Progressive Rehabilitation and Closure Plan

Fairhill Coal Project

Tenure number: ML 700043

May 2024

Version 2.0

Prepared for: Department of Environment, Science and Innovation

Prepared by: Futura Mining Services Pty Ltd

EA holder: Fairhill Coking Coal Pty Ltd

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1. INTRODUCTION

The Fairhill Coal Project (the Project or FHCP) is a small-scale coal mine proposed by Futura Resources Pty Ltd (Futura). The EA holder is Fairhill Coking Coal Pty Ltd (FHCP).

The Project is approved to undertake Environmentally Relevant Activities (ERAs) under Environmental Authority (EA) BRID0071. The EA was approved on 1 June 2021. A transition notice for a Progressive Rehabilitation and Closure Plan (PRC Plan) has been issued by the Department of Environment and Science (DES) requiring a PRC Plan to be submitted to the DES by 31 May 2024.

This PRC Plan has been developed in accordance with Sections 126C and 126D of the *Environmental Protection Act 1994* and to meet the requirements specified in the DES's *Progressive Rehabilitation and Closure Plans Guideline* (ESR/2019/4964 version 3.00).

This PRC Plan comprises two main components. The rehabilitation planning component (Sections 1 to 9) provides information on the characteristics of the site, legislative requirements, post-mining land use, community consultation, rehabilitation goals, rehabilitation methodology, risk assessment and monitoring program.

The PRC Plan schedule component (Section 10 to 12) provides a final site design and a detailed schedule of progressive rehabilitation activities including rehabilitation area and milestones.

This PRC Plan presents Futura's strategy for managing Project activities in a way that maximises the progressive rehabilitation of the land to a stable condition, as well as specifying the condition to which Futura will rehabilitate the land before the EA is surrendered.

The FHCP is located approximately 55 kilometres (km) northeast of Emerald in the Bowen Basin. The Project is situated in close proximity to other coal mines, infrastructure and coal deposits. The Gregory Branch of the main Blackwater rail line is approximately 8.5km south west of the boundary of the Project area and connects with the coal export terminals at the Port of Gladstone. Surrounding mines and resources include:

- Wilton Mine 10km to the southwest;
- Ensham Mine adjacent to the western boundary of the Wilton Mine;
- Kestrel, Crinum and Gregory Mines to the west;
- Oaky Creek, to the north; and
- Curragh Mine to the east.

The Project's regional location is presented in Figure 1

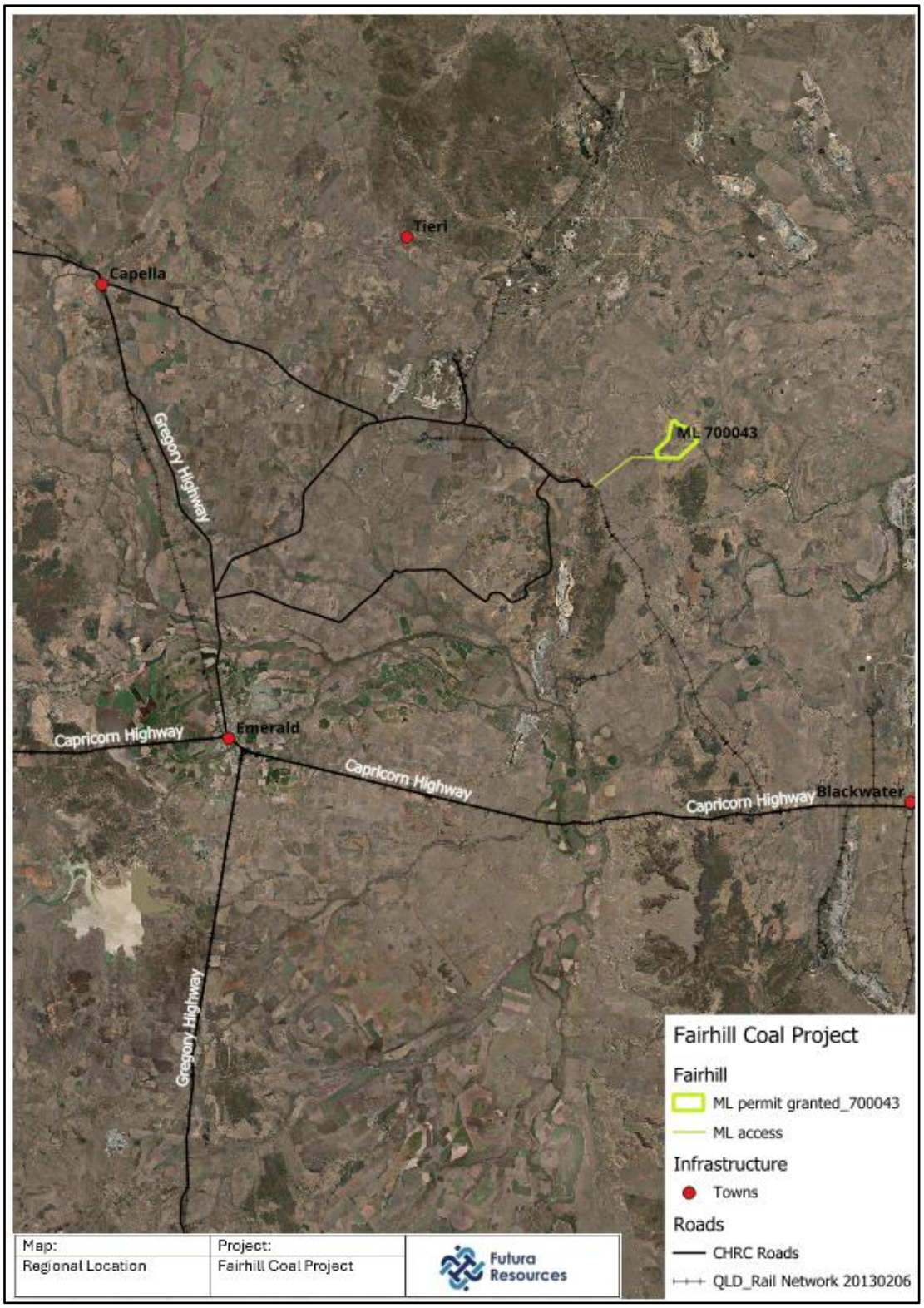

Figure 1. FHCP Regional Location

1.1. Site Description

1.1.1. Resource Tenures

The FHCP will operate on mining lease (ML) 700043. The ML is approximately 1,014.5 hectares (ha). The ML is held by Fairhill Coking Coal Pty Ltd, a wholly owned subsidiary of Futura.

A list of the properties, tenure, usage and owners/managers within the ML boundaries and access road are provided in Table 1

Table 1. Land Tenure and Real Property Descriptions for the FHCP

Lot/Plan	Tenure	Usage	Owner	Area within ML700043 (ha)
2/TT241	Freehold	Grazing	Peter and Denise Comiskey	1,011.6
M/TT397	Easement	No Longer used	Isaac Reginal Council	2.89

1.1.2. Topography

The FHCP area consists of a west–east running ridge through the centre of the tenement. The elevation of the area ranges from approximately 215mAHD at the western boundary to 150mAHD within the bed of Cooroora Creek in the south-eastern corner of the tenement. The ridge slopes gently to the east, north and south, with slopes of generally less than 1%.

The majority of the project site has been altered by agricultural practices (medium density cattle grazing) and associated road and rail tracks. The impacts of these activities, including land clearing, weed invasion and accelerated erosion processes are observed throughout the project area.

Figure 2, presents the topography at the FHCP.

Figure 2. FHCP Topography

1.1.3. Climate

The FHCP is situated in a subtropical climate, with distinct wet and dry seasons. Long term rainfall and temperature data have been sourced from the Bureau of Meteorology's (BoM) weather station 035027 located at the Emerald Post Office (years 1882 to 1992), and weather station 035264 located at Emerald Airport (years 1981 to present). Neither Emerald Post Office nor Emerald Airport have information on evaporation rates. Evaporation data has been sourced from the nearest suitable location – Clermont Post Office, BoM station 035019.

The average annual rainfall at Emerald Post Office was 640.3 millimetres (mm), and 555.2 mm at Emerald Airport. The majority of precipitation occurs during the summer months of December, January and February. Significantly less rainfall occurs during May through to August.

During the summer months, temperatures commonly exceed 34°C in December and January, with the lowest mean temperatures occurring during July.

Mean monthly rainfall and temperature for Emerald is presented in Figure 3, Figure 4 and Figure 5.

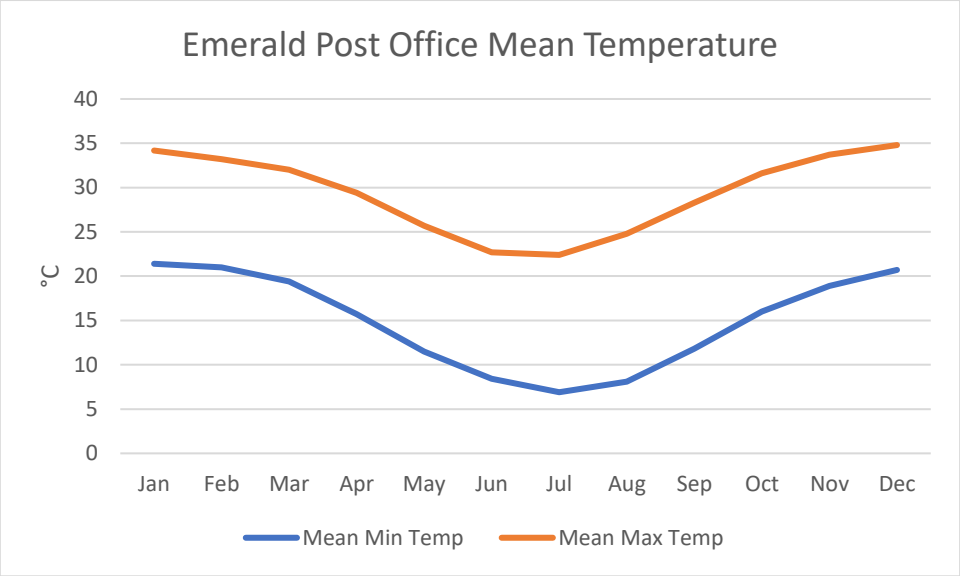

Figure 3. Emerald Post Office mean temperature, years 1882 to 1992. Source: BoM, 2023

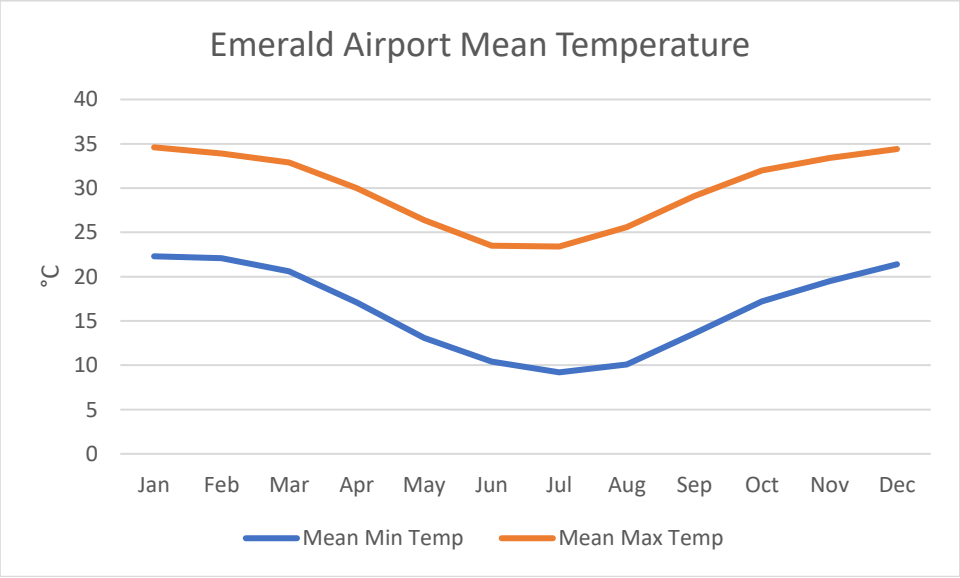

Figure 4. Emerald Airport mean temperature, years 1981 to present. Source: BoM, 2023

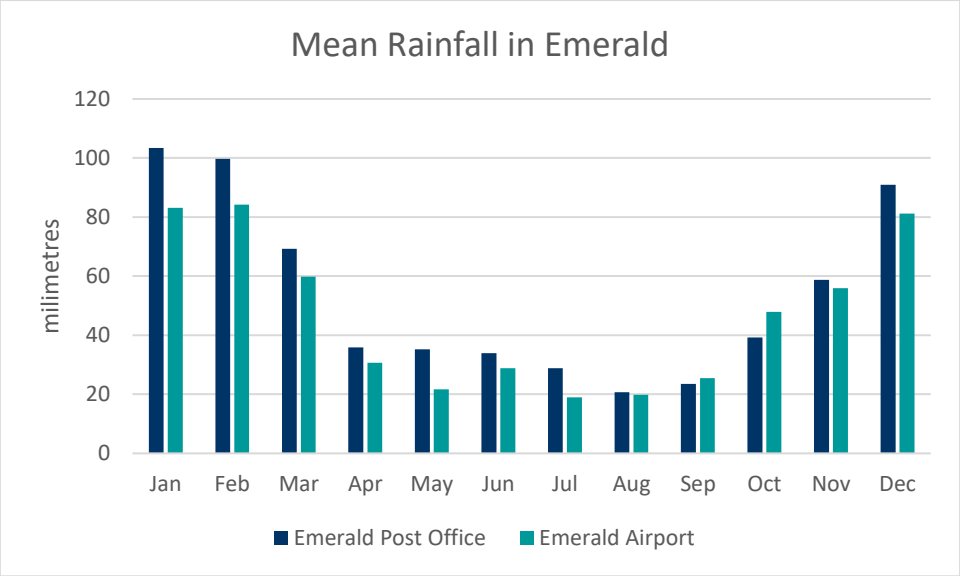

Figure 5. Mean rainfall at Emerald Post Office (years 1882 to 1992) and Emerald Airport (years 1981 to present). Source: BoM, 2023

Evaporation datasets were not available through the BoM stations at Emerald. Evaporation datasets were instead obtained from the Queensland Government's SILO database. For SILO grid point 'Talagai' (Latitude -23.13, Longitude 148.53), the mean daily evaporation is 5.64mm. The mean evaporation rate exceeds mean rainfall for each month of the year; however, the size of the deficit varies with season.

Climate change models produced by the (CSIRO, 2015) suggest with medium confidence that there will be long-term decreases in average winter and spring rainfall over the next 80 years. Long-term changes in summer and autumn rainfall are also possible, but the direction is unclear (CSIRO 2015). On the short timescales of the FHCP, the influence of natural rainfall variability is projected to predominate over trends due to increasing greenhouse gas emissions (CSIRO 2015), and the rainfall data presented in Figure 5 is therefore most relevant to the FHCP during the rehabilitation and vegetation establishment stage. Over the next 80 years, however, an increase in the intensity of extreme rainfall events is projected with high confidence, and the time spent in drought is projected to increase with medium confidence. These long-term changes can affect the prospect of survival for long-lived trees.

The effect of climate change on temperature is projected to be more apparent short-term than for rainfall. For the near future (2030), the annually averaged warming across all emission scenarios is projected to be around 0.5 to 1.4 °C above the climate of 1986–2005 (CSIRO 2015); note that the current climate (as at the end of 2019) is already 0.24 °C warmer than the 1986-2005 average (CSIRO 2015). This warming is projected to be 1.3 to 5.0 °C by 2090 (CSIRO 2015). Temperature changes have been considered both for the vegetation establishment phase of rehabilitation and for the long-term survival of trees post-relinquishment. Species to be used in revegetation all have widespread geographic distributions (including hotter and drier locations than the FHCP area). It is therefore unlikely that the FHCP area currently represents the limit of environmental tolerance for any of the species utilised.

1.1.4. Wind Characteristics

Wind rose data has been generated for the Fairhill Coal Project based on site-specific data for the period of 2015 and 2016 (SEG, 2019). The wind rose data generated summarises wind statistics at a 10m height on site, as calculated by the air pollution model (SEG, 2019). Wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points – N, NNE, NE, ENE, E, etc. The length of the bar represents the frequency of occurrence of winds from that direction and the colour of the bar sections correspond to wind speed categories. It is noted that the predominant wind direction for the Fairhill Coal Project during the year is from the northeast through to the southeast as presented in Figure 6 to Figure 8**.**

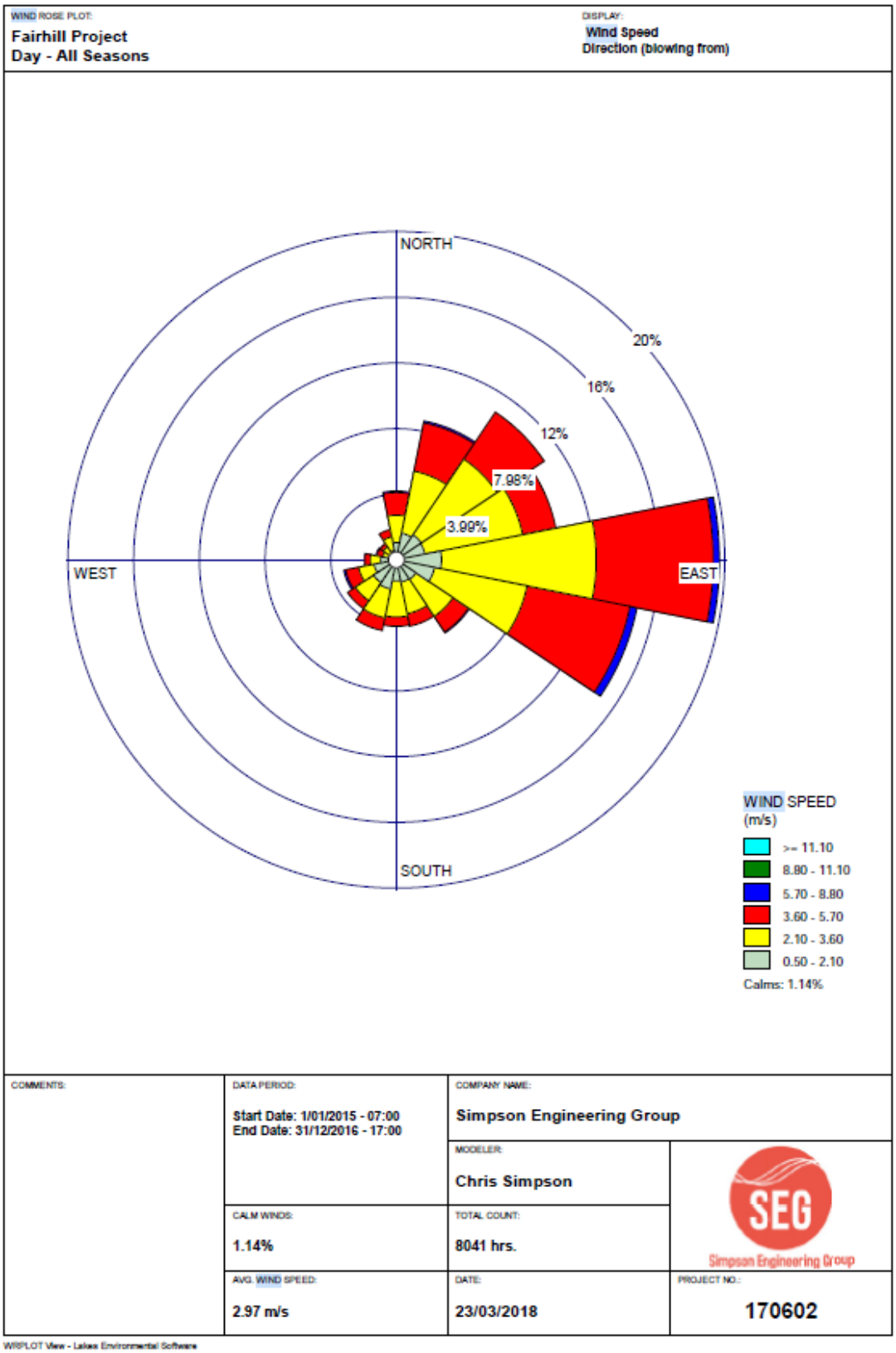

Figure 6. Wind rose data for day winds (all year) at the Fairhill Coal Project.

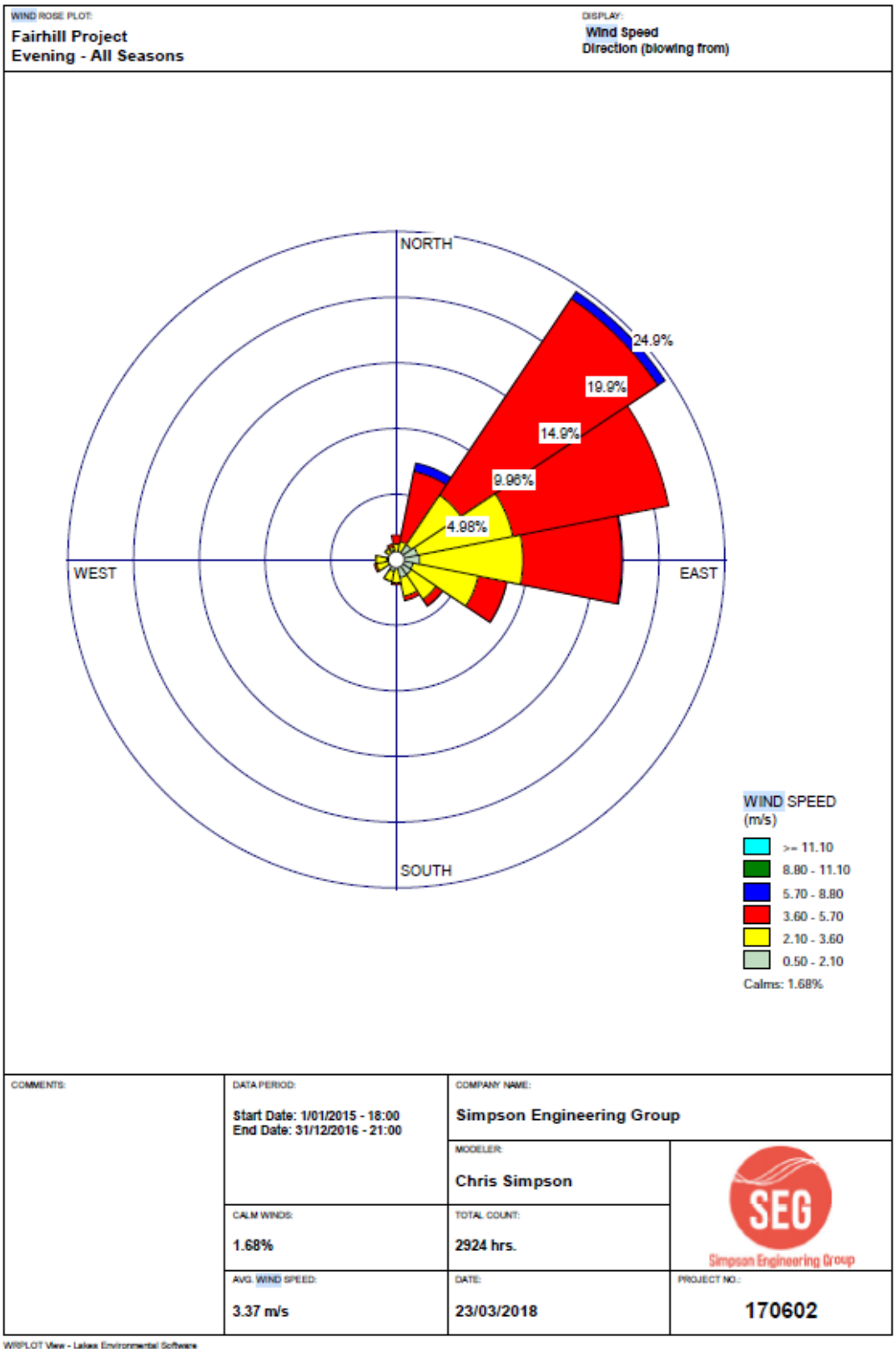

Figure 7. Wind rose data for evening winds (all year) at the Fairhill Coal Project.

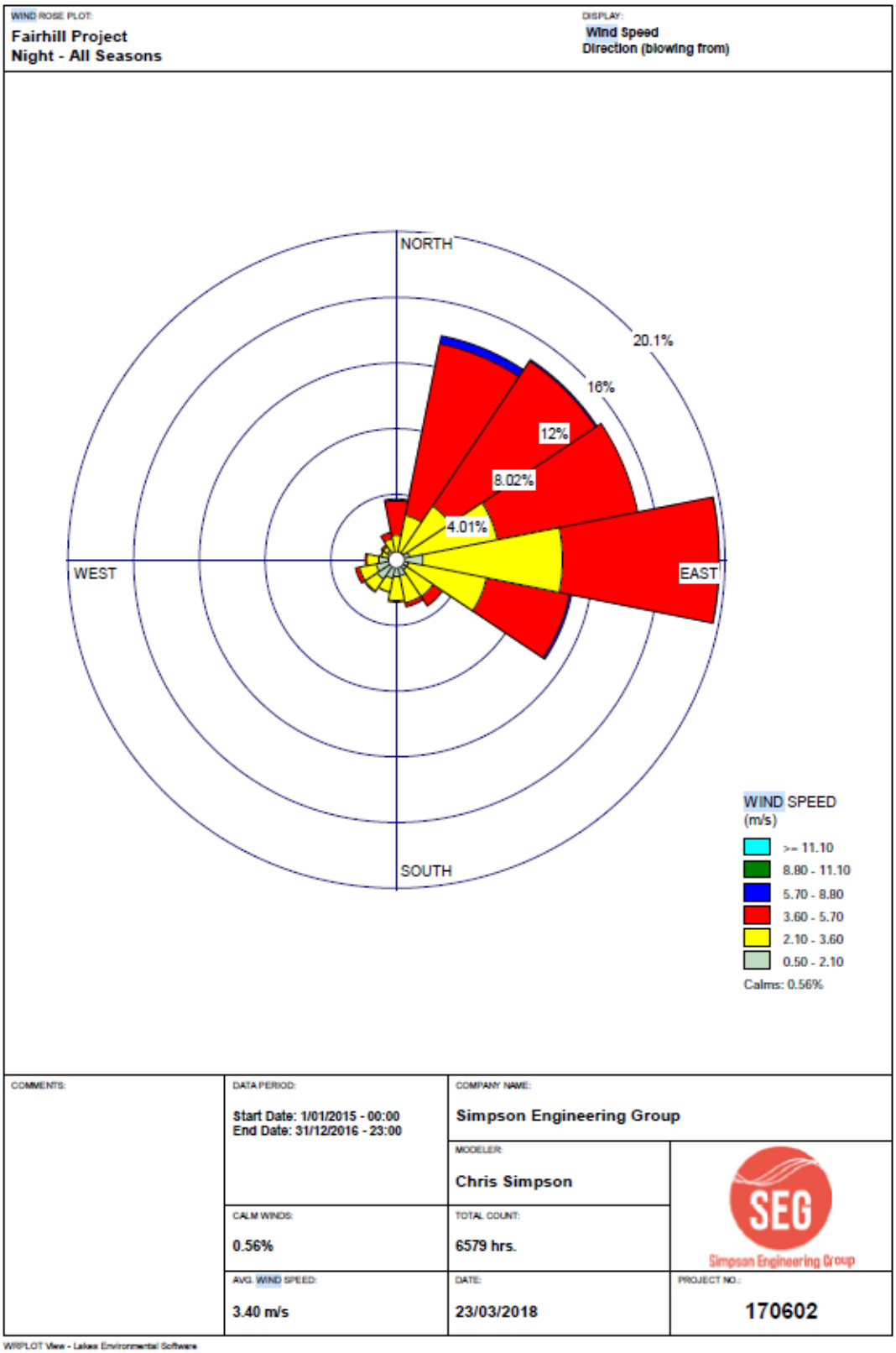

Figure 8. Wind rose data for night winds (all year) at the Fairhill Coal Project.

1.1.5. Geology

The FHCP is located within the Bowen Basin which regionally consists primarily of Permian and Triassic rocks that host coal reserves of significant economic importance. The Bowen Basin is overlain by semi-consolidated sediments of Quaternary age (Galloway, Summary Description of the Isaac-Comet Area, 1967a) (Dickins & Malone, 1973). To the south the Bowen Basin is overlain by the Jurassic-Cretaceous sequence of the Great Artesian Basin and includes Lower Jurassic sandstone and Mesozoic granites. Tertiary rocks within the Bowen Basin include basalt, acid igneous intrusions and terrestrial sediments (Galloway, 1967b) and are widely spread throughout the basin.

Permian rocks in the region consist of three major units:

- Lower Bowen Volcanics (LBV) – dominated by andesitic flows and pyroclastics,and are referred to as the Lizzie Creek Volcanics.
- Middle Bowen Beds or Back Creek Group – consist of marine shales, limestones and sandstones.
- The Upper Bowen Coal Measures – comprises terrestrial sandstone, siltstone, shale and coal (Galloway, 1967a).

Triassic sediments consist of terrestrial quartz sandstone, shale, siltstone and conglomerates (Galloway, 1967b). Sequences include the Rewan Formation (mudstone, siltstone and sandstone); Clematis Sandstone (highly resistant quartz sandstone) and the Moolayember Formation (comprises shale and sandstone beds) (Galloway, 1967b).

Deposition of alluvial sediments, comprising of sand, clays and gravels in places. Quaternary sediments typically overly bedrock (NRC, 2018a).

1.1.6. Regional stratigraphy

Permian

Permian rocks in the region consist of three major units: Lower Bowen Volcanics (LBV), Middle Bowen Beds and Upper Bowen Coal Measures.
LBV are dominated by andesitic flows and pyroclastics. Referred to as the Lizzie Creek Volcanics, LBV are overlain by the Middle Bowen Beds or the Back Creek Group, which consists of marine shales, limestones and sandstones. This unit is superimposed by the Upper Bowen Coal Measures. The Upper Bowen Coal Measures unit comprises terrestrial sandstone, siltstone, shale and coal (Galloway, 1967a).

Triassic

Triassic sediments consist of terrestrial quartz sandstone, shale, siltstone and conglomerates. Sequences include the Rewan Formation, Clematis Sandstone and the Moolayember Formation.
The Rewan Formation comprises mudstone, siltstone and sandstone. The Clematis Sandstone is a highly resistant quart sandstone that overlies the Rewan Formation and is itself overlain by the Moolayember Formation. The Moolayember Formation comprises shale and sandstone beds (Galloway, 1967b).

Jurassic and Cretaceous

To the south, the Bowen Basin is overlain by the Jurassic-Cretaceous sequence of the Great Artesian Basin, and includes Lower Jurassic sandstone and Mesozoic granites.

Tertiary

Tertiary rocks within the Bowen Basin include basalt, acid igneous intrusions and terrestrial sediments (Galloway, 1967b). Tertiary rocks are widely spread throughout the basin.

Quaternary

Deposition of alluvial sediments, comprising of sand, clays and gravels occurs throughout the Bowen Basin and are typically overly bedrock.

1.1.7. Geology of the Fairhill Area

The local stratigraphy is composed of Quaternary alluvium, Tertiary laterite material and the Late Permian Burngrove, Fairhill, MacMillan and German Creek Formations. The strata in the region generally strike north-south and dip gently to the southwest of the FHCP. Dips can vary locally due to the presence of a series of synclines and anticlines. These smaller synclines and anticlines relate directly to the structural deformation, which formed the Comet Ridge and share a north-south axial strike.

Cainozoic

Quaternary alluvium is present predominantly along the Cooroora Creek floodplain, which intersects the FHCP from the north of the exploration lease to the south-eastern corner. The width of the alluvium varies from approximately 450m to as much as 800m within the exploration lease.

Tertiary material only covers a small mesa in the north-eastern corner of the project site. Tertiary laterite cover is commonly found in the surrounding topographically elevated areas. Where present, the laterite presents as a hardened siliceous/ferrous cap over the top of ridges and plateaus. Distinct laterite layers have not been reported from within the project area. The higher ground and ridges running north-south throughout the centre of the adjacent Wilton coal project have been described as dermosol above the weathered early Tertiary sediments of the Emerald Formation (Environmental Earth Sciences, 2012).

