through areas considered likely to have high wildlife diversity or to contain cryptic or threatened species. Two 55-watt 12-volt spotlights were used to scan roadside vegetation for arboreal and ground-dwelling wildlife. An advantage of this survey technique is the efficiency with which large areas can be covered. A total of 10 hours of vehicle spotlighting were undertaken on the Project Site during the surveys.

Habitat searching

To further enhance the likelihood of detecting small cryptic species, opportunistic diurnal searches of likely micro-habitats were conducted at each transect and in other selected areas of the Project Site. Searches involved the rolling of rocks and logs, rustling through leaf litter and the peeling of exfoliating bark from standing trees. Observed animals were caught where possible to aid positive species identification.

Scat / Track searching

At each transect and secondary site a search of the immediate area was conducted for evidence of the presence of cryptic wildlife species through the identification of obvious tracks, scats and other signs of occupation (e.g. tree trunk scratchings).

Incidental recordings

Throughout the survey periods numerous wildlife species were observed or heard on the Project Site during the course of routine activities, such as setting and checking trap-lines, conducting vegetation transect surveys, or driving between transects. Where required, a closer inspection of detected wildlife was carried out to ensure positive species identification. All incidental observations were recorded and appropriate notes made on the surrounding habitat.

5.4.3 Fauna Study Locations

Fauna transect locations are displayed above in Figure 6, while site descriptions and associated photographs are provided below (refer to Photo Plates 1 - 5).

5.4.3.1 Fauna Transect 1

Fauna Transect 1 was located within a mixed eucalypt woodland dominated by Pink Bloodwood (*Corymbia intermedia*) and White Mahogany (*Eucalyptus latisinensis*) (Vegetation Community 1, Section 6.1). This transect was located near the north western corner of the Project Site, and is shown below in Photo Plate 1.

Photo Plate 1: The Fauna Trapping Line at Transect 1

5.4.3.2 Fauna Transect 2

Located in the central region of the Project Site, Fauna Transect 2 was also established in a mixed eucalypt woodland dominated by Pink Bloodwood and White Mahogany (Vegetation Community 1, Section 6.1). This site was more open than Fauna Transect 1, with evidence of selective logging in recent years, as can be seen in Photo Plate 2 below.

Photo Plate 2: The Fauna Trapping Line at Transect 2

5.4.3.3 Fauna Transect 3

Located in the eastern region of the Project Site, Fauna Transect 3 was positioned in riparian vegetation of an unnamed waterway. The waterway was dominated by Paperbark (*Melaleuca quinquenervia*) with occasion mixed eucalypt species (Vegetation Community 2, Section 6.2). This transect line is shown below in Photo Plate 3.

Photo Plate 3: The Fauna Trapping Line at Transect 3

5.4.3.4 Fauna Transect 4

Located in the southern corner of the Project Site, Fauna Transect 4 was positioned in a paperbark woodland (Vegetation Community 3, Section 6.3). This transect was sampled in the April survey period only. It was not replicated in the August survey due to changed access conditions to the site.

Photo Plate 4: The Fauna Trapping Line at Transect 4

5.4.3.5 Fauna Transect 5

Fauna Transect 5 was located outside of the MLA boundary, and positioned in a mixed eucalypt woodland dominated by Pink Bloodwood and White Mahogany (Vegetation Community 1, Section 6.1). This transect was sampled in the August survey period only, to survey an option for the proposed access track alignment. This transect is shown below in Photo Plate 5.

Photo Plate 5: The Fauna Trapping Line at Transect 5

6.0 FLORA RESULTS AND DISCUSSION

The following sections describe the vegetation communities occurring on the Project Site. This includes a description of the vegetation structure and the dominant species of the canopy, mid-storey and ground layer. Where possible, community descriptions are written using species common names.

Six vegetation communities were identified on the Project Site during the AARC field surveys. Five of these communities are classed as remnant vegetation. Associations within the communities reflect different vegetation structures and compositions, which occur on different geophysical locations. The corresponding Queensland Herbarium RE classifications are noted for each of the described remnant vegetation communities.

The six vegetation communities include:

Community 1 – Mixed Eucalypt Woodland (RE 12.5.4a);

Community 2 - Mixed Eucalypt Woodland (RE 12.5.4);

Community 3 – *Melaleuca quinquenervia* Riparian Woodland (RE 12.3.5/12.3.11 85/15);

Community 4 – *Melaleuca viridiflora* Woodland on Alluvial Plains (RE12.5.9);

Community 5 – Sedgeland (12.5.9); and

Community 6 – Non-remnant vegetation.

Figure 7 maps these vegetation communities within the Project Site.

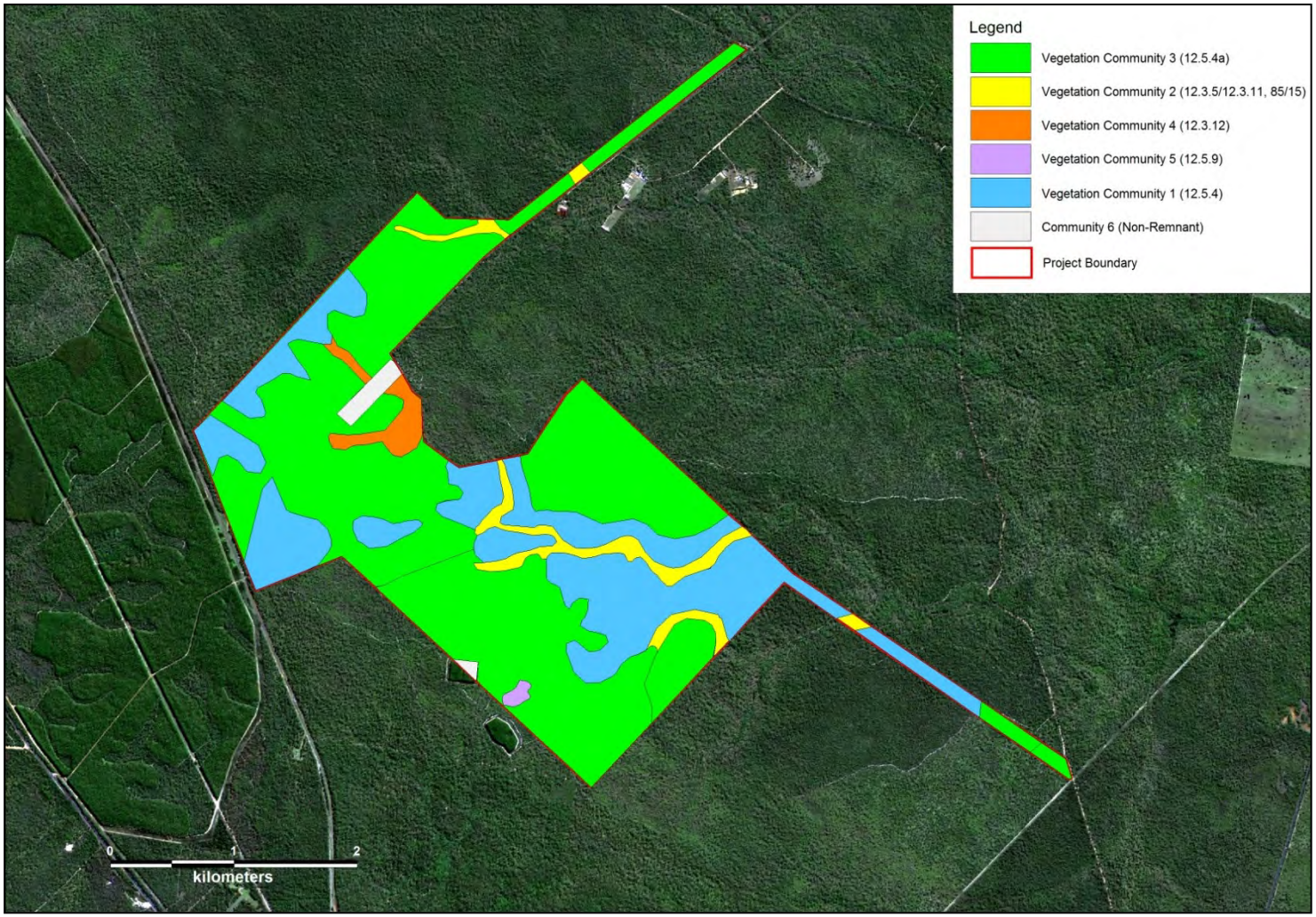

Figure 7 **Vegetation Communities**

6.1 COMMUNITY 1 – MIXED EUCALYPT WOODLAND

Remnant vegetation areas of Mixed Eucalypt Woodland (Photo Plate 6) occur on remnant Tertiary sediments. The community forms a predominant vegetation type on the Project Site.

The community corresponds to RE 12.5.4 and is well represented in the local area. Its distribution is illustrated in above Figure 7.

Photo Plate 6: Mixed Eucalypt Woodland

6.1.1 Community Description

The Mixed Eucalypt Woodland has an average stem cover of 8 square metres per hectare (m^2/ha). Ground cover is high with 70% grass / sedge and / or Grass Tree (*Xanthorrhoea johnsonii*). The bare ground and litter components were seen to vary depending on seasonality. The tree canopy height ranges from 12 m to approximately 15 m and average crown cover is 24%.

The Mixed Eucalypt Woodland community covers an area of 285.2 (approximately 28%) of the Project Site.

The community is identified by Pink Bloodwood and White Mahogany dominating the upper tree canopy with Blue Gum (*Eucalyptus tereticornis*), Queensland Peppermint (*Eucalyptus exserta*) and Spotted Gum (*Corymbia citriodora*) occasionally present. Paperbark (*Melaleuca quinquenervia*), Red Silky Oak (*Grevillea banksii*) and Black She-oak (*Allocasuarina littoralis*) form a sparse understorey. The ground layer is generally dominated by Grass Tree, although species including Wiry Panic

(*Entolasia stricta*), *Rhynchospora heterochaeta*, Kangaroo Grass (*Themeda triandra*), Guinea Flower (*Hibertia stricta*) and Swamp Banksia (*Banksia robur*) were present.

6.1.2 Species Composition

Species presented within Table 6 are indicative of the dominant species recorded within this community. A full species list is presented in Appendix A.

Table 6 **Dominant Flora of Mixed Eucalypt Woodland**

Stratum	Relative Dominance	Scientific Name	Common Name
Canopy	Co-dominant	*Corymbia intermedia*	Pink Bloodwood
	Co-dominant	*Eucalyptus latisinensis*	White Mahogany
	Occasional	*Eucalyptus tereticornis*	Blue Gum
	Occasional	*Eucalyptus exserta*	Queensland Peppermint
	Occasional	*Corymbia citriodora*	Spotted Gum
Understorey	Associated	*Melaleuca quinquenervia*	Paperbark
	Occasional	*Grevillea banksii*	Red Silky Oak
	Occasional	*Allocasuarina littoralis*	Black She-oak
Groundcover	Dominant	*Xanthorrhoea johnsonii*	Grass Tree
	Intermittent	*Rhynchospora heterochaeta*	-
	Intermittent	*Hibertia stricta*	Guinea Flower
	Intermittent	*Themeda trianda*	Kangaroo Grass
	Intermittent	*Banksia robur*	Swamp Banksia

6.1.3 Conservation Value

Regional Ecosystem 12.5.4 (Mixed Eucalypt Woodland) is listed as 'Not of Concern' under the VM Act and the DERM Biodiversity Status. The community is not listed under the EPBC Act.

The Mixed Eucalypt Woodland vegetation community is common in the region. Large stands of intact vegetation occur both in the immediate vicinity of the Project Site and in the broader region.

This eucalypt woodland, and much of the surrounding vegetation, has been subject to selective clearing in the past 10 years. Old access tracks and tree stumps remain as evidence of this disturbance. Evidence of fire within the six to 12 months leading up to the wet season survey was also observed. This natural disturbance is not thought to have significantly affected species composition at the time of the surveys.

No weed species listed under the LP Act, were observed within Vegetation Community 1. One introduced species, *Centaurium tenuiflorum*, was observed in low abundance during the wet season survey. This exotic annual herb is not considered a serious environmental weed in Queensland.

Targeted searches for species of conservation significance did not identify any Rare or Threatened plant species inhabiting the Mixed Eucalypt Woodland on the Project Site.

Numerous hollow trees, logs and branches form potential habitat for a range of native fauna within this vegetation community. Fauna habitats associated with the Project site are further defined in Section 7.

The Mixed Eucalypt Woodland does not constitute a listed threatened community. On the Project Site, no rare or threatened species were found to inhabit the community and species richness was not particularly high. Assuming mitigation strategies are implemented and disturbance is minimised, it is considered unlikely that the community will be significantly impacted at a regional scale.

6.2 COMMUNITY 2 –*MELALEUCA QUINQUENERVIA* RIPARIAN WOODLAND

The *Melaleuca quinquenervia* Riparian Woodland forms a linear stand of remnant vegetation fringing the waterways on the Project Site (Photo Plate 7). Small patches of Blue Gum, Pink Bloodwood and Spotted Gum are interspersed within the woodland and are not distinguished in vegetation mapping of the Project (mapped as mixed polygons).

The community corresponds to RE 12.3.5 (85%) and 12.3.11 (15%) and is a common feature of watercourses in the region. Its distribution on the Project Site is illustrated in Figure 7.

Photo Plate 7: Melaleuca quinquenervia Riparian Woodland

6.2.1 Community Description

The Paperbark Riparian Woodland has an average stem cover of 9.5 m^2/ha. Ground cover is reasonable with 50% grass / sedge, 43% bare ground, 7% litter and less than 1% cryptophytes. The tree canopy height is approximately 13 m and average crown cover is 25%.

This vegetation community covers an area of 46.8 ha (approximately 4.6%) of the Project Site.

The community is distinguished by Paperbarks dominating the upper tree canopy with interspersed patches of Pink Bloodwood, Spotted Gum and White Mahogany. Blue Gum is occasionally present as an emergent species. No shrub layer exists within this community. The ground layer is dominated by Scented Top Grass (*Capillipedium parviflorum*), *Fimbristylis* sp., *Cyperus haspan* and Scrobic (*Paspalum scrobiculatum*).

6.2.2 Species Composition

Table 7 indicates the dominant species recorded within this community. A full species list for the Project is presented in Appendix A.

Table 7 **Dominant Flora of *Melaleuca quinquenerva* Riparian Woodland**

Stratum	Relative Dominance	Scientific Name	Common Name
Emergent	Occasional	*Eucalyptus tereticornis*	Blue Gum
Canopy	Dominant	*Melaleuca quinquenervia*	Paperbark
Interspersed Patches	Associated	*Corymbia intermedia*	Pink Bloodwood
	Associated	*Corymbia citriodora*	Spotted Gum
	Associated	*Eucalyptus latisinensis*	White Mahogany
Groundcover		*Capillipedium parviflorum*	Scented Top Grass
		Cyperus haspan	-
		Paspalum scrobiculatum	Scrobic
		Fimbristylis sp.	-

6.2.3 Conservation Value

Regional Ecosystem 12.3.5 (*Melalueca quinquenervia* dominant woodland) is listed as 'Not of Concern' under the VM Act but has an 'Of Concern' DERM Biodiversity Status due to its limited remaining extent in Queensland. The community is not listed under the EPBC Act.

The less dominant RE 12.3.11 (interspersed Pink Bloodwood, Spotted Gum, White Mahogany and Blue Gum) is listed as 'Of Concern' under both the VM Act and the DERM Biodiversity Status due to its limited remaining extent in Queensland. The community is not listed under the EPBC Act.

Despite its 'Of Concern' listing, the *Melaleuca quinquenervia* Riparian Woodland community is the predominant vegetation type along waterways in the region. The community is well represented in the surrounding landscape.

This vegetation community, and much of the surrounding vegetation, has been subject to selective clearing in the past 10 years. Evidence of fire prior to the wet season survey was also observed. This natural disturbance is not thought to have significantly affected species composition at the time of the surveys.

No species listed under the LP Act were observed within the *Melaleuca quinquenervia* Riparian Woodland. The introduced *Centaurium tenuiflorum*, was observed in low abundance during the wet season survey. This annual herb species is not considered a serious environmental weed in Queensland.

Targeted searches for species of conservation significance did not identify any Rare and Threatened plant species in this vegetation community on the Project Site.

Numerous hollow trees, logs and branches were observed within the *Melaleuca quinquenervia* Riparian Woodland. These, and the high percentage ground cover, would provide conservation value as potential habitat for a range of native fauna. Section 7 details fauna habitats associated with the Project.

Overall the *Melaleuca quinquenervia* Riparian Woodland is of conservation value due to the limited remaining extent of the community in Queensland. On the Project Site, no threatened species were found to inhabit the community and species richness was not particularly high. Assuming mitigation strategies are implemented, and disturbance is minimised, the community is unlikely to be significantly impacted at a regional scale.

6.3 COMMUNITY 3 – *MELALEUCA QUINQUENERVIA* MIXED WOODLAND ON TERTIARY PLAINS

Melaleuca quinquenervia Mixed Woodland on Tertiary Plains (Photo Plate 8) occurs across the Project Site on deep sandy clay sodosols.

The community corresponds to RE 12.5.4a and is a common feature of the local landscape. Its distribution on the Project Site is illustrated in Figure 7. The Regional Ecosystem is classified as a Palustrine Wetland (Wetland Mapping Program, 2010).

Photo Plate 8: ***Melaleuca quinquenervia*** **mixed Woodland on Tertiary Plains**

6.3.1 Community Description

The *Melaleuca quinquenervia* mixed Woodland on Tertiary Plains community has an average stem cover of 2.5 m^2/ha. Ground cover is relatively low with 32% grass / sedge, 58% bare ground and 10% litter. The tree canopy height is approximately 12 m and average crown cover is 13%.

Vegetation Community 3 covers an area of 659.5 ha, approximately 64.5% of the Project Site.

The community varies from woodland solely dominated by Paperbark to a mix of Pink Bloodwood, White Mahogany, Paperbark and Broad Leaved Teatree. Ground cover is dominated by the Grass Tree, Scented Top Grass, Kangaroo Grass, *Drosera peltata*, Swamp Banksia, Fern Leaved Banksia *(Banksia oblongifolia)* and Wire Grass (*Aristida warburgii*).

6.3.2 Species Composition

Species presented within Table 8 are indicative of the dominant species recorded within this community. A full species list for the Project Site is presented in Appendix A.

Table 8 **Dominant Flora of *Melaleuca quinquenervia* mixed Woodland on Tertiary Plains**

Stratum	Relative Dominance	Scientific Name	Common Name
Canopy	Dominant	*Melaleuca quinquenervia*	Paperbark
Interspersed Patches	Associated	*Corymbia intermedia*	Pink Bloodwood
	Occasional	*Eucalyptus latisinensis*	White Mahogony
	Associated	*Melaleuca viridiflora*	Broad Leaved Teatree
Groundcover		*Xanthorrhoea johnsonii*	Grass Tree
		Capillipedium parviflorum	Scented Top Grass
		Drosera peltata	
		Banksia robur	Swamp Banksia
		Aristida warburgii	Wire Grass
		Banksia oblongifolia	Fern Leaved Banksia

6.3.3 Conservation Value

RE 12.5.4a is listed 'Least Concern' under the VM Act and 'No Concern at Present under the DERM Biodiversity Status. The community is not listed under the EPBC Act. The community is also well represented in the immediate vicinity of the Project Site.

Again, evidence of previous selective logging activities, access tracks, and fire were noted within this community, although was not thought to have significantly affected species composition at the time of the surveys.

No species listed under the LP Act, or any other exotic species, were recorded within the *Melaleuca quinquenervia* Mixed Woodland on Tertiary Plains.

Targeted searches for species of conservation significance did not identify and Rare or Threatened plant species within this community within the Project boundary.

Numerous hollow trees, logs and branches were observed within the *Melaleuca quinquenervia* Mixed Woodland on Tertiary Plains. These may provide conservation value as potential habitat for a range of native fauna. RE 12.5.4a is also listed as a Palustrine Wetland. During times of high rainfall vegetated swamp like conditions were observed on the site providing potential habitat for a range of native amphibian species. Section 7 details fauna habitats associated with the Project.

Overall, this community is of conservation value due to its limited remaining extent in Queensland. In the Maryborough region the community is a relatively common landscape feature. On the Project Site, one threatened amphibian species, *Crinia tinnula* (Wallum Froglet), was found to inhabit the *Melaleuca quinquenervia* Mixed Woodland on Tertiary Plains. Section 7.1 provides details of this threatened fauna species. Assuming mitigation strategies are implemented, and disturbance is minimised, the community is unlikely to be significantly impacted at a regional scale.

6.4 COMMUNITY 4 – *MELALEUCA VIRIDIFLORA* WOODLAND ON ALLUVIAL PLAINS

Melaleuca viridiflora Woodland on Alluvial Plains (Photo Plate 9) occurs in the northern section of the Project Site on alluvial surfaces.

The community corresponds to RE 12.3.12 and is a common landscape feature of the region. Its distribution on the Project Site is illustrated in Figure 7.

Photo Plate 9: ***Melaleuca viridiflora*** **Woodland on Alluvial Plains**

6.4.1 Community Description

The *Melaleuca viridiflora* Woodland on Alluvial Plains has an average stem cover of 4 m^2/ha. Ground cover is variable with seasonality, although relatively high with 50% grass / sedge, 15% bare ground and 5 - 30% litter. The tree canopy height is approximately 15 m and average crown cover is 19%.

The *Melaleuca viridiflora* Woodland on Alluvial Plains covers an area of 17.6 ha (approximately 1.7%) of the Project Site.

The community is dominated by Broad Leaved Teatree with associated Paperbark and White Mahogany. Queensland Peppermint is occasionally present in the understorey.

6.4.2 Species Composition

Species presented within Table 9 are indicative of the dominant species recorded within this community. A full species list for the Project Site is presented in Appendix A.

Table 9 **Dominant Flora of *Melaleuca viridiflora* Woodland on Alluvial Plains**

Stratum	Relative Dominance	Scientific Name	Common Name
Canopy	Dominant	*Melaleuca viridiflora*	Broad Leaved Teatree
	Associated	*Melaleuca quinquenervia*	Paperbark
	Associated	*Eucalyptus latisinensis*	White Mahogany
	Occasional	*Corymbia intermedia*	Pink Bloodwood
Understorey	Occasional	*Eucalyptus exserta*	Queensland Peppermint
Groundcover	Dominant	*Xanthorrhoea johnsonii*	Grass Tree
		Themeda triandra	Kangaroo Grass
		Drosera peltata	-
		Banksia robur	Swamp Banksia
		Pimelia linifolia	Slender Rice Flower

6.4.3 Conservation Value

Regional Ecosystem 12.3.12 is listed as 'Of Concern' under both the VM Act and the DERM Biodiversity Status due to its limited remaining extent in Queensland. The community is not listed under the EPBC Act.

Despite its 'Of Concern' listing, this vegetation community is common in the Project region. The community is also well represented in the immediate vicinity of the Project Site.

Selective clearing and fire is again evident in this community, although is not thought to have significantly affected species composition at the time of the surveys.

No species listed under the LP Act, or any other exotic species, were recorded within the *Melaleuca viridiflora* Woodland on Alluvial Plains.

Targeted searches for species of conservation significance did not identify any Rare or Threatened plant species within Community 4 within the Project boundary.

Numerous hollow trees, logs, and branches were observed within the *Melaleuca viridiflora* Woodland on Alluvial Plains. The community also had a high percentage ground cover contributing to fauna habitat values. Section 7 details fauna habitats associated with the Project.

Overall, this community is of conservation value due to its limited remaining extent in Queensland. In the Maryborough region, and in the immediate vicinity of the Project Site, the community is common. On the Project Site, no threatened species were found within the community and species richness was not particularly high. Assuming mitigation strategies are implemented, and disturbance is minimised, the community is unlikely to be significantly impacted at a regional scale.

6.5 COMMUNITY 5 – HEATHLAND

The Heathland vegetation community occurs on Tertiary soils in the south western section of the Project Site.

The community corresponds to RE 12.5.9 and commonly occurs in small isolated areas throughout the region. Its distribution on the Project Site is limited to one small area as illustrated in Figure 7. The Regional Ecosystem is classified as a Palustrine wetland (Wetland Mapping Program, 2010).

Photo Plate 10: Heathland

6.5.1 Community Description

The Heathland is void of any tree canopy resulting in a tree stem cover of 0 m^2/ha and 0% crown cover. Ground cover is high and there is an average of 95% Grass / shrub cover, 2% bare ground and 3% litter.

Community 5 covers an approximate area of 3.1 ha (0.3%) of the Project Site.

The community is dominated by Kangaroo grass with Grass trees, Thyme Honey Myrtle and *Westringia tenuicaulis* common in the ground layer. Occasional stunted Paperbark, stunted Eucalyptus and *Persoonia virgata* are present as occasional emergent shrubs.

Typically this Regional Ecosystem is associated with lower lying areas, however, this is not the case for the community on the Project site. Heathland vegetation on the Project is located on high ground

(surface elevation 28.12 m). Surface soils were observed to remain wet / boggy with shallow water ponding on the surface following high or prolonged rainfall. Section 6.9 details wetland attributes and conservation values of the Heathland community.

6.5.2 Species Composition

Species presented within Table 10 are indicative of the dominant species recorded within this community. A full species list is presented in Appendix A.

Table 10 **Dominant Flora of Heathland**

Stratum	Relative Dominance	Scientific Name	Common Name
Canopy	Occasional	*Melaleuca quinquenervia*	Paperbark
	Occasional	*Persoonia virgata*	-
	Occasional	*Eucalyptus* sp.	Eucalyptus
Groundcover	Dominant	*Themeda triandra*	Kangaroo Grass
	Associated	*Xanthorrhoea johnsonii*	Grass Tree
	Associated	*Melaleuca thymifolia*	Thyme Honey Myrtle
	Associated	*Westringia tenuicaulis*	-

6.5.3 Conservation Value

Regional Ecosystem 12.5.9 (Heathland) is listed as 'Of Concern' under the VM Act and the DERM Biodiversity Status. The community is not listed under the EPBC Act.

The Heathland community is common in the region and generally occurs in small isolated patches. Typically this Regional Ecosystem is associated with lower lying areas, however, this is not the case for the community on the Project site.

The Heathland Regional Ecosystem is classified as a Palustrine wetland. Palustrine wetlands refer to vegetated non-channel environments of less than 8 hectares. They include billabongs, swamps, bogs, springs, soaks etc, and have more than 30 percent emergent vegetation (DERM, 2009). The heathland community on the Project site was observed to hold shallow ponding water on the surface following high or prolonged rainfall. Apart from the lack of tree canopy, the community does not show vegetative characteristics of typical wetland environments. Section 6.9 details wetland attributes and conservation values of the community.

No weed species listed under the LP Act, were observed within Vegetation Community 5.

Targeted searches for species of conservation significance did not identify any Rare or Threatened plant species inhabiting the Heathland on the Project Site. No wetland dependant species were identified within this community. During times of high rainfall vegetated swamp like conditions provide potential habitat for a range of native amphibian species. Section 7 details fauna habitats associated with the Project.

A dense ground cover provides some protection for smaller animals and may be a source of food for larger mammals such as macropods, however, a distinct lack of tree cover and fallen logs limits the habitat potential of the community. Fauna habitats associated with the Project site are further defined in Section 7.

The Heathland community is listed as of concern due to the extent of clearing in Queensland. On the Project Site, no rare of threatened species were identified within the community, however, suitable habitat exists for amphibian species including *Crinia tinnula* (Wallum froglet) which is listed as Vulnerable under the NC Act. Section 7 details fauna habitats associated with the Project. Assuming mitigation strategies are implemented and disturbance in minimised, it is unlikely that this community will be significantly impacted at a regional scale.

6.6 COMMUNITY 6 – NON-REMNANT VEGETATION

Small areas of non-remnant vegetation in the form of Pine Plantations are present within the Project Site. Due to the limited area, (11 ha, approximately 1% of the entire project area), limited fauna and flora habitat value (few hollow-bearing trees, no structural diversity, dense vegetative cover excluding other plant species, low species richness), this community was not surveyed.

There are no RE equivalents for non-remnant vegetation, and the community is not listed as threatened under any legislation. No specific mitigation strategies will be required for this community.

6.7 COMMUNITIES OF CONSERVATION SIGNIFICANCE

6.7.1 Regional Ecosystems of Significance

A summary of the conservation significance of REs occurring on the Project Site is provided below in Table 11.

Table 11 **Conservation Significance of Regional Ecosystems**

Vegetation Community	Regional ecosystem equivalents	VMA (1999) status	QEPA Biodiversity status	EPBC Status	Proportion of Project Site
Mixed Eucalypt Woodland on Tertiary Surface	12.5.4	Least Concern	No Concern at Present	Not Listed	28%
Melaleuca quinquenervia Riparian Woodland	12.3.5 (85%)	Least Concern	Of Concern	Not Listed	4.6%
	12.3.11 (15%)	Of Concern	Of Concern	Not Listed	
Melaleuca quinquenervia Mixed Woodland on Tertiary Plains	12.5.4a	Least Concern	No Concern at Present	Not Listed	64.5%
Melaleuca viridiflora Woodland on Alluvial Plains	12.3.12	Of Concern	Of Concern	Not Listed	1.7%
Heathland	12.5.9	Of Concern	Of Concern	Not Listed	0.3%
Non-remnant Vegetation	No RE Equivalent	Not listed	Not Listed	Not Listed	1.1%

RE 12.3.5 is listed as 'Of Concern' under the DERM Biodiversity Status and REs 12.3.11, 12.3.12 and 12.5.9 are listed as 'Of Concern' under both the DERM Biodiversity Status and VM Act. All REs are designated this status due to their limited remaining pre-clearing extent in Queensland.

The nature of the Project requires clearing of these communities within the bounds of the MLA area. Mitigation Strategies (Section 8) have been proposed to minimise the impacts of the Project. Assuming disturbance is limited to the project area, and impact mitigation measures are put in place, it is unlikely this community will be significantly impacted on a regional scale.

6.8 COMPARISON TO DERM REGIONAL ECOSYSTEM MAPPING

Ground-truthing and detailed vegetation surveys revealed some differences between DERM RE Mapping and actual vegetation communities on the Project Site. These differences were related to the designated land zone and the scale at which mapping was undertaken. Ground surveys by experienced botanists were able to better define boundaries of REs and more accurately describe mixed polygons where multiple REs could not be separated / defined. Communication with the Queensland Herbarium has confirmed the absence of land zone 3 in the south west corner of the Project Site. Figure 7 shows Regional Ecosystems / vegetation communities on the Project Site as determined by the vegetation surveys.

In addition, QEPA mapping identifies a small (3 ha) patch of RE 12.3.13 on the Project Site. This RE is described as closed heathland on seasonally waterlogged alluvial plains usually near the coast (QEPA, 2008). It is also known to contain Palustrine wetland (e.g. vegetated swamp). This RE was targeted in the seasonal Flora assessment and it was determined not to exist. A vegetation transect (P6) was positioned within the area mapped by the QEPA and results supported this conclusion.

6.9 WETLANDS ON THE PROJECT SITE

Field surveys and targeted assessment concluded that an area of wetland exists on the Project site, as defined 'Wetland Mapping and Classification Methodology – Overall Framework document (EPA, 2005):

Wetlands are areas of permanent of periodic/intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed 6 metres. To be classified as wetland, the area must have one or more of the following attributes:

iv. At least periodically, the land supports plants or animals that are adapted to and dependant on living in wet conditions for at least part of their life cycle, or
v. The substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or
vi. The substratum is not soil and is saturated with water, or covered by water at some time.

6.9.1 Heathland Vegetation Community - Palustrine Wetland

RE 12.5.9 (Heathland vegetation community) was identified in a single small (3 ha) location within the Project area (Figure 7).

Typically this Regional Ecosystem is associated with lower lying areas, however, this is not the case for the community on the Project site. The Heathland community on the Project is located on high ground (surface elevation 28.12 m). Surface soils were observed to remain wet / boggy with shallow water ponding on the surface following high or prolonged rainfall. As a result of this temporary inundation the Heathland community can be considered a Palustrine wetland.

Excluding the lack of tree canopy (foliage projective cover), the community does not show vegetative characteristics of typical wetland environments. The Heathland contained similar ground species (grasses, forbs and shrubs) to other communities on the Project site and no wetland habitat dependant species were identified. The community provides suitable habitat to a range of amphibian species

The wetland is thought to be fed by rainfall and overland flow, however, it is not associated with any particular creek or stream.

The soil profile within the heathland community (to <1 m deep) was observed to remain damp or saturated for prolonged periods following significant rainfall. The anaerobic conditions created by the soil saturation is thought to be the reason for the lack of tree canopy, however, it is noted that surface dampness is insufficient to support wetland dependant / characteristic species in the ground layer.

Groundwater investigations of the wetland indicated no connection to any groundwater aquifers in the region (Streamline Hydro, 2010). Specifically:

- Water in the deeper coal seam aquifers is highly saline and is not representative of ponded surface water within the wetland; and

- Water is only present in wetlands for a short duration following high or prolonged rainfall events. At other times the surface substrate remains completely dry suggesting the wetland is not being fed by any underground aquifers.

Based on the outcomes of the ecological survey and the groundwater investigation it was determined that the wetland was not fed by groundwater.

The 3 ha Heathland community is of conservation value in that it constitutes a wetland habitat by definition and that it represents an 'of concern' vegetation community. The Heathland also provides potential habitat for amphibian species including *Crinia tinnula* (Wallum froglet) which is listed as Vulnerable under the NC Act (see Section 7.1). Mitigation strategies are recommended in Section 8 to minimize impacts of the Project on this community.

6.9.2 *Melaleuca quinquenervia* Mixed Woodland on Tertiary plains - Palustrine Wetland

Vegetation community 3, *Melaleuca quinquenervia* Mixed Woodland on Tertiary Plains, corresponds to regional ecosystem 12.5.4a (DERM, 2011). The regional ecosystem description classifies the community as a vegetated wetland (or vegetated swamp).

On the Project site, *Melaleuca quinquenervia* Mixed Woodland on Tertiary Plains, occupies approximately 659 hectares. Generally the community is found in lower lying areas which were observed to become periodically damp at the soil surface following significant rainfall.

The presence of *Melaleuca quinquenervia* in the tree canopy and Swamp Banksia (*Banksia robur*) in the shrub layer indicates that groundwater is often present in the soil profile at depths of less than 5 m (BAAM 2010). The distinct absence of wetland dependant species in the ground layer suggests that surface soil (< 1m) dampness is short term only (BAAM 2010). The groundwater study for the Project (Streamline Hydro, 2010), supports this conclusion describing the presence of groundwater within shallow, localized, lensoidal, zones across the site.

The *Melaleuca quinquenervia* Mixed Woodland on Tertiary Plains community is of conservation value in that it constitutes a wetland habitat by definition. The regional ecosystem, which is not listed as being of conservation significance, also provides habitat for a range of amphibian species including *Crinia tinnula* (Wallum froglet) which is listed as Vulnerable under the NC Act (see Section 7.1). Mitigation strategies are recommended in Section 8 to minimize impacts of the Project on this community.

6.10 BIOREGIONAL TERESTRIAL CORRIDOR

Database searches have revealed the Colton Project to be located within the bounds of a Bioregional Terrestrial Corridor (SEQ Biodiversity Planning Assessment, 2007). As discussed in Section 4.5, these corridors have the aim of maintaining connectivity of species and vegetation, maintaining landscape/ecosystem processes, maintaining migratory pathways and identifying key areas for rehabilitation and offsets.

The location of the Colton Coal Mine is dictated by the location of the economical coal resource. As such, the location of the Project site cannot be changed. However, long term impacts of the Project on the goals of the Bioregional Terrestrial Corridor are expected to be minimal. This prediction is based on the following:

- As shown in Figure 4, the Project is totally surrounded by a buffer of remnant vegetation (minimum buffer distance of 2.3 km around the mine). This surrounding vegetation suggests that connectivity of the corridor will be maintained;

- Land disturbance is relatively low due to the small size of the Project;

- Clearing of vegetation will be temporary only (8 year mine life) with rehabilitation a requirement of the Project; and

- Recommendations have been made in this report to ensure impacts are minimized and rehabilitation goals include restoration of the corridor.

Section 7.3 describes the specific management strategies aimed at minimising impacts on the corridor network, as well as, tailoring rehabilitation methodology to return the biodiversity values of the described corridor. Based on the aforementioned points, it is anticipated that the long term affects of the Project on the corridor will be minimal.

7.0 FAUNA RESULTS AND DISCUSSION

A combined total of 62 vertebrate fauna species were identified on the Project Site during the seasonal surveys, comprising 9 amphibian, 7 reptiles, 15 mammals, and 31 birds. The overall ecological value of the Site was considered to be moderate and fauna observations were representative of species diversities and abundances of the region, and the size of the Project site.

A complete list of all observed fauna species is provided in Appendix B.

7.1 AMPHIBIANS

7.1.1 Habitat Values

Potential habitat on the Project Site varies over time due to the ephemeral nature of the waterways and the periodic nature of the Palustrine Wetlands identified on the site. Following periods of high rainfall, habitat values on the Project site increase as pools standing water build up and areas of soil dampness or saturation develop, particularly within wetland communities (see Section 6). Sandy loam soils on the Project Site provide favorable burrowing conditions and offer additional habitat value.

7.1.2 Observed Species

The Cane Toad (*Rhinella marina*) was noted in great abundance throughout the Project Site. Ample food and breeding ground resources have resulted in the high numbers of Cane Toads observed throughout the surveys. Cane Toads are a major pest species that prey on native fauna as well as competing for food, habitat and breeding areas with native frogs. Further discussion of the Cane Toad is provided in Section 7.6, with associated management strategies examined in Section 8.3.

Targeted wet season surveys identified 8 native Australian frog species on the Project site. These species included: *Crinia tinnula* (Wallum Froglet), *Limnodynastes tasmaniensis* (Spotted Grass Frog), *Pseudophryne raveni* (Copper-backed Broodfrog), *Litoria fallax* (Eastern Dwarf Tree Frog), *Litoria gracilenta* (Dainty Green Tree Frog), *Litoria inermis* (Peter's Frog), *Litoria nastua* (Rocket Frog), and *Litoria rubella* (Red Tree Frog).

Of the 9 amphibian species identified on the project site only the Wallum Froglet is listed as threatened under State or Federal legislation. The species is listed as Vulnerable under the NC Act (Wildlife Regulation 2006) with habitat loss considered the predominant threat to species numbers. Vegetation within suitable areas varies, and includes heathland, sedgeland and Melaleuca swamp, (Hines et al. 1999). In Queensland, the frogs are restricted to the coastal lowlands (or "wallum" of Coaldrake 1961) of the south-east. Although males may call throughout the year, breeding occurs in autumn and, presumably, in late winter, spring and late summer. Males call from secluded positions either beside water or while afloat amongst vegetation. Breeding occurs in swamps, dams and flooded ditches (Anstis 2002). Section 8 details mitigation strategies to minimize impacts of the project on this species.

7.2 REPTILES

7.2.1 Habitat Values

Australia's environment supports an extremely diverse assemblage of reptile species which exploit a wide array of micro-habitats (e.g. tree hollows, soil cracks) and food sources (e.g. succulent leaves, termites, grasshoppers, birds, and other reptiles) (Pianka 1969). This diversity encompasses species of widely different body sizes (skinks compared to goannas), and life history strategies (burrowing blind snakes compared to arboreal geckos).

7.2.2 Observed Species

Seven reptile species were observed on the Project Site during the surveys comprising one dragon (Agamidae), four skinks (Scincidae), one snake (Elapidae) and one monitor (Varanidae).

The Tommy Roundhead Dragon (*Diporiphora australis*), is common in Queensland and occupies a wide range of habitats. The species (Photo Plate 11) is semi-arboreal, feeding on insects on the ground and laying eggs in burrows excavated in open areas (Wilson and Swan 2003). This species was observed in abundance both on and in the vicinity of the Project Site.

Four diurnal skink species were observed during the survey, the Grass Skink (*Lampropholis delicata*), the Wall Skink (*Cryptoblepharus virgatus*), the Robust Ctenotus (*Ctenotus robustus*) and the Rainbow Skink (*Carlia vivax*). These species are usually arboreal and occupy a range of wooded and rocky habitats (Wilson and Swan 2003).

One diurnal snake species, Red-bellied Black Snake (*Pseudechis porphyriacus*) was identified on the Project site. The species is found in eastern Australia from far north Queensland, New South Wales, Victoria and south-eastern South Australia. The Red-bellied Black Snake is commonly associated with streams, swamps and lagoons and feeds principally on frogs (Cogger, 2000).

The Lace Monitor (*Varanus varius*) was also observed. This species is common in well timbered areas throughout eastern Australia where they forage on the ground and take to trees when disturbed (Photo Plate 12). Termite nests play an important role in their ecology as they are favoured egg laying sites (Wilson and Swan 2003).

Photo Plate 11: **Tommy Roundhead Dragon (*Diporiphora australis*)**

Photo Plate 12: Lace Monitor (*Varanus varius*)

7.3 BIRDS

7.3.1 Habitat Values

Avian assemblages are generally determined by factors such as food sources (e.g. fruit, nectar, seeds, and insects), as well as a mosaic of habitat structures such as grasses, thick understorey, mid-storey and canopy vegetation (i.e. vertical habitat complexity). Generally, the more food sources available and the more complex the structure of vegetation, the more diverse the avifauna.

Food sources on the Project Site are generally restricted to nectar, seeds, insects and vertebrate prey items. The Project Site largely lacked a permanent or abundant supply of fruit producing plant species, suggesting fructivorous species are less likely to occur.

7.3.2 **Observed Species**

A combined total of 30 bird species from 18 families were observed on the Project Site during the seasonal surveys. No threatened species listed under the NC Act were identified.

The Rufous Fantail, (*Rhipidura rufifrons*) was identified within the Project Site. This species is listed as Marine and Migratory under the EPBC Act. The distribution of the Rufous Fantail is widespread throughout eastern and northern Australia, and the local population on the Project site is unlikely to constitute an 'ecologically significant proportion' of the total population of the species. Furthermore, the Project site is not at the limit of the species' range, nor is the species considered to be declining within the region. The species can reside in numerous different habitat types, ranging from rainforest to paperbark forests, mangroves to gardens (Pizzey and Knight 2001), and the habitat within the Project Site that is utilised by the species is well-represented and extensive in the surrounding area. Therefore, it is unlikely the Project will have a significant impact on the regional populations of this species, and as a result the Project does not need to be referred under the EPBC Act.

The Black-faced cuckoo-shrike (*Coracina novehollandiae*) and the White Bellied cuckoo-shrike (*Coracina papuensis*) were also identified on the Project site. These species are listed as Marine under the EPBC Act. Like the Rufous Fantail, these Cuckoo-Shirke species are not listed as threatened and populations are not considered to be at risk. Furthermore, the species distribution of the Cuckoo-Shrikes extends well beyond the boundary of the Project throughout mainland Australia. Both species occupy a wide range of habitats including forests, woodlands, watercourses, parks and gardens (Pizzey and Knight 2001). It is unlikely the Project will have a significant impact on the regional populations of these species, and as a result the Project does not need to be referred under the EPBC Act.

Honeyeaters were common on the Project Site with six species represented. The most numerous species being Noisy Friarbirds (*Philemon corniculatus*). Also present were the Little Wattlebird (*Anthochaera chrysoptera*), Blue-faced Honeyeater (*Entomyzon cyanotis*), White-throated Honeyeater (*Melithreptus albogularis*), the Scarlet Honeyeater (*Myzomela sanguinolenta*) and the Little Friarbird (*Philemon citreogularis*).

Granivorous (seed eating) birds were well represented on the Project Site. The Peaceful Dove (*Geopelia striata*), Common Bronzewing (*Phaps chalcoptera*), Button Quail (*Turnix* sp.), Pale-headed Rosella (*Platycercus adscitus*), Scaly-breasted Lorikeet (*Trichoglossus chlorolepidotus*), Yellow-tailed Black-cockatoo (*Calyptorhynchus funereus*) and Rainbow Lorikeet (*Trichoglossus haematodus*) were observed on the Project Site particularly in the early mornings and late afternoons.

Insectivorous birds and species that prey on vertebrates include the Australian Owlet-Nightjar (*Aegotheles cristatus*), White-necked Heron (*Ardea pacifica*), Red-backed Fairy-wren (*Malurus melanocephalus*), White-faced Heron (*Egretta novaehollandiae*), Pied Butcherbird (*Cracticus nigrogularis*), Australian Magpie (*Gymnorhina tibicen*), Torresian Crow (*Corvus orru*), Grey Fantail (*Rhipidura fuliginosa*), Brush Cuckoo (*Cacomantis variolosus*), Pheasant Coucal (*Centropus phasianinus*) Willie Wagtail (*Rhipidura leucophrys*), Laughing Kookaburra (*Dacelo novaeguineae*), Tawny Frogmouth (*Podargus strigoides*), Rufous Whistler (*Pachycephala rufiventris*), and Grey-Crowned Babbler *Pomatostomus temporalis*).

