PROGRESSIVE REHABILITATION CLOSURE PLAN FOR EPML00841513

COMMODORE MINE PRCP

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PRCP FOR EPML00841513

This information is in support of a transitional PRCP for Commodore Coal Mine, ML50151.

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2 REHABILITATION PLANNING

2.1 PROJECT PLANNING

2.1.1 Site Location

Commodore Mine, ML50151, is an open cut coal mine located south of Millmerran in QLD. **Figure 1 - Tenure location of ML50151, Figure 2 - Regional Location Plan showing geological basins** and a tenure map from QLD Globe in **section 3.4.1** outlines the location and extents of mining lease (ML) ML50151. The Commodore Mine mining lease (ML50151) was granted in 1999, expiring in 2034. Current mine planning indicates sufficent reserves until 2037 and covers 2316 Ha with and planned total mine disturbance area of 2032.5 Ha. The activities authorised by the Environmental Authority (EA) EPML00841513 include *Schedule 3 13: Mining Black Coal, ERA8* for Chemical Storage, *ERA60* for waste disposal such as ash from the power station and tyres from the mine, and *ERA62* for the storage and recovery of resource (coal combustible products (ash)) within the mining EA and ML50151 footprint.

Figure 1 - Tenure location of ML50151

For further context and background information, an EA Amendment project is currently being reviewed and proposed by Millmerran Power Partners (MPP) to allow the conversion of adjoining MDL299 (part of) and MDL300 resource areas. Conversion of the existing mineral development licence (MDL) areas will allow the Millmerran Power Project to operate until the end of its design life in approximately 2051. The proponent has applied to undertake a voluntary EIS process for the major amendment of the current EA (EPLM00841513) to address environmental values. An updated the Progressive Rehabilitation and Closure Plan (PRCP) will be lodged with the future amendment application.

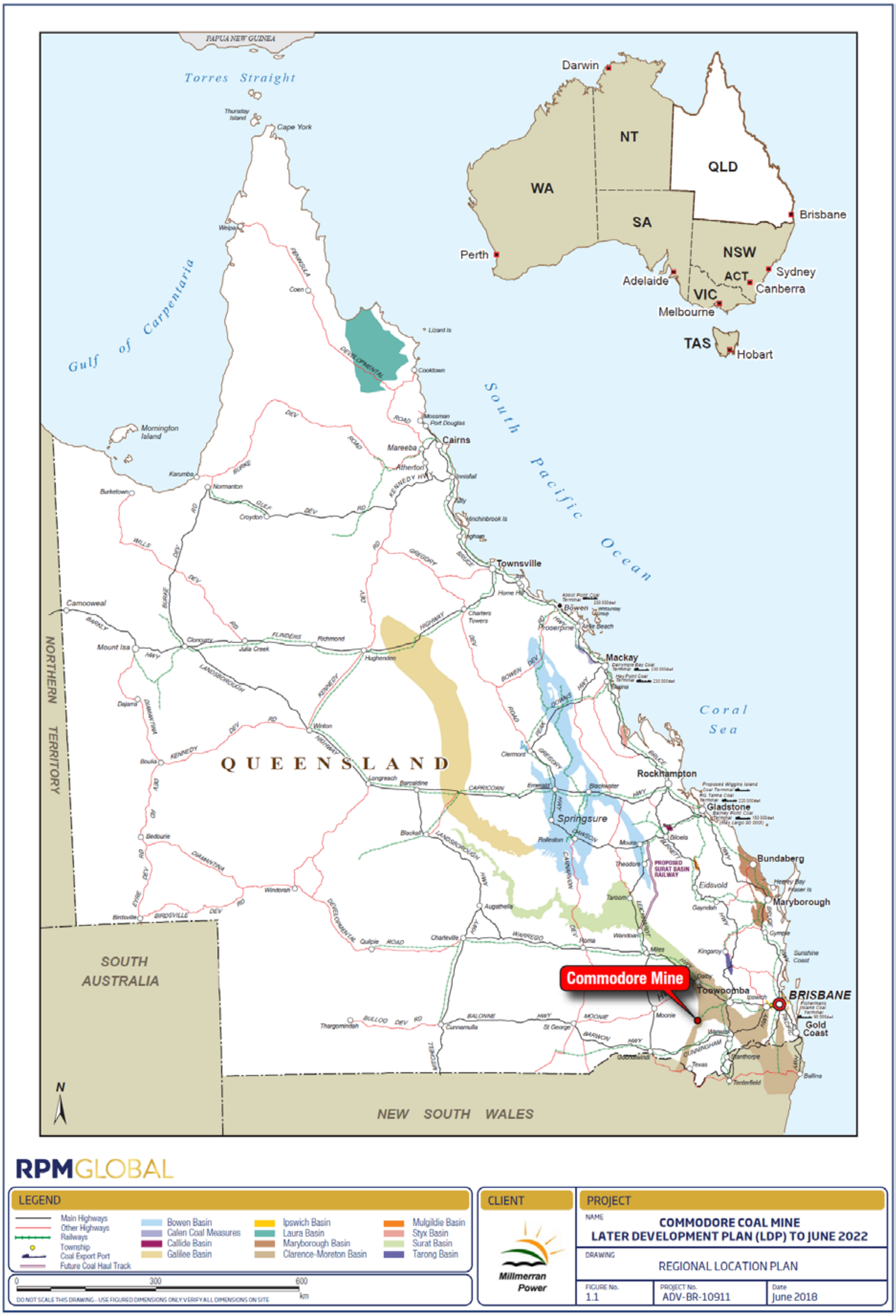


Figure 2 - Regional Location Plan showing geological basins

2.1.2 MILLMERRAN POWER PROJECT

Millmerran Power Project consists of the Millmerran Power Station and Commodore Coal Mine. The Millmerran Power Partners (MPP) is a partnership that owns and operates (through Millmerran Operating Company (MOC)) an 850 MW advanced cycle supercritical coal-fired base load power station, south of Millmerran in south eastern Queensland, Australia. The coal used to fuel the power station is obtained from the Commodore Coal Mine (ML50151) adjacent to the station. The mine is operated by a coal mining contractor, on behalf of MPP, who maintains an Environmental Management System (EMS) to ISO 14000 standards. Water for the power project, in the form of recycled effluent, is sourced from the Wetalla Sewage Treatment Plant (STP), located north of Toowoomba.

The coal mine delivers 3.3-3.7 million tonnes of coal per year to the run-of-mine (ROM) hopper. Coal is transported via an overland conveyor belt at a throughput rate of approximately 1,500 tonnes per hour to the Power Station coal bunkers, via an active coal stockpile management area (Power Station Stockpile). The Power Station Stockpile is managed by a coal stacker/reclaimer. The typical Power Station Stockpile capacity is approximately 100,000 tonnes. Coal stockpiles at the mine are generally maintained between 70,000 – 100,000 tonnes. See the general arrangement of the Millmerran Power Project in Figure 1.