Burngrove Formation

At the FHCP, the Burngrove Formation is only present at the surface in the western section of the site. It consists of mudstone and siltstone that can be siliceous and tuffaceous in parts. Interbedded with the dominant mudstone and siltstones are dark grey to black shales, labile sandstones and calcareous sandstones. A low-energy depositional environment is likely to have resulted in the lack of clastic material above silt-size in the formation. It is likely that these formations were deposited by lakes and swamps.

Although most of the coal occurs in the upper section of the Blackwater group, thins seams are present in the Burngrove Formation. A number of coal seams have been reported in this Late Permian-aged formation. These coal seams include Pisces, Virgo, Leo, Aquarius, Scorpio and Centaur in youngest to oldest stratigraphic order.

Fairhill Formation

The Fairhill Formation hosts the targeted coal seams for the FHCP. It is present at the surface across the majority of the site. Jensen (1975) described the Fairhill Formation located north of Cooroora homestead as coarse-grained, micaceous, calcareous sandstone, conglomeratic (in places), and interbedded with very minor brown calcareous mudstone. Fossil logs are common, generally replaced with siderite or limonite (Jensen, 1975). Prouza (1977) reported that thick banded coal seams with mudstone and tuffaceous mudstone interbeds occur in 'cyclothems' within the predominantly arenaceous formation. The seams were named based on correlations in government boreholes, in descending order as Phoenix, Pegasus, Hercules, Canis, Lepus and Fairhill. All these coal seams are interbedded with various amounts of layered sediments of non-coal material, generally siltstone and carbonaceous mudstone. The Fairhill Formation sequence of coal seams is found in a stratigraphic interval approximately 130m thick.

MacMillan Formation

The MacMillan Formation lies stratigraphically below the Fairhill Formation separating it from the German Creek Formation within the project area. The MacMillan Formation was interpreted by Prouza (1977) and others as a shallow marine incursion, barren of coal seams. In the area, the MacMillan Formation is approximately 70m thick (Prouza, 1977). Prouza (1977) outlined the formation suggesting a prominent massive dark grey to black mudstone in its lower part. Marine fossils and fawn biotitic tuff were also described in the lower MacMillan Formation. The mudstone sequence in the description of Prouza (1977) grades upwards to an interbedded, bioturbated, micaceous mudstone and siltstone, with arenites common at the top of the Formation. The boundary to the Fairhill Formation is often abrupt but can be gradational in places. The MacMillan Formation only outcrops in small areas at the southwestern corner and eastern extent of the site.

German Creek Formation

Prouza (1977) correlated the regional Crocker Formation with the upper, coal bearing part of the German Creek Formation. It is predominantly arenaceous, with coal forming cycles corresponding to those of the German Creek Formation. Historical drilling within the site has identified five seams within the German Creek Formation that are the Pleiades, Aquila, Tieri, Corvus and German Creek seams. The only outcrop of this unit is mapped approximately 5km southeast of the site.

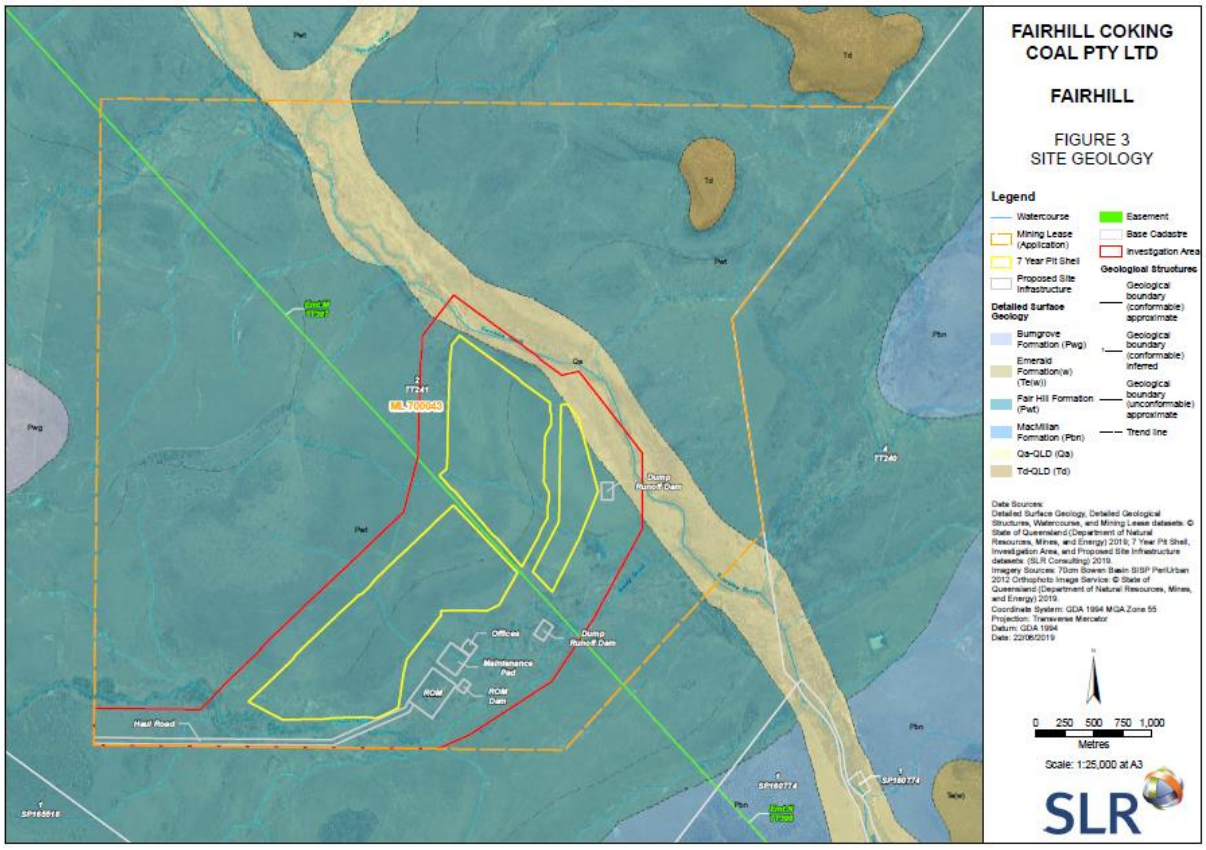

Figure 9 Regional Geology *(Note – ML boundary has been updated since map creation)*

1.1.8. Hydrology and Fluvial Networks

Regionally, The FHCP is located in the Mackenzie River sub-basin, within the Fitzroy River Basin**.** The Fitzroy River catchment covers an area of 142,665 square kilometres, making it the largest river catchment flowing to the eastern coast of Australia. The catchment stretches from the Carnarvon Ranges in the west to the river mouth in Keppel Bay, near Rockhampton. It is bounded to the north by the Burdekin River catchment area and to the south by the Burnett River catchment area.

The proposed FHCP is located within the Mackenzie River sub-basin of the Fitzroy Basin, a major Queensland catchment.

Figure 10 and Figure 11, illustrate the FHCPs regional and local drainage features.

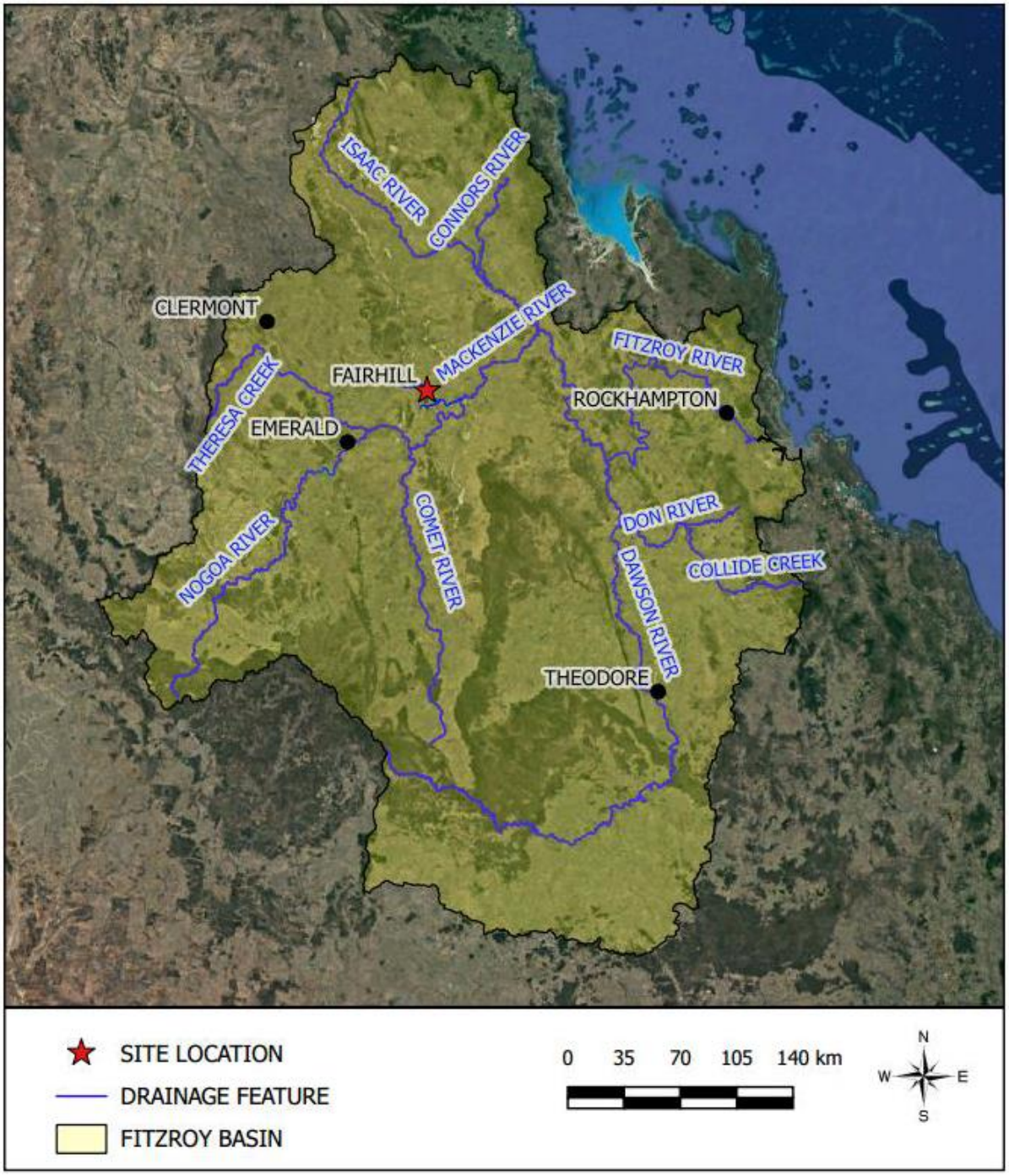

Figure 10. Regional Drainage

Several drainage features are located within the proposed FHCP area and typically drain southerly to Sandy Creek, a minor watercourse or easterly to Cooroora Creek, a major watercourse. It is noted that all drainage features within the proposed FHCP area are tributaries of Cooroora Creek.

The Fairhill project site is elevated between RL140m and RL170m with an upstream catchment of some 400ha. Cooroora Creek flows to the south-east past the northern extents of the project site.

At RL220m, this creek is formed some 15km to the west of the site, from a number of unnamed drainage lines. Cooroora Creek flows approximately 51km before joining the Mackenzie River, dropping some 100m elevation over its length.

Sandy Creek, formed at approximately RL190m from a number of unnamed drainage lines, flows along the southern boundary of the project site. This creek flows in an easterly direction to join Cooroora Creek some 2km downstream of the project site, at approximately RL150m.

The project site is located close to the top of the local catchment. The drainage lines flowing through the project site itself are ephemeral with flow occurring only in response to rainfall events and expected to be of short duration. Drainage paths within the proposed project site are shown in Figure 11.

The nearest gauging station to the FHCP site is located on the Mackenzie River at Bingegang. This station monitors the time-series of flow and quality of water in the Mackenzie River.

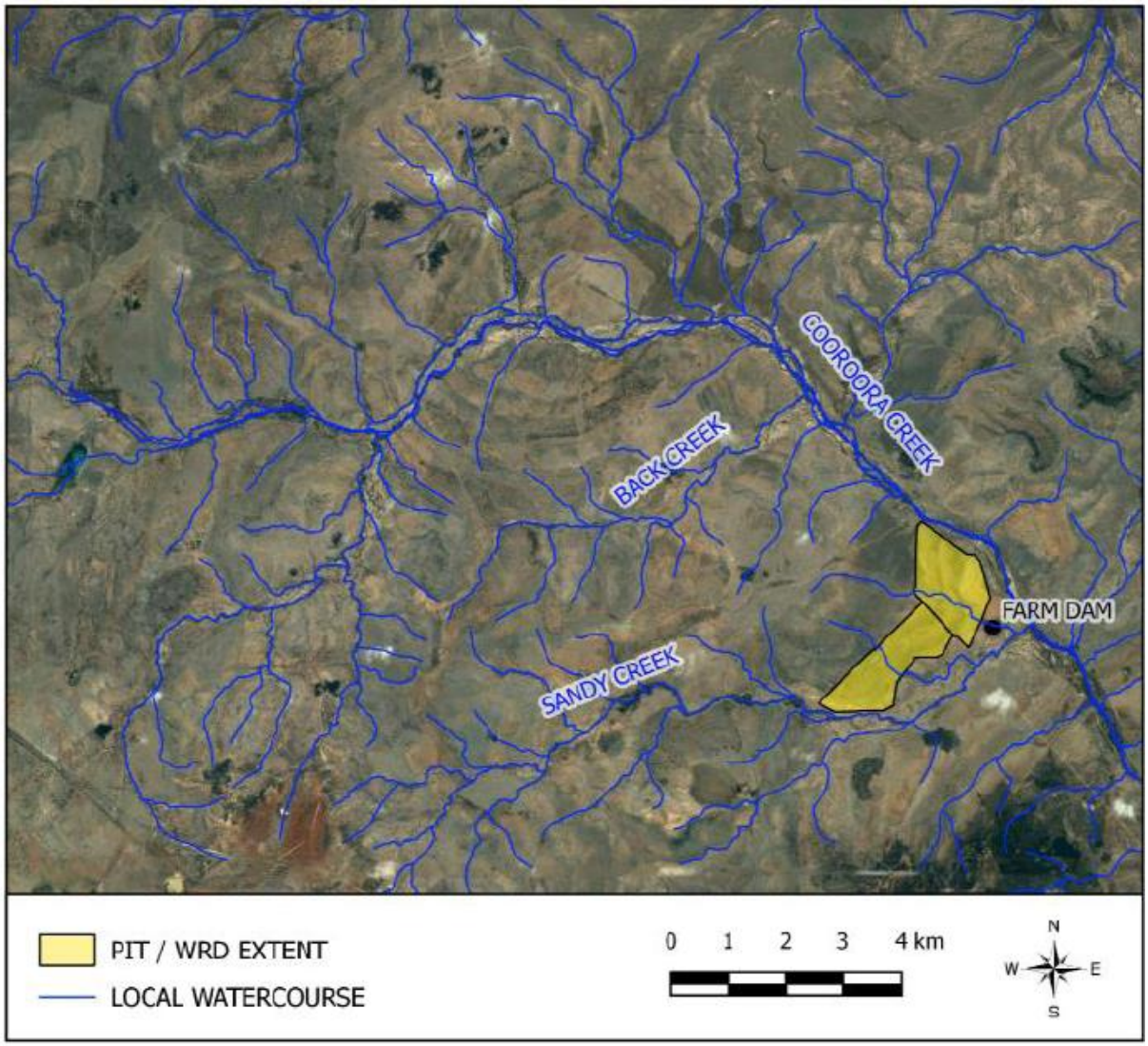

Figure 11. Local Drainage

1.1.9. Surface Water Quality

Water quality monitoring was undertaken by Northern Resource Consultants (NRC) in March 2018 at locations (Table 2) shown in Figure 12.

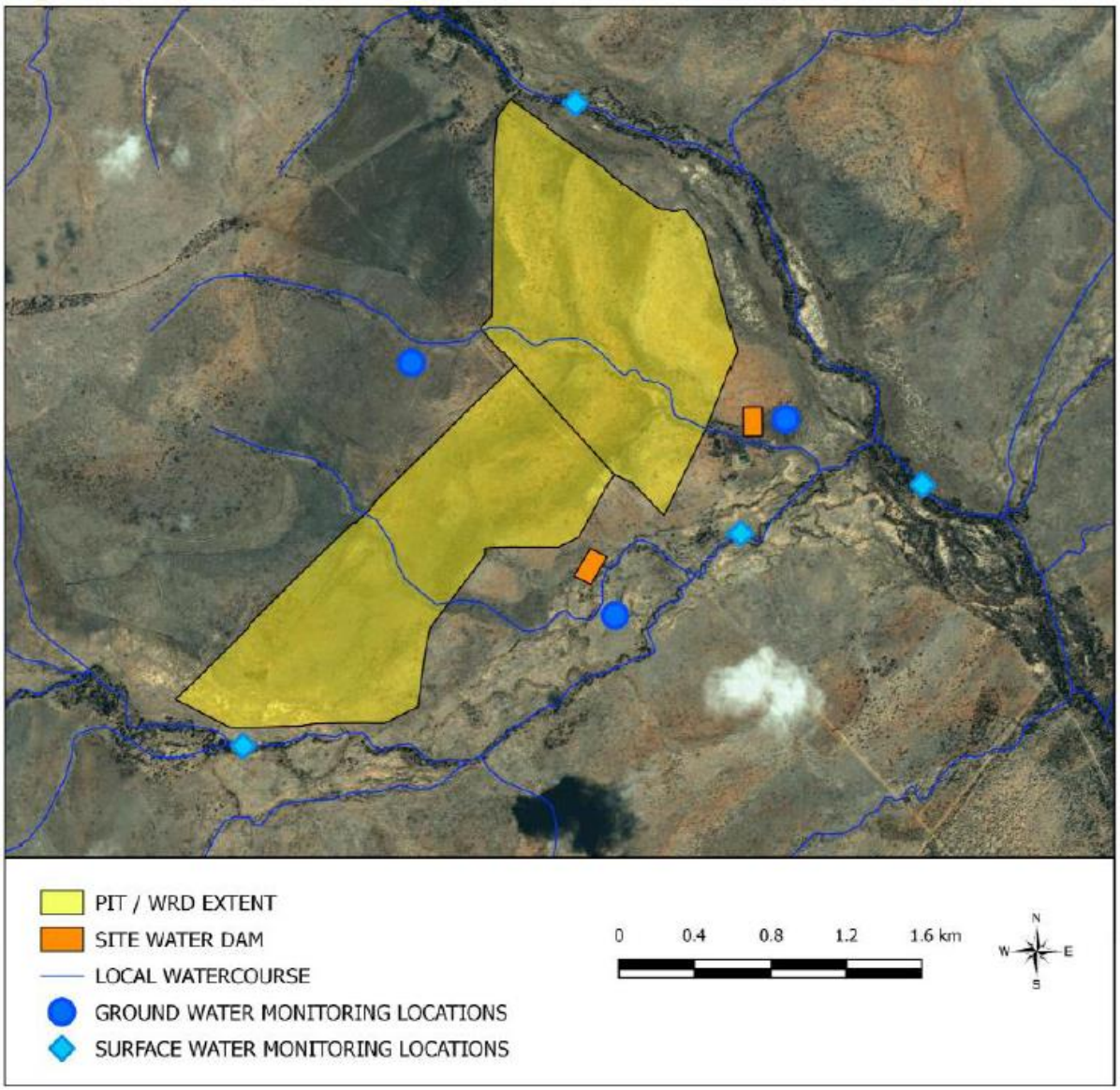

Figure 12. Water Quality Monitoring Locations

Monthly monitoring of surface water at FHCP is not possible due to the ephemeral nature of the creeks and short-lived flow regime due to the site's location in the upper reaches of the catchment.

During the sampling that was conducted in March 2018, the 3 sites in Sandy Creek were dry.

Table 2. Locations of surface water monitoring sites used in background

LOCATION ID*	STREAM	EASTING	NORTHING
2018 Surface water monitoring sites			
FHCC1	Cooroora Creek	666753	7431925

LOCATION ID*	STREAM	EASTING	NORTHING
FHCC2	Cooroora Creek	668365	7430784
FHCC3	Cooroora Creek	669187	7429429
FHWC1	Sandy Creek	664771	7428603
FHWC2	Sandy Creek	666439	7428117
FHWC3	Sandy Creek	667505	7428620

Surface water quality data was used to assess environmental values of surface water and determine water quality objectives. Natural conditions were established following the ANZECC/ARMCANZ (2000) criteria. However, some of these trigger values were modified based on the results from baseline monitoring at FHCP. The proposed interim trigger values are presented in Table 3.

Table 3. Proposed interim trigger values for FHCP surface water monitoring sites

Parameter	Measure	Interim Trigger Level
Physico-chemical	EC (µS/cm)	TBD[A]
	pH (pH units)	6.5 (lower trigger); 8.5 (upper trigger)
	TSS (mg/L)	110[B]
	Turbidity (NTU)	50[B]
Chemical (dissolved except for selenium)	Nitrate + Nitrite (mg/L)	0.7
	Ammonia (mg/L)	0.9
	Aluminium (mg/L)	TBD[A]
	Arsenic (mg/L)	0.013
	Barium (mg/L)	TBD[A]
	Boron (mg/L)	0.37
	Cadmium (mg/L)	0.0002
	Chromium (mg/L)	0.001
	Cobalt (mg/L)	TBD[A]
	Copper (mg/L) 0.0014	0.0014
	Lead (mg/L)	0.0034

	Manganese (mg/L)	1.9
	Mercury (mg/L)	0.00006C
	Nickel (mg/L)	0.011
	Selenium (total; mg/L)	0.005C
	Uranium (mg/L)	TBDA
	Vanadium (mg/L) TBDA	TBDA
	Zinc (mg/L)	0.008
Organics	Total BTEX (µg/L)	TBDA
	Total Xylenes (µg/L)	TBDA
	TRH (C6-C10) (µg/L) TBDA	TBDA

Default ANZECC & ARMCANZ (2000) Freshwater Aquatic ecosystems trigger value for 95% species protection used with exception of the following:

A To be determined: Insufficient number of samples to determine interim trigger.
B WQO to protect aquatic ecosystem EVs under baseflow for Mackenzie River .
C 99% species protection used due to potential for bio-accumulation.

pH

The pH of surface water samples was reported to be almost neutral, ranging from 7.4 to 7.5 (NRC, 2018c). The sediments collected from the surface water sampling locations were also assessed for pH. The pH in soil (1:2) was observed to range from 6.9 to 8.4 (NRC, 2018c). Although slightly alkaline, the pH observed from the sediments was within the acceptable range.

Electrical Conductivity

Electrical conductivity (EC) observed in surface water samples during the recent REMP (NRC, 2018c) ranged from 130 µS/cm to 200 µS/cm. The low EC indicates the freshness of surface water around the FHCP site.

Metals and metalloids

According to the REMP report (NRC 2018), the surface water at FHCP exceeded ANZECC/ARMCANZ (2000) default aquatic ecosystem protection guideline values for the following metals:

- Dissolved aluminium and copper concentrations at FHCC1 and FHCC2; however, dissolved copper was below the hardness modified trigger value (HMTV) at FHCC2.
- The concentration of dissolved zinc exceeded the ANZECC/ARMCANZ (2000) guideline value at FHCC2.

1.1.10. Hydrogeology

In the vicinity of the FHCP availability of water in geological strata is limited to coal measures.

At FHCP, all of the monitoring bores have been installed to monitor groundwater in the Fairhill Formation.

- Quaternary alluvium: the thickness of Quaternary alluvium at the FHCP site is variable The alluvium layer extends to approximately 11.5m deep at FH006, 6 m deep at FHMB02, and 10 m at FHMB01. The permeability of this unit is also variable depending on the proportion of coarse-grained material.

  FHMB01 is the only registered bore in the vicinity of FHCP that intercepts groundwater from an alluvial aquifer overlying clay. Measured yield from this bore was limited (<0.1L/s) and groundwater was highly saline (44,600 µS/cm).

- Tertiary sediments: consist of a thin layer of colluvium or *in-situ* weathered sandstone, to a maximum depth of 10m, rather than alluvial sediments. Therefore, it can be assumed that the FHCP site does not host any tertiary alluvial aquifers.

- Permian coal measures: Groundwater in the region exists in the confined Permian sandstone, siltstone and mudstone units and associated coal seams of the Burngrove and Fairhill Formations. The sedimentary units tend to be tuffaceous in nature with high clay content. The fine grains and lithified nature of these sedimentary strata results in low aquifer potential and much of the water-bearing units act as aquitards. Aquifer potential increases where there is contact between different rock types, e.g. sandstone, siltstone or coal—yields and permeability tend to increase. Deformation and fracturing in these units also increases aquifer potential. The coal seams can act as effective water-bearing and permeable units due to its low strength and high fracture potential. Unfractured aquitards prevent vertical inter-mixing between aquifer layers. The MacMillan Formation mudstone and siltstones underlying the Fairhill Formation likely act as a regional aquitard, confining the even deeper German Creek Formation coal measures.

At FHCP, all of the monitoring bores have been installed to monitor groundwater in the Fairhill Formation. The Burngrove Formation occurs only as a thin, weathered layer covering part of the western portion of the tenement which does not hold groundwater. Therefore, no aquifers of the Burngrove Formation are likely to be found within FHCP.

Table 4 presents the local stratigraphy at the FHCP.

Table 4. Local Stratigraphy

Age	Group	Formation	Lithology	Aquifer Type
Quaternary	-	-	Unconsolidated sand and clay, with basal gravel and pebbles.	-
Tertiary	-	Emerald Formation	Clayston and siltstone, interbedded basalt (deeply weathered in outcrop).	-
Permian	Blackwater Group	Burngrove Formation	Terrestrial mudstone, siltstone, sandstone, coal and tuff.	Pices Virgo Libra Leo Aquarius Scorpio Centaur
		Fairhill Formation	Terrestrial lithic and feldspathic labile sandstone with minor siltstone, mudstone, and coal seams.	Phoenix Pegasus Hercules Canis Lepus Fairhill Fairhill Lower
	Unconformity			
	Back Creek Group	Mac Millan Formation	Marine sandstone, siltstone, shale and mudstone.	-
		German Creek Formation	Sandstone, siltstone, mudstone, coal seams	Pleiades Aquila Tieri1 Tieri 2 Corvus Corvus 2 German Creek

		Ingelara Formation	Conglomeratic sandy siltstone, sandstone and mudstone	-
		Freitag Formation	Thin interbedded sandstone, siltstone, mudstone and minor coal seams	-

1.1.11. Groundwater Quality

Groundwater EC at Fairhill is highest in the alluvium (44,600µS/cm at FHMB01). Groundwater in the Fairhill Formation ranges in EC from 15,400 to 25,300µS/cm. Groundwater sample pH values ranged from 6.63 to 8.59. A drop in pH values to near-neutral occurred after the initial monitoring event, probably pointing to insufficient development of bores.

Major ionic proportions in groundwater indicate predominantly sodium-chloride type water at FHCP. Fresher sodium-bicarbonate dominant groundwater is found in the neighbouring WCP site, which is not hydraulically connected to FHCP groundwater.

Boron and zinc seem to be abundant in the water-bearing strata at FHCP as well as regionally, as seen in the adjacent WCP monitoring bores. This implies that baseline concentrations of these parameters are most likely already higher than guideline values for Aquatic ecosystem protection. Nevertheless, baseline data should continue to be collected until sufficient sample size has been attained so that more suitable limits can be derived from the data.

If groundwater is brought to the surface by artificial means, it should not be discharged directly into surface water drainage channels since concentration of some metals exceed Aquatic ecosystems trigger levels.

Other potential contaminants such as cadmium and chromium may occasionally exceed guideline values but concentrations may be too low to become an ongoing concern.

There are no known groundwater bores within the FHCP tenement that are used for stock watering or human consumption owing to high salinity.

Depth to groundwater

Groundwater is understood to be primarily associated with the coal seams, at depths of between 10m and 40m below ground level. The encountered aquifers were generally low yielding, with high salinity levels. It is therefore anticipated that interaction with groundwater will occur during mining activities; however, groundwater inflows to the pit are expected to be minimal, with any groundwater inflows that do occur during mining able to be managed by the proposed surface water management system.

Flow direction

High variability in the direction of groundwater gradients suggests heterogeneity within aquifers due to very low aquifer permeability and/or structural controls such as folding. Structural geology appears to be an important control on groundwater in the region.

Overall, surrounding the proposed FHCP pit, groundwater flow seems to converge on FHMB01.

Potential groundwater flow paths/directions have been inferred to converge on FHMB01 from:
- southwest to northeast
- northwest to southeast.

A potential groundwater flow divide probably exists at the southern extents of FHCP aligning approximately with Sandy Creek. A separate flow path appears to occur to the south.

Groundwater Yields

Groundwater yields and hydraulic conductivity values in monitoring bores are low and spatially variable across the site. This indicates low aquifer potential.

The yield rates in the monitoring bores at FHCP were measured and ranged from <0.1L/s to 1L/s. Out of the seven existing bores at FHCP, two bores reported yield values 'too low to measure'.

Alluvium

Recharge of groundwater is likely to occur predominantly through the infiltration of rainfall in areas of elevated topography (e.g. 2km north-northeast of the proposed FHCP pit). Minor recharge may occur through slow infiltration of pooled surface water along the Cooroora Creek stream bed and floodplain. Evidence of significant pooling over clay-rich alluvium adjacent to Cooroora Creek can be seen in aerial imagery. Significant evaporation / evapotranspiration in pools above surficial clays and subsequent slow infiltration may be one of the mechanisms resulting in the salinisation of groundwater in the region. Some recharge may also occur through surface water infiltration into Sandy Creek.

Groundwater Monitoring

Seven groundwater monitoring bores have been installed at FHCP to monitor groundwater levels and water quality. Out of seven bores, five monitoring bores (FHMB03, FHMB04, FHMB05, FHMB06 and FHMB07) are targeted to monitor deep strata, whereas the other two monitoring bores are shallow and located close to Cooroora Creek to monitor potential groundwater-surface water interaction. Data from the monitoring bores indicate that the aquifers at FHCP are generally saline and of low yield (Table 5).

Table 5 Groundwater occurrences and yield of monitoring bores at the FHCP

Bore	Depth	Water at	Strata	Yield	RWL (m AHD)	EC 2012 µS/cm
FHMB01	24m	9m	Alluvium/weathered basement	<0.1	141.64	44600
FHMB02	18.5m	11m	Coal/siltstone	1L/s	151.27	25300

Bore	Depth	Water at	Strata	Yield	RWL (m AHD)	EC 2012 µS/cm
FHMB03	20m	dry	Screened in sandstone/siltstone	N/A	Dry	N/A
FHMB04	29.5m	24 m	Tuffaceous siltstone	0.44L/s	148.57	16400
FHMB05	23.5m	16m	Coal/tuff	To low to measure	155.91	15400
FHMB06	41m	22m	Sandstone, mudstone/coal	<0.1L/s	167.95	24600
FHMB07	48m	36m	Sandstone, mudstone/coal	Too low to measure	152.86	17900

Easting and northing in GDA94 Zone 55

* FHMB01 top of casing elevation has not been surveyed. An approximate elevation from Google Earth has been used.