7.4 MAMMALS

7.4.1 Habitat Values

The morphology of mammal species varies widely from small rodents to larger kangaroos and bats. The ecology of each of these groups is equally variable and they are assessed separately in the following sections.

Small Mammals

Habitats suitable for small mammals include areas that provide a plentiful food source and suitable shelter sites. The highest density of small mammal species is usually associated with reliable rainfall which is reflected in a reliable source of food and dense ground vegetation, particularly shrubs and grasses.

The diversity of small mammals on the site may be somewhat limited by the lack of grass species in the ground layer. Consequently, small mammal populations could fluctuate dramatically in response to rain which increases seed production. During less favourable periods, small mammal populations could be very low.

Surveys revealed the Common Planigale (*Planigale maculata*) and the House Mouse (*Mus musculus*) to inhabit the Project Site. The Common Planigale is a native marsupial that feeds mainly on insects and small vertebrates. The species inhabits crevices in rocks and hollow logs in wetter areas with cover of trees, shrubs, grasses or sedges. The Common Planigale is not listed as a threatened species under the NC Act or the EPBC Act.

The House Mouse is an exotic pest species originating in Asia. The species is capable of inhabiting a large range of habitats and its distribution is widespread throughout Australia. Section 7.6 discusses this species in greater detail and Section 8.3 provides mitigation strategies for population control.

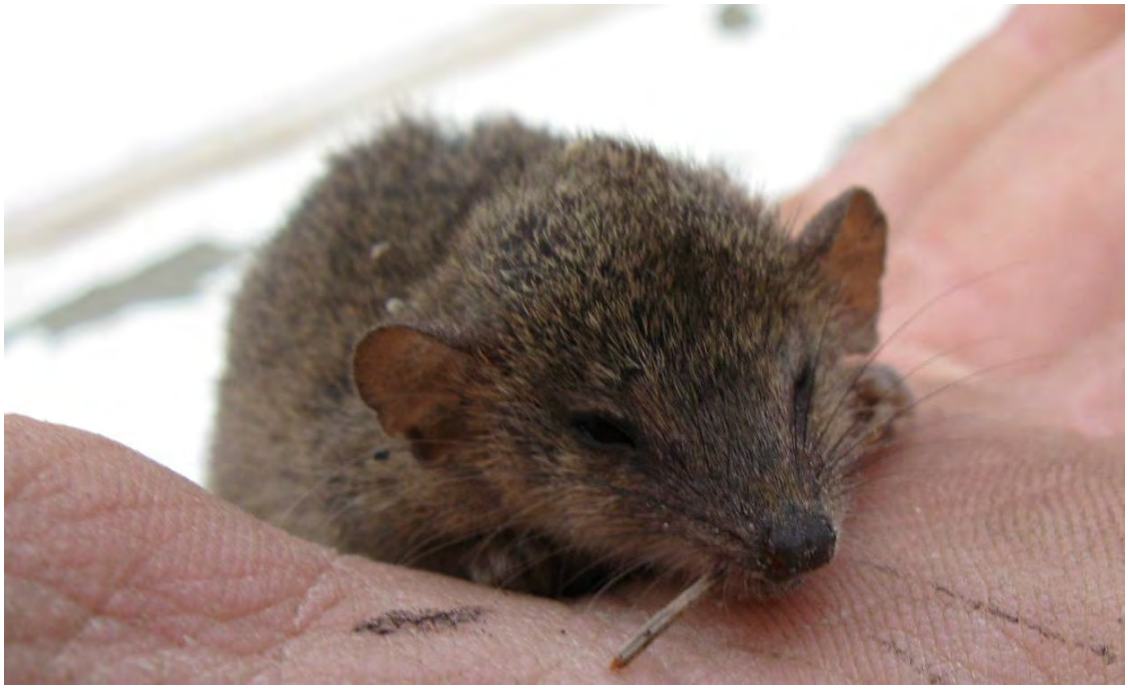

Photo Plate 13: Common Planigale (*Planigale maculata*)

Medium and Large Mammals

Factors affecting the occurrence of medium-sized mammals are varied. Important factors can include land-clearing, feral animal predation and grazing pressures.

In contrast, larger mammals such as kangaroos have been much less affected by predation and land clearing activities. In fact, many species have flourished in response to increased areas of grassland and open vegetation e.g. the Eastern Grey Kangaroo (*Macropus giganteus*).

The Eastern Grey Kangaroo and the Swamp Wallaby (*Wallabia bicolour*) were observed on the Project Site during the surveys. Both species are common and widespread in Queensland.

The Feral Pig (*Sus scrofa*) and the Wild Dog (*Canis familiaris*) were also identified on the Project Site via tracks. Both species are listed as a Class 2 pest in Queensland under the LP Act. Section 7.6 further discusses these species and Section 8.3 provides mitigation strategies for population control.

Bats

The density and diversity of Australian bat species is determined primarily by the availability of suitable nesting and roosting sites. Roosting sites can include locations such as thick foliage, loose exfoliating bark, rock caves or cavities, tree hollows or even fabricated structures such as old buildings and culverts (Churchill 1998).

Consequently, areas with a large number of hollow-bearing trees that occur within remnant vegetation are of high value to many bat species. As bats have a small body size, these hollows can be much smaller in size than required by arboreal mammals. Vegetation on the Project site provides a suitable habitat for some bat species.

ANABAT echolocation detection identified the probable presence of the Little Bent-Winged Bat (*Miniopterus australis*), Little Broad-Nosed Bat (*Scotorepens greyii*), Central-Eastern Broad-Nosed Bat (*Scotorepens* sp.), Yellow-bellied Sheathtail-Bat (*Saccolaimus flaviventris*), Eastern Freetail-Bat (*Mormopterus* sp.) and the Beccari's Freetail-Bat (*Mormopterus beccari*). Species possibly occurring on the Site include the Hoary Wattled Bat (*Chalinolobus nigrogriseus*) and the Eastern Broad-Nosed Bat (*Scotorepens orion*). All of these species are common and relatively widespread in Queensland.

Gliders

Active mainly at night Gliders inhabit a range of forests and woodlands in Queensland. Agile climbers and capable of gliding large distances, gliders are generally arboreal building a nest of leaves and bark in hollow trees.

Mixed Eucalypt woodlands on the Project Site provide suitable habitat for gliders. Seasonal surveys identified a Sugar Glider (*Petaurus breviceps*) while spotlighting on the site.

7.5 SPECIES OF CONSERVATION SIGNIFICANCE FROM THE REGION NOT OBSERVED ON THE PROJECT SITE

This section discusses Rare and Threatened species that are known from the broad region but were not observed during the survey periods. These species have been identified from wildlife database searches and scientific literature searches. Table 11 provides an assessment of the likelihood of these species utilising the Project Site.

Three Migratory / Marine species (as listed in Table 3) were observed on the Project Site during the seasonal surveys. Given the size and location of the proposed operation, and the abundance of similar habitat surrounding the Project Site, it is considered highly unlikely that the Colton Mine Project would impact any migratory or marine flyover species. For this reason only potential rare and threatened species are included in this section.

Table 12 **Threatened Species From The Region Not Identified On The Project Site**

Scientific Name Common Name	Status		Habitat	Notes
	EPBC	NCWR		
Erythrotriorchis radiatus Red Goshawk	V	E	The Red Goshawk prefers a mix of vegetation types with its habitat including tall open forest, woodland, lightly treed savannah and the edge of rainforest. It is found over eastern Queensland, across northern Australia and there are also confirmed sightings from central Australia (www.epa.qld.gov.au).	If present, the species is likely to be very rare in region. Some birds may occur over the Project Site intermittently, but these are likely to be transient individuals. Very little or no impacts of the proposed activities are expected upon the species.
Lathamus discolour Swift Parrot	E	E	Preferring dry sclerophyll forests and woodlands, the species is endemic to south-eastern Australia, breeding in Tasmania from September to March. Migrating to the mainland (southern and central Victoria and eastern New South Wales) occurs in April (www.birdsinbackyards.net.au).	The species is highly unlikely to inhabit the Project Site or surrounding region. The Project Site is clearly outside the known range of the species, furthermore no preferred habitat exists on the Project Site. No impacts from the proposed activities are expected upon the species.
Rostratula australis Australian Painted Snipe	V	V	Inhabits shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled, throughout many parts of Australia (www.epa.qld.gov.au).	Suitable habitat was not identified on the site. Some birds may occur over the Project Site intermittently, but these are likely to be transient individuals. Very little or no impacts of the proposed activities are expected upon the species.
Turnix melanogaster Black-breasted Button-quail	V	V	Inhabits leaf litter of drier forests and thickets or lantana patches. Its current distribution stretches from the Northern Rivers of New South Wales up to the Byfield region in Queensland (www.epa.qld.gov.au).	Given the species distinctive habitat requirements, it is highly unlikely the species would occur on the Project Site. No impacts of the proposed activities are expected upon the species.
Chalinolobus dwyeri Large-eared Pied Bat	V	R	Roosts in small groups in caves, mines, usually in the twilight zone near the entrance. Uncommon in eucalypt forest from Blackdown Tableland south to near Wollongong in New South Wales.	No caves or similar habitat exists on the Project Site. It is highly unlikely this species will be impacted by the proposed mine.

Scientific Name Common Name	Status		Habitat	Notes
	EPBC	NCWR		
Dasyurus hallucatus Northern Quoll	E	-	Prefers rocky eucalypt woodland but occurs in range of vegetation types, mostly within 200km of coast (Menkhorst and Knight 2001).	Potential habitat exists on the Project Site. Specific searches revealed no evidence of the species.
Dasyurus maculatus maculatus Spotted-tailed Quoll (South east mainland population)	E	V	Found from sea-level to sub-alps in many habitats, rainforest, wet and dry sclerophyll, coastal heath and scrub and sometimes Red Gum forest along inland rivers (Menkhorst and Knight 2001).	Potential habitat exists on the Project Site. Specific searches revealed no evidence of the species.
Pteropus poliocephalus Grey-headed Flying-fox	V	-	Rarely more than 200km inland. Formerly found north to Mackay but their range is now contracting In warmer months they gather in very large camps, usually in dense forest gullies (Menkhorst and Knight 2001).	Habitat on the Project Site is not ideal for this species. It is highly unlikely this species will be impacted by the proposed mine.
Xeromys myoides False Water-rat	V	V	Inhabits saline grassland, mangroves and margins of freshwater swamps. Found in coastal northern areas of the Northern Territory and coastal Queensland from the Gold Coast to Proserpine (Menkhorst and Knight 2001).	It is unlikely the species inhabits the Project Site as potential habitat is limited. It is highly unlikely this species will be impacted by the proposed mine.
Nannoperca oxleyana Oxleyan Pygmy Perch	E	V	Found in swamps with prolific sedge growth, gently flowing streams and dune lakes in coastal heathland. Water is often darkly tannin-stained and acidic (pH 5.4 – 6.5) and a temperature range from 12° to 28°C (Allen, Midgley and Allen 2003).	No suitable habitat exists on the Project Site. It is highly unlikely this species will be impacted by the proposed mine activities.
Neoceratodus forsteri Australian Lungfish	V	-	Inhabit slow flowing rivers and still water (including reservoirs) with some aquatic vegetation on the banks. They are most common in deep pools and can be found in water with mud, sand or gravel bottoms (Menkhorst and Knight 2001).	No suitable habitat exists on the Project Site. It is highly unlikely this species will be impacted by the proposed mine and associated activities.

Scientific Name Common Name	Status		Habitat	Notes
	EPBC	NCWR		
Phascolarctos cinereus Koala	-	V	Open (structurally complex with mixture young / mature / old growth, especially 30 – 80 centimetres diameter at breast height), mixed (rich in number and species diversity of food trees) eucalypt forest and woodland (QEPA 2008).	Some habitat exists on the Project site, however. The majority of vegetation is not considered ideal for supporting the supporting the species. No evidence of Koalas was positively identified on the site. Some tree scratchings were observed on the site, however, they could not be confidently attributed to any species. The Project is not expected to impact on the species.

KEY:

E = Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*
V = Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*
E = Endangered (Schedule 2) under the *Nature Conservation (Wildlife) Regulation 2006*
V = Vulnerable (Schedule 3) under the *Nature Conservation (Wildlife) Regulation 2006*
R = Rare (Schedule 4) under the *Nature Conservation (Wildlife) Regulation 2006*

7.6 PEST SPECIES

Two introduced species, listed as pest species under the LP Act, were detected on the Project Site during the wet and dry season surveys. Species observed included:

1. Dingo / Wild Dog listed as a Class 2 pest under the LP Act; and

2. Feral Pig listed as a Class 2 pest under the LP Act.

Under the LP Act, land managers must take reasonable steps to ensure that lands are kept free of Class 2 pests.

Each of the listed pest species are discussed below, while Appendix C details Department of Employment, Economic Development and Innovation (DEEDI) Pest Fact Sheets for declared pest species. In addition to these listed species the Cane Toad and the House Mouse were frequently observed on the Project Site and are considered to be serious pests. For this reason they have also been included in this section.

7.6.1 Dingos / Wild Dogs

Dingos / Wild Dogs can carry diseases such as distemper and parvovirus, as well as a range of parasites. They are known to prey on native fauna and farm species, causing both ecological and economic damage (DEEDI Pest Fact Sheet – Wild Dog Control). Wild Dog tracks were observed during routine assessment activities on the site. They are considered to be common in the broader region.

Management strategies for controlling Dingo / Wild Dogs during construction and operation of the proposed mine are examined in Section 8.3.2.

7.6.2 Feral Pigs

Feral Pigs wallow in mud along watercourses, destroy habitat for native animals, and spread weed seeds. They damage almost all crops from sowing to harvest, damage pastures by grazing and rooting and carry many diseases and parasites. Their destructive nature is often a hindrance to any re-vegetation/ rehabilitation plans (DEEDI Pest Fact Sheet – Control of Feral Pigs), as they will eat almost any available plant material, but prefer succulent green herbage. Pig tracks were observed on a number of occasions during the survey both on and surrounding the Project Site.

Management strategies for controlling feral pig populations during construction and operation of the proposed mine are examined in Section 8.3.2.

7.6.3 House Mouse

Mice are considered pests because of their reproductive capacity, diet, and potential for carrying disease. When conditions are favourable populations can dramatically increase in size causing serious damage to crops, stored grains and foods, and equipment. Mice are also a known vector for Salmonella which can cause severe food poisoning in humans (www.dpi.qld.gov.au).

Management strategies for controlling the House Mouse during construction and operation of the proposed mine are examined in Section 8.3.2.

7.6.4 Cane Toad

Introduced to Australia in 1935 to control agricultural pests, Cane Toads have continued to expand their territory, causing widespread ecological disturbance in the process. The ample food source, suitable environment, and low rates of predation continue to allow dynamic reproduction and population spread. Competition for food and breeding grounds with native frogs, defensive toxic venom glands, and voracious feeding habits are responsible for widespread ecological damage. Cane Toads were observed frequently at various localities on the Project Site. Competition between the introduced Cane Toad and native species often limits the potential for native species to colonise an area with the more aggressive Cane Toad dominating habitat resources.

Management strategies for controlling Cane Toads during construction and operation of the proposed mine are examined in Section 8.3.2.

8.0 SUGGESTED MITIGATION STRATEGIES

8.1 MANAGEMENT OF NATIVE FLORA AND FAUNA

Although the vegetation and habitat types within the Project Site are well-represented in the wider region, in recognition of the intrinsic value of extant native vegetation and ecological significance of fauna habitat value, every effort should be made to keep proposed disturbance areas to a minimum. Suggested strategies to minimise the impacts on native flora and fauna, and recommendations regarding rehabilitation of the Project Site, are outlined below:

- To maintain the integrity of vegetated land not impacted by proposed activities, appropriate erosion and sediment controls are recommended to prevent sediment deposition in remaining habitat. Such controls may include hessian fences, ground-cover mats / blankets and sand-bags. These controls are particularly important given the Project Site's potential to flood in response to heavy rainfall events;

- Native vegetation removal should be conducted only after:

    - the areas to be cleared have been clearly delineated and identified to equipment operators and supervisors;

    - appropriate erosion and sediment control structures are put in place; and

- To ensure that the seed bank in removed soil is preserved as much as practical, stockpiling of topsoil is recommended. Maintenance of retained areas of vegetation also provides an important source of seed for mine rehabilitation works and further validates efforts to minimise disturbance;

- It is recommended that recreated landforms consider the drainage capacity of the Project Site;

- Infrastructure planning should avoid the creation of permanent, shallow water areas, such as septic and other tank overflows that form a permanent seep. Such areas create an artificial environment that encourage pest species such as Cane Toads that can alter the existing ecological balance;

- In the event that abandoned, injured, rare or unusual fauna is found at any stage of the Project the Site Supervisor and other relevant personnel should be notified and the situation managed to prevent further injury. Local wildlife care groups or experts such as Queensland Parks and Wildlife should be informed and arrangements made to care for the animal. The species and location of the fauna should be noted and include an account of the events preceding the incident;

- A segment of the Staff Induction Program should be allocated to informing staff of the conservation values on the Project Site, to increase their awareness of the species present. This could include photographs, brief descriptions and management requirements of species of conservation significance known to inhabit the Project Site and surrounding areas. Particular detail should be given to amphibian and reptilian species which can often be overlooked given their small size and cryptic movements;

- A rehabilitation strategy, as part of the Environmental Management Plan is required. This strategy should embody the concepts and recommendations presented above and include provision for monitoring of rehabilitation progress over the life of the operation;

- It is recommended that the methodologies for the rehabilitation / re-vegetation works for the proposed Project use native species endemic to the area. Such methodologies would include habitat-matching to encourage the return of native fauna. Appropriate species for rehabilitation include *Eucalyptus tereticornis, Eucalyptus latisinensis, Corymbia intermedia, Melaleuca quinquenervia, Grevillea banksii* and *Allocasuarina littoralis;*

8.2 MANAGEMENT OF VEGETATION COMMUNITIES OF CONSERVATION SIGNIFICANCE

Vegetation Community 1 – *Mixed Eucalypt Woodland on Tertiary Surface* (RE equivalent 12.5.4), encompassing approximately 28% of the Project Site, is not listed under State or Commonwealth legislation; therefore no specific management strategies in addition to those suggested in Section 8.1 are recommended.

Vegetation Community 2 – *Melaleuca quinquenervia* covers approximately 4.6% of the Project Site. The RE equivalent 12.3.5 (which constitutes 85% of the vegetation community) is listed as 'Of Concern' under the DERM Biodiversity Status and RE equivalent 12.3.11 (15% of the vegetation community) is listed as 'Of Concern' under both the VM Act and DERM Biodiversity Status. The location of disturbance areas associated with the Project will require clearing of this community within the bounds of the Project Site.

Areas required to be cleared within this community should be visibly delineated and clearing undertaken by a qualified operator. Diversion bunds, drains and dams will be designed and constructed to prevent the release of contaminated water from the site under normal operating conditions. This is important to prevent contaminated runoff entering waterways and impacting riparian vegetation further downstream. In addition, regular monitoring for weeds and pest species should be undertaken on the Project site throughout the life of the operation.

Vegetation Community 3 – *Melaleuca quinquenervia Mixed Woodland on Tertiary Plains* covers approximately 64.5% of the Project Site. The RE equivalent, RE 12.5.4a is not listed under State or Commonwealth legislation. The community provides habitat to one positively identified amphibian species of conservation significance. Existing mine plans for the Project require some land disturbance within this community. Areas required to be cleared within this community should be minimised and visibly delineated. Clearing should be undertaken by a qualified operator.

Vegetation Community 4 – *Melaleuca viridiflora Woodland on Alluvial Plains* (RE equivalent 12.3.12) occurs in the western portion of the Project Site, and covers approximately 1.7% of the Project Site area. The RE equivalent, 12.3.12, is listed as 'Of Concern' under both the VM Act and DERM Biodiversity Status. The community is well represented in the region surrounding the Project however is limited throughout Queensland, hence its conservation status. Existing mine plans for the Project require some land disturbance within this community. Areas required to be cleared within this community should be visibly delineated and clearing undertaken by a qualified operator.

Vegetation Community 5 – Heathland (Palustrine wetland) (RE equivalent 12.5.9) covers approximately 0.3% of the Project Site. This community is listed as being under threat by the VM Act and the DERM Biodiversity Status. Where possible, disturbance should be minimized within and upstream of the vegetation community. The community also provides habitat to one positively identified amphibian species of conservation significance. Areas required to be cleared within or near

to this community should be minimised and visibly delineated. Clearing should be undertaken by a qualified operator.

Patches of non-remnant vegetation (pine plantations) cover approximately 1.4% of the Project site. No specific management strategies are required for non-remnant vegetation.

8.3 MANAGEMENT OF FAUNA SPECIES OF CONSERVATION SIGNIFICANCE

The Wallum Froglet (*Crinnia tinnula*) has been positively identified on the Project site and in the surrounding habitat. The results of the survey indicate that large numbers Wallum Froglets are supported within the low-lying areas of Community 3 (RE 12.5.4a).

National populations of the Wallum Froglet appear relatively stable within protected habitats. The species, however, remains threatened by loss of habitat through clearing (Hines et al. 1999). Development of the Colton Mine Project requires clearing of Wallum Froglet habitat. To minimise impact on this threatened species:

- Areas of potential habitat required to be cleared will be minimised and visibly delineated;
- Clearing should be undertaken by a qualified operator;
- A segment of the Staff Induction Program should be allocated to informing staff of the conservation values of Wallum Froglet. This could include photographs, brief descriptions and management requirements; and
- Where possible, the rehabilitation strategy should aim to recreate habitat of the Wallum Froglet on the Project site.

8.4 MANAGEMENT OF THE BIOREGIONAL TERRESTRIAL CORRIDOR

Specific management strategies have been developed to minimise impacts of the Project on the Bioregional Terrestrial Corridor that is identified as underlying the Project in the South East Queensland Biodiversity Planning Assessment (2007). These include:

- Where possible minimise disturbance areas within the corridor to reduce potential impacts on the connectivity of the corridor;
- Include the Bioregional Terrestrial Corridor as a segment of the staff induction program to promote awareness of the corridor;
- The rehabilitation strategy for the Project will describe progressive rehabilitation of available disturbance areas throughout the life of mine. Progressive rehabilitation aims to minimise impacts on the environment by reducing the length of time for which land would remain disturbed. This in turn will minimise potential impacts on the Bioregional Terrestrial Corridor;
- It is recommended that the methodologies for the rehabilitation / re-vegetation works for the proposed Project use a mix of species naturally endemic to the area. Such methodologies would aim to encourage the return of native fauna and replicate the existing environment, particularly underlying the Bioregional Terrestrial Corridor. Appropriate species for rehabilitation include

Eucalyptus tereticornis, Eucalyptus latisinensis, Corymbia intermedia, Melaleuca quinquenervia, Grevillea banksii and *Allocasuarina littoralis;* and

- The rehabilitation strategy will include the use of reference sites for long term monitoring of rehabilitated areas. Reference sites should be located in undisturbed areas, within the corresponding vegetation community and within the bounds of the Bioregional Terrestrial Corridor. This strategy will assist in returning the conservation values of disturbed areas within the Project site, while minimising potential impacts on the Bioregional Terrestrial Corridor by recreating the natural habitat.

8.5 MANAGEMENT OF INTRODUCED FLORA AND FAUNA

8.5.1 Weed Management Strategies

The following weed management strategies are recommended to minimise the spread of identified weed species and the potential of future weed infestations:

- Ongoing monitoring of the Project Site by personnel for weeds of management concern should be undertaken;
- If increases in weed abundance, or new weed species, are identified on the Project Site, they should be eradicated in accordance with local best management practice and / or DEEDI Pest Fact sheets;
- Observations of treated areas to assess the success of any declared weed eradication should be undertaken; and
- To promote the awareness of weed management issues at the Project Site, it is recommended that weed management is included in the Site Induction Program for the Project.

8.5.2 Management Strategies for Introduced Fauna

Four introduced species were recorded by AARC during the fauna surveys:

1. Cane Toad;
2. Dingo / Wild Dog;
3. Feral Pig; and
4. House Mouse.

All of these introduced species are known to increase their abundance around human habitation and have the potential for significant detrimental impact upon the native environment.

The Wild Dog / Dingo and Feral Pig are of particular ecological concern, and both are classified as Class 2 pests under the LP Act. They are notorious for causing vegetation and habitat destruction, disease distribution and native species exclusion. Under the LP Act, landholders must take reasonable steps to ensure that land is kept free of Class 2 pests.

Management strategies for the control of pest species could include:

- Integrate on-site control programs with those already being implemented in the local region;
- Implement control strategies to reduce the abundance of pest animals on the Project site, such as:
  - Ensure that putrescibles wastes are stored in covered containers prior to removal from site;
  - Avoiding the creation of structures around the mine where feral animals may find refuge;
  - Avoid creating areas of permanent moisture where Cane Toads or other pests can breed; and
  - Include an ongoing monitoring program that verifies the success of pest control programs on the Project site.

The DEEDI pest fact sheets for Cane Toads, Wild Dogs / Dingos, and Feral Pigs are contained within Appendix C.

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Appendix A: Flora Species Identified on The Project Site

	Maryborough Flora Species List		
Tag	*Species*	*Common Name*	*Exotic*
	Acacia melanoxylon	Blackwood	
	Acacia sp		
	Acmella grandiflora var. brachyglossa		
	Acrotriche aggregata		
	Allocasuarina luehmannii	Bulloak	
	Allocasuarina littoralis	Black She-oak	
48ii	*Aristida warburgii*	Wire Grass	
	Banksia oblongifolia	Fern Leaved Banksia	
	Banksia robur	Swamp banksia	
	Baumea articulata	Jointed Rush	
	Baumea rubiginosa	River Twig Rush	
24	*Brunoniella australis*	Blue trumpet	
28	*Buchnera urticifolia*	Black Rod	
	Burchardia umbellata		
7b	*Caladenia catenata*	White fingers	
19	*Capillipedium parviflorum*	Scented-top Grass	
45	*Cassytha filiformis*	Dodder Laurel	
26	*Centaurium tenuiflorum*		Yes
23	*Centella asiatica*	Penny wart	
22b	*Chorizema parviflorum*		
	Corymbia citriodora	Lemon-scented Gum, Spotted gum	
	Corymbia intermedia	Pink Bloodwood	
	Cyanthillium cinereum	Vernonia	
	Cyperus exaltatus		
14	*Cyperus haspan*		
	Cyperus haspan subsp juncoides		
	Daviesia ulicifolia	Gorse Bitter Pea	
	Daviesia umbellulata		
34b	*Desmodium rhytidophyllum*	Hairy Trefoil	
	Desmodium sp		
13b	*Dianella rara*		
26b	*Dianella revoluta*	Spreading Flax Lilly	
11	*Digitaria brownii*	Cotton Panic Grass	
37	*Drosera peltata*		
46	*Entolasia stricta*		
	Eragrostis bahiensis		Yes
30	*Eragrostis brownii*	Browns Lovegrass	
	Eragrostis sp		
36	*Eriachne glabrata*		
	Eucalyptus exserta	Queensland Peppermint	
	Eucalyptus latisinensis	White Mahogony	
	Eucalyptus tereticornis	Blue Gum	
5	*Fimbristylis sp.*		
33b	*Fimbristylis depauperata*		
29	*Fimbristylis tristachya*		
34	*Fuirena ciliaris*		
32b	*Gahnia aspera*	Saw Sedge	
	Gompholobium latifolium	Golden Glory Pea	

8	*Gompholobium pinnatum*	Pinnate Wedge Pea	
27	*Gonocarpus chinensis*		
51	*Gonocarpus micranthus*	Creeping Raspwort	
	Goodenia rotundifolia		
27	*Goodenia thederacea*		
	Glycine sp		
	Grevillea banksii	Red silky oak	
	Grevillea leiocarpa		
41i	*Grevillea reptans*		
	Haemodorum austroqueenslandicum		
	Hakea florulenta		
6	*Hibbertia stricta*	Guinea Flower	
	Hibbertia vestita	Hairy Guinea Flower	
	Hyparrhenia rufa		Yes
21	*Ischaemum australe*		
29b	*Jacksonia scoparia*	Dogwood	
11b	*Lepidosperma laterale*	Variable Sword Sedge	
41ii	*Leptospermum polygalifolium*	Yellow Tea Tree	
	Leptospermum trinervium	Slender Tea Tree	
42b	*Leucopogan sp*		
20	*Lobelia purpurascens*		
	Lomandra longifolia		
9b	*Lomandra multiflora*	Forest Lomandra	
9	*Lomandra sp.*		
43b	*Melaleuca nodosa*	Prickly leaf paperbark	
	Melaleuca quinquenervia		
	Melaleuca thymifolia	Thyme Honey Myrtle	
	Melaleuca viridiflora	Broad-leaved paperbark	
	Micromyrtus littoralis		
31	*Murdannia graminea*		
22	*Panicum effusum*	Hairy Panic	
	Parsonsia straminea	Common Silkpod	
18	*Paspalum scrobiculatum*	Scrobic	
	Patersonia sericea var. *sericea*	Silky Purple Flag	
	Petrophile shirleyae	Cone Sticks	
30b	*Persoonia tenuifolia*		
	Persoonia virgata		
	Philydrum lanuginosum	Frogsmouth	
13	*Pimelea linifolia*	Slender Rice Flower	
38	*Platysace linearifolia*	Carrot Top	
	Poaceae sp		
46b	*Prasophyllum brevilabre*	Leak Orchid	
48i	*Pultenaea borea*		
	Pultenaea rariflora		
Mary 4	*Rhynchospora heterochaeta*		
20b	*Rhynchospora rubra*		
17	*Saccidepis indica*		
	Sacciolepis indica	Indian Cupscale Grass	
10b	*Schizaea bifida*	Forked Comb Fern	
	Schoenus apogon var. apogon	Common Bog-rush	
	Solanum sp		
	Stylidium gramifolium		

	Stylidium gramineum		
	Themeda trianda	Kangaroo Grass	
12	*Thysanotus tuberosus*	Common Fringe Lilly	
	Tricoryne elatior	Yellow Rush Lily	
31b	*Viola sp.*		
43	*Westringia tenuicaulis*		
	Xanthorrhoea johnsonii	Northern Grasstree	
40	*Xyris complanata*		
47b	*Xylomelum benthamii*	Woody Pear	
28	*Zornia dictyoneura*		

Appendix B: Fauna Species Identified on the Project Site

Table 1: Amphibian Species Observed on the Project Sites

Scientific Name	Common Name	Status	Dry Survey	Wet Survey	FT1	FT2	FT3	FT4	I
Crinia tinnula	Wallum Froglet	V		X					X
Limnodynastes tasmaniensis	Spotted Grass Frog	C		X					X
Pseudophryne raveni	Copper-backed Broodfrog	C		X					X
Litoria fallax	Eastern Dwarf Tree Frog	C		X					X
Litoria gracilenta	Dainty Green Tree Frog	C		X					X
Litoria inermis	Peter's Frog	C		X					X
Litoria nastua	Rocket Frog	C		X					X
Litoria rubella	Red Tree Frog	C		X					X
Rhinella marina	Cane Toad	P	X	X					X

Table 2: Reptile Species Observed on the Project Sites

Scientific Name	Common Name	Status	Dry Survey	Wet Survey	FT1	FT2	FT3	FT4	I
Diporiphora australis	Tommy Round-head Dragon	C		X		X		X	
Lampropholis delicata	Grass Skink	C		X	X				
Carlia vivax	Rainbow Skink	C	X	X		X			
Cryptoblepharus virgatus	Wall Skink	C		X	X				
Ctenotus robustus	Robust Ctenotus	C		X					X
Pseudechis porphyriacus	Red-bellied Black Snake	C		X					X
Varanus varius	Lace Monitor	C		X					X

Table 3: Mammal Species Observed on the Project Sites

Scientific Name	Common Name	Status	Dry Survey	Wet Survey	FT1	FT2	FT3	FT4	I
Canis familiaris	Wild Dog	P2	X						X
Planigale maculata	Common Planigale	C	X		X				
Chalinolobus nigrogriseus	Hoary Wattled Bat	C	Possible	Possible					
Miniopterus australis	Little Bent-Winged Bat	C	X	-					
Saccolaimus flaviventris	Yellow-bellied Sheathtail-Bat	C		X					X
Scotorepens greyii	Little Broad-Nosed Bat	C	X	-					
Scotorepens orion	Eastern Broad-Nosed Bat	C	Possible	-					
Scotorepens sp.	Central-Eastern Broad-Nosed Bat	C	X	Possible					
Mormopterus sp.	Eastern Freetail-Bat	C		X					
Mormopterus beccari	Beccari's Freetail-Bat	C		X					
Macropus giganteus	Eastern Grey Kangaroo	C	X	X					X
Wallabia bicolour	Black Wallaby	C		X					X
Mus musculus	House Mouse	C	X			X			
Petaurus breviceps	Sugar Glider	C		X					X
Sus scrofa	Pig	P2							X

Table 4: Bird Species Observed on the Project Sites

Scientific Name	Common Name	Status	Dry Survey	Wet Survey	FT1	FT2	FT3	FT4	FT5	I
AEGOTHELIDAE										
Aegotheles cristatus	Australian Owlet-Nightjar	C	X	X						X
ARDEIDAE										
Ardea pacifica	White-necked Heron	C	X	X						X
Egretta novaehollandiae	White-faced Heron	C	X	X						X
ARTAMIDAE										
Cracticus nigrogularis	Pied Butcherbird	C	X							X
Gymnorhina tibicen	Australian Magpie	C		X						X
CACATUIDAE										
Calyptorhynchus funereus	Yellow-tailed Black-cockatoo	C		X						X
CAMPEPHAGIDAE										
Coracina novehollandiae	Black-faced Cuckoo-shrike	C		X						X
Coracina papuensis	White Bellied Cuckoo-shrike	C		X						X
CENTROPODIDAE										
Centropus phasianinus	Pheasant Coucal	C		X						X
COLUMBIDAE										
Geopelia striata	Peaceful Dove	C	X	X						X
Phaps chalcoptera	Common Bronzewing	C		X						X
CORVIDAE										

Scientific Name	Common Name	Status	Dry Survey	Wet Survey	FT1	FT2	FT3	FT4	FT5	I
Corvus orru	Torresian Crow	C	X	X						X
CUCULIDAE										
Cacomantis variolosus	Brush Cuckoo	C		X						X
DICRURIDAE										
Rhipidura fuliginosa	Grey Fantail	C	X						X	X
Rhipidura leucophrys	Willie Wagtail	C	X	X						X
Rhipidura rufifrons	Rufous Fantail	C	X							X
HALCYONIDAE										
Dacelo novaeguineae	Laughing Kookaburra	C	X	X						X
MALURIDAE										
Malurus melanocephalus	Red-backed Fairy-wren	C		X						X
MELIPHAGIDAE										
Anthochaera chrysoptera	Little Wattlebird	C	X	X						X
Entomyzon cyanotis	Blue-faced Honeyeater	C		X						X
Melithreptus albogularis	White-throated Honeyeater	C		X						X
Myzomela sanguinolenta	Scarlet Honeyeater	C		X						X
Philemon citreogularis	Little Friarbird	C	X							X
Philemon corniculatus	Noisy Friarbird	C	X	X						X
TURNICIDAE										
Turnix sp.	Button Quail	C		X						X
PACHYCEPHALIDAE										

Scientific Name	Common Name	Status	Dry Survey	Wet Survey	FT1	FT2	FT3	FT4	FT5	I
Pachycephala rufiventris	Rufous Whistler	C	X	X					X	X
PODARGIDAE										
Podargus strigoides	Tawny Frogmouth	C	X	X						X
POMATOSTOMIDAE										
Pomatostomus temporalis	Grey-Crowned Babbler	C	X							X
PSITTACIDAE										
Platycercus adscitus	Pale-headed Rosella	C	X	X						X
Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet	C								X
Trichoglossus haematodus	Rainbow Lorikeet	C	X	X						X

Location Key:

FT1 = Fauna Transect 1
FT2 = Fauna Transect 2
FT3 = Fauna Transect 3
FT4 = Fauna Transect 4
FT5 = Fauna Transect 5
I = Incidental observation

Status Key:

C = Least Concern (Schedule 6) under the *Nature Conservation (Wildlife) Regulation 2006*
V = Vulnerable (Schedule 3) under the *Nature Conservation (Wildlife) Regulation 2006*
P2 = Class 2 declared pest under the *Land Protection (Pest and Stock Route Management) Act 2002*
P = Non-declared pest under the *Land Protection (Pest and Stock Route Management) Act 2002*

Appendix C: Pest Fact Sheets

Invasive plants and animals

Feral pigs in Queensland

- distribution, ecology and impact

DECLARED CLASS 2

Domestic pigs *(Sus scrofa*) were introduced to Australia by early settlers. Subsequent accidental and deliberate releases resulted in the wild (feral) population establishing throughout Australia. Feral pigs damage crops, stock and property, spread weeds and transmit diseases such as Leptospirosis and Foot and Mouth. They also cause environmental damage, digging up large areas of native vegetation and spreading weeds.

Feral pigs are declared Class 2 pests under *Land Protection (Pest and Stock Route Management) Act 2002*. Declaration requires landholders to control declared pest on the land under their control. A local government may serve a notice upon a landholder requiring control of declared pests.

For information on Control of feral pigs see DPI&F Pest Fact PA7. For specific information of Feral Pig management in the wet tropics, see DPI&F Pest Fact PA8.

Description

Australian feral pigs have more in common with their Eurasian cousins than with domestic pigs. They are smaller, leaner and more muscular than domestic pigs, with well-developed shoulders and necks and smaller, shorter hindquarters. Their hair is sparse and longer and coarser than domestic pigs. Feral pigs also have longer, larger snouts and tusks, straight tails, smaller mostly pricked ears and much narrower backs.

Colouring is predominantly black, buff-coloured or spotted black and white. Some are agouti-patterned (dark hair with a lighter tip). Juveniles may be striped. Colours vary between and within areas.

Growth potential is similar to domestic pigs, although harsh environmental conditions tend to stunt development. The weight of an average adult female feral pig is roughly 50 to 60 kg, with the males usually weighing 80 to 100 kg. Exceptional animals have reached 260 kg.

Older boars (razorbacks) have massive heads and shoulders and a raised and prominent back bone which slopes steeply down to small hams and short hind legs. A keratinous plaque or shield up to three centimetres thick usually develops on their shoulders and flanks. This provides some protection from serious injury during fights with other boars.

Some boars develop a crest or mane of stiff bristles extending from their neck down the middle of their back, which stands straight on end when the animal is enraged.

Distribution

Feral pigs inhabit about 40% of Australia from subalpine grasslands to monsoonal floodplains and are found in all habitat types in Queensland – see figure 1.

Areas need supply only the basics of food, water and cover.

Estimations of numbers of feral pigs in Australia range up to 24 million. The greatest concentrations of feral pigs are on the larger drainage basins and swamp areas of the coast and inland.

Biology and behaviour

Feral pigs are capable of migrating considerable distances but they tend to stay in home ranges, with watering points the focus of activity, particularly during hot weather. Pigs have few sweat glands, so high temperatures require them to drink more often and wallow in water or mud to cool off. Dense cover is the preferred habitat, providing protection from the sun and their main predator, man.

Female and juvenile pigs usually live in small family groups with a home range of 2–20 km^2. Adult males are typically solitary, with a home range of 8–50 km^2. Range size varies with season, habitat, food availability and disturbance. Herds of 400 pigs have been recorded in Cape York.

Most pigs remain in their home ranges, even when subject to some disturbance such as infrequent hunting by people and dogs. Regular disturbance will drive them on.

Feral pigs are generally nocturnal, spending daylight hours sheltering in dense cover. They are shy animals and will avoid humans, making it easy to miss their presence or to drastically underestimate their numbers.

Pigs are omnivorous, eating plants and animal flesh. They are extremely opportunistic feeders, exploiting any temporarily abundant food. They prefer green feed and will eat grains, sugar cane and other crops, fruits and vegetables. They root extensively for tubers, worms and soil invertebrates. Small animals are preyed upon. Stock losses occur primarily with lambs but occasionally with newborn calves. Carrion (dead and rotting flesh) is also consumed.

Feral pigs have relatively high energy and protein requirements, particularly during pregnancy and lactation. These requirements are not available for all the year in all areas, so pigs often have to move to other parts of their home range during pregnancy.

This seasonal need for either more food, or high energy or protein-rich food, is often the reason for their impact on agricultural crops. It is also the weakness in their ecology that can be exploited for management purposes.

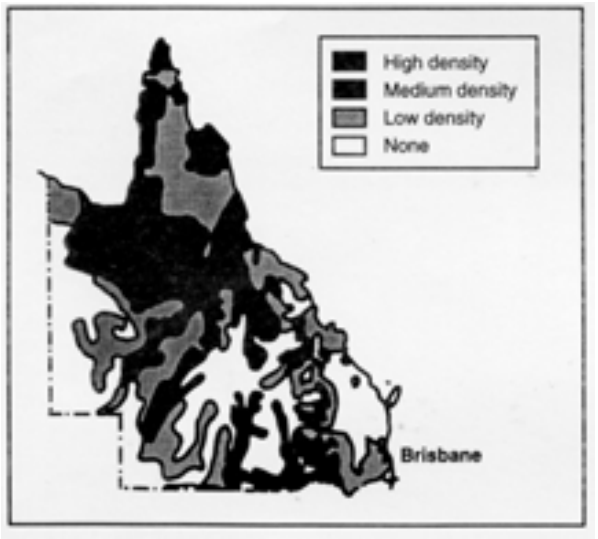


FIGURE 1 − DISTRIBUTION OF FERAL PIGS IN QUEENSLAND

Life cycle

The reproductive potential of feral pigs is more similar to rabbits than other large mammals in Australia. In good conditions feral pig populations may increase fivefold in a 12 month period.

Under favourable conditions breeding occurs all year. Adult females have a 21−day oestrus cycle, with a gestation period of about 113 days, producing a litter of four to 10 piglets, depending on the sow's age, weight and food supply.

Sows can make nests of available vegetation just before farrowing. Nests can be 3 m long by 1.5 m wide and up to 1 m high, with a domed roof.

Nests are usually less than 2 km from available water. Piglets normally spend the first 1–5 days of life inside the nest, with the sow inside or close by.

The next fertile mating can occur after 2–3 months of farrowing, allowing sows to produce two litters per year if good seasonal conditions prevail.

Weaning occurs after 2–3 months. Sexual maturity is reached when sows weigh about 25 kg, usually around 6 months of age.

Mortality of juveniles is high if the mother's dietary protein intake is low (up to 100% mortality in dry seasons). Adult mortality does not vary as much with seasonal conditions, but few animals live more than five years.

Estimating populations

Sightings are the least reliable guide to feral pig presence. Careful observation of the signs of pig activity will allow an experienced observer to estimate population densities. A beginner, however, may see nothing.

The following is a list of common pig signs that may be used to establish relative numbers and sizes:

- fresh digging or rooting of ground (causing a ploughed appearance) indicates recent pig activity, but the area affected gives little indication of numbers as large areas can be dug by a small number of pigs
- tracks and faeces on and off pads. Faeces size, shape and consistency vary with age and diet, but is typically 3–6 cm wide, 7–22 cm long and well formed. Close inspection can enable diet to be established – plant matter and seeds, egg shell and bone fragments, wool and marsupial hair
- mud or hair at holes in fences where pigs have pushed through
- wallows – distinctive oval depressions in mud
- tusk marking and mud rubs on trees and fence posts give an indication of pig size
- nests in vegetation made by sows before farrowing should only be approached with caution
- spotlighting, aerial survey, and use of dogs can be used for actual pig counts.

Impact on man and the environment

Feral pigs wide habitat range, omnivorous diet and potential for rapid population growth in good seasons mean that few agricultural pursuits are unaffected. Damage is estimated at $100 million annually.

Economic impact is of three types:

1. value of the direct losses to agricultural production
2. value of the continuing expenditure on pig control
3. value of lost opportunities to take profit from alternative investment of this expenditure.

Examples of direct agricultural losses:

Crops

Pigs can damage almost all crops from sowing to harvest, starting with uprooting seed and seedlings to feeding on or trampling mature crop.

They feed on seed and grain crops (except safflower), fruit (especially banana, mango, papaw, macadamia and lychee) and vegetable crops.

Most damage to sugar cane occurs during the dry season. Older cane with a high sugar content is preferred. Pigs can "camp" in a paddock for several weeks, causing substantial damage as sufficient moisture can be obtained from the cane.

Livestock

Predation on livestock is basically limited to lambs. Research has shown feral pigs can take up to 40% of lambs. This not only reduces income from the sale of lambs but also reduces the opportunity for herd improvement by limiting selection for optimum wool traits.

Pasture

Pastures are damaged by grazing and rooting. Pigs can also transport weeds and their diggings provide ideal conditions for weed establishment.