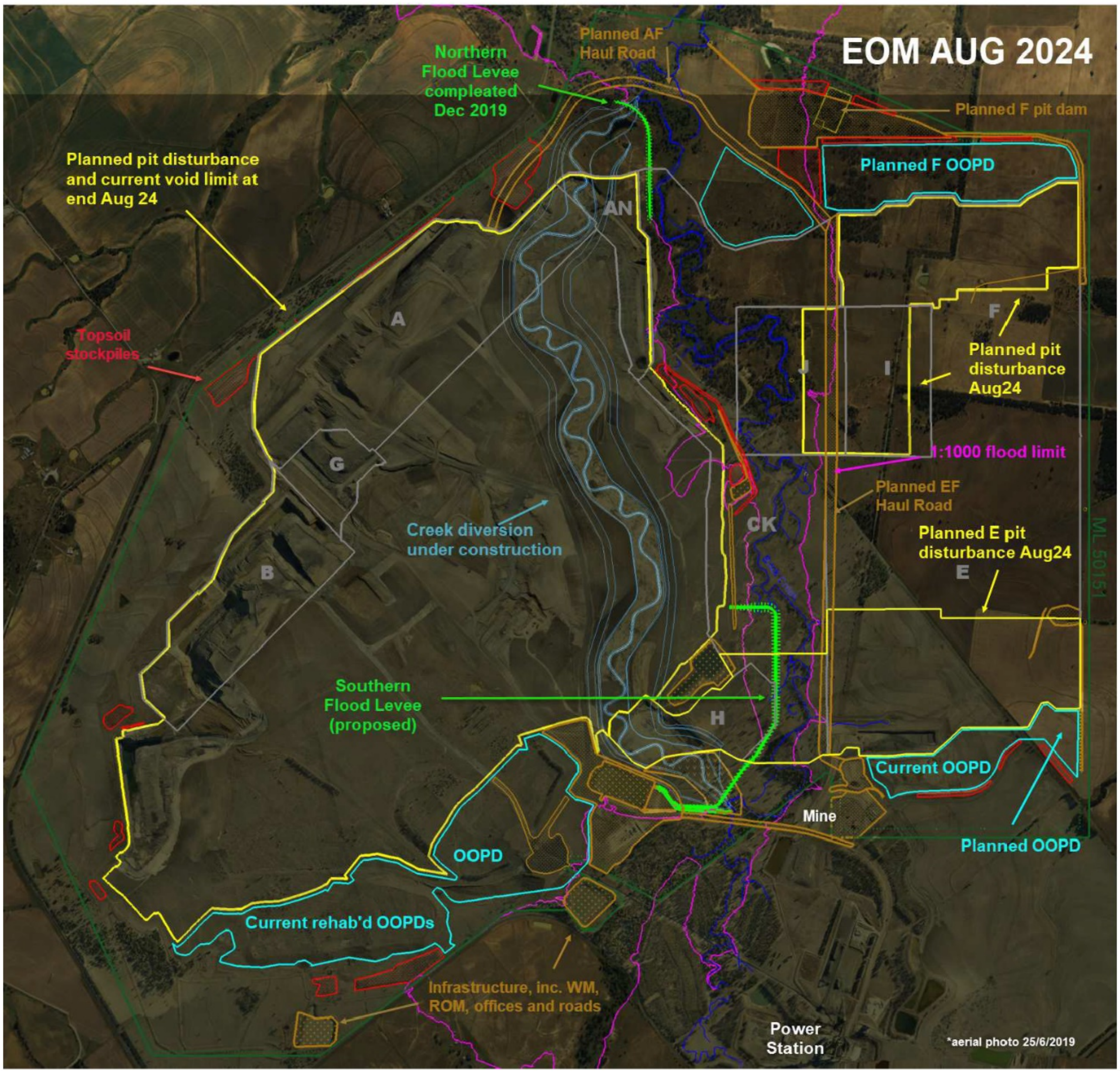


Figure 3 - General Arrangement of the mine layout next to the Power Station

In the process of electricity generation, the Power Station produces approximately 1.2-1.3 million tonnes of coal combustion products, commonly referred to as fly-ash and bottom ash (Ash) per year, which is processed through a dry ash facility and stored in silos. From the silos, the Ash is sent to a beneficiation plant or dispatched into haul trucks supplied by the Coal Mining Contractor for transportation and burial in the Mine as part of the rehabilitation process. Conditions within EA EPML00841513 require the ash is transported conditioned (approximately 10 – 20% moisture) to reduce fugitive dust during transport.

Approximately 25 - 30% of fly-ash generated is transferred to a beneficiation plant adjacent to the Power Station owned and operated by a third party under a separate commercial arrangement. The ash generated through this plant is managed under the End of Waste Code for Coal Combustible Products (ENEW07359717) in QLD and the Resource Recovery Order (Coal Ash Order 2014) in NSW.

Baseline information, a more detailed description and further details of the project are all detailed in **Attachment 4 Millmerran Power Project Impact Assessment Statement, Volume 1, Section 2.** A short description is included below for context with the mining process and how that relates to rehabilitation and mine planning.

2.1.3 COMMODORE COAL MINE

The mining process from topsoil stripping to replacement is shown in **Figure 4** - Conceptual Mining sequence from the IAS, 1998, Fig. 2.11 and **Figure 21** - Mining process from topsoil stripping to replacement. These figures conceptually show the method of progressive rehabilitation as the mining strips advance and the rehabilitation follows behind in strips. There will be a short period of around two to three years post mining where the final mined areas are rehabilitated (refer to **Appendices** for the PRCP schedule and spatial data). Following initial rehabilitation (landforming, topsoiling and seeding) the final areas will then be left to become established, except for monitoring and maintenance, when the land has achieved surface requirements. **Section 2.5.4** outlines site rehabilitation milestones as part of the PRCP.

The rehabilitated landform design is based on gentle slopes of about 5° for the in-pit dump and 10° for the out-of-pit dump. The hilly areas around the ROM will have slopes <60° (Refer to EA licence). Contour drains will divert run-off to sedimentation dams constructed within the spoil. Water collected in the sedimentation dams will be used preferentially for dust suppression as per current mining operations and approved EA conditions.

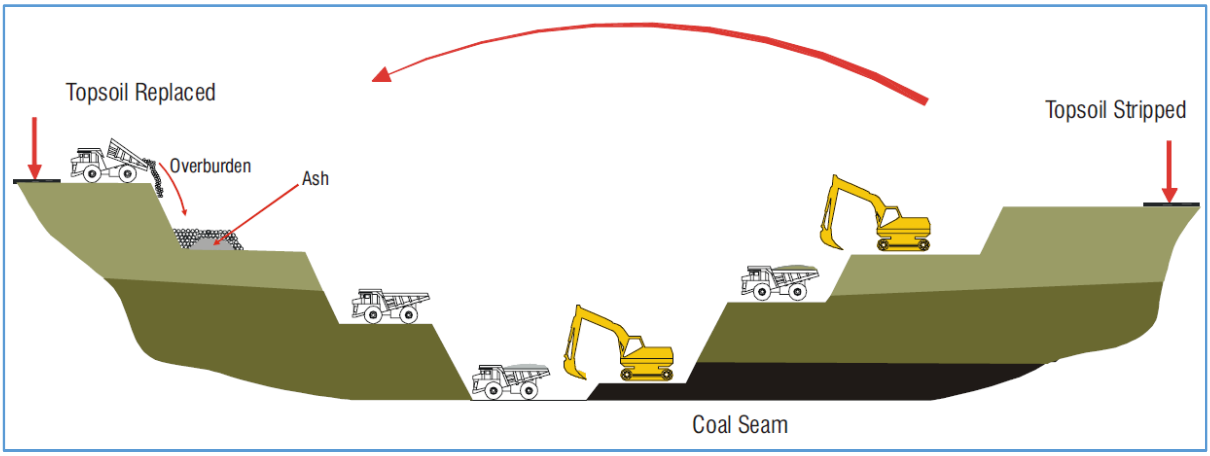


Figure 4 - Conceptual Mining sequence from the IAS, 1998, Fig. 2.11

Ash from the power station, is either recycled into beneficial reuse applications or returned to the mine for storage and land forming. The ash is covered with overburden in layers called "lifts" (See Figure 5).

The project investigated the properties of the coal and coal ash in the original environmental studies for the project (see Attachment **4 Millmerran Power Project Impact Assessment Statement (IAS)**). The Coordinator General approved the return of ash as interburden to the mine with the following commitments to reduce the environmental risks of ash burial:

- That burial of ash will occur below at least 8m of overburden; and
- The burial of ash will only occur above the likely groundwater levels; and
- That ash will not be buried under surface water storage dams; and
- That ash will not be buried within 150 metres of the edge of the final void; and
- That no burial of ash will occur within 150m of the edge of the final pit outline; and
- That ash will not be buried under Back Creek Diversion; and
- That lysimeters will be placed within ash to monitor water content and quality.

Ash burial must also be managed and monitored with piezometers as per EA conditions.

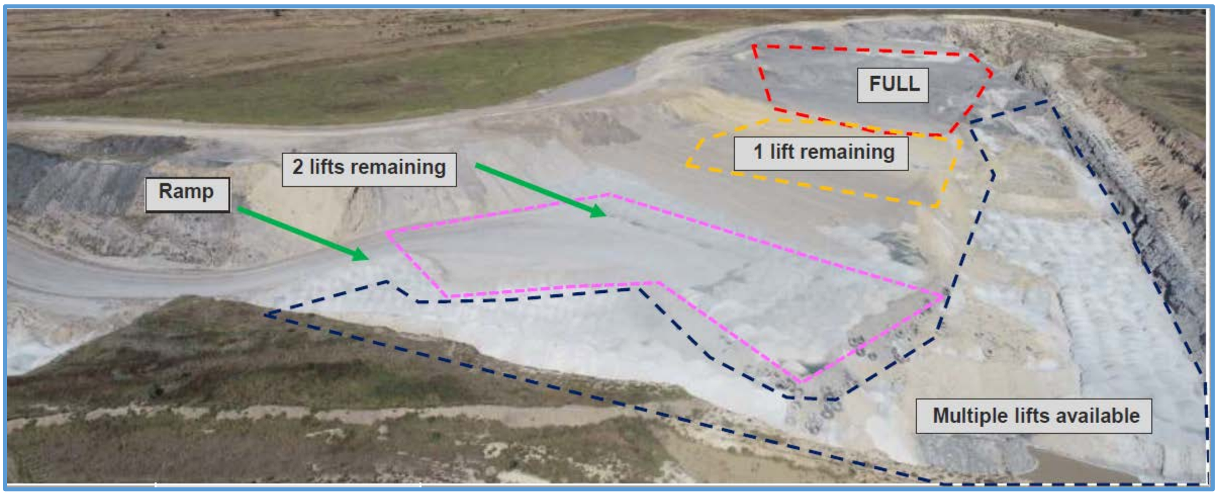


Figure 5 - Ash burial in layers or "lifts"

The ash will be transported by rear-dump truck from a hopper (silo) located adjacent to the power station. A historic low-level crossing was installed on Back Creek to enable ash trucks to carry the ash from the hopper at the power station to the mine and provide access to the contractor's industrial area from the mine.