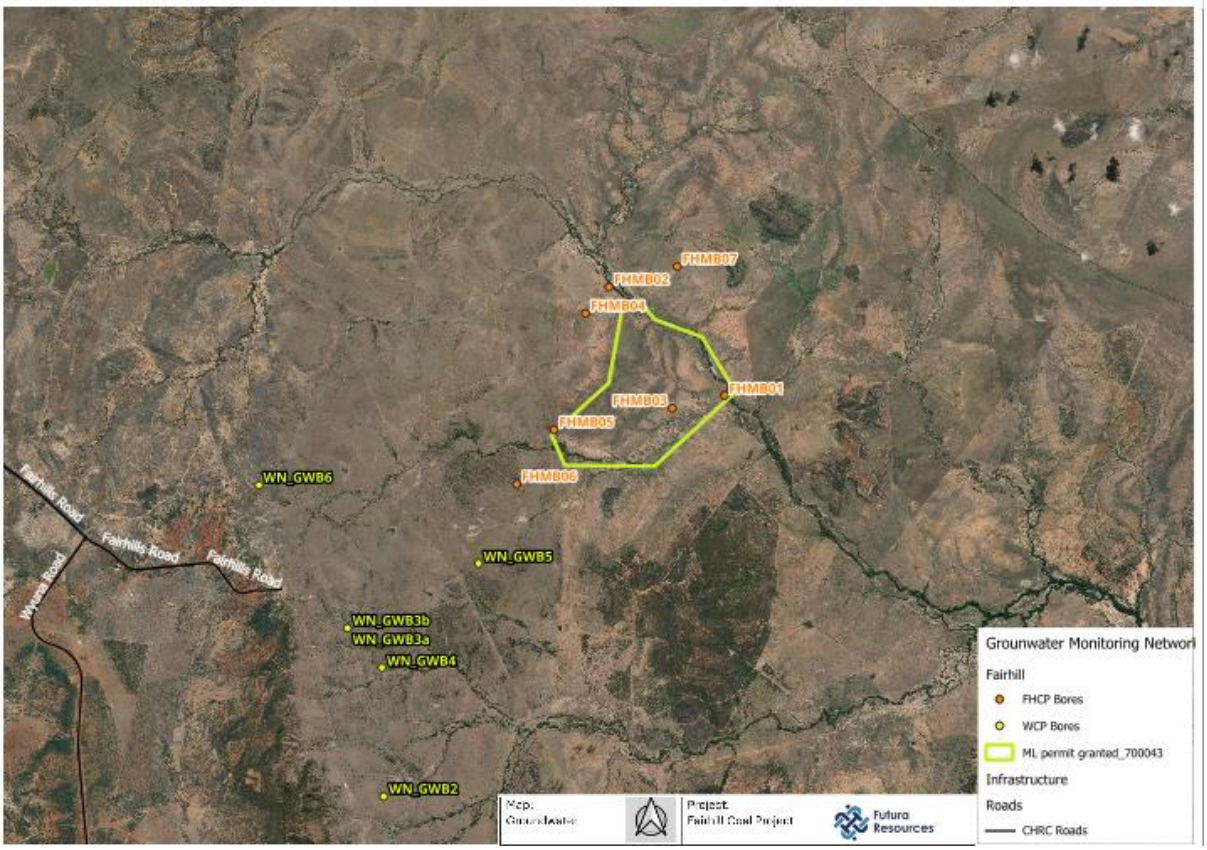

Figure 13. Groundwater Monitoring Network

1.1.12. Soil

The Fairhill Coal Project is dominated by 4 Soil Mapping Units (SLR, 2019). Black Brown and Grey Vertosols and Brown and Red Dermosols dominate and are associated with the Fairhill Formation and Black, Brown and Grey Vertosols an Black, Brown and Grey Dermosols dominate and are associated with Quaternary Alluvium.

These soils have been classified in terms of the seven Soil Profile Classes of the Central Queensland region. Land suitability and GQAL studies conducted for the Fairhill Coal Project have indicated a low chemical and physical fertility generally, as well as salinity and sodicity of the subsoil in some areas (EES, 2012). Nutrient levels across the study area were found to be poor.

1.1.13. Soil Health and Function

Based on desktop, field and laboratory assessment results (Soil and Land Suitability Assessment , SLR 2019) the results identified the Soil Mapping Units across the Project site area, as shown in Figure 14Figure 14. Soil Mapping Units.

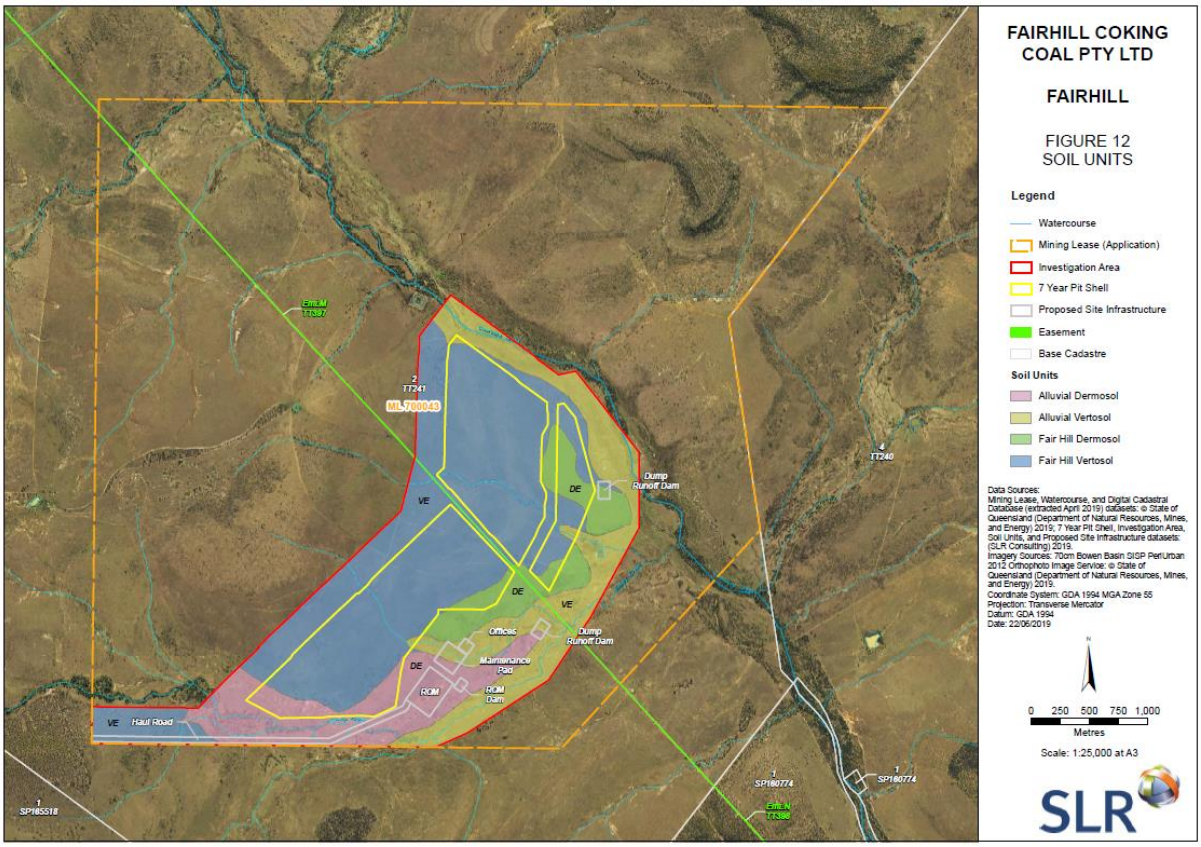

Figure 14. Soil Mapping Units (*Note – the figure still shows previous ML boundary, as SMU do not require updating*)

1.1.14. Land suitability

SLR (2019) also conducted a detailed assessment of land suitability class and good quality agricultural land (GQAL). Detail on methodologies to assess land suitability for the FHCP including findings is provided in SLR (2019). A summary of findings is provided below.
The Department of Mines and Energy (DME, 1995) guideline *Land Suitability Assessment Techniques* provides guidance on the assessment of land suitability pre-mining land and establishment of post-mining land use potential. The FHCP has been assessed against these *Land Suitability Assessment Techniques* (DME, 1995) to determine pre-mining land suitability.

Table 6**,** provides a summary of land suitability and GQAL classes.

Table 6 Land suitability class and GQAL class descriptions

Class	Definition
Land Suitability	
Class 1	**Suitable land with negligible limitations** that is highly productive and requires only simple management to maintain economic production.
Class 2	**Suitable land with minor limitations** which either reduce production or require more than the simple management practices of Class 1 to maintain economic production.

Class	Definition
Land Suitability	
Class 3	**Suitable land with moderate limitations** which either further lower production or require more than those management practices of Class 2 to maintain economic production.
Class 4	**Unsuitable land with severe limitations** so severe that the sustainable use of the land in the proposed manner is precluded. In some circumstances, the limitations may be surmountable with changes to knowledge, economics or technology. .
Class 5	**Unsuitable land with extreme limitations** that preclude its use.
Good Quality Agricultural Land classes (GQAL)	
A	Crop land – Land that is suitable for current and potential crops with limitations to production that range from none to moderate.
B	Limited crop land – Land that is marginal for current and potential crops due to severe limitations; and suitable for pastures. Engineering and/or agronomic improvements may be required before the land is considered suitable for cropping.
C	Pasture land – Land that is suitable only for improved or native pastures due to limitations which preclude continuous cultivation for crop production; but some areas may tolerate a short period of ground disturbance for pasture establishment.
D	Non-agricultural land – Land not suitable for agricultural uses due to extreme limitations. This may be undisturbed land with significant habitat, conservation and/or catchment values or land that may be unsuitable because of very steep slopes, shallow soils, rock outcrop or poor drainage.

The FHCP study area was assessed to be land suitability Class 3 and Class 4 under the land suitability framework for beef cattle grazing, when assessed for each of the following limitations:

Water availability;

- Nutrient deficiency;
- Soil physical factors;
- Salinity;
- Rockiness;
- Micro relief;
- Soil pH;
- Soil ESP;
- Wetness;
- Topography;
- Water erosion;
- Flooding; and
- Vegetation regrowth.

A direct correlation between land suitability and GQAL classes can be made to classify the soil units on the Project site into the appropriate GQAL class.

Correlation the GQAL framework and confirmation of Pastoral management associated with the study area indicates that for the majority of the study area the land is Class C2 and C3 GQAL, Indicating suitability for grazing native pastures with limited suitability for pasture improvement. Additional supporting evidence of this was the extensive land clearing/pasture improvement activities noted to have occurred in the study area during field activities. The findings are shown in Figure 15 below.

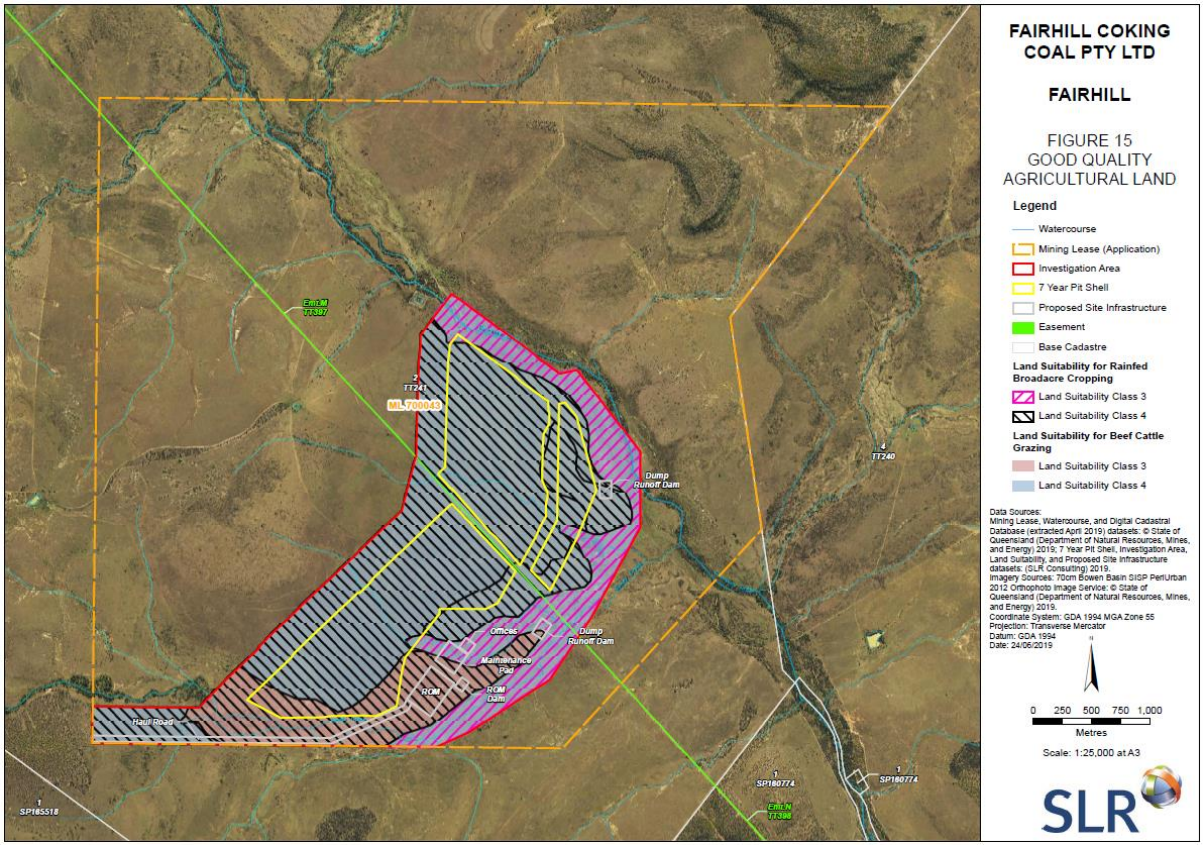

Figure 15. Land Suitability and GQAL Assessment (*Note – the figure still shows previous ML boundary, as Land Suitability does not require updating*)

No strategic cropping land trigger mapping was identified within the study area and no strategic cropping land was assessed.

1.1.15. Vegetation

The FHCP tenement is located in the "Brigalow Belt of Queensland. The land in the area has been largely disturbed by cattle grazing and farming activities. Pasture improvement in the region has led to the clearing and raking of timbered areas, generally in undulating to flat terrain. The majority of the FHCP site is located in such terrain and is characterised by improved pasture with small fragments of remnant vegetation retained along watercourses and drainage features.

Vegetation community ground-truthing surveys were conducted in September 2017 and May 2018. FHCP has been designed to avoid all areas of remnant regional ecosystems (REs) shown on the Department of Natural Resources, Mines and Energy (DNRME) Vegetation

Management Map, as well as those identified through the ground-truthing surveys. (refer to Appendix B –).

1.1.16. Regional Ecosystems and Regulated Vegetation

The study area contains eight polygons of remnant vegetation shown on the DNRME RE mapping. These polygons contain at least one of the following REs: RE 11.3.3, RE 11.3.25, RE 11.9.1, RE 11.9.2, RE 11.9.5, RE 11.9.7, RE 11.10.11 and RE 11.10.12. Large areas of non-remnant vegetation occur between fragments of remnant vegetation mapped within the study area. A small polygon of HVR is mapped in the southwest corner of the study area along Sandy Creek. This area is mapped as a mixed polygon of Category R and Category C regrowth vegetation.

Table 7 RE status and descriptions for mapped remnant vegetation provides a summary of all the REs mapped throughout the study area including the short descriptions provided in the REDD (Queensland Herbarium, 2018).

Table 7 RE status and descriptions for mapped remnant vegetation

RE CODE	VMA STATUS	BIODIVERSITY STATUS	REGIONAL ECOSYSTEM DATABASE SHORT DESCRIPTION
11.3.3	Of concern	Of concern	*Eucalyptus coolabah* woodland on alluvial plains
11.3.25	Least concern	Of concern	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines
11.9.1	Endangered	Endangered	*Acacia harpophylla-Eucalyptus cambageana* woodland to open forest on fine-grained sedimentary rocks
11.9.2	Least concern	No concern at present	*Eucalyptus melanophloia* +/- *E. orgadophila* woodland on fine-grained sedimentary rocks
11.9.5	Endangered	Endangered	*Acacia* harpophylla and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks
11.9.7	Of concern	Of concern	*Eucalyptus populnea, Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks
11.10.11	Least concern	No concern at present	*Eucalyptus populnea, E. melanophloia* +/- *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks
11.10.12	Least concern	No concern at present	*Eucalyptus populnea* woodland on medium to coarse-grained sedimentary rocks

Vegetation community surveys largely supported the DNRME RE mapping within the main remnant areas. The 2 secondary and 24 quaternary surveys confirmed the presence, extent, status and condition of remnant vegetation within the study area and allowed confirmation of DNRME mapping, with some exceptions.

An area in the far southwest corner of the study area is shown on the State mapping as containing numerous mixed polygons including REs 11.9.2/11.9.1/11.9.5, a mixed polygon of

REs 11.9.2/11.9.1, a mixed polygon of REs 11.3.3/11.3.25/11.9.1 and a polygon of 11.10.12. The small area that was ground-truthed showed the mix of polygons as RE 11.9.2 (*Eucalyptus melanophloia* and *Acacia leiocalyx* woodland) that is listed as 'least concern' under the VM Act and has a ‘no concern at present’ biodiversity status (see the ground-truthed map in Appendix B)

Endangered RE 11.9.1 was confirmed in conjunction with RE 11.3.25e along Cooroora Creek and Sandy Creek. Two small polygons along Sandy Creek were State mapped as mixed polygons of high value regrowth and Category R vegetation (see Maps in Appendix A). Although confined to the edges of Sandy Creek, these polygons recorded heights and covers within thresholds defined in the VM Act (1999) when compared to the respective RE technical description provided by DES and are considered remnant vegetation. These two mixed polygons support a species composition and structure consistent with remnant REs 11.9.1 and 11.3.25e. Similar to the mixed polygon along Cooroora Creek, the small polygons of RE 11.9.1/11.3.25e along Sandy Creek occur with a broad ecotone and accurate differentiation of individual homogenous REs was not possible.

Remnant vegetation along major watercourses were State-mapped as mixed polygons. One of these (RE 11.3.3) is described as *Eucalyptus coolabah* open woodland, but this was not identified in the study area. However, scattered *Eucalyptus coolabah* were present and scattered through remnant vegetation along larger watercourses but was not a dominant component of any area assessed. The presence of *Eucalyptus coolabah* could indicate that RE 11.3.3 might have been present prior to clearing for agricultural land-use.

The small sandstone outcrop northeast section of the study area was mapped as RE 11.10.11 (*Eucalyptus populnea, Eucalyptus melanophloia +/- Callitris glaucophylla* woodland); however, ground-truthing identified it as RE 11.10.12 (*Eucalyptus populnea* woodland), as *Eucalyptus melanophloia* and *Callitris glaucophylla* were not present

REs identified in the study area included Res 11.3.25e, 11.9.1, 11.9.2 and 11.10.12. Both REs 11.9.2 and 11.10.12 are of ‘least concern’ under the VM Act and have a ‘no concern at present’ biodiversity status. RE 11.3.25e has a ‘least concern’ VM Act class and an ‘of concern’ biodiversity status. RE 11.9.1 has an ‘endangered’ VM Act class and biodiversity status.

Current mining and infrastructure plans avoid disturbance to all remnant and HVR vegetation by design. The current proposed disturbance footprint of the project is located in the middle of the study area within broad areas of non-remnant vegetation.

Adjacent to Cooroora Creek are two large areas with numerous gilgai. This wetland area is situated in the northern extent of the proposed disturbance area. This habitat is outside of the currently proposed disturbance area with a minimum 25m buffer zone included. Although this area is not shown on the map of referrable wetlands (DES, 2018b) this habitat type is a seasonal wetland and is considered high quality habitat for Ornamental Snakes.

1.1.17. Threatened Ecological Communities

No threatened ecological communities were identified and/or met the condition thresholds during the vegetation surveys.

1.1.18. Endangered, Vulnerable, Rare or Near Threatened Flora and Fauna

The potential for each listed flora and fauna species identified in the desktop analysis to occur within the study area is discussed in the Flora and Fauna Technical Report (Appendix of this PRC Plan).

No flora or fauna species listed as threatened under the EPBC Act were detected within the study area during the surveys.

No Critically Endangered, Endangered, Vulnerable, or Near Threatened flora species as listed under the *Nature Conservation Act 1992* (NC Act) were identified during the vegetation surveys, despite targeted surveys in suitable habitat.

No Critically Endangered, Endangered, Vulnerable, or Near Threatened fauna species as listed under the NC Act were identified during the survey, despite conducting targeted threatened fauna surveys.

Two threatened fauna species, the Squatter Pigeon (southern) and the Ornamental Snake, have been recorded in the local area (SHG, 2011) and therefore have a high likelihood of occurrence within the study area.

Evidence of one ‘special least concern’ species, the Short-beaked Echidna (*Tachyglossus a. aculeatus*), was recorded within the study area during the 2017 baseline survey.

1.1.19. Pest species

The number of pest flora species observed within the study area was moderate, comprising around 17% of total flora species identified. Significant weed species recorded include Parthenium (*Parthenium hysterophorus*), Common Pest Pear (*Opuntia stricta*), Prickly Pear (*Opuntia tomentosa*) and Harrisia Cactus (*Harrisia martinii*), which are restricted invasive plants under the *Biosecurity Act 2014*. Parthenium and Mimosa Bush were recorded throughout the study area on the margins of watercourses and drainage features, often occurring as dense infestations.

Eight invasive fauna species were identified during the fauna surveys, all of which commonly occur in disturbed habitats throughout Queensland. The following species were observed within the study area:

- Common Myna (*Acridotheres tristis*)
- European Rabbit (*Oryctolagus cuniculus*)
- Wild Boar (*Sus scrofa*)
- House Mouse (*Mus musculus*)
- Cane Toad (*Rhinella marinus*)
- Feral Cat (*Felis catus*).

Domestic Cattle (*Bos Taurus*) and Horses (*Equus caballus*) were also recorded within the study area and likely impact native fauna through competition and destruction or modification of habitat.

Some locally occurring threatened bird species have the potential to occur within the study area.

1.1.20. Protected animal breeding places

None of the vegetation communities mapped within the study area are mapped as essential habitat on the DNRME essential habitat map. The proposed disturbance area does not include any areas shown on the flora survey trigger map as being ‘high risk’.

1.1.21. Ground Water Dependent Ecosystems (GDE’s)

There is a moderate chance that terrestrial GDE’s (ecosystems dependent on the sub surface presence of groundwater) may exist along watercourses. Mapping of these types of GDEs is undertaken under the Queensland RE framework, so existing remnant RE mapping is an essential component of determining the spatial extent of GDEs on site.

Vegetation communities were ground-truthed along Sandy Creek during the flora and fauna assessments. Ground-truthing was fairly consistent with the Regulated Vegetation management map (DNRME, 2018), identifying the majority of Sandy Creek as non-remnant vegetation.The only discrepancy were two small areas below the proposed disturbance area within Sandy Creek. One of these areas was shown as high value regrowth of RE 11.9.1/11.3.25/11.3.3 and the other was mapped as non-remnant vegetation on DNRME RE mapping. Ground-truthing surveys concluded that both of these areas have the height and cover to be classified as remnant vegetation. River Red Gum (Eucalyptus camaldulensis) and Coolibah (Eucalyptus coolabah) which were located immediately within the bed and bank of Sandy Creek. These species were sparsely distributed within the two ground-truthed remnant polygons along Sandy Creek. They are typically associated with watercourses and floodplains, are known to use groundwater intermittently throughout the year and were the only species located that can reach and use the saline groundwater. Although ground-truthed as meeting the requirements as remnant vegetation, these two polygons are small in size, heavily impacted from cattle and non-native species and are considered to be of low ecological function.

Ground-truthed vegetation within the study area along Cooroora Creek was similar to DNRME mapping. Two large polygons were mapped as mixed vegetation community of RE 11.9.1/11.3.25. River Red Gum was recorded as dominant immediately within the bed and bank of Cooroora Creek. It is highly likely that large River Red Gums are using groundwater at least intermittently throughout the year. Additionally, Coolibah were present and scattered through remnant vegetation along Cooroora Creek but was not a dominant component of any area assessed.

These potential GDEs would likely be utilising aquifers in unconsolidated alluvial sediments. Monitoring of Coolibah tree health will be an ongoing requirement to ensure that groundwater drawdown is not having a significant deleterious impact on GDEs. Changes in groundwater level as a result of potential seepage into the pit will be monitored by water level measurements and water quality sampling in impacted and reference monitoring bores.

A GDEMP for the FHCP is requires bio-condition assessment and ongoing monitoring of the potential terrestrial GDE’s associated with Coorora and Sandy Creeks as per EPBC requirements.

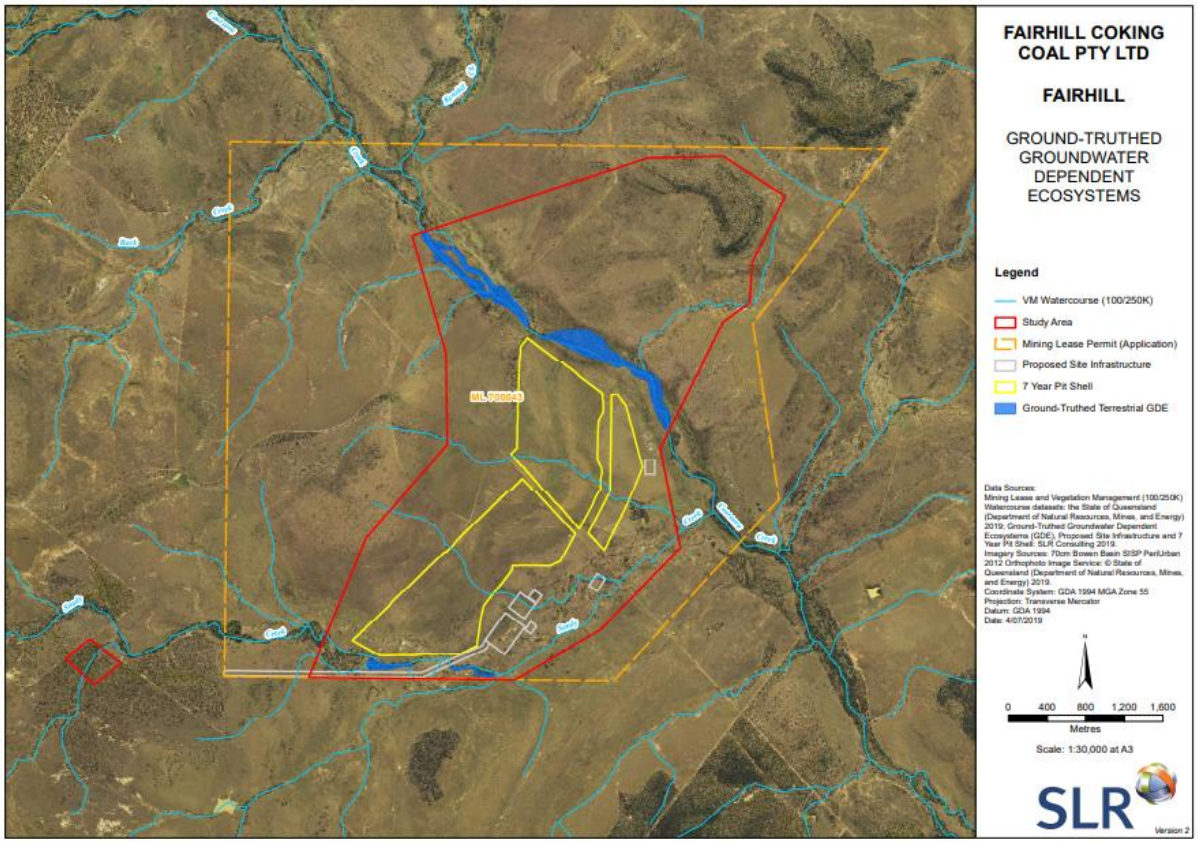

Figure 16. Potential Terrestrial GDE's (*Note – the figure still shows previous ML boundary, as Groud-truthed GDE's do not require updating*)

1.1.22. Pre-mining Land Use

The regional land use in the Emerald area of the Bowen Basin region is generally rural with some coal mining activities. Rural land uses are predominately cattle grazing and irrigated and rainfed broadacre cropping.

A large proportion of the prime agricultural land in the region surrounding the proposed Fairhill Coal Project is situated on the flood plain of the Nogoa River around Emerald and to the east, supplied by Fairbairn Dam. Away from the flood plain, cattle are grazed on native or improved dry land pasture (EES, 2012).

Cattle grazing is the dominant land use in the FHCP tenements with much of the flatter land around the northern and eastern areas cleared. Tracks, fences, dams and yards are present across the area for the purpose of cattle grazing.

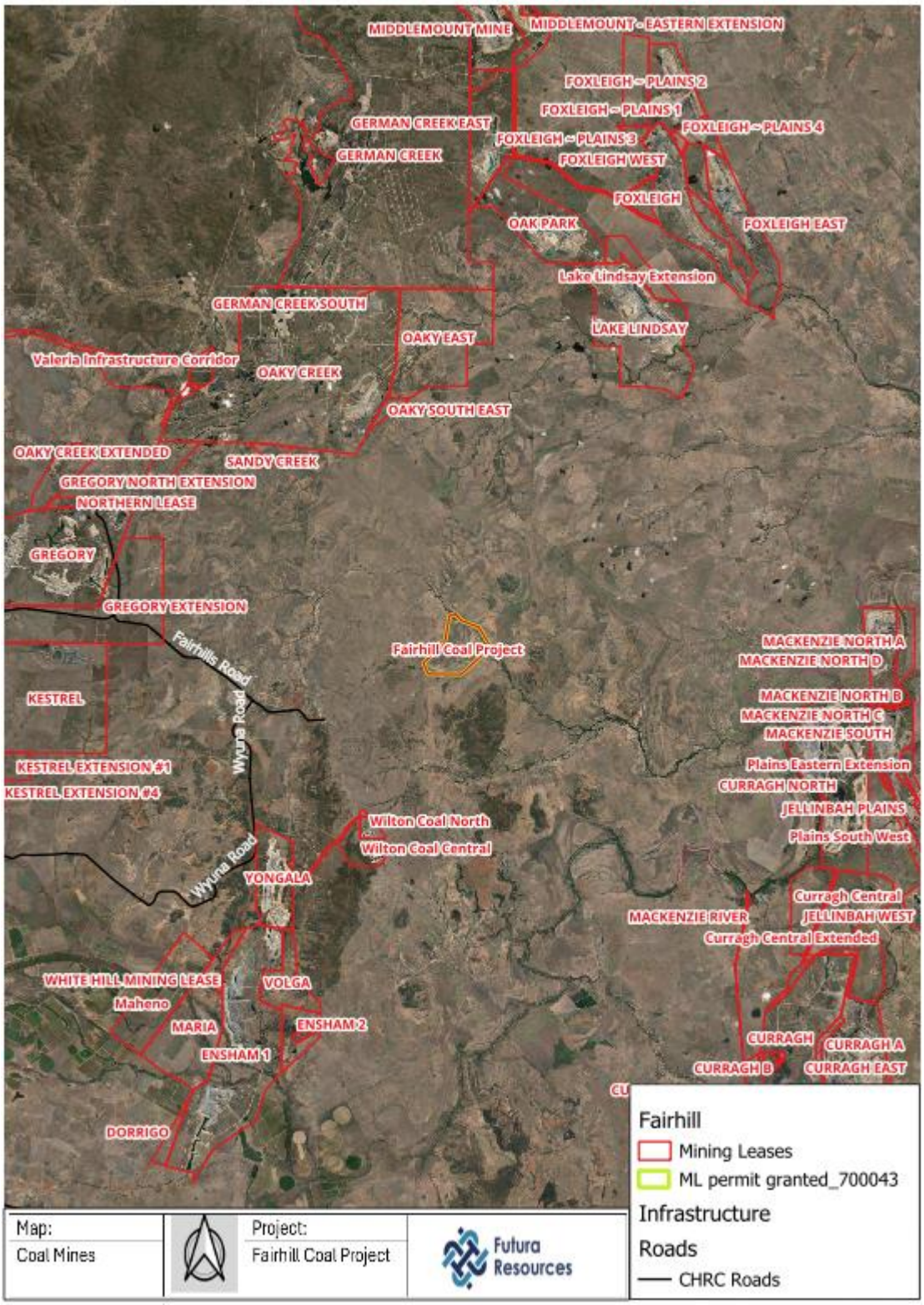

Figure 17. Existing mining operations surrounding the FHCP

1.2. Environmentally Relevant Activities

Environmentally Relevant Activities (ERAs) are prescribed activities under the *Environmental Protection Regulation 2008*, which are generally industrial or intensive animal industries with the potential to release emissions which impact on the environment and surrounding land uses. The straightforward nature of the proposed Project with no proposed processing on site, limits the Project's need to undertake additional prescribed activities.