Fences and watering points

Wallowing pigs damage and foul the water in tanks and bore drains and silt up troughs. Rooting can weaken dam walls. Being large, powerful animals, pigs can breach fences, allowing passage of other pest animals.

Environmental concerns

Pig activity has a **dramatic** affect on creeks and lakes. In many areas concentrated rooting "ploughs" up to 20 m around the waterline.

Such disturbance of the soil and natural vegetation degrades water quality and the habitat for small animals of the land and water. It also creates erosion and allows the establishment of exotic weeds.

Predation of native fauna does occur and examination of faeces has shown remains of marsupials, reptiles and insects, ground-nesting birds and their eggs.

Diseases and parasites

Feral pigs can carry many infectious diseases and internal and external parasites. Some are endemic (already present) while others are still exotic to Australia.

Many of the diseases can not only spread to domestic pigs but to other livestock and humans. Diseases naturally transmitted from animal to man are called zoonoses.

Zoonoses currently in feral pigs in Australia:

- **Tuberculosis** (TB) – a serious disease of the lungs. Once common but now rare, it is contracted by eating inadequately cooked flesh of infected animals.
- **Brucellosis, Porcine and Bovine** – a bacterial disease causing severe long-term illness, undulant fever and possible infertility, both strains are contracted by handling raw meat. Porcine Brucellosis is rare in Queensland.

Feral pigs were blamed for the spread of TB and Bovine Brucellosis amongst cattle but both diseases have been eradicated from Queensland without directly targeting feral pigs.

- **Sparganosis** – a parasite that can infest the muscles of humans, forming encyst lumps, is common in pigs from swampy areas; contracted by ingesting raw meat.
- **Melioidosis** – a serious bacterial disease which causes abscesses.
- **Leptospirosis** – a serious bacterial disease; in humans called Weil's disease, causing very high temperatures, kidney trouble and jaundice; can be fatal. It is found in up to 20% of feral pigs in Queensland.
- **Q Fever** – this disease occurs in all animals and is well known by meat workers. It can cause very high temperature and result in heart problems; can be fatal.

Leptospirosis and Q Fever infection can occur through contact with blood, meat and urine through broken skin, intake of urine-contaminated food or water, and inhalation of infectious airborne organisms.

Brucellosis, Leptospirosis and Q Fever cause flu-like symptoms similar to Ross River Fever. Leptospirosis and Q Fever can be fatal.

To prevent contracting these diseases it is advisable to avoid handling feral pigs. Slaughtering and butchering should be undertaken only at licensed premises where there is a full-time meat inspector on duty to ensure that animals are free of the above diseases.

If you must handle feral pig meat use suitable protective clothing (mask, goggles, strong rubber gloves and plastic apron and boots) to minimise contamination with blood, urine and faeces.

Rare or undercooked meat should not be eaten; meat should be thoroughly cooked to avoid contracting pathogens.

Exotic livestock diseases

A major concern with feral pigs are their potential to harbour or spread exotic diseases. The cost to the Australian community if Foot and Mouth Disease were introduced to Australia is estimated at $3 billion in lost export trade, even if the outbreak were eradicated immediately. This would result in major social upheaval in rural Australia.

Other exotic diseases of concern:

- **Swine vesicular disease** – viral disease affecting only pigs
- **Aujeszky's disease** – highly contagious herpes viral disease affecting several animal species, killing up to 100% of affected piglets.
- **African swine fever** – highly contagious viral disease affecting only pigs, mortality rate high.
- **Classical swine fever** (CSF) or hog cholera, highly contagious viral disease of pigs, in acute form killing up to 90% of infected animals.

For more information on animal diseases contact your local DPI&F veterinarian.

Exotic zoonotic diseases and parasites

- **Japanese encephalitis** – a virus spread from pigs to humans by mosquitoes, causing acute severe problems of the nervous system – pain, sleepiness, and coma.
- **Rabies** – a serious disease affecting the brain - can be fatal.
- **Screw-worm fly** – maggots from this fly can attack healthy flesh and if untreated can cause massive wounds to animals and humans.
- **Trichinosis** – is a helminth (roundworm). All mammals are susceptible, with humans infected by eating improperly cooked meat.

North Queensland's popularity as a tourist destination is increasing. Many international visitors have travelled through countries infected with exotic diseases before entering Australia. Feral pigs are known to frequent rubbish tips around tourist lodges and to scavenge human waste.

There is a real danger that an exotic disease could enter Australia via this contact and remain undetected for some time. Such a time lapse could allow the disease to become widespread, making eradication difficult or even impossible.

Biosecurity Queensland gratefully acknowledge the contribution from Choquenot, D., McIlroy, J. and Korn T. (1996) *Managing Vertebrate Pests: Feral Pigs*, Bureau of Resource Sciences, AGPS, Canberra. Commonwealth of Australia copyright reproduced by permission.

Further information

Further information is available from animal control/environmental staff at your local government or, if your council does not have animal control staff, from your local Department Primary Industries and Fisheries Land Protection Officer: contact details available through 13 25 23.

Invasive plants and animals

Dingoes in Queensland

- distribution and ecology

DECLARED CLASS 2

The dingo *(Canis lupus dingo)* is a primitive canid related to wolves and coyote. The dingo was not a part of the ancestral fauna of Australia. Though its origins are not clear, it is thought to have arrived in Australia 3 500–4 000 years ago.

It is the largest mammalian carnivore remaining in mainland Australia, and as such fills an important ecological niche. Females weigh about 12 kg and males 15 kg.

The dingo has been regarded as a serious predator of domestic stock since early European settlement in Australia. Early research emphasis was on control, indeed eradication of the dingo. No attempt was made to study the animal, measure predation, or to understand why the problem existed.

Under the *Land Protection (Pest and Stock Route Management) Act 2002* the dingo/wild dog is a declared animal, and it is the responsibility of landholders to reduce the number of dingoes/wild dogs on their property.

Description

Red, ginger and sandy-yellow are the dominant coat colours, though dingoes can also be pure white, black and tan or solid black.

It is not difficult to distinguish between most dingoes and hybrids. The presence of domestic genes is suggested by broken colours eg. brindling and patchiness in the normally pure white feet and chest patch and sable colouration (black hairs along the back and sides).

Dingoes have a more heavily boned skull and larger teeth (especially the canine) than domestic dogs of similar size.

Distribution

Dingo numbers are believed to be higher today than in pre-European times. This is thought to be due to increased food availability via the introduced rabbit and cattle carcasses, and the development of permanent waters in arid areas of the state.

Dingoes/wild dogs are now present in all parts of the State.

The distribution of the wild dog in relation to purebred dingoes varies throughout the state. In far western areas, most dingoes sighted appear to be ‘pure’, with characteristic white points and broad head. Closer to settled areas a greater number of feral domestic dogs produce a generally hybrid population. It has been estimated that dingoes are 50% pure in south-east Queensland and 90─95% pure in south-west and central Queensland.

Reproduction

Dingoes have only one breeding season per year (usually April to June), whereas domestic bitches have two or more oestrus cycles per year. However, unless seasons are particularly favourable or human source of food is intentionally or inadvertently provided, feral domestic dogs are unlikely to successfully rear two litters per year. After a nine week gestation, the pups (usually four to six) are born in a hollow log or cave den. Bitches tend to use the same den each year.

Pups are suckled four to six weeks and generally weaned at four months. When large enough to travel, pups are taken from the den to kills, and other dens many be used. The range of pups is increased as they are moved from den to den. In this way the pups are gradually moved around the home range of the bitch.

Independence may occur as early as 6 months of age when parents abandon them, but this results in high juvenile mortality.

Pups that become independent around 12 months appear to disperse voluntarily. Being larger and more experienced, mortality is then usually low.

Where dingoes live alone or in small groups (most pastoral and semi-settled areas), mature females will breed successfully each year.

By contrast, dominant female infanticide results in only one litter being successfully raised each year within groups containing several adult females (eg. undisturbed areas such as the Simpson Desert). The dominant (alpha) female will kill all pups of the other females, and then use subordinate females to suckle and rear her litter.

Home range

Radio tracking studies show dingoes occupy a discrete area known as a ‘home range’. The dingo visits the edge of this district frequently.

The home range can vary in size according to the productivity of the country; from 9 km² in rainforest areas to 300 km² on the Nullabor plain.

The edge of the home range is commonly associated with a major topographic feature, e.g. an escarpment, a major ridge or stream.

The home range is not used uniformly. Activity is centred on areas with highest food density.

Hunting movement is slow and exploratory, in contrast to frequent rapid movement around the home range boundary.

Pads follow well defined paths and are most likely associated with sociality and home range boundary maintenance. Activity is highest at dusk and dawn.

Social organisation

Dingoes in an undisturbed area generally belong to discrete packs (3─12 members) which occupy long term, non-overlapping territories. The group rarely moves as a pack, rather members meet and separate again throughout the day. Dingoes are most gregarious during the breeding season.

There is overlap of home ranges within a group. In contrast, boundaries between groups are more rigid, actively defended, and infrequently crossed.

Olfactory communication (smell) is important in dingo social organisation. Dingo droppings are deposited along pads in specific areas where other dingoes will encounter them (creek crossings, intersections of roads and fences).

These ‘scent-posts’ appear to delineate the home range boundary and act as a warning to neighbouring groups and individuals.

This strong site attachment of dingoes is contrary to the notion commonly held by property owners that dingoes will travel large distances to kill stock.

Diet

Dietary research entailing stomach content and faecal scat examination has shown dingoes are opportunistic predators.

Medium size animals such as kangaroos, wallabies, rabbits and possums consistently form the major part of their diet.

Such dietary studies could suggest dingo predation of domestic stock is low. There is however a need for caution in using such studies to assess dingo impact on stock.

Studies by the Western Australia Agriculture Protection Board show dingoes in undisturbed refuge areas killed and ate kangaroos strictly according to need.

On grazing country however ‘dingoes harassed, bit or killed sheep in large numbers, often without eating any'. The consumption of these sheep carcasses was the exception rather than the rule. Even kangaroos in these areas were sometimes killed in "play" type behaviour rather than for food.

Grouping increases foraging efficiency and appears necessary to exploit larger prey. Dingoes co-operating in groups are more successful in hunting kangaroos than lone dingoes. Whilst lone dingoes can easily kill sheep it is less likely a solitary dingo would successfully attack a calf in the presence of a defending cow.

Disease threat

Dingoes are vectors of canid diseases (e.g. distemper, parvovirus) and parasites. The hydatid parasite *Echinococcus granulosus* is a major problem of dogs and domestic stock, and can cause illness and occasionally death in humans.

The dingo could pose a serious risk if the exotic disease rabies was introduced to Australia.

Beneficial considerations

The establishment of watering points post-European settlement has resulted in a huge increase in the kangaroo population, with consequent strong pasture competition with domestic livestock.

Though it is widely accepted that sheep production is near impossible in the presence of dingoes, many cattle producers will tolerate dingoes because of their believed suppression of kangaroo numbers. Research has shown that not only does the dingo have the potential to mitigate population growth of native species during abundant seasons, it could also be an important limiting factor for many feral animal populations e.g. feral pigs and goats.

Destruction of the dingo could cause increases in other pests to the grazing industry and result in widespread degradation of environmentally sensitive areas. However, this has not been proven.

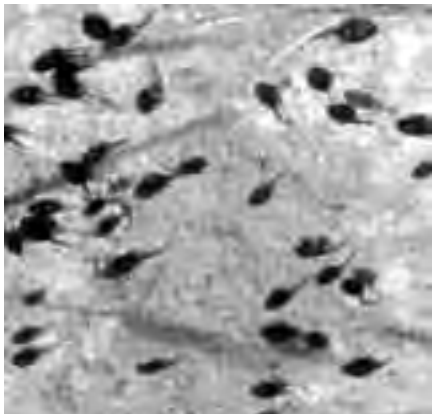
Further information

Further information is available from animal control/environmental staff at your local government, or if your council does not have animal control staff, from your local Department of Primary Industries and Fisheries Land Protection Officer: contact details available through 13 25 23.

Invasive plants and animals

The cane toad

Bufo marinus



The cane toad *(Bufo marinus)* is not a declared pest in Queensland so there is no legal requirement to control them.

Their original introduction in 1935 was to control agricultural pests, but they proved ineffective.

For the past 60 years, cane toads have been expanding their territory in Australia, and are capable of colonising at least four of the mainland Australian states.

As the toad's geographical range continues to expand, concern has increased about their detrimental environmental effects, particularly on the wetlands of the Northern Territory.

Studies into the feasibility of biological control have commenced.

History of introduction and dispersal

The cane toad or giant toad *(Bufo marinus)* is an amphibian, native to Central and South America. They have been introduced throughout the world as a biological control for insect pests of agriculture, most notably sugar cane.

A consignment of cane toads from Hawaii was released into Queensland cane fields in 1935. The introduction was surrounded by controversy as to the potential costs and benefits to Australia.

It was hoped that the toad would control Frenchi and Greyback beetles, pests of economic importance to the sugar cane industry.

By 1941, however, it had become evident that the cane toad was exerting only limited control over its intended prey.

This was because:

- Greyback beetles are only rarely in contact with the ground and Frenchi beetles invade cane fields at a time when the toads are absent due to the lack of protective cover.
- The cane toad has a wide-ranging and indiscriminate diet, and it was not solely dependant upon its intended prey.

The unlimited food source, suitable environment and low rates of predation allowed dynamic reproduction and spread. Toads were recorded in Brisbane only 10 years after release. The toad continues to thrive and has now invaded the Northern Territory and New South Wales ... see distribution map.

FIGURE 1 − CURRENT DISTRIBUTION OF THE CANE TOAD

The cane toad's advance is only limited by environmental factors, such as the availability of water for breeding, tolerable temperatures, suitable shelter, and an abundance of food

Toads at the frontier of their range of expansion may be larger than those in established populations. This is most probably due to greater food supply, combined with a lower incidence of disease.

Description

Adult

In comparison with native frog and toad species, adult cane toads have a distinctive head and face, and are large and heavily built creatures (Adults may grow to 20 cm).

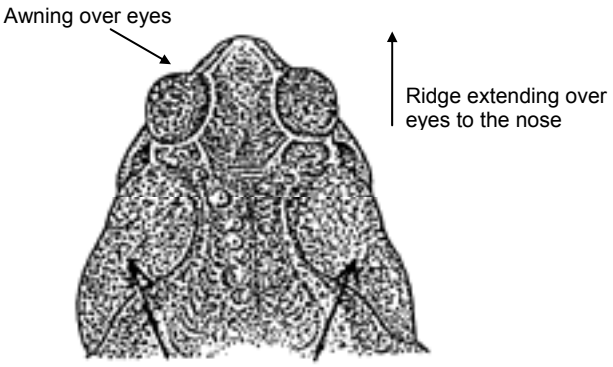
Following their aquatic larval stages (eggs and tadpoles), cane toads are generally encountered at night near any source of light. Cane toads are ground-dwelling, being poor climbers and unable to jump very high.

Description

A definite visor or awning extends over each eye and a high angular bony ridge extends from the eyes to the nose.

The parotid glands (see figure 2) are perhaps the most characteristic feature of the adult cane toad. These glands are large, protuberant, and are situated on the head, behind each ear. These glands carry a toxin.

FIGURE 2 − DISTINGUISHING FEATURES OF THE CANE TOAD



The hands and feet are relatively small and lack discs at the tips of the digits. Webbing is absent between the fingers but is distinct and leathery between the toes.

Colouring on the dorsal (upper) surface may be brown, olive-brown or reddish-brown. The ventral (underneath) surface varies from white to yellow and is usually mottled with brown.

Warts are present on all cane toads, however males possess more than females. Warts are dark brown at the caps.

Mating

Mating can occur at any time of the year and is only dependant on available food and permanent water. The mating call is a continuous purring trill that sounds like a running motor.

In situations where females are scarce or absent, male cane toads may have the ability to undergo a sex change to become fertile females, however this has not been proved.

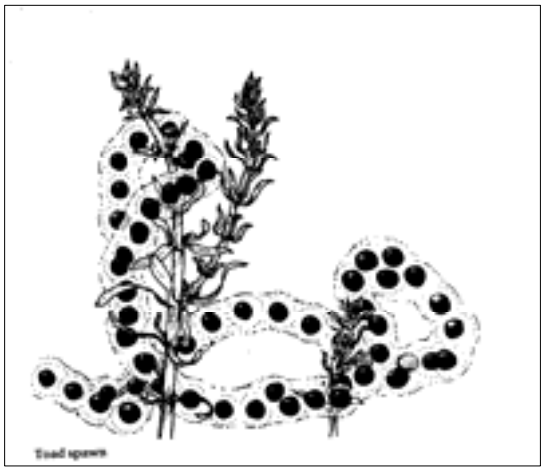
Identification of toad immature stage eggs

Both cane toads and native frogs spawn in slow moving or still water, but their eggs can be easily distinguished.

Cane toad eggs are laid in long, gelatinous "strings" with the developing tadpoles appearing as a row of small black dots along the length. The strings are unique to cane toads with native frogs eggs laid in clusters, generally appearing as blobs of jelly attached to water plants or debris. Native frogs generally produce egg clusters as mounds of foam floating on the water surface.

By comparison with native species, cane toad egg production is dynamic and a single clutch can contain up to 35 000 eggs. Any cane toads eggs found should be removed from the water and allowed to dry out.

FIGURE 3 − DRAWING OF TOAD SPAWN FROM 'WILDLIFE OF GREATER BRISBANE' PAGE166.



Tadpoles

The cane toad is the only species in Australia that has a pure black tadpole. Native frogs have lighter-coloured undersides with a great range of colours and markings. (Cane toad tadpoles may turn paler colours to almost transparent at night).

The cane toad tadpoles are small and usually congregate in vast slow-moving shoals. This "shoaling" behaviour is uncharacteristic of most native species.

Further, unlike cane toad tadpoles native species develop lungs at an early stage and periodically rise to the surface in order to exchange their lung gasses. Thus large groupings of tadpoles which do not break the water surface for air indicate cane toads.

Young toads

Following emergence from the water, the young toadlets usually congregate around the moist perimeter of the water body for about a week before they eventually disperse.

Young toads are very difficult to distinguish from the native *Uperoleiea species*, which also have parotid glands, but all *Uperolelea* species have bright red patches in the groin area.

Under ideal conditions toadlets may reach adult size within a year.

The problem

Toxicity

Bufo marinus produce venom in glands occurring in most of the skin on their upper surface. The venom is concentrated in the parotid glands as a creamy-white solution, which is released when the animal experiences extreme provocation or direct localised pressure, e.g. grasped by the mouth of a predator.

The parotid solution is highly toxic and when ingested it produces drastic acceleration of the heartbeat, shortness of breath, salivation and prostration. It is extremely painful if accidentally rubbed into the eye.

Ingestion of toads by domestic and most native animals can result in death. In some recorded cases death has occurred within fifteen minutes.

Field observations suggest that some predatory Australian species have learnt how to feed safely on cane toads.

Birds have been observed flipping toads over before feeding to avoid toad's parotid glands. Predatory reptiles may have more trouble adapting, being unable to remove a toad from their mouth once they start feeding.

Effects on wildlife

All stages of the cane toad as poisonous and most native frog larvae and many aquatic invertebrates are dramatically affected by their presence.

Cane toads are voracious feeders that consume a wide variety of insects, frogs, small reptiles, mammals and even birds. Perhaps the only limiting factor to the prey taken is the width of the cane toad's mouth.

It has been suggested that cane toad competition for food and breeding grounds has been responsible for reducing the populations of some native frogs. However many native frogs are arboreal (tree dwelling), and so occupy different niches. Neither do cane toads have the native frogs' ability to "shut down" during dry seasons when resources are limited.

Pressure from cane toads may displace native animals (frogs and other species) where they already suffer due to manipulation of their habitat by man and his grazing animals. Animals that use waterholes as retreat sites during the dry season are especially vulnerable, as toads will also congregate here in large numbers.

Public health

Cane toads readily eat animal and human faecal material and, in areas of poor hygiene, they have been known to transmit disease such as salmonella.

Control

Control of the cane toad has never been enforced and has remained at the discretion of the individual. Recently the Brisbane City Council established the cane Toad Eradication Committee that urges residents to exercise greater control of the pest.

Freezing is also a humane form of treatment. As a reaction to cold the animal initiates dormancy, and eventually dies in its sleep.

Fencing is recommended to keep toads out of ponds intended for native fish and frogs; a height of 50cm is sufficient. (Birdwire with 1cm hole may keep toads out of an area)

CSIRO are investigating organisms for biological control. However, exhaustive testing would be necessary to ensure that viral or bacterial agents are cane toad specific and not harmful to native species.

Injured or 'lost' frogs

Brisbane Forest Park	07 3300 4855
Wildlife Preservation Society of Queensland	07 3221 0194
Queensland Museum	07 3840 7555

WILVO's Wildlife Volunteer's Organistaion (look up local phone directory to see if a group operates in your area).

Further information

Is available from animal control/environmental staff at your local government, or if your council does not have animal control staff, from your local Department of Primary Industries and Fisheries Land Protection Officer: contact details available through 13 25 23.

FOI 180401
Document 5

From: Gomez Gane, Kylie
To: s22
Cc:
Subject: RE: Colton Coal Project - Request for reconsideration of referral decision [SEC=UNCLASSIFIED]
Date: Monday, 6 February 2017 2:23:42 PM
Attachments: image001.png

---

s22

As per our discussions I can confirm that since the proposal was determined a Not Controlled Action on 6 October 2010 there have been no steps taken to commence or further progress the proposed development due to the fact that the Mining Lease has not been granted yet.

Regards,

Kylie Gomez Gane
Manager Environment, Policy and Approvals
.....
New Hope Group | Corporate Office
T: +61 s47F **M:** +61 s47F
E: *kgomezgane@newhopegroup.com.au*
W: *newhopegroup.com.au*
.....

http://www.newhopegroup.com.au/files/images/Newsig0916.png

From: s22 @environment.gov.au]
Sent: Monday, 6 February 2017 10:15 AM
To: Gomez Gane, Kylie
Cc: s22
Subject: Colton Coal Project - Request for reconsideration of referral decision [SEC=UNCLASSIFIED]

Hello Kylie

This email is to inform you that the Department of the Environment and Energy has received a request to reconsider the referral decision for the Colton Coal Project (EPBC 2010/5625), which was assessed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and determined to be 'not a controlled action' (NCA) on 6 October 2010.

The request for reconsideration was made under section 78(1)(a) and 78A of the EPBC Act on the basis that the revocation and substitution of the existing approval is warranted by the availability of substantial new information about the impacts that the action will have or is likely to have on a protected matter. The reconsideration request is attached for your information. Please be aware, if any one of the grounds for changing the original decision are satisfied, then the original decision will be revoked and a new decision under section 75 of the EPBC Act will likely be made.

To verify that it is possible for us to consider the request, could you please confirm the steps that

have been taken to commence or further progress the proposed development since the proposal was determined a Not Controlled Action on 6 October 2010.

Once we have determined that the request is a valid request, you will be given 10 business days to provide comment on the reconsideration request, in accordance with section 78B of the EPBC Act. The request for reconsideration will also be published on the Department's website with a request for public comment.

If you have any questions regarding this request or the reconsideration process please contact me on the details provided below.

Regards,

s22

Queensland Major Projects Section
Environmental Standards Division
Department of the Environment and Energy
s22 @environment.gov.au
Ph: (02) 6274 s22 | GPO BOX 787 Canberra ACT 2601

FOI 180401
Document 6

From: EPBC
To:
Cc: s22
Subject: RE: Invitation to comment - Request for a reconsideration of Colton Coal Mine Project [SEC=UNCLASSIFIED]
Date: Friday, 10 March 2017 8:24:48 AM
Attachments: Geoscience Australia comment on the reconsideration of the Colton Mine P....pdf

Good morning s22

Thank you for the opportunity to comment on the reconsideration of Colton Coal Mine Project (EPBC 2010/5625). Please see attached comments from Geoscience Australia, please contact s22 @ga.gov.au) if you have any questions. The Department of Industry, Innovation and Science do not have any further comments to make.

Many thanks,

s22
Mining and Investment
Onshore Minerals Branch
Resources Division
02 6243 s22 @industry.gov.au

Department of Industry, Innovation and Science | www.industry.gov.au

From: s22 @environment.gov.au]
Sent: Friday, 17 February 2017 9:14 AM
To: EPBC <EPBC@industry.gov.au>
Cc: 'epbc@ga.gov.au' <epbc@ga.gov.au>; s22 @industry.gov.au>
Subject: Invitation to comment - Request for a reconsideration of Colton Coal Mine Project [SEC=UNCLASSIFIED]

To whom it may concern

You are invited to provide comment within 10 business days, on the request for a reconsideration of the 'not controlled action' decision for the Colton Coal Mine project, made under the EPBC Act on 6 October 2010.
Please refer to the attached documents for further information.

Regards

s22
Queensland Major Projects Section
Environmental Standards Division
Department of the Environment and Energy
s22 @environment.gov.au
Ph: (02) 6274 s22 GPO BOX 787 Canberra ACT 2601

FOI 180401
Document 6a

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Mining and Investment
Onshore Minerals Branch
Resources Division
Department of the Industry, Innovation and Science

9 March 2017

Attn: s22

Re: Request for a reconsideration of Colton Coal Mine Project (EPBC 2010/5625)

I refer to your request dated 20 February 2017, for comment on the reconsideration of the Colton Mine Project (the Project). The Mary River Catchment Coordination Committee (MRCCC) submitted a request for reconsideration of the referral decision under Section 78 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The project was originally referred in August 2010 (EPBC 2010/5625) and was not considered a controlled action (and therefore not subject to the assessment process under the EPBC Act). Geoscience Australia has reviewed the referral information and other documentation with attention to water resource issues and to technical geoscience and geological factors. Sections 24D and 24E of the EPBC Act are not applicable to this reconsideration as these Sections were not included in the Act at the time the referral was submitted.

Summary

The referral for the Project was submitted on 25th August 2010 by Colton Coal Limited, a subsidiary of Northern Energy Corporation Limited (now New Hope Corporation Ltd), and was self-assessed as not a controlled action under the EPBC Act. The (then) Department of Sustainability, Environment, Water, Population and Communities agreed that the Project was not a controlled action.

The MRCCC request for reconsideration focusses on the threat of a significant impact to the Great Sandy Strait Wetland and EPBC–listed species. In their submission, the MRCCC state that, by 2016, substantial new information was available for the Project compared to when the referral was made in 2010, particularly regarding water quality and ecological impacts. The MRCCC cite these sources of new information as being the third revision of the Environmental Management Plan (EMP) (AARC, 2014), the documents associated with a Court Case in the Queensland Land Court and the Queensland Department of Environment and Heritage Protection Assessment Report for the Project.

Geoscience Australia notes that there is a large amount of information available on the Project from the referral documentation and documentation available on the New Hope website. Some of the information is inconsistent between documents, making it difficult to determine how the potential impacts may have changed since the referral. Other documents that relate to the Project and may clarify these matters are not publically available, such as the Environmental Authority granted by the Queensland Government on 15th December 2016, and the Queensland Department of Environment and Heritage Assessment Report for the Project.

Conclusions

Geoscience Australia has identified a number of inconsistencies in the documents provided and other matters which may require review by subject matter experts. The three most important of these are discussed below. Other matters are discussed in the Attachment.

- The potential increase in risks inherent in a larger volume of mined coal (than that identified in the original referral) needs to be addressed.
    - The 2010 referral indicates an estimated 5.9 Million tonnes (Mt) of coal will be mined, producing 1.0 Mt Run of Mine (ROM) coal per annum. The 2014 EMP (AARC, 2014) states 12 Mt of coal will be mined, producing 1.2 Mt of ROM coal per annum. It is possible that the increased tonnage to be processed may result in larger out-of-pit spoil dumps over the life of the Project and in perpetuity, and a larger mine void. This may have implications for additional seepage from spoil areas, potentially resulting in an enhanced risk of acid rock drainage and the mobilisation of higher concentrations of heavy metals and other contaminants. Runoff from the out-of-pit spoil dumps will be captured in the Mine Water Dam, and may be released to the Mary River if quality allows.
- The potential downstream impacts of peak discharges and suitable monitoring approaches may need to be addressed.
    - When the mine is operational there will be a need to dispose of excess surface water and groundwater. The referral documentation indicates an average of 946 megalitres (ML) of excess water will need to be discharged from the Mine Water Dam to the Mary River each year. This is described as being less than 0.01% of total annual flow of the river at the discharge location in the referral. Geoscience Australia notes there is a discrepancy between the percentage reported in the referral and in the Colton Mine Water Management Plan (NEC, 2010a), which is an attachment to the referral. The referral reports <0.01% whereas the 2010 Water Management Plan reports <0.1%.
    - The revised EMP (AARC, 2014) indicates that the predicted median annual release will be 445 ML each year, and the maximum mine water release could make up 5.8% of total water flow over the life of the mine. The maximum and minimum discharge rates are important considerations because the ecosystem at the discharge location, and downstream, will be more sensitive to daily changes in flow and water quality than annual averages. The potential impact of mine water discharge, and the significance of annual average versus peak flow, should be further investigated by subject matter experts.

- Since the submission of the referral, additional work has been undertaken to model dispersion at the Mary River discharge point and to geochemically characterise the overburden material (DHI, 2014 and CSIRO, 2014, respectively). The results of these investigations indicate the discharge to the Mary River would increase the concentrations of cadmium, cobalt, manganese, selenium and silver above existing background concentrations. Of these, only cadmium, cobalt and manganese concentrations would exceed the high ecosystem guideline values; however, background levels of these compounds are already above these guidelines (DHI, 2014). This information was not available at the time of the referral.

If you have any queries on this, please contact me on 6249 9788 or lucy.lytton@ga.gov.au

Kind regards,

s22

s22

Director Groundwater Advice and Data, Groundwater Branch
Environmental Geoscience Division
Geoscience Australia

ATTACHMENT

Background

The Project is located about 10 km north of Maryborough and the referral indicates the Project will mine approximately 5.9 Mt of coking coal via open cut methods over an 8—10 year period. The Project footprint is just over 1000 ha and is located 8 km upstream of The Great Sandy Strait, a Ramsar listed wetland.

The Project is in the preproduction stage and will target the Burrum Coal Measures in the Maryborough Basin. New Hope's most recent resource estimates for Colton are dated from 2013. However, New Hope state in their 2016 Annual report that recent exploration has been focussed on groundwater studies and coal seam correlations across the deposit and that the area will be remodelled following this work to publish an updated report of resources.

As shown in Table 1, the most recently reported black coal *in situ* Economic Demonstrated Resource (EDR) for Colton is 16 Mt, representing 0.02% of Australia's *in situ* black coal. There is also 60 Mt of Inferred *in situ* black coal, representing 0.06% of Australia's inferred *in situ* black coal.

Table 1 Resources of the Colton Coal Mine Project

Black coal (*in situ*)	EDR		Inferred	
	Mt	% Aust.	Mt	% Aust.
Australian Resources[1]	83,324		101,145	
Colton Coal Mine Project	16	0.02	60	0.06

[1]AIMR (Australia's Identified Mineral Resources) 2016

Abbreviations: EDR - Economic Demonstrated Resources; Mt - million tonnes

The 2010 referral states that there is not likely to be a significant impact on The Great Sandy Strait wetland for the following reasons:

- The design of the Mine Water Management Dam will maximise sediment retention in order to minimise deposition of sediments off-site during an extreme weather event.
- The proposed discharge to the Mary River (average of 946 ML/yr) accounts for less than 0.01%[1] of total annual flow of the Mary River at the discharge location.
- The discharge location is a significant distance (8—12.5 km) from the entrance to the Great Sandy Strait Ramsar wetland.
- The current water quality of the Mary River.

The proponents submitted an EMP to the Queensland Government in 2010, however this was considered non-compliant, as was a revised plan that was submitted in 2011. A third revision of the EMP (AARC, 2014) was submitted in May 2014 and a draft Environmental Authority granted in August 2014. As previously noted, an Environmental Authority for the Project was given on 15/12/2016.

[1] There is a discrepancy between the percentage reported in the referral and that reported in the Colton Mine Water Management Plan (NEC, 2010a), which is an attachment to the referral. The referral reports <0.01% whereas the 2010 Water Management Plan reports <0.1%.

on the Mary River and all of the Susan River (10 km away from Project site) is identified as high ecological value (HEV) and the plan requires these waterways to maintain or achieve an effectively unmodified waterway condition. This equates to the ANZECC and ARMCANZ (2000) 99% species protection levels in setting water quality objectives for metal contaminants.

Based on the results of geochemical characterisation of the overburden material in the Receiving Water Mixing Study (CSIRO, 2014) and the modelling undertaken for the Mary River Dispersion Study (DHI, 2014), the release of discharge water to the Mary River is modelled to result in an increase in the concentrations of cadmium, cobalt, manganese, selenium and silver above existing background concentrations. Of these, cadmium, cobalt and manganese concentrations would also exceed ANZECC guideline values for 95% species protection. The proponent notes that background levels of these compounds are already above these guideline values. This information was not presented in the 2010 referral documentation.

The 2010 Colton Mine Water Management Plan (NEC, 2010a) proposed Mary River discharge contaminant release limits and discharge contaminant trigger investigation levels. These values were derived from a range of water quality values found in the ANZECC & ARMCANZ (2000) guidelines (e.g. primary contact recreation, marine aquaculture, mid-estuary slightly to moderately disturbed ecosystems). The revised EMP (ARCC, 2014) recommends that for the parameters where the background concentrations were above the trigger value, the 80th percentile background concentration is used as the receiving water quality trigger value. For background values below the trigger levels, the receiving water trigger value should be consistent with the ANZECC aquatic ecosystem protection – slightly to moderately disturbed, or the Mary River water quality objectives (DERM, 2010). The trigger levels set will need to be carefully monitored such that the high ecological value section of the river 8 km downstream of the discharge point is not impacted. Hydrobiology (2014) also indicates that concentrations of aluminium, iron and copper were adjusted based on experimental results of metal precipitation. Whilst this may reduce the concentration of heavy metal concentrations in the surface water system, it will increase the concentration in stream sediments. The potential long-term impacts of this additional load of metals in stream sediments should be reviewed by subject matter experts and may indicate the need for sediment monitoring at the discharge location (not currently recommended in the EMP (AARC, 2014)).

The Colton Project will require a Worked Water Dam, to take water from the pit and runoff from the mine industrial area and coal handling and processing plant (CHPP) area, and a Mine Water Dam, which will collect the runoff from overburden stockpiles. The Worked Water Dam is likely to have higher contaminant concentrations than water in the Mine Water Dam. There is also potential for the water to contain small quantities of hydrocarbons either from the CHPP area, mine industrial area, or the pit floor itself. In the original Colton Mine Water Management Plan that was submitted with the referral, both the Worked Water Dam and the Mine Water Dam were classified as High Hazard dams containing hazardous waste, under the Code of Compliance for environmental authorities for high hazard dams containing hazardous waste (EM1698 - https://www.ehp.qld.gov.au/assets/documents/regulation/era-ses-high-hazard-dams.pdf). In the revised EMP (AARC, 2014), the Mine Water Management Dam is classified as in the Significant Consequence category according to the Manual for assessing consequence categories and hydraulic performance of structures (https://www.ehp.qld.gov.au/assets/documents/regulation/era-mn-assessing-consequence-hydraulic-performance.pdf). Dams that are categorised as Significant Consequence are required to contain a 1:10 storm event and a 1:20 wet season. Given the life span of the project, it is highly likely that a 1:10 storm even will occur, and possible that a 1:20 wet season will occur. Therefore, it is pertinent to consider the impact of these dams potentially failing to contain these events in relation to surface water systems near the project.

Comments

The revised EMP (AARC, 2014) and other documents relating to the Colton Coal Project indicate some of the information presented in the referral has changed. Some of these changes are discussed below and are also set out in Table 2.

The proponent has indicated there is a change in the coal reserve from 5.8 Mt to 12 Mt. This increase is likely to be a result of an improved understanding of the reserve and is accompanied by a 20% increase in ROM coal from 1.0 to 1.2 Mt per annum (Mtpa). As there has been no change to the amount of product coal (0.5 Mtpa), this information suggests a much higher strip ratio for the mine (ratio of waste material to extracted ore) than was presented in the referral. This ratio may be revised once the new geological model is available (as indicated in New Hope's 2016 Annual Report). However, it is possible that the increased tonnage to be processed may result in larger out-of-pit spoil dumps over the life of the Project and in perpetuity, and a larger mine void. This may result in additional seepage from spoil areas, potentially resulting in greater acid rock drainage and mobilising higher concentrations of heavy metals and other contaminants, which may impact surface water and groundwater systems.

The referral documentation indicates that an average of 946 megalitres (ML) of excess water will be discharged from the Mine Water Dam to the Mary River each year. In the referral this is described as being less than 0.01% of total annual flow of the river at the discharge location (see footnote above). The revised EMP (AARC, 2014) indicates that the predicted median annual release will be 445 ML each year. On an annual basis, the ratio of modelled mine release to Mary River flow would range from 0.003% to 0.22% of total flow at the discharge point. On a daily basis the range is up to 5.8% with a median of 2.5%. A daily rate was not discussed in the 2010 referral and it is an important consideration because the ecosystem at the discharge location and downstream will be more sensitive to daily changes in flow and water quality than annual averages.

The revised information also indicates the pipeline to discharge water from the site into the Mary River will have a greater capacity. The 2010 Surface Water Management Report (PSM Australia, 2010) indicates that the discharge pipeline to the Mary River should have a capacity of 130—150 litres per second (L/s), however in the 2014 EMP, this is increased to 200 L/s. The report also recommends the following discharge conditions:

- when the Mary River flow rate is less than 150 ML/day, there will be no discharge allowed
- When the flow rate is greater than 150 ML/day discharge can occur at a rate of 100 L/s
- When the flow rate is greater than 300 ML/day, the discharge rate can increase to 200 L/s (WRM, 2014) (this equates to 5.8% of flow).

The potential predicted impact on the Susan River is unchanged with a predicted reduction of a maximum of 4% of total flow as a result of the redirection of surface water flows across the site. However, it appears there is no longer any monitoring recommended for the Susan River so impacts may not be identified (see Figure F1, p. 284 of the revised EMP (AARC, 2014) compared to Figure 6-1 p. 41 of the Colton Mine Water Management Plan (NEC, 2010a)).

The environmental values for waters within the Mary River and Susan River are described in the Queensland Government document *Environmental Protection (Water) Policy 2009 - Mary River Environmental Values and Water Quality Objectives* (DERM 2010), which applies to fresh and estuarine surface water and groundwater as represented in plan WQ1381 (see DERM, 2010). The Environmental Protection (Water) Policy identifies the level of protection for different waters covered by the plan. The level of protection identified in the Plan for the discharge area is moderately disturbed aquatic ecosystems. This equates to an objective of 95% species protection under the ANZECC and ARMCANZ (2000) Guidelines. However, 8 km downstream from the discharge location

The issues identified above are summarised in Table 2 below.

Table 2 Summary of information in 2010 referral and 2014 Environmental Management Plan

Information in 2010 referral	Information in 2014 EMP
Project proposes open cut mining of **5.8** Mt of coking coal reserve, resulting in up to **1.0** Mt of ROM coal per year, to produce about 0.5 Mt of product coal per year for export.	Project proposes open cut mining of **12** Mt of coking coal reserve, resulting in up to **1.2** Mt of ROM coal per year, to produce about 0.5 Mt of product coal per year for export.
Average annual release of 946 ML of water from the Mine Water Dam discharged to the Mary River (**<0.01%** of total annual flow). No daily rate calculated.	**Median** annual release of 445 ML/year of water discharged from the Mine Water Dam to the Mary River (range of 0.003% to 0.22% of total annual flow). **Daily** range is up to **5.8%** of total flow, with a median of 2.5% of flow.
Mary River Pipeline capacity to discharge water from Mine Water Dam at rate of **130-150 L/s**.	Mary River Pipeline capacity of **200 L/s** (up to 17.3 ML/day). In the assessment of the mixing zone at the discharge point, a rate of 100 L/s was assumed, however it is reported that the results are still valid with a discharge of 200 L/s, but the higher discharge rate will have some impact on the mixing process (DHI, 2014).
No information provided on the concentration of heavy metals in the discharge water compared to background concentrations in the Mary River.	Discharging water to the Mary River will increase the concentrations of cadmium, cobalt, manganese, selenium and silver above existing background concentrations. Of these, cadmium, cobalt and manganese concentrations would also exceed the proposed ANZECC guideline values. The background concentrations are already above these guideline values.
The Groundwater Report suggests the open cut pit will cover an area of approximately **115 ha** and be 60-80m below ground level (StreamlineHYDRO, 2010). The Groundwater modelling report indicates voids will be 40 ha (AGE, 2010). Modelled inflow to the pit was done using the mine plan annual blocks and was modelled to be 0.8—1.2 ML/day.	The Colton Mine Project Mining lease application in 2010 indicates the excavation will be approximately **350ha** (NEC, 2010b). In the 2014 EMP the final void will cover approximately **111 ha**. The void will be larger than this over the life of the project and will be incrementally stripped, mined and backfilled. The 2014 EMP states groundwater inflow to mine pit 438 ML/yr (average of 1.2 ML/day). This does not change between the 10th and 90th percentile and median site water balances.
The 2010 Colton Mine Water Management Plan (NEC, 2010a) indicated water would only be released from the Worked Water Dam to the Mine Water Dam under emergency conditions (see Figure 5.1, p.25).	The 2014 Colton Project Water Management Plan (WRM, 2010) indicates that water will be transferred from the Worked Water Dam to the Mine Water Dam if quality allows and that it will be released immediately (see Figure 5.4, p.22).
Worked Water Dam and Mine Water Dam both classified as High Hazard dams.	Worked Water Dam and Mine Water Dam both classified in the Significant Consequence category, which result in more lenient design criteria than High Hazard.

References

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DHI (2014). Colton Mine Mary River Dispersion Study, Model Development, Calibration and Analysis. Appendix M of the Colton Mine Project Environmental Management Plan. http://www.newhopegroup.com.au/files/files/15%20Appendix%20M%20-%20Mary%20River%20Dispersion%20Study.PDF

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StreamlineHYDRO (2010). Colton Mine – Hydrogeological Study, StreamlineHYDRO Pty Ltd ,Brisbane.

WRM Water and Environment (2014). Colton Project – Site Water Management Assessment. Report Number 0727–02–A1. Appendix L of the Environmental Management Plan.

FOI 180401
Document 7

From: s22
To:
Cc:
Subject: FW: Colton Coal request for a reconsideration [SEC=UNCLASSIFIED]
Date: Tuesday, 14 March 2017 10:14:59 AM

Hi s22

OWS has reviewed the response from New Hope Group (the proponents of Colton Coal Project) and found that information in their response does not change the advice of OWS in any way.

OWS advice on the project can be summarised by the opening lines of the response to questions in the original request for advice (reconsideration request stage), provided by OWS on 27/01/2017:

Yes. OWS considers that the items raised under 'Water Quality and Sediment in the Mary and Susan Rivers' (Items 6 to 12) contain new information AND information that demonstrates that a change in the potential impacts of the action is likely to happen with a high degree of certainty. However, without a more detailed assessment, OWS is unable to provide advice on the likely extent/magnitude of the change in potential impacts and relevance to MNES.

New information includes:

- the predicted volume of discharge from the proposed project has increased
- the predicted volume of discharge from the proposed project relative to the flow in the Mary River has increased
- the assessment of water quality impacts to the Mary River has been updated and impacts to Mary River water quality are now predicted, where previously impacts were assessed to be nil
- mine water management arrangements, including dam operation and criteria for discharging mine water to the Mary River, have changed.

Changes to potential impacts include:

- increases in levels of cadmium, cobalt, manganese, selenium & silver in the Mary River at the mine water discharge point
- concentrations of cadmium & cobalt remaining elevated further downstream at the High Environmental Value zone as a result of mine water discharges.

Please let me know if you require further information.

Cheers

s22

From: s22
Sent: Wednesday, 8 March 2017 4:45 PM
To: Ramsar EPBC advice <RamsarEPBCadvice@environment.gov.au>; Office of Water Science Advice <OWS.Advice@environment.gov.au>

Cc: s22 @environment.gov.au>; s22 @environment.gov.au>
Subject: Colton Coal request for a reconsideration [SEC=UNCLASSIFIED]

Hello s22
We have now received a response (attached) from New Hope Group, the proponents of the Colton Coal Project. I would appreciate an indication as to whether their response changes your earlier advice to us in any way or whether you are able to provide any further advice to us.