The backfilled area will be profiled, topsoiled and formation of the final drainage structures will form part of the mining cycle. This will include construction of contour drains and settling dams, if required, in the backfill.

The ash has been monitored since the beginning of the mine and no contamination movement has been found by monitoring. The buried ash remains dry and low risk from annual leachate monitoring to date.

2.1.4 LAND OWNERSHIP

Ownership of land directly impacted by ML50151 belongs to the Millmerran Power Partnership. **Figure 3** outlines the ownership boundary of MPP. A more detailed map showing MPP interests and surrounding MPP held MDLs is in **Section 3.4.1**.

Figure 6 - MPP owned land around ML50151

2.1.5 TOPOGRAPHY AND HYDROLOGY

The Project site (Commodore Mine) is located near the western watershed of the Condamine River Catchment, approximately 15 km from the Condamine River. The Condamine River Catchment is a part of the greater Balonne-Condamine Drainage Basin which is part of the greater Murray Darling Basin.

The mine site is characterised by poorly defined ephemeral drainage lines that only flow after rain through a series of gullies into Back Creek that runs through the site.

The surrounding land consists of flat ground or gently undulating landforms with low relief (See Figure 7 - Topography of the Study Area and surrounding land.).

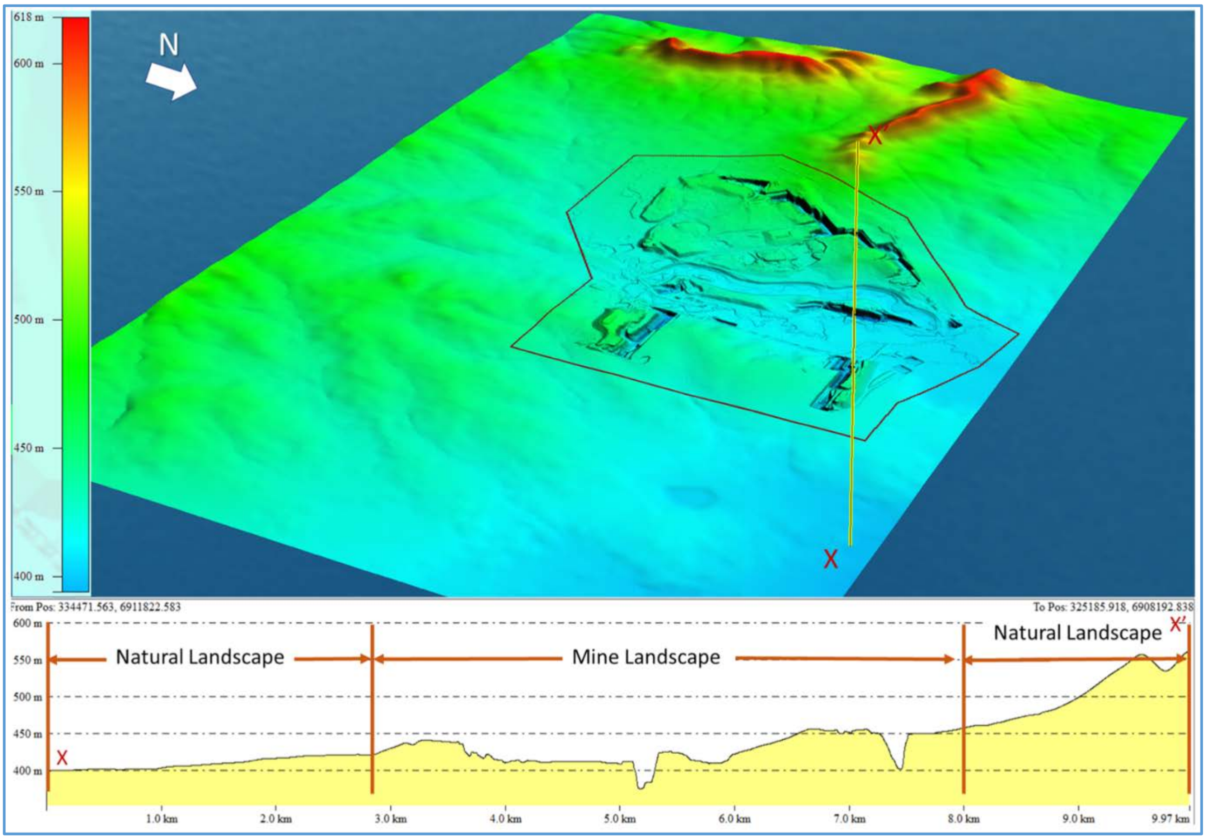


Figure 7 - Topography of the Study Area and surrounding land.

Total natural relief across the mining lease is 50 m with elevations ranging from 420 m, in the northwest, to 470 m in the low rises to the east (Figure 8). Previous mining activities have influenced the local topography with the deepest point of the northern pit reaching 360 m.

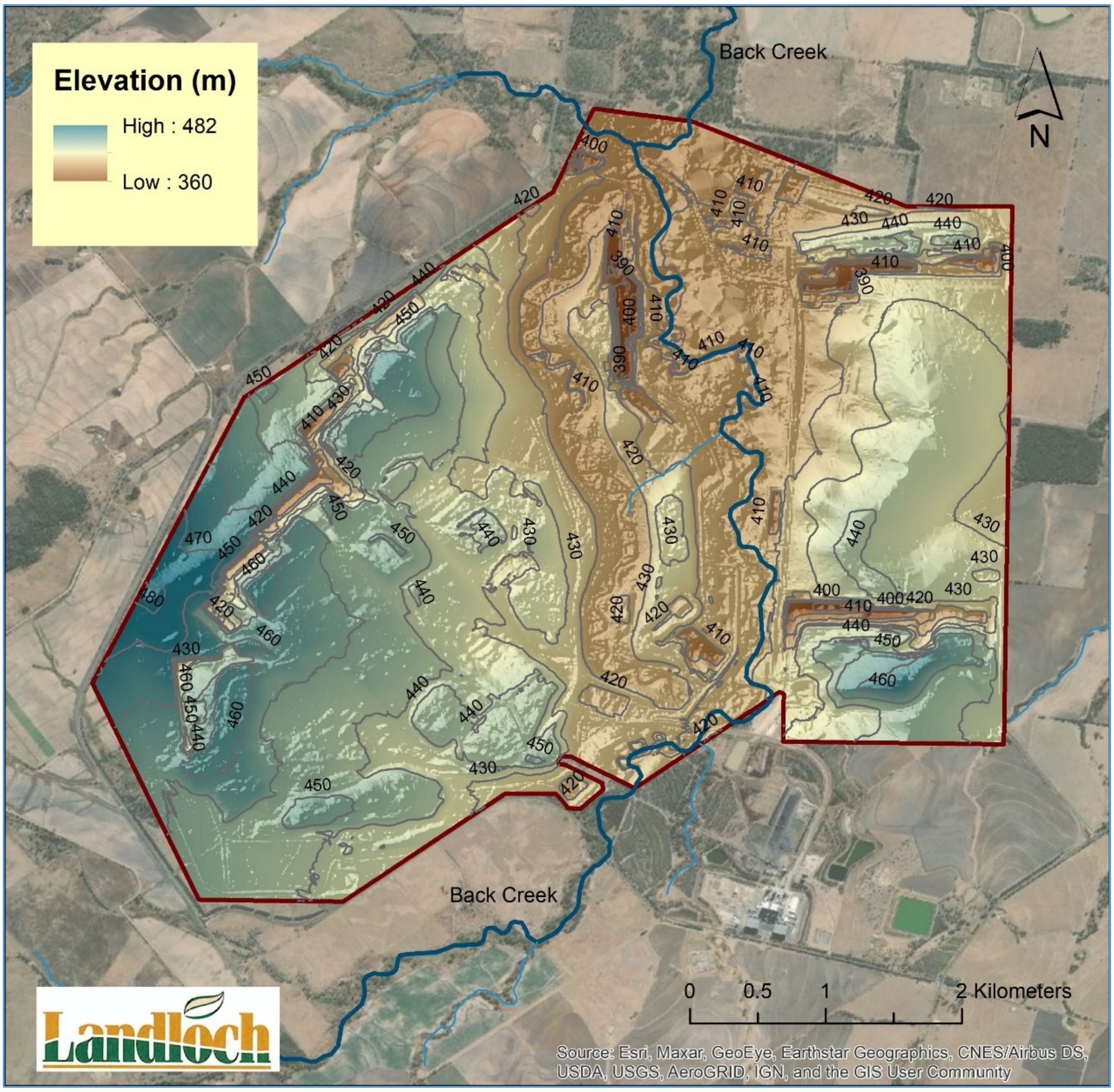


Figure 8 - Topography the Study Area.