ERAs for the Project are listed in Table 8. Environmentally Relevant Activities.

Table 8. Environmentally Relevant Activities

Activity	Environmentally Relevant Activity	Location
Mining Black Coal	ERA 13	ML700043
Waste disposal	Ancillary 60 – Waste disposal 1: Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(a)(a) less than 50,000t	ML700043

1.2.1. Project Description & likely duration

The Project is intended as a hard coking coal production mine, utilising a shallow open cut method to selectively mine targeted coal seams. The coal mining activity is aiming for an initial operation of 1.7 Mtpa run of mine (ROM) coal, ultimately producing approximately 1.1 Mtpa of product coal. FHCP intend to bring export quality coking and thermal coal products to market. The volume of the resource available sits close to the surface (between 0 and 200 m below the surface), with the majority of the in-situ coal product located between 50 and 100 m deep (ROM Resources, 2013).

The LoM is currently scheduled for 7 years. Rehabilitation Monitoring and Maintenance is anticipated to continue for a further 10 years.

1.2.2. Primary mine features and infrastructure onsite

The mine site will comprise the following land disturbances:

- Open pit;
- Overburden dump;
- Transportable administration office blocks for personnel;
- Transportable ablution facilities;
- Surface water and mine-affected water (MAW) management structures (dams);
- Maintenance workshop and laydown area;
- Warehouse facilities for mining and haulage contractors;
- Power generators for workshop (1) and administration facilities (1);
- Communications infrastructure including towers and cabling;
- Haul road network, and site access road network; and

- ROM coal stockpile area.

The proposed site layout is presented in Figure 18.

The FHCP aims to excavate the coal of the Middle-Lower Permian Fairhill Formation using a combination of excavators, scrapers, loaders and trucks to allow stripping of the coal from interburden. ROM coal will then be trucked to nearby established mining facilities at Gregory-Crinum to make use of pre-existing wash plant, tailings storage and rail load out infrastructure.

The mining method involves the use of scrapers, excavators and trucks to strip mine shallow coal from interburden. Coal will be loaded into dump trucks for delivery to the ROM pad before being hauled via road registered trucks to Gregory-Crinum for processing. A fleet of 30t excavators will mine coal and interburden ensure efficient collection of raw product.

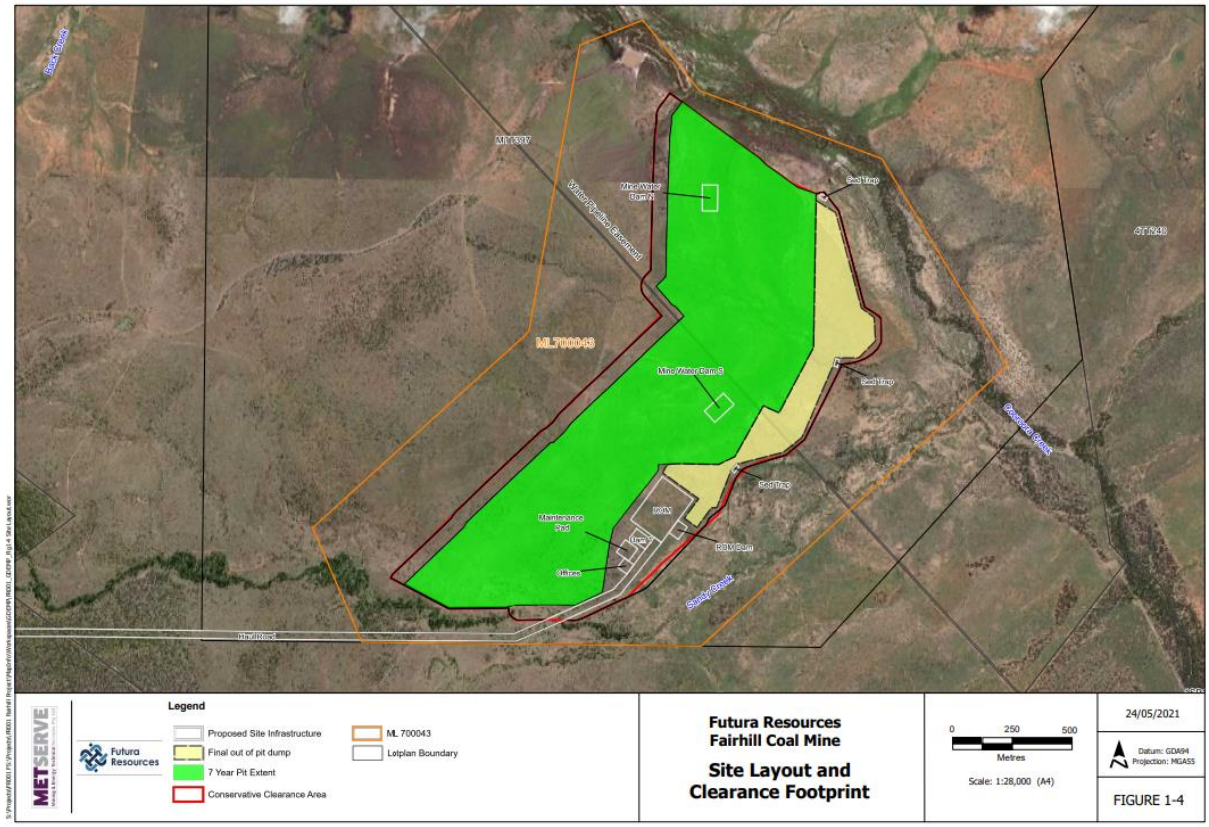

Figure 18. Site Layout

1.2.3. Water Management

The Project is a relatively small, shallow open-pit disturbance area of approximately 311 hectares in total for the initial life of the mine, located at the top of a catchment due west of the Mackenzie River. Full details of the potential interaction of the project with surface water and groundwater is included in Appendix C - *A response to guideline ESR/2015/1837 Application requirements for activities with impacts to water.*

Evaluation of risk of impact to downstream waterways from unplanned or uncontrolled release has been rated as low. Control strategies for the containment of mine impacted water are discussed at length in the ATC Williams Water Management Assessment report in **Appendix A2** (ATC Williams, 2019; Appendix C).

The key objectives with respect to water management are to:

- Minimise mine affected (disturbed) areas and divert clean water around the development area for the ultimate disturbance to receiving waters.
- Control the release of impacted water from site to the extent that the environmental values of the receiving environment are not detrimentally impacted.

Management approaches to water types for the Fairhill Coal Project are described in Table 9.

Table 9. Management approaches to water types for the FHCP

Water Type	Description	Management Approach
Clean Water	Runoff derived from areas: - Upstream of the mine development footprint or - Stabilised/rehabilitated areas of the footprint. This water is considered to be unaffected by mine operations and therefore clean.	Direct off site release via diversion drains, bunds and / or clean water sump or pump systems to defined discharge locations or the Clean Water Dam without causing excessive erosion of the receiving environment and sediment discharge.
Sediment Laden Water	Runoff coming into contact with disturbed earth surfaces associated with cleared areas ahead of active strip mining. Contact with these surfaces is considered likely to mobilise sediments and therefore requires capturing of the sediments prior to release.	Minimise extent of disturbed surfaces. Divert runoff from these surfaces to sediment basins for capture and settlement/treatment (flocculation if required) of sediments prior to release to the clean water system and the receiving environment.
Mine Affected Water	Runoff coming into contact with - disturbed/unstabilised earth surfaces located within the opencut pits or - unstabilised surfaces of the overburden dumps. Contact with these surfaces is considered to increase the potential for mobilisation of sediments and other diffuse source contaminants and as such is considered to be 'mine affected'. While not anticipated, this would include any groundwater that reports to the mine pits.	Minimise extent of areas of disturbance. Capture and contain runoff from these areas, for release to the environment subject to sufficient flow events and accordance with predetermined volumetric flow ratio. Further settlement/treatment (flocculation if required) of sediments might be required prior to release to the clean water system and the receiving environment.

2. LEGISLATIVE REQUIREMENTS AND GUIDELINES

2.1. Mineral Resources Act 1989

Resource activities are regulated through a 'resource authority' under *the Mineral Resources Act 1989*. This provides resource companies with the right to enter land and undertake the approved activity. Under section 107(10) of this act, a mining claim can only be surrendered once improvement restoration (i.e., returning the tenement to substantially the same condition it was in before mining) has been carried out and the relevant environmental authority has been surrendered.

2.2. Environmental Protection Act 1994

The Environmental Protection Act 1994 (EP Act) is the principal legislation for protecting environmental values potentially affected by the resource industry in Queensland. The EP Act grants the Queensland Government the power and means to assess, approve and prescribe conditions on proposed mining projects.

The EP Act requires that all areas of disturbed or undisturbed land within the relevant mining tenure be rehabilitated to a post-mining land use (PMLU) or managed as a non-use management area (NUMA). Section 125(1)(n) of the EP Act requires a proposed PRC plan to accompany site-specific EA applications for a mining activity. In the case of mining operations which hold an existing site-specific EA prior to the PRC Plan framework being implemented, transitional provisions apply. These provisions include issuing existing holders of site-specific EAs with a transition notice. The transition notice will require the EA holder to develop and submit a proposed PRC Plan which complies with sections 126C and 126D of the EP Act by a specific date. Transitional PRC Plan's should translate all existing rehabilitation commitments as approved by the DES into the transitional PRC Plan.

Under the EP Act, the Queensland Government is administrating authority of an EA to carry out a mining activity, and the subsequent approval of a PRC Plan schedule for a PRC Plan. Under section 431A and 753 of the EP Act, if the PRC Plan schedule is not submitted by the transition date or is refused for the second time, the relevant activity authorised under the existing EA must not be carried out (ceasing operations). The EA and PRC Plan schedule includes all conditions imposed on the authority and schedule. The EP Act also prescribes the requirements for surrendering an EA, including the preparation of final rehabilitation reports and post-mining management reports.

2.3. Mineral and Energy Resources (Financial Provisioning) Act 2018

In Queensland, the Mineral and Energy Resources (Financial Provisioning) Act 2018 regulates a financial provisioning scheme for reducing potential risks to the Government in the event an EA holder fails to meet their environmental and rehabilitation obligations. This act also amended the EP Act to require mining companies to develop PRC plans.

2.4. Progressive Rehabilitation and Closure Plans Guideline

The DES Guideline Progressive rehabilitation and closure plans (PRC plan) contains information to assist applicants in developing a PRC plan as required by a PRC Plan transition notice. The administering authority (DES) must consider this guideline when making a decision about a PRC Plan schedule under section 176A of the EP Act.

2.5. Rehabilitation Requirements for Mining Resources Activities Guideline

The Rehabilitation requirements for mining resource activities guideline has been prepared by the DES to assist mining companies to propose acceptable rehabilitation outcomes and strategies. The administering authority must consider this guideline when making a decision about a PRC Plan schedule under section 176A of the EP Act.

2.6. Environmental Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's key piece of legislation protecting matters of national environmental significance. Actions that will or are likely to impact matters of national environmental significance require approval from the Environment Minister under the EPBC Act.

The FHCP was referred under the EPBC Act (2019/8549) and was determined to be a controlled action 17 March 2020. Requiring assessment and approval under the EPBC Act. The relevant controlling provisions:

- Listed threatened species and communities (sections 18 & 18A)
- A water resource, in relation to coal seam gas development and large coal mining development (section 24D & 24E)

The project was assessed by public environment report.

The project received approval on 25 May 2021 with conditions relating to the requirement to submit a GDEMP.

3. STAKEHOLDER ENGAGEMENT

3.1. Community Consultation Plan

In accordance with section 126C(1)(c)(iii) and (iv) of the EP Act, the rehabilitation planning part of the PRC plan must include:

- details of the consultation undertaken by the applicant in developing the proposed PRC plan;
- details of how the applicant will undertake ongoing consultation in relation to the rehabilitation to be carried out under the plan.

The above stakeholder consultation requirement has been used to guide stakeholder engagement activities associated with project planning, the environmental approvals process and the development of the PRC Plan. Ongoing stakeholder engagement during progressive rehabilitation and closure phases has also been considered and will be undertaken in accordance with the PRCP Community Consultation Plan .

Given that the proposed PMLU seek to re-establish, for the most part, the current site land uses, the key stakeholders and interested parties relevant to the FHCP are identified in **Error! R eference source not found. .**

Table 10 Identified Stakeholders

Stakeholder	Association
Peter and Denise Comiskey (Lyra Park)	Underlying Landholder & Neighbouring Landholder
Richard and Robyn Simmons (Simmons Cattle Company)	Neighbouring Landholder & Access
Clint Chalmers (Simmons Cattle Company)	Property manager
Keith & Carolyn Chapman and Debra & Murray Haigh (Redrock)	Neighbouring Landholder & Access

In addition to the above stakeholders, relevant stakeholders for the development of the Project also include:

- Queensland Department of Environment, Science and Innovation (DESI);
- Queensland Department of Resources (DoR);

- Queensland Department of Transport and Main Roads (DTMR); and
- Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW)

Prior consultation between Futura and stakeholders includes the following provisions regarding rehabilitation planning and related aspects:

- Compensation agreement (August 2020): An agreement between Futura and the Comiskey family:
    - The management of complaints, including compliance with a Complaints Regime (as outlined within the compensation agreement) by Future and the landholder;

Discussion between the landholders and Futura regarding PMLU has been undertaken and is ongoing, and consultation between Futura and relevant stakeholders will continue as the project progresses. Given the small scale, remote location of the Project and the proposal to return the land to its pre-mine land use, it is considered unlikely that stakeholder perspectives on PMLUs will change significantly during progressive rehabilitation, particularly if the proposed rehabilitation activities are implemented successfully as anticipated.

Further detail regarding Stakeholder consultation is provided in the Stakeholder Consultation Plan, Appendix F.

3.1.1. Cultural Heritage Consultation

The Western Kangoulu people are the traditional owners of lands underlying the proposed Fairhill Coal Project area. The Western Kangoulu people's Traditional Country is the area surrounding Emerald.

Futura has engaged extensively with the Traditional Owners (Western Kagoulu People) for over a decade through the exploration undertaken on the Project through to consultation on current developments. Full broad acre cultural inspections and clearances on the relevant FHCP disturbance areas have been conducted and all identified cultural heritage artefacts and sites have been identified and recorded by the parties and either mitigated in line with agreement between the parties, or in some cases, and where possible, mine plans have adjusted to avoid disturbance of significant cultural artefacts. Though not formally required for this project, Futura has also taken the initiative in engaging with the Western Kangoulu people on the negotiation of a Cultural Heritage Management Plan, which the parties continue to negotiate towards the execution of in good faith.

Engagement of the Western Kangoulu people will be a key component of mine closure and inclusion and input will be sought as part of the consultation process.

3.1.2. Stakeholder Consultation Register

A stakeholder consultation register that complies with section 126C(1)(c)(iii) of the EP Act will be maintained and provided throughout the operational life of the Project, which captures ongoing discussions between Futura and relevant stakeholders. The stakeholder consultation register is a record of all consultation activities, describing the attendees, topics of discussion, outcomes, and ongoing commitments for each consultation meeting. The FHCP stakeholder consultation register is provided in Appendix A of the PRCP Community Consultation Plan, Appendix F.

During the consultation process outlined above, topics of discussion with stakeholders have included the proposed rehabilitation approach, the plan for the mine, PMLUs, areas of disturbance, rehabilitation and management methods, progressive rehabilitation, and closure timeframes.

4. POST-MINING LAND USE

A post-mining land use (PMLU) is defined under section 112 of the *EP Act* as the purpose for which the land will be used after all relevant activities for the PRC Plan carried out on the land have ended. In accordance with Part 3 of the *Environmental Protection (Rehabilitation Reform) Amendment Regulation* 2019, a proposed PMLU:

a) is viable, having regard to the use of land in the surrounding region; and

b) satisfies at least one of the following-

- the use is consistent with how the land was used before a mining activity was carried out on the land;
- the use is consistent with a development approval relating to the land;
- the use is consistent with a use of the land, other than a use that is mining, permitted under a State or Commonwealth Act, including, for example, a planning instrument under the *Planning Act 2016*; and
- the use will deliver, or is aimed at delivering, a beneficial environmental outcome.

The regional land use surrounding the Project is dominated by low-intensity grazing, in addition to several established coal mines. The land on which the Project is located upon is currently used for low-intensity cattle grazing, with extensive historic land clearing for pasture improvement having occurred. The PMLU proposed for all land associated with the Project aims to re-instate the pre-mining land use of low-intensity grazing at the completion of PRC Plan rehabilitation activities. The PMLU of grazing has prior approval through the Project EA..

Based on previous studies, grazing is an achievable PMLU in the Bowen Basin (Bisrat, Mullen, Grigg, & Shelton, 2004). To achieve the proposed PMLU, rehabilitated land should have a land suitability class of at least 4 (marginal land for grazing). Soils within the FHCP study area are Class 5 land for Rainfed Broadacre Cropping and Beef Cattle Grazing, with the exception to Beef Cattle Grazing on Site 2, which was noted to be Class 4.

As this is a transitional PRC Plan, Futura is not required to complete the information requirements under section 126C(1)(j) of the EP Act.

4.1. Accordance with Stakeholders' Requests

Discussions have been held with the relevant stakeholders concerning the project's PMLU. Through this process, all relevant stakeholders have expressed support for the PMLU of low-intensity grazing. This outcome is consistent with the pre-mining area's land use and the project EA.

4.2. Regulatory Constraints

4.2.1. Isaac Regional Planning Scheme

Under the Isaac Regional Planning Scheme, the Project is located in a 'Rural' zone. The Isaac Regional Planning Scheme defines uses suitable for 'Rural' zones as cropping, intensive horticulture, aquaculture, grazing, intensive animal industries, renewable energy facilities and extractive industries. These defined uses are consistent with the PMLU applied to the Project.

4.2.2. Mackay, Isaac and Whitsunday Regional Plan

The Queensland Government, via its Mackay, Isaac and Whitsunday Regional Plan, maps the Project in a 'regional landscape and rural production area', which includes land used for agriculture, water catchment, traditional uses, conservation areas and native forests. The proposed PMLU for the Project is consistent with these planned land uses. The Project's ML lack ecological significance under the Mackay, Isaac and Whitsunday Regional Plan. This plan aims to minimise the impact of development on such areas of high ecological significance, and a PMLU that is compatible with restoring many of the original environmental values is consistent with this regional plan.

4.3. Assessment of Options

The proposed PMLU of low-intensity grazing is consistent with how the land was used prior to the Project, is consistent with a development approval relating to the land (Section 4.2) and is consistent with the land use of the surrounding region. Other PMLUs suggested in the DES' Guideline Progressive rehabilitation and closure plans (PRC plan) 2023 such as native ecosystems, forestry or cropping have limited applicability to the Project's future use as these uses do not align with the pre-mining or surrounding region land use of grazing. The proposed PMLU of low-intensity grazing is considered to be most appropriate to apply across the Project's extent and also satisfies the EP Regulation requirements of a PMLU.

No other PMLUs have been assessed in this PRC Plan as the PMLU of grazing was previously assessed in prior approvals and accepted by the DES. No non-use management areas (NUMAs) are proposed.

4.4. Statutory Constraints to be Imposed

Given the lack of NUMAs, low potential of reactive waste rock material, and the Project's final landform designed to resemble the surrounding landscape, few statutory constraints are expected to be imposed on the future managers of the Project's land. Vegetation cover will be important in minimising erosion on sloping rehabilitated landforms, hence, limits on livestock stocking rates may be imposed shortly after rehabilitation activities have been completed. Any restrictions on the future stocking rates are to be described in the Postmining Management Report (see Section 9.6) and imposed through a Site Management Plan, to be adopted by future land managers of the Project's land. This is to be confirmed following pasture development and performance monitoring.

4.4.1. Voids in floodplains

The PRC Plan Guideline ESR/2019/4964 includes the statutory information for requiring floodplain modelling to be carried out. In accordance with section 126D(3) of the EP Act, "*if land the subject of the proposed PRCP schedule will contain a void situated wholly or partly in a flood plain, the schedule must provide for the rehabilitation of the land to a stable condition*". The FHCP does not propose a void situated wholly or partly in a floodplain, therefore section 126(D) of the EP Act is not considered applicable.

The PRCP guideline, Section 3.4 'Voids in flood plains' outlines 'a void is considered to be located in a flood plain if the flood plain modelling shows that, when all relevant activities carried out on the land have ended, the land is the same height as, or lower than, the level

modelled as the peak water level 0.1% AEP for a relevant watercourse under the guideline Australian Rainfall and Runoff (2019) (ARR).

Flood Plain Modelling carried out by ATC Williams (July 2019) showed that there is minimal overlap between the proposed disturbance footprint and the 0.1% AEP for Cooroora and Sandy Creek in the pre-mining condition. Figure 19 below shows the overlap of the opencut depression and Dump with the maximum inundation levels for the pre-mining scenario for the 0.1 year AEP. The final pit depression will have negligible overlap and the landform will be deigned to to be higher than the peak water level 0.1AEP as modelled.

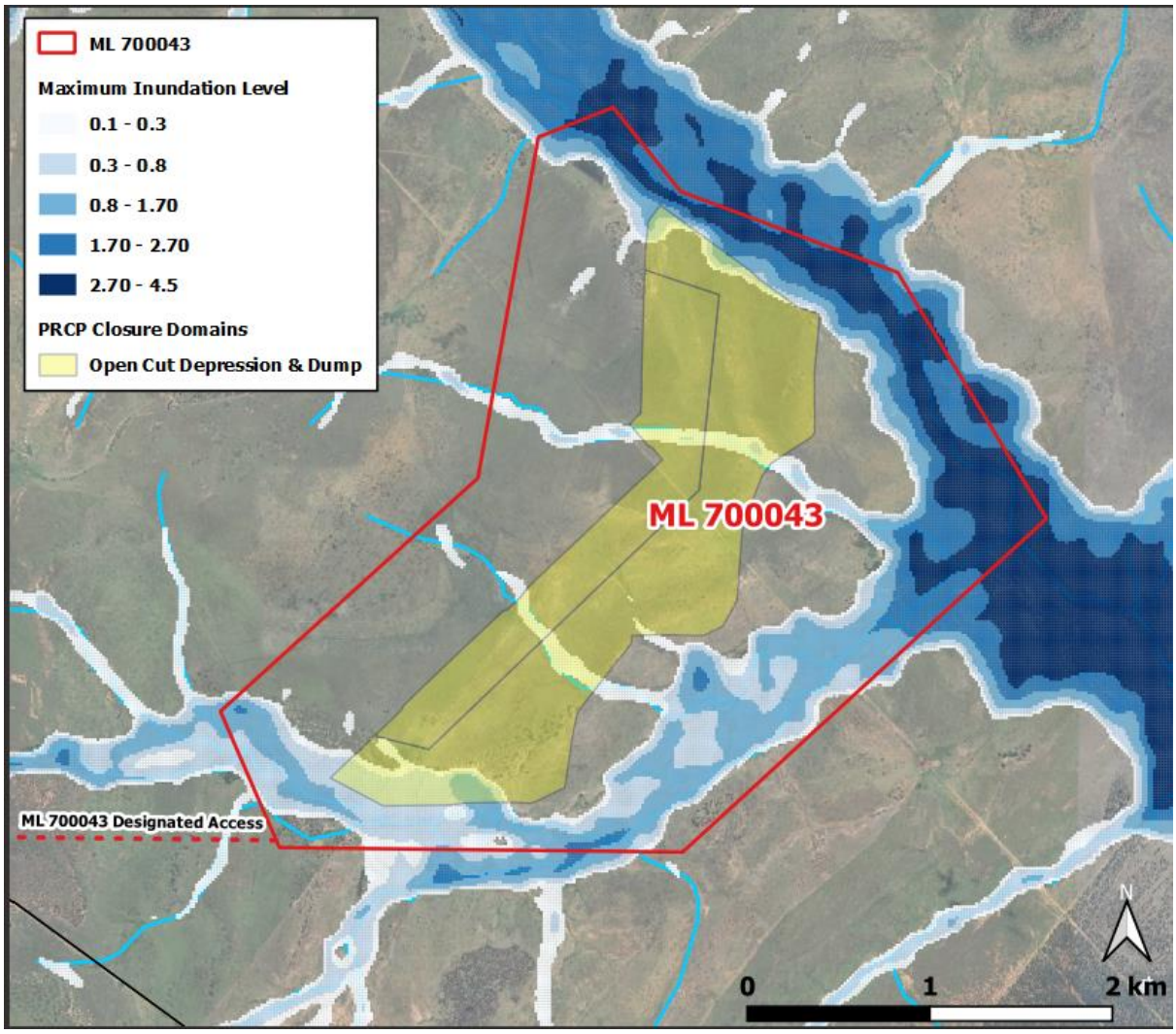

Figure 19. Disturbance footprint and the 0.1% AEP (Pre-mining)

The land outcome for FHCP does not include any voids but rather a depression that will achieve the PMLU of grazing. Any depressions in the landscape are required as per the EA (Appendix A - Rehabilitation Completion Criteria) to be located outside of the 1% AEP flood zone.

Due to the Project location, i.e. located close to the top of the local catchment (approximately 2km to the northwest), there is a negligible difference between 1% and 0.1% AEP at the

project site. Figure 20 below shows the modelled maximum inundation levels for the post-mining scenario for the 0.1 year AEP.

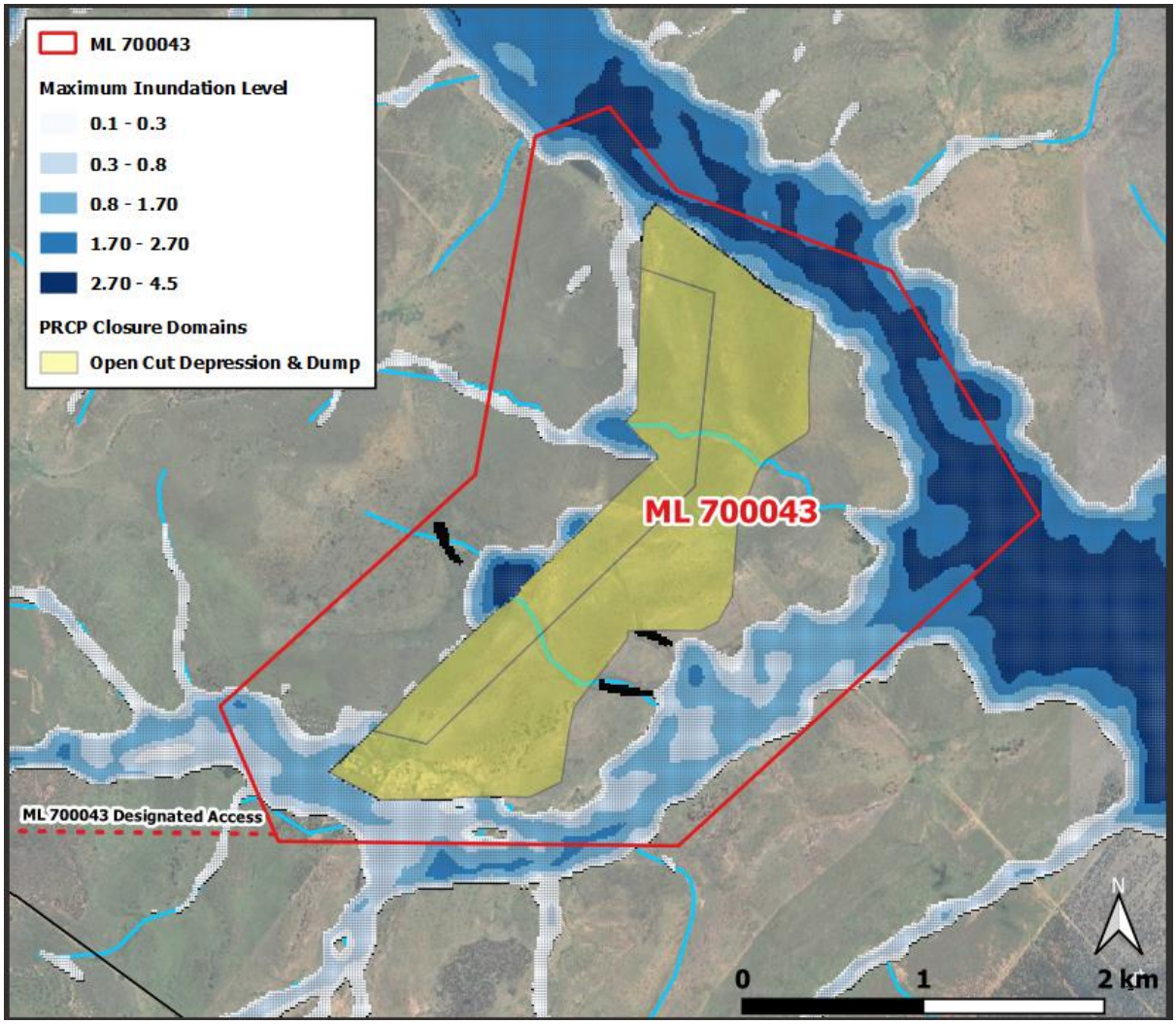

Figure 20. Disturbance footprint and the 0.1% AEP (Post-mining)

The information sheet 'Voids in flood plains' ESR/2019/4966. Identifies key elements of floodplains criteria to include both meeting the definition of a floodplain in which peak water levels are modelled for a 'relevant watercourse' and meeting the definition of a 'relevant watercourse'. A 'relevant watercourse' is defined as a watercourse classified as a stream order 4 or higher under the Strahler stream order classification system.

The 'Watercourse Lines – Queensland' dataset which represents the state's drainage network and includes the Strahler stream order, is recommended for the purposes of identifying 'relevant watercourses' and supports the absence of higher stream orders. Cooroora Creek is a fourth order streams and therefore the only 'relevant watercourse' for which a flood plain modelling is considered to be required according to the information sheet.

Furthermore the PRCP guideline Section 3.4 'Applicability to transitional PRC plans' states that 'Where a land outcome document has a pre-approved land outcome for a void with a location specified (in the case of FHCP the EA is the pre-approved LOD), flood plain modelling is not required'. It follows that a related report is also not required.

Futura Resources considers the land outcome for the ‘depression’ to be approved and the location specified (BRID0071), flood plain modelling is therefore not required.

Information relating to flood modelling that has been undertaken is included.

5. REHABILITATION GOALS

Under section 176A(3)(c)(i) of the EP Act, mined land must be rehabilitated to a stable condition. Land is in a stable condition, as defined in section 111A of the EP Act, if:

(a) the land is safe and structurally stable;
(b) there is no environmental harm being caused by anything on or in the land; and
(c) the land can sustain a post-mining land use.

These three components of stability are the general rehabilitation goals for all areas disturbed by mining in Queensland. They have been developed from the ecologically sustainable development policy framework, especially in relation to intergenerational equity, polluter pays principle, protection of biodiversity, and maintenance of essential ecological processes.

A clearly defined set of rehabilitation objectives have been developed for each infrastructure area relating to the PMLU of low-intensity grazing. For rehabilitation objectives to be appropriate for the Project, disturbance areas have been separated into individual domains. The division of disturbance areas into domains allows for more specific rehabilitation objectives and is easier to identify the rehabilitation commitments for each area. The Project's domains, as outlined in the EA:

- Domain 1 - Open Cut Depressions (including in-pit dumping)
- Domain 2 - Overburden Spoil Dump
- Domain 3 – Access tracks and Haul roads
- Domain 4 - Water storage Infrastructure – possibly to be retained.
- Domain 5 - Mine infrastructure (Site office, ROM pad, and Workshop buildings), and Water storage Infrastructure – to be decommissioned.

These five domains correspond to the FHCP's six Rehabilitation Areas (RAs) (see section 10):

- RA1, RA3 (Domain 1)
- RA2 (Domain 2)
- RA4 (Domain 5)
- RA5 (Domain 3)
- RA6 (Domain 4)

Each of the Project's domains have been assigned the PMLU of low-intensity grazing, returning the Project's land to the pre-mining land use. For each rehabilitation objective, one or more rehabilitation indicators (measurements of progress towards the rehabilitation objectives) have been developed. These indicators are designed to be auditable against completion criteria, which act as targets for the rehabilitation process. Each completion criterion is applied to the PRC Plan Schedule as a milestone criterion for the later stages of rehabilitation (**Section 10**). The full list of rehabilitation objectives, indicators and completion criteria is shown in Table 11 below. For details about how each indicator is to be measured, refer to **Section 9**. Rehabilitation objectives, indicators and completion criteria outlined in Table 11 are included in the Project's EA and have been agreed upon by the DES in previous approval processes. These rehabilitation commitments are being transitioned to the PRC Plan. Table 12 and Table 13 outline the site's surface water and groundwater quality trigger values from the EA which are subject to amendment based in the continuation of data collection.