Happy to discuss timeframes
Regards
s22

Queensland Major Projects Section
Environmental Standards Division
Department of the Environment and Energy
s22 @environment.gov.au
Ph: (02) 6274 s22 GPO BOX 787 Canberra ACT 2601

FOI 180401
Document 8

From: s22
To: EPBC Referrals
Cc: s22
Subject: Reconsideration request—Colton Coal Mine Project, Maryborough Queensland (EPBC 2010/5625)
Date: Thursday, 2 March 2017 10:16:25 AM
Attachments: image001.png
image002.png
Reconsideration 2010-5625.pdf
Colton Coal Mine Assessment Report (part report) EHP.pdf

Hello,

I write in response to your letter dated 16 February 2017 inviting comment on the request for reconsideration of the decision under subsection 78A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in regard to the Colton Coal Mine Project, Maryborough Queensland (EPBC 2010/5625).

I advise the department considers the scope and scale of the proposal has changes since the time it was referred for determination under the EPBC Act. Whereby, the project resources estimates are up on the original figures, and the proposed water management system has evolved. For further details refer to attached environmental authority assessment report. I have attached a scanned copy of this advice to this email. You will receive the original letter through the post.

If you have any queries about the letter, please contact s22 on (07) s22 .

Kind regards, s22

s22
Project Officer
Technical Support | Regulatory Capability and Customer Service Branch
Department of Environment and Heritage Protection

P 07 s22
Level 9, 400 George Street, Brisbane
GPO Box 2454, Brisbane QLD 4001
www.ehp.qld.gov.au

FOI 180401
Document 8a

Queensland Government

Department of
Environment and Heritage Protection

Ref CTS 101/0003868-005

2 March 2017

Referrals Gateway
Department of the Environment and Energy
GPO Box 787
CANBERRA ACT 2601

Dear Sir/Madam

Reconsideration request—Colton Coal Mine Project, Maryborough Queensland (EPBC 2010/5625)

Thank you for your department's letter dated 16 February 2017, inviting the Department of Environment and Heritage Protection (EHP) to comment on the request for reconsideration of the decision under subsection 78A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in regard to the Colton Coal Mine Project, Maryborough Queensland (EPBC 2010/5625).

EHP considers the scope and scale of the proposal has changed since the time it was referred for determination as a controlled action under the EPBC Act. Whereby, the project resources estimates are up on the original figures, and the proposed water management system has evolved since it was originally referred. For further details, please refer to the attached environmental authority assessment report.

Should you have any further enquiries regarding this letter, please do not hesitate to contact me on telephone (07) s22

Yours sincerely

s22

Director, Impact Assessment and Operational Support

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Queensland Government

Assessment report

Licensing

Environmentally relevant activities

APPLICATION NOTES:

1. *Each assessment report prepared to support recommendations made for decision is to be structured in the format shown below.*
2. *Explanatory notes for completing the report are given under each heading in brackets.*
3. *The report is to be completed, where indicated, to confirm conclusion of supervisory review/endorsement, and decision stages of the process.*

This assessment report is for mining environmentally relevant activities to be assessed via the Environmental Protection Act 1995.

COUNCIL DA NUMBER: N/A Mining Application	DERM PROJECT NO: 248999
DERM EA NUMBER: MIN101122010	FILE NO: MBH3210
APPLICATION TYPE: Environmental Authority (mining activities) for a non-code complaint level 1 mining project	
DEVELOPMENT TRIGGER: Mining black coal	
DEVELOPMENT DESCRIPTION: Colton Coal Mine	
LOCATION DESCRIPTION: Approximately three km NW of Aldershot near Maryborough Qld.	
APPLICANT: Colton Coal Pty Ltd	
TRADING AS: Colton Coal Pty Ltd (a subsidiary company of Northern Energy Corporation Limited)	

1.Issues

The Proposal

This proposal consists of an open cut coal mining operation to develop the Burrum Coal Measures to produce 500,000 tonnes per year of final product high quality coking coal for export. To produce this volume of final product coal, around 1.5M tonnes per annum of run of mine (ROM) coal will need to be mined and processed through a coal handling and preparation plant (CHPP or more commonly termed a washery). This coal “washing” process will generate reject waste material of both coarse and fine fractions.

Environmental Issues

The proposed Colton Coal open cut mine will require dewatering to avoid the pit filling with groundwater and impacting the mining operations. This groundwater and stormwater from disturbed areas of the mine site will need to be collected and stored in on site dams to avoid the uncontrolled release of contaminated water. During periods of extended wet weather a portion of this water will need to be discharged to avoid uncontrolled overflows from the storage dams. The proponent intends to release excess volumes of water stored in the main on site dam in a controlled manner to the Mary River via a pipeline and according to a controlled release strategy to ensure environmental values are not impacted.

Extensive dewatering with extraction bores will need to be conducted to avoid flooding in the pit as the mine progresses to depths below the regional groundwater table. This will, as mentioned above, result in a groundwater source that may need to be release under certain circumstances, but may also impact groundwater dependant vegetation and wetland systems within the area of the cone of groundwater depression (which is expected to extend beyond the mining lease boundaries). This could have potential impacts on both the deeper regional aquifer system that exists in the area (which primarily exists in the Burrum Coal measures) and the shallow, localised lensed groundwater systems that are also predicted to exist and which may support groundwater dependant vegetation and associated ecosystem components.

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Water on the site will be selectively handled in a series of on site dams to ensure that the more contaminated site water (such as from the workshop and CHHP areas) is stored in dams that are contained and will not receive other stormwater or groundwater inputs. It is important to selectively manage these waters and avoid inputs of groundwater and stormwater to these dams. These measures are designed to ensure there is no need to release water from these dams, which is important as as this water is generally not fit for release to the environment.

Other dams on site will collect groundwater from the pit and dewatering bores and stormwater from disturbed areas of the site such as the out of pit spoil dumps. This water may contain sediment and elevated trace metals and salts and may require treatment such as settling to ensure it is suitable for release to the environment. During period of extended wet weather, volumes in the water storage will build to a point where release of water will be necessary to ensure the dams do not overflow. To avoid this, a pipeline will be built to the Mary River and water will be discharged from the site Main Dam (the dam with the best water quality of all proposed on site dams) via this pipe in a controlled manner.

This mine water pipeline discharge has the potential to negatively impact the environmental values of the river. To ensure appropriate water quality objectives are maintained in the Mary River during periods when water is released, a strategy for when water can be discharged in relation to the flow in the Mary River at the time has been developed. This will ensure that water is only discharged at times when the Mary River flows are high enough to dilute and disperse the water discharged from the mine to levels where the relevant water quality objectives will be maintained.

There is also potential for some on site storage dams to fill to the point where they fail to contain the water collected and discharge via the spillway in an uncontrolled manner. Colton Coal is proposing to manage this with a mine water handling system that diverts any uncontrolled release of water into the pit for temporary storage as required. During times when the water handling system storage is reaching capacity, pit dewatering will also cease and the pit allowed to capture and hold the volumes of groundwater that infiltrate and incident stormwater created by the pit until sufficient dam storage becomes available. Both these scenarios will result in a potentially significant build-up of water in the pit that will impact normal mine production until the pit can be dewatered. Colton Coal predict that there is a 10% chance that at some stage over the operation life of the mine, the volume of water stored in the pit during such events could exceed 1000ML. Colton Coal claims that the mining operation can accept this as an operational risk.

The overburden from the mine and coal reject waste material from the mines proposed Coal Handling and Preparation Plant will be disposed to spoil piles, which have the potential to generate acid and metalliferous mine drainage following disturbance in not appropriately managed. Potentially acid forming materials need to be mixed with acid neutralising spoil or selectively placed and encapsulated with non-acid forming material to avoid generation of acid drainage. The fine reject material will be dewatered to avoid the generation of a wet “tailings” or “slimes” stream that is often generated during coal washing. This dewatering process will mean that solid fine reject material can be blended with coarse reject material and selectively placed in waste dumps within the mine’s proposed in-pit and out-of-pit spoil piles.

A selective placement strategy will be required for all coarse and fine reject material and overburden with the potential to generate acid metalliferous drainage (AMD). Such material can be placed in the centre of the spoil pile and encapsulated with benign overburden materials to preclude air (containing oxygen) and water from contacting these potentially AMD generating materials. Encapsulation of material with the potential to generate AMD will be necessary to control the generation of AMD from the oxidation of sulphide minerals in such potentially acid forming waste material when exposed to air and water during and after mining. Uncontrolled AMD could otherwise contaminate surface and groundwater on the proposed mine site.

During initial pre-design meetings with the client, a strategy of returning mine spoil to the mine void to minimise permanent land disturbance was outlined by the proponent. The EM Plan now outlines that an out of pit spoil material dump will also be required for permanent disposal of the majority of the mine spoil material, as it is not economically viable to move all of this material back into the pit void. It is estimated (from looking at the client's rehab design plans) that less than one third of the overall spoil material that will be generated during mining will ultimately be placed into the mine void.

The open cut mining process will result in disturbed areas with the potential to generate dust emissions that have potential to impact on the nearby township of Aldershot and the residence nearest to the mining operation in particular if not properly controlled. Other operations like stockpiling and coal loading operations can also result in dust emissions. Colton Coal was required to demonstrate that they could maintain all relevant ambient air quality objectives specified under the *Environmental Protection (Air) Policy 2008* while conducting the mining operations. Dust modelling has been conducted by the client, and this indicates that dust emissions from the proposed mining operation will not exceed relevant criteria defined under legislation (TSP, $PM_{10,}$ and dust deposition rate) at all surrounding sensitive receptors.

Noise from the pit operations and the running of the Coal Handling and Preparation Plant has the potential to generate nuisance at nearby sensitive receptors (Aldershot and the residence nearest to the mining operation in particular) if not mitigated or properly controlled. The operation is predicted (through the client's use of an acoustical model) to be able to operate within levels levels allowed under the Department of Environment and Heritage Protection (EHP) guideline document *Planning for Noise Control*.

The one exception to this is a single residence to the north of the Aldershot. This residence is in an isolated location and is the nearest occupied residence to the mine site. Colton Coal has indicate it intends to attempt to acquire the property or negotiate with the property owner in relation to managing complaints that may arise in relation to noise impacts from the mine at the property in question. It is not considered that this is an outcome that Colton Coal can guarantee if the property owner does not want to sell or enter into an agreement in relation to noise impacts and nuisance complaints. To date, Colton Coal has not taken any actions to address this issue. For this reason, a special condition needs to be included within any environmental authority to be issued for the mine that ensures the outcome of avoiding nuisance noise impacts at this sensitive receptor is achieved.

Noise and vibration from blasting operations that may at times be conducted in the pit have the potential to generate airblast overpressure and ground vibration nuisance at nearby sensitive receptors (Aldershot and the residence nearest to the mining operation in particular) if not mitigated or properly controlled. Modelling of the airblast overpressure and ground vibration conducted by specialist consultants for Colton Coal has indicated that the blasting operations will achieve compliance with all relevant guideline levels for both vibration and airblast overpressure at all surrounding sensitive receptors if the blasts are appropriately sized and managed.

Biodiversity Impacts and Required Offsets

The large combined disturbed areas of the pit void, spoil piles, mine dams and infrastructure areas also means that a significant portions of the three subject mining lease areas will be cleared for the purpose of developing the mine. This clearing and subsequent mining disturbance will cause an impact on the biodiversity value of the area, resulting in a net loss of biodiversity both when mining activities are actively being undertaken and when mining ceases and the final site rehabilitation is completed.

This area is currently undisturbed (being Unallocated State Land), and forms part of a continuous corridor of land running along the SEQ coastline that has been mapped as a terrestrial bioregional corridor under a South East Queensland Biodiversity Planning Assessment conducted by the (then) EPA in 2006. The subject land parcel also contains areas that are categorised as threatened species habitat

(Koala and Wallum Froglet), threatened plant habitat (Pineapple Zamia), and vegetation that is categorised as Endangered Remnant Ecosystem.

EHP determined (based on legal advice) that the Colton Coal Mine proposal would trigger the requirement for offsets under the now superseded Queensland Biodiversity Offset Policy. Offsets were determined to be required for any significant residual impact on matters that constituted State Significant Biodiversity Values (SSBV) under the Queensland Biodiversity Offset Policy. It is not possible to determine the exact liability value of these offsets until Colton Coal finalises the delivery mechanisms for the offsets, however EHP estimates of the likely costs indicate that these liabilities will represent a significant cost to the Colton Coal project.

While it has been determined that an offset is required for the significant residual impacts of the mining activities on SSBVs, offsets can only be utilised after avoidance and minimisation of any impacts on SSBVs has been demonstrated through on-site mitigation measures. Colton Coal claim that they cannot avoid impacts on these areas, as the mine has to be located where the recoverable coal resource exists. They have also proposed a range of other measures to try and minimise the impacts of the mining operations on all relevant prescribed environmental matters that exist on the site.

Other issues

New Hope Group, the parent company of Colton Coal, has also indicated publicly that if this application is approved then a subsequent application could be made for a much larger mining operation in the same area. Any subsequent stage of the mine would most likely also be located within or partially within the bioregional corridor but would have a much larger footprint. Such a proposal would also be likely to trigger an EIS as part of the application assessment process.

2.Description of operation

Spoil Management

Spoil material will be generated by the mining operation and will become a waste product requiring selective handling and disposal on the mine site. The spoil consists of:

1) overburden material that needs to be removed from over the Burrum Coal measures where the coal resource is located;
2) interburden layers that exist within the coal seam, and either contain rock material or coal material of a type that is not suitable for recovery as a saleable resource;
3) coal reject material from the coal preparation process (such as reject rock and coal fines).

This material was sampled by Colton Coal with exploration bores and subjected to laboratory analysis to determine if any special handling or disposal techniques need to be applied when it is excavated and disposed.

This assessment of the spoil material (geochemical analysis) particularly needed to examine the potential of any of the material to generate acid metalliferous drainage (AMD) from any sulphide minerals that may be present. If the any of the overburden and particularly the interburden contains oxidisable sulphide minerals, the AMD process can lead to drainage from spoil piles that has low pH values and also elevated levels of dissolved metals (which are mobilised out of the spoil material by the lowered pH). The interburden material generally has the highest risk of the occurrence of sulphide minerals, as these are most commonly associated with the coal, and shales, sandstone and siltstone above and below the coal seams within coal bearing geological sequences.

Elevated levels of metals in spoil drainage are also on rare occasions a potential risk in mining operations even in the absence of AMD (this situation is often termed neutral mine drainage). Saline drainage is also a potential risk from spoil disposal area, even in the absence of AMD formation. The potential for the spoil to be removed during the mining operations at the Colton Coal mine to generate AMD,

dissolved metals or excessive salinity needed to be assessed to determine if the mining operation could control these potential environmental impacts effectively.

Colton Coal contracted Environmental Geochemical International Pty Ltd to conduct a geochemical assessment of overburden and interburden material and the coal present to the depth to be mined. This analysis included a range of geochemical analysis on 32 samples from 11 separate bore holes to quantify the potential for AMD generation, saline spoil drainage, and any leaching of metals from spoil material. The geochemical analysis indicated the issues outlined below that are relevant to how the spoil material will have to be handled and disposed.

Results of testing indicate that the bulk of the overburden and interburden represented is likely to be non-acid forming (NAF). A guiding figure of the relative proportion of non-acid forming to potentially acid forming (PAF) material present in the spoil material was calculated, and NAF materials were estimated to make up approximately 90% of overburden and interburden material. The NAF overburden generally has low sulphur and high excess acid neutralisation capacity, resulting in a high excess of acid neutralisation capacity. Most of the overburden and interburden is therefore expected to be NAF and will not require special handling. Given the expected high proportions of NAF to PAF in the spoil material, the client's consultant has indicated that blending of NAF and PAF overburden/interburden together with the excess alkaline leachate from NAF materials would be a robust approach to controlling AMD generation from the spoil materials. The client has indicated that selective handling and encapsulation will be the strategy employed by Colton Coal rather than just relying on blending of spoil. Selective handling and encapsulation of PAF material is considered to be more representative of best practice spoil handling than blending according to the *Managing Acid and Metalliferous Drainage* manual of the *Leading Practice Sustainable Development Program for the Mining Industry* manual series.

The leach tests indicated that any significant degree of leaching and mobilisation of metals will only occur if acid production via AMD is allowed to occur in the spoil material. The solubility of metals/metalloids in the Colton Coal mine spoil will largely be determined by pH and therefore the measures that will be required to be implemented to control of AMD will effectively control metal leaching. The leachate samples that did have lowered pH values (indicating probable AMD generation) showed that drainage from mine spoil where AMD is allowed to occur will likely have elevated levels of the following metals: aluminium, cadmium, cobalt, copper, iron, nickel, zinc, and possibly arsenic in highly acidic solutions from materials containing elevated arsenopyrite. Other neutral mine spoil leachate may contain slightly elevated sulphate where interaction with pyritic materials occurs.

Pyritic (oxidisable sulphur) materials are associated with coal seam layers, and results suggest that coal seams, seam roof, seam floor, rejects and tailings are likely to be mainly PAF. Kinetic net acid generation testing indicates that PAF materials are likely to be fast reacting, and could start producing acid within weeks of exposure to atmospheric oxidation conditions if not handled and disposed of correctly. The geochemical testing also showed that relatively straight forward total S and NAGpH testing in isolation could be used for routine classification of overburden/interburden during operations.

It was considered that the final geochemical analysis of the material to be excavated during the mining process that was conducted by Colton Coal was sufficient to effectively quantify the risk associated with handling and disposal. The level of analysis was also considered to be sufficient to deliver sufficient data for Colton Coal to devise the necessary spoil handling strategy. This strategy was required to ensure there would be no environmental harm from either salinity or AMD impacts that potentially could occur from the disposal of spoil material.

The first spoil pile structure will be an out of pit spoil pile structure formed on the south western side of the pit. The second will be an in pit spoil pile structure, formed in the area of the pit behind the advancing mine face. Overburden, coal partings (the layers between the economic coal seams) and reject coal

material from the coal washing process will be selectively dumped with dump trucks into the spoil pile areas.

The dumping will be performed via selective placement of these materials in accordance with a spoil placement strategy which will be designed to ensure that potentially acid forming material is mixed with acid neutralising materials, and that also the potentially acid forming material is encapsulated with sufficient non-acid forming material to limit oxygen ingress, which also inhibits the formation of acid drainage

The spoil dump encapsulation strategy has been designed to ensure material is available at all stages of mining available to facilitate the required levels of encapsulation, and can be summarised as follows:

- PAF material will be placed in thin layers to a maximum height of no more than 5m, traffic compacted and immediately over-dumped with NAF spoil.
- The immediate base of the dump will comprise a 2 – 5m thick layer of NAF material to help isolate overlying PAF materials from any water flow along the interface between dump and natural ground.
- Out of pit spoil dump design will ensure PAF material is placed 100m back from the dump toe, and include a (not less than 20m) outer zone of NAF material (preferably high acid neutralisation capacity (ANC), and incorporate strategies to limit oxygen transfer and fluctuating moisture conditions in PAF materials.

It is considered that the proposed spoil management strategy proposed by Colton Coal represents best practice for avoidance of impacts from AMD, metalliferous and saline drainage. As discussed further in the Rehabilitation section below, it is also considered that the proposed strategy of placing spoil material into the pit void represents as far as economically reasonable, best practice management. An optimal outcome would be to return the maximum volume of spoil material into the void, but economic and mine operational factors prohibit this outcome for the Colton Coal mine proposal.

Other waste disposal

The processing of the run of mine coal in the proposed Coal Handling and Preparation Plant (CHPP) will generate reject rock material and coal fines that will likely be potentially acid forming (PAF). This reject material will be assumed to be PAF until shown through testing to be otherwise, and will be disposed of via encapsulation in accordance with the company's proposed Waste Material Characterisation Plan.

Coarse reject material from the CHPP will be dewatered over a screen ready for disposal via dumping in the spoil pile. Coal fines from the CHPP will be thickened via a belt filter press and then pumped to a series of small self-contained holding cells for drying via evaporation. Once dried the coal fines will be combined with coarse rejects and loaded into trucks for dumping within the spoil pile and encapsulated using NAF spoil material from excavation.

Colton Coal proposes to manage and dispose of other general and regulated wastes in accordance with a Waste Management Plan (WMP) they will develop and include in the Plan of Operations. This waste management appears to be representative of best practice and also to be in accordance with the waste hierarchy of:

- Waste minimisation;
- Waste reuse/recycling;
- Waste treatment; and
- Waste disposal.

Waste disposal (via removal from site to an authorised disposal facility) will be the option adopted at the mine where no other reasonable economic option is available for minimisation, reuse, recycling or treatment. All waste from the mine will be source segregated where possible. The waste for disposal from the mining operation will include domestic waste (food scraps, general rubbish), scrap metal and

several forms of regulated waste types (discussed below). The mine will engage a local waste management contractor for the regular removal and disposal of general waste to a Council managed landfill. This contract will provide for the segregation of industrial and domestic putrescibles rubbish to ensure appropriate disposal at the external facility.

Other waste material will include some regulated waste such as batteries, oil and solvents, oil filters, drum and oily materials such as rags. These regulated waste materials will be transferred off-site by a licensed contractor and disposed of to a facility lawfully allowed to accept such waste. Small vehicle tyres will also be subject to this procedure. Large vehicle tyres / heavy earth moving tyres will be disposed of on site in accordance with the existing guidelines established by EHP for the disposal of tyres in spoil piles on mine sites.

Sewage Treatment and Disposal

The mine proposal includes an onsite STP to service the mine site personnel, and land will need to be utilised for the irrigation of the treated sewage effluent that will be generated. The required land area was calculated based on the methodology outlined in Australian Standard *AS1547 On-site domestic wastewater management*. This standard is applicable to domestic onsite STPs for treating wastewater originating from household or personal activities including water closets, urinals, kitchens, bathrooms and laundries. Such domestic wastewater includes that from facilities serving staff/employees in industrial establishments such as mine sites.

AS1547 generally covers systems designed for domestic wastewater flows up to 14 000 L/week, from a population equivalent of up to 10 persons. Employing this standard to calculate required disposal areas is not what EHP generally considers to be best practice, however was not considered to be any need to have required Colton to conduct more complex daily time step irrigation modelling (generally conducted with a package such as MEDLI) given the small risk presented by the small plant and the proposed location. The Colton Coal system exceeds the sizing of plants that AS1547 is applicable to, as it is equivalent to 36 equivalent persons sizing. The sewage treatment plant is still considered to be small and of low risk given it will be implemented on a working mine site and that the client claims that all inputs to groundwater will be captured by pit dewatering operations and directed to on-site storage dams. The effluent area sizing calculations conducted in accordance with AS1547 are also considered conservative in terms of sizing of the effluent irrigation area, and EHP has assessed other applications against this standard in the past when effluent irrigation area sizing has been required for small low risk sewage treatment plants.

A wastewater flow estimate, based on potable usage demand calculations and assuming all potable water will report to the STP yielded an effluent volume of 7300L/day. Soil testing has indicated this will be on a cat 6 soil type and will be disposed of via spray irrigation. AS1547 specifies that a design infiltration rate of 2 mm/day is appropriate for this cat 6 (heavy clay) soil type.

A minimum area of 3650 m^2 of land will thus need to be utilised for the irrigation of treated sewage effluent. It is not considered necessary to know the exact location of this area at this stage as the mine site will avail ample opportunity to secure the required area of suitable land. The minimum area only was specified and no location diagram for the disposal area was included in the draft EA document.

The standard EHP Model Mining Conditions for sewage treatment and effluent disposal will be applied under any environmental authority that may be issued, and these will require Colton Coal to meet the effluent quality standards specified for land based irrigation, which are as follows:

- Biochemical oxygen demand (BOD_5) – 20 mg/L
- Total suspended solids – 30 mg/L
- Nitrogen – 30 mg/L
- Phosphorus – 15 mg/L
- E-coli – 1000 organisms/100ml

- pH 6.0 – 9.0.

These parameters will all be required to be monitored on a monthly basis as required under the EHP Model Mining Conditions.

Water Management

Dewatering from the pit, consisting mostly of groundwater that infiltrates the void, will be pumped into the worked water dam. The worked water dam will need to be expanded in size as the pit becomes larger. A second stage of the dam will be developed and placed into operation as required at around year 6 of the mining operation (see Figure 5 below).

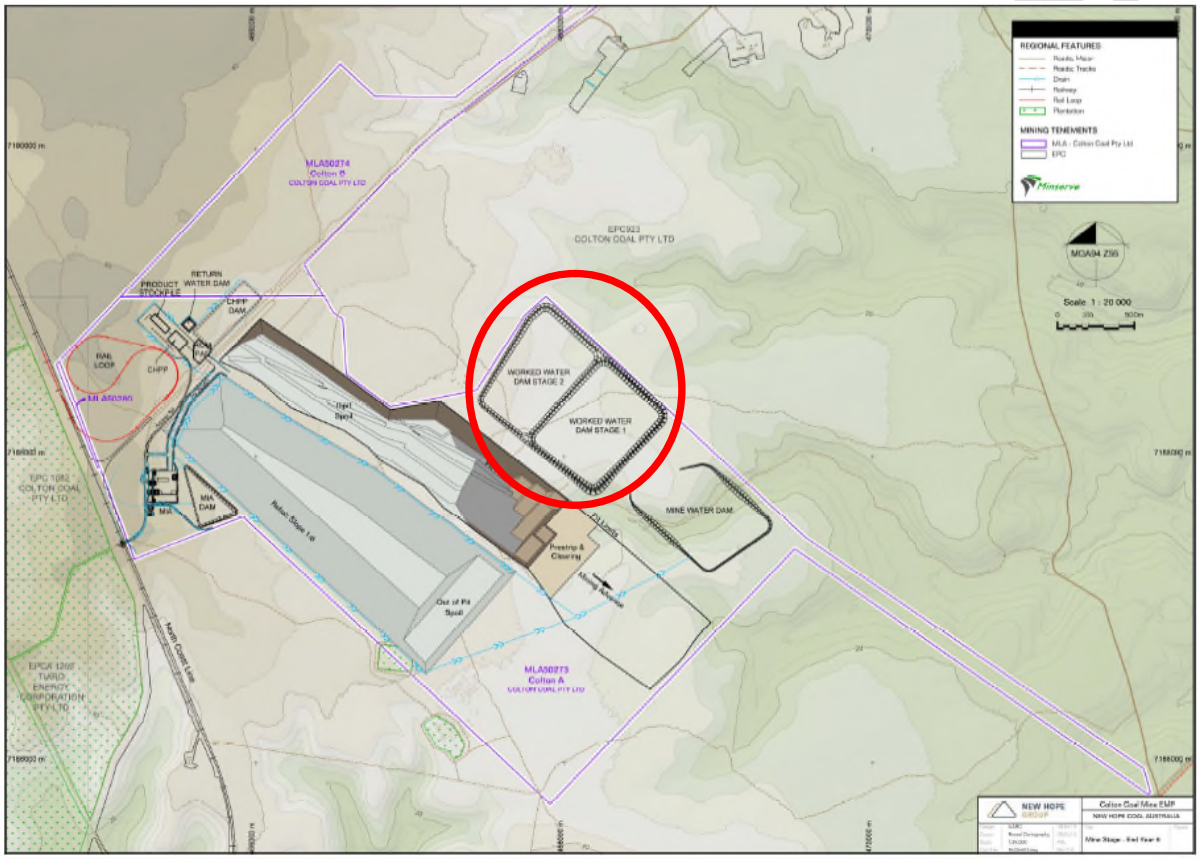

Figure 5 – Mine configuration at year 6 of mining
(source: Colton Coal EM Plan v3, Figure 40, p159)

Biodiversity Impacts of Mining Activities and Offsets

The original application for the Colton Coal mine was submitted on 3 February 2010. Colton Coal had previously submitted an EM Plan for assessment and was advised that the EM Plan did not meet the content requirements stipulated under the EP Act on 24 September 2010. The current application for the Colton Coal mine was submitted on 10 November 2010, and Colton Coal then submitted a revised version of the EM Plan on 21 September 2011.

Subsequent to all of the above mentioned actions, the Queensland Biodiversity Offset Policy (QBOP) came into effect on 3 October 2011. The QBOP applied to all level 1 (and other) mining proposals under the EP Act which had not been approved as of 3 October 2011. As Colton Coal's Environmental Authority had not been approved at this time, EHP determined that the QBOP applied

to Colton Coal's application for an environmental authority to conduct a level 1 mining activity. On 23 February 2012 Colton Coal were notified that in order to progress their application, the application must proceed in accordance with the requirements stipulated under the QBOP.

Representatives from Colton Coal made representation to the department that they did not consider the Colton Coal project should be subject to the QBOP, based on the fact that the policy was not even in existence at the time their application was made. Colton Coal sought legal advice on the matter and met with representatives from the department's policy team responsible for the introduction of the policy on 7 March 2012. The legality of the EHP determination relating to the applicability of the QBOP was subject to confirmation from the EHP Litigation Unit received on 18 June 2012. The advice listed below summarises the findings of this legal advice.

1. Subsections 210(3) – (6) of the EP Act, which specifically allow the Department to include environmental offset conditions in the draft environmental authority, came into force prior to the submission of the amended EM Plan by Colton Coal. Accordingly, s210(3) – (6) of the EP Act would appear to apply to the Colton Coal application.
2. The QBOP came into effect on 3 October 2011 and applies to all approvals granted after that date. Approval of the Colton Coal application did not occur prior to 3 October 2011. Accordingly, the QBOP would apply to any approval given to the Colton Coal application after 3 October 2011.
3. Subsection 210(1) of the EP Act (which existed prior to the Colton Coal application being submitted in February 2010) specifies that the Department may include conditions in a draft environmental authority that the Department considers necessary or desirable. Accordingly, if the Department (acting within the scope of its jurisdiction) considers environmental offset conditions to be 'necessary' or 'desirable', s210(1) suggests that those conditions may be included in a draft Environmental Authority.
4. Subsection 210(7) of the EP Act (which existed prior to the Colton Coal application being submitted in February 2010) specifies that in fixing proposed conditions for the draft, the Department must consider the standard criteria. Several of the standard criteria appear to support the inclusion of environmental offset conditions in the draft environmental authority.
5. The Queensland Government Environmental Offset Policy (QGEOP) came into effect on 1 July 2008 and is still in effect. The QGEOP contains interim arrangements which specifically allow for environmental offsets to be used for approval processes under the Act, and in particular for environmental authorities for mining and petroleum activities.

Colton Coal subsequently agreed to provide a Biodiversity Offset Strategy document for the Colton Coal mine proposal, and this document was first provided in draft format for review on 24 August 2012 and also provided as part of the amended EM Plan document submitted for the project on 30 May 2014.

Subsequent to the submission of Colton Coal's Biodiversity Offset Strategy document, the *Environmental Offsets Act 2014* (EO Act) became effective on 1 July 2014. This new act and associated legislative framework (consisting of a regulation and policy) has replaced the QBOP for all future applications. Legal advice was sought in relation to the applicability of the new EO Act for the Colton Coal mine application. It was advised that the EO Act contains transitional provisions within section 95 that state the act does not apply to any application that was made, but not decided, prior to the new act coming into force on 1 July 2014. The Colton Coal mine application falls into this category and therefore cannot be subject to any of the provisions of the new EO Act or associated regulation.

<u>Consideration of Offset requirements and development of proposed EA conditions</u>

The Queensland Biodiversity Offset Policy was considered, and conditions were included in the proposed environmental authority conditions that required offsets in accordance with the manner that they are calculated under the Queensland Biodiversity Offset Policy. The proposed EA conditions developed

by EHP were considered to be necessary to ensure effective delivery of the required offsets to deal with the residual impacts on the biodiversity values of the area.

The conditions to be included in the draft EA document for the project are worded to reflect a requirement to deliver offsets that are calculated in a manner consistent with the QBOP. For financial offsets, the costing calculation equation was defined within a condition. This condition included all required costing elements such as administrative cost and management costs, as opposed to being left to external references (such as EHP guidelines or websites), as these sources may not continue to be maintained by EHP now the QBOP has been superseded for all future applications.

The conditions were developed to allow flexibility in relation to allowing for the detail of how the environmental offsets will be delivered to be worked out closer to the actual activity commencing. This is in the form of an offset delivery plan (which stipulates whether a financial offset payment will be made, or a direct land based or offset transfer will be delivered, or a combination of both financial and direct delivery options.

The proposed environmental authority conditions allow the delivery of offsets can also be staged in accordance with progressive development and subsequent increasing area of disturbance created by an open cut mining operation. This was considered important to ensure that more accurate analysis of the offsets could be performed, as this could be analysed progressively over the separate stages of the life of the mine. It also allows the liability associated with such a large scale impact to be spread over more reasonable scales across the life of the project. This is considered by EHP to be reasonable, as the disturbance from the mine never extends beyond what is defined for a stage of the project, and offsets must be payed or secured prior to commencement of any mining activities for the stage.

The Colton Coal Biodiversity Offset Strategy document that was included with the EM Plan for assessment was composed to address the requirements of QBOP. It therefore includes a list of State Significant Biodiversity Values (SSBV) that Colton Coal has identified as being impacted by the proposed mining activities. The SSBVs for the project as provided by Colton Coal are as shown in tables 3 and 4 below. These were considered by EHP as the matters identified by Colton Coal which required offsets to be provided.

Table 3 - Summary of Impacts of the Colton Mine Project on *Prescribed Matters* / SSBVs – Vegetation and Other

Description	Regional Ecosystem	VM Act Status	Broad Vegetation Group	Area of Impact (ha)	QBOP Values to be Offset (QBOP V1.1 - Appendix 1)
Regional Ecosystems / Essential Habitat					
Eucalyptus tereticornis +/- Eucalyptus siderophloia, Corymbia intermedia open forest on alluvial plains usually near coast	12.3.11	Of concern	16c	11.03	Remnant – Of Concern; Essential Habitat – Koala; Watercourse (Stream Order 1).
				2.65	Essential Habitat – Pineapple Zamia
Sedgeland to heathland in low lying areas on complex of remnant Tertiary surface and Tertiary sedimentary rocks	12.5.9	Of Concern	29a	8.7	Remnant – Of Concern;
				3.03	Wetland (Vegetation Management Act 1999; Essential Habitat – Pineapple Zamia
Sedgeland to heathland in low lying areas contains palustrine wetland (e.g. in swales). Melaleuca nodosa low open forest or thicket. Occurs on complex of remnant Tertiary surfaces and Tertiary sedimentary rocks. Lower slopes.	12.5.9a	Of Concern	21b	2.58	Remnant – Of Concern.
Melaleuca quinquenervia open forest on coastal alluvium	12.3.5	Least Concern	22a	39.52	Essential Habitat – Wallum Froglet; Essential Habitat – Koala; Watercourse (Stream Order 1).
				15.02	Essential Habitat – Pineapple Zamia
Eucalyptus latisinensis or E. exserta, Melaleuca viridiflora var. viridiflora woodland on alluvial plains	12.3.12	Least Concern	21a	483.1	Essential Habitat – Wallum Froglet; Essential Habitat – Koala.
Palustrine wetland of Eucalyptus latisinensis +/- Corymbia intermedia, C. trachyphloia subsp. trachyphloia, Angophora leiocarpa, Eucalyptus exserta woodland on complex of remnant Tertiary surfaces and Cainozoic and Mesozoic sediments	12.5.4a	Least Concern	21a	25.46	Essential Habitat – Pineapple Zamia
Eucalyptus latisinensis +/- Corymbia intermedia, C. trachyphloia subsp. trachyphloia, Angophora leiocarpa, Eucalyptus exserta woodland on complex of remnant Tertiary surfaces and Cainozoic and Mesozoic sediments	12.5.4	Least Concern	9g	103.85	Essential Habitat – Pineapple Zamia
Connectivity					
Connectivity	All Remnant	N/A	All Remnant	1013	Connectivity.

(source: Colton Coal EM Plan v3, Appendix O, Table1, pp6-7)

Table 4 - Summary of Impacts of the Colton Mine Project on *Prescribed Matters* / SSBVs – *Nature Conservation Act 1994* Matters

Description	Status under Nature Conservation Act 1992	Recognised Habitat Impacted (RE / BVG)	Approximate Area to be Impacted (ha)
Crinia Tinnula (Wallum Froglet)	Vulnerable	RE 12.3.5 / 22a	39.52
		RE 12.3.12 / 21a	483.1

(source: Colton Coal EM Plan v3, Appendix O, Table2, p7)

The Biodiversity Offset Strategy document was reviewed by EHP biodiversity officers in light of the requirements of the QBOP, and it was determined that there are still some minor issues present in relation to the Biodiversity Offset Strategy document provided when assessing it against what the now superseded QBOP required. These issues were identified as follows:

1. The QBOP (A3 information requirements) requires at the application stage, details of whether the project will be delivered in stages. This has not been detailed in the Colton Coal Mine Biodiversity Offset strategy, but Colton Coal state it will be provided prior to mining activity commencing.

2. RE 12.5.9 and RE 12.5.4a – Wallum froglet habitat
   The EM Plan (section 3.4.3) identifies Regional Ecosystem types (RE) 12.5.9 and 12.5.4a as habitat for the Wallum Froglet, which is a protected species; however these RE's are not reflected as habitat for Wallum Froglet in the Biodiversity Offset Strategy. The habitat of protected wildlife is a value which requires an offset under the QBOP.

   The risk associated with this omission is however considered low for the following reason. Both these RE's are also of concern RE's and therefore require an offset anyway, and therefore both these values (of concern RE and protected wildlife habitat) can likely be co-located. The value of these RE's as wallum frog habitat will need to be considered in detail when the Offset Delivery Plan is developed to ensure the proposed offset for these RE's is also suitable as wallum frog habitat, otherwise additional areas will need to be found to offset the wallum frog habitat prescribed environmental matter. It is not a matter that is considered to be required to be finalised at this stage of the approvals process.

3. Special least concern animals – echidna habitat
   Habitat of special least concern animals protected under the NCA is a value that requires an offset under the QBOP. The Echidna is a Special Least Concern animal protected under the NCA and has been recorded in the same RE's that occur on the subject site There has still been no consideration/analysis of the potential for habitat for echidna to occur over the proposed impact site.

   The risk associated with this omission is again considered low for the following reason The RE's identified above are required to be offset as they align with other prescribed environmental matters (e.g. Of concern RE). Therefore any value lost as habitat for echidna, can likely be co-located within an offset for these RE's as well.

Given the above mentioned concerns, it is considered that the matters requiring offsets should be subject to confirmation by Colton Coal through additional flora and fauna studies and associated work prior to the offset delivery plan that will be required under the EA conditions being finalised. This offset delivery plan will need to developed and submitted to EHP for agreement prior to any mining activities that impact on the identified SSBVs being undertaken.

The conditions being proposed in relation to offsets of the EA require that the mechanism of offset delivery and a delivery offset plan have to be developed prior to any mining activities that impact upon SSBVs for a stage commencing. This then needs to be provided to EHP for comment before the mining activities for the stage can commence. It is therefore not considered reasonable for EHP to require Colton Coal to provide details of the delivery mechanisms as part of the EM Plan for the project.

While it has been determined that an offset is required for the significant residual impacts of the mining activities on SSBVs as defined under the QBOP, offsets can only be made after avoidance and minimisation of these impacts has been shown to be not able to be reasonably achieved through on-site mitigation measures. Colton Coal needs to demonstrate how the Colton Coal mine project avoids

adverse impacts on SSBVs as defined under the QBOP, or, where this is not reasonably possible, impacts are minimised and residual impacts are offset.

Colton Coal claim that they cannot avoid impacts on these areas, as the mine has to be located where the recoverable coal resource exists. They have also proposed a range of other measures to try and minimise the impacts of the mining operations on all relevant prescribed environmental matters that exist on the site. These include:

- Native Flora and Fauna shall be managed such that every effort is made to keep proposed disturbance areas to a minimum;
- The integrity of vegetated land not impacted by proposed activities will be maintained through erosion and sediment controls;
- Vegetation removal will only be conducted after the areas to be cleared have been clearly delineated and identified to equipment operators and supervisors;
- Ensuring the seed bank in removed soil is preserved as much as practical via stockpiling of topsoil. Maintenance of retained areas of vegetation to provide a source of seed for mine rehabilitation works;
- Recreated landforms will consider the drainage capacity of the site;
- Infrastructure planning will avoid the creation of shallow water areas that create an artificial environment that encourage pest species such as Cane Toads that can alter the existing ecological balance;
- In the event that abandoned, injured, rare or unusual fauna is found relevant personnel will be notified and the situation managed to prevent any further injury and/or ensure the safety of the animal;
- Colton Coal's Staff Induction will include conservation values on the site, to increase their awareness of the species present etc;
- Rehabilitation of the site will be conducted to try and restore the values of the relevant prescribed matters as far as reasonably practicable through techniques such as use of appropriate endemic species and habitat-matching to encourage the return of native fauna;
- Vegetation communities of conservation significance required to be cleared will be visibly delineated and clearing should be undertaken by a qualified operator;
- Flora species of conservation significance, (which at this stage only includes one species Macrozamia pauli-guilielmi or Pineapple Zamia) will be managed so that if disturbance cannot be avoided, prior to clearing, the plant will be translocated to either a) a local area where no impact is likely or b) a nearby national park or other protected area**;**
- Fauna Species of Conservation Significance such as the Wallum Froglet will be managed so that areas of potential habitat required to be cleared will be minimised, and where disturbance cannot be avoided clearing should be undertaken by an experienced operator, and the site rehabilitation strategy will aim to recreate habitat of the Wallum Froglet in suitable areas post mining;
- Specific management strategies have been developed to minimise impacts on the Bioregional Terrestrial Corridor identified in the *South East Queensland Biodiversity Planning Assessment* (2007) which include:
    - minimising disturbed areas within the corridor to reduce potential impacts on the connectivity of the corridor;
    - conducting progressive rehabilitation of disturbed areas throughout the life of mine to minimise impacts by reducing the length of time for which land would remain disturbed;

- conducting rehabilitation in a manner that encourages the return of native fauna and replicates the existing environment to try and as far as possible restore connectivity;

Colton Coal claim that that the above mentioned measures (assuming the viewpoint that the mine must be located in the proposed location to access the resource), demonstrate that Colton Coal have avoided or minimised impacts on SSBVs as defined under the QBOP. Since avoidance and minimisation of the impacts has been proposed to be implemented, Colton Coal is able to and must provide offsets for any residual impacts in accordance with Policy requirements specified under the QBOP. In this case the residual impacts are relatively extensive due to the location of disturbed areas relative to the location of areas containing prescribed environmental matters, and the inability to avoid these areas or minimise impacts due to mining activities having high levels of disturbance. These offsets will be required to be provided in accordance with the provisions of the EA conditions relating to offsets prior to mining activities commencing.

Tim Brain, as the delegate deciding this application, has previously advised that if offsets cannot be secured for all prescribed matters that the mine may impact upon, it would be necessary to refuse the application due to the level of impact of the mine on the significant biodiversity values for the proposed site. The impact of the mine, if not offset, is considered to be too great.

Proposed Rehabilitation

In preliminary meetings for the proposal, Colton Coal representatives had stated that the overall rehabilitation objective for the site was stated to be to return the majority of disturbed land to a vegetation and habitat condition similar to the pre-existing condition where appropriate. EHP did not consider that this stated was possible for extensively disturbed areas such as the pit void, spoil pile and on site dams. As the proposal progressed, Colton Coal revised the rehabilitation strategy to what was considered a more realistic set of outcomes for achievable rehabilitation objectives, and included this in the application that was subsequently made.

The EHP guideline titled *EM1122 - Rehabilitation requirements for mining resource activities* provides guidance in relation to acceptable rehabilitation outcomes and strategies for mining operations. In assessing the acceptability of rehabilitation objectives, indicators and completion criteria that may be proposed for a mining project, EHP gives regard to a hierarchy for mine rehabilitation. This hierarchy, in order of decreasing capacity to prevent or minimise environmental harm, is:

1. avoid disturbance that will require rehabilitation
2. reinstate a “natural” ecosystem as similar as possible to the original ecosystem
3. develop an alternative outcome with a higher economic value than the previous land use
4. reinstate previous land use (e.g. grazing or cropping)
5. develop lower value land use
6. leave the site in an unusable condition or with a potential to generate future pollution or adversely affect environmental values.

The guideline also specifies four general rehabilitation goals that require rehabilitation of areas disturbed by mining to result in sites that are:

- safe to humans and wildlife;
- non-polluting;
- stable;
- able to sustain an agreed post-mining land use.

The guideline states that site specific rehabilitation goals may also be appropriate for a particular mining project and site setting. In the case of Colton Coal Mine proposal, the site specific rehabilitation goals could also include the following:

- establish native vegetation communities that are demonstrably similar to a pre-existing ecosystem and have this as the final land use wherever possible; and
- establish or enhance the habitat of an endangered species;

Colton Coal has developed a set of what they term site rehabilitation objectives. These consist of the following:

- Return the majority of disturbed land to a vegetation and habitat condition similar to the pre-existing condition;
- At completion of mining operations make remaining disturbed areas stable so that the proposed subsequent land use is not compromised by surface instability;
- Prior to closure remediate any contaminated land; and
- Construct landforms, such as waste spoil dumps, to be geochemically stable to the extent that they do not adversely impact on surface water or groundwater quality.