The gradients of the areas adjacent to the mining operations are typically less than 3 % on an undulating plain, and between 3–5 % on the residual rises. Within the mine the existing batters on the landforms are generally between 10–33 % with the pit walls exceeding 33 % (as expected while in operation). The gradients of benches and plateaus on these structures are generally less than 5 % (Figure 9).

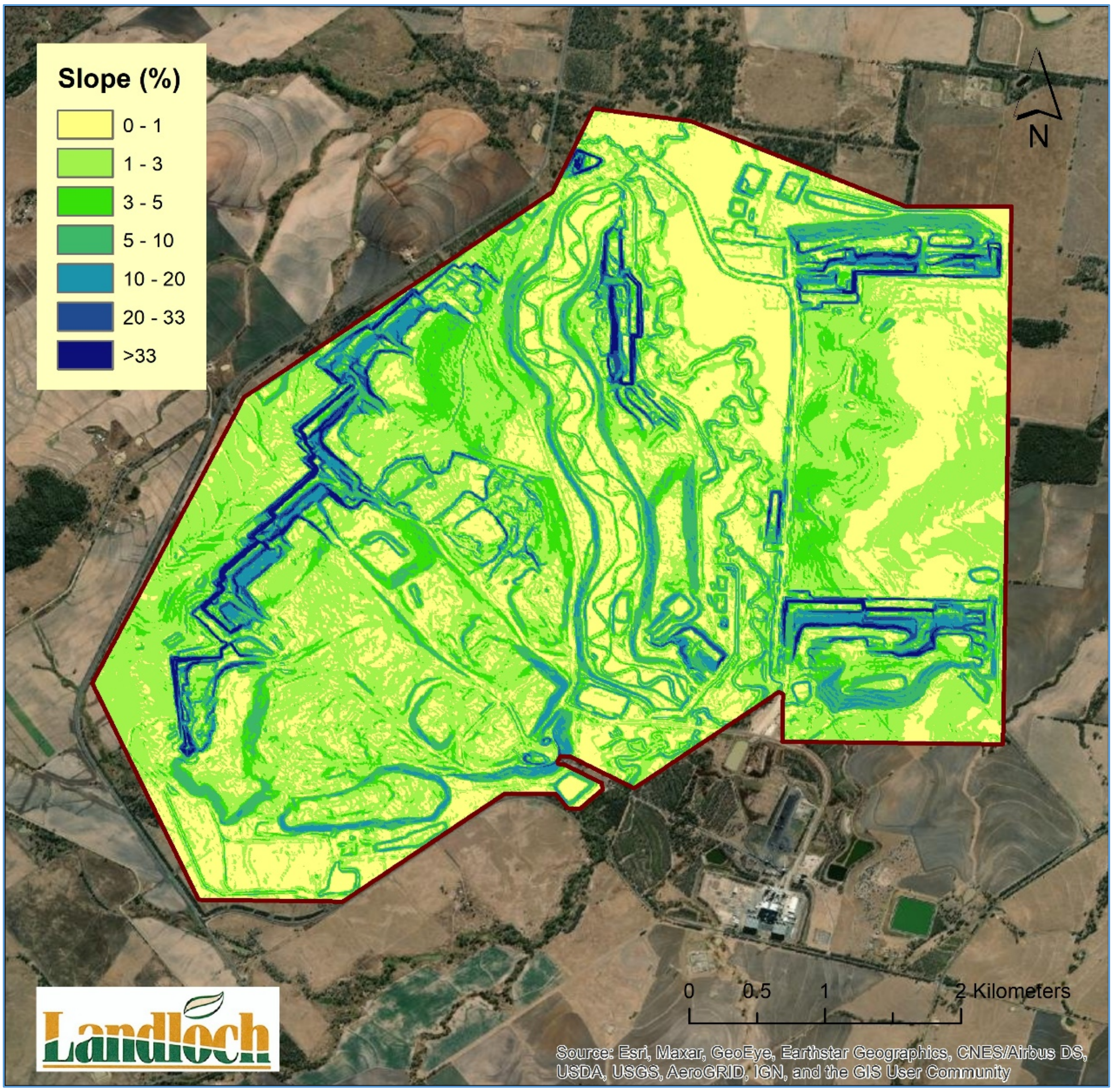


Figure 9 - Existing gradients of the Study Area.

SUMMARY OF ORIGINAL IAS (EIS):

The Project site is situated in the upper Condamine Catchment. A smaller network of ephemeral creeks including Back Creek, a tributary of the Condamine River, traverses ML 50151 at several locations. Back Creek and its upper branches flow through the site to both the north and south of the open cut pits and to the west of Millmerran Power Station. Back Creek generally flows north-east across the site. Once offsite, Back Creek flows through Millmerran and into the southern branch of the Condamine River, approximately 15 km from Site. Several other unnamed ephemeral tributaries also flow through the Project site. These unnamed tributaries flow into Grasstree Creek and Back Creek, both of which are tributaries of the Condamine River. The mine EA (EPML00841513) requires that a Receiving Environment Management Plan (REMP) and monitoring be undertaken to manage the risks to environmental values.

The Project site is gently sloping, moving away from the Condamine flood plain and towards the hilly boundary of the Condamine River Catchment. The Project site is located at an elevation range of 420–440 m Australian Height Datum (mAHD), roughly 60 m above the height of the Condamine River at its nearest point. Landform is described as rolling hills with undulating low hills and gently undulating to level plains.

For more information refer to **Attachment 4 Millmerran Power Project Impact Assessment Statement, Volume 1 – Section 3.1.2, Volume 2 – Appendix H** and the **Supplementary Report – Section 4**. For surface and ground water assessment see Section 4.1.

The mine is broken into several distinct catchment areas to manage mine water run-off and, where possible, allow clean water to report to natural catchments (light blue outlines areas in **Figure 10**). Refer to **Attachment 10 CCM Catchment Areas and SW Infrastructure Plan**, for current catchment areas and surface water management infrastructure detail. When an entire catchment area is certified as rehabilitated then that catchment area run-off will be returned to the natural catchment. All surface water is managed in accordance with EA conditions and the mine site EMS. Water quality records have been maintained since mining commenced in 2001.

BACK CREEK DIVERSION

The surface hydrology of Commodore Mine includes the construction of the Back Creek Diversion under Development Permit 541211 and Water Licence 104534 authorises the disturbance to the alluvial waters. Refer **to Attachment 6 Back Creek Detailed Design Report 2007** for the design and description of the diversion.

Since the start of mining the final landform was developed to incorporate a creek diversion through the spoil. The spoil is typically comprised of clays and the final construction for the low flow channel, where the water meanders, was completed in 2020. A 3m clay liner was installed in the meander to assist the natural development of the creek into perpetuity. The diversion shall be completed in 2022 after two seasons of vegetation establishment and stability assessment. This will involve the opening of both ends of the diversion and blocking water flows down the natural Back Creek. 10 years of monitoring and management shall follow. As per original project commitments and requirements, no ash has been utilised in the construction of the creek diversion.

A Vegetation Management Plan (Attachment 6 Back Creek Detailed Design Report 2007) was developed for the diversion. In 2019 a review was undertaken prior to construction (Attachment 7 Back Creek Diversion VMP review 2019)

Background monitoring has been undertaken on the original creek line and shall be the baseline against the diversion monitoring (Attachment 9 Baseline Back Creek Monitoring Report 2009). Baseline Monitoring subsequently was undertaken in 2009, 2013, 2016 and 2019 with construction monitoring.