Table 11. Rehabilitation objectives, indicators and completion criteria

GOAL	OBJECTIVES	INDICATORS	COMPLETION CRITERIA
Domain 1 – Open Cut Depressions (including in-pit dumping)			
Safe for humans and animals.	The site is safe, structurally sound, and stable for humans and animals.	No exposed hazardous materials.	Coal seams are fully capped by at least two metres of competent and benign material. No evidence of spontaneous combustion post closure.
		No contaminated mine drainage.	Water quality in final depressions achieves stock water quality (ANZECC) demonstrated by surface water quality monitoring regime post closure. Monitoring of surface material quality has demonstrated that physical and chemical properties are safe and able to support the identified post closure land use. The area is not listed on the Contaminated Land Register and Environmental Management Register.
		Risk assessment documentation	Risk assessment documents potential risks and it is demonstrated that identified controls and mitigation measures have been successfully implemented post closure in accordance with relevant guidelines and Australian Standards such as ISO31000 Risk Management. Risk/s identified as per risk assessment must be low. Demonstrate that risk assessment documents risk and controls, and mitigation measures have been successfully implemented.
Stable	Low probability of subsidence, rock falls, slumping of slopes.	Geotechnically stable.	Slopes of the post mining landform are geotechnically stable as demonstrated by a geotechnical assessment conducted by a suitably qualified and experienced person. No slopes steeper than 25%. Slopes between 15% and 25% must consist of competent rock (as built design reports to demonstrate adequate cover and materials placement by a suitably qualified and experienced person). Vertical intervals between slope breaks are 10m so that the overall maximum length of slope will be approximately 40m. No evidence of slumping identified as per the geotechnical assessment conducted by a suitably qualified and experienced person.

	Landform design achieves appropriate erosion rates.	Rate of soil loss will be similar to sites in the general area surrounding the mine.	No evidence of the formation of erosion gullies and rill erosion. Benchmark erosion study completed by an appropriately qualified person, has been conducted and compares sediment run-off rates from the post closure landform versus the sediment run-off rates in undisturbed regions. The erosion rates on the post closure landform are similar to rates of reference sites.
	Vegetation cover sufficient for a self-sustaining community and to minimise erosion.	Vegetation type and density.	Evidence that the vegetation type and density are of species suited to the site's characteristics including soil type, topography and climate and that soil erosion. Ground cover of at least 90% compared to the reference sites.
Non-polluting	Water quality solute concentrations met. Low risk of contamination. No mine drainage issues. Mine affected water contained on site. Current and future groundwater quality values will be maintained at acceptable levels for downstream users.	Final depressions that collect water have no risk to fauna (i.e. meet stock drinking water contaminant limits at all monitoring locations).	Water quality of surface water runoff does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives. Groundwater quality does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives. Evidence that no significant decline in groundwater quality has occurred relative to historic (background) groundwater quality.
	Hazardous and toxic materials are not buried within the mine area unless encapsulated.	A life of mine hazardous materials register indicating the volumes.	An audit of the hazardous materials register has been conducted to identify the location, use and disposal of potentially hazardous materials during the life of the mine.
Able to sustain an agreed post-mining land use (Grazing area)	Agreed vegetation cover to achieve species richness and density comparable to surrounding grazing areas	Ecosystem functioning indicators water level and quality (dissolved oxygen, pH, temperature, salinity and nutrients (nitrogen and phosphorus)	Final Depressions are located outside of the AEP 1% flood zone. Landscape Function Analysis (LFA) monitoring demonstrates that vegetation cover, types and densities are comparable to relevant rehabilitation monitoring reference sites.

		Habitat indicators: width, continuity, extent of shading and species composition.	Soil characteristics demonstrate acceptable levels of surface roughness, infiltration capacity, aggregate stability and surface condition as defined in the Australian Soil and Land Survey Handbook and capable of sustaining the identified post closure land use. Final landform demonstrates the ability to sustain grazing as the identified post closure land use. Landform suitable for grazing activities and provides suitable access to water for stock and able to sustain pre-mining grazing capacity. Certification by an appropriately qualified person, that the vegetation type and density of species in rehabilitated areas are suited to the soil composition, slope, aspect, climate and agreed post mining land use. Certification by an appropriately qualified person, that species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence, and will continue to do so. Certification by an appropriately qualified person that the vegetation in rehabilitated areas includes the presence of species suitable and complimentary to the post-mining land use, and are at a density and composition comparable to reference sites.
		Regenerative capacity and resilience of the pastures	Pasture productivity recovers following natural and man-made events (e.g. grazing, fire, slashing, and drought).
	Weed infestation less than pre-mining conditions.	Weed and pest species absence.	Evidence that weed and pest species management is occurring where appropriate. The presence of weeds and pest species is no greater than the prevalence on the reference sites.
Domain 2 - Overburden Dump			
Safe for humans and animals.	The site is safe, structurally sound, and stable for humans and animals.	No exposed hazardous materials.	Potential hazardous materials have been identified during mine life and removed or selected capping material has been applied with cover thickness appropriate to the contaminant as determined by appropriately qualified person.
		Risk assessment documentation	Risk assessment documents potential risks and it is demonstrated that identified controls and mitigation measures have been successfully implemented post closure in accordance with relevant guidelines and Australian Standards such as ISO31000 Risk Management. Risk/s identified as per risk assessment must be low. Demonstrate that risk assessment documents risk and controls, and mitigation measures have been successfully implemented.
Stable	Low probability of subsidence, rock falls, slopes	Structural and geotechnical adequacy No major erosion.	No slumping or gullying >0.5m within 5 years post closure. No slopes greater than 25%.

	slippage and inert material loss. No long-term erosion and geotechnical stability. Landform is capable of similar land use capabilities/suitable prior to disturbance. Self-sustaining vegetation cover.	No hanging material which carries a moderate risk of rock fall.	Final landform demonstrates the ability to sustain grazing.
	Landform design achieves appropriate erosion rates.	Rate of soil loss will be similar to sites in the general area surrounding the mine.	No evidence of the formation of erosion gullies and rill erosion. Benchmark erosion study completed by an appropriately qualified person, has been conducted and compares sediment run-off rates from the post closure landform versus the sediment run-off rates in undisturbed regions. The erosion rates on post closure landform are similar to rates of reference sites.
	Vegetation cover sufficient for a self-sustaining community and to minimise erosion.	Vegetation type and density.	Evidence that the vegetation type and density are of species suited to the site's characteristics including soil type, topography and climate. Ground cover of at least 90% compared to the reference sites.
Non-polluting	Water quality solute concentrations met. Low risk of contamination. No mine drainage issues. Mine affected water contained on site. Current and future groundwater quality values will be	Overburden Spoil Dump water runoff have no risk to receiving environment (i.e. meet stock drinking water contaminant limits at all monitoring locations).	Water quality of surface water runoff does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives. Groundwater quality does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives. Evidence that no significant decline in groundwater quality has occurred relative to historic (background) groundwater quality.

	maintained at acceptable levels for downstream users.		
	Hazardous and toxic materials are not buried within the mine area unless encapsulated.	A life of mine hazardous materials register indicating the volumes	An audit of the hazardous materials register has been conducted to identify the location, use and disposal of potentially hazardous materials during the life of the mine.
Able to sustain an agreed post-mining land use (Low-density grazing area).	Agreed vegetation cover to achieve species richness and density comparable to surrounding grazing areas.	Ecosystem functioning indicators water level and quality (dissolved oxygen, pH, temperature, salinity and nutrients (nitrogen and phosphorus). Habitat indicators: width, continuity, extent of shading and species composition.	LFA monitoring demonstrates that vegetation cover, types and densities are comparable to relevant rehabilitation monitoring reference sites. Soil characteristics demonstrate acceptable levels of surface roughness, infiltration capacity, aggregate stability and surface condition as defined in the Australian Soil and Land Survey Handbook and capable of sustaining the identified post closure land use. Final landform demonstrates the ability to sustain grazing as the identified post closure land use. Landform suitable for grazing activities and provides suitable access to water for stock and able to sustain pre-mining grazing capacity. Certification by an appropriately qualified person, that the vegetation type and density of species in rehabilitated areas are suited to the soil composition, slope, aspect, climate and agreed post mining land use. Certification by an appropriately qualified person, that species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence, and will continue to do so. Certification by an appropriately qualified person that the vegetation in rehabilitated areas includes the presence of species suitable and complimentary to the post-mining land use and are at a density and composition comparable to reference sites.
		Regenerative capacity and resilience of the pastures	Pasture productivity recovers following natural and man-made events (e.g. grazing, slashing, fire, and drought).
	Weed infestation less than pre-mining conditions.	Weed and pest species absence.	Evidence that weed and pest species management is occurring where appropriate. The presence of weeds and pest species is no greater than the prevalence on the reference sites.
Domain 4 - Water storage Infrastructure (to be retained)			

Safe for humans and animals	The site is safe, structurally sound, and stable for humans and animals	Risk Assessment documentation	Risk assessment documents potential risks and it is demonstrated that identified controls and mitigation measures have been successfully implemented post closure in accordance with relevant guidelines and Australian Standards such as ISO31000 Risk Management. Risk/s identified as per risk assessment must be low. Demonstrate that risk assessment documents risk and controls, and mitigation measures have been successfully implemented.
Stable	Water Storage is fit for purpose. No long-term erosion and geotechnical. instability.	Structurally and geotechnically stable and hydraulic adequacy. No major erosion.	Final structure is fit for purpose as demonstrated by a suitably qualified and experienced person. Spillway must have adequate capacity to safely manage a 1:100 year flood event. No evidence of the formation of erosion gullies and rill erosion. Benchmark erosion study completed by an appropriately qualified person, has been conducted and compares sediment run-off rates from the post closure landform versus the sediment run-off rates in undisturbed regions. The erosion rates on post-closure landform are similar to rates of reference sites.
Non-polluting	Acid mine drainage will not cause serious environmental harm. Water quality solute concentrations met. No mine drainage issues. Mine affected water contained on site.	Stock drinking water limits are met.	Water quality is within the ANZECC stock watering quality criteria as demonstrated by surface water quality monitoring regime post closure. No acid mine drainage or discharges. Surface water quality does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives. Sediments/sludge removed from the structure.
	Low risk of contamination.	No seepage to groundwater.	Groundwater quality does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives. Evidence that no significant decline in groundwater quality has occurred relative to historic (background) groundwater quality.

Able to sustain an agreed post-mining Land use.	Water quality in the dam is suitable for the post mining land uses.	Water quality Sediment Quality.	Water quality of surface water runoff does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives. Sediment at the base of the dam complies with the levels outlined in the Draft Guidelines for the Assessment and Remediation of Contaminated Sites in Queensland or any later guideline.
	Post Mining landholder to retain infrastructure.	Legally binding agreement between entities.	Sign off by post mining landholder – asset transfer agreement; receiver of the structure is aware of risks. Water storage Infrastructure retained must not be a referral dam under the Water Supply (Safety and Reliability) Act 2008 Certification and condition report on all Water storage Infrastructure to be retained by post mining landholder.
Domain 3 and 5 - Mine infrastructure (Site office, ROM pad, and Workshop buildings), Access tracks and haul roads and Water storage Infrastructure – to be decommissioned			
Safe for humans and animals	The site is safe, structurally sound, and stable for humans and animals	Risk Assessment documentation.	Risk assessment documents potential risks and it is demonstrated that identified controls and mitigation measures have been successfully implemented post closure in accordance with relevant guidelines and Australian Standards such as ISO31000 Risk Management. Risk identified as per risk assessment must be moderate to low or additional mitigation measure implement. Demonstrate that risk assessment documents risk and controls, and mitigation measures have been successfully implemented.
	Rehabilitation of exploration drill holes and groundwater monitoring bores.	All exploration drill holes and all monitoring bores established on the Mining Leases have been rehabilitated.	All exploration drill holes and monitoring bores have been rehabilitated in accordance with the applicable Australian Standard or guideline. All aquifers have been isolated where exploration drill holes or monitoring bores have intersected more than one water bearing strata, in accordance with the 'Minimum Construction Requirements for Water Bores in Australia' (Australian Government, February 2012) or latest edition.
Stable	Low probability of subsidence, rockfalls, slumping or inert material loss	Structural and geo-technical adequacy.	Achieve geotechnically stable as demonstrated by a geotechnical assessment conducted by a suitably qualified and experienced person. Slopes of the post mining landform are similar to those pre mining topography.
	Landform design achieves appropriate erosion rates.	No major erosion.	No evidence of the formation of erosion gullies and rill erosion.
		Rate of soil loss will be similar to sites in the general area surrounding the mine.	Benchmark erosion study completed by an appropriately qualified person, has been conducted and compares sediment run-off rates from the post closure landform versus the sediment run-off rates in undisturbed regions. The erosion rates on disturbed land are similar to rates of reference sites.

Non-polluting	Current and future groundwater quality values will be maintained at acceptable levels for downstream users	Surface water runoff from the rehabilitation areas meet water quality objectives.	Groundwater quality does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives. Evidence that no significant decline in groundwater quality has occurred relative to historic (background) groundwater quality.
	Current and future surface water quality values will be maintained at acceptable levels for downstream users	Ecosystem functioning indicators water level and quality	Water quality of surface water runoff does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives.
	Removal of potential sources of contamination.	Results of site contaminated land investigation report.	Evidence in the Rehabilitation Report that measures required in site contaminated land investigation report have been implemented. Site is within agreed contaminant levels, suitable for the proposed post-mining land use being beef cattle grazing, and removed from Contaminated Land Register and/or Environmental Management Register.
Able to sustain an agreed postmining land use of grazing	Agreed vegetation cover to achieve species richness and density comparable to surrounding grazing areas	Ecosystem functioning indicators water level and quality (dissolved oxygen, pH, temperature, salinity and nutrients (nitrogen and phosphorus) Habitat indicators: width, continuity, extent of shading and species composition	LFA monitoring demonstrates that vegetation cover, types and densities are comparable to relevant rehabilitation monitoring reference sites. Soil characteristics demonstrate acceptable levels of surface roughness, infiltration capacity, aggregate stability and surface condition as defined in the Australian Soil and Land Survey Handbook and capable of sustaining the identified post closure land use. Ground cover of at least 90% compared to the reference sites. Final landform demonstrates the ability to sustain grazing as the identified post closure land use. Landform suitable for stock and related stock management activities and able to sustain pre-mining grazing capacity. Certification by an appropriately qualified person, that the vegetation type and density of species in rehabilitated areas are suited to the soil composition, slope, aspect, climate and agreed post mining land use. Certification by an appropriately qualified person, that species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence, and will continue to do so.

			Certification by an appropriately qualified person, which the vegetation in rehabilitated areas includes the presence of species suitable and complimentary to the post-mining land use, and are at a density and composition comparable to reference sites.
		Regenerative capacity and resilience of the pastures	Pasture productivity recovers following natural and man events (e.g. grazing, slashing, fire, and drought)
	Post Mining landholder to retain infrastructure and tracks	Legally binding agreement between entities	Sign off by post mining landholder – asset transfer agreement; receiver of the equipment or asset are aware of risks. Certification and condition report on all buildings to retain by post mining landholder.
	Weed infestation less than pre-mining conditions	Weed and pest species absence	Evidence that weed and pest species management is occurring where appropriate. The presence of weeds and pest species is no greater than the prevalence on the reference sites.

Table 12. Surface water quality trigger values

Quality characteristic	Release limits
pH (pH units)	6.5 (lower trigger) 8.5 (upper trigger)
EC (µS/cm)	base flow: 310 A high flow: 210 A
Turbidity (NTU)	<10% increase from upstream
Nitrate + Nitrite (mg/L)	0.7
Ammonia (mg/L)	0.9
Aluminium (mg/L)	0.055
Arsenic (mg/L)	0.013
Barium (mg/L)	TBD
Boron (mg/L)	0.37
Cadmium (mg/L)	0.0002
Chromium (mg/L)	0.001
Cobalt (mg/L)	0.0028
Copper (mg/L)	0.0014
Lead (mg/L)	0.0034
Manganese (mg/L)	1.9
Mercury (inorganic) (mg/L)	0.00006 [c]
Nickel (mg/L)	0.011
Selenium (total; mg/L)	0.005 [c]
Uranium (mg/L)	0.005 [c]
Vanadium (mg/L)	0.005 [c]
Zinc (mg/L)	0.008
Total BTEX (µg/L)	3[B]

Quality characteristic	Release limits
Total Xylenes (µg/L)	1.5[B]
TRH (C6-C10) (µg/L)	50[B]
Sulfate (mg/L)	250
TSS (mg/L)	110[A]

Notes:

Default ANZECC & ARMCANZ (2000) Freshwater Aquatic ecosystems trigger value for 95% species protection used with the exception of the following:

[A] Water quality objectives to protect aquatic ecoystsem environmental values under baseflow for Mackenize River.
[B] Limit of reporting.
[C] Se and Hg is 99% due to potential for bioaccumulation

Table 13. Groundwater quality triggers and limits

Groundwater quality parameter	Bore	Limit A	Limit B
Drawdown	B02, B03, B04, B05, B06	> 2 m	> 2 m
	B01, FHMB010, FHMB011, New 1	> 0.6 m	> 0.6 m
	FHMB09	> 0.5 m	> 0.5 m
pH (pH Units)[4]	All bores		7.1 – 8.1
EC (µS/cm)[4]	B01		47,000
	B02, B03, B04, B05, B06	24,000	24,300
Major ions (Na, Ca, Mg, K, Cl, HCO_3, CO_3) (mg/L)	All bores	For interpretation only	
Total Hardness (as $CaCO_3$)	All bores	For interpretation only	
Aluminium (mg/L)[3]	B01	0.194	0.207
	B02, B03, B04, B05, B06	0.055	0.08
Ammonia (mg/L as N)[1]	All bores	1	1.6
Arsenic (mg/L)3	B01, B02, B04, B05		0.013
	B03, B06	0.03	0.04
Boron (mg/L)[3]	All bores	0.6	0.7
Cadmium (mg/L)[1]	All bores		0.0002
Chromium (mg/L)[1]	All bores		0.001
Cobalt (mg/L)[3]	B02, B03, B04, B05, B06	0.002	0.005
	B01	0.017	0.018
Copper Dissolved (mg/L)[2]	All bores	0.003	0.004
Iron (mg/L)[3]	All bores	3	5
Lead Dissolved (mg/L)[1]	All bores		0.0034
Manganese (mg/L)[1]	B02, B03, B04, B05, B06	0.6	1

Groundwater quality parameter	Bore	Limit A	Limit B
	B01	9	9.7
Mercury (mg/L)	All bores		0.0006
Nickel (mg/L)[3]	All bores		0.011
Selenium (mg/L)[1]	All bores	0.005	0.011
Sulphur as Sulfate SO4 (mg/L)[3]	B02, B03, B04, B05, B06	430	450
	B01	2380	2400
Uranium (mg/L)[3]	All bores	0.01	0.013
Vanadium (mg/L)[3]	All bores		0.006
Zinc (mg/L)[2]	All bores	0.06	0.008

Notes:

[1] Default ANZECC & ARMCANZ (2000) Freshwater Aquatic ecosystems trigger value for 95% species protection used with the exception of Se which is 99% due to potential for bioaccumulation.

[2] Fitzroy Groundwater zone 34, 80th percentile, deep bores.

[3] Site-specific triggers

6. REHABILITATION MANAGEMENT METHODOLOGY

6.1. Infrastructure to be Retained or Decommissioned

Built infrastructure that is proposed to be retained in the post-mining landscape is limited to items considered advantageous to on-going land management activities associated with the PMLU of low-intensity cattle grazing.

Retention of specific project infrastructure has not yet been agreed or planned for at this stage, however the possibility of infrastructure retention will be assessed and agreed closer to the end of the active life of mine. Water storages comprise Infrastructure likely to be considered for retention.

Where infrastructure is agreed to be retained, all removable infrastructure will be removed and the structure left in a safe stable and non-erosive condition. For Dams water quality will be required to meet the surface water quality stipulated in the EA.

Most mine features will be removed, de-contaminated, rehabilitated and/or decommissioned in line with the project's PMLU (Table 14. Site infrastructure and closure goals). This includes ROM pad, offices, fuel storage, haul roads, water dams, and workshop areas. Alternatively, infrastructure such as roads, powerlines and dams may be retained by the landholder following rehabilitation, in line with the PMLU.

All infrastructure related waste material, such as concrete, bitumen, tyres and fencing will be demolished/removed and disposed of offsite.

Demolition planning and execution will be undertaken in accordance with relevant standards, policies and legislation requirements, and will include both an investigation of the site and surrounding aspects, and an investigation for the structures to be removed.

At the cessation of mining a depression will remain as a feature of the post-mining landform. The depression that remains will be rehabilitated in line with ANZECC water quality standards and the Environmental Protection (Water) Policy 2009 Mackenzie River Sub-basin Environmental Values and Water Quality Objectives. In-pit dumping will occur during operations to backfill the mining pit. Final wall slopes will be rehabilitated to ensure geotechnical and erosional stability.

Table 14. Site infrastructure and closure goals

Infrastructure	Closure goal
Transportable administration office blocks and ablution facilities for personnel	Decommissioned, removed, and area rehabilitated
Surface water and mine-affected water (MAW) management structures (dams)	Rehabilitated and retained for landholder
Maintenance workshop	Decommissioned, removed, and area rehabilitated
Laydown area	Decommissioned, removed, and area rehabilitated
Warehouse facilities for mining and haulage contractors	Decommissioned, removed, and area rehabilitated

Infrastructure	Closure goal
Power generators for workshop and administration facilities	Decommissioned and removed from site
Communications infrastructure including towers and cabling	Decommissioned and removed from site
Haul road network	Decommissioned and rehabilitated
Site access road network	Rehabilitated and likely to be retained for landholder
ROM coal stockpile area	Decommissioned and area rehabilitated

6.2. Landform Design

6.2.1. Overview

The final landform has been designed to limit the size of the Project's final footprint. Waste rock material will be used to backfill the open-cut pit with a shallow depression to remain post mining forming a part of the final landform.

The pit will be backfilled progressively, utilising a combination of paddock dump and end-tipping techniques. Dump lifts are generally anticipated to be low, enhancing rapid material settlement. Placed waste shaping and profiling will be completed with bulldozers. Final landform geometry will be surveyed progressively to maintain adherence to the final landform and surface water management design. An In-Pit Dump (IPD) will have a cover that facilitates plant establishment. Sub-soil, rock mulch (derived from waste rock), if required to make competent, and topsoil will be spread with bulldozers and will be the subject of depth and distribution survey and quality control monitoring, as detailed in **Section 6.3**.

All other mining activities will result in limited change to the pre-mining topography and hence all areas excluding retained infrastructure will resemble the pre-mining landform. To achieve this, minor shaping or reprofiling works will be undertaken once infrastructure has been removed and contamination is remedied to smooth the ground surface and merge the landform into the surrounding natural contours.

A conceptual final landform has been modelled for the FHCP (year 7) and is shown in Figure 21, representing the extent of the rehabilitation associated with the proposed residual Landscaped depressions and out of pit overburden dump. The corresponding sections are shown in Figure 22Figure 22. The final landform will feature an elevated landform in the east and north in the location of the OOPDs, sloping down to form a depression in the west. Majority of slope angles are modelled to <10% except for battered slope angles achieving between 10% and 25%.

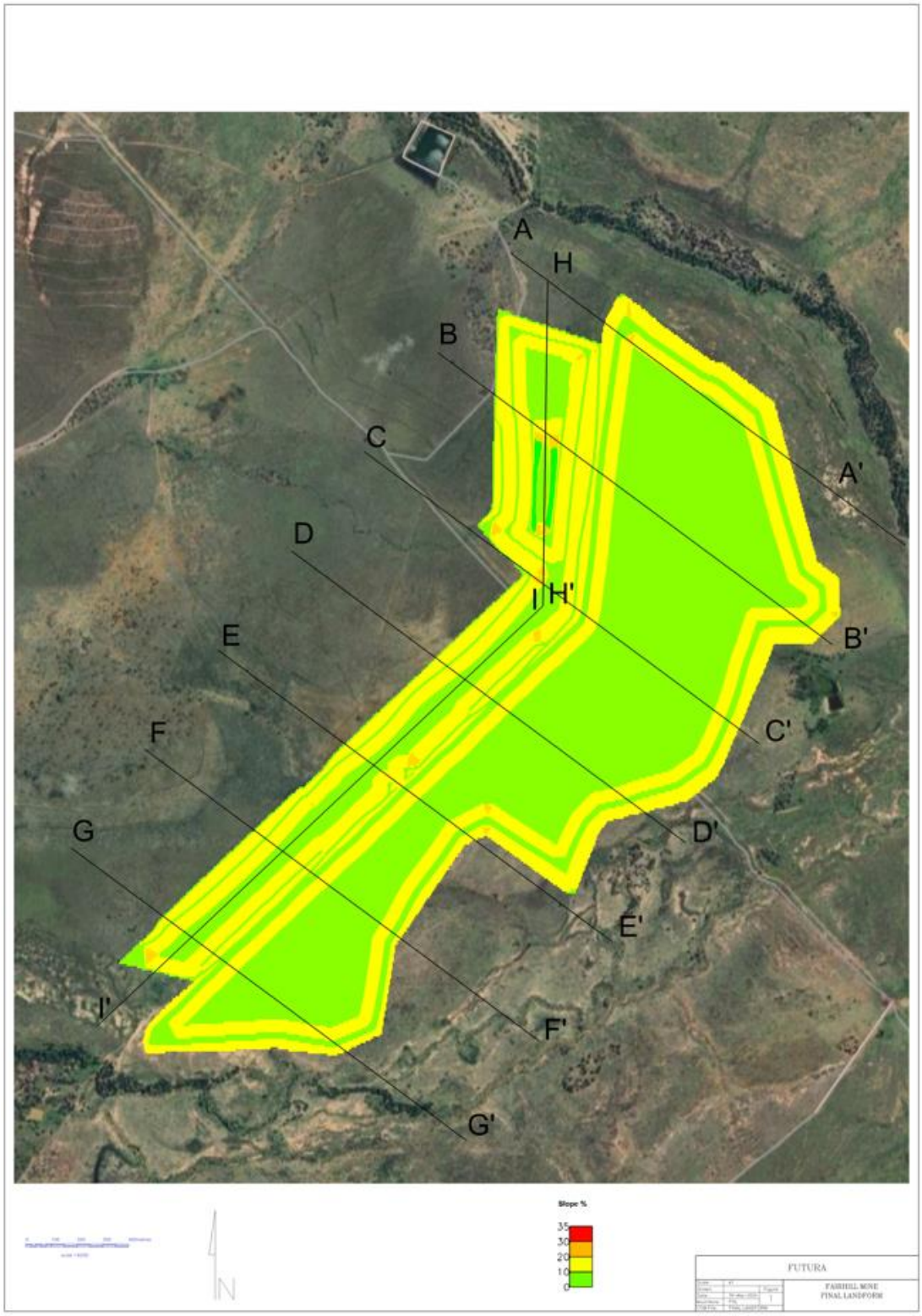

Figure 21. Modelled 3D Landform Design

Figure 22. 3D Final Landform Cross Sections

It is also important to note that the modelled conceptual final landform has been superimposed on the actual location in the landscape. The surrounding landscape is relatively featureless with the elevated reshaped overburden, backfilled voids and sloped depression fitting well into the landscape.

Comparing the conceptual final landform with the existing elevated topographical features, it is clear that similar slope angles are present in both the conceptual and the natural land forms. This demonstrates the compatibility of the proposed final landform with the natural landscape.

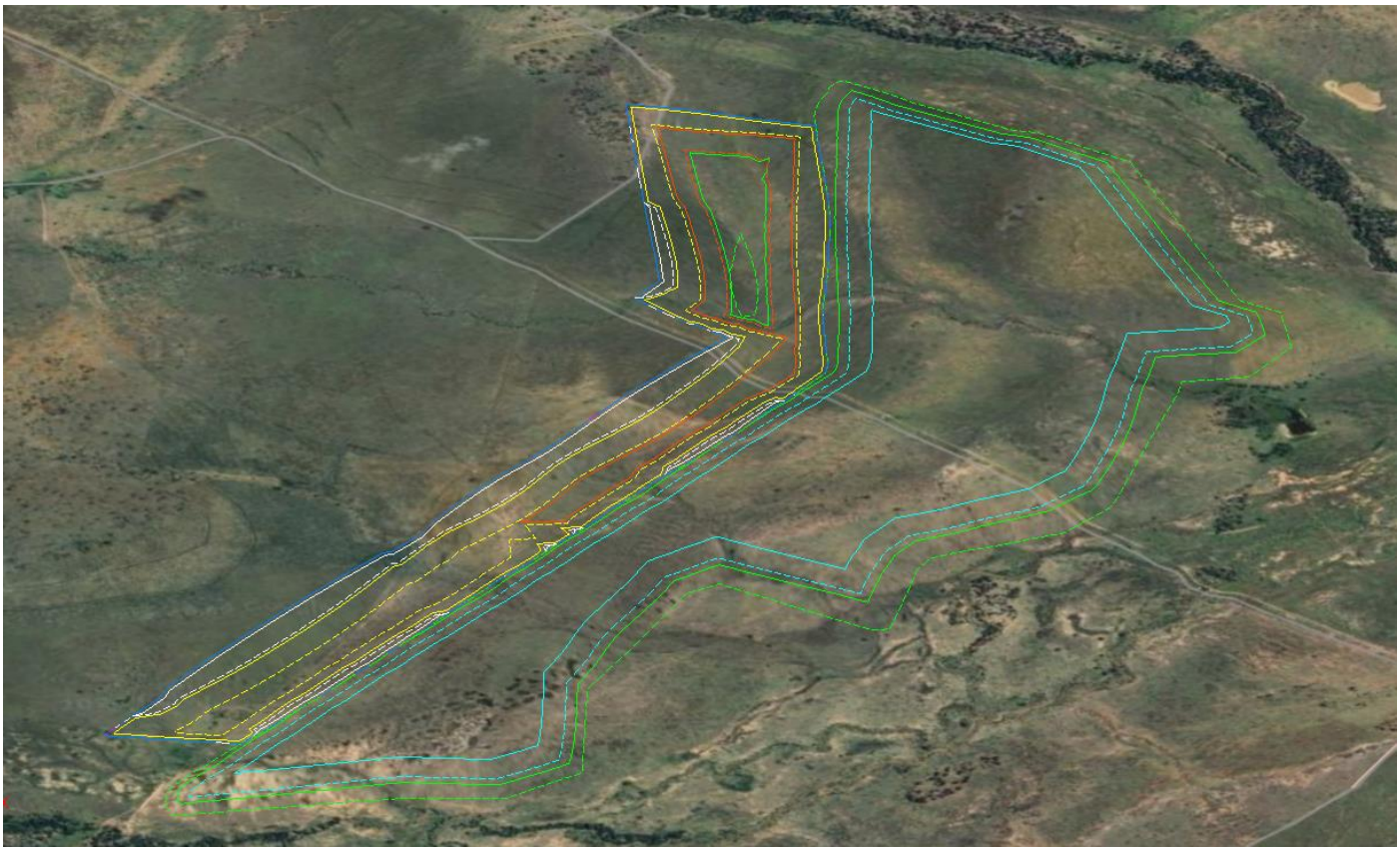

Figure 23. Modelled Landform Elevations imposed onto landscape (Drape)

Figure 24. Topography of Post mining landscape – demonstrating final landform compatibility

Mining will commence via an initial box-cut to the west of the proposed waste rock dump with formed strips running northeast to southwest progressively moving in an upslope north-westerly direction. Mine development is planned based on formation of a 'northern' and 'southerm' extent.

Progressive rehabilitation activities are described for each year of the LOM are described in Table 21.