Colton Coal proposes to return the site to its predominant pre-mining land use of native habitat. Where necessary, they propose to leave vehicle access tracks in place for ongoing monitoring and maintenance of rehabilitated areas. 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 uses. Dams containing mine impacted water and potentially contaminated sediment will be decommissioned and contaminated sediment material removed or capped as required prior to reestablishment of native habitat over the area. Stormwater dams will be re-contoured and original drainage paths restored where possible prior to reestablishment of native habitat.

It is accepted that for non-highly disturbed areas such as the Coal Preparation plant site, roads and even areas where a dam was located during operation, native habitat similar to pre mining conditions could be successfully re-established under rehabilitation. Colton Coal has addressed the final residual void rehabilitation and justified the requirement to leave it as a permanent water body. They also outline how they intend to rehabilitate the 225 ha of spoil pile that will remain out of the pit void at the end of mining operations. Where practical Colton intend to contour the spoil dumps to form an extension of the backfilled mining pit. The outer slope of the spoil pile will be recontoured to an angle of 1:6 the final landform will be covered with topsoil. The slopes will then be seeded with native grass and shrub species known to suit the local area.

This spoil pile rehabilitation strategy will not achieve a true representation of the pre-mining native habitat areas due to the lack of tree species in this design, but still appears to be a high ranking outcome in accordance with the waste hierarchy. Colton Coal has not to date provided significant justification for not exploring the option of restoring tree species under their initial rehabilitation strategy included in the EM Plan. Colton Coal has committed under the rehabilitation objectives outlines in their proposed conditions in the EM Plan to establish self-sustaining natural vegetation on the spoil piles during rehabilitation. The completion criteria they have proposed is that they will show evidence that vegetation species composition, richness and weed abundance of rehabilitated areas is statistically equivalent to analogue sites.

The practice of establishment of native habitat during rehabilitation of spoil pile areas is being implemented during rehabilitation at other Australian open cut mining operations and is therefore considered possible to achieve. It is considered that these highly disturbed areas will be considerably more challenging in terms of establishing successful functioning native habitat systems than other less disturbed areas of the site.

When formulating the mine's Final Rehabilitation Plan, Colton Coal will be required to explore the feasibility of re-establishing trees in this area to achieve a native vegetation habitat that is closer to the pre mining land use. They need to do this to show the proposed rehabilitation for the spoil pile areas is in accordance with the rehabilitation hierarchy. Colton Coal will also need to ensure that rehabilitation trials are established

as early as possible for the spoil pile area and the Final Rehabilitation Plan should specifically focus on development of effective rehabilitation strategies for the spoil pile areas.

Colton Coal has committed to, where operational possible, placing spoil material back into previously mined sections of the void as mining occurs. The client claims it is not operationally possible to do this for all spoil material. The EM Plan shows that only a portion of all the overburden and waste rock material will ultimately be returned to the mine void due to the economic constraints of having to move such a large volume of material back into the void. The typical finished landform profile taken from the EM Plan (Figure 6 shown below) suggests that the portion of spoil material that will be placed in the void is less than 1/3 of the total spoil material that will be generated. Even after final landform profiling during rehabilitation, it appears that the bulk of the spoil material will remain in an out of pit spoil pile landform (see figure 7 below). It is not considered reasonable to require all material to be replaced into the void, as this is generally beyond best practice for final land forming during rehabilitation, and generally not economically feasible for single strip mining operations due to the costs associated with the double handling of spoil. This rehabilitation methodology is generally only feasible for strip mining operations, where the overburden material can be placed directly into an adjacent mine void generated by a previous mining.

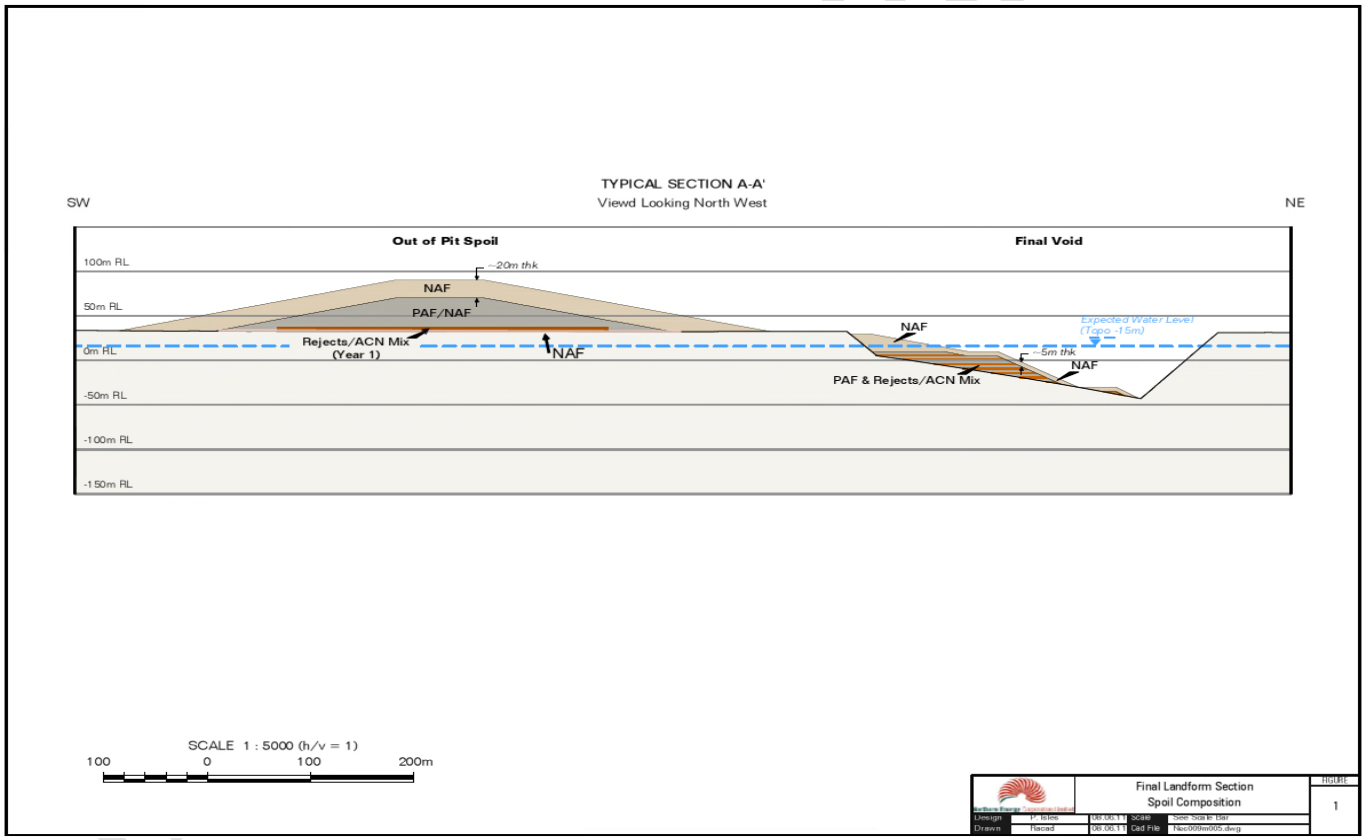

Figure 6 – Typical cross section of Final Landform Profile for Pit Void and Out of Pit Spoil Dump
(source: Colton Coal EM Plan v3, Figure 44, p181)

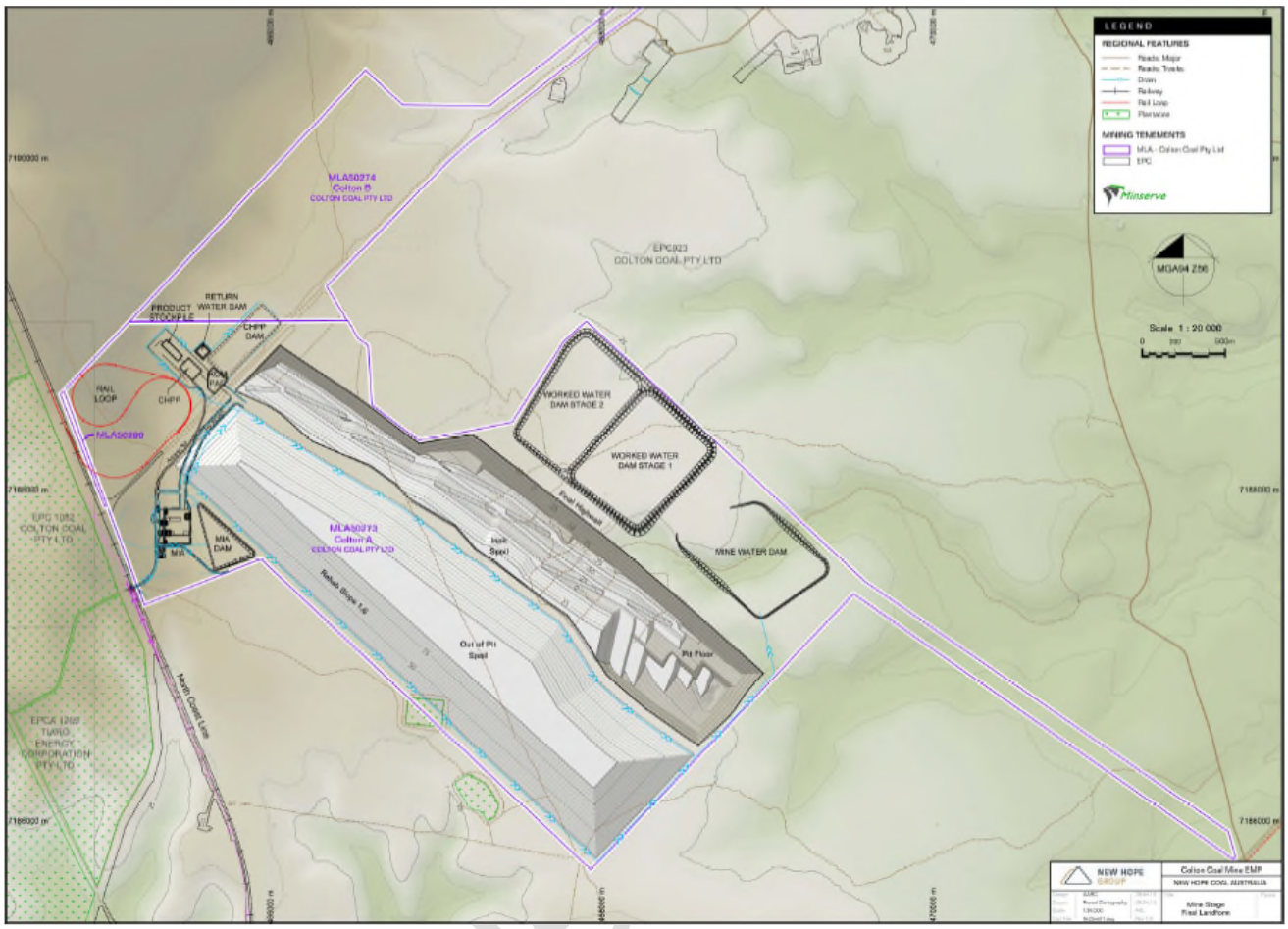

Figure 7 – Final landform of spoil pile and pit
(source: Colton Coal EM Plan v3, Figure 41, p160)

Swelling of the spoil material when removed from the ground (typically around a 25% increase in volume is experienced) which means that all the spoil material would not fit evenly back into the pit and a raised landform would still be required, albeit with a smaller disturbance footprint.

The current EHP rehabilitation guideline does not specifically require that all spoil must be returned to the mine void and this would only generally be required if it could be shown that it was necessary to return all spoil material to the mine void to prevent environmental harm. Given that the spoil piles are constructed to provide encapsulation of potentially acid forming waste materials of inter/overburden, it would be potentially harmful to disturb the out of pit spoil pile (to attempt to place the spoil into the mine void) as this would expose and intermingle the potentially acid forming materials that would be selectively placed within the spoil pile for encapsulation.

The general rehabilitation methodology that will be employed for the final landforms will consist of contouring to minimise erosion and maximise water retention, spreading of topsoil and ripping to maximise infiltration and plant root establishment, and then revegetation with suitable native species. The species selected will be, where possible, targeted to achieve reestablishment of the vegetation communities that are present on the site prior to commencement of the mining activities. Domain specific techniques will need to be employed in some areas, such as the spoil pile, which may not be able to be effectively rehabilitated by this general rehabilitation methodology. Trials of specific techniques for such domains will need to be conducted by Colton Coal as early as operational aspects allow.

Topsoil will be categorised based on the soil type present and material will be stripped to a depth of 20cm and placed into stockpiles of no greater than 2m in height for each soil type. The stockpiles will be ripped if

required and seeded with a quick establishment pasture to control stockpile erosion and assist to maintain a viable seed bank. The soil will then be reclaimed as required for use during rehabilitation as the topsoil cover for final landforms. The application of phosphate based fertiliser (at approximately 100kg/ha) may be necessary as the topsoil on the proposed mine site is low in fertility, however this may adversely affect native species who are sensitive to phosphorous and Colton Coal will need to consider this prior to employing this technique.

It is considered that the proposed rehabilitation strategy is sufficient in terms of its level of detail to demonstrate that Colton Coal will achieve the rehabilitation goals required by EHP for mining proposals, that being, following completion of mining activities all areas of the site will be composed of landforms that are safe to humans and wildlife, non-polluting, stable and able to sustain an agreed post-mining land use. Further detailed assessment of rehabilitation will be required to be conducted by Colton Coal when formulating the Final Rehabilitation Plan for the mine, but it is considered that Colton Coal have demonstrated that the rehabilitation will be targeted at achieving restoration of the existing natural environment as far as reasonably possible. The one exception to this that will have to be explored under the Final Rehabilitation Plan that will need to be developed if the mine commences operation is if a native species vegetation cover with trees can be utilised to rehabilitate the mine spoil piles.

Consideration was also given to the fact that Colton Coal will be subject to the requirement to offset impacts on biodiversity values of the area where the mine is proposed. The level of proposed rehabilitation is considered to be in accordance with the requirements of the EHP guideline titled *EM1122 - Rehabilitation requirements for mining resource activities.*

3. Emissions, discharges and environmental compliance

Water

Surface waters surrounding the mine site and environmental values of the waterways

The proposed Colton Coal Mine will be almost exclusively located within the catchment of the Susan River, which discharges into the Mary River at River Heads (see Figure 26 below). A very small portion of the mine site falls into the catchment of the Mary River, but this area is not subject to any significant land disturbing activity and does not contain any dams.

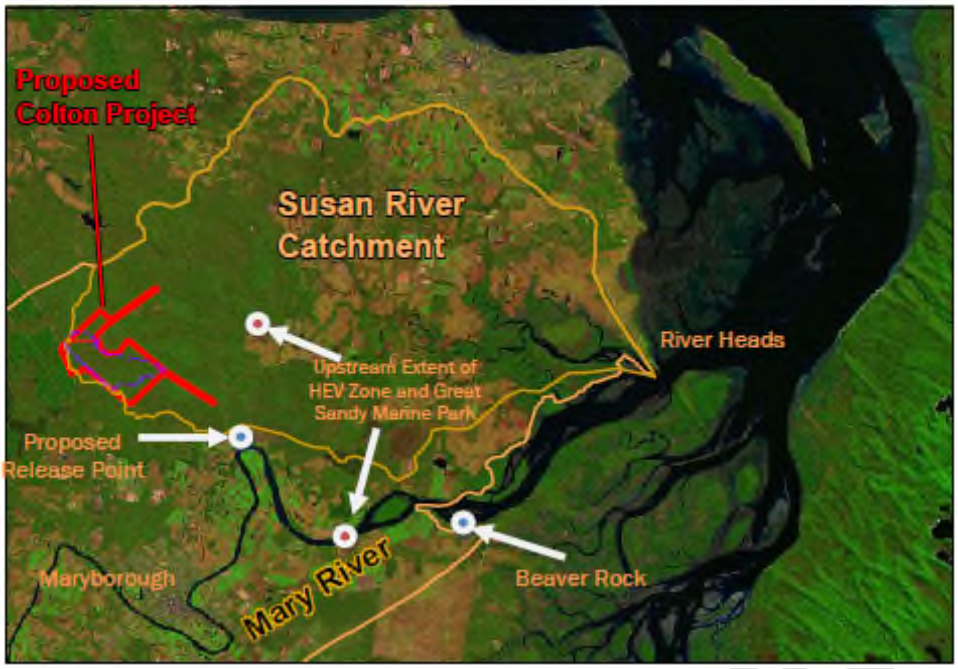

Figure 26 – Surface water catchment surrounding the proposed Colton Coal mine site
(source: Colton Coal EM Plan v3, Figure 47, p187)

The mining operation will have two sources of potential impacts on both the Susan and Mary Rivers. The first is land disturbance from mining activities and the storage of mine impacted waters in dams within the Susan River catchment. The second potential impact is related to Colton Coal's proposal to discharge excess water in storage on the mine site as required into the Mary River via a direct pipeline release.

Both of the two above mentioned activities have the potential to impact on the environmental values of the Susan and Mary Rivers if the related aspects of the mining activities are not subject to proper controls by Colton Coal. This is of particular concern as sections of both the Susan River and the Mary River that could potentially be impacted by the mine are classified as High Ecological Value or HEV in terms of their management intent.

The environmental values for waters within the Susan River and Mary River are described in the *Mary River Environmental Values and Water Quality Objectives (EPA, 2007),* which applies to fresh and estuarine surface waters and groundwater draining the Mary River catchment as represented in plan WQ1381. The majority of the Susan River and the lower Mary River estuary region and the Great Sandy Strait have been designated HEV status under the *Environmental Protection (Water) Policy 2009*.

Figure 27 below shows the environmental values of the relevant sections of the Susan and Mary Rivers as defined under the *Mary River Environmental Values and Water Quality Objectives.* The environmental value for protection of the aquatic ecosystem is considered to be the most sensitive of these environmental values in terms of potential impacts from activities that have the potential to discharge contaminants into the river systems.

Water	Environmental values [1, 2, 3, 4, 5]													
	Aquatic ecosystems	Seagrass	Irrigation	Farm Supply/use	Stock water	Aquaculture	Human consumer	Oystering	Primary recreation	Secondary recreation	Visual recreation	Drinking water	Industrial use	Cultural and spiritual values
Mary River – lower estuary / enclosed coastal	✓	✓				✓	✓		✓	✓	✓			✓
Mary River – mid estuary	✓					✓	✓		✓	✓	✓		✓	✓
Susan River – estuarine and freshwater	✓						✓			✓	✓			✓

Figure 27 – Environmental values defined for the relevant sections of the Susan and Mary Rivers
(source: *Mary River Environmental Values and Water Quality Objectives,* July 2010, Table 1, p8)

Section 14 of the *Environmental Protection (Water) Policy 2009* identifies the management intent (level of protection) for specified waters. This section identifies some waters for which the management intent is to maintain or achieve an effectively unmodified waterway condition (high ecological value - HEV). These may include waters that are currently HEV, slightly disturbed, or potentially, more modified waters which can be progressively improved to achieve HEV condition. The areas shown as yellow cross hatched in Figure 28 below are identified as HEV under the *Environmental Protection (Water) Policy 2009*, including the lower estuary area of the Mary River and the majority of the Susan River.

The management intent (level of protection) for the area of the Mary River shown upstream of the yellow hatched area in Figure 28 below is to maintain or improve from a moderately disturbed condition, for which corresponding WQOs have been derived. This includes, including the point where Colton Coal intend to locate their mine water discharge pipe outlet into the Mary River (also shown in Figure 28 below).

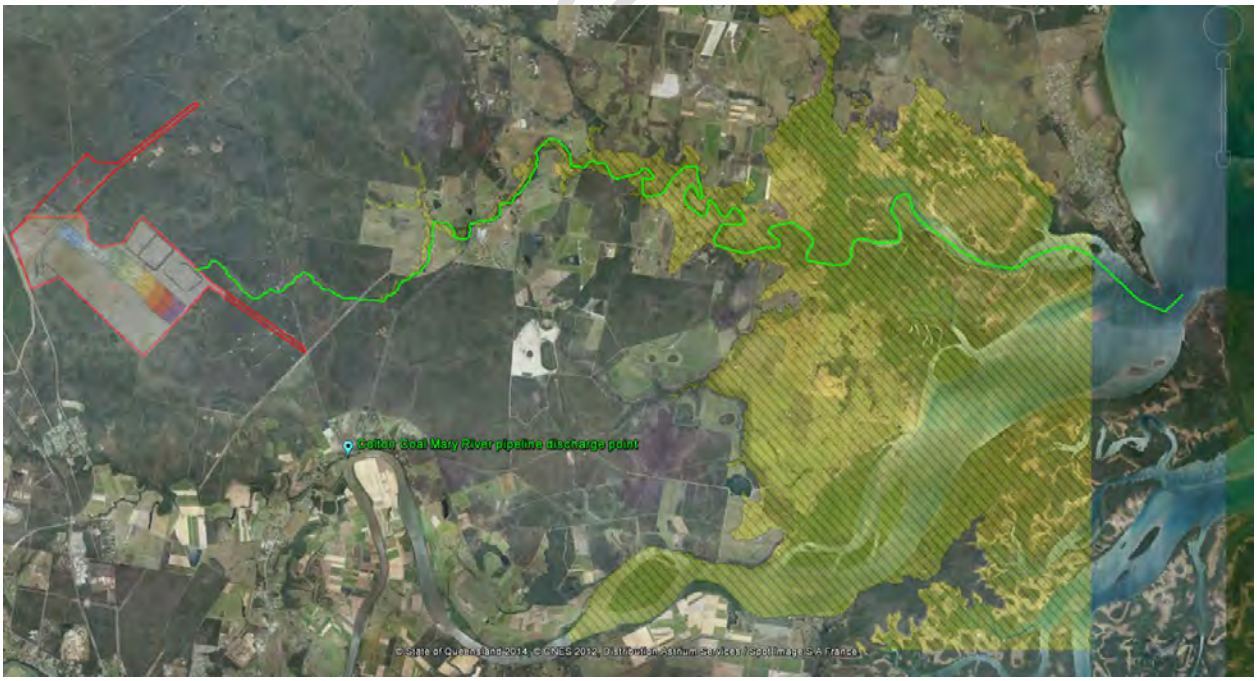

Figure 28 – Catchment downstream of Colton Coal mine site showing HEV zones (yellow hatched area), the proposed controlled release point into the Mary River (blue icon) and the path that an uncontrolled release from the site would take after discharging from the main dam

The *Mary River Environmental Values and Water Quality Objectives* specify water quality objectives (WQOs) to support and protect different identified environmental values for a water type. The *Mary River Environmental Values and Water Quality Objectives* specify the following water quality objectives for the Susan and Mary River HEV zones:

Maintain existing water quality (20th, 50th and 80th percentiles), habitat, biota, flow and riparian areas. The 20th, 50th and 80th percentiles of existing water quality for these waters are:

- turbidity: 1 – 2 – 4 NTU
- suspended solids: 4 – 9 – 13 mg/L
- chlorophyll a: 0.6 – 0.8 – 1.3 µg/L
- total nitrogen: 110 – 115 – 160 µg/L
- oxidised N: 2 – 2 – 3 µg/L
- ammonia N: 2 – 7 – 10 µg/L
- organic N: 100 – 100 – 150 µg/L
- total phosphorus: 6 – 10 – 14 µg/L
- filterable reactive phosphorus (FRP): 2 – 2 – 3 µg/L
- dissolved oxygen: 90 – 95 – 105% saturation
- pH: 8.1 – 8.2 – 8.4
- secchi depth: 1.8 – 2.9 – 4.3 m

The *Mary River Environmental Values and Water Quality Objectives* refers to the ANZECC and ARMCANZ (2000) 99% species protection levels in setting water quality objectives (WQOs) for metal contaminants in an HEV Zone, the boundary of which is located approximately 8km downstream of the proposed release point. In the area between the release point and the HEV Zone (the Middle Estuary) the less stringent ANZECC aquatic ecosystem 95% species protection levels for SMD waterways apply.

The *Mary River Environmental Values and Water Quality Objectives* specify the following water quality objectives for the Mary River moderately disturbed classification section that exists upstream of the HEV zone:

- turbidity: <8 NTU
- suspended solids: <20 mg/L
- chlorophyll a: <4 µg/L
- total nitrogen: <300 µg/L
- oxidised N: <10 µg/L
- ammonia N: <10 µg/L
- organic N: <280 µg/L
- total phosphorus: <25 µg/L
- filterable reactive phosphorus (FRP): <6 µg/L
- dissolved oxygen: 85 – 105% saturation (20th—>80th percentile)
- pH: 7.0 – 8.4
- secchi depth: >1.0m (20th percentile)

It is important that the Colton Coal Mine proposal does not negatively impact on any of the environmental values of the Susan and Mary Rivers, and to ensure this occurs they need to demonstrate that the project does not cause exceedance of the specified WQOs for any sections of the waterways that are potentially impacted by the mining operations.

Mine Water sources and handling

Mine water will be generated from a variety of sources at the Colton Coal mine. The quality of this water will vary according to where the water is sourced and what process inputs and other contaminant sources are in the water. The different sources of water around the mine site have been subject to classification by Colton Coal depending on the level of potential contamination of the water (both in terms of chemical and physicochemical parameters).

The three different classifications for the water sources around the mine site that have been adopted by Colton Coal are as follows:

- Unaffected - Water which has not been impacted by mining operations
- Intermediate - Water which has had low level contact with mining operations which has had negligible or minor change in chemical and physicochemical properties
- Worked - Water which has had significant contact with mining operations which has had notable change in chemical and physicochemical properties

Table 12 below shows a listing of all the sources of water around the mine site that have been identified by Colton Coal. Table 12 also identifies water use/reuse opportunities that have been identified by Colton Coal for all the water sources.

Table 12 – Summary of site water sources and uses for the proposed Colton Coal mine

Water Source	Potential Contaminants of Concern	Water Quality Classification	Suitable End Uses
Groundwater seepage into mine pit	Low pH High salinity Metals	Worked	Site use only (retain within the operational facilities water circuit)
Groundwater supply/ dewatering bores	Low pH High salinity Metals	Intermediate	Use on site Release offsite (subject to discharge criteria)
Surface runoff from unaffected mine areas	Nil	Unaffected	Diversion around operational areas
Runoff & seepage from out of pit overburden dumps	Low pH High salinity Metals Turbidity	Intermediate	Use on site Release offsite (subject to discharge criteria)
In-pit rainfall/runoff	Low pH High salinity Metals Turbidity Potential risk of hydrocarbons (from spills)	Worked	Site use only (retain within the operational facilities water circuit) In very wet periods, release offsite (subject to discharge criteria)
Runoff from site roads & disturbed/operational areas	Low pH High salinity Metals Turbidity Hydrocarbons (from spills)	Worked	Site use only (retain within the operational facilities water circuit) In very wet periods, release offsite (subject to discharge criteria)
CHPP, washdown bay, facilities runoff & discharge	Low pH High salinity Metals Turbidity Hydrocarbons (from spills)	Worked	Site use only (retain within the operational facilities water circuit)
Rejects decant	Low pH High salinity Metals Hydrocarbons (from spills)	Worked	Site use only (retain within the operational facilities water circuit)
Stockpile runoff & seepage	Low pH High salinity Metals Turbidity	Worked	Site use only (retain within the operational facilities water circuit)

(source: Colton Coal EM Plan v3, Table 69, pp199-200)

Site Water Management Plan

A site water management plan was developed for the site to outline how the mining operation would deal with water generated on the site. The aim of the water management plan was to, as far as possible, store and reuse mine impacted water in mining operations that require water. Water would also be segregated within the dams to the maximum extent possible to ensure that more highly contaminated water sources are not mixed with water of better quality. Water that is not impacted by mining operations will be diverted around the active mining areas to avoid contamination and allowed to then continue through the downstream natural drainage network.

This strategy of segregation of more highly contaminated water and avoidance of contamination of uncontaminated water sources whenever possible is consistent with the waste hierarchy in terms of avoiding the generation of larger volumes of water with higher contaminant concentrations. This segregation strategy also ensures that, if the site water handling system comes to the point where a controlled release of water to the Mary River is required, the water quality is as high as possible.

The principles adopted by Colton Coal for mine water management to achieve the aims discussed above were stated as being as follows:

1. Existing surface water drainage patterns will be maintained where practical to do so;
2. Water from different sources will be managed separately:
    - Unaffected surface water will be diverted around disturbed areas wherever possible;
    - Intermediate water will be captured and retained in the Mine Water Dam for use on site and/or controlled off site discharge via pipeline to the Mary River;
    - Worked mine water will be captured and retained for use on site.
3. Water will be selected for use based on water quality considerations;
4. Water for mine operating purposes will be sourced from dedicated on-site mine water storages. Water in these storages will be from on-site runoff, groundwater seepage and dewatering bores;
5. The Coal Handling and Preparation Plant (CHPP) and facilities area will be a closed catchment area protected by its own catchment dam;
6. Overburden dumps will be rehabilitated as soon as practical to minimise potential for release of contaminated surface runoff. Surface runoff will be directed to the Mine Water Dam;
7. Infrastructure to manage worked water will be designed and operated to achieve zero uncontrolled discharge;
8. Discharge of excess water off site will be in accordance with the relevant Environmental Authority (EA) conditions;
9. The site will be left in a safe and environmentally stable condition to protect waters from harm from the mine site post mining operations. The final voids will be bunded, and in-pit dumps above the final voids will be shaped to send runoff away from the voids.

Colton Coal has stated that the water management system that is proposed for managing water on the site has the following features:

- Wherever possible, clean runoff from undisturbed areas is diverted around the disturbed areas of the project;
- The main point of water supply for all demands on the site will be a small storage called the Return Water Dam. Supplies to the coal handling and preparation plant, haul road dust suppression and other site uses will be maintained by pumping to the Return Water Dam from all other dams in the water management system;
- Groundwater and surface runoff inflows to the mine pit will be pumped to the Worked Water Dam as soon as possible. The worked water dam will be constructed in stages as the pit area increases;
- Runoff from the Mine Industrial Area (MIA) will be captured in the MIA Dam;
- Runoff from the Coal Handling and Preparation Plant (CHPP) area will be captured in the CHPP Dam;
- When water levels in the MIA Dam and CHPP Dam are high, water will be transferred to the Worked Water Dam to limit the risk of uncontrolled discharge from the MIA and CHPP Dams;

- Runoff from the out of pit spoil dumps will be captured and diverted into the Mine Water Dam, on the eastern edge of the Mine Lease;
- To limit the potential for any uncontrolled discharges from the Mine Water Dam, when water quality allows, excess water will be released via a pipeline to the Mary River estuary;
- The risk of off-site dam overflows will be virtually eliminated by the construction a spillway around the end of the south-western Mine Water Dam embankment. In an unusually large rainfall event, the dam (which contains mine impact water classified as intermediate quality) would then overflow to the south-west. During the early years, the overflow would be retained on site as it would fill the gully between the south-western embankment and the mine pit. In later years, and very large rainfall events, some overflow into the mine pit would result.

A schematic diagram of the site water management system is shown below in figure 29.

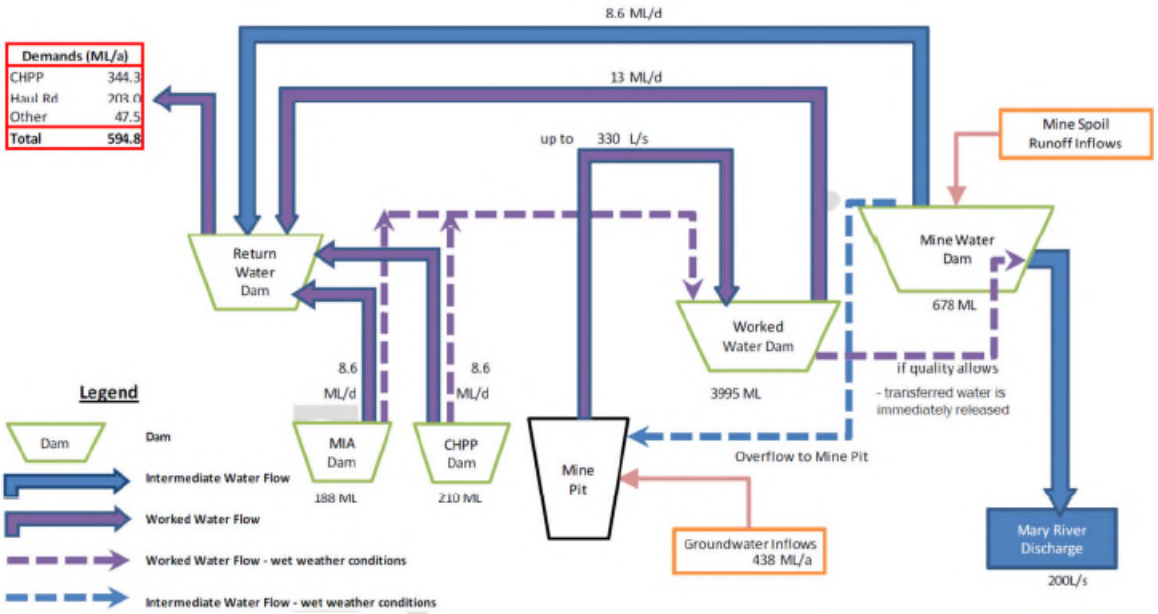

Figure 29 - Schematic diagram of the site water management system
(source: Colton Coal EM Plan v3, Figure 52, p206)

The storage of water in dams is an integral part of the proposed water management system for the Colton Coal Mine proposal. There will be five major storage dams on site (see Table 13 and Figure 30 below).

Table 13 – Details of major storage dams that will form part of the site water handling system (note that minor stormwater settling dams etc are not included in this listing)

Dam	Max Catchment Area	1 in 20 DSA Volume from Method of Deciles	ESS Volume	Current Design Capacity
	ha	ML	ML	ML
CHPP Dam	17	199	57	203
MIA Dam	16	187	54	188
Worked Water Dam	77	901	259	3,995
Return Water Dam	0.4	4.7	1	25
Mine Water Dam	376	4,380	1,264	678
Total		5,672		5,089

(source: Colton Coal EM Plan v3, Table 75, p213)

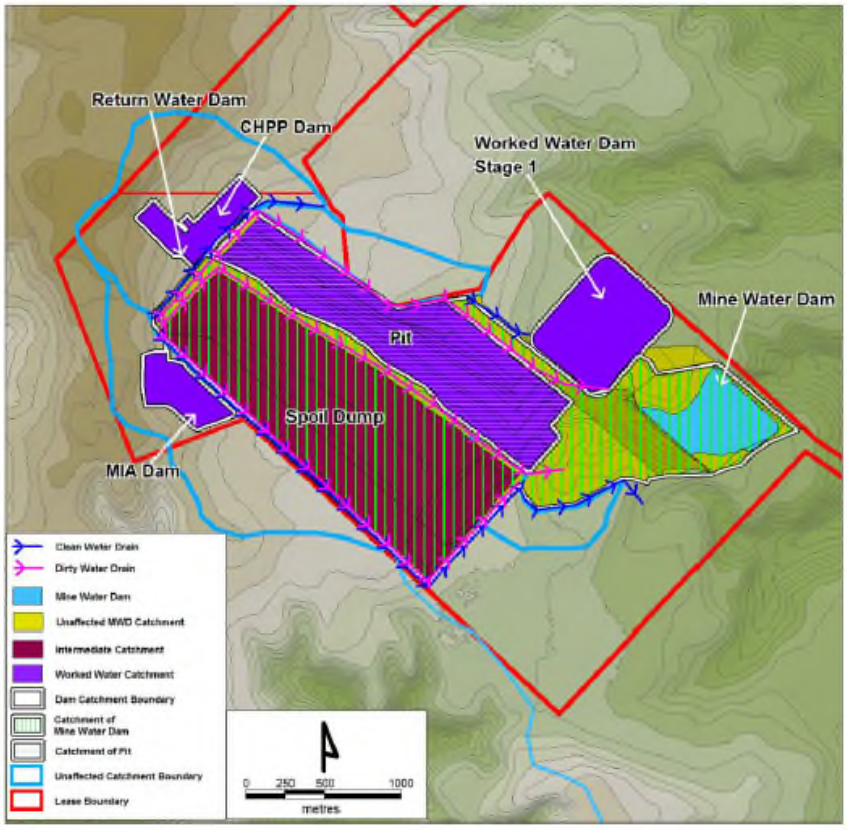

Figure 30 – Location of the five major on site dams and dam catchment areas
(source: Colton Coal EM Plan v3, Figure 54, p209)

Colton Coal has developed a set of operational rules for the management of the on-site dams. They have stated that each of the dams is to be operated such that a minimum operating freeboard (which is required under the Regulated Dam management provisions for control of extreme storm surges) is maintained under normal operating conditions. When the maximum operating volume is reached in a dam, pumping to the dam ceases.

The following operating rules were applied:

- Pit inflows are pumped to the Worked Water Dam (WWD) as they enter;
- Water accumulating in Mine Industrial Area (MIA) Dam is immediately pumped to RWD;
- Water accumulating in Coal Handling and Preparation Plant (CHPP) Dam is immediately pumped to Return Water Dam (RWD);
- CHPP, wash down water and miscellaneous site demands drawn from RWD;
- Haul road dust suppression drawn from RWD (only on dry days);
- Release from Mine Water Dam (MWD) to Mary River when MWD volume is above 10ML;
- Release from WWD to Mary River (via the MWD) when WWD volume is above 1000ML;
- Mary River releases limited to the proposed release pipeline capacity of 200 L/s (17.3 Ml/d)
- Pit dewatering was applied at rate of 110 L/s for each pit pump. Up to 3 pumps may be used for dewatering, with successive pumps switched on as water accumulates in the pit (at stored volumes of 5 ML, 20 ML and 40 ML)

At times when climatic conditions result in available storage for water within the system of onsite dams being filled to capacity, water will need to be discharged via a controlled release to the Mary River via a pipeline from the Mine Water Dam (the onsite mine water storage dam with the highest water quality). During extreme weather events that constitute an emergency, water might also discharge from the system via an uncontrolled release from the Mine Water Dam (noting that the client intends to divert this discharge in the pit void to avoid the uncontrolled release of mine impacted water from the site, as discussed in the *Possible uncontrolled water storage releases* section below).

Site Water Balance

A site water balance model was developed for the proposed mine, which predicted the ability of the mine to deal with water that would be generated by the mining operation, and store the water for later reuse (which needs to be shown to be the priority option employed in accordance with the waste hierarchy) or release in a sustainable manner.

The water balance model of the site was used to not only assist in site water demand analysis for the operator, but also to examine the performance of the system and the sizing of the storages. This is important in terms of the water handling system not experiencing uncontrolled water releases during storm events or periods of extended wet weather. It is also important during dry periods to ensure enough water is available for mining operations, including environmental control measures such as dust suppression with water sprays and road watering with water carts.

A site water balance model based on GoldSim (a computer simulation package) was developed by Colton Coal's consultants (WRM) for the proposed water management system. This model was used to simulate the performance of the proposed site water handling system in response to a range of real life climatic (rainfall) events on a day by day basis. The model utilised was a daily time step model that simulates the stored water in each of the dams on site under actual climatic conditions.

The actual climatic conditions used in the site water balance model come from historical rainfall records from the Bureau of Meteorology for the Maryborough region. This rainfall record spanned a 111 year period from 1900 through to the end of 2010. The CSIRO developed AWBM (Australian Water Balance Model) was used in the simulation as the conceptual rainfall-runoff model. This model is widely used and accepted in Australia and around the world for this purpose.

Colton Coal's consultants stated that the behaviour of the site water management system was shown to vary significantly depending on whether the project encountered a historically wet or dry period. As the

proposed mine water release rate to the Mary River is dependent on Mary River flow, the system behaviour was also found to be very dependent on the corresponding Mary River flow conditions. A statistical analysis on the range of potential outcomes was carried out by investigating the system behaviour over 124 sets of ten-year samples from the historical record, in a manner such that every year of the project development was tested against every year of data in the dataset.

Mary River Mine Water Discharge Strategy

An integral component of the water management plan for the Colton Coal site was a controlled release of excess levels of mine water to the Mary River. This was determined to be required to avoid the build-up of excess levels of intermediate category mine impacted water within the Mine Water Dam due to runoff from the large mine spoil pile areas. The discharge would be via a controlled release pumped through a pipeline that would have a maximum discharge capacity of 200L/s.

Colton Coal would also need to discharge water via the Mary River Discharge Pipeline from the Worked Water Dam after periods of prolonged wet weather high levels of surface run off captured in the pit and potentially overflows from the Mine Water Dam required removal. This water quality in the Worked Water Dam would be relatively good due to the significant dilution effects when such an event occurred, and it is anticipated to be suitable for release via the Mary River discharge pipeline subject to the applicable limits in these circumstances.

Originally, Colton Coal proposed a discharge strategy that saw the rate of water released via the pipeline calculated and set relative to the flow level in the Mary River at the time and the concentration of individual contaminants present in the mine water at the time of release. This was aimed at ensuring discharges of mine water did not cause exceedances of the relevant WQOs in the Mary River, particularly during periods of low very low river flow. This initial discharge strategy that Colton Coal were proposing was subject to specialist review by water scientists (including Dr Ian Ramsay, Science Leader) from the Water Assessment & Systems (WAS) group within the Department of Science, Information Technology, Innovation and the Arts (DSITIA) at the request of EHP.

WAS officers determined that the discharge strategy that Colton Coal were proposing for the release of excess mine water from the main Mine Water Dam to the Mary River would potentially be too complex to implement, as it relied on water testing results that could take some time to be returned from the laboratory to calculate the required discharge rate. More importantly it would allow the potential to discharge water into the Mary River at times when very little flow was occurring. This did not implement a concept that WAS officers have developed for the Fitzroy catchment to deal with mine water discharges. This concept is based upon only discharging mine impacted water containing elevated salinity levels at times when the river is experiencing a flow event.

The WAS officers advised that during a flow event in a river, the water quality is generally degraded from catchment inflows, and the impact of a discharge containing a contaminant on the river is far less significant at this time. The WAS officers also advised that any WQOs that are published for river systems are generally applied to base flow conditions, and are not considered directly applicable during flow events. For this reason, it is highly desirable to ensure that releases of water containing contaminants only occur during flow events, and not during periods of low or no flow.

The WAS officers included advice in relation to employing this strategy (i.e. discharging during flow events) upon review of Colton Coal's original water discharge strategy. This original strategy proposed to continuously vary the water discharge rate from the mine in response to flow levels in the Mary River and the water quality for a range of parameters including physical parameters and dissolved metal concentrations.

Colton Coal revised the mine water management strategy to implement this advice in relation to timing the discharge into the Mary River when flow events were occurring. Colton Coal conducted a statistical analysis of flows in the Mary River, the results of which can be seen in Figure 31 below. It can be seen

that the total flow in the Mary River (the sum of flows from gauging stations on the Mary River Barrage and the Tinana Barrage) has a median value of 685ML/day. Colton Coal choose to adopt two flow values, the first representative of a value below which the river was not experiencing a flow event of any significance. This was adopted as the "low flow trigger", and was set at 150ML/day. A second value was adopted as a "medium flow trigger", above which the flow is more significant and would allow the discharge of a greater rate of mine water without contributing contaminants at levels that may result in WQO exceedances. This was set at 300ML/day.