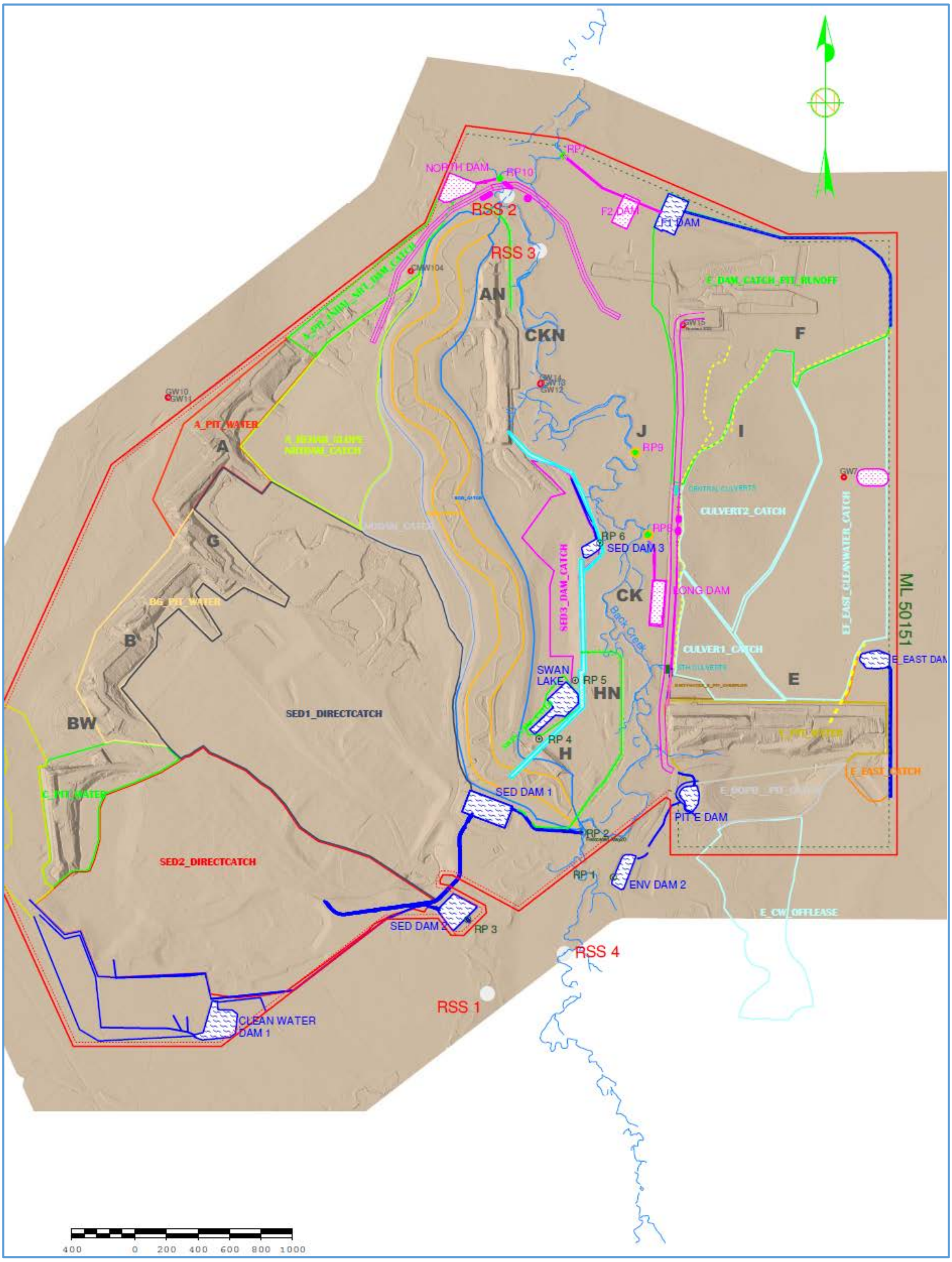


Figure 10 - Surface Water Catchment Overview

2.1.6 CLIMATE

The Millmerran area climate is sub-tropical, with warm hot summers and cool to mild winters. The mine is situated in a persistently dry semi-arid climatic zone with hot summers and cool to mild winters.

Average monthly temperatures tend to range from 2 °C to 20 °C in winter, and from 14 °C to 31 °C in summer. Summer temperatures can exceed 40 °C for short periods (BoM, 2021[1]). Average monthly minimum temperatures range from 2 °C to 4 °C in winter, and from 14 °C to 18 °C in summer (BoM, 2021[1])

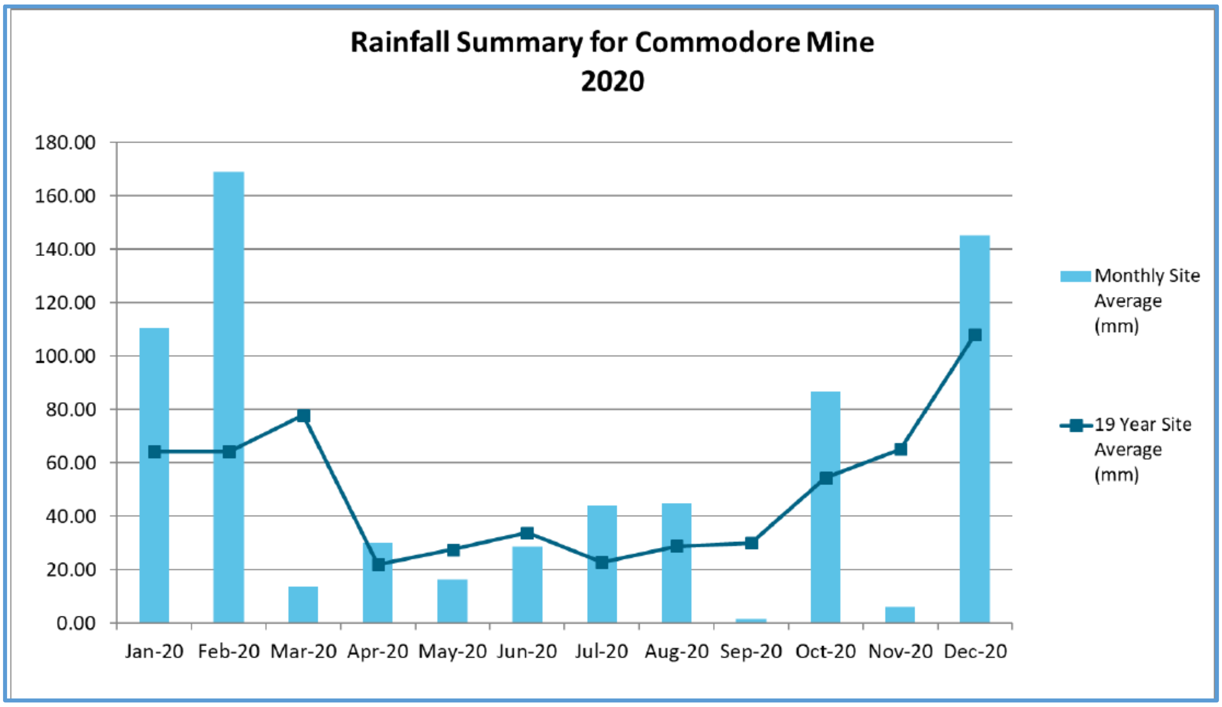
Rainfall is summer dominant with 66% of rain falling between October and March. Intermittent droughts occur which affect rehabilitation timeframes. Rainfall average can be seen in **Graph 1.** Evaporation rates are high, peaking in the summer months. See **Figure 11 - Evaporation summary for 2020**, for a typical yearly spread.

Dominant winds are east to south-east. See **Figure 12 - Wind rose report for 2020**. This is a typical wind diagram for a year around Millmerran.

Climate conditions periodically limit agricultural and rehabilitation activities and are considered in the land capability assessment and rehabilitation strategies. A weather station is utilised on site to monitor the climate conditions and this correlates to local weather observations.

For more information refer to **Attachment 4 Millmerran Power Project Impact Assessment Statement, Volume 1 – Section 3.1.**

During site development and operations, site specific data has been collected and collated since 2002. The 19-year rainfall average measured on site is 598 mm. **Graph 1** details the site average rainfall.



Graph 1 - Average site rainfall and 2020 rainfall data.