6.2.2. Development of design concept

Development of the landform design concept for the Project commenced with collation of design criteria and literature review of regulatory publications, best practice guidelines, ACARP research reports, site documentation and historical information and previous landform studies completed. Consultation with the relevant stakeholders and the underlying landholder in particular also informed the final layout and landform design. Relevant information on rehabilitation and landform designs from similar mine sites in Central Queensland was also utilised where available; and coupled with understanding and review of site conditions and stakeholder and landholder input.

This process developed a range of landform design options which were subsequently investigated and the considerations discussed further in the sections below.

6.2.3. Key factors of relevance to design concept

The FHCP EA requires all surface areas significantly disturbed by mining activities to be rehabilitated to a safe, stable and non-polluting landform, with self-sustaining vegetation cover. Residual voids must not cause any serious environmental harm to land, surface waters or any recognised groundwater aquifer other than the environmental harm constituted by the existence of the residual void itself. These requirements have been taken into consideration in relation to the depression in the landform design concept as appropriate.

Development of the landform design has further required the synthesis of a wide range of technical and environmental factors and constraints, into the design concept. This concept has addressed any underlying factors through design, but also responds to the specific requirements present for the FHCP to ensure long-term environmental control and adequate performance.

The environmental factors have typically driven the design concept outcomes, as with the following considerations:

- spoil type;
- appropriate slope criteria for each spoil type;
- disturbed material and land;
- the location and performance of adjacent watercourse;
- floodplain interactions and protection; and
- rehabilitation drainage.

The key environmental factor of relevance to the FHCP relates to the erosive potential of materials, and by extension, the erosive stability of the landforms. This has formed a primary driver of the landform design concept as well as the overall rehabilitation approach for the FHCP. A further secondary factor that has driven the landform design relates to the PMLU of cattle grazing, and ensuring the land suitability requirements are provided to support these land outcomes.

6.2.4. Achieving sustainable rates of soil loss (erosion)

Erosion is the greatest risk to any post-mining landscape in central Queensland. Though historical rates of soil loss up to 40 t/ha/y were considered acceptable, the contemporary view is that erosion rates from rehabilitated landforms should be analogous to surrounding unmined areas. Williams (2000) summarised various soil losses and found for mixed pasture and woodlands, rates have a maximum of around 4 t/ha/y. Coincidently, Grigg et al. (2001) conclude the rate of soil loss in mine rehabilitation should not exceed the rate of soil renewal, which is less than 4 t/ha/y.

It is well established that high vegetation percentages reduce erosion in rehabilitation, even on steep slopes (Carroll et al. 2000; Loch 2000). Under vegetation, infiltration capacities increase greatly, soil structure is improved, and erosion can be greatly reduced. So et al. (1998) suggest 30 to 40 % vegetation cover will be required to reduce erosion to acceptable levels. For sloping rehabilitation, rates higher than 50% were recommended by Grigg et al. (2001).

With consideration to material characteristics and more than 40 years of industry-led research and practice, FHCP has determined the following typical design objectives for slopes.

1. Tertiary overburden slopes, regardless of soil type, will typically have:
   - Gradients ≤10%, and
   - Lengths ≤200m, variable depending on the size of the contributing upper catchment.
2. Permian overburden slopes, regardless of soil type, will typically have:
   - Gradients ≤15%, and
   - Lengths ≤100m, variable depending on the size of the contributing upper catchment.

The above landform design criteria, if implemented correctly, has the ability to limit long-term erosional impacts on a landform. The gentle slope angles allow for longer slope lengths without resulting in unacceptable stability concerns.

6.3. Cover Design

A cover system is typically required for circumstances where the surface treatment of a mine landform or other waste material is needed to manage the exposure of waste materials that may be reactive (e.g., potentially producing AMD, NMD or saline drainage). Where cover systems are required, it is in order to ensure that such contaminants are not released to the receiving environment, create legacy concerns or directly impact on the success of rehabilitation.

Most of the materials at the FHCP are classified as Non Acid-Forming (NAF), with low potential for acid drainage. The materials also have a low potential to produce drainage with elevated metal or metalloid concentrations. Testing undertaken over the life of the mine to date have not identified any elevated levels of metals or metalloids. However, the FHCP spoil material is of concern from the perspective of salinity and dispersity.

For these materials, the preferential waste handling strategy employed for the site is that the more dispersive materials are placed under a cover of less dispersive material. Where this is not possible, the slope is reduced, as defined in Section 5.

As such, no engineered covers will be installed, and therefore, the remaining requirements for cover design are not relevant.

6.4. Mine Waste Geochemistry

Waste rock geochemistry has been assessed in the FHCP, Overburden and Potential Coal Reject Characterisation Report by Northern Resource Consultants (NRC, 2018), see Appendix E. The results of the study indicate that all samples assessed (27) were NAF, Thus, acid generation probability is extremely low and unlikely to occur. None of the overburden samples reported high EC, thereby reducing the likelihood of saline drainage.

Given the Project's waste rock will be NAF material, no specific handling or storage requirements have been recommended. Any PAF material identified during mining will be removed /adequately capped in the final landform.

6.5. Soil Assessment

Fairhill Coking Coal Pty Ltd commissioned a soils and land suitability assessment as part of baseline environmental studies to support environmental approvals for development of the Fairhill Coal Project. The study was conducted by SLR (2019).

Natural soils have horizons or layers, approximately parallel to the land surface, with morphological properties different from layers below and/or above it (National Committee on Soil and Terrain 2009). Horizon notation is deduced from profile descriptions, usually colour and texture, and sometimes laboratory data. Typical horizon notations are A horizons of darker, organic rich surface materials, B horizons of mineral soil layers with distinct colours, and C horizons of partly weathered parent materials beneath the solum (AB profile).

6.5.1. Quality of available resource

Soils at the FHCP are characterised by 4 Soil Mapping Units (SMU's)

1. Black, Brown and Grey Vertosols (>90%), possible minor occurrences of Black, Brown and Grey Dermosols (<10%) on Fairhill Formation
2. Brown and Red Dermosols on Fairhill Formation
3. Black, Brown and Grey Vertosols (>80%), likely minor occurrences of Black, Brown and Grey Dermosols (<20%) on Alluvium
4. Black, Brown and Grey Dermosols (>80%), likely minor occurrences of Black, Brown and Grey Vertosols (<20%) on Alluvium

Limitations to soil types identified within the Fairhill Coal Project study area were due to PAWC soil physical factors incl. rockiness, nutrient deficiency, and pH at some sites. It is considered that most soils within the study area are Land suitability Class 4 for Beef Cattle Grazing with some areas associated with the Alluvial Dermosols being Class 3 for Beef Cattle Grazing.

6.6. Material Availability

Topsoil material, once stripped during the initial stages of the Project, will be stockpiled on the OOPDs separated from overburden dumping areas. During rehabilitation activities, topsoil will be sourced from the stockpiles on the OOPDs and spread via scraper and dozer. Erosion and sediment controls will be established in accordance with the Project's Erosion and Sediment Control Plan and Water Management Assessment to ensure adequate drainage and reduce the amount of sediment laden water running off the OOPD footprints. Soil analysis of topsoil stockpiles prior to rehabilitation will be conducted to confirm topsoil quality and the requirement of soil ameliorants such as gypsum. As outlined in **Section 6.5,** initial soil sampling indicated that topsoil available at the FHCP is not saline or sodic but is potentially lacking in nutrients. Confirmatory topsoil sampling will be completed prior to the commencement of rehabilitation

activities to inform if further soil ameliorants are required. The application of soil ameliorants will aim to improve soil quality, vegetation growth and reduce soil dispersion. Further information on the quantities of topsoil available at the FHCP is detailed in **Section 6.10.3.**

6.6.1. Quantities and source material location

Open Cut Depression (Domain 1)

Backfilling of the open cut pit will occur progressively. Hence, the sourcing of backfill material is not required for rehabilitation. During the initial construction of each pit stage, topsoil to a depth of 0.1-0.25 meters (m) will be removed and stockpiled on the OOPDs. Topsoil will be stockpiled away from active waste rock dumping areas to prevent mixing of topsoil with overburden material. Once a pit stage the pit has been backfilled and re-shaped, topsoil will be placed and spread via dozer and scraper across the pit footprint. Following the placement of topsoil, the footprint will be ripped and subsequently seeded.

Out-of-Pit Dumps (Domain 2)

Topsoil material, once stripped during the initial stages of the Project, will be stockpiled on the OOPDs separated from overburden dumping areas. During rehabilitation activities, topsoil will be sourced from the stockpiles on the OOPDs and spread via scraper and dozer. Erosion and sediment controls will be established in accordance with the Project's Erosion and Sediment Control Plan and Water Management Assessment to ensure adequate drainage and reduce the amount of sediment laden water running off the OOPD footprints. Quality of topsoil will be assessed prior to rehabilitation activities to identify if soil ameliorants (e.g. fertiliser, gypsum, lime) are required to improve soil quality. Further discussion of the Project's topsoil management is provided in Section 6.10.3.

Water Storage Infrastructure to be retained (Domain 4)

Retention of specific project infrastructure has not yet been agreed or planned for at this stage, however the possibility of infrastructure retention will be assessed and agreed closer to the end of the active life of mine. Water storages comprise Infrastructure likely to be considered for retention.

Where dams are agreed to be retained, all infrastructure will be removed and the structure left in a safe stable and non-erosive condition. Water quality will be required to meet the surface water quality stipulated in the EA.

ROM, MIA, Haul Road and Designated Access Road and Water storage infrastructure to be decommissioned (Domain 3 & 5)

Rehabilitation of these areas will involve ripping of the surface to promote natural vegetation growth followed by seeding.

6.7. Water Management

Management of surface and groundwater is a key consideration in achieving long-term rehabilitation success, with surface water features being a primary consideration for rehabilitation at the FHCP. Post-mining landforms at the FHCP are designed to not concentrate overland flow and therefore, do not require contour banks or rock-lined waterways to transport overland flow downslope and off rehabilitation.

Rather, landform design is sympathetic to natural geo-fluvial processes. Slope lengths are broken by wide, flat benches to slow runoff velocities without concentrating flow and to encourage infiltration and soil profile wetting. This limits the volume and velocity of runoff and encourages revegetation. The Water Management Plan be the basis of water management across site until end of mine life.

the total extent of the final landform would exist as clean water catchment, which would generally drain towards the final depression or towards the creeks to the North and East. The final landforms will be subject to investigation works and detailed design and will include assessment of the water chemistry, surrounding environment and consideration of infrastructure to remain post closure (subject to relevant agreements).

Consideration to specific water management aspects relevant to post-closure as described by ATC Williams, 2019 are detailed below.

Clean Water Dam (CWD)

The CWD is formed from a pre-existing dam that is in use by current landholder as a farm dam. The dam may be reasonably handed back to the next landholder for agricultural purposes or could be decommissioned and rehabilitated (pending negotiation with the land holder).

Depression (Rehabbed Pit Shell)

The final landform for the open cut pit is proposed to be a 'depression' It is expected (although unconfirmed) that it will naturally fill with surface water runoff over time for use as a water storage capable of supporting livestock watering with safe access. To achieve this final landform and outcome, a geotechnical and geochemical assessment shall be conducted to evaluate the long-term stability of the landform, ensuring that it is safe for humans and wildlife, non-polluting, stable and able to sustain the PMLU of low-intensity cattle grazing.

The quality of water that may accumulate in the depression would be expected to improve over time as the revegetated surfaces of the rehabilitated overburden dump establish and mature, thus reducing the mobilisation of sediments and remnant salinity associated with the operational phase of the mine. Water accumulating in the landform depressions have not been assessed, however the area could overflow during rainfall events discharging to the natural environment on the eastern and northern extents of the site.

As part of the surface monitoring regime in pit water quality monitoring will also commence as part of the operational phase of the mine. The results of input water quality will be used as inputs into a water quality model to obtain insight into expected post closure surface water quality compared to stock water quality standards. Relevant monitoring locations will be identified and monitored during the operational phase of the mine. In pit surface water monitoring will continue throughout the life of the mine including closure. The in-pit surface water monitoring regime will be updated throughout the LoM to remain relevant. In pit water quality monitoring will play a key role in developing a surface water quality model demonstrating expected post closure water quality compared to stock watering water quality standards but also showing that stock watering water quality standards will be achieved post closure.

Drainage Systems

The final landform design will consider shaping of effective drainage lines in order to shed surface runoff without causing erosion of the final land surface. In the establishment phase, this will comprise cleaning of all drains, landscaping and placement of a soil layer that is followed with revegetation.

Permanent drainage will be designed and constructed for long term durability, which could include increasing capacity, reducing gradients or providing erosion protection as required.

6.8. Hydrogeology

A detailed description of the hydrogeological systems of relevance to the FHCP is provided in **Appendix C –** . Appendix D summarises relevant historical information and presents a summary of the hydrogeology of the site and all connected strata. Detail of a conceptual model has also been included to illustrate the mine site's groundwater systems.

An adaptive management strategy is proposed to assist with the management and mitigation of potential drawdown and water quality impacts on the site. The strategy includes ongoing monitoring programs of

groundwater level and quality, and the development of site-specific groundwater trigger values and contaminant limits.

6.9. Flooding

The FHCP is located within the Nogoa River catchment, and flooding interactions and impacts are an important consideration for the site. The susceptibility of the mine site to flooding, and potential influence of flood interactions in the long-term, has been appropriately investigated (Appendix C – FHCP Water Management Assessment, ATC 2019).

From a site impacts perspective, the Project is located close to the top of the local catchment (approximately 2km to the northwest).

Flood assessment of the project area was undertaken to understand the natural flooding extents and assess the impacts of flooding on the proposed site infrastructure and the potential flood risk issues associated with site access and operations, as well as the impacts of the project on flood levels and discharge rates. Modelling has considered likely flood extents for a range of design storm events, up to and including probable maximum flood (PMF) levels. All modelled outputs have been made available to DES, and modelling work completed as part of the FHCP Water Management Assessment (ATC 2019) is considered fit for purpose and utilises contemporary flood modelling techniques.

Outcomes from the flood impact assessment highlight that the site location represents a number of safety and operational risks in relation to potential flood impacts.

Comparison of results between pre-and post-closure condition suggests that the final landform will have limited impact on downstream flooding. The presence of the final depressions in the landscape would act as a storage mechanism effectively removing or delaying the contribution of runoff from the upstream catchment. Limited reductions in peak discharge rates were observed. Reduction in maximum inundation depths of 0.2m (1% AEP) and 0.1m (0.1%AEP), and minimal difference in maximum modelled velocities between the two conditions was observed.

For each of these reasons, rehabilitation at FHCP is not expected to have a significant impact on the morphology of the Nogoa River in the long term.

6.9.1. Modelled flood levels

Flood modelling for pre and post mining 0.1% and Probable Maximum Precipitation (PMP) are shown in Table 15

Table 15. Flood Modelling Results

Scenario	Parameter	1% AEP	0.1% AEP	PMP
Pre-mining	Maximum Modelled Depth (m)	4.51	5.35	7.48
	Maximum Modelled Velocity (m/s)	1.32	1.29	1.54
Post-closure	Maximum Modelled Depth (m)	3.78	4.67	6.78
	Maximum Modelled Velocity (m/s)	1.15	1.22	1.46

6.10. Revegetation

6.10.1. Revegetation Objectives

The following are the revegetation objectives for the site, consistent with the PMLU of low-intensity cattle grazing:

- to ensure rapid establishment of vegetation on exposed soil in order to limit erosion over the early stages of rehabilitation;
- to establish a pasture with native and exotic grass species that is sufficiently dense in the long term to protect the soil surface from erosion and support low-intensity cattle grazing;
- to establish a moderate density of locally native trees and shrubs that provide shade for livestock;
- to limit invasion by declared weed species to levels that are similar to those on site prior to mining or representative of adjacent areas.

6.10.2. Key Flora Species

Rehabilitated areas will be revegetated with grazing pasture grass species that are present at the site's pre-mining landform. Seed mix will be applied following topsoil application and amelioration to ensure that erosion is controlled. Species used in pasture revegetation will be 3P grasses (i.e., grasses that are perennial, productive, and palatable). These species are also suitable for the soil types that will be used as part of topsoil cover. The species selection includes a mixture of native and cover crop grasses and native tree species for shade.

The following native grasses have been recommended for rehabilitation; however, it is understood that availability of commercial quantities of seed may be limited for some species:

- *Ancistrachne uncinulata* (Hooky grass)
- *Aristida calycina* (Dark Wiregrass)
- *Astrebla squarrosa* (Bull Mitchell Grass)
- *Cymbopogon refractus* (Barbwire Grass)
- *Dactyloctenium radulans* (Button Grass)
- *Enneapogon lindleyanus* (Wirey nineawn)
- *Eriachne mucronata* (Mountain Wanderrie Grass)
- *Heteropogon contortus* (Black Speargrass)
- *Themeda triandra* (Kangaroo Grass).

The stockpiling of topdressing materials for use in rehabilitation will facilitate retention of the woody plant seed bank, however, this seed bank is also likely to be dominated by seeds of the dominant aggressive pasture grasses, and its use is likely to substantially reduce the effectiveness of any direct seeding with native grasses.

The use of Indian Couch (*Bothriochloa pertusa*), while not ideal, is not incompatible with the establishment of other native plant species, however Buffel Grass (*Cenchrus ciliaris*) is likely to outcompete native species and should be avoided.

Regrowth of exotic pasture grasses should be managed through the use of selective herbicides prior to any direct seeding efforts in rehabilitation areas and should be incorporated into rehabilitation activities.

The following woody species are recommended for rehabilitation:

- *Acacia harpophylla* (Brigalow)
- *Acacia shirleyi* (Lancewood)
- *Alstonia constricta* (Bitterbark)
- *Atalaya hemiglauca* (Whitewood)
- *Carissa lanceolata* (Currant Bush)
- *Enchylaena tomentose* (Ruby Salt Bush)
- *Terminalia oblongata* (Yellow Wood).

The above species of trees and shrubs are recommended on the basis that they were commonly encountered on a variety of landforms and regional ecosystems within the Fairhill Coal Project, and would therefore be most tolerant of local conditions, and would result in vegetation communities that more closely resemble current vegetation communities present on site.

6.10.3. Topsoil Management

Topsoil within the Project's disturbance areas will be stripped prior to the construction of infrastructure and prior to the commencement of mining. Futura has conducted an extensive soil characterisation assessment across the Project's disturbance areas to better understand the characteristics of the area's topsoil and to inform how topsoil will be used in rehabilitation activities. The FHCP Soil and Land Suitability Assessment (SLR, 2019) outlines that there is sufficient A horizon available for stripping across the Project's disturbance areas to facilitate the necessary rehabilitation activities.

Topsoil depths ranged from 0.1 to 0.3m across the disturbance areas with a conservative estimate being an average of 0.2 m. Topsoil stripping will this range from 0.1 to 0.3m depending on the soil profile as encountered,. A horizon soils will be stripped via dozer or scraper and ideally when slightly moist. Topsoil will then be stockpiled in piles no higher than 4 m along the edge of the OOPD, separated from active waste rock dumping areas to prevent mixing of materials. Table 16 presents the topsoil material balance for the disturbance areas. The calculations indicate that there will be a surplus of topsoil available for rehabilitation.

Table 16. Topsoil Material Balance

Infrastructure	Disturbance Area (m^2)	Topsoil Stripping Depth (m)	Topsoil Stripped (m^3)	Required Topsoil for Rehab (m^3)	Balance
Overburden Dump	535,700	0.1	53,570	107,140	-53,570
Open cut pit/ Depression	3 110,100	0.3	933,030	622,020	311,010
Tracks and Haul Roads	160,700	0.2	32,140	32,140	0
Water Storage Infrastructure to be retained	20,700	0.2	4,140	4,140	0
MIA, ROM, Dams	824,600	0.2	164,920	164,920	0
Surplus Topsoil Remaining					257,440

Surface chemistry data indicates that while not an issue for topsoil, sodicity and salinity as a potentially limiting factor as depth increases.

Once the disturbance domain has been shaped, a rock layer may be applied where necessary (to ensure stability) and topsoil will be applied to a depth of approximately 0.2 m. Where necessary topsoil will be deep ripped incorporating the topsoil into the underlying rock material, aiming to promote grass growth shortly after placement. Haulage distances from topsoil stockpiles to the rehabilitation areas are not expected to exceed 1 km. Surplus topsoil which may remain at the completion of topsoil placement will be spread across the slopes of the OOPDs nearest to the relevant topsoil stockpile.

Should B horizon sodic soil be encountered during rehabilitation activities, such areas will be treated with soil ameliorants such gypsum or lime in order to reduce the sodic nature of the soil. Should treatment prove unsuccessful, sodic soil will be contained with the OOPDs encapsulated with NAF material.

A Topsoil Management Plan (TMP) will be developed to assist in the management, recovery, reuse and reconditioning of topsoil during the implementation of progressive rehabilitation activities across the Project. The TMP addresses the following:

- Topsoil stripping depths and quantities;
- Stockpile locations, height, and erosion and sediment control (ESC) measures;
- Topsoil recovery and respreading procedures; and
- Re-conditioning management of poor-quality soils through use of soil ameliorants (e.g., NPK fertiliser, gypsum, lime).

Topsoil Stockpiling

Topsoil will be stockpiled where practicable for use on retained vegetation and rehabilitation areas to promote revegetation and retention of soil quality. The following measures for soil management will be implemented where relevant and practicable, to reduce the risk of soil degradation and improve the chances of rehabilitation success:

- topsoil stockpiles are to be less than 4 m high and be contoured and positioned in a manner that encourages water drainage and discourages erosion. Grass and herbaceous plants germinating from the soil seed bank are to be maintained as a protective cover for stockpiles;
- if stockpiles fail to develop a natural grass cover, they are to be seeded with a fast-growing, non-invasive, commercially available sterile grass species. Recommended species are listed in Appendix 4 of the Soil Conservation Guidelines for Queensland (DSITI, 2015);
- if there is a risk of a grass cover not establishing voluntarily, stockpiles will need to be ripped and seeded with a quick establishment pasture. Topsoil should ideally be stockpiled for the minimum time. Studies have shown that most deterioration occurs within the first year (Keipert, 2005);
- topsoil should be stockpiled for the minimum time practicable. Studies in the Hunter Valley have shown that the majority of deterioration occurs within the first year (Keipert, 2005);
- stockpiles are to be monitored annually for weeds and control measures implemented to prevent weed colonisation on the stockpiles;
- where soil must be stockpiled for extended periods (>2 years), soil testing will be implemented before use for rehabilitation purposes; and
- topsoil stockpiles are to be located in areas fenced to exclude livestock.

Rock Armour

Placement of armour rock or mulch cover to assist in stabilising the landform and reducing topsoil loss will be considered for slopes above 15%. FHCP does not propose to have any steep slopes in the final landform and therefore rock mulch is unlikely to be required.

Topsoil Amelioration

Due to the nature of soils at the site, with neutral to alkaline pH in some surface soils, and low nutrient status, application of ameliorants to topdressing materials would aid in their effectiveness for soil stabilisation and plant establishment.

While soils within the study area have good plant growth, disruption of soil structure and fertility through soil stripping, stockpiling and spreading can result in poor outcomes for site rehabilitation. Slow plant establishment and high erosion can occur as a result of inappropriate handling of topdressing materials. Minimising stockpiling times for topdressing materials and maintaining low slope gradients will also help to optimise land rehabilitation outcomes.

Application of organic matter will be considered if necessary to lower soil pH. Organic matter is important for long term soil stability and retention of water and nutrients. Application of organic matter also aids in creating a favourable root environment for plants and increasing the biological activity within the soil. Examples of organic materials which can be used to improve soil structure are manure, straw, woodchips or sawdust.

Many of the soils within the study area are deficient in nutrients. Application of nitrogen, potassium and phosphorus (NPK) fertilizer is recommended to improve plant establishment for site rehabilitation.

Organic Matter Application

The soils within the broader Project Area contained low to very low organic matter content.

All stockpiled material would benefit from incorporation of composted organics with a nitrogen drawdown index (NDI) > 0.5. Use of this organic amendment will increase soil water holding, soil drainage (leaching) and nutrient retention and help stabilise the topsoil to resist erosion and promote healthy plant growth. If controlled or slow-release fertilisers are applied, the composted organics will ensure nutrients are not leached from the root zone.

Where possible, topsoil should be stripped with its existing ground cover vegetation and, if subject to stockpiling, relocated with its cover crop vegetation.

Depending on availability, additional organic matter (such as mulches, manures, or compost), may be incorporated into the topsoil.

6.10.4. Subsoil Management

Some of the subsoils within the FHCP are prone to dispersive erosion, especially following disturbance. These soils will be managed to avoid erosion risk and sedimentation in downstream waterways. Subsoil will be managed in the following ways:

- subsoil will be stored separately from topsoil, to avoid contamination between subsoils and topsoils.
- subsoil to be directly placed into its final position rather than stockpiled as a priority;
- subsoil stockpiles to be contained, to ensure that any eroded material is retained within the pits and not released into waterways;
- subsoil stockpiles should not to be placed on slopes greater than 3%, and the stockpile surface should be levelled to reduce the speed of any run-off; and
- sediment control infrastructure will be considered if necessary around all stockpile areas.

6.10.5. Revegetation Approach

Soil Spreading

A growing medium of approximately 200 mm of topsoil will be placed over the landform. Organic material harvested from the mine footprint will be incorporated into the topsoil, where practicable.

Following the spreading of topsoil, rehabilitated areas are to be ripped to a depth of 0.4 to 0.5 m if necessary. Ripping reduces compaction from heavy machinery, encourages the infiltration of water and reduces the risk of erosion.

Spread and ripped soil should have a rough surface with abundant troughs and banks, which help to resist erosion, improve infiltration and retain leaf litter.

Where practicable, topsoil placement will occur in October-November, shortly before the commencement of the wet season. Soil operations are to be undertaken when the soil is dry or damp, but not saturated.

Fertiliser and Soil Amelioration

Some the soils in the Project Area will require some degree of amelioration. The addition of an initial fertiliser application at the time of planting will facilitate plant establishment and growth. A controlled-release fertiliser with the following nutrient concentrations is to be applied at the time of seeding as required:

- Nitrogen: 7.0-25.0%;
- Phosphorus: 0.3-2.0%; and
- Potassium: 4.0-15.0%.

Application rates should follow the manufacturer's guidelines, but are expected to be 100-500 kg/ha, depending on nutrient concentrations.

Besides using fertilisers, incorporating native leguminous forbs such as *Rhynchosia minima* (Rhynchosia) and *Glycine tomentella* (Hairy Glycine) to the seed mix is a natural method of increasing soil nitrogen levels due to the nitrogen fixing capabilities of legume species. This could establish natural nitrogen cycling within the topsoil resulting in long-term improvements in soil fertility and self-sustaining vegetation.

Seeding

Seeding operations shall not take place until the prepared area has been constructed in accordance with the specified requirements. Ideally, sowing should take place within one week of topsoil placement and ripping. Rainfall between cultivation and sowing results in the partial collapse of furrows and crusting of the soil surface. Sites may need to be re-ripped prior to sowing if rain occurs following the initial treatment. Seeding operations are not to be undertaken on days:

- when wind speeds exceed 15 km/h;
- where the surface is fully saturated;
- when temperatures exceed 37°C; and
- during or after heavy rain, or when heavy rain is forecast.

The seed mix to be applied varies by soil management unit. However, all seed mixes are to include a combination of sterile grass varieties (e.g., Silk Sorghum *Sorghum* spp. and/or Japanese Millet *Echinochloa esculenta*) which act as cover crops, native species and pasture species.

A fast-establishing sterile annual cover crop is recommended to be included in the seed mix. This will help to rapidly establish ground cover and minimise topsoil loss. This approach will also help to supress weeds and assist in restarting biological processes in the soil, creating a favourable micro-environment for the germination and emergence of the native seeds.

Hydromulching

Where deemed appropriate on the steepest banks that are more disposed to potential erosion, hydromulching may be implemented. Hydromulching may be undertaken with a slurry of water, seed, fertiliser, mulch and a

binder to contribute to ideal growing conditions and rapid vegetation through the stabilisation of the landform, incorporation of organic matter and nutrient addition.

Planting of Container Stock

If woody stem species do not establish through the seed bank of topsoils or through the application of seeds, supplementary planting of tubestocks of relevant species will be undertaken to achieve shade trees establish in rehabilitation areas.

Container stock is to be hand-planted in clusters of 5-10 individuals, each seedling spaced approximately 2 m apart. The planting of container stock is to take place within five days of heavy rain (>40 mm over a 24-hr period), when soil moisture levels are high. The spacing between clusters will depend on the density of other species that successfully germinate, but planting densities of up to 100 trees per hectare may be required where seed germination is particularly poor.

All container stock is to be sun-hardened for at least one month prior to planting.

Planting holes are to be excavated to a minimum diameter equivalent to twice the diameter of the plant container and to a depth equivalent to the height of the plant container. The material at the bottom of the hole is to be broken up to a depth of 50 mm. The sides of the hole are to be roughened. The top of the plant's root ball is to be level with the surrounding ground. The topsoil is to be tamped down to create a slightly depressed basin surrounding the plant, without exposing the root system.

Fencing

Livestock-proof fencing is to be installed around all revegetated areas at or prior to the completion of seeding and planting. Rehabilitated areas are to be maintained free of livestock until these sites are sufficiently established for the commencement of grazing.

Seed Mix

Under adequate handling and storage management practices, stripped stockpiles of topsoil should contain a viable seedbank for use in rehabilitation. The species present would represent the diversity of dominant tree, shrub and grass species that naturally occur in the area. This will form the primary method of revegetation, where possible. If the natural seedbank contained within the topsoil used in rehabilitation were to fail, then seed will be sourced from a combination of local collections and commercial suppliers. Local seed collections will begin at least two years prior to the commencement of revegetation, to allow for the potential of unfavourable weather to cause the failure of seed production in any one year. Seed is to be stored for a maximum of five years prior to use, and regular collections/purchases will be required throughout the Project.

Preliminary seed mixes will be developed based on the dominant species of trees, shrubs and grasses present within the Project Area prior to mining. Adjustments to these seed mixes will be made, pending seed availability and the performance of the earliest rehabilitation efforts on site.

This approach aims to replicate the pastures occurring on site prior to mining and establish a diverse mix of native and exotic pasture species that have high pasture productivity and environmental value.

Rehabilitation Trials

In accordance with the *Progressive Rehabilitation and Closure Plans Guideline*, rehabilitation trials are not to result in the delay of rehabilitation. They should also take place in locations that have been or will be disturbed for other components of the Project, so as to not unnecessarily enlarge the total disturbance footprint.

The rehabilitation methodology has been informed by rehabilitation trials elsewhere in Queensland, as well as reference data gathered during ecological surveys of the site prior to mining. The rehabilitation methodology (e.g., seed mixes, relative contribution of tubestock, timing of planting, soil management and amelioration) will also be progressively refined following the early outcome of each year's progressive rehabilitation efforts.

7. SURRENDER OF THE ENVIRONMENTAL AUTHORITY

A surrender application must comply with requirements contained in section 262 of the *Environmental Protection Act 1994*. This application must be accompanied by a final rehabilitation report, a post-mining management report and a compliance statement for the EA and PRC Plan schedule.

The final rehabilitation report is to contain an environmental risk assessment and information on any proposed costs related to residual risks remaining at the site. The environmental risk assessment must be completed using a methodology agreed to by the administering authority. The risk assessment is a key step before the calculation of any residual risk costs for the site. The calculation of costs could include consideration of the present value of the future costs of likely repairs, necessary monitoring and maintenance costs and the ongoing management costs of rehabilitated land.

There is a payment as a pre-condition of the surrender of an EA in order to allow the government to address residual risks associated with a site at surrender. Residual risks may include the possibility that rehabilitation works and engineered structures may fail or the ongoing costs of monitoring and maintenance after surrender.

The residual risk requirements do not remove or change the obligations of an EA holder to complete rehabilitation to required standards. The residual risk framework enables companies to relinquish the tenure and surrender an EA whilst ensuring the State understands any remaining risks on site and is resourced to manage the risks, including possible financial consequences of future environment harm.