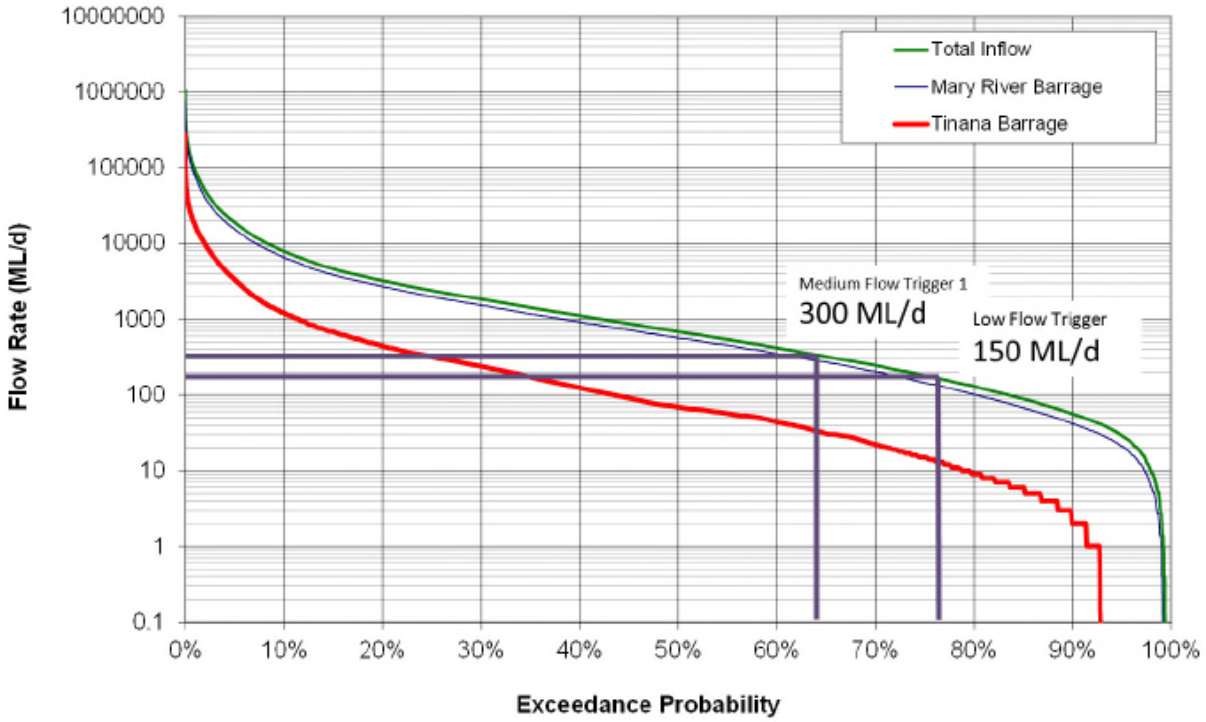

Figure 31– Frequency of fresh water inflows in the Mary River Estuary, showing adopted flow trigger levels (source: Colton Coal EM Plan v3, Appendix L, Figure 5.6, p28)

Colton Coal then proposed a new Mary River discharge strategy to be implemented under the site water management system. All discharges to the Mary River via the discharge pipeline will be conducted in accordance with the rules shown in Table 14 below.

Table 14 – Mary River Discharge Pipeline Operational Rules

Mary River Flow Level	**Maximum discharge rate allowed to Mary River**
Total flow in Mary River <150 ML/day	No Release allowed
Total flow in Mary River >150 ML/day but <300ML/day	0.1 m^3/s (or 100L/s)
Total flow in Mary River >300 ML/day	0.2 m^3/s (or 200L/s)

The WAS officers considered that the latest strategy of releasing water via the discharge pipeline during periods where the river is experiencing a flow event will ensure the protection of the Environmental Values specified for the Mary River under the provisions of the *Environmental Protection (Water) Policy 2009*. This avoids issues with reduced flows carrying water back and forward in the Mary River Estuary during periods of low or no flow.

A demonstration of the effectiveness of the mine water management strategy in the implementation of a system where mine water is only released when high flow conditions are present in the Mary River can be gained by examination of Figure 32 below. It shows flows typically experienced in the river when mine

water was subject to discharge into the river. The time period covered was selected as it is representative of a period when high levels of mine water were being discharged. It can be seen that the proposed times when mine water is being discharged is typically accompanied by periods of high flow levels in the Mary River.

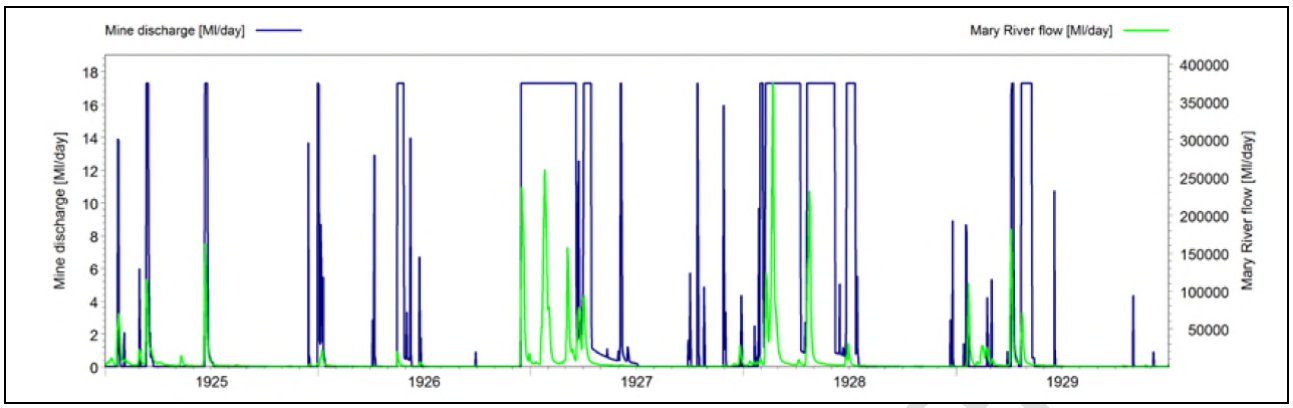

Figure 32 – Representation of flows typically experienced in the river when mine water was predicted to be required to be discharged. The time period covered was selected as it is representative of a period when high levels of mine water were being discharged.
(source: Colton Coal EM Plan v3, Appendix M, Figure 14, p19)

Colton Coal's consultants have indicated that because the Mary River flows will generally be well above the low flow triggers, the release will usually represent a significantly smaller proportion of flow than the maximum allowable 5.8%. If releases were made whenever they are allowed under the proposed conditions, the median ratio of mine release to freshwater inflow to the estuary would be 0.8%. The potential range of annual releases under the proposed flow triggers would be 1,010ML per annum to 6,300ML per annum (with median of 4,500ML per annum over 280 days). However, Colton Coal's consultants claim that in practice, the release of water from the pipeline will generally not be required during periods of low flow in the Mary River (because significant site rainfall would generally coincide with flow in the Mary River).

Assessment of the Dispersion of Contaminants for Mary River Discharge

There are three separate considerations for the assessment of the dispersion of contaminants for Mary River discharge. The first is the near field impacts of the release of the mine impacted water from the release pipe. These are localised, and examine the localised impacts around the "mixing zone" for the point where the discharge pipe releases.

The second consideration is the impact of the water release on the section of the Mary River where the discharge occurs. This needs to be considered both in an upstream direction and a downstream direction, as the tidal flows in this section of the river can carry water both ways. The impact of the mine water should be evaluated in light of the management intent for this section of the Mary River (moderately disturbed) and the applicable WQOs for this section of the river. These included the published WQOs under the *Mary River Environmental Values and Water Quality Objectives* and the ANZECC and ARMCANZ (2000) aquatic ecosystem 95% species protection levels for metal species in SMD waterways (see environmental values of the waterways section above).

The third consideration is the impact of the water release on the downstream section of the Mary River that has a HEV management intent declared (eight kilometres downstream of the proposed release point). The impact of the mine water should be evaluated in light of the HEV management intent and the applicable WQOs for this section of the river. These included the published WQOs under the *Mary River Environmental Values and Water Quality Objectives* and the ANZECC and ARMCANZ (2000) aquatic

ecosystem 99% species protection levels for metal species in HEV waterways (see environmental values of the waterways section above).

Characterisation of the mine impacted water to be released into Mary River

All three considerations (near field impact, release point section of the Mary River Impact and downstream HEV section of the Mary River impact) all need to use a prediction of the concentration of contaminants in the mine impacted water to be released from the Mine Water Dam. Colton Coal engaged CSIRO to conduct a review of the expected Mine Water Dam (MWD) contaminant levels. This was based on a recommendation from WAS officers that the original assessment Colton Coal of absolute worst case metal concentrations were not indicative of what would be experienced in operating the mine water management system, and also not indicative of water quality that WAS officers have experienced at other operating open cut coal mine sites .

A new assessment of the potential worst case scenario for dissolved metal concentrations from mine dam water discharge to the Mary River was undertaken by consultants for Colton Coal (EGi and CSIRO). The majority of the mine dam waters are to comprise surface water runoff that has been in contact with either undisturbed areas of the catchment of the mine water dam or the overburden/interburden material stored in mine spoil pile. Colton Coal's consultants expect a small fraction of the waters to leach from the waste rock, where a portion of that water may pass through both non-acid forming (NAF) and potential acid forming (PAF) materials. To characterise the metal concentrations released from the waste rock, Colton Coal's consultants conducted laboratory leachate experiments on both NAF and PAF materials. Based on these results and information from Colton mine on NAF/PAF overburden generation for the life of the mine and the likely metal concentrations of the mine water were characterised.

The results of this assessment, as well as background Mary River concentrations is shown in Table 15 below. Colton state that these are represented of water quality in the MWD for the first year of the mine life, when water quality is expected to be at its worst. By the end of year 10 of the mine life, dilution inflows will be more significant and the water quality in the MWD will improve as a result.

It is noted that the predicted levels of cadmium and selenium in the MWD water are predicted exceed the SMD trigger values that apply for the water they will be discharged into. This situation would constitute a trigger an investigation to occur under the proposed EA conditions, but does not mean that the SMD trigger values will be exceeded in the Mary River after the water is discharged from the MWD via the Mary River release pipeline. Modelling conducted by the client predicts that after mixing with the river water, the SMD levels should not be exceeded due to the influence of the discharged water (see section titled *Impact on the section of Mary River around the point of release* below).

Table 15 – Predicted typical mine water composition, Mary River background metal levels and ANZECC aquatic ecosystem protection trigger values

Metal	Background Concentration (80th Percentile) (µg/L)	Proposed Concentration in Mine Discharge Water Prior to Release (µg/L)	SMD Trigger (µg/L)	Marine HEV Guideline (µg/L)
Aluminium	49.2	2.238	55	0.0005
Arsenic	10.00	0.293	13	0.0023
Boron	2556	6.442	370	5.1
Cadmium	0.025	0.236	0.2	0.0007
Chromium	0.400	0.132	1.0	0.00014
Cobalt	0.10	0.578	1.0	0.005
Copper	1.58	0.225	2.0	0.3
Iron	57.2	1.307	300	No Guideline
Lead	0.10	0.082	3.4	0.0022
Manganese	3.82	61.168	200	0.09
Nickel	1.48	0.575	11	0.007
Selenium	0.5	14.555	10	3
Silver	0	0.024	1.0	0.8
Zinc	21	1.313	8.0	0.007

(source: Colton Coal EM Plan v3, Appendix M, Table 3, p21)

Near Field discharge pipe release impact assessment

An assessment of the near field mixing of the mine water when released into the Mary River was undertaken by Colton Coal's consultants using the CORMIX modelling package developed by the US EPA. Two separate cases of extremes of flow conditions were considered, that being a high freshwater flow conditions that were experienced in 1928, and very low freshwater flow conditions that were experienced in 2010.

The initial dilution is very rapid under the high freshwater flow conditions. The distance at which the water quality criteria are met ranged from 35–70 m. The distance to full vertical mixing ranged from 455–500 m. This is because the receiving waters are assumed to be fresh while the density of the mine water ranges from 1013 to 1025 kg/m^3, resulting in a negatively buoyant plume tending to sink to the bottom and limit the vertical mixing.

Under the low flow conditions dominated by saltwater tidal conditions a very different pattern is observed depending on whether the density of the discharge water is similar to, or lesser than that of the receiving water. The consultant assumed the river water to be saline for this scenario with a density of 1025 kg/m^3. When the mine water was assumed to be saline in nature the plume was neutrally buoyant and the distance at which the water quality criteria were met ranged from 125–185 m. However, when the mine water was assumed to contain less salt, and density was assumed to be 1013 kg/m^3 the distance to reach the water quality guidelines exceeds 8km This is well outside the near field zone and therefore the hydraulic calculations of CORMIX model were not reliable at this distance. The CORMIX model cannot be relied on to predict impacts over this distance, and the distance to full lateral mixing (which ranges from 575–635 m) is a more important parameter in terms of estimating the degree of mixing that will be encountered.

As cases of negatively buoyant releases, where the discharged water sinks to the bottom and is very slowly dispersed are encountered at times in the Mary River, the consultant considered that it would be necessary to consider an option such as a multiport diffuser to enhance the initial mixing. It is not considered that the risk associated with this is great enough to warrant a specific condition requiring a diffuser to be fitted, as this would not be in line with the EHP policy of non-prescriptive conditioning, but it is expected that Colton Coal must be able to demonstrate they are achieving effective dispersion of their mine water release into the Mary River.

Impact on the section of Mary River around the point of release

The calculated typical Mine Water Dam concentrations for each of the metals were subject to a dilution calculations to estimate in-stream metal concentrations for the Mary River when receiving a mine water release. The in-stream metal concentrations were calculated for the worst case dilution scenario of a Mary River flow of the lowest level at which discharge is allowed (150ML/day) and the applicable pipeline discharge rate for this flow level of 100 L/s (discussed in Table 14 above). This scenario yields a dilution ration of 1:17.4 for discharged mine water to Mary River water.

The predicted in-stream concentrations within the Mary River were then presented for the zone directly surrounding the discharge point (classified as moderately disturbed under the *Mary River Environmental Values and Water Quality Objectives*). The results indicate that the Mary River has capacity to assimilate the expected loads of the 14 metals considered in the mine water proposed to be released from the proposed Colton Mine in the section of River where they are discharged (see dispersion study for more information in relation to impacts on the HEV zone). The potential increase to in-stream and estuarine metal concentrations as a result of the mine water discharge are very small compared to the background Mary River concentrations.

The results of Colton Coal consultant's assessment of the predicted end of pipe limit metal concentrations for the 14 metals against the ANZECC Water Quality Guideline trigger values for aquatic ecosystem protection based on a SMD protection level that must be applied for the point of release in the River are shown in Table 16. All predicted end-of-pipe metal concentrations were generally less than ANZECC SMD trigger values for both the beginning (Year 1) and end of mine (Year 10) scenarios. The only exceedances predicted were for Cd and Se in Year 1, and these levels were only slightly above the trigger values. Once the discharge was subject to dilution within the Mary River (based on using the 1:17.4 mine water to Mary River water ratio), all concentrations were well below the trigger values.

Colton Coal have stated that the impact of the proposed release of water into the Mary River via a pipeline from the site's Mine Water Dam will not affect the environmental values of the section of Mary River around the point of release, as the discharge has been shown to meet the relevant WQOs for the moderately disturbed management intent of the section of the river.

Table 16 - Predicted end of pipe metal/metalloid concentrations compared with Trigger Values, Background water quality conditions and scenario of diluting the discharge in Mary River Water

Parameters	Concentrations in Inflows to Mine Water Dam	TV based on Background concentrations	ANZECC TVs	Sites W2 and W3 Median	Sites W2 and W3 80th Percentile	1:17.4 Dilution with Precipitation Applied
Year 1						
Ag	0.02	1.4	1.4	*Not measured*		0.0014
Al	26.63	55	55	2.5	49.2	0.1286
As	0.29	24	24	5	10	0.0169
B	6.44	5100	5100	1215	2556	0.3702
Cd	0.24	0.2	0.2	0.025	0.025	0.0135
Co	0.58	1.4	1.4	0.05	0.1	0.0332
Cr	0.13	1	1	0.25	0.4	0.0076
Cu	0.62	1.58	1.4	1.3	1.58	0.0129
Fe	26.62	300	300	11	57.2	0.0751
Mn	61.17	200	200	1.1	3.82	3.5154
Ni	0.57	11	11	1.2	1.48	0.0330
Pb	0.08	4.4	4.4	0.05	0.1	0.0047
Se	14.56	11	11	*Not measured*		0.8365
Zn	2.24	21	15	2	21	0.0754
Year 10						
Ag	0.05	1.4	1.4	*Not measured*		0.0026
Al	13.17	55	55	2.5	49.2	0.0636
As	0.18	24	24	5	10	0.0101
B	4.55	5100	5100	1215	2556	0.2615
Cd	0.10	0.2	0.2	0.03	0.03	0.0060
Co	0.28	1.4	1.4	0.05	0.1	0.0163
Cr	0.09	1	1	0.25	0.4	0.0053
Cu	0.51	1.58	1.4	1.3	1.58	0.0107
Fe	13.88	300	300	11	57.20	0.0392
Mn	26.84	200	200	1.1	3.82	1.5423
Ni	0.28	11	11	1.2	1.48	0.0162
Pb	0.06	4.4	4.4	0.05	0.10	0.0036
Se	6.43	11	11	*Not measured*		0.3698
Zn	1.15	21	15	2	21.00	0.0385

Green cells indicate concentrations < TV
Orange cells indicate concentrations > TV
(source: Colton Coal EM Plan v3, Appendix N, Table 5-5, p47)

Mary River dispersion modelling to impacts on Mary River HEV section downstream

Colton Coal engaged a specialist consultant (DHI) to conduct modelling of the dispersion of contaminants in the mine water released from the mines discharge pipe into the Mary River. The modelling yielded results for estimated concentrations of contaminants within specified sections of the Mary River and in particular the Mary River HEV section downstream. These predicted metal concentrations could then be compared to the relevant Water Quality Objectives for the HEV section of the Mary River (as outlined in the Environmental Values section above).

The dispersion modelling was conducted with a one dimensional hydraulic model (MIKE11) coupled with an advection module to track contaminants in the Mary River between the upstream extents (bounded by the Mary River and Tinana Creek barrages) and the downstream extent (bounded by the River Heads outlet into the Great Sandy Strait) as shown in Figure 33 below. The model output was then used to test assumptions about transport mechanisms and the mixing of the contaminants within the River, and the resulting in-stream concentrations are compared to water quality guidelines at the HEV reach of the Mary River estuary.

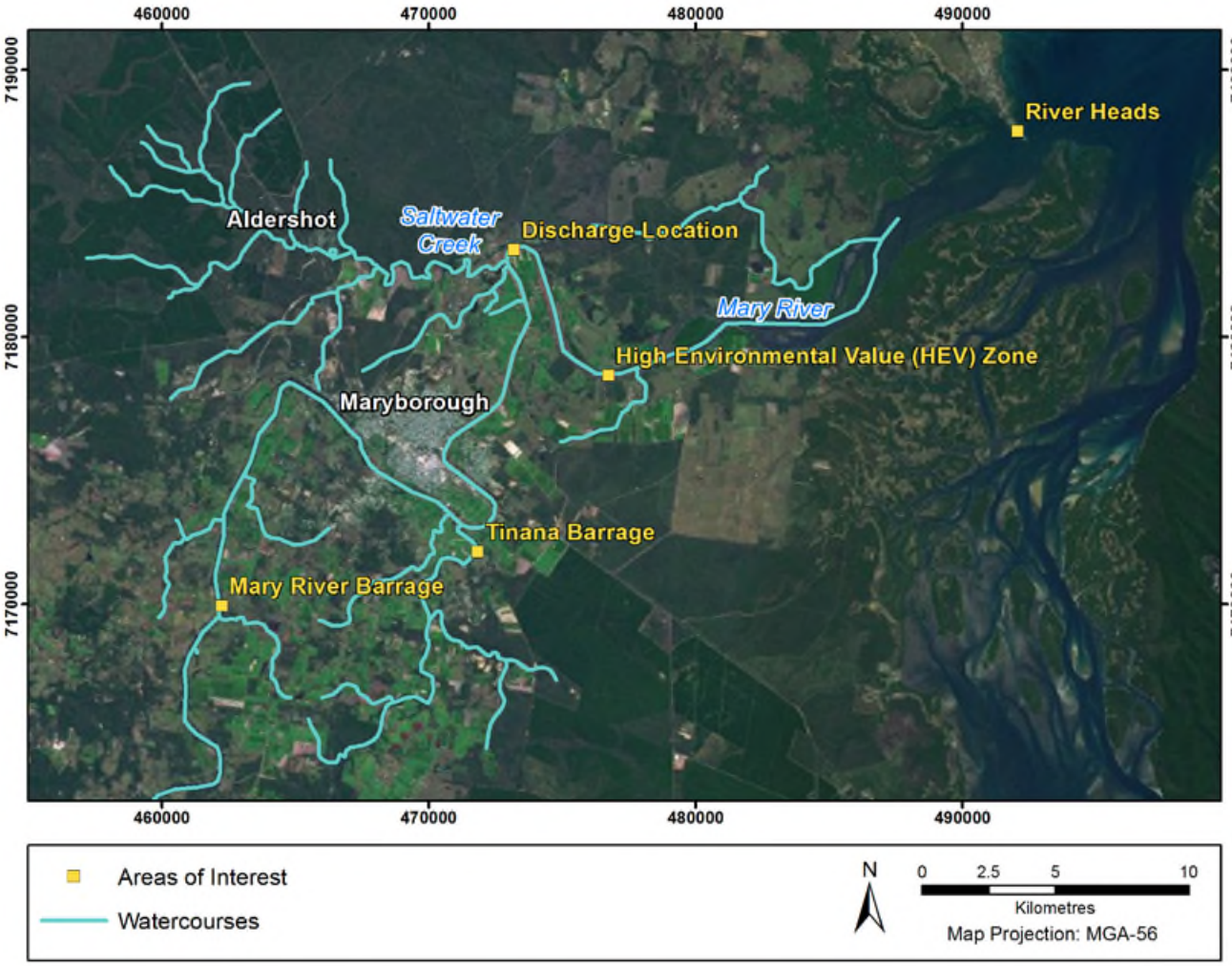

Figure 33 – Extent of dispersion modelling conducted (ie within area bounded by the Mary Barrage and Tinana Barrage and River Heads, also noting upstream extent indication of declared HEV zone and the mine water pipe discharge location)
(source: Colton Coal EM Plan v3, Appendix M, Figure 1, p3)

The modelling used a sophisticated modelling technique to estimate flow patterns within the Mary River system for not only downstream of the mine water discharge release point into the river, but also the area upstream as well. This was necessary as the discharge point is located in the estuarine reaches of the Mary River, which is subject to tidal flows. This makes the system very complex, as contaminants can be carried upstream on an incoming tide and then return at a few hours later on a falling tide to enhance the contaminant loading at that point in time. The model needed to cope with this situation to give accurate predictions of potential contaminant levels.

The hydraulic model accounted for the interaction of the tide, inflows from the Mary River and Tinana Creek barrages and the release of mine water. The model was calibrated to actual recorded water levels, discharges and velocities by Colton Coal's consultants at seven locations within the section of the Mary River that the model covered. Acoustic Doppler Current Profiling (ADCP) was also conducted in cross sections at key points in the River. This profiling is used to assess secondary circulations and mixing processes within the river, which are important because the hydrodynamic model assumes instantaneous cross-section mixing when mine water is released.

The ADCP profiling showed that good cross-section mixing occurs at both flood and ebb tides as would be expected. However, it was also noted that during a slack tide, downstream and cross-stream velocities would be very low and, therefore, much less cross-stream mixing would occur.

The calibrated hydraulic model of the Mary River flow was used with the advection transport module to determine possible concentrations of 14 metals at key locations in the Mary River estuary under a range of river flow conditions. These 14 metals had previously been identified (based on groundwater and geochemical analysis of overburden and coal) as the contaminants of concern for the mining operation that would most likely be present in the mine water (based on groundwater and geochemical analysis of overburden and coal, and rock leaching testing).

The modelling approach assumed that all metals when released into the river are dissolved or suspended in the water column and that no flocculation or other reactive processes that commonly remove metals from the water column was occurring. This considered an appropriately conservative approach as it will yield worst case metal concentrations compared to real life conditions in the Mary River.

The dispersion modelling conducted by Colton Coal's specialist water consultant appears to represent best practice in terms of assessment of the assimilative capacity of the receiving water system. The modelling that has been conducted has allowed Colton Coal to estimate the level of dispersion that can be expected when mine impacted water is released into the Mary River. This was a very complex task but was considered necessary by EHP and WAS officers to ensure potential levels of contaminants could be assimilated by the Mary River System, in particular the HEV declared zone downstream of the release point, and ensure the HEV management intent is achieved.

It was shown that during a release of mine water at worst case flow and discharge conditions (ie discharging 100L/s from the discharge pipeline with only 150ML/day flow in the river), the release would see increases in concentrations of cadmium, cobalt, manganese, selenium and silver above existing background concentrations. Of these, only cadmium, cobalt and manganese concentrations would exceed HEV guideline values; however, testing of the water quality has shown that the background levels of these compounds is already well above these guidelines.

Colton Coal have stated that the impact of the proposed release of water into the Mary River via a pipeline from the site's Mine Water Dam will not affect the environmental values of downstream section of Mary River that have a HEV management intent declared, as the discharge has been shown to meet the relevant WQOs for the HEV management intent of the section of the river, except where the background values already exceeded these values. The level of increase in the concentration in the Mary River predicted to be caused by the proposed discharge in these cases (cadmium, cobalt and manganese) is very small compared to the actual background level.

Possible uncontrolled water storage releases

During extreme weather events that constitute an emergency, water might also discharge from the system via an uncontrolled release from the site main dam. Initially the application proposed a mine water handling system that was configured so that during this situation, water from the Mine Water Dam would have spilled over the spillway and have been discharged to the ephemeral watercourses to the north east of the mine site, which are part of the Susan River catchment.

Water released during an uncontrolled release from the Mine Water Dam, if it were allowed to leave the site, would flow into the Susan River and continued into the very lower reaches of the Mary River as it discharges into the Great Sandy Strait at River Heads.

This flow path for any uncontrolled release that may ever occur from the mine site Main Dam is shown in Figure 34 below. Some of the flow path for potential uncontrolled releases is through the lower portion of the Susan River which is designated High Ecological Value (HEV) status under the *Environmental Protection (Water) Policy 2010* (Water EPP).

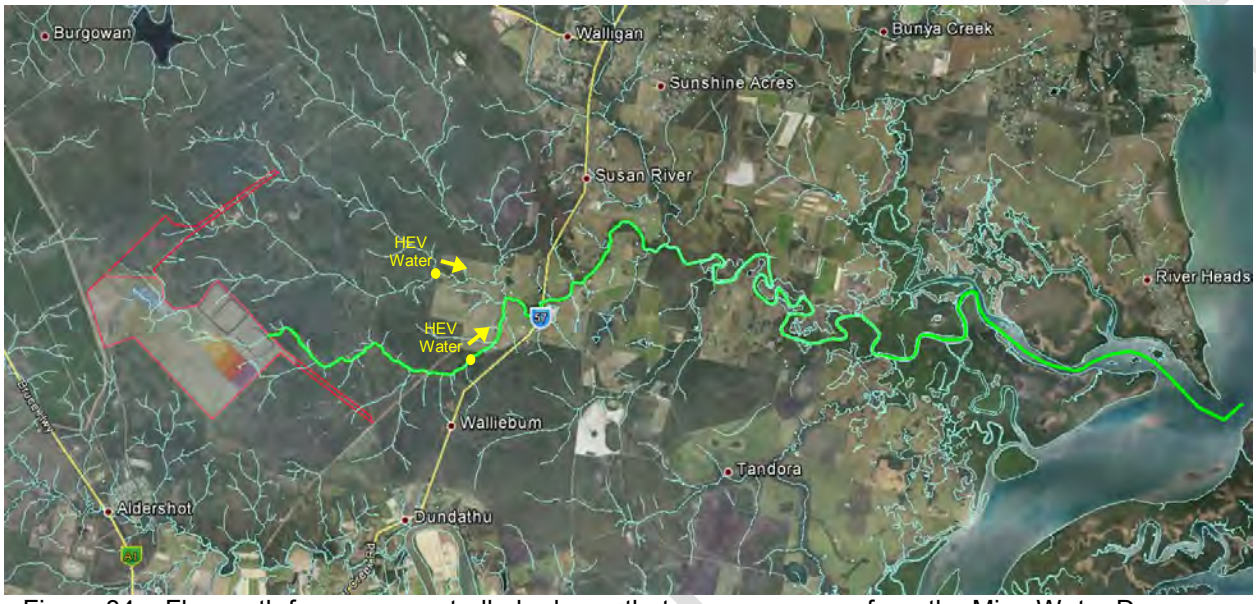

Figure 34 – Flow path for any uncontrolled release that may ever occur from the Mine Water Dam

The Colton Coal site water management plan and water balance model was subject to specialist review by water scientists (including Dr Ian Ramsay, Science Leader) from the WAS group at the request of EHP.

In general, EHP and WAS officers found that the site water handling system and water management plan were considered conceptually sound and the water balance model that had been developed appeared to be a suitable tool for predicting the site water system behaviour. It was not however considered by EHP or the reviewing specialist water scientists from the Water Assessment Systems that an uncontrolled release of mining impacted water to this catchment was acceptable unless in an emergency situation. The daily time step water balance modelling of the configuration of the water handling system that was originally conducted by Colton Coal (see below for more details) indicated a total of 19 uncontrolled overflow events from the site Main Dam could occur over the 111 year period that the historical climatic records covered.

The frequency of uncontrolled release events was not considered acceptable by EHP or the WAS officers in terms of potential impacts on the environmental values of the Susan River, in particular the HEV zone. Colton Coal had not performed any assessment of the potential impacts of the water release during these uncontrolled release events on the environmental values of the Susan River System. On this basis Colton Coal were advised by EHP in December 2011 that this issue must be addressed before moving forward with the application.

A revised water management strategy was then developed by Colton Coal under which, during such situations where an uncontrolled release of water was imminent due to all on site storage in the dams being exceeded, water would be diverted into the main pit void for storage. The pit contains a large potential volume for the storage of such water, but having to utilise it for water storage in these situations will impact on the ability of the mine to continue normal production in the pit until it is fully dewatered.

To control the risk over overflow through using the pit storage the following strategy will be employed by Colton Coal. The pit dewatering pumps will be switched off as required when high rainfall event are experienced and storage in the Worked Water Dam is fully used. As no flow will then enter the Worked Water Dam, it will no longer ever require water to discharge into the Mine Water Dam. This action significantly reduces input volumes to this Mine Water Dam and greatly reducing the chance of overflows. The Mine Water Dam will continue to fill from normal inputs from the spoil pile and its own catchment area, and during extreme rainfall periods, water may still on occasion discharge from the Mine Water Dam. When this occurs, under the new management strategy the overflow will be completely diverted into the pit for storage and later controlled dewatering.

The time step water balance model now indicates that there were no occurrences of uncontrolled overflow events that would leave the mine site from any of the dams on site over the 111 year period that the historical climatic records covered. This includes the major flood events that were experienced over the period including floods of 1927, 1955, 1968, 1974 and 1992. The site Water Balance Model predicts that Mine Water Dam will generally be storing levels of water well below the dam's capacity (see Figure 35 below).

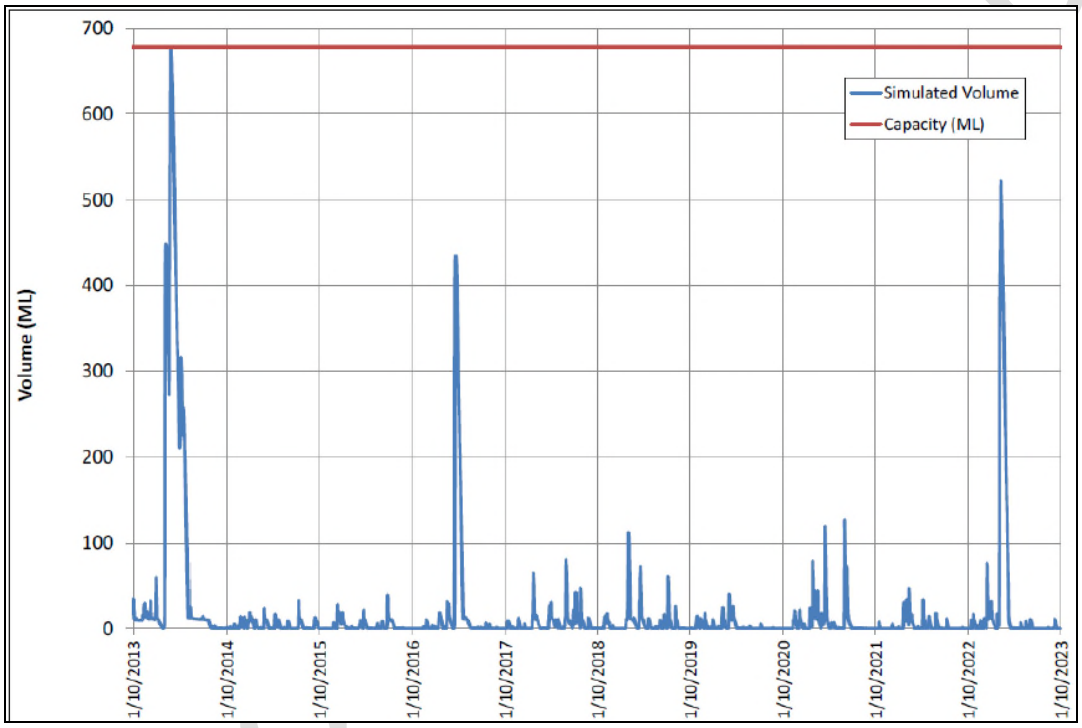

Figure 35 – Typical levels of storage that will be encountered in the Mine Water Dam
(source: Colton Coal EM Plan v3, Figure 55, p217)

There were situations where water overflowed from the Mine Water Dam to the mine pit, but the modelling suggests these would be infrequent, with a maximum overflow volume of 1670ML. Colton Coal claim that the in-pit water volumes generated could generally be easily accommodated within the pit and associated water management infrastructure, however, in later years, there is a significant operational risk that in pit water volumes could exceed 1000ML. This could result in potentially long production down times while the pit is dewatered. Colton Coal have predicted that there is a 10% chance that the volume of water in the pit could at some stage exceed 1000ML, but they claim the mining operation can cope with this operational risk.

Proposed EA water release conditions, water release limits and water monitoring conditions

Water will only be allowed under the EA conditions to be discharged via controlled release through the pipeline from the Mine Water Dam to the Mary River. Water will only be allowed to be discharged subject to low and medium flow triggers in the Mary River. This is analogous to the standard approach of limiting discharge volumes that is taken under the standard EHP model mining conditions (Model water conditions for coal mines in the Fitzroy basin) except there will be no salinity based triggers, as WAS officers have advised that this is not necessary due to the Mary River section being an estuary and therefore not sensitive to Salinity impacts.

End of pipe monitoring will be required for discharges to the Mary River. This discharge stream will be subject to limits on water discharged, and these are as per recommendations made by WAS officers. The limits will apply are shown in Table 17 below. Proposed monitoring frequency is also shown and was also based on recommendations made by officers from WAS.

Table 17 – Water quality limits and monitoring frequency

Quality Characteristic	Release Limits	Monitoring Frequency
Electrical Conductivity (µS/cm)	4000	Prior to commencement of release and thereafter continuously during release
pH (pH Unit)	6.5 (minimum) 9.0 (maximum)	Prior to commencement of release and thereafter continuously during release
Turbidity (NTU)	50	Prior to commencement of release and thereafter continuously during release
Dissolved Oxygen (mg/L)	4	Prior to commencement of release and thereafter continuously during release

The discharge to the Mary River will also be subject to a set of contaminant trigger investigation levels based on the ANZECC and ARMCANZ (2000) aquatic ecosystem 95% species protection levels for metal species in SMD waterways, with adjustments made to cater for limitations in relation to detection limits for some analytical techniques where appropriate (as per WAS officers recommendations). These trigger values and the monitoring frequency proposed are shown in Table 18 below. If any of these trigger values are exceeded during a release event an EA condition will require Colton Coal to complete an investigation into the potential for environmental harm for all the parameters which are exceeded and provide a written report to EHP. The EA condition will also require Colton Coal to outline any actions they need take to prevent environmental harm.

Table 18 –Mary River release contaminant trigger investigation levels

.Quality Characteristic	**Trigger Levels**	**Comment on Trigger Level**	**Monitoring Frequency**
Aluminium (µg/L)	55	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	**Prior to commencement of release and thereafter weekly during release**
Arsenic (µg/L)	13	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	
Boron (µg/L)	370	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	
Cadmium (µg/L)	0.2	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	

Chromium (µg/L)	1.0	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	
Cobalt (µg/L)	1.0	*ANZECC aquatic ecosystem protection, marine, slightly to moderately disturbed*	
Copper (µg/L)	2	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed, however ICMS LOR limits to 2 µg/L*	
Iron (µg/L)	300	*ANZECC section 8.3.7.1 for metals and metalloids*	
Lead (µg/L)	3.4	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	
Manganese (µg/L)	200	*For aquatic ecosystem protection, based on WHO 2005*	
Mercury (µg/L)	0.2	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed however LOR for Cold Vapour FIMS is 0.2 µg/L*	
Nickel (µg/L)	11	*ANZECC aquatic ecosystem protection, freshwater 95% species protection for SMD*	
Selenium (µg/L)	10	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed, however LOR for ICP-MS is 10 µg/L*	
Silver (µg/L)	1	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed, however ICMS LOR limits to 1 µg/L*	
Vanadium (µg/L)	100	*ANZECC aquatic ecosystem protection, marine, slightly to moderately disturbed*	
Zinc (µg/L)	8.0	*ANZECC aquatic ecosystem protection, freshwater, slightly to moderately disturbed*	
Sulphate (SO42-) (mg/L)	770	*Based on expected acceptable mine water quality*	
Total Nitrogen (µg/L)	300	*Mary River WQO for Mary River mid estuary*	
Ammonia (µg/L)	10	*Mary River WQO for Mary River mid estuary*	
Nitrate (µg/L)	10	*Mary River WQO for Mary River mid estuary*	
Total Phosphorus (µg/L)	25	*Mary River WQO for Mary River mid estuary*	
Total Petroleum hydrocarbons (C6-C9) (µg/L)	20	*ANZECC Section 8.3.7.21 and EHP model Fitzroy water conditions*	
Total Petroleum hydrocarbons (C10-C36) (µg/L)	100	*ANZECC Section 8.3.7.21 and EHP model Fitzroy water conditions*	

Colton Coal has had their consultants conduct studies in relation to treating water from the Mine Water Dam to reduce metal contaminants in case such a situation ever arose. The simulated minewater gained from the

worst case scenario of leaching test was used to investigate a range of treatment options using alum along with pH adjustments. The most effective treatment was found to be alum with the pH adjusted to above 8.5. Colton Coal claims that this indicates that there are feasible mechanisms for treating the water should metal concentrations exceed the trigger values.

A Receiving Water Monitoring Program (REMP) is proposed for characterising the site discharge water, and identifying exceedances of the WQOs within the HEV Zone, and at points upstream and downstream of a mixing zone near the Mary River release point. This REMP will be required under the environmental authority conditions. REMP monitoring will be conducted at the locations shown in Table 19 and Figure 36 below.

Table 19 – Mary River REMP monitoring locations

Monitoring Point	**Receiving Waters Location Description**	**Latitude (Decimal degree, GDA 94)**	**Longitude (Decimal degree, GDA 94)**
Upstream Background Monitoring Points (noting that Mary River at point of discharge is tidal)			
W1	Mary River Queens Park Boat Ramp	25.539115	152.706977
W2	Mary River Upstream of Dundathu	25.487129	152.738037
Downstream Monitoring Points (noting that Mary River at point of discharge is tidal)			
W3	Mary River Downstream of Dundathu	25.486601	152.747454
W4	Mary River HEV Zone boundary	25.507081	152.782611
W5	Mary River Beaver Rocks Boat Ramp	25.500707	152.835815
W6	Mary River Power Island	25.450681	152.882649

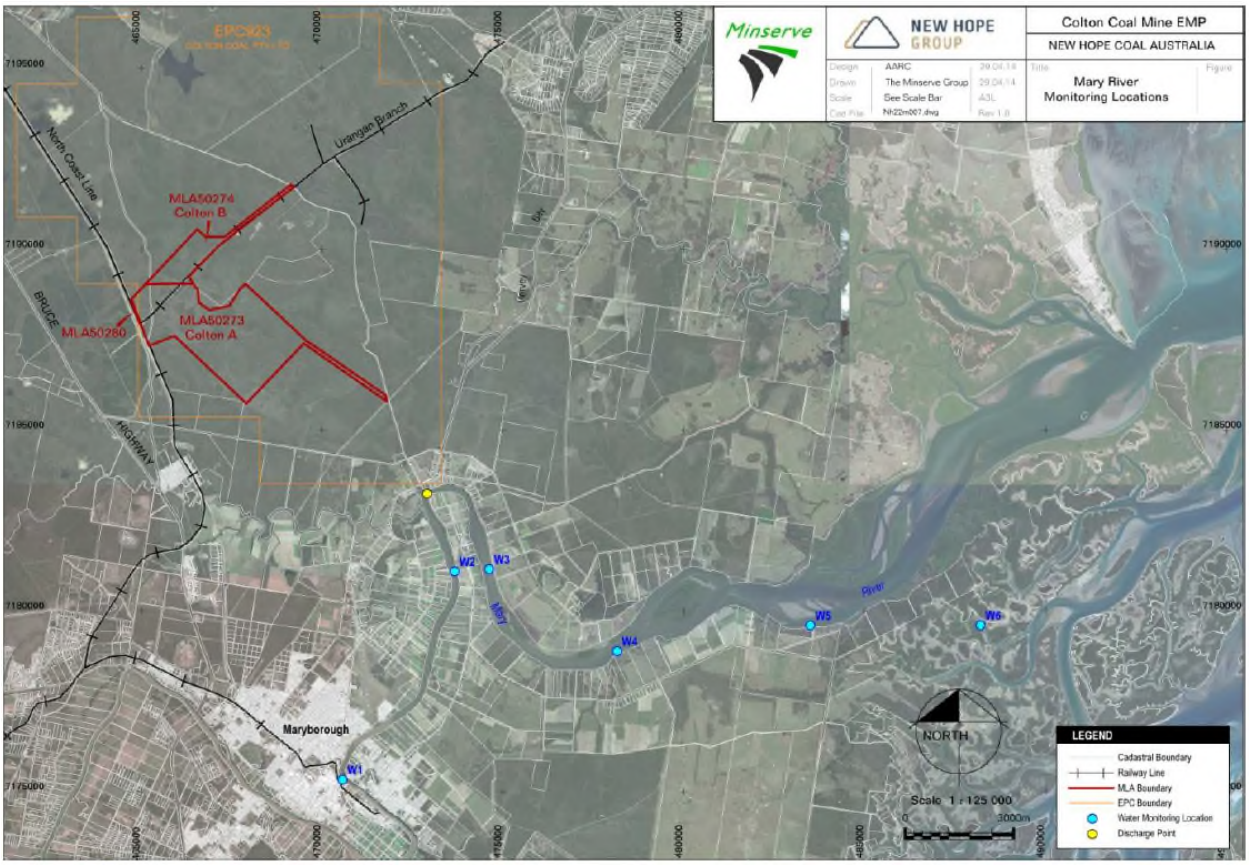

Figure 36 – Mary River REMP monitoring locations
(source: Colton Coal EM Plan v3, Figure 50, p193)

Groundwater

Groundwater Sources

Sources of groundwater in the surrounds of the Colton Coal Mine Lease areas have been assessed by the applicant as being:

- shallow, localised lenses associated with iron or other organic material cemented sandy or ferugenous gravels in the overlying Elliott Formation;
- aquifers formed within fractures in the weathered sections of the overlying Elliott Formation; and
- confined / semi-confined aquifers in the Elliot, and in particular the Burrum Coal measures; and
- present within the Burrum Coal Measures at a depths between 15 m AHD and 26 m AHD at the proposed mine site.

Colton Coal's groundwater consultant has also expressed the opinion that the ephemeral watercourses and water holes both on the mining lease areas and in the immediate surrounds do not have a have a significant link to groundwater. This means that the watercourse is not fed from groundwater and stream flows should not be impacted by any lowering of the groundwater table from pit dewatering. This also means that disturbance or diversion of water flows from any of the watercourse within or surrounding the mining lease areas should not have any significant impact of groundwater recharge. The impact of pit dewatering operations will be far more significant in terms of groundwater levels.

Groundwater EVs and Use

The *Mary River Environmental Values and Water Quality Objectives* specify that the environmental values to be protected with respect to groundwater in the locale of the mine may include:

- Aquatic ecosystems;
- Drinking water;
- Irrigation;
- Stock water; and
- Farm supply.

The groundwater quality in the area is however considered to be low due to high salinity levels of the groundwater. The groundwater would not be suitable for human consumption without treatment as it exceeds the NHMRC & NRMMC drinking water guideline limits, and would not be suitable for watering poultry, dairy cattle and beef cattle without loss of production and a decline in animal condition as it exceeds stock water total dissolved solids guideline levels specified under ANZECC & ARMCANZ. It would also cause foliar damage if crops were irrigated with the water according to the ANZECC & ARMCANZ sodium trigger values specified for irrigation water.

The client has conducted searches with the DNRM Groundwater Data Base that contains records of groundwater bores drilled over the past 100 years, for any surrounding users with groundwater bores in the vicinity of the mine project site. One registered bore was found in the search, and it was determined by the client to be a test/exploration bore. It is located is an isolated area of unallocated state land to the north of the proposed mine site and therefore very likely to not be in use as a groundwater supply.

It is generally acknowledged that this listing of "registered bores" is not always comprehensive in terms of the existence of groundwater users in a specific area. Small bores for stock and domestic use are commonly not recorded in this register. One submission supplied to EHP by a resident in the Aldershot area (the resident closest to the proposed mine site) has indicated that he has a groundwater bore on his property that he currently does not use, but he still wants to ensure it is protected from excessive drawdown impacts that may result from future mine dewatering. Other domestic supply bores could also be likely to exist within private properties in Aldershot, Dundathu and domestic or stock water supply bores at other individual properties in the surrounding area. Drawdown impacts should also be considered for these locations, even though the existence of any such bores has not been confirmed.