[1] BoM. (2021, August 10). Bureau of Meteorology. Retrieved from Laguna Station: http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=&p_c=&p_stn_num=041062

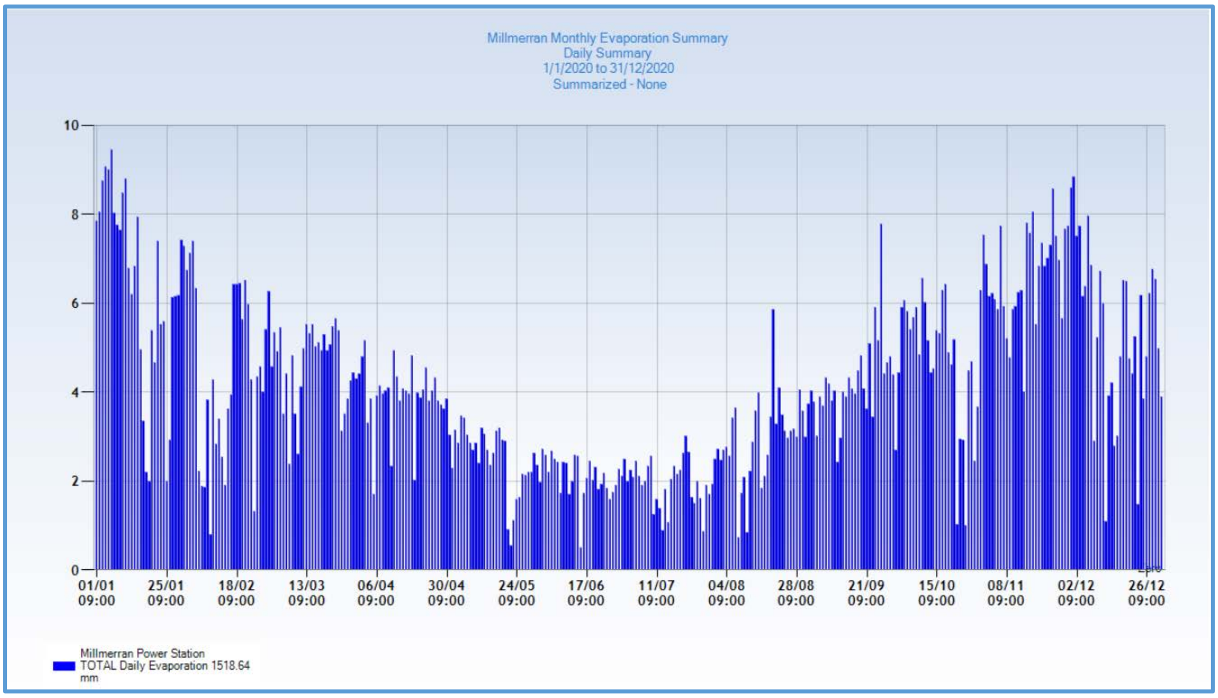


Figure 11 - Evaporation summary for 2020

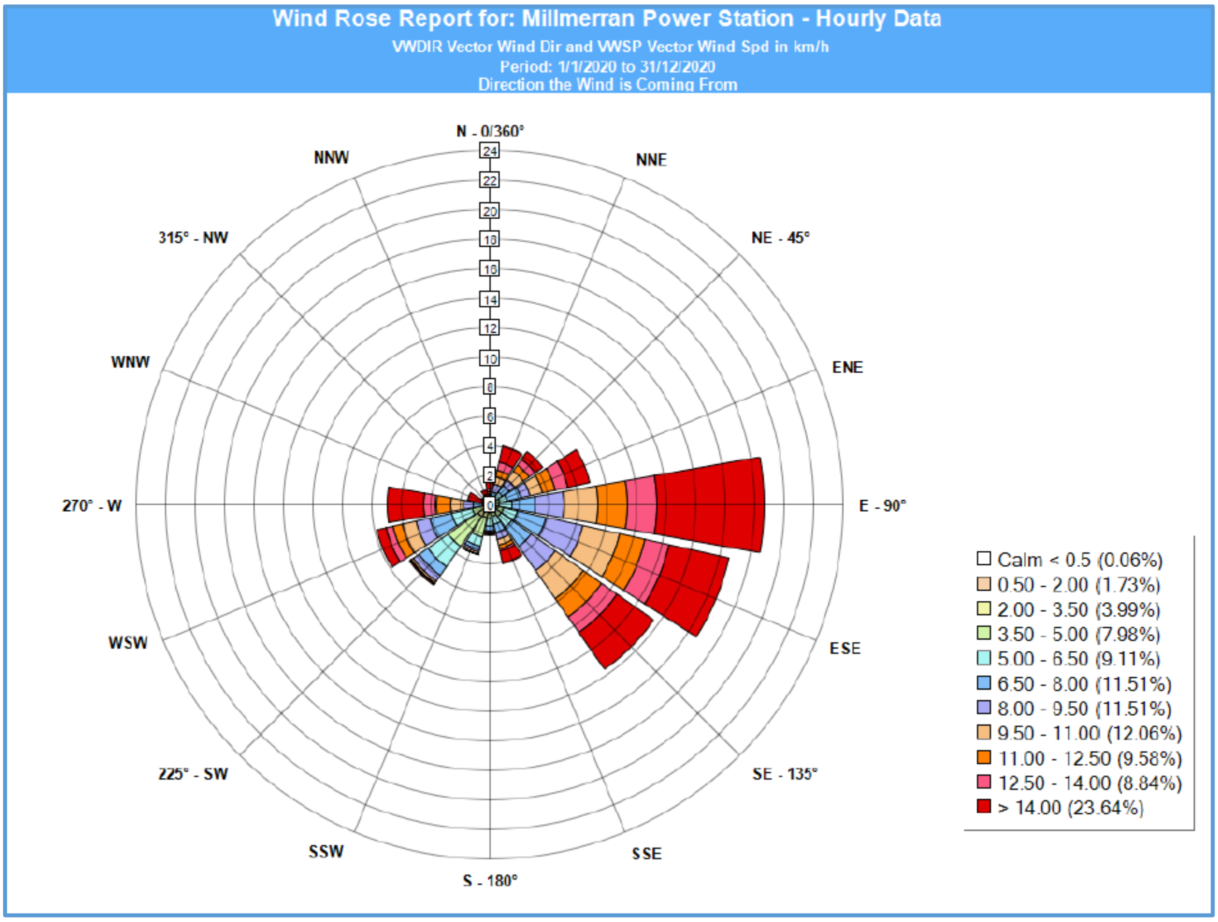


Figure 12 - Wind rose report for 2020

2.1.7 SITE SOILS AND GEOLOGY

Rehabilitation planning has been undertaken for the last 20 years in a continuous improvement cycle. The testing and categorisation of the soil and spoil allows for a simple, effective land forming and rehabilitation processes.

REGIONAL SOILS

Soil mapping of the mine[2] identifies two land resource areas (LRA). These include:

- LRA 2d: broad level plains of mixed basaltic and sandstone alluvium, dominant soils are grey cracking clays; and
- LRA 6c: undulating to steep, low hills and rises on Walloon sandstone, dominant soils are grey-brown cracking clays with brown sands over brown clays.

Land resource area LRA 7c was identified near the mine boundary and may be another soil present if mining operations disturbed any steep hills previously present on the mining lease. It contains black to dark brown clays or brown clay loam soils. Relevant details of these three LRA's are provided in Table 1 and their locality and distribution are presented in Figure 13.

Table 1 - Summary details of Land Resource Areas in the Study Area.

LRA Code	Landform	Vegetation	Major Soils	ASC Soil Classification and Description
2d	Broad level plains of mixed basaltic and sandstone alluvium.	Poplar box and Queensland blue gum woodland with belah and wilga.	Grey cracking clays	Vertosol – Clay-rich soils of uniform texture with shrink-swell properties. High potential for strong cracking. Parent materials range from intermediate, mafic to ultramafic in composition. Soils are found in a range of imperfectly to well-drained areas. These soils have high agricultural potential with high chemical fertility and water-holding capacity.
6c	Undulating to steep, low hills and rises on Walloon sandstone.	Brigalow, belah, Wilga forest with black tea tree.	Grey-brown cracking clays	As previous
7c	Steep hills and mountains	Mountain coolabah and narrow leafed ironbark open woodland.	Black to dark brown clays or brown clay loams	Dermosol – non-texture contrast soils that have structured subsoils (B horizons). They are found mainly in the upland areas, often in association with Kandosols that have massive B horizons. These soils can vary from stony hardsetting soils to friable deeper profiles.

[2] Harris, P. S., Biggs, A. J., & Stone, B. J. (1999). Central Darling Downs Land Management Manual. Department of Natural Resources, Queensland DNRQ990102.