8. RISK ASSESSMENT

As required by s126C1(f) of the EP Act, the risks of a stable PMLU not being achieved have been identified together with how these risks will be minimised or managed. For each rehabilitation milestone, inherent risks (in the absence of risk controls) and residual risks (once controls are in place) are identified and assessed for each hazard. Risks are scored based on the risk assessment matrix in Table 17 and criteria in Table 18**.** The risk assessment is presented in Table 19**.**

Table 17. Risk analysis matrix

RISK ASSESSMENT MATRIX (R)					
LIKELIHOOD OF OCCURRENCE (L)	SEVERITY OF CONSEQUENCES (C)				
	Catastrophic – widespread damage (5)	Major – long term impact (4)	Moderate – medium term impact (3)	Minor – short term impact (2)	Insignificant (1)
Almost certain (5)	10	9	8	7	6
Likely (4)	9	8	7	6	5
Possible (3)	8	7	6	5	4
Unlikely (2)	7	6	5	4	3
Rare (1)	6	5	4	3	2

Table 18. Risk evaluation criteria

RISK SCORE	RISK RATING	ACTION REQUIRED
9 – 10	Extreme	Immediate.
7 – 8	High	Action required. Senior management attention.
5 – 6	Moderate	Specific monitoring or procedures required.
2 – 4	Low	Management through routine procedures.

Table 19. Risk assessment for the Fairhill Coal Project for the post closure phase

MILESTONE	HAZARD	POTENTIAL IMPACT TO CLOSURE	INHERENT RISK RATING			RISK CONTROLS	RESIDUAL RISK RATING			JUSTIFICATION FOR RISK CONTROLS SELECTED	RESOURCE REQUIREMENTS, PERFORMANCE MEASURES, SCHEDULING, MONITORING
			(L)	(C)	(R)		(L)	(C)	(R)		
1 – Infrastructure decommissioning and removal	Decommissioning and removal of infrastructure takes longer than planned	• Achievement of Milestone 1 is delayed	2	2	4	• Monthly progress meetings are undertaken between management and work crews • Additional work crew resourcing may be sought	1	2	3	Controls will allow delays to be identified early in the program and allow the work schedule and resourcing to be adjusted to ensure the scheduled works are completed	Allow adequate time to have monthly meetings, funding for additional resources to be available. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Final reuse, recycling, disposal options unable to be used	• Failure to remove all infrastructure in accordance with PRC Plan Schedule	2	3	5	• A register of infrastructure and its agreed final use/disposal is kept and updated.	1	3	4	An updated register of infrastructure will allow the final reuse/disposal of infrastructure to be identified, negotiated and agreed in sufficient time to achieve the milestone	Mine management responsible for keeping register and negotiating final use/disposal options. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
2 – Remediation of contaminated land	Waste rock is more reactive than expected	• Reduction of surface water and groundwater quality • Land contaminated by residue in drains and water infrastructure • Higher than expected costs of remediation	2	4	6	• Waste characterisation continued throughout operations • Operational procedures in place to manage waste rock that is reactive • Monitoring of mine affected water throughout operations	1	4	5	Ongoing waste characterisation is a standard operational procedure and will ensure there is sufficient time to develop and implement management options. Management of reactive waste rock during operations is easier than remediating the impacts.	Adequate annual budget for geochemical testing and formation of management options. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Not all contamination is identified	• Achievement of Milestone 2 is delayed • Increased cost of remediation	2	3	5	• Incident register includes records of all spills, leaks and other incidents occurring that may result in contamination. • Employees and contractors made aware of their reporting obligations through a Site Induction • A suitably qualified person is engaged to conduct a site investigation and prepare other documentation as required by the EP Act	1	3	4	Availability of records of incidents will assist in identifying contaminated land. As per the EP Act, all contaminated land investigation documents must be completed by a suitably qualified person and certified by an approved auditor. This will allow a PMLU of low intensity grazing to be implemented.	Contingency funding allocated to remediation tasks, and auditing. Adequate time and resources for incident reporting. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Remediation of contaminated land is not completed in the given timeframe	• Achievement of Milestone 2 is delayed which in turn may delay subsequent milestone achievements	2	2	4	• Contamination is identified and managed throughout operations • Initial consultation with an approved auditor to identify contamination targets for remediation or removal • Monthly progress meetings are undertaken between management and decontamination work crews	1	2	3	This milestone needs to be completed and allow sufficient time to complete the bulk earthworks and surface preparation required in subsequent milestones.	Adequate time and resources allowed to complete the investigation, remediation and validation steps of the process. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
3 – Landform development and reshaping/re	Mining schedule changes	• Final landform is not achieved, either because material is not available, or area is not available	3	2	5	• Detailed mine planning, using robust resource and overburden models • Divide landforms into smaller portions to meet goals • Amend PRC plan if necessary	2	2	4	Amendment of the PRC Plan is not desirable, so planning mine development and progressive rehabilitation in smaller portions will keep a better handle on achieving the final landform.	Adequate resources for mine planning, scheduling and surveying. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.

MILESTONE	HAZARD	POTENTIAL IMPACT TO CLOSURE	INHERENT RISK RATING			RISK CONTROLS	RESIDUAL RISK RATING			JUSTIFICATION FOR RISK CONTROLS SELECTED	RESOURCE REQUIREMENTS, PERFORMANCE MEASURES, SCHEDULING, MONITORING
			(L)	(C)	(R)		(L)	(C)	(R)		
	Predicted waste rock swell factor overestimates or underestimates volume of material available for preparation of final landform.	• Final landform (and thus Milestone 3) is not achieved	3	2	5	• Detailed mine planning, using validated resource and overburden models • Frequent surveying of quantity of waste rock	2	2	4	Validation of models through surveying of quantities will better inform mine planning so that predictions can be updated and new quantities accommodated.	Adequate resources for mine planning, scheduling and surveying. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Design specifications not followed	• Final landform (and thus Milestone 3) is not achieved	3	2	5	• Annual audits to confirm agreement between as-constructed landforms and approved designs	2	2	4	Identifying if the progressive landform is meeting specifications allows modification to be made where and when needed.	Adequate time and budget allocated for planning and auditing. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Formation, reshaping and reprofiling takes longer than expected	• Final landform (and thus Milestone 3) is not achieved	2	2	4	• Monthly progress meetings are to take place between management and work crews regarding landform construction	1	2	3	Controls will allow delays to be identified early in the program and allow the work schedule and resourcing to be adjusted to ensure the scheduled works are completed	Allow adequate time to have monthly meetings, funding for additional resources to be available. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Heavy rain after reprofiling is complete, but before surface preparation and revegetation	• Surface erosion • Sedimentation of downstream waterways • Reduced safety/stability of the landform	4	3	7	• Slope designed with shallow gradient • Earthworks timed to coincide with dry season • Sediment management systems (drains and sediment dams) to be operational during construction of final landform	2	3	5	Risk controls are focused on adequate erosion and sediment controls being implemented. This system would be designed in accordance with the Best Practice Erosion and Sediment Control (IECA 2008) guidelines. Heavy downpours are unlikely between the months of June and October, therefore earthworks will be scheduled during this time.	Appropriate time and resources are required for design and construction of the erosion and sediment control system. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Geotechnical instability of depression area	• Depression collapse • Instability of surrounding land • Risk to humans, wildlife, livestock	3	4	7	• Final pit walls reshaped to an angle that supports long-term geotechnical stability and safe access • Monitoring	2	4	6	Geotechnical stability is required for safe and stable landform. Monitoring and reshaping will ensure the integrity of the final depression.	Time and resources allocated for monitoring and reshaping. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
4 – Surface preparation	Inappropriate topsoil/subsoil management/storage	• Reduced viability of topsoil • Weed infestation of topsoil allowing spread to rehabilitation sites	4	4	8	• Segregation of topsoil and subsoil stockpiles • Topsoil managed in accordance with the Topsoil Management Plan	2	3	5	Project life is 4 years, therefore with topsoil managed according to best practice the viability will be maintained.	Resources allocated for topsoil management including herbicides and work crew. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Inadequate topsoil cover	• Exposure of landform to erosion • Exposure of potential dispersive soils • Limited plant establishment	4	3	7	• Inventory of topsoil volumes and storage locations kept updated • Minimum of 200 mm of topsoil to be placed on all exposed subsoil • 30% rock cover applied to topsoil on slopes • Subsoils mixed with 25% rock • Apply rapid growth grasses in seed mix to establish an interim vegetation cover • Erosion and sediment controls to be operational during surface preparation and revegetation milestones	2	2	4	Risk controls are industry accepted best practice erosion and sediment controls and are implemented commonly at other mine sites. Topsoil inventory estimates sufficient topsoil is available to cover dispersive subsoil.	Sufficient volume and quality of waste rock (non-reactive) is available for use as protective cover on slopes. Seed is required to be purchased, and adequate time and resources need to be available to carry out the controls. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.

MILESTONE	HAZARD	POTENTIAL IMPACT TO CLOSURE	INHERENT RISK RATING			RISK CONTROLS	RESIDUAL RISK RATING			JUSTIFICATION FOR RISK CONTROLS SELECTED	RESOURCE REQUIREMENTS, PERFORMANCE MEASURES, SCHEDULING, MONITORING
			(L)	(C)	(R)		(L)	(C)	(R)		
5 – Revegetation	Heavy rain after surface preparation before vegetation cover is established	• Loss of topsoil • Sedimentation of downstream waterways • Failure of plant establishment • Increased cost for surface preparation and respreading topsoil	4	3	7	• Low slope gradient to limit velocity of runoff • Minimise time between surface preparation and seeding • 30% rock cover applied to topsoil on slopes • Rapid growth grasses applied in seed mix to establish an interim vegetation cover • Erosion and sediment controls operational during surface preparation and revegetation milestones	2	3	5	Risk controls are industry accepted best practice erosion and sediment controls and are implemented commonly at other mine sites.	Appropriate time and resources allocated for design and construction of the erosion and sediment control system. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Equipment and machinery used for surface preparation contaminated with weed seeds	• Invasion of weeds, inhibiting vegetation growth	3	4	7	• Strict vehicle wash-down practices for vehicles entering the site from contaminated areas • Annual weed monitoring program, to allow the early detection and treatment of new weed infestations	2	3	5	Prevention of weed introduction and early treatment of new infestations are central to the successful and cost-effective management of weeds on site.	Adequate time and budget for wash-downs, monitoring and weed control. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Limited seed availability	• Composition of established vegetation is affected in the long term if seed of particular species is missing from a seed mix	4	3	7	• Collection of seed onsite or at reference sites to ensure composition maintained • Seed mixes prepared by suitably qualified person • Species missing in seed mixes planted as tube stock in following wet season	2	2	4	Local seed collection proposed as not all species can be commercially supplied.	Adequate time and resources allowed for seed collection in time for revegetation activities. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Inappropriate seed mix used	• Insufficient grass cover protecting topsoil from erosion • Fast/high grass cover inhibiting establishment of woody tree and shrub species • Incorrect establishment of tree canopy and shrub layer causes failure to achieve target ecosystem	3	3	6	• Seed mixes prepared by suitably qualified person • Monitoring of rehabilitation sites informs application rates of grass species and weedy tree/shrub species • Supplementary planting of tube stock or sowing of grass seeds and fertilizer applied in bare patches • Thinning of established seedling if necessary	2	2	4	Identification of issues by monitoring will reduce rework and costs. Remediation of poor revegetation is proposed to minimise impact.	Budget allocated to purchase and/or collection of suitable seed mixes and ongoing monitoring of rehabilitation areas. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Drought after seed application and planting	• Poor vegetation establishment and survival	4	3	7	• Schedule revegetation and planting in early wet season • Monitoring of success of planting informs requirement for supplementary revegetation activities	3	2	5	Planting in early wet season increases possibility that follow up rain will occur. Costs of remediation will be reduced. Monitoring and remediation will minimise impact.	Time and resources allocated for remediation of unsuccessful planting. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Heavy rain after seed application and planting	• Loss of topsoil • Sedimentation of downstream waterways • Failure of plant establishment • Increased cost for surface preparation and respreading topsoil	4	3	7	• Low slope gradient to limit velocity of runoff • Minimise time between surface preparation and seeding • 30% rock cover applied to topsoil on slopes • Rapid growth grasses applied in seed mix to establish an interim vegetation cover • Erosion and sediment controls operational during surface preparation and revegetation milestones	2	3	5	Risk controls are industry accepted best practice erosion and sediment controls and are implemented commonly at other mine sites.	Appropriate time and resources are required for design and construction of the erosion and sediment control system. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Damage to vegetation from stray livestock	• Seedling and grass establishment inhibited • Topsoil eroded	3	3	6	• Cattle excluded from rehabilitation areas until vegetation established	2	2	4	Exclusion of livestock allows vegetation to establish.	Resources allocated to exclusion of livestock and associated monitoring.

MILESTONE	HAZARD	POTENTIAL IMPACT TO CLOSURE	INHERENT RISK RATING			RISK CONTROLS	RESIDUAL RISK RATING			JUSTIFICATION FOR RISK CONTROLS SELECTED	RESOURCE REQUIREMENTS, PERFORMANCE MEASURES, SCHEDULING, MONITORING
			(L)	(C)	(R)		(L)	(C)	(R)		
6 – Achievement of surface requirements	Revegetation equipment, vehicles, footwear contaminated with weed seeds	• Invasion of weeds, inhibiting vegetation growth	3	4	7	• Strict vehicle wash-down practices for vehicles entering the site from contaminated areas • Annual weed monitoring program, to allow the early detection and treatment of new weed infestations	2	3	5	Prevention of weed introduction and early treatment of new infestations are central to the successful and cost-effective management of weeds on site.	Adequate time and budget for wash-downs, monitoring and weed control. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Weather and climatic influences	• Poor pasture establishment • Species richness and biodiversity reduced • Poor tree/shrub establishment • Erosion of surface • Sedimentation of local waterways	4	3	7	• Appropriate selection of species mix • Reapply fertilizer and re-sow seeds or replant tube stock as appropriate • Ameliorate erosion and apply permanent erosion and sediment controls	3	2	5	Climate and weather are not controllable so responses are required to assist rehabilitation to survive events.	Adequate budget and resources to carryout amelioration tasks and monitor impacts of weather events.
	High plant mortality	• Poor pasture establishment • Poor tree/shrub establishment • Growth of weeds • Species richness and biodiversity reduced	2	3	5	• Appropriate selection of species and use of good quality seeds/tube stock • Experienced crews tasked with sowing and planting • Replacement of dead plants • Annual weed monitoring program, to allow the early detection and treatment of new weed infestations	2	2	4	Selection of appropriate species for the conditions and correct sowing/planting technique requires suitably qualified and experienced personnel to complete.	Adequate time, resources and budget for good quality seeds and tube stock, sowing/planting, monitoring and weed control. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Inadvertent or unauthorised access to rehabilitated areas by mining equipment and vehicles.	• Damage to surface • Disturbance to vegetation • Spread of weeds • Acceleration of erosion	3	4	7	• Clear delineation of no-go zones • Employees and contractors made aware of rehabilitated areas and no-go zones through a Site Induction and regular toolbox talks • Annual weed monitoring program, to allow the early detection and treatment of new weed infestations	1	3	4	Important to communicate to mine workers areas that should not be disturbed. This will reduce costs of replanting and remediating damage that is caused.	Time allocated for regular communication of changing situation. Resources and budget allowed to remediate damage. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Final landform instability	• Poor vegetation reestablishment • Erosion of growth media • Species richness and biodiversity reduced	2	3	5	• Landforms developed in accordance with design criteria • Erosion and sediment controls installed until PMLU successfully achieved	2	2	4	Design of landforms considers rehabilitation goals ensuring the slope lengths and degrees are appropriate to maintain geotechnical stability.	Suitably qualified person allocated to design final landforms, adequate budget and work crews allocated for erosion control installation. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Weeds and pests	• Growth of weeds outcompeting desired species • Damage to pasture and trees from insects	3	4	7	• Strict vehicle wash-down practices for vehicles entering the site from contaminated areas • Annual weed monitoring program, to allow the early detection and treatment of new weed infestations • Pest control with herbicides if appropriate	2	3	5	Prevention of weed introduction and early treatment of new infestations are central to the successful and cost-effective management of weeds on site.	Adequate time and budget for monitoring, pest control and weed control. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Stray livestock	• Seedling and grass damaged and establishment inhibited • Topsoil eroded	3	3	6	• Cattle excluded from rehabilitation areas until vegetation established	2	2	4	Exclusion of livestock allows vegetation to establish.	Resources allocated to exclusion of livestock and associated monitoring. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.

MILESTONE	HAZARD	POTENTIAL IMPACT TO CLOSURE	INHERENT RISK RATING			RISK CONTROLS	RESIDUAL RISK RATING			JUSTIFICATION FOR RISK CONTROLS SELECTED	RESOURCE REQUIREMENTS, PERFORMANCE MEASURES, SCHEDULING, MONITORING
			(L)	(C)	(R)		(L)	(C)	(R)		
7 – Achievement of stable PMLU (grazing)	Fire	• Damage or mortality of vegetation	2	3	5	• Fire break installed on the western and southern boundary • Emergency response plan considers management and control of fires on site	1	3	4	Wooded areas exist to the west of the site, and fire is more likely to originate in these areas.	Resources allocated to construct the fire break. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Unsafe access for livestock	• Loss and injured livestock	2	4	6	• Design and reprofiling of landforms undertaken by suitably qualified persons • Inspections and maintenance of access carried out to assess long term stability of landform	2	2	4	Appropriate design, construction and maintenance will ensure stable landforms for access by livestock.	Resources and budget allocated to the design of landforms. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Low pasture productivity	• Livestock cannot be supported in the long term	2	4	6	• Seed mixes based on reference sites and experience from nearby mines • Seed and fertilizer application rates optimised • Supplementary sowing and planting to increase pasture productivity	2	2	4	Productivity needs to maintain the livestock therefore controls are focused on improving and optimising the productivity of the pasture.	Adequate resources and time are allocated to monitoring, evaluating, and optimising productivity of the pasture species. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Low pasture diversity	• Reduced nutrient cycling • Failure of pasture viability • Susceptibility to damage from environmental stress	3	4	7	• Sufficient diversity of grass species included in seed mixes used • Species known to supress the growth of other species included in very low rates in seed mixes • Seed mixes informed by nearby rehabilitation, suitably qualified person and monitoring	2	3	5	Over-dominance of one or a few pasture species increases the vulnerability of the pasture to environmental stresses.	Adequate budget allowed for targeted seed mixes. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
	Poor landscape function	• Long term loss of resources from sites (nutrients, water, sediment) • Rehabilitation completion criteria not achieved	2	4	6	• Low slope gradient to limit velocity of runoff • 30% rock cover applied to topsoil on slopes • Management of topsoil as per management plan • Use of diverse seed mixes for both pasture/grass and wooded vegetation establishment	1	3	4	Appropriate design and construction of landform will achieve good landscape function of rehabilitation areas. Landscape function analysis is widely used to assess function of the landscape.	Adequate resources, budget and time allocated for the design, construction and monitoring of post mining landform. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.
8 – Achievement of stable condition for retained	Lack of structural integrity	• Landowner does not accept retained water structures • Delays to mining lease relinquishment	1	4	5	• Prior negotiation with landowner regarding condition of structures at handover • Regular inspection of water structures and scheduling of maintenance when required	1	2	3	Risk of achieving the milestone is minimised with clear conditions of the landowner agreement.	Adequate time allocated to negotiating and engaging with landowner. Refer to Section 5 for performance measures and Section 9 for monitoring and reporting.

9. MONITORING

9.1. Milestone Monitoring

The purpose of the Monitoring and Maintenance Program is to demonstrate the Rehabilitation Milestones and milestone criteria have been achieved. The monitoring to be carried out for the FHCP is described in Table 20. The milestone criteria applicable to each Rehabilitation Milestone has already been described in Section 5 of this document and these criteria are also provided as Appendix A of the EA for the FHCP. Some additional criteria have been proposed and are included in italics in the table below.

Table 20. Monitoring and maintenance schedule for Fairhill Coal Project

CRITERIA	MONITORING AND MAINTENANCE	FREQUENCY / TIMING	QUALITY ASSURANCE AND DATA MANAGEMENT	EVIDENCE, REPORTING AND REVIEW
Rehabilitation Milestone 1 – Infrastructure decommissioning and removal				
All built and service infrastructure demolished and removed (except for clean water management structure as agreed in writing with the landowner)	• Confirm by visual inspection the following as decommissioned and removed: - Services - Road materials - Pipelines - Buildings and foundations - Machinery and equipment - Scrap - General and regulated waste • Infrastructure has been reused/disposed of in accordance with the Infrastructure Register	Once after rehabilitation area has been cleared	Decommissioning, demolition and removal works will be conducted by appropriately qualified work crews. Checklists will be kept in document control system	Site inspection and checklist record Receipts from recycling/waste disposal locations accepting infrastructure etc.
All exploration drill holes and monitoring bores rehabilitated in accordance with the applicable Australian Standard or guideline.	• Confirm by visual inspection and audit of records that all exploration drill holes and monitoring bores (where not needed post mine closure): - Are decommissioned - Have had unused drill chips disposed to the bore hole or sump - Are capped at a depth suitable for grazing activities or any future use of the land stipulated by the landholder (at least 300 mm below ground surface) - Are backfilled to ground level.	As soon as practical after each exploration bore is no longer required.	Records of exploration drilling and rehabilitation of drill sites will be kept in the document control system.	Inspection record sheets Rehabilitation records
All aquifers isolated where exploration drill holes or monitoring bores have intersected more than one water bearing strata, in accordance with the 'Minimum Construction Requirements for Water Bores in Australia' (Australian Government, February 2012) or latest edition.	• Report against requirements of the 'Minimum Construction Requirements for Water Bores in Australia'.	Prior to relinquishing the exploration tenure or before the end of the exploration program	Reporting will be signed off by Exploration Manager.	Report to be reviewed by Site Manager
Risk assessment documents identified potential risks and controls/mitigation measures successfully implemented post closure in accordance with relevant guidelines and Australian Standards such as ISO31000 Risk Management.	• Audit implementation of risk controls contained within the risk assessment conducted for the PRC Plan.	Once at mine closure	Audit will be carried out by a person with appropriate experience in auditing risk assessments	Audit report
Rehabilitation Milestone 2 – Remediation of contaminated land				
Potential hazardous materials identified during mine life and removed or selected capping material applied with cover thickness appropriate to the contaminant as determined by appropriately qualified person.	• Review hazardous materials register, incidents register and waste transport register. • Confirm locations where potentially hazardous materials are disposed of onsite. • Confirm an appropriately qualified person designed capping and covers	Immediately following completion	Review will be carried out by third party who is also an appropriately qualified person. Live registers kept within document control system throughout all stages of the project.	Registers Confirmation report
Contaminated land assessment completed by a suitably qualified person and certified by an approved auditor.	• Audit incident register and hazardous materials register to identify location of potential contaminated land. • Complete a preliminary site investigation to determine the extent of any contaminated land and outline how it will be managed.	Once, after infrastructure is removed and contaminated land assessment complete	Soil sampling will be carried out in accordance with AS4482 (Parts 1 and 2 as relevant)	Site investigation report Validation report and Site Suitability Statement

CRITERIA	MONITORING AND MAINTENANCE	FREQUENCY / TIMING	QUALITY ASSURANCE AND DATA MANAGEMENT	EVIDENCE, REPORTING AND REVIEW
	• Complete remediation of contaminated land and have the results validated • If contamination is to be managed on site, prepare a draft site management plan for approval		Preparation of investigation report will be by a suitably qualified person. Certification will be by an approved auditor	
Sediment at the base of the dam retained for landholder complies with the levels outlined in the Draft Guidelines for the Assessment and Remediation of Contaminated Sites in Queensland or any later guideline.	• Include the retained water infrastructure in the preliminary site investigation	Once during the contaminated land assessment	Preparation of investigation report will be by a suitably qualified person. Certification will be by an approved auditor	Site investigation report Validation report and Site Suitability Statement
Land removed from the Environmental Management Register and the Contaminated Land Register where relevant	• Submit contaminated land assessment documents to Administering Authority	Once upon receipt of validation report	Preparation of investigation report will be by a suitably qualified person. Certification will be by an approved auditor	Notice from Administering Authority
Rehabilitation Milestone 3 – Landform development and reshaping/reprofiling				
Final Depressions are located outside of the AEP 1% flood zone. *Major earthworks completed in accordance with design specifications for a final stable landform provided by a suitably qualified person.* *Natural drainage lines reinstated. Where necessary, erosion and sediment control systems are installed, fit for purpose and designed by a suitably qualified person.* *Dam and /or depressions to remain for landholder use is safe for livestock access.* Coal seams fully capped by at least 2 metres of competent and benign material. No slopes steeper than 25%. Slopes between 15% and 25% consist of competent rock unless it is demonstrated that stability can be achieved without rock cover. Vertical intervals between slope breaks are 10m. No evidence of slumping identified as per the geotechnical assessment conducted by a suitably qualified and experienced person.	• Prepare as built design report confirming the details of the constructed landform. • Conduct a geotechnical assessment of all post-mining landforms confirming slopes are geotechnically stable.	Immediately following completion	As built design reports will be prepared by a suitably qualified and experienced person (RPEQ) Geotechnical assessment will be conducted by a suitably qualified and experienced person (RPEQ)	As built design report Geotechnical assessment report
Rehabilitation Milestone 4 – Surface Preparation				
Surface roughness, infiltration capacity, aggregate stability and surface condition are capable of sustaining the identified post closure land use or meet conditions consistent with the pre-mining Soils.	• Determine the characteristics of the final surface soils as defined in Australian Soil and Land Survey Handbook	Once in each rehabilitation area following completion of surface preparation.	Field surveys will be conducted in accordance with applicable Australian Standards and QA methodology	Geochemistry report

CRITERIA	MONITORING AND MAINTENANCE	FREQUENCY / TIMING	QUALITY ASSURANCE AND DATA MANAGEMENT	EVIDENCE, REPORTING AND REVIEW
Topsoil has been managed according to the requirements of the environmental authority and the Topsoil Management Plan.	• Conduct regular audits of the Topsoil Management Plan required by the environmental authority to confirm the operational controls have been implemented and monitored appropriately. • Where necessary, develop and implement corrective actions to improve seedbed preparation for revegetation.	As required by Topsoil Management Plan	Records of visual inspections kept in document control system	Records of visual inspections and audit reports
Rehabilitation Milestone 5 – Revegetation				
Pasture species mix sown at appropriate rate/ unless seedbank is retained and sufficient to establish vegetation.	• Review seed mix specification and rehabilitation records. • Conduct annual rehabilitation monitoring to determine species condition, composition and cover. • Record progressive development allowing for tracking of growth against reference sites. • Report on rehabilitation condition annually. • Where necessary, develop and implement corrective actions to meet criteria, such as retreating topsoil, and resowing an amended seed mix.	Zero, three, six and twelve months after completion of seeding. Annual reporting	Appropriately qualified person(s) to undertake revegetation monitoring.	Records of progressive assessment Annual reports
Rehabilitation Milestone 6 – Achievement of surface requirements				
Vegetation type and density are of species suited to the site's characteristics including soil type, topography and climate. Species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence, and will continue to do so. Vegetation in rehabilitated areas includes the presence of species suitable and complimentary to the post-mining land use, and are at a density and composition comparable to reference sites. Pasture productivity recovers following natural and man-made events (e.g. grazing, fire, slashing, and drought). The presence of weeds and pest species is no greater than the prevalence on the reference sites. Ground cover of at least 90% compared to the reference sites.	• Establish benchmark vegetation data for pre-mining comparison of success of rehabilitation. • Conduct field surveys to monitor vegetation type and densities, and to confirm self-sustaining revegetation is occurring (evidence of flowering, viable seed setting, germination and emergence). • Record health of revegetation with photos. • Identify species and abundance of weeds and pests. • Undertake field monitoring after significant events such as bushfire, grazing or drought. • Where necessary, develop and implement corrective actions to meet criteria, such as retreating topsoil, and resowing an amended seed mix.	Annual monitoring from first revegetation activities	Monitoring by appropriately qualified person(s) to record progress and track against reference sites	Records of progressive assessment Annual reports
Rehabilitation Milestone 7 – Achievement of stable PMLU (grazing)				
No evidence of spontaneous combustion post closure.	• Conduct inspections to detect early onset of spontaneous combustion, using indicators developed during the operation of the mine. • Retain historical information regarding spontaneous combustion events. • Report on trends.	Quarterly monitoring from closure of the open pit.	Monitoring undertaken in accordance with relevant Mine Safety Procedures using calibrated equipment where necessary and by suitably qualified person.	Quarterly reports
No formation of erosion gullies and rill erosion.	• Conduct benchmark erosion study and compare sediment run-off rates from the post closure landform versus the sediment run-off rates in undisturbed regions.	Annual during rehabilitation	Study undertaken by an appropriately qualified person(s)	Annual report

CRITERIA	MONITORING AND MAINTENANCE	FREQUENCY / TIMING	QUALITY ASSURANCE AND DATA MANAGEMENT	EVIDENCE, REPORTING AND REVIEW
The erosion rates on the post closure landform are similar to rates of reference sites.	• Conduct benchmark erosion study and compare sediment run-off rates from the post closure landform versus the sediment run-off rates in undisturbed regions.	Annual during rehabilitation	Study undertaken by an appropriately qualified person(s)	Annual report
Water quality in the depression achieves stock water quality (ANZECC) demonstrated by surface water quality monitoring regime post closure.	• Monitor water quality in the depression area and assess against stock water quality. • Monitor water quality of receiving environment (during all phases of the project) in accordance with the Receiving Environment Monitoring Program. • Monitor groundwater quality (during all phases of the project) in accordance with the Groundwater Monitoring Program. • Where necessary, develop and implement corrective actions to meet criteria.	Monitoring frequency as outlined in the relevant monitoring programs	Monitoring undertaken by appropriately qualified person(s)	Annual monitoring reports
Water quality of surface water runoff does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives or the water quality at upstream reference sites.				
Groundwater quality does not show a decline by comparison with background /reference groundwater quality.				
No significant decline in groundwater quality has occurred relative to historic (background) groundwater quality.				
Vegetation cover, types and densities comparable to relevant rehabilitation monitoring reference sites.	• Conduct Landscape Function Analysis (LFA) monitoring and compare to reference sites	Once, upon completion of rehabilitation	LFA undertaken by an appropriately qualified person(s)	Rehabilitation Report
Landform suitable for grazing activities and provides suitable access to water for stock and able to sustain pre-mining grazing capacity.	• Conduct an assessment of vegetation against reference sites and ensure that when assessed for Grazing capacity and stocking rates, low intensity grazing can be supported. • If land does not achieve desired carrying capacity, implement corrective actions such as fertilise soil and re-sow an amended seed mix.	Once, upon completion of rehabilitation	Assessment undertaken by an appropriately qualified person(s)	Land Suitability Assessment Report Review land suitability assessment report and remediate if necessary
Risk assessment documents identified potential risks and controls/mitigation measures successfully implemented post closure in accordance with relevant guidelines and Australian Standards such as ISO31000 Risk Management.	• Audit implementation of risk controls contained within the risk assessment conducted for the PRC Plan.	Once at mine closure	Audit will be carried out by a person with appropriate experience in auditing risk assessments	Audit report
Risks identified in risk assessment are low to moderate for all domains	• Audit implementation of risk controls contained within the risk assessment conducted for the PRC Plan.	Once at mine closure	Audit will be carried out by a person with appropriate experience in auditing risk assessments	Audit report
Rehabilitation Milestone 8 – Achievement of stable condition for retained infrastructure				
Final structure is fit for purpose as demonstrated.	• Assess retained water infrastructure for safety, stability and capacity. • Make recommendations for remediation if not fit for purpose.	Once at mine closure	Assessment by suitably qualified and experienced person(s) (RPEQ).	Assessment report
Spillway has adequate capacity to safely manage a 1:100 year flood event.				
Sediments/sludge removed from the structure.				
Water storage Infrastructure retained must not be a referral dam under the *Water Supply (Safety and Reliability) Act 2008*.				
No formation of erosion gullies and rill erosion.	• Conduct benchmark erosion study and compare sediment run-off rates from the post closure landform versus the sediment run-off rates in undisturbed regions.	Annual during rehabilitation	Study undertaken by an appropriately qualified person(s)	Annual report

CRITERIA	MONITORING AND MAINTENANCE	FREQUENCY / TIMING	QUALITY ASSURANCE AND DATA MANAGEMENT	EVIDENCE, REPORTING AND REVIEW
The erosion rates on post-closure landform are similar to rates of reference sites.	• Conduct benchmark erosion study and compare sediment run-off rates from the post closure landform versus the sediment run-off rates in undisturbed regions.	Annual during rehabilitation	Study undertaken by an appropriately qualified person(s)	Annual report
Water quality achieves stock water quality (ANZECC) demonstrated by surface water quality monitoring regime post closure.	• Monitor water quality in the retained infrastructure and assess against ANZECC stock water quality criteria. • Monitor water quality of receiving environment (during all phases of the project) in accordance with the Receiving Environment Monitoring Program. • Monitor groundwater quality (during all phases of the project) in accordance with the Groundwater Monitoring Program. • Where necessary, develop and implement corrective actions to meet criteria.	Monitoring frequency as outlined in the relevant monitoring programs	Monitoring undertaken by appropriately qualified person(s)	Annual monitoring reports
Water quality of surface water runoff does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives or the water quality at upstream reference sites.				
Groundwater quality does not show a decline by comparison with background /reference groundwater quality.				
Sign off by post mining landholder – asset transfer agreement; receiver of the structure is aware of risks.	• Condition assessment and certification of all Water storage Infrastructure is conducted.		Completed by suitably qualified and experienced person	Certification and condition report retained by post mining landholder
Risk assessment identified potential risks and controls/mitigation measures successfully implemented post closure in accordance with relevant guidelines and Australian Standards such as ISO31000 Risk Management.	• Audit implementation of risk controls contained within the risk assessment conducted for the PRC Plan.	Once at mine closure	Audit will be carried out by a person with appropriate experience in auditing risk assessments	Audit report
Risks identified in risk assessment are low.	• Audit implementation of risk controls contained within the risk assessment conducted for the PRC Plan.	Once at mine closure	Audit will be carried out by a person with appropriate experience in auditing risk assessments	Audit report

9.2. Audits

In accordance with section 285 of the *Environmental Protection Act 1994*, holders of a PRC Plan schedule must commission a rehabilitation auditor to undertake an audit of the PRC Plan schedule every three years. The first audit must be for the three-year period that commences from the day the schedule takes effect. Each subsequent audit period is for the three years commencing on the day after the previous audit period ended. Each audit report must be delivered to the administering authority within four months after the end of each audit period.

In accordance with section 286 of the *Environment Protection Act 1994*, each audit must include the following:

- a statement about whether the holder has complied with the schedule during the audit period;
- a description of actions the holder has taken with respect to rehabilitation milestones and management milestones;
- whether the holder has complied with conditions imposed on the schedule;
- a declaration stating the holder has not knowingly given false or misleading information;
- an assessment of whether the post-mining land use is likely to be achieved; and
- recommendations about actions the holder should take to ensure rehabilitation milestones and management milestones are achieved.

In addition to the mandatory three-yearly audits, the administering authority has the power (under section 322 of the *Environmental Protection Act 1994*) to issue an audit notice, which requires the holder of a PRC Plan schedule to commission an audit.

9.3. Annual Return

In addition to the annual return requirements that relate to EAs, in accordance with section 316IA of the *Environmental Protection Act 1994*, the annual return must also include an evaluation of the effectiveness of the PRC Plan schedule for rehab works due to have been completed 10 December of the previous year. Any environmental management carried out under the schedule, for the previous year to which the annual return relates should also be included. This evaluation must include:

- any milestones to be completed under the PRC Plan schedule during the previous year have been met; and
- the conditions imposed on the PRC Plan schedule for the previous year have been complied with.

9.4. Progressive Rehabilitation Report

In the event that a particular rehabilitation area within the tenure of the Mine has been rehabilitated in accordance with all relevant requirements of the *Environmental Protection Act 1994*, the relevant environmental authority, the PRC Plan schedule and any relevant

guidelines made under the *Environmental Protection Act 1994*, the holder of the EA can apply for progressive certification.

In accordance with section 318ZD of the *Environmental Protection Act 1994*, the application for progressive certification must be accompanied by a progressive rehabilitation report. The requirements for a progressive rehabilitation report are listed in section 318ZF of the *Environmental Protection Act 1994.*

9.5. Final Rehabilitation Report

A final rehabilitation report is to be prepared when applying to surrender the EA. The purpose of this final rehabilitation report is to demonstrate that the conditions of the EA have been complied with, and that rehabilitation of disturbed land has been carried out satisfactorily. The requirements of this final rehabilitation report are listed in section 262 of the *Environmental Protection Act 1994.*

9.6. Post-mining Management Report

A post-mining management report is to be submitted as part of the surrender application for the EA. This report states the requirements for ongoing management of the land, and includes an environmental risk assessment. The requirements of this post-mining management report are listed in section 264A of the *Environmental Protection Act 1994.*

10. PRC PLAN SCHEDULE

This section has been prepared in accordance with section 126D(1) of the *Environmental Protection Act 1994*. It contains a description of each rehabilitation area, a schedule of land availability for rehabilitation and a detailed description of the rehabilitation milestones that apply to each rehabilitation area. This information has been used to develop a PRC Plan schedule that describes when each rehabilitation milestone is to be progressively achieved in each rehabilitation area.

10.1. Final Site Design

The Closure Domains are identified as follows:

- Domain 1 – Open Cut Depressions (including in-pit dumping)
- Domain 2 - Overburden Dump
- Domain 3 - Access tracks and haul roads
- Domain 4 - Water storage Infrastructure (to be retained by agreement)
- Domain 5 - Mine infrastructure (Site office, ROM pad, and Workshop buildings), and Water storage Infrastructure – to be decommissioned.

The Closure Domains are shown in Figure 25.

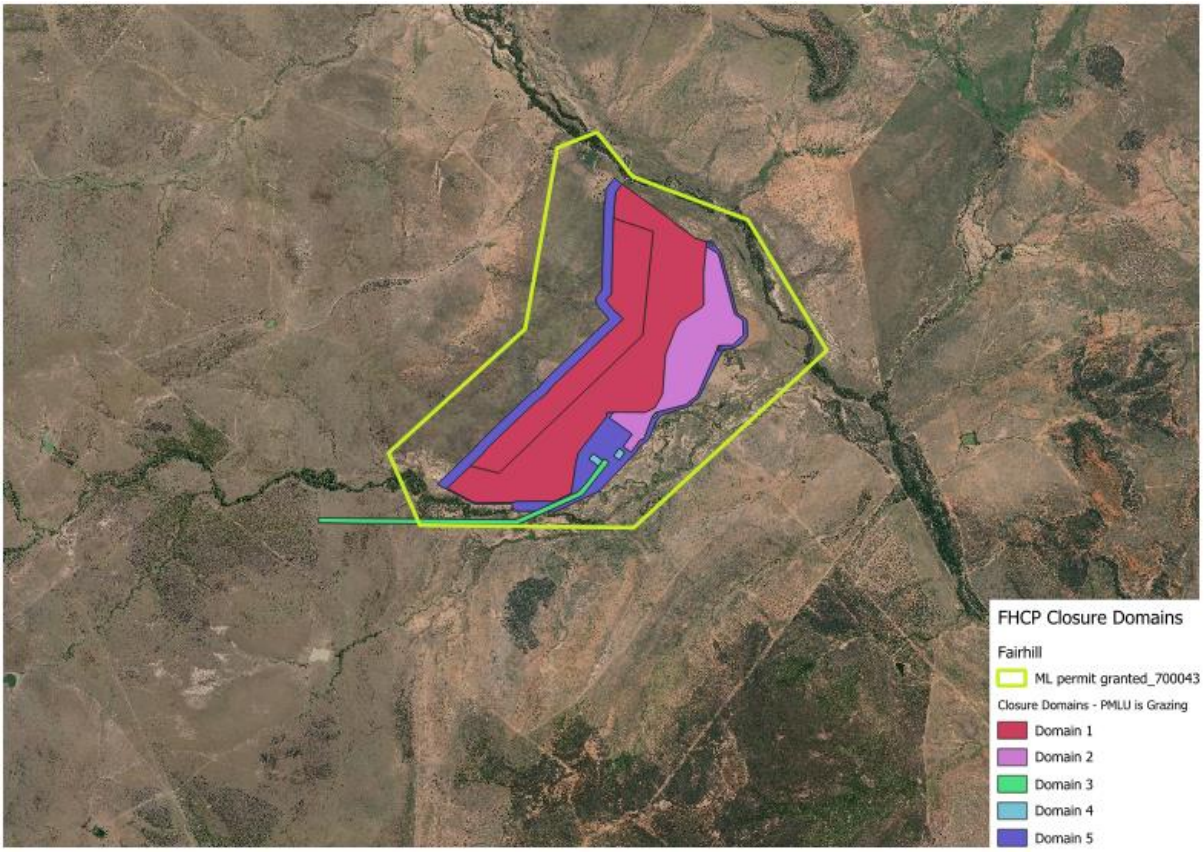

Figure 25. Closure Domains

The final site design/ post mining land use is shown in Figure 26.

The proposed PMLU for the Project is low-intensity cattle grazing. While currently not yet agreed and planned for there may be some areas of infrastructure that is retained for the use of the landholder. In particular water storages are expected to be retained.

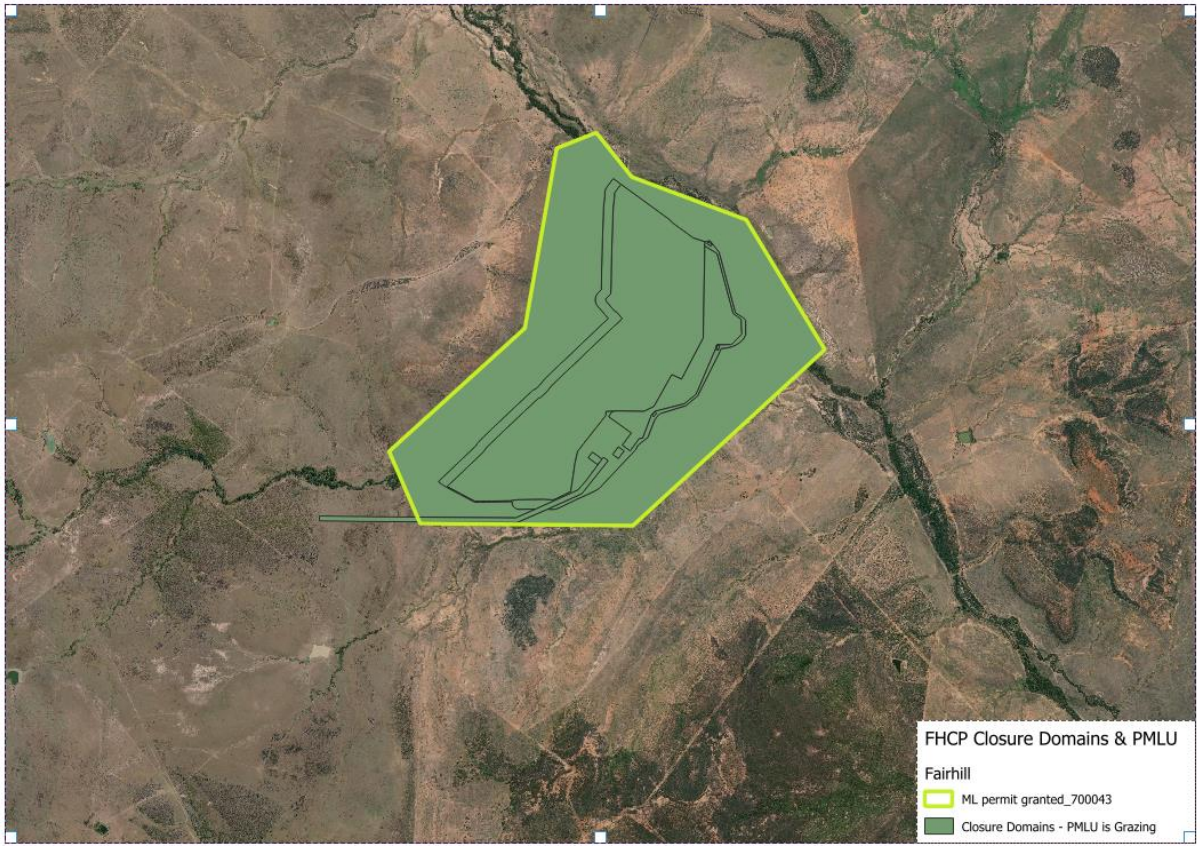

Figure 26. Final Site Design

The disturbance footprint of the Project has been divided into the following seven rehabilitation areas (RA):

- RA1: Open Cut Depression
- RA2: Out of Pit Spoil Dump;
- RA3: In Pit Dump
- RA4: Mine Infrastructure (including ROM and MIA);
- RA5: Mine Infrastructure (Access tracks and Haul Roads);
- RA6: Mine Infrastructure possibly to be Retained (Water Dams)

The division of the disturbance footprint into rehabilitation areas is shown in Figure 27.

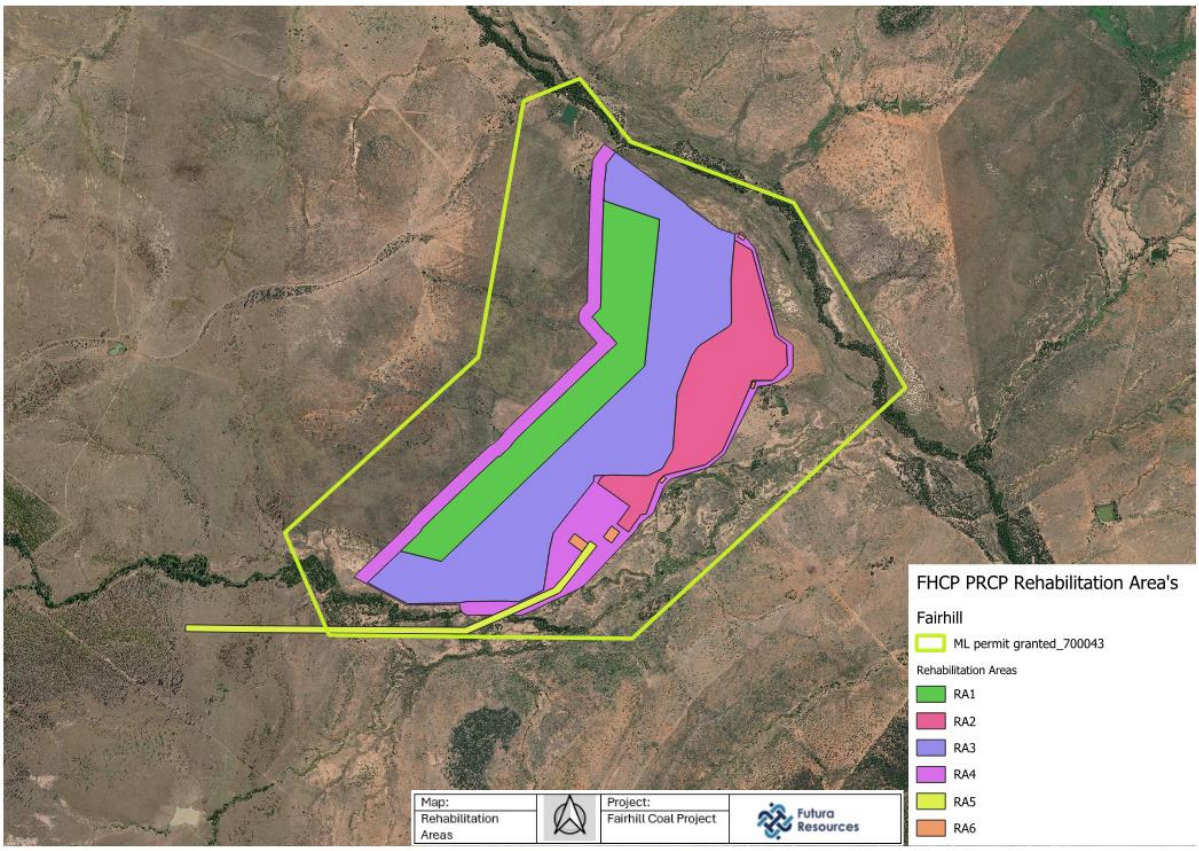

Figure 27. Rehabilitation Areas

10.2. Schedule of Land Availability

Due to the progressive back-filling of the mined pit, land will become progressively available for rehabilitation throughout the years of the Project. Disturbed land is available for rehabilitation when the land:

1. is no longer being mined;
2. is no longer being used to dump further waste rock;
3. is no longer being used for operating infrastructure or machinery for mining; and
4. does not support permanent infrastructure.

10.2.1. Timing Considerations

In accordance with the *Progressive Rehabilitation and Closure Plans Guideline*, annual reporting of rehabilitation works is to be based on the completion date of 10 December each calendar year. Consequently, the progression of the mine (and its rehabilitation) within any one calendar year is strongly dependent on the date the Project commences. A commencement date of 01 September 2024 has been assumed.

One rehabilitation milestone (revegetation) is strongly season-dependent, and is only to take place following the start of wet season rain. It is assumed that any land available for rehabilitation later than July in any one calendar year is unlikely to have sufficient time to undergo infrastructure removal, decontamination and final landform shaping in preparation for revegetation at the start of the wet season (November-January, depending on the year). Consequently, deferring the commencement of rehabilitation of such land until the following year will not delay the revegetation stage.

Land that is available for rehabilitation before July will commence rehabilitation in the same calendar year. It is expected that rehabilitation milestones. RM1 & RM2 (see **Section 10.3**) will be completed in the year that land becomes available for rehabilitation, RM3 will be completed in the same year or the following year. Milestones RM4 and RM5 may also be completed the same year but in most cases are completed the following year. There is a ten-year period scheduled between RM4/RM5 and RM6/RM7 to allow shade trees to establish.

Based on tree growth rates and pasture development at other mines in central Queensland (Mulligan *et al.* 2006), it is expected that the target grazing and shade tree species density will be established ten years after planting, and the land will be suitable for the commencement of grazing at this time. This is a conservative estimate to allow for opportunities for remedial planting in the event of initial failures; grazing has been successfully introduced to central Queensland pastures with trees that are as young as four years old (Donaghy *et al.* 2010).

10.2.2. Schedule of Availability

Land disturbed by the Project's authorised activities must be progressively rehabilitated in accordance with Condition H3, H4 of the EA.

The schedule of land available for rehabilitation throughout the life of the Project has been developed and progressive rehabilitation requirements established in Table H1 of the EA. Below.

Table 21. Table H1 of the EA

Year	Progressive Rehabilitation (minimum % of disturbed area)
1[1]	0
2	2%
3	5%
4	10%
5	15%
6	25%
7	40%
8	50%
9	100%

[1] Indicates one (1) year from the commencement of mining activities.

10.3. Rehabilitation Milestones

10.3.1. Rehabilitation Milestone Descriptions

Rehabilitation milestones relevant to the Project area are listed in Table 22.

Table 22. Rehabilitation milestones for the FHCP

Code	Milestone	Applicable Rehabilitation Areas
RM1	Infrastructure decommissioning and removal	RA4, RA5
RM2	Remediation of contaminated land	RA2, RA3, RA4, RA5, RA6, RA7
RM3	Landform development and reshaping/reprofiling	RA1, RA2, RA3, RA4, RA5, RA6
RM4	Surface Preparation	RA1, RA2, RA3, RA4, RA5, RA6
RM5	Revegetation	RA1, RA2, RA3, RA4, RA5, RA6
RM6	Achievement of surface requirements	RA1, RA2, RA3, RA4, RA5, RA6
RM7	Achievement of stable PMLU (grazing)	RA1, RA2, RA3, RA4, RA5, RA6
RM8	Achievement of stable condition for retained infrastructure	RA6

10.3.2. Rehabilitation Milestone Criteria

Milestone criteria pertaining to each of the rehabilitation milestones are listed in Table 23**.**

Table 23. Milestone Criteria for the FHCP

Code	Milestone	Criteria
RM1	Infrastructure decommissioning and removal	RM1.1 All built and service infrastructure demolished and removed (except for clean water management structure as agreed in writing with the landowner) RM1.2 All exploration drill holes and monitoring bores rehabilitated in accordance with the applicable Australian Standard or guideline. RM1.3 All aquifers isolated where exploration drill holes or monitoring bores have intersected more than one water bearing strata, in accordance with the 'Minimum Construction Requirements for Water Bores in Australia' (Australian Government, February 2012) or latest edition. RM1.4 Risk assessment documents identified potential risks and controls/mitigation measures successfully implemented post closure in accordance

Code	Milestone	Criteria
		with relevant guidelines and Australian Standards such as ISO31000 Risk Management.
RM2	Remediation of contaminated land	RM2.1 Potential hazardous materials identified during mine life and removed or selected capping material applied with cover thickness appropriate to the contaminant as determined by appropriately qualified person. RM2.2 Contaminated land assessment completed by a suitably qualified person and certified by an approved auditor. RM2.3 Sediment at the base of the dam retained for landholder complies with the levels outlined in the Draft Guidelines for the Assessment and Remediation of Contaminated Sites in Queensland or any later guideline. RM2.4 Land removed from the Environmental Management Register and the Contaminated Land Register where relevant.
RM3	Landform development and reshaping/reprofiling	RM3.1 Major earthworks completed in accordance with design specifications for a final stable landform provided by a suitably qualified person. RM3.2 Natural drainage lines reinstated. Where necessary, erosion and sediment control systems are installed, fit for purpose and designed by a suitably qualified person. RM3.3 Dam to remain for landholder use is safe for livestock access. RM3.4 Coal seams fully capped by at least 2 metres of competent and benign material. RM3.5 No slopes steeper than 25%. RM3.6 Slopes between 15% and 25% consist of competent rock. RM3.7 Vertical intervals between slope breaks are 10m. RM3.8 No evidence of slumping identified as per the geotechnical assessment conducted by a suitably qualified and experienced person.
RM4	Surface Preparation	RM4.1 Surface roughness, infiltration capacity, aggregate stability and surface condition are capable of sustaining the identified post closure land use. RM4.2 Topsoil has been managed according to the requirements of the environmental authority and the Topsoil Management Plan.
RM5	Revegetation	RM5.1 Where seedbed is not viable a Pasture species mix is sown at appropriate rate.
RM6	Achievement of surface requirements	RM6.1 Vegetation type and density are of species suited to the site's characteristics including soil type, topography and climate.

Code	Milestone	Criteria
		RM6.2 Species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence, and will continue to do so. RM6.3 Vegetation in rehabilitated areas includes the presence of species suitable and complimentary to the post-mining land use and are at a density and composition comparable to reference sites. RM6.4 Pasture productivity recovers following natural and man-made events (e.g., grazing, fire, slashing, and drought). RM6.5 The presence of weeds and pest species is no greater than the prevalence on the reference sites. RM6.6 Ground cover of at least 90% compared to the reference sites.
RM7	Achievement of stable PMLU (grazing)	RM7.1 No evidence of spontaneous combustion post closure. RM7.2 No formation of erosion gullies and rill erosion. RM7.3 The erosion rates on the post closure landform are similar to rates of reference sites. RM7.4 Physical and chemical properties of surface soils are safe and able to support the identified post closure land use. RM7.5 Water quality in the depression area achieves stock water quality (ANZECC) demonstrated by surface water quality monitoring regime post closure. RM7.6 Water quality of surface water runoff does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives, or the water quality at upstream reference sites. RM7.7 Groundwater quality does not show a decline by comparison with background /reference groundwater quality. RM7.8 No significant decline in groundwater quality has occurred relative to historic (background) groundwater quality. RM7.9 Vegetation cover, types and densities comparable to relevant rehabilitation monitoring reference sites. RM7.10 Landform suitable for grazing activities and provides suitable access to water for stock and able to sustain pre-mining grazing capacity. RM7.11 Risk assessment documents identified potential risks and controls/mitigation measures successfully implemented post closure in accordance with relevant guidelines and Australian Standards such as ISO31000 Risk Management. RM7.12 Risks identified in risk assessment are low to moderate.

Code	Milestone	Criteria
RM8	Achievement of stable condition for retained infrastructure	RM8.1 Final structure is fit for purpose as demonstrated. RM8.2 Spillway has adequate capacity to safely manage a 1:100 year flood event. RM8.3 Sediments/sludge removed from the structure. RM8.4 Water storage Infrastructure retained must not be a referral dam under the *Water Supply (Safety and Reliability) Act 2008*. RM8.5 No formation of erosion gullies and rill erosion. (additional to pre-mining condition) RM8.6 The erosion rates on post-closure landform are similar to rates of reference sites. RM8.7 Water quality achieves stock water quality (ANZECC) demonstrated by surface water quality monitoring regime post closure. RM8.8 Surface water quality does not exceed limits outlined in Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives or the water quality at upstream reference sites RM8.9 Groundwater quality does not show a decline by comparison with background /reference groundwater quality. RM8.10 No significant decline in groundwater quality has occurred relative to historic (background) groundwater quality. RM8.11 Sign off by post mining landholder – asset transfer agreement; receiver of the structure is aware of risks. RM8.12 Risk assessment identified potential risks and controls/mitigation measures successfully implemented post closure in accordance with relevant guidelines and Australian Standards such as ISO31000 Risk Management. RM8.13 Risks identified in risk assessment are low.

10.4. PRC Plan Schedule

Please refer to the attached Microsoft Excel spreadsheet.

11. REVISION OF THE PRC PLAN

The holder of a PRC Plan may, at any time, apply to the administering authority to amend their PRC Plan schedule (an amendment application). An application may be made to amend only the PRC Plan schedule, or as part of an amendment application for an EA. An amendment application must be submitted in the approved form and be accompanied by the relevant fee and an amended rehabilitation planning part for the holder's PRC plan that complies with section 126C of the EP Act. Due to the dependencies between an EA and the PRC Plan schedule, an applicant should always consider whether a proposed amendment to the PRC Plan schedule requires a concurrent amendment to the EA in order to ensure consistency between both instruments.

Once a PRC Plan schedule has been amended, the rehabilitation planning part of the PRC plan must be reviewed and revised to make any necessary or appropriate changes. The administering authority is to be provided with a copy of the amended PRC plan within 10 business days of receiving a copy of the amended PRC Plan schedule (or receiving written notice under section 211 of the EP Act), unless the administering authority agrees to a longer period.

12. SPATIAL INFORMATION

Shapefiles detailing the following spatial information were submitted to the administering authority accompanying the submission of this PRC Plan.

- the location and maximum extent of the disturbance footprint for the mine life;
- the PMLU for the area within the resource tenures; and
- the rehabilitation areas within the resource tenure.

13. REFERENCES

ANU. (2021). *A review of Koala habitat assessment criteria and methods.* Canberra: The Australian National University.

ANZECC & ARMCANZ. (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments.* Canberra: Australian and New Zealand Environment and Conservation and Agriculture and Resource Management Council of Australia and New Zealand.

ATC Williams. (2019). *Fairhill Coal Project Water Management Assessment.*

Aumann, T., & Baker-Gabb, D. (1991). *RAOU Report 75: A Management Plan for the Red Goshawk.* Melbourne: Royal Australasian Ornithologists Union.

BirdLife International. (2016). *Falco hypoleucos: The IUCN Red List of Threatened Species*. Retrieved from https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22696479A93566768.en

Bisrat, S., Mullen, B., Grigg, A., & Shelton, H. (2004). Net primary productivity and rainfall use efficiency of pastures on reconstructed land following open-cut coal mining in central Queensland, Australia. *Tropical Graddlands, 38*, 47-55.

Burgess, J. (2003). *Land resource assessment of the Windeyers Hill area, Isaac-Connors.* Queensland Department of Natural Resources and Mines.

Commonwealth of Australia. (2011). *EPBC Act Policy Statement 3.25, Referral Guidelines for the Endangered Northern Quoll, Daysyurus hallucatus.*

CSIRO. (2015). *Climate Change in Australia - Information for Australia's Natural Resouce Management Regions: Technical Report.* Australia: CSIRO and Bureau of Meterology.

Debus, S., & Czechura, G. (1988). The Red Goshawk Erythrotriorchis radiatus: A Review. *Australian Bird Watcher, 12*, 175-199.

DEE. (2017a). *EPBC Act protected Matters Report.* Department of the Environment and Energy, Australian Government.

DEE. (2017b). Retrieved from Species Profile and Threats Database: https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Dickins, J., & Malone, E. (1973). *Geology of the Bowen Basin, Queensland.* Canberra: Australian Government Publishing Service.

DNRM. (2016). *Springs in the Surat Cumulative Management Area: A Summary Report and Spring Research and Knowledge .* Department of Natural Resources and Mines.

Donaghy, P., Bray, S., Gowen, R., Rolfe, J., Stephens, M., Hoffmann, M., & Stunzer, A. (2010). The bioeconomic potential for agroforestry in Australia's northern grazing systems. *Small-scale Forestry, 9*, 463-484.

DPIRD. (2020). *Identifying dispersive (sodic) soils)*. Retrieved from https://www.agric.wa.gov.au/dispersive-and-sodic-soils/identifying-dispersive-sodic-soils

DSITI. (2015). *Soil Conservation Guidelines for Queensland.* Brisbane: Department of Science, Information Technology and Innovation, Queensland Government.

EES. (2012). *Soil and land suitability assessment, Wilton Coal Project.* Environmental Earth Sciences.

EES. (2012). *Soil and Land Suitability Assessment, Wilton Coal Project version 2.*

Galloway, R. (1967a). Summary Description of the Isaac-Comet Area. In *Lands of the Isaac-Comet Area, Queensland* (Vol. Land Research Series No. 19). CSIRO.

Galloway, R. (1967b). Geology of the Isaac-Comet Area. In *Lands of the Isaac-Comet Area, Queensland* (Vol. Land Research Series No. 19). CSIRO.

Keipert, N. (2005). *Effect of different stockpiling procedures on topsoil characteristics in open cut coal mine rehabilitation in the Hunter Valley, New South Wales. Doctoral Thesis.* University of New England.

Marchant, S., & Higgins, P. (1993). *Handbook of Australian, New Zealand and Antarctic Birds.* Melbourne: Oxford University Press.

Mulligan, D., Gillespie, M., Gravina, A., & Currey, N. (2006). An assessment of the direct revegetation strategy on the tailings storage facility at Kidston Gold Mine, North Queensland, Australia. In A. Fourie, & M. Tibbett, *Proceedings of the First International Seminar on Mine Closure* (pp. 371-381). Perth: Australian Centre for Geomechanics.

Noble, R., Rummenie, S., Long, P., Fabbro, L., & Duivenvoorden, L. (1996). The Fitzroy River Catchment: An assessment of the condition of the riverine system. *Proceedings of the 8th Australian Agronomy Conference.* Toowoomba.

NRC. (2019 rev 3). *Fairhill Coal Project Terrestrial Flora and Fauna Technical Report.*

NRC. (2018). *Fairhill Coal Project Overburden and potential Coal Reject Characterisation Report*

Richardson, S., Irvine, E., Froend, R., Poon, B., Barber, S., & Bonneville, B. (2011). *Australian Groundwater-Dependent Ecosystems Toolbox Part 1: Assessment Framework.* ACT: National Water Commission.

SLR. (2019) *Fairhill Coal Project: Guideline Response for Activities with Impacts to Water.*

SLR. (2019) *Fairhill Coal Project Soil and Land Suitability Assessment.*

TSSC. (2015a). *Commonwealth Listing Advice on the Geophaps scripta scripta (Squatter Pigeon, southern).* Threatened Species Scientific Commitee.

Williams, D. (2001). Prediction of erosion from steep mine waste sopes. *Environmental Management and Health 12*, 35-50.

Appendices

Appendix A – FHCP Soil & Land Suitability Assessment

Appendix B – FHCP Terrestrial Flora and fauna Report

Appendix C – Water Management Assessment

Appendix D – Guideline Response for Activities with Impacts to Water

Appendix D1 - Underground Water Impact Report

Appendix E – Overburden and Potential Coal Reject Characterisation Report

Appendix F - Community Consultation Plan

Appendix H - Soils and Land Suitability Assessment NRC 2018

Appendix I - Landform Design Report

Appendix K - Guideline Response for Activities with Impacts to Land

Appendix L - Fairhill Cover Design

Appendix M - Mine Closure Plan