Potential Impacts on Groundwater from Mining Activities

Colton Coal had consultants evaluate the mines potential impacts on the groundwater system underlying the mine. This included groundwater modelling to predict inflow volumes into the pit and the potential drawdown impacts over the different stages of the mine life.

The key findings of this study, conducted by AGE consultants were as follows:

- The groundwater inflow into the pit reaches 0.8 ML/day in the second year of mining and then gradually increases to 1.2 ML/day at the end of Year 4 after which it is relatively constant for the remaining years of mining;
- As an indication of the zone of influence of the drawdown created by the pit, the one metre predicted drawdown level contour will extend about 2.9 km from the pit boundary;
- No registered bores are within the simulated zone of influence;

Figure 37 below shows the predicted drawdown levels for the area surrounding the mine.

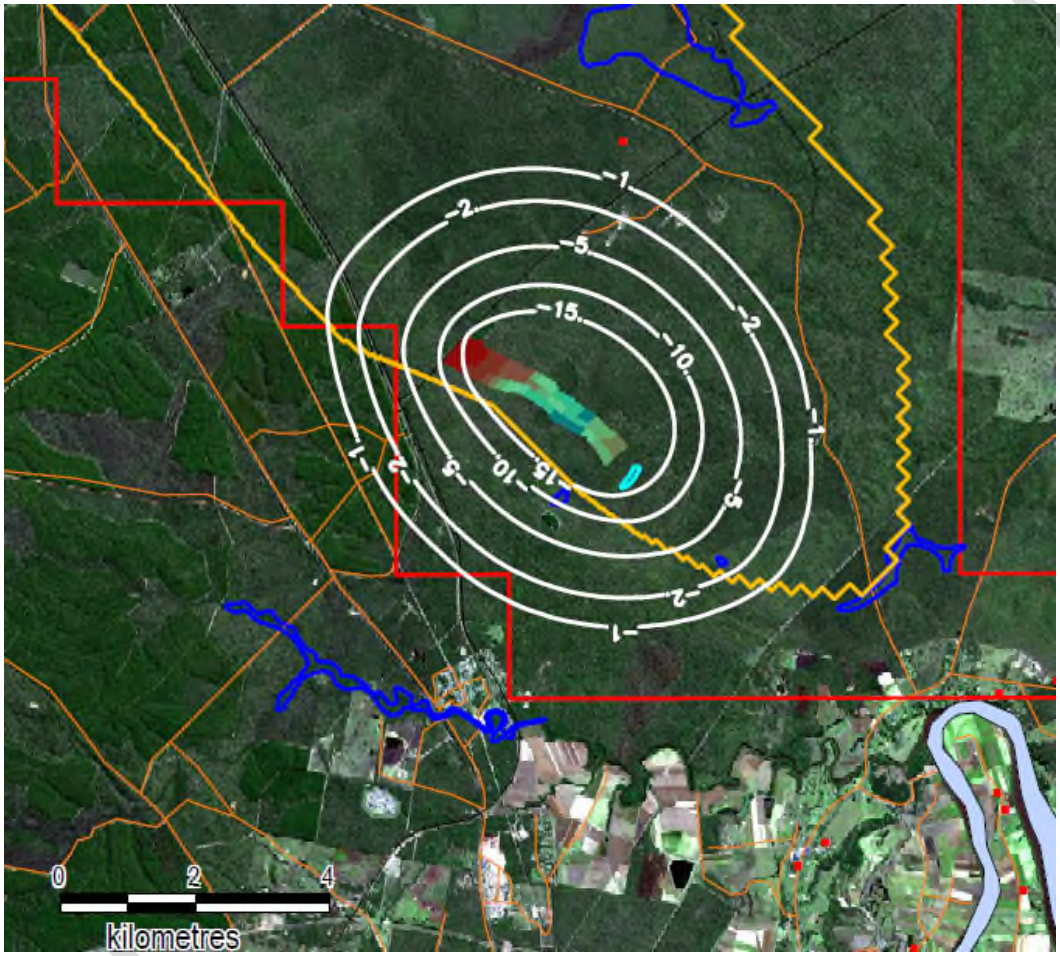

Figure 37 – Predicted drawdown levels for the area surrounding the mine
(source: Colton Coal EM Plan v3, Appendix E, AGE report Drawing 6)

Colton Coal identified a range of potential impacts that the proposed mine could have on the groundwater resource. These included:

- Contamination of the groundwater by acid and metalliferous drainage
- Leakage of contaminants from the proposed dams
- Groundwater depletion from the drawdown crested by the mine

- Potential negative impact on groundwater dependent ecosystems

Colton Coal has a specialist groundwater consultant assess the risk of mining activities causing contamination of the underlying groundwater. It was concluded that the drawdown of the groundwater table that would be induced by the dewatering of the pit would ensure that all seepage generated from the on-site dams, the exposed PAF layers in the pit walls and floor and the spoil pile, would ensure that all potential contaminants would be drawn towards the pit and captured in the dewatering. It appears that the level of overall risk to the groundwater table is reduced via this mechanism, however it was still considered that leakage detection and the potential for localised contamination of the underlying geological units meant that groundwater quality monitoring and leakage detection was required under the conditions of the EA.

The in pit spoil placement area had been designed to ensure that PAF material is encapsulated, and will be placed at a depth that is below the expected water level when the pit fills with water when dewatering is removed. This is the strategy that Colton Coal will employ to ensure that post mining pit water quality in the final void is non-polluting. This is consistent with best practice measures to control acid and metalliferous drainage from such PAF material.

Groundwater Monitoring and Limits
A groundwater monitoring program has been proposed by Colton Coal to:

- provide a means of early detection and management of groundwater related impacts
- assess the impact of de-watering due to dewatrering bores and seepage into the mine pit thus aiding in water supply/storage management
- identify any seepages and changes in groundwater quality as a result of de-watering or seepage from dam, spoil and stockpile areas
- to check for acid rock drainage generation and assess the performance of management strategies
- provide data for review of the groundwater model

Colton Coal has stated the purpose of groundwater monitoring to be as follows:

- Collect baseline / background data prior to mining, during operation and after mine closure;
- Provide a means of early detection and management of groundwater related impacts;
- Assess the progress of de-watering due to bores and seepage into the pit thus aiding in water supply/storage management;
- Identify any seepage from dams, spoil and stockpile areas;
- Identify any changes in groundwater quality as a result of de-watering or seepage from dams, spoil and stockpile areas to check for acid rock drainage generation and assess the performance of management strategies;
- Provide data for review of the groundwater model; and
- Satisfy regulatory requirements.

Groundwater monitoring will be undertaken using the existing network of monitoring bores shown in Figure 38 below.

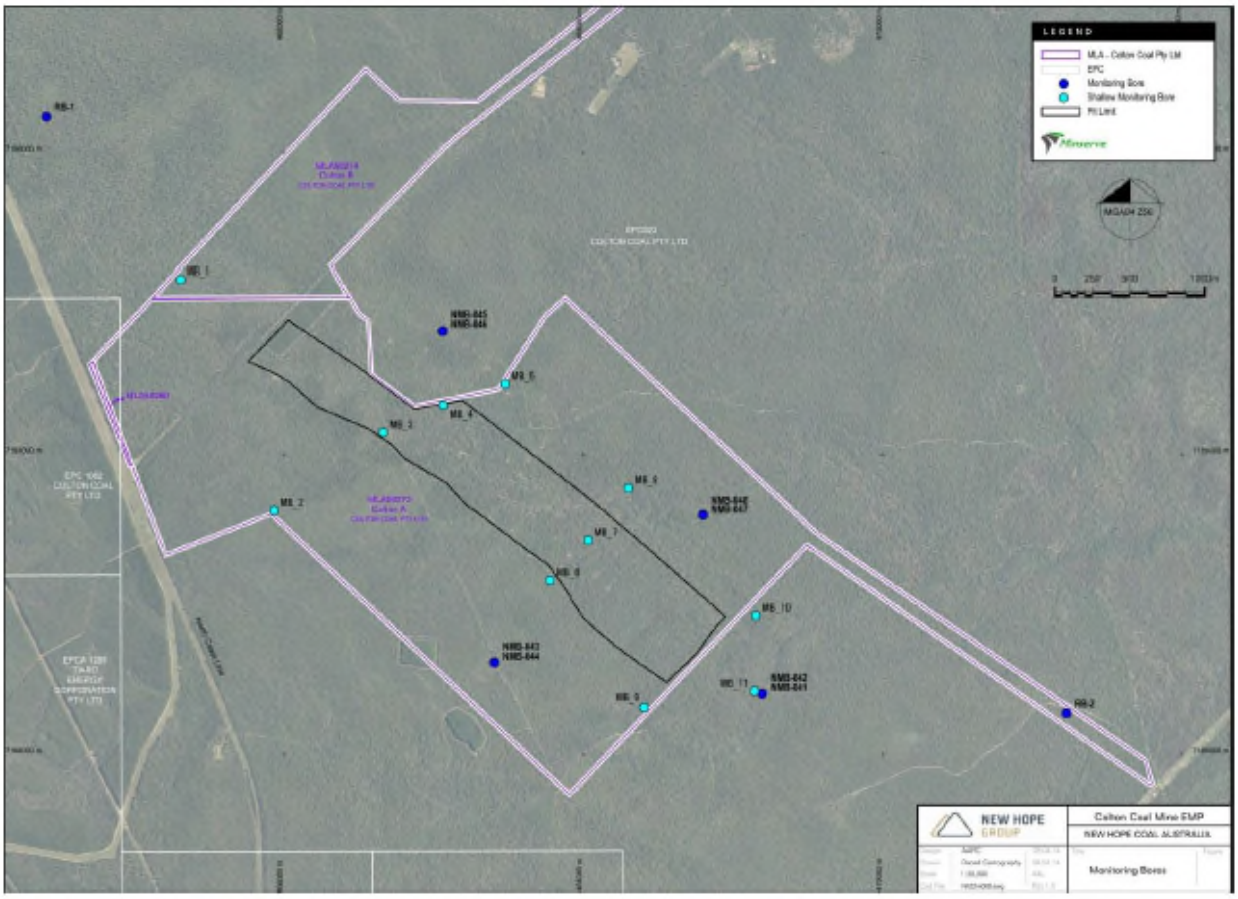

Figure 38 – Groundwater monitoring bore network
(source: Colton Coal EM Plan v3, Figure E2, p290)

Colton Coal has indicated that they do not want limits on groundwater quality to be imposed under the environmental authority conditions. This is not consistent with the EHP model mining conditions, and the standard ground water quality limit table is proposed, with groundwater monitoring parameters taken from either NHMRC & NRMMC drinking water guideline limits for the contaminant trigger level and the higher ANZECC & ARMCANZ livestock watering guideline value as the limit (unless baseline monitoring indicted higher baseline groundwater concentrations, in which case this was uses as the trigger value).

Groundwater quality monitoring and reference bore monitoring must be undertaken at the bores listed in Table 20 below. The groundwater trigger values and limits will apply to the bores indicated as compliance bores.If the groundwater trigger values are exceeded, Colton Coal must compare the compliance monitoring bore results to the reference bore results and complete an investigation in accordance with the ANZECC and ARMCANZ 2000, as required under the EHP model mining conditions. If the limits values are exceeded, they will be in breach of their approval conditions. The EA conditions will however include a caveat that a groundwater limit will not apply to a groundwater monitoring bore where a contaminant level in the bore is shown to be below the background levels as determined by an investigation which compares the monitoring bore result to reference bore results.

Table 20 – Groundwater quality monitoring bores

Monitoring Point	Location		Surface RL (mAHD)	Bore Depth (m)	Monitoring Frequency	Lithology Monitored	Comment
	Latitude (GDA94, decimal degrees)	Longitude (GDA94, decimal degrees)					
Reference Bores							
RB-1	25.41872814	152.6918421	Bores not yet installed.		Quarterly	Bores not yet installed.	
RB-2	25.39888363	152.6610721			Quarterly		
Compliance Bores							
NMB-041	25.4389873	152.6936504	19.20	51.38	Quarterly	Coal Seams	Nested bore installation
NMB-042	25.43897827	152.6936504	19.22	21.00	Quarterly	Claystone/ minor sandstone	
NMB-043	25.43707982	152.6758632	28.27	49.48	Quarterly	Clays, sandstone, mudstone	Nested bore installation
NMB-044	25.43708885	152.6758632	28.12	24.92	Quarterly	Sandstone	
NMB-045	25.41711496	152.6724761	31.05	56.22	Quarterly	Claystone with minor coal seams	Nested bore installation
NMB-046	25.41711498	152.6724861	31.05	12.35	Quarterly	Clay and coal	
NMB-047	25.42822377	152.6897296	20.09	60.70	Quarterly	Claystone with minor coal seams	Nested bore installation
NMB-048	25.42821474	152.6897297	20.09	30.60	Quarterly	Claystone, sandstone, mudstone with coal	

Groundwater level monitoring must also be conducted, and trigger values are specified on the EA for groundwater drawdown levels. Groundwater monitoring must be undertaken at the bores listed in Table 21 below. If the trigger drawdown values are exceeded, Colton Coal must compare the compliance monitoring bore results to the reference bore results and complete an investigation in accordance with the ANZECC and ARMCANZ 2000, as required under the EHP model mining conditions.

Table 21 – Groundwater level monitoring bores

Monitoring Point	Location		Trigger Level Threshold (m)
	Latitude (GDA94, decimal degrees)	Longitude (GDA94, decimal degrees)	
RB-1	25.41872814	152.6918421	na
RB-2	25.39888363	152.6610721	na
NMB-041	25.4389873	152.6936504	5
NMB-042	25.43897827	152.6936504	5
NMB-043	25.43707982	152.6758632	5
NMB-044	25.43708885	152.6758632	5
MB_1	25.41404112	152.6551632	2
MB_2	25.4279623	152.6612891	2

Post Mining Groundwater Recovery

Colton Coals consultants predict the groundwater level is to recover to within 50% of the pre-mining level within the first 2 years, 75% within about 9 years and an equilibrium level in 100 to 150 years.

No mitigation measures are proposed in relation to groundwater depletion as no existing users who may be impacted have been identified and depletion is not expected to result in any adverse impact on any of the identified environmental values.

Groundwater Dependant Ecosystems

The vegetation types present on the mining lease areas potentially contain wetland species, and EHP held concerns that some of the lease areas could contain groundwater dependant ecosystems (GDE). These are areas where the vegetation is maintained in its natural state by the presence of plant accessible groundwater. EHP required Colton Coal to conduct a study into the possible existence of GDE within the mining lease areas. This was based on two small areas of the lease being mapped as wetland under EHP wetland mappings.

Colton Coal's consultants found that perennial watercourses or surface water bodies do not exist within or in close proximity to the proposed mine site. Small water holes were observed within the non-perennial watercourses draining the proposed mine site, but Colton Coal's consultant stated that it is not believed that the non-perennial watercourses or water holes on-site have a significant link to groundwater. Colton coal's consultants have stated that there is some possibility that on occasion groundwater may locally discharge to watercourses on site. This would occur following periods of high rainfall which have recharged near surface localised aquifers in sand lenses or on ferruginous gravel and would not be expected to be of sufficient volume to generate flow in a watercourse. Groundwater discharge may also occur under similar circumstances where the coal measures outcrop or sub-crop near surface, although these discharges have not to date been observed by Colton coal. EHP mapping of GDE in the area indicates that the closest mapped area of GDE to the edge of the pit void is over 4.2kms away to the east of the mine site, on the Susan River, in the locale of the upstream extent of the areas mapped as HEV waters on the Susan River, as shown in Figure 28.

A study using soil moisture probes and shallow groundwater monitoring bores was conducted by Colton Coal's consultants to help assess whether the vegetation surrounding the mine site is reliant on shallow groundwater. The pH of shallow groundwater was found to be generally slightly acidic with a range between 3.62 and 5.77. Colton Coal's consultants claim that the concentration of total dissolved solids (range between 599 mg/L to 11,200 mg/L) show that most of the shallow groundwater can be classified as brackish to saline in nature. They suggest that based on the poor quality of shallow groundwater, combined with the discontinuous nature of the shallow aquifers, that vegetation on the Colton site is unlikely to be dependent on the underlying shallow aquifers as a water source.

To monitor for potential impacts of mining operations on groundwater dependent ecosystems that may be present within and surrounding the mine site, Colton Coal have established a shallow aquifer monitoring program and it will be continued when mining commences to monitor water level and quality in shallow aquifers on the Project site. It is anticipated, based on this preliminary assessment of the regional groundwater table being at a depth not accessible by most vegetation types in the area, and the shallow groundwater system most likely being localised perched lenses, that mining activities should not impact on areas of GDE that may exist (and not be covered by EHP mappings) other than the areas that are directly destroyed by land disturbing mining activities such as the pit, spoil pile and dams.

As per the current EHP model mining conditions, no specific conditions are included in relation to GDE impacts or monitoring.

Regulated Dams

The mine proposal includes and integrated water management system with five major storage dams (excluding minor stormwater settling dams etc). Each dam will hold water of varying water quality. The

size, capacity, design storage allowance (DSA) and extreme storm storage (ESS) details for each of the dams is shown below in Table 22.

Table 22 – Details of Regulated Dams to be constructed on the mine site

Dam	Max Catchment Area	1 in 20 DSA Volume from Method of Deciles	ESS Volume	Current Design Capacity
	ha	ML	ML	ML
CHPP Dam	17	199	57	203
MIA Dam	16	187	54	188
Worked Water Dam	77	901	259	3,995
Return Water Dam	0.4	4.7	1	25
Mine Water Dam	376	4,380	1,264	678
Total		5,672		5,089

The recently released EHP guideline titled *Structures which are dams or levees constructed as part of environmentally relevant activities* requires that any structures which are dams, or levees that are constructed as part of a mining activity are assessed to determine the consequence category for three failure to contain scenarios. This is required to be performed in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures*. This assessment then determines whether a structure is a 'regulated structure' for the purpose of the environmental authority, and sets the level of consequence category for a dam failure event as high, significant or low.

Colton Coal has conducted an assessment of the consequence category for each dam as required under the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* for each of the listed dams(note: this assessment is a risk assessment only, and is not part of a structural design process for the dam which when performed must be conducted by a qualified person). These results can be summarised as follows:

- CHPP, MIA and Return Water Dams – Significant consequence category based on potential for contamination with hydrocarbons
- Mine Water Dam – Significant consequence category based on potential metal contamination in water from overburden runoff, but could be high category given the dams proposed proximity to the mine pit as it is a possible safety issue for a dam break scenario where large volumes of water could flow over the pit high wall.
- Worked Water Dam – Significant consequence category based on potential metal contamination in water from overburden runoff and very small catchment scale.

At the time the application was made, this manual was a previous version that only covered failure to contain scenarios from overtopping and dam break failures. Colton have performed the two assessments, but have not covered the "failure to contain – seepage" scenario. The *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* states that any consideration of potential impacts on groundwater systems should consider the water quality of the potential receiving aquifer as well as the quality of fluid stored in the regulated dam.

Existing groundwater drawdown in areas surrounding resource operations (e.g. drawdown as a result of mine pit or underground mine dewatering) can also be considered when assessing the consequence of dam seepage on groundwater systems. It was taken into consideration that the open cut mine pit will result in considerable drawdown and groundwater capture from under all proposed storage structures on the Colton lease. For this reason, it was accepted that the failure to contain – seepage consequence category would be "low".

It was considered appropriate to require the client to conduct an initial assessment of the consequence category for each proposed dam, to enable EHP to consider the risk of the proposed storage dams. Once final design plans are completed for each dam, a new assessment of the consequence category for each dam must again be conducted in light of the additional detail that will be available on the design and siting of the dams. Recent changes made to the model mining condition mean that the details, including exact location, and dam consequence category no longer have to be included in the EA conditions, and are instead required to be contained within a Register of Regulated Structures, and these details need to be finalised prior to the operation of a regulated structure.

4. Assessment considerations.

Support and substantiation for the identified relevant considerations are given below under the appropriate headings:

i) Standard criteria (as applicable)

NOTE: when considering the standard criteria, comments related only to those considered relevant are required. For criteria considered not relevant to the matter, no notation is made. Information provided should reflect the complexity of issues for the application. Example text is provided for guidance.

Ecological sustainable development

The object of the *Environmental Protection Act 1994* is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (*ecologically sustainable development*).

Australia's *National Strategy for Ecologically Sustainable Development (1992)* defines ecologically sustainable development as: 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'.

Mining in general is not a sustainable activity *per se* due to the nature of the activity. Mineable resources are generally limited for a particular mine, and the mine with have a limited working lifespan because of this. There are also questions associated with the sustainability of the use of coal. The use of coal for purposes such as electricity generation to meet the communities energy needs and for the economic benefit of the State is considered a necessary development or use of the community's resources in accordance with the above interpretations of ecologically sustainable development.

Regardless, mining coal is an Environmentally Relevant Activity as defined under the *Environmental Protection Regulation 2008* (the version that was in force at the time of the application), and a proponent can mine coal under a relevant environmental authority for the activity. The question of whether coal mining activities in general sustainable is thus not addressed in this assessment, as this is outside of the jurisdiction that the approval process covers. This assessment is focused on ensuring that the mining activities are conducted in a manner that constitutes ecologically sustainable development for the particular mine and surrounding environment.

It is considered that the proponent has demonstrated the principles of ecologically sustainable development by proposing cleaner production techniques, waste minimisation and best practice environmental management programs, which includes a program to conduct rehabilitation of the areas that are subject to mining disturbance. The decision made to issue the draft environmental authority has integrated the long and short term economic, environmental, social and equity considerations.

The character, resilience and values of the receiving environment

The existing land use and designation of the subject site (Unallocated State Land) and surrounding areas and the location of sensitive land uses have been considered during the assessment process. The receiving environment has been considered extensively by EHP during the assessment of the application and proposed management options for environmental risks associated with the activity on the receiving

environment. Protection of the environmental values of the receiving environment was also considered when developing proposed conditions for inclusion on the draft EA for the application.

FOI 180401
Document 9

From: s22
To:
Cc:
Subject: RE: Colton Coal [SEC=UNCLASSIFIED]
Date: Friday, 27 January 2017 9:24:19 AM
Attachments: OWS Advice.docx

Hi s22

Please find attached advice from OWS regarding the Colton Coal reconsideration.

Please contact myself or s22 (out of office until Tuesday 31 Jan) if you have any questions.

Cheers

s22
Project Officer – Hydrology
Project Advice Team, Office of Water Science, Science Division
Department of the Environment and Energy
Phone: (02) 6275 s22 | Email: s22 @environment.gov.au
Nishi Building, 2 Phillip Law Street, Level 4, ACT 2601

From: s22
Sent: Wednesday, 18 January 2017 3:18 PM
To: s22 @environment.gov.au>
Subject: FW: Colton Coal [SEC=UNCLASSIFIED]

From: s22
Sent: Monday, 16 January 2017 10:41 AM
To: s22 @environment.gov.au>
Subject: Colton Coal [SEC=UNCLASSIFIED]

Hi s22
s22 suggested you may be able to help me with another Colton Coal request for reconsideration of the original NCA decision (made in 2010).
Attached is the request as well as a table I've put together with the matters they've raised and our response.
There are two water matters that I'm not sure about and I wondered if you could have a look?

Happy to discuss

s22

s22
Queensland Major Projects Section
Environmental Standards Division
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OFFICE OF WATER SCIENCE ADVICE
COLTON MINE PROJECT

Requesting section	Queensland Major Projects Section	**Requesting officer**	s22
Date of request	17/01/2017	**Date of advice**	27/01/2017
EPBC reference	EPBC 2010/5625	**OWS reference**	OWS 2017-002
Project assessment stage	Reconsideration request		
OWS contact officer	s22		
Cleared by	s22 A/g Director Project Advice Team	**Date**	27/01/2017

This document, prepared at the request of the Environmental Standards Division, outlines the Office of Water Science's technical advice on the Colton Coal Mine Project in relation to water quality concerns raised in the 2016 request for reconsideration by the Mary River Catchment Coordinating Committee. The OWS does not speak for, and our response has not been endorsed by, the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development.

The Colton Mine Project (the proposed project) proposal to develop a new open-cut coal mine approximately 11 km north of Maryborough, Queensland, was referred to the Department in August 2010. The project was determined to be "not a controlled action" (NCA) on 6 October 2010. The Mary River Catchment Coordinating Committee requested reconsideration of the NCA decision on 22 December 2016 (the Reconsideration Request) on the basis that new information has become available since the original decision. This advice relates to the information presented in that reconsideration request concerning water quality impacts of the mine.

The original referral documentation (NEC 2010a), the new Environmental Management Plan (EMP) (AARC 2014), and the 2015 EHP Assessment Report (EHP 2015), were used in preparation of this advice. It should be noted that these documents and their attachments constitute a large amount of information (over 1000 pages), thus a thorough review was not able to be undertaken by OWS in the timeframe provided. This advice is the result of a preliminary review of the documentation only.

Question 1: I would like OWS advice as to whether the items raised under 'Water Quality and Sediment in the Mary and Susan Rivers' (Items 6 to 12) contain: new information that was not considered when the original referral decision was made; AND information that demonstrates that a change in the potential impacts of the action is likely to happen with a high degree of certainty.

Yes. OWS considers that the items raised under 'Water Quality and Sediment in the Mary and Susan Rivers' (Items 6 to 12) contain new information AND information that demonstrates that a change in the potential impacts of the action is likely to happen with a high degree of certainty. However, without a more detailed assessment, OWS is unable to provide advice on the likely extent/magnitude of the change in potential impacts and relevance to MNES.

New information includes:

- the predicted volume of discharge from the proposed project has increased
- the predicted volume of discharge from the proposed project relative to the flow in the Mary River has increased
- the assessment of water quality impacts to the Mary River has been updated and impacts to Mary River water quality are now predicted, where previously impacts were assessed to be nil
- mine water management arrangements, including dam operation and criteria for discharging mine water to the Mary River, have changed.

Changes to potential impacts include:

- increases in levels of cadmium, cobalt, manganese, selenium & silver in the Mary River at the mine water discharge point
- concentrations of cadmium & cobalt remaining elevated further downstream at the High Environmental Value zone as a result of mine water discharges.

Details are provided below.

<u>New Information</u>

1. Items 6 to 12 of the Reconsideration Request do contain some new information that was not contained in the documentation associated with the 2010 referral of the proposed project.
    a. Item 6 presents new information in that the predicted volume of discharge from the proposed project has increased since the original referral decision was made.
        i. The original referral documentation states that the proposed discharge to the Mary River was an average of 946 ML/year (NEC 2010, p. 21). New documentation states that the proposed discharge to the Mary River could potentially be up to 6300 ML/year (EHP p. 65, WRM 2014 p. 29), but water balance modelling indicates it will be closer to 573 ML/year (median) with a maximum of 2750 ML/year (WRM 2014 p. 37, 40).
        ii. It is not possible to define the extent of change from the original reported average discharge, as the range (max, min) was not provided in the 2010 documentation

and the figure reported was an average, not a median as given in the 2014 documentation. The 2010 average sits between the 2014 median and maximum modelled discharges.

b. Item 6 also presents new information in that the predicted volume of discharge from the proposed project relative to the flow in the Mary River has increased from the "less than 0.01% of the total annual flow of the Mary River" at the discharge location (NEC 2010 p. 21) since the original referral decision was made. The increase in mine water discharge relative to Mary River flows depends on the time scale and how the Mary River flow is calculated but ranges from 0.003% to 0.8% of freshwater inflow to the estuary (as measured at the discharge point) per annum (details below).

    i. Discharge from the proposed project will be up to 5.8% of daily total freshwater flow at the discharge point. This is a daily maximum figure that will only be reached under specific flow conditions (where flow is approximately 150-300 ML/day as per WRM 2014 p. 28 Figure 5.6).

    ii. If releases were made whenever they were allowed under the proposed flow triggers (based on Mary River flow records, assuming discharge whenever the flow triggers are reached without taking into account whether the mine would actually need to discharge water at the time), the median ratio of mine water to freshwater inflow to the estuary would be 0.8% (unknown whether annual or daily; WRM 2014, p. 29). In practice, as demonstrated by modelled mine water releases, the ratio of modelled mine release to Mary River flow would range from 0.003% (1 in 30,050) to 0.22% (1 in 460) on an annual basis (WRM 2014 p. 37).

c. Item 7 presents new information on water quality impacts (also discussed in point 3, below).

    i. The operation of the Worked Water Dam (WWD) and Mine Water Management Dam (MWD) changed between the 2010 and 2014 documentation, with the main changes being that pit dewatering would be directed to the WWD, which will discharge to the MWD under certain conditions (NEC 2010b p. 14; EHP 2015 pp. 59–61). These changes to the operation of the dams may lead to associated changes to the water quality within them.

    ii. The 2010 referral documentation stated that there would be no impacts on the water quality of the Mary River due, in part, to the predicted quality of mine water discharge (NEC 2010a p. 23, 25). However, evidence to support this statement was not provided in the 2010 documentation. Maximum contaminant concentrations for the WWD and the MWD were presented as part of the Hazardous Dam Assessments (NEC 2010b pp. 14–19), but were not then related to expected mine water discharge quality or potential downstream concentrations.

    iii. The 2014 EMP (AARC 2014) provides predicted water quality data of mine discharge water and predicts downstream concentrations through dispersion modelling (Table 1), thereby providing new information on potential water quality impacts. As a result, the 2014 EMP predicts water quality impacts to the Mary River (EHP 2015 p. 70, DHI 2014 pp. 19–27).

Table 1: Modelled impact of mine water release on water quality objectives (DH1 2014 p. 27)

Metal	Concentration (µg/L)					
	Background Value	SMD Trigger	Marine HEV Guideline	Mine Discharge Water	Maximum Modelled Concentration at HEV Zone	Comments
Aluminium	49.2	55	0.0005	2.238	49.2	Background concentration exceeds the HEV guideline, but not the SMD guideline
Arsenic	10.0	13	0.0023	0.293	10.0	Background concentration exceeds the HEV guideline, but not the SMD guideline
Boron	2556	370	5.1	6.442	2556	Background concentration exceeds HEV and SMD guidelines
Cadmium	0.025	0.2	0.0007	0.236	0.030	Background concentration exceeds HEV and SMD guidelines
Chromium	0.400	1.0	0.00014	0.132	0.400	Background concentration exceeds the HEV guideline, but not the SMD guideline
Cobalt	0.10	1.0	0.005	0.578	0.112	Background concentration exceeds the HEV guideline, but not the SMD guideline
Copper	1.58	2.0	0.3	0.225	1.58	Background concentration exceeds the HEV guideline, but not the SMD guideline
Iron	57.2	300	No guideline	1.307	57.2	Background concentration well below SMD guideline
Lead	0.10	3.4	0.0022	0.082	0.10	Background concentration exceeds the HEV guideline, but not the SMD guideline
Manganese	3.82	200	0.09	61.168	5.13	Background concentration exceeds the HEV guideline, but not the SMD guideline
Nickel	1.48	11	0.007	0.575	1.48	Background concentration exceeds the HEV guideline, but not the SMD guideline
Selenium	0.5	10	3	14.555	0.812	In-stream concentration well below SMD and HEV guidelines
Silver	0	1.0	0.8	0.024	0.0005	In-stream concentration well below SMD and HEV guidelines
Zinc	21	8.0	0.007	1.313	21	Background concentration exceeds HEV and SMD guidelines

d. Item 8 presents new information in that the discharge criteria have changed between the 2010 documentation and the 2014 EMP. The original proposed discharge strategy related the rate of proposed discharge from the mine to relative flow in Mary River and concentration of contaminants in mine water. The 2014 EMP proposed release conditions include a Mary River low-flow trigger of 150 ML/day (allowing mine water release at 100L/s) and a medium-flow trigger of 300 ML/day (allowing mine water release at 200L/s). Releases in-accordance with the flow triggers would comprise a maximum of 5.8% of freshwater inflow to the estuary on a daily basis, under specific flow conditions (WRM 2014, p. 28).

    i. The Queensland Department of Environment and Heritage Protection (EHP), upon advice from the Queensland Department of Science, Information Technology, Innovation and the Arts (DSITIA) Water Assessment & Systems group water scientists, determined the 2010 release strategy may be too complex to implement (EHP p. 63). DSITIA Water Assessment & Systems water scientists consider the 2014 strategy will ensure protection of environmental values in the downstream High Environmental Value (HEV) zone (EHP p. 64).

e. Item 9 does not present any new information as, despite the different dam classification, there has been no material change in the purpose or design of the dams between the 2010 documentation and the 2014 EMP. The 2010 surface water management report (PSM 2010) states the MWD will have a capacity of 670 ML (p.19) and does not specify the capacity of the WWD. The 2014 documentation states the MWD capacity will be 678 ML (WRM 2014, p. 27).

    i. OWS notes that the proposed MWD sizing does not appear to result in an adequate storage volume to meet Design Storage Allowance (DSA) guidelines (EHP 2016) for a significant hazard dam. This may result in higher-than-apparent risk of uncontrolled discharge to the Susan River. The 2014 EMP states with regard to the MWD that 'the potential impact of spillway overflows on the receiving environment will be virtually eliminated by directing spillway flows to the mine pit' (AARC 2014 p. 210); however figures provided regarding mine stage development,

which include drainage features, do not show that water will be able to flow into the pit until at least year 4 of mining (AARC 2014 pp. 157-158).

f. Item 10 presents new information in that the WWD, which may contain higher levels of contaminants, will now be managed for zero uncontrolled discharge and will include controlled discharge to the MWD under certain conditions (EHP pp. 59–61). The 2010 documentation did not allow for discharge from the WWD to the Mary River (via the Mine Water Dam), only uncontrolled discharge via overflow to the Susan River (NEC 2010a, p. 19).

g. Item 11 presents new information in that water quality monitoring in the Susan River was proposed in the 2010 documentation (NEC 2010b p. 41) and is no longer proposed in the 2014 EMP (AARC 2014 pp. 282–284). This is the location that would be subject to incidental spills from the water management system, uncontrolled discharges in extreme events, and downstream erosion and sedimentation impacts during construction.

h. Item 12 does not present any new information as the 2010 documentation identified reduced flow to the Susan River (NEC 2010b p. 21).

Change in potential impacts

2. OWS considers that the new information discussed in Point 1 (above) indicates that a change in the potential impacts of the action is likely to happen with a high degree of certainty.

3. The 2010 documentation predicted no/nil impacts on the water quality of the Mary River (and downstream receptors such as listed species and the Great Sandy Strait Ramsar site) based on available information on the predicted quality and volume of mine water discharge relative to the volume of passing flows in the Mary River (NEC 2010a p. 23, 25). New information has been presented on the predicted water quality and discharge volumes in the 2014 EMP (AARC 2014). This new information indicates there *will* be an impact on the water quality of the Mary River. The potential magnitude/extent of that change is discussed below.

    i. The Colton Mine Mary River Dispersion Study (DHI 2014) in the 2014 EMP predicts that worst-case scenario mine water discharge will increase levels of cadmium, cobalt, manganese, selenium & silver in the Mary River at the discharge point, to levels above existing background concentrations. The assessment assumed 150 ML/day flows with mine water release at 100L/s during the first year of the 10-year mine life where water quality is expected to be worst (EHP 2015 p. 70, DHI 2014 pp. 19–27).

    ii. The same assessment predicts that concentrations of cadmium & cobalt from mine water discharges may remain elevated further downstream, at the High Environmental Value (HEV) zone. At this point predicted concentrations were modelled to exceed the HEV Guideline values (see Table 1) and the contribution of the mine discharge water to these predicted concentrations is not clearly specified. Background contaminant levels presented in Table 1 are already well above guideline values. The Dispersion Study (DHI 2014) concludes that “the increase to in-stream metal concentrations as a result of the mine water discharge is not significant compared to the background concentrations” (see Table 1; EHP 2015 p. 70, DHI 2014 pp. 19–27). However, the OWS has not had the opportunity to

conduct a detailed review of dispersion modelling to assess accuracy of predicted downstream contaminant concentrations resulting from the proposed action.

iii. The way that modelled and pre-impact water quality values were compared may understate the extent of the impact. The 80th percentile water quality monitoring results were adopted to represent "background" levels for contaminants in the 2014 EMP (AARC 2014 pp. 197–198, DHI 2014 p. 27). Using values from the upper limits of the range of data collected (such as the 80th percentile) may over-estimate existing levels of contamination, thereby lessening the apparent impact of the mine water discharges when compared to "background" water quality. The median or mean values would be more commonly used for comparison.

iv. The 2010 assessment of no/nil impacts to listed species and the Great Sandy Strait relied on there being no impact on the water quality of the Mary River (NEC 2010a p. 11, 15, 23, 25). Impacts to the water quality of the Mary River are now predicted to occur (EHP 2015 p. 70, DHI 2014 pp. 19–27) and associated impacts to the Great Sandy Strait Ramsar site and listed threatened species and communities has not been re-assessed. The proposed project may therefore contribute to the cumulative effect of metals contamination in the Mary River on downstream sensitive receptors such as listed species and the Great Sandy Strait Ramsar site. The OWS notes that as background concentrations are already above the water quality objectives, any additional increase will make it more difficult for the objectives to be met.

b. The lack of water quality monitoring in the Susan River in the 2014 EMP (AARC 2014) means that any potential impacts to the Susan River from uncontrolled discharges or sedimentation impacts may not be detected.

<u>Other issues of note</u>

4. New Hope Group have indicated publicly that if this application is approved then a subsequent application could be made for a much larger mining operation in the same area (EHP report p. 6).

5. Less than 1/3 of spoil will be returned to the pit (EHP p. 26) and there is no water balance modelling provided for the final pit void to assess risk of contamination & overflow.

References

AARC 2010. *Colton Mine Project EPBC Matters Report*.

AARC 2014. *Colton Mine Project Environmental Management Plan*

DHI 2014. *Colton Mine Mary River Dispersion Study: Model Development, Calibration and Analysis*.

EHP 2015. *Assessment report: environmentally relevant activities. Colton Coal Mine*. EHP, Queensland.

EHP 2016. *Manual for assessing consequence categories and hydraulic performance of structures*. EHP, Queensland.

NEC Ltd 2010a. *Referral of proposed action*

NEC Ltd 2010b. *Colton Coal Mine Water Management Plan*

PSM Australia 2010. *Colton Mine Surface Water Management.* Report no. 327.01

WRM 2014. *Colton Project Site Water Management Assessment*. Appendix L of Colton Mine Project Environmental Management Plan. Available at: http://www.newhopegroup.com.au/content/projects/development/colton

FOI 180401
Document 10

From: s22
To:
Cc: Ramsar EPBC advice; s22
Subject: EPBC 2010/5625 RECONSIDERATION wetlands advice [SEC=UNCLASSIFIED]
Date: Thursday, 2 March 2017 12:52:25 PM
Attachments: image001.jpg
2010-5625 RECONSIDERATION Colton coal mine project Maryborough QLD-Wetlands Advice-Final.pdf

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Hi s22

I have attached wetlands advice for EPBC 2010/5625 (RECONSIDERATION).

Kind regards, s22

s22
Senior Policy Officer
Wetlands Section | Wetlands, Policy and Northern Water Use | Commonwealth Environmental Water Office
Department of the Environment and Energy | Australian Government
GPO Box 787, CANBERRA ACT 2601
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http://www.environment.gov.au/water/topics/wetlands

cid:image014.jpg@01D2893B.C52619D0

DEPARTMENT OF THE ENVIRONMENT

COMMONWEALTH ENVIRONMENTAL WATER OFFICE

EPBC ACT RECONSIDERATION ADVICE FROM WETLANDS SECTION

REFERRAL: EPBC 2010/5625

DATE DUE BACK TO EACD: 7/3/2017

COLTON COAL MINE PROJECT, MARYBOROUGH, QLD – RECONSIDERATION

The Colton Mine Project proposal to develop a new open-cut coal mine approximately 11 km north of Maryborough, Queensland, was referred to the Department in August 2010. The project was determined to be "not a controlled action" (NCA) on 6 October 2010. The Mary River Catchment Coordinating Committee requested reconsideration of the NCA decision on 22 December 2016 on the basis that new information has become available since the original decision. This advice relates to the information presented in that reconsideration request concerning potential water quality impacts of the mine on the Great Sandy Strait Ramsar wetland.

The request for reconsideration is at Attachment A.

Brief Description of Project

The proposal is an open cut coal mine in the Maryborough Basin, in south east Queensland. The company proposed to mine an estimated 5.9 Million tonne (Mt) coking coal reserve of the Burrum Coal Measures at a rate of approximately 1.00 Mt run of mine (ROM) coal per year to produce an average of 0.50 Mt per annum (Mtpa) of product coal for export. Project production life was anticipated to be 8 to 10 years.

The project has not yet commenced, given issues with finalising an Environmental Management Plan (EMP) for the project (with revisions of Sept 2011 and May 2014, in response to Qld DoE determination that original EMP was non-compliant).

Rainfall in the area of the mine site is high, so surface water management measures were proposed. The majority of rainfall was to be diverted around the mine infrastructure as clean water. Rain that falls in the mining pits, combined with groundwater that seeps into the pits, was expected to total approximately 1 000 ML per annum. The mining operation (including dust suppression, the CHPP water needs, etc) does not require such a large volume of water, thus the mining pits were to be dewatered and discharged to the mine water management dam. Once this dam reaches a certain level it was to be discharged to the Mary River.

Issues Checklist

How far is the proposal from a Ramsar site?

The proposed action is approximately 5 km from the nearest edge of the Great Sandy Strait Ramsar site, listed under the Convention on Wetlands of International Importance in 1999 (Attachment B - distance estimated from ArcGIS). The mine was to release water into the Mary River at a point approximately 12.5 km upstream of where it enters the Ramsar site.

Ramsar wetland and key ecological characteristics

The Great Sandy Strait is a particularly outstanding Ramsar site in Australia in that it supports a large diversity of wetland habitats and a high diversity of wetland flora and fauna species, a number of which are nationally and internationally threatened. It also supports several community types that reflect the transition between tropical and temperate marine and coastal zones. The proximity and connectivity between wetland types further enhances biodiversity and productivity in the site. At the date of listing, the site met seven of the current Ramsar criteria.

The site supports a diverse and regionally significant area of seagrass beds as well as mangrove wetland habitats that comprise species at, or near to, their northern or southern geographical limits. The site also supports large intertidal mud and sand banks, small but regionally significant coral reefs and sponge gardens, and other estuarine elements. These habitats in turn support feeding, roosting, shelter and/or migration pathways for abundant and diverse communities of crustaceans, fish, sea turtles, mammals (dolphins, dugong, whales, a water mouse), migratory and resident shorebirds, sponges and corals. The site is at or near the limits of geographic extent for several species of flora and fauna. A substantial area of non-forested peat swamp, comprised mainly of rare 'patterned fens', occurs within the site. These fens together with areas of 'wallum' heath swamps, support species adapted to the prevailing acidic water and substrate including threatened frogs and fishes as well as species of crayfish and earthworm.

An Ecological Character Description (ECD) for the site is currently being finalised by the Queensland Department of Environment and Heritage Protection. The draft ECD sets out the following critical components, processes and services of the estuarine and marine wetlands of the Great Sandy Strait Ramsar site which are relevant to this proposed development:

Ecological service	**Contributing components and processes**
Seagrass habitat - regional significant area and diversity of species	Hydrology - Freshwater flows Physicochemical components - Nutrient loads, turbidity, toxins, light and salinity
Mangroves - large and diverse areas of mangrove communities	Hydrology - Freshwater flows Physicochemical components - Nutrient loads, turbidity
Subtropical and inshore reefs - including coral and sponge communities near their geographic limits	Physicochemical components - Nutrient loads, turbidity, salinity
Nationally threatened marine turtles	Habitats – extent and condition of food resources (seagrasses, sponges, soft coral, other benthic invertebrates) Nutrient dynamics – seagrass and invertebrate food production
Large numbers of marine mammals including cetaceans and internationally vulnerable dugong	Habitats – area and condition of seagrass, mangroves, coral reefs and sponge habitat (preferred foods) Hydrology – freshwater flows Physicochemical components – water quality to support habitats and food webs Nutrient dynamics – primary and secondary productivity
Substantial stocks of fish, prawns and crabs	Habitats – diversity, extent of spawning, feeding and migration habitats Hydrology – Freshwater flows Physicochemical components – water quality, especially turbidity and salinity Nutrient dynamics – primary and secondary productivity

Large numbers of waterbirds, with high counts of 8 species of shorebird, including far eastern curlew	Habitats – feeding and roosting areas Physicochemical components – water quality Nutrient dynamics – food abundance and availability

Issues to note

The reconsideration request was based on material in the 2014 EMP, which identifies a number of changes to the project. Those considered to be substantive new information by ESD include:

- discharge was to be less than 0.01% of river flow, but actual discharge could be up to 5.8% of daily flow – this could impact on effectiveness of dilution of contaminants. Increased concentration of contaminants in Mary River could impact on water quality in Ramsar site and potential health of habitats and species.
- In the case of cadmium, cobalt, manganese, selenium and silver, the proposed mine discharge concentrations will exceed the background concentrations in the Mary River. Although the Mary River already has high levels of heavy metals, the proposed mine discharge will increase concentrations of these heavy metals. High concentrations can have an immediate impact on water quality and habitat health in the river and downstream in the estuary (part of the Ramsar site). Total load can be a longer-term issue due to concentration in the food web. The aim should be to maintain or improve water quality in the ecosystem, not allow it to deteriorate further.
- The discharge criteria have changed so that only the flow rate in the river is considered (not the river water quality or level of pollutants in the wastewater) – these are important in determining concentrations and loads of contaminants in receiving waters.
- Mine water management arrangements have changed. All dams will have water (including from plant infrastructure area) transferred into the one Mine Water Dam, which will discharge to the Mary River – impacts of this on likely discharges and downstream impacts need to be considered.
- Water quality monitoring has been reduced (2014 EMP requires no monitoring of receiving stream sediment in Mary River or Susan River and no contaminant or trigger levels for sediment). While EHP Assessment recommended a management rather than monitoring approach, monitoring is required to assess concentrations and total amounts of contaminants to detect potential short and long-term impacts on the ecological character of the GSS Ramsar site.