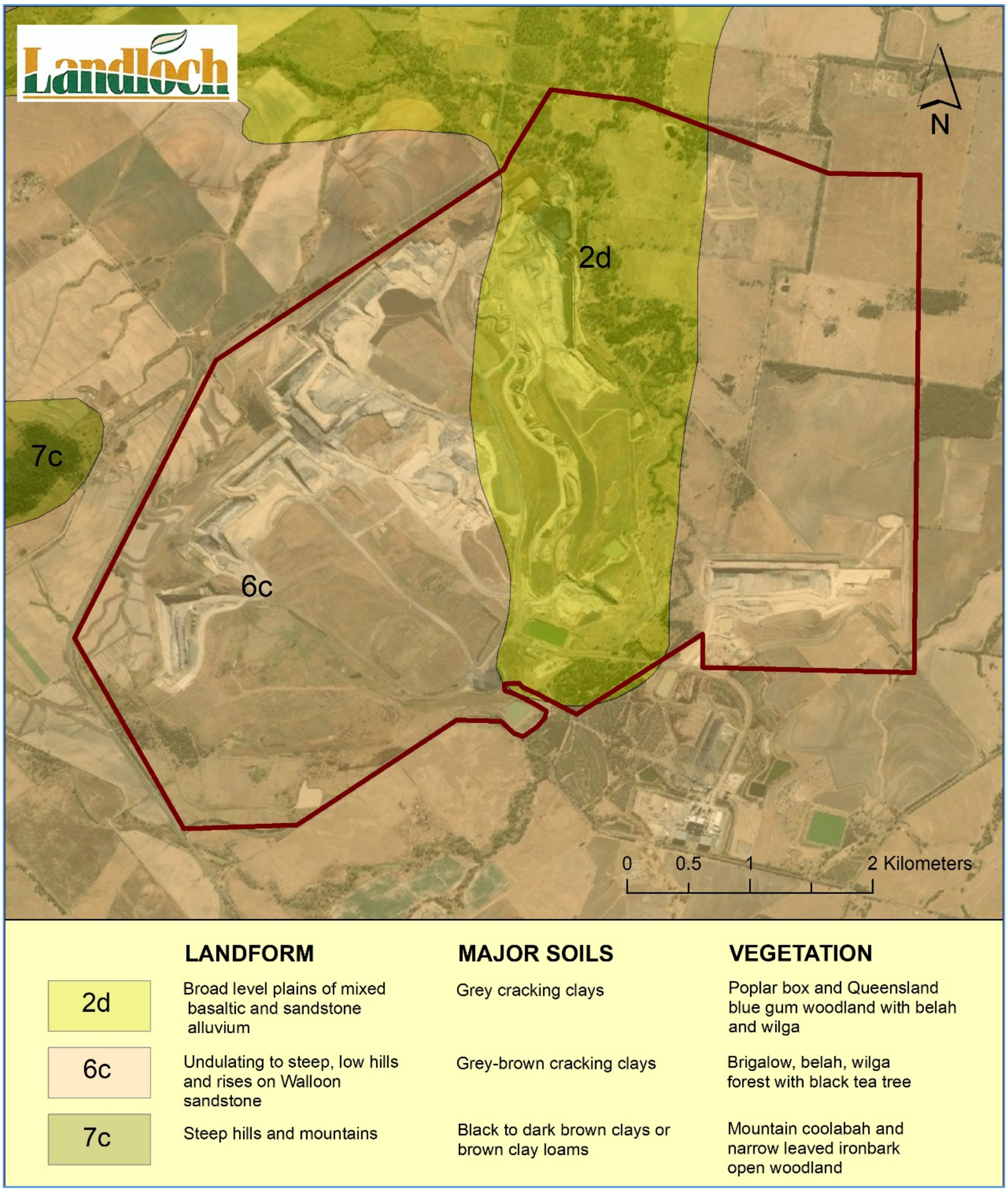


Figure 13 - Regional soil mapping of the Study Area (cf. Land Management Field Manual for the Central Darling Downs area of Southern Queensland, Department of Natural Resources).

RECOVERABLE SOILS

The soils (vertosols) on site generally consisted of very dark brown to black, light to light clay A horizons (topsoil) with strong subangular blocky structure, mostly overlying a light medium to medium clay B2 horizon with strong subangular blocky structure. The topsoil predominantly showed neutral to slightly acidic, non-sodic, non-saline and moderate effervescent properties. The B2 horizon generally showed alkaline to very strongly alkaline, moderately to highly sodic, moderate saline and highly effervescent properties, typically increasing with depth.

For more information refer to **Attachment 4 Millmerran Power Project Impact Assessment Statement, Volume 1 – Section 3.3** for soils information and 3.4 for land use capability including pre-mining capability in 3.4.1.1. Section 3.5 details overburden characteristics. See also the **IAS Supplementary Report – Section 3 and Section 3.9** for overburden characterisation.

A soil assessment was undertaken as part of the Impact Assessment Study (**IAS, 1999, Attachment 4**) and submitted with the mining lease application for the project. A total of 116 soil profiles were assessed across the 2,300 ha mining lease (Site Soils test locations in **Section 3.4.4**). The ground observation rate was 1 site per 20 ha, and correlates to a soil survey scale of 1:25 000 (McKenzie, Grundy, Webster, & Ringrose-Voase, 2008[3]).

In this survey 11 soil mapping units (SMU) were identified across the study area. The soil details for the main SMU's located in the mine boundary are provided in Table 8, Figure 30 and mapped distribution in Section 3.4.4 - Site Soils.

Most soils identified as part of the study can be classified into either black, brown or grey vertosols under the Australian Soil Classification (ASC), indicating soils share some similar properties such as clay type and profile morphology. In addition, the study identified the following soil properties common to all soil types:

- High content of fine soil fraction (silt and clay);
- Neutral to strongly alkaline through the profile; and
- Low salinity.

The depth of recoverable topsoil across the site ranged from 0 to 900 mm (Figure 14). The principal factors governing the determination of soil recovery depths were chemical (salinity and sodicity) and physical (structure and stoniness) features. The study found high quality and deeper soils were located on mid to upper slopes to the south-east and south-west of the site. Poorer soils are located to the north and along Back Creek.

Topsoil stockpiles are maintained on site for rehabilitation purposes. A 2021 list of volumes and locations are in Section 3.4.5. This information is updated and reviewed as part of the rehabilitation management methodology.

The most significant limiting factor in determining the recoverable depth of topsoil is sodicity. The sodicity limits referenced by Baker & Eldershaw (1993[4]) were used, being:

- ESP < 6% (non-sodic);
- ESP 6-15% (sodic); and
- ESP > 15% (strongly sodic).

Sodic soils were generally found in the lower parts of the landscape and generally, sodicity increased with depth. The most sodic soils were represented by SMU Hs and SMU Bx and the least sodic soil was SMU Ba

The alkaline spoil is best topsoiled and seeded as soon as possible to manage erosion and to improve the pasture establishment results. When sodic soils are disturbed, the potential for erosion will increase so vegetation establishment is key to prevent rework and further disturbance to rehabilitation areas.

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[3] McKenzie, N. J., Grundy, M. J., Webster, R., & Ringrose-Voase, A. J. (2008). *Guidelines for Surveying Soil and Land Resources* (2ed). Melbourne: CSIRO Publishing.

[4] Baker, D.E.; Eldershaw, V.J. [1993] *Interpreting soil analyses - for agricultural land use in Queensland*. (Queensland Dept. of Primary Industries, Indooroopilly (Australia). Land Use and Fisheries) Project Report Series QO93014, Australia.

Rehabilitation is undertaken in accordance with the plans and procedures developed as part of mining operations and as required under the current EA conditions and mining management procedures.

For more information refer to **Attachment 4 Millmerran Power Project Impact Assessment Statement), Volume 1 – Section 3.1.3.**

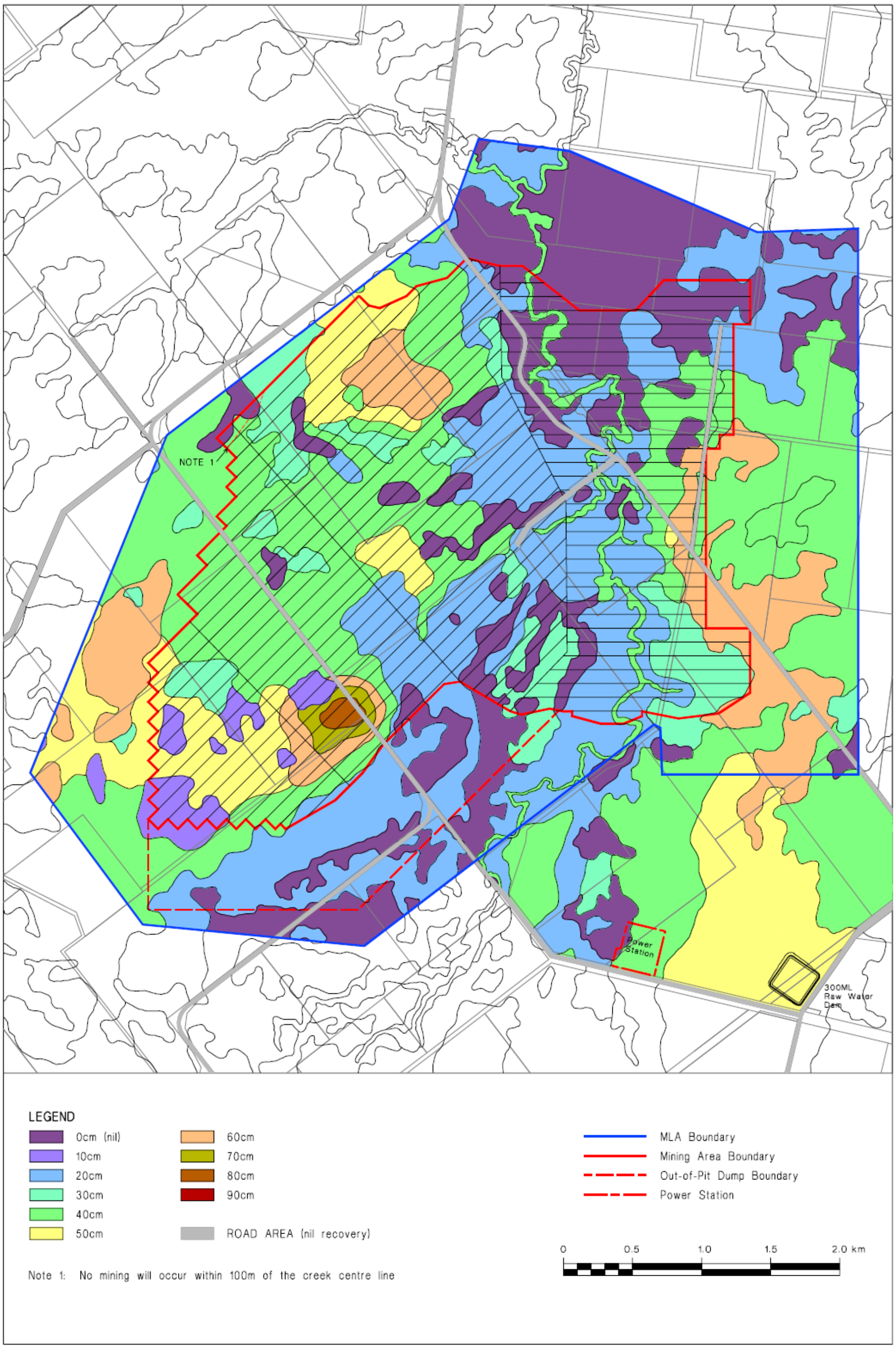
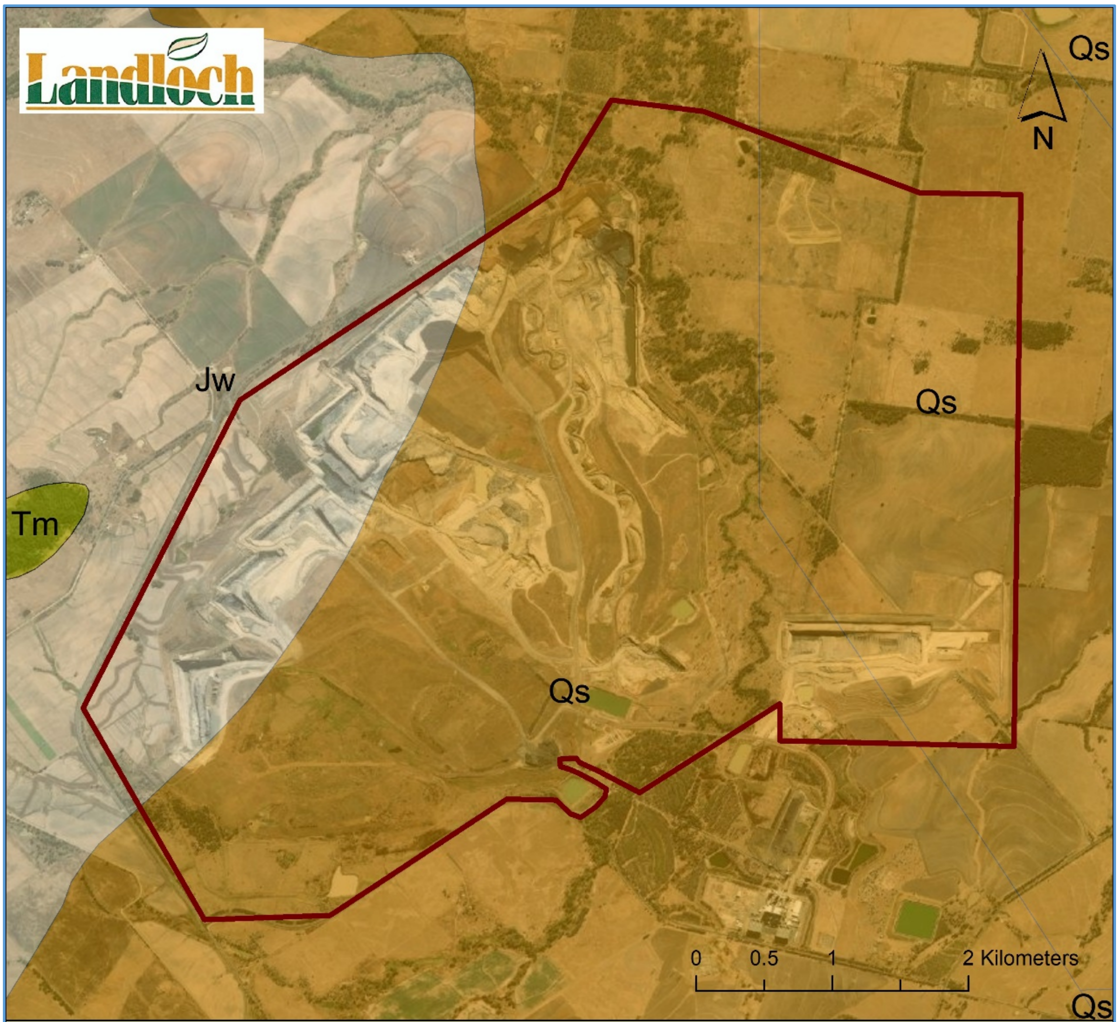


Figure 14 - Depths of recoverable topsoil identified in the previous soils' assessment (IAS, 1999).

GEOLOGY

The geology can be described as Surat Basin sedimentary sequences which include the Walloon Coal Measures which consist of interbedded carbonaceous mudstones and siltstones with some sandstone and coal. The coal for the project is overlaid with Quaternary sediments.

The detailed surface geology mapping for Queensland (Department of Natural Resource, Mines and Energy, 2020) indicates there are three main broad geological units in the Study Area. The distribution of geological units is provided in Figure 15 and descriptions are in Table 2 - Primary geological units relevant to the Study Area (IAS 1998).



GEOLOGICAL UNIT		DOMINANT ROCK	LITHOLOGY	AGE
Tm	Main Range Volcanics	Basalt	Olivine basalt	Eocene-Miocene
Jw	Walloon Coal Measures	Arenite-Mudrock	Shale, siltstone, sandstone, coal seams	Middle Jurassic
Qs	Qs-SQ	Micellaneous unconsolidated sediments	Sand, red sandy soil, silt and some gravel; floodout and sheet sand with alluvium	Quaternary

Figure 15 - The geology units of the Study Area (cf. Detailed surface geology – Queensland, Department of Natural Resources).

Table 2 - Primary geological units relevant to the Study Area (IAS 1998).

Geological Unit	Map Code	Description
Walloon Coal Measures	**Jw**	A Late Jurassic geological subgroup composed of coal, shale, sandstone, siltstone and mudstone.
Quaternary Sediments	**Qs**	Quaternary sediments overlaying the Walloon Coal Measure consisting of sand, some alluvium and gravel.
Main Range Volcanics	**Tm**	Formation of volcanic and pyroclastic rocks of Tertiary age. Olivine basal is the dominant