An increase in size of reserve (doubled to 12 million tonnes) was identified, potentially increasing the chance of mine expansion with potentially greater impacts on the Great Sandy Strait Ramsar site. However, any future expansion of the mine would be referred and assessed separately

Potential impacts (based on new information since referral)

Areas of the wetland being destroyed or substantially modified

No change - The project does not involve any earthworks or clearing within the boundary of the Ramsar site, thus it is not likely that areas of the wetland will be destroyed or substantially modified as a result of the proposed action.

A substantial and measurable change in the hydrological regime of the wetland

Change - Discharge was to be less than 0.01% of river flow, but actual discharge could be up to 5.8% of daily flow.

This represents a change, but is not considered to be a substantial and measurable change, in the hydrological regime of the wetland as a result of the proposed action. However, should there be a series of high rainfall events, there may need to be unscheduled releases from the dam, which if it was already full, have the potential to significantly increase freshwater outflows to both the Mary and Susan Rivers, and into the Great Sandy Strait estuary.

A substantial and measurable change in the physico-chemical status of the wetland

Mine water can be contaminated with salt, acid and metals from acid rock drainage (or acid sulphate soils), and sediments. Additional contaminants from the mine site such as oils, fuels and detergents may also end up in mine runoff.

The original proposal stated that dilution would reduce impacts of total dissolved solids (TDS), water quality monitoring would detect signs of acid rock drainage and a management plan would be implemented, mine discharge water will be monitored, and will be treated before release if trigger levels reached for EC, pH or DO, the receiving water will also be monitored at points upstream and downstream of the mine site each flow event, and upstream and downstream of the discharge point monthly, and if trigger points exceeded, then the proponent will investigate potential environmental harm and notify the administering authority, and that suspended sediment and fine silt in mine water should settle out in the mine water dam.

Changes – Given the potentially larger volume of discharge water in relation to passing flows at the Mary River, despite the 12.5 km downstream distance to the Ramsar boundary, impacts on the Ramsar site are possible.

These could be due to one-off high concentrations of contaminants in mine water discharge, or accumulation of contaminants over the expected 8-10 year lifespan of mining activities at the site.

With the limited monitoring measures now included in the 2014 EMP (as outlined above) it may be difficult to determine potential contaminant risks to the Ramsar site.

It is possible there could be a substantial and measurable negative change in the physico-chemical status of the wetland as a result of the proposed action. It will be difficult to determine this unless monitoring is undertaken to detect adverse changes. Monitoring will also allow appropriate management action to be taken in a timely manner.

The habitat or lifecycle of native species dependent on the wetland being seriously affected

The proposed action is approximately 5 km from the nearest edge of the Ramsar site, so the site itself is unlikely to represent a significant habitat resource for native species dependent upon the wetland.

However, if mine water discharges decrease the water quality of the receiving environment, the action does have the potential to impact the stream and estuary habitat of native species dependent on the Ramsar site and benthic animals that form the basis of the food web.

Possible impacts of declines in water quality within the estuary (due to heavy metal contaminants, salt, acid and sediments) may include smothering and toxicity to seagrasses, invertebrate fauna and other food organisms, which in turn may adversely affect fish, mammals and birds, particularly through heavy metals, which can accumulate in the food chain. These are all critical components, processes and services which make up the ecological character of the Ramsar site.

The habitat or life cycle of a native species dependent upon the wetland is likely to be impacted as a result of the proposed action. Monitoring of water quality in the receiving waters of the Mary River and the Ramsar site would reveal any potential impacts and allow mitigating action to be taken.

An invasive species that is harmful to the ecological character of the wetland being established or encouraging of existing invasive species

No change - It is not expected or likely that an invasive species which is harmful to the ecological character of the wetland will become established, or that the spread of existing invasive species will be encouraged, as a result of the proposed action.

Conclusion

Changes to the management of discharge water set out in the 2014 EMP have the potential to adversely affect the ecological character of the Great Sandy Strait Ramsar site (through impacts on water flows in high rainfall conditions, and on water quality, habitats and species). It is considered that monitoring should be undertaken to enable sufficient knowledge to adequately predict and manage the potential impacts of the proposed action. This monitoring should cover both concentration and amounts of contaminants in discharge water and receiving waters, to enable the proponent to detect if these might cause a change in ecological character, and for them to take mitigating action. An operational plan to manage mine water during high rainfall events to avoid unscheduled releases would also be appropriate, given the risks such releases would pose to the Ramsar site.

Advice prepared by:	s22
Other DotE areas consulted:	No
Is OWS providing advice?	Yes (examined)
EACD Referral Officer:	s22

Cleared by: s22 Director: Wetlands Section

Signature:.. s22 .....

Date: 28 February 2017

Cleared by: John Foster, Acting Assistant Secretary: Wetlands, Policy and Northern Basin Branch

Signature: s22 .....

Date: 2 March 2017

Sources:

- ArcGIS
- ECD
- Environment Reporting Tool: Interactive Map - internal
- Referral Documentation
- Request by Mary River Catchment Coordinating Committee for reconsideration
- Information and advice from Qld Team and OWS

ATTACHMENT A

MARY RIVER CATCHMENT COORDINATING COMMITTEE

INTEGRATED CATCHMENT MANAGEMENT

Resource Centre	25 Stewart Terrace, Gympie
Postal	PO Box 1027, Gympie, Qld. 4570
Telephone	(07) 5482 4766
Fax	(07) 5482 5642
E- mail	admin@mrccc.org.au
Website	www.mrccc.org.au

Working towards a sustainable and productive catchment

22 December 2016

Environment Assessment Branch
Department of the Environment
GPO Box 787
Canberra ACT 2601

epbc.referrals@environment.gov.au

CC: Minister Frydenberg, Josh.Frydenberg.MP@aph.gov.au

Dear Delegate

Re: Request for reconsideration of the proposed Colton Mine Project as a Controlled Action (Referral Number 2010/5625)

The Mary River Catchment Coordination Committee (MRCCC) is a community based catchment management group which adopts a science based approach to the challenges of integrating multiple land uses within the Mary River catchment. We have particular expertise in water quality analysis and in assessing impacts on biodiversity and water quality associated with land use change. At the time of the initial public comment period for the proposed Colton Mine (August 2010), the MRCCC was not aware of the Referral until it was too late to make a submission and we did not make comment. However we have major concerns about the proposal and have met with Department of Environment Staff about the proposal on two occasions (February 2012 and February 2016). During these meetings we highlighted concerns about the water quality and ecological impacts on the Great Sandy Strait Ramsar Wetland and the many threatened and migratory species that use the Great Sandy Strait, as well as concerns about other EPBC listed threatened species including the vulnerable Wallum Sedgefrog (*Litoria olongburensis).*

The 2010 Environmental Management Plan, from which much of the 2010 Referral Documentation was drawn, was considered non-compliant by the State Government department for several reasons including that it has not adequately addressed the potential impact to the Mary and Susan Rivers (and therefore to the Great Sandy Strait). The new owners of the project, New Hope Coal, submitted a revised plan in September 2011 which was not made public and which the EHP again deemed non-compliant due in part to concerns regarding uncontrolled releases to the Susan River and discharge to the Mary River. The current EMP was released in May 2014 and the Environmental Authority granted in August 2014. Given that the original Referral decision was made on the basis of documentation which the State Government considered non-compliant with regard to issues that pertain to Ramsar impacts it would seem pertinent for the Commonwealth to revisit the project on the basis that the initial information provided was insufficient to assess whether or not there would be a significant impact.

In 2016 there is substantial new information available compared to when the referral was made in August 2010. Some aspects of the project relevant to Matters of National Environmental Significance have changed and new information has been made available. The new information sources include version 3 EMP (2014), the documents associated with a recently concluded Court Case in the Queensland Land Court (2016) and the EHP Assessment Report for the project (2015).

The MRCCC gratefully acknowledges the support of
The Sunshine Coast Regional Council, Noosa Council and Gympie Regional Council,
the Australian Government Department of Environment, the Burnett Mary Regional Group, the Department of Transport and Main Roads, the Department of Science, Information Technology and Innovation
Seqwater, Unity Water, HQPlantations, Bendigo Bank Cooroy
and landholders throughout the Mary Catchment.

On the basis of the substantial new information which has come to light since the Referral and was therefore not considered by the delegate, we request a reconsideration of the proposal as a controlled action under section 78(1)(a) of the *Environment Protection and Biodiversity Conservation* Act 1999. Our request is focused on the threat of a significant impact to the Great Sandy Strait Ramsar Wetland and the threat to EPBC listed species (please refer to the map enclosed which shows key features adjacent to the mine site).

The key issues which on their own represent substantial new information are summarised in dot points below. Further detail of these and other points is provided in the Table attached to this letter. The table provides a summary of new information available in 2016 relative to what was available during the Referral process. In the table, the new information is divided into three sections – general information (5 issues), water quality and sediment (7 issues) and threatened species (4 issues). For each piece of new information we provide a comment on the potential impact. This table and the dot points below constitute the basis on which we request a reconsideration. We suggest that, taken together, all of these pieces of new information represent substantial new information other than that considered by the delegate in 2010. This new information indicates a significant increase in the potential impacts of the project to Matters of National Environmental Significance compared to the information provided to the delegate at the time of the Referral.

New information regarding impacts on the Ramsar site

In the referral three justifications were given to suggest that the impact on the Ramsar site from the mine would be "nil". They were:

- The design of the Mine Water Management Dam, which gives consideration to maximizing sediment retention in order to minimize any deposition of sediments during any extreme weather event;
- The proposed discharge to the Mary River (average of 946 ML/yr) is considered to account for less than 0.01% of the total annual flow of the Mary River at the discharge location;
- The discharge location is a significant distance (8 – 12.5 km) from the entrance to the Great Sandy Strait.

There are two possible means by which the Mine could have an impact on the Ramsar site and there is new information relating to each of these for the purpose of a reconsideration:

1) impact of controlled releases into the Mary River;
2) Impact of uncontrolled releases into the Susan River due to a failure to contain or dam break scenario.

The key new information with regard to each is as follows (please refer to the table below for more detail):

Key new information related to releases to the Mary River

1. The Referral stated that the discharges to the river would equal only 0.01% of the total annual flow of the river. In the 2014 EMP this has increased to up to 5.8% of the daily flow. This represents a very substantial increase in the proportion of the flow that will be polluted mine wastewater.
2. This wastewater exceeds the guidelines for Heavy Metals for High Environmental Values waters of the Great Sandy Strait for Aluminium, Arsenic, Boron, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Nickel and Zinc. When dilution with the River is taken into account the proponents own modeling shows that the wastewater releases would increase concentrations of cadmium, cobalt, manganese, selenium and silver above existing background concentrations and cadmium, cobalt and manganese concentrations would exceed HEV guideline values.
3. The HEV/Ramsar waters are 8 km downstream of the discharge point rather than the 12.5 km stated in the referral document. Analysis performed for the Land Court Case found this section of the estuary to be "well-mixed" (McGowan 2015) which would imply it is not reasonable to assume that concentrations between the release point and the Ramsar site will change significantly given there are no significant tributaries entering the river in this stretch.
4. Monitoring of sediments in the Mary River was proposed in 2010 in the EPBC Matters report submitted with the Referral. This has changed in the 2014 EMP and now no monitoring of receiving water sediments will occur during operation of the mine.

Key new information related to the impact to the Susan River

The Referral stated that there would be no impact on the Susan River, however the EMP 2010 stated that:

- *Given the presence of the Great Sandy Marine Park and HEV Zone in the estuarine reaches of the Susan River approximately 10km downstream of the site,* ***there would be potential for harm to a significant environmental value in the event of a failure to contain scenario****. (Colton EMP 2010 pp198)*

1. In the 2014 EMP, the design criteria for the dams containing heavy metal polluted water (the Mine Water Dam from which releases to the Mary River occur and uncontrolled to the Susan could occur and the Worked Water Dam, from which uncontrolled releases to the Susan could occur) have been changed so that they have less stringent design criteria.
   - In the documents provided in association with the Referral, both of these dams were rated as High Hazard in the Dam Hazard Assessment (see Colton Mine Water Management Plan 2010 pgs 14-20). According to the Queensland Department of Environment and Heritage Protection Code of environmental compliance for Environmental Authorities for High Hazard Dams Containing Hazardous Waste" which was used in the 2010 EMP and ANCOLD 1999 guidelines referenced in this Code, a high hazard dam containing polluting liquors shall be designed so that "no liquor… is released for less than a 1 in 100 AEP storm and that for larger storms to spill it shall be demonstrated that there is sufficient dilution to prevent downstream environmental damage"[1].

   - In the current design their hazard has been downgraded to Significant (2014 EMP pg 210-212). As a consequence the dams are now designed for a 1 in 20 year critical wet season and for a 1 in 10 year storm (see Department of Environment and Heritage Protection's (EHP) Manual for Assessing Hazard Consequence and Hydraulic Performance of Structures (version 4, EHP, 2013 https://www.ehp.qld.gov.au/land/mining/guidelines.html) If the dams had been rated as High Hazard they would have been designed for a 1 in 100 year critical wet season and a 1 in 100 year storm according to these guidelines. According to the 2013 guideline used in the 2014 EMP, a dam that threatens a MNES, MSES or HEV should be given a High Hazard and sized accordingly to reduce the chance of uncontrolled discharges. Instead the less stringent criteria for a Significant Hazard dam have been used.

2. The current plan for the mine relies on the mine pit holding excess water to avoid uncontrolled overflow of the dams. When this occurs the mine will have to stop production.
   - Avoiding overflows into the Susan River requires adherence to a complicated water management system and stopping production to allow for the Mine Pit to hold the excess water.
   - The modeling of site water balances which are used to design storages and ensure that there is sufficient capacity on site to prevent uncontrolled discharges do not make allowance for an increase in groundwater inflow to the mine site during wet seasons.
   - Downgrading the dam design presents an increased risk of overflows and dam failure which would directly impact on the Susan River ecosystem and the Ramsar site. The proponent underestimates this risk and has not conducted the analysis needed to prove that their claims of negligible impact are justifiable. They assume dilution will be sufficient to mitigate impacts of wastewater in the smaller Susan River catchment, despite the same wastewater exceeding guidelines in the much larger Mary River.

3. The potential for dam break in which one of the dam walls fail is not considered anywhere in the EMP assessment process. This is despite WRM Consultants recommending it (See EMP 2014 Appendix L pg 24) for the Mine Water Dam: "A failure impact assessment will need to be completed for this dam. Given its proximity to the mine pit, it is possible it will be assigned a High Consequence category for the dam break scenario." No such impact assessment has been provided.

4. There has been no analysis performed by the proponent of potential impacts of the heavy metal contaminated water referred to above on the relatively pristine Susan River system and no ongoing monitoring proposed in the draft Environmental Authority conditions.
   - An assumption has been made that impacts of any unanticipated overflow would be mitigated by dilution despite the fact that the Susan River stream flow is significantly less than the Mary River. The impact on this

[1] ANCOLD 1999 Guidelines on tailings dam design construction and operation, http://www.infomine.com/library/publications/docs/ANCOLD1999.pdf, pag.e 31

important fish habitat and surrounding swamps and wallum vegetation, including acid frog habitat could be significant. Furthermore any flows would be discharged into a small catchment (7 km2) with small ephemeral flows and mean annual runoff estimated at 216mm/a or 48L/s (EMP 2010 Surface Water Management Report). As mentioned above, the mine wastewater exceeds guideline values of eleven heavy metals for High Environmental Value waters. The water is also turbid, saline and acidic.

- Due to the topography of the area, during a high flow event the discharge would spread out over the landscape before being captured in the stream channels that flow into the Ramsar site and the Fish Habitat downstream. The saline nature of the water would have an impact on these watercourses as they are fresh in the vicinity of the mine site and do not experience a tidal influence until about 6 km downstream.
- The lack of ongoing monitoring proposed for the Susan River sediments or water quality (or required in the Environmental Authority) means that the impact of any uncontrolled discharges would go unnoticed by the mining company and regulators.

Please refer to the attached table for further analysis of the new information regarding the proposed Colton Coal project.

Please contact the MRCCC for copies of any of the documents referenced in the request and to discuss in further detail any aspect of this proposal. Our contacts are included on the first page of this correspondence.

We look forward to hearing from you in the near future. In the meantime we wish you and your family a Merry Christmas.

Yours sincerely,

Ian Mackay
Chair
MRCCC

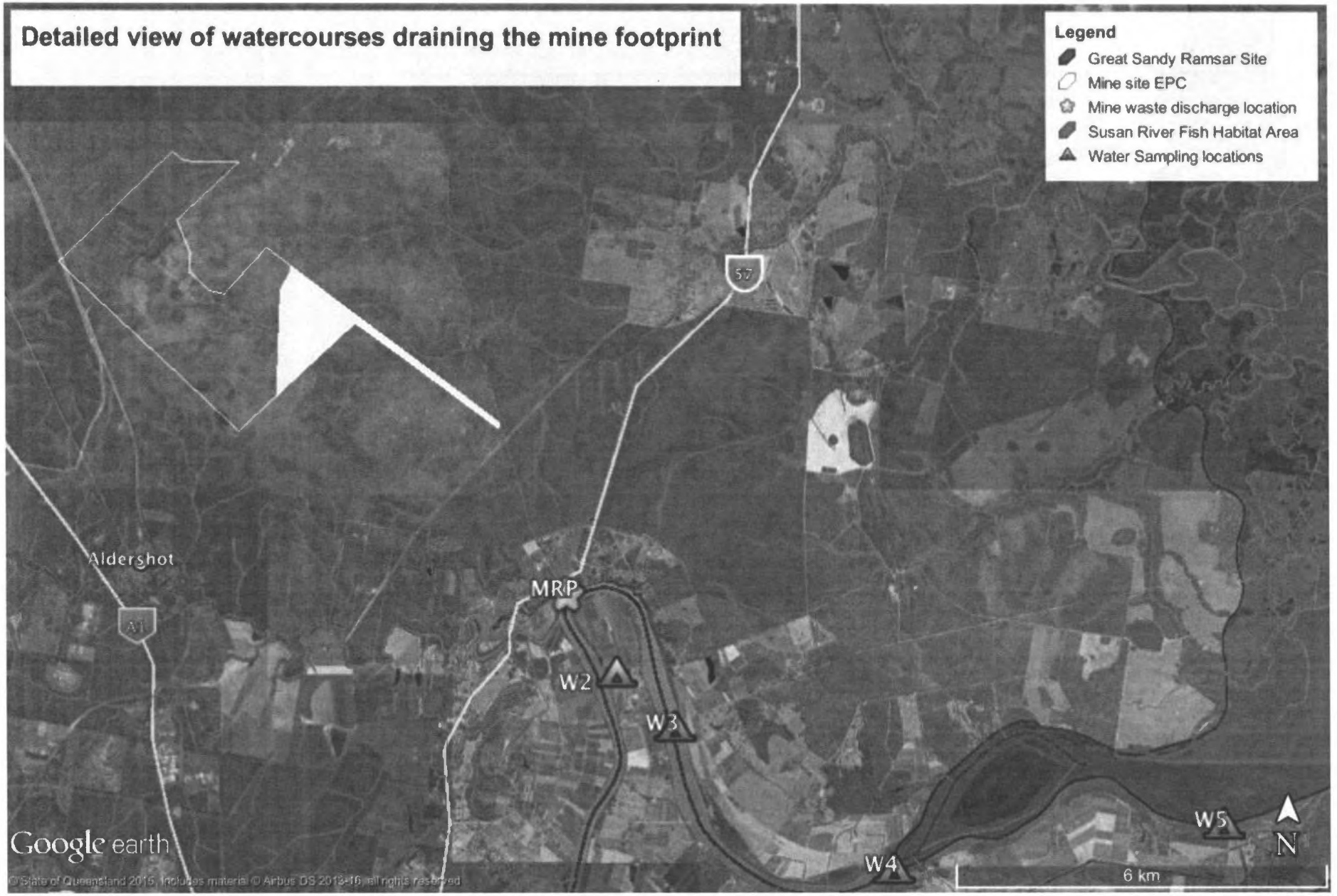


Figure 1 Map of mine showing waterway network, Ramsar site and discharge point

Table 1: Comparison of Information available at time of the Referral (August 2010) with new information available and as at December 2016 and potential consequences of the new information

No.	Referral statement (2010)	New Information available in 2016	Likely impact/consequences
1	Mine will have Run of Mine (ROM) production of 1.0 MT tonne. Reserve was estimated at 5.9 million tonnes of coking coal (p2)	The 2014 EMP identifies an increase in ROM production by 0.2 MT/annum but no increase in the coal production – still at 0.5 Mtpa. Reserve has now doubled and is now estimated at 12million tonnes.	The increased size of the reserve increases the chance that the mine will be expanded and bring with it increased impact on the terrestrial ecosystem and water quality of the Susan River and Great Sandy Strait. (see related point No 2 below)
2	There will be no cumulative impact. This Project is a standalone project. NEC will continue to explore for additional economic coal reserves within its surrounding exploration tenements. At the time of this application no plans to develop additional coal resources existed. (p3)	However, since the time of submission of the Referral the size of the reserve has more than doubled and the ROM production has increased by 20% (from 1.0MT/annum to 1.2 MT/annum) and yet the proposed level of production has not changed and remains at 0.5 million tonnes per annum, the limit above which an Environmental Impact Statement would have been required by the Queensland Government. According to the EHP Assessment Report New Hope had publicly signaled that there were interested in applying for a much larger project in the same area if this project were to be approved.	Given the discovery of a much larger reserve it seems highly probable that New Hope would pursue an expansion, especially given they publically expressed the potential for this. Cumulative impacts are therefore of concern. Waiting for an expanded proposal to trigger a controlled action when the proposed mine is already underway would represent a missed opportunity to protect the Ramsar site from much greater impact.
3	Effects on the Great Sandy Strait are expected to be nil. This is a result of: (several points including) • The discharge location is significant distance (8 – 12.5 km) from the entrance to the Great Sandy Strait.	The distance to the Ramsar site is what is of significance for the Referral. It is 8km.	This speaks to the credibility of the material provided in the original referral.
4	The EM Plan has been finalised and was submitted to Maryborough DERM on the 13th of August 2010.	EMP has been revised on two occasions (September 2011 and May 2014) in response to the Queensland Department of Environment telling the company (NEC in the first instance and New Hope in the second instance) that the EMP was non compliant and needed to be revised. Concerns regarding impacts on the Mary River and Susan River (relevant to the Ramsar site) were central to the non-compliance.	This issue speaks to the credibility of the information provided to the Commonwealth as part of the 2010 Referral.

5	The project and its entire associated infrastructure is not located on adjacent to any World Heritage properties. (p4)	The proposal is adjacent to a proposed World Heritage area. The wastewater from the Mine will flow into the proposed Great Sandy World Heritage area which is on the UNESCO World Heritage tentative list. The boundary for this area is the boundary of the Ramsar site 8km downstream from the discharge point. The nomination was submitted in January 2010 and was therefore active at the time of the Referral.	Progress of the mine may jeopardise the proposed listing due to the impact on the values for which the area would be listed.
WATER QUALITY & SEDIMENT IN THE MARY AND SUSAN RIVERS			
6	The Project is anticipated to have no impact on water quality of the Mary River or Great Sandy Strait based on: . the large volume of water passing the discharge point relative to the proposed discharge (<0.01%); (p23)	Actual discharge is up to 5.8% of the daily flow. The maximum 5.8% equates to a 1 in 17.4 dilution. (pg 200, 2014 EMP) Each time the river flow meets the release trigger the proportion discharged will be 5.8%.	This volume of water is 580 times greater than indicated in the Referral. Such a significant increase in the volume of untreated wastewater being discharged represents potential for a much greater impact that would have been considered during the 2010 Referral assessment process.
7	The Project is anticipated to have no impact on water quality of the Mary River or Great Sandy Strait based on: . Calculations of predicted water quality data of the project; . The current water quality data of the Mary River. (p23)	To quote from the 2014 EMP: In the case of cadmium, cobalt, manganese, selenium and silver, the proposed mine discharge concentrations exceed the background concentrations in the Mary River. For the remaining compounds, the maximum modelled concentrations are the same as the background concentrations. (EMP 2014 pg 224) The behaviour of the estuary is complex due to the effect of tide and the influence of the channel geometry, which will affect the concentrations of mine water throughout the estuary. The time series of modelled releases was used in the Mary River Dispersion Study (DHI) to undertake statistical analysis of the potential impact of the release throughout the estuary, including the High Environmental Zone. Based on the results of Receiving Water Mixing Study (CSIRO, 2014) and the Mary River Dispersion Study (DHI, 2014),	It is clear from this analysis that the mine will increase concentrations of five different heavy metals in the river above background levels and that for three of these they will exceed the HEV guidelines. Therefore the statement made in the Referral that the project will have no impact on water quality is incorrect. The implications of these elevated levels of heavy metals for the estuarine ecosystem has not been considered. Instead the company argues that elevating these levels is not an issue because other parameters are already high. They also rely on precipitation to predict levels without providing details about assumption made and the potential for precipitated metals to be resuspended in the right conditions. The total load of metals is also important for the health the ecosystem, not only the concentration. Metals of course do not break down but change their form and can move between the water and sediment depending on

		under these conditions, the release would see increases in concentrations of cadmium, cobalt, manganese, selenium and silver above existing background concentrations. Of these, only cadmium, cobalt and manganese concentrations would exceed HEV guideline values. (Appendix L – Colton Site Water Management Assessment (April 2014) pg 4) (Please note: In the 2014 EMP 80th percentile figures for the background concentrations in the River have been reported. This may lead to exaggerated interpretations of ambient conditions. A median (50% percentile) figure should be provided for a more representative comparison.)	conditions including salinity and pH. Ultimately they may end up in the food web through ingestion at low levels of the food chain. Heavy metals released from the mine will accumulate in the Ramsar wetland over the life of the mine. (see Jezierska and Witeska, 2006[2] for an explanation of heavy metal accumulation in fish and Nieto et al 2007[3] for an example of the complexity of heavy metal dynamics and bioaccumulation in an estuary). Fraser Island is directly opposite the mouth of the Mary River and it makes the Great Sandy Strait a body of water with a high residence time reliant primarily on tidal action and river flow for water movement. The low movement of water in the Strait and Hervey Bay just to north is demonstrated by the fact that Hervey Bay and the Strait becomes hypersaline at times[4]. Relying on dilution to solve a pollution problem in this kind of system is inappropriate. Sediment flow patterns indicate that sediment from the Mary ends up on the western edge of Fraser Island – which is World Heritage listed[5]. We suggest that due to the international and national significance of the Great Sandy Strait Ramsar site and the legislative requirement to adhere to HEV guidelines, the aim must be to improve water quality in this ecosystem, not knowingly allow it to further deteriorate.

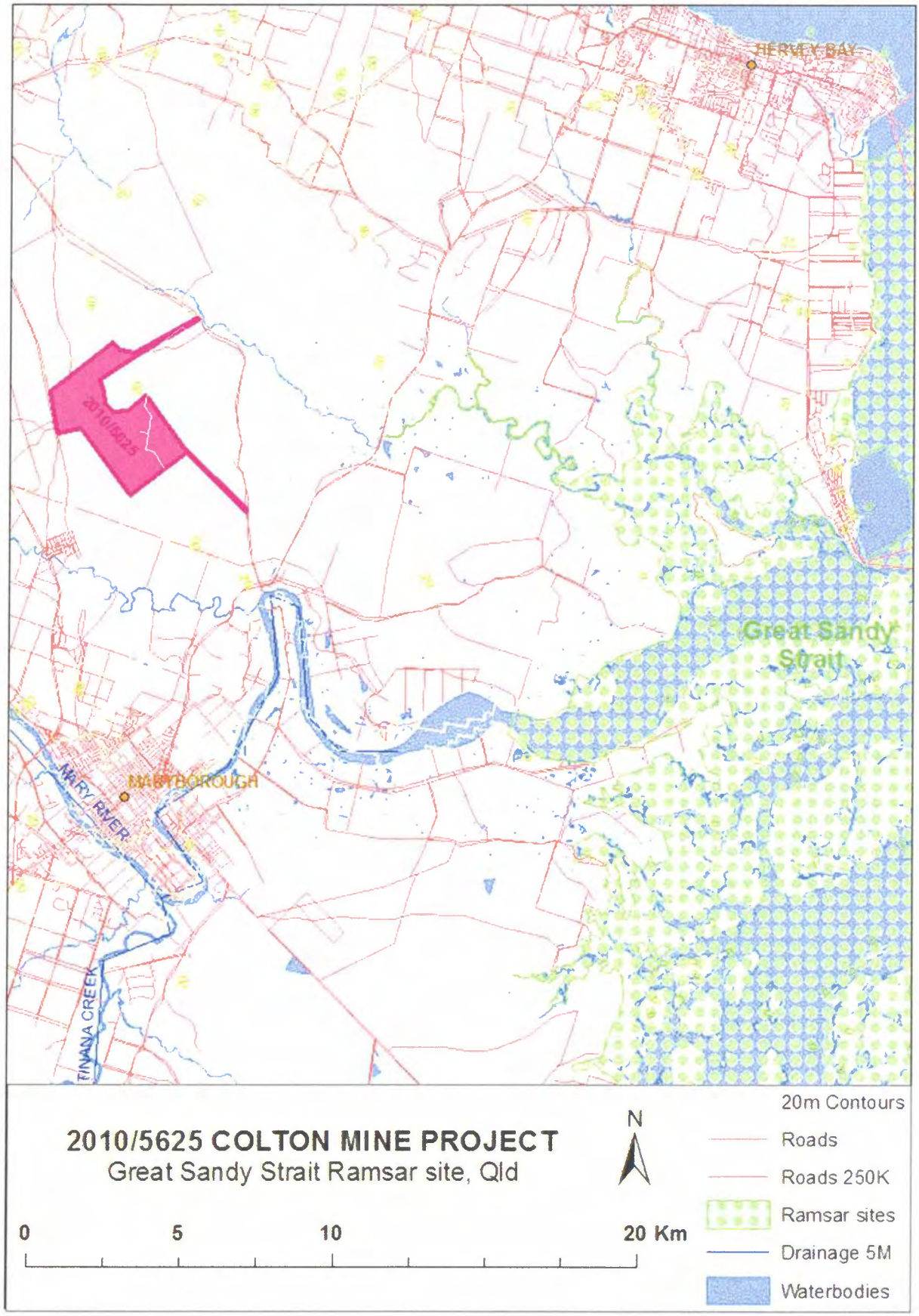
[2] Jezierska, B. & Witeska, M. (2006) "The metal uptake and accumulation in fish living in polluted waters" *Soil and Water Pollution Monitoring, Protection and Remediation, 3 107-114*
[3] Nieto, J. M., Sarmiento, A. M., Olias, M., Canovas, C. R., Riba, I., Kalman, J. & Delvalls, T. A. (2007) "Acid mine drainage pollution in the Tinto and Odiel rivers (Iberian Pyrite Belt, SW Spain) and bioavailability of the transported metals to the Huelva Estuary" *Environment International, 33 445-455*

[4] Gräwe, U., Wolff, J. O. & Ribbe, J. (2010) "Impact of climate variability on an east Australian bay" *Estuarine, Coastal and Shelf Science, 86 247-257 and* Ribbe, J. (2006) "A study into the export of saline water from Hervey Bay, Australia" *Estuarine, Coastal and Shelf Science, 66 550-558*
[5] Piorewicz, D. J. (1997). Hervey Bay Beaches - Present Situation and Recommendations for Beach Protection *In:* Central Queensland University, Department of Civil Engineering and Building.

8	Discharge criteria and comprehensive monitoring program have been proposed to ensure no impact on receiving waters of the Mary River on the listed threatened species which possible inhabit it. (pg 25) In the 2010 EMP the discharge rules were based on three considerations: the flow in the river, the water quality in the river and the level of pollutants in the wastewater. (EHP Assessment Report pg 63)	The discharge criteria have been changed so that only one factor – the flow rate in the river is considered. The EMP 2014 says that the rules are now based on discharge during events. However the median daily flow rate at the discharge point is 685 ML/d. The term event typically refers to higher than median flow. And yet discharge can commence at a river flow rate of 150ML/d. The allowed discharge rate at this level is 100L/s which at 150ML/d is equal to 5.8% of the river flow. Once river flow reaches 300 ML/d the discharge of polluted wastewater can be increased to 200L/s which is 5.8% of the flow.	The modelling of wastewater quality and its behaviour in the estuary once released is a very complicated and uncertain process and many assumptions have been made. Now that there is no operational requirement to consider the actual water quality of the wastewater when determining release rates there is less protection of water quality from controlled releases than there was in the 2010 referral. The monitoring program cannot prevent the impact and may not even detect it until it is well advanced due to the complexity of the estuarine ecosystem. Furthermore there is no monitoring proposed of any threatened species in the estuary which would enable an impact on them to be ascertained. All of these factors point to the potential for a significant impact to occur as a result of cumulative effects over time that are not monitored.
9	The Mine Water Dam and Worked Water Dam are assessed to be High Hazard dams	Both dams are considered Significant Hazard which brings with it much less stringent design criteria. The details regarding this change were discussed at length above.	Reducing the stringency of the dam designs increases the likelihood of failure of the dam and of controlled overflow. The fact that the rating for the Mine Water Dam provided in the EMP is lower than recommended by the consultant in the relevant Appendix L is concerning.
10	A Mine Water Management Dam will be constructed to capture runoff water from the operational areas around the mining pit and groundwater pumped from mine dewatering bores. Approximately 946 ML of excess water is proposed for discharge from the Mine Water Management Dam each year. This water will be comprised of approximately 27% groundwater and 73% surface water runoff. Suspended sediments will be allowed to settle and when the dam reaches a certain level it is proposed that excess water will be pumped to the Mary River for controlled discharge. The dam will not contain potentially contaminated water from the Plant	In the 2014 design, all dams will have water from them transferred into the Mine Water Dam (refer to Water Management Schematic on pg 206 of the 2014 EMP) and therefore any pollutants in these dam can reach the Mary River. Therefore the following statements made in 2010 are no longer the case: . the Mine Water Dam would "not contain potentially contaminated water from the Plant Infrastructure area" . the Worked Water Dam will not discharge into the environment	This means that hydrocarbon pollutants could be present in the Mine Water Dam because in the event of a spill these pollutants would be washed into one of the other dams which feed into the Mine Water Dam as required. These pollutants could therefore occur in wastewater discharged into the Mary River. This has not been considered at all in assessing the impacts of the project. The discussion above about the potential for dam failure and uncontrolled releases to the Susan River is also pertinent.

	Infrastructure area. Runoff from the plant infrastructure area will be captured by the Worked Water Dam where it will be used for coal washing. This dam will not discharge to the environment (excluding significant rainfall events greater than the design criteria). (p19)		
11	A detailed water quality monitoring program has been proposed and will be implemented throughout the life of the Project. Contaminant triggers and limits have been proposed to ensure the Project has no impact on receiving waters. Water treatment measures may be implemented prior to discharge if required. (p25 of the Referral) Sites in the Susan River catchment would be monitored and trigger levels developed for them (EPBC Matters Report, Pg 20) The 2010 EMP contained Receiving Stream Sediment Contaminant and Triggers levels (pg 242)	The Receiving Environment Monitoring plan in the 2014 EMP includes no monitoring of the Susan River or unnamed tributaries to which dams on the mine site would overflow. As mentioned in point 8 above, the water quality of the river and of the wastewater are no longer being taken into account when deciding whether to discharge wastewater into the river. In contrast the 2014 EMP requires no monitoring of receiving stream sediment either in the Mary River or Susan River and there are no contaminant and trigger levels for sediment.	Lack of ongoing monitoring of the Susan River and of sediment in the Mary River means that two of the main mechanisms via which this project could impact on the Great Sandy Ramsar site are not being measured and therefore there is limited scope for detecting an impact. This has major implications for being able to avert a significant impact on the Great Sandy Strait from the project.
12	Based on the above, the project will therefore have no identifiable impact on the flow regime or water quality of the Great Sandy Strait or its associated ecosystems. (p4)	In addition to the comments made about water quality in the Mary River, the EMP 2014 identifies that the mine infrastructure will reduce flowrates in the Susan River by 4%.	Impacts of this reduction of freshwater flow on levels of salinity in the Susan River and associated implications for fish breeding in this important fish habitat and Ramsar site has not been taken into account.
TERRESTRIAL AND ESTUARINE THREATENED SPECIES			
13	A combined total of 45 vertebrate fauna species were identified on the Project Site during the seasonal surveys, comprising one amphibian, five reptiles, 11 mammals, and 28 birds. (p6)	The amphibian recorded in the first survey was the cane toad. Subsequent surveys found 8 native frog species which were missed in the original survey (pg 51 of the EMP 2014). In addition 7 reptiles, 30 birds, 9 mammals including three feral animals.	The failure to detect any species other than the cane toad in the original survey brings into question the quality of the survey conducted. This survey was the basis of documents provided in the Referral. Essential habitat of the *Crinia tinnula* occurs on the site. This frog is one of four frogs considered in the Wallum Frogs Recovery Plan. The only mitigation action proposed is an education

			program for staff working at the mine.
14	Wallum Sedge Frog (*Litoria olongburensis*) - unlikely to occur and unlikely to be impacted (pg 10)	As mentioned in point 13, a survey conducted after the Referral found wallum froglet (*Crinia tinnula*) which shares some habitat with the Wallum Sedge Frog. The vegetation type which they share with the Wallum Froglet (RE 12.3.5 - *Melaleuca quinquenervia* Riparian Woodland) is on the mine site.	It is unclear on what basis the presence of the Wallum Sedge Frog was ruled out. It is inappropriate to assume they are unlikely to occur and unlikely to be impacted. Instead, new information available suggests they may occur, and if present they will certainly be impacted.
15	Impact on Pineapple Zamia listed as unlikely (p7)	Pineapple macrozamia were found within the footprint during subsequent surveys.	This highlights another EPBC matter which was not considered in the original referral.
16	Indo Pacific Humpback dolphin – species or species habitat may occur. No migratory species associated with the Great Sandy Strait are predicted to be impacted on by the project, although two species (*Orcaella brevirostir* – Irrawaddy Dolphin and *Sousa chinensis* – Indo Pacific Humpback Dolphin have been known to migrate to the area potentially affected by the discharge. The potential for the project to impact on the Great Sandy Strait is nil… as a result no impact on the Irrawaddy Dolphin or the Pacific Humpback Dolphin is anticipated (Pg 15 of the Referral)	Please refer to points 7 and 11 above which show that the project will increase both concentrations of three heavy metals in the estuary and total loads of 14 heavy metals and that there has been no monitoring of sediment to assess impact on benthic organisms that form the basis of the food web on which the dolphin depends. There is also no monitoring of the sediment proposed if the mine commences operation. These dolphins are estuarine dwelling species that are high up the food chain and therefore at risk of bioaccumulation of metals and the impacts of direct toxicity and bioaccumulation on their food source.	As mentioned there is no proposed testing or monitoring of these estuarine species or benthic organisms and ecosystems. Therefore impacts of the project on this ecosystem could go unnoticed until they reach such a magnitude that the community notices significant changes in the environment. This situation is not consistent with the intent of the EPBC Act.


HERVEY BAY
2010/5625
Great Sandy Strait
MARYBOROUGH
MARY RIVER
TINANA CREEK
2010/5625 COLTON MINE PROJECT
Great Sandy Strait Ramsar site, Qld
N
0
5
10
20 Km
20m Contours
Roads
Roads 250K
Ramsar sites
Drainage 5M
Waterbodies

FOI 180401
Document 11

From: s22
To:
Cc:
Subject: Colton Coal request for a reconsideration [SEC=UNCLASSIFIED]
Date: Thursday, 9 March 2017 3:24:41 PM

Hi s22

On the basis of the further information which has been received from the proponents of the Colton Coal Project, including a response to each of the concerns expressed by the Mary River Catchment Coordinating Committee, and a copy of the Permit/Environmental Authority granted on 15 December 2016 by the Qld DEHP, we consider there is adequate information to address the concerns we expressed in our initial advice on the reconsideration.

The proponent's response argues that there has been no material change to the project, and that adequate water management and monitoring requirements have been set in place by the Environmental Authority/Permit, after considerable technical assessment (including by the Qld Department of Science, Information, Technology and Innovation). In particular, they argue that any increase in metal concentrations is not significant compared to background concentrations, and that the release of water will only be required during and following significant rainfall events (coinciding with higher streamflows) and that trigger amounts controlling release, and monitoring requirements within the Environmental Authority, will be adequate to detect any impact.

The Environmental Authority puts limits on the quality of water which can be discharged from the site, threshold fresh water regimes in the Mary River below which water must not be discharged, and water quality monitoring requirements.

With regard to our concern about overtopping of containment structures, this will be addressed by the ability to transfer water between storages and into the mine pit, and the development and implementation of a Water Management Plan and a Stormwater and Water Sediment Control Plan.

The requirements under the DEHP Environmental Authority (granted on 15 December 2016), include:

- Monitoring at discharge point (Mary River discharge pipeline):
  - with limits on EC, pH, Turbidity and Dissolved Oxygen before water can be released. Any non-compliant releases to be reported
  - monitoring of 23 contaminants (including heavy metals, S, N, P), with exceedence of trigger levels resulting in reporting to environmental authority within 24 hours, investigation into potential for environmental harm, action to be taken to prevent harm, and reporting
- Monitoring of stream flows daily during flow events at 2 gauging points, and release only when stream flows meet particular levels (0.1 m^3/s for over 150 -300 ML/ day flows, 0.2 m^3/s for over 300 ML/day flows)
- The preparation of a Receiving Environment Monitoring Program (REMP)– to monitor at least 2 upstream and 4 downstream points specified (noting Mary River at mine-site is tidal) to monitor, identify and describe any adverse impacts to surface water values, quality and flows – including under natural flow conditions and when mine water is being discharged. This would include any sensitive receiving waters or environmental values. (Note – there is no timeframe for this Plan, but it must be made available to the

administering authority on request)

- The preparation of a report annually which outlines the findings of the REMP – covering an assessment of background reference water quality, the condition of downstream water quality compared with water quality objectives and the suitability of current discharge limits to protect downstream environmental values.

On the basis of this additional material, we consider that these requirements are adequate to address our concerns, as long as the REMP, Water Management Plan and Stormwater and Water Sediment Control Plans are put in place before water discharges commence.

This advice has been cleared by John Foster, Acting AS, Wetlands Policy and Northern Water Use.

s22
Assistant Director | Wetlands Section | Commonwealth Environmental Water Office | Australian Government Department of the Environment and Energy | T: (02) 6274 s22 E: s22 @environment.gov.au | GPO Box 787 Canberra ACT 2601 | Level 3, John Gorton Building, King Edward Terrace, PARKES ACT 2600 |

In office on Mondays, Tuesdays, Wednesdays and Thursdays

From: s22
Sent: Wednesday, 8 March 2017 4:45 PM
To: Ramsar EPBC advice <RamsarEPBCadvice@environment.gov.au>; Office of Water Science Advice <OWS.Advice@environment.gov.au>
Cc: s22 @environment.gov.au>; s22 @environment.gov.au>
Subject: Colton Coal request for a reconsideration [SEC=UNCLASSIFIED]

Hello s22
We have now received a response (attached) from New Hope Group, the proponents of the Colton Coal Project. I would appreciate an indication as to whether their response changes your earlier advice to us in any way or whether you are able to provide any further advice to us.

Happy to discuss timeframes
Regards
s22

s22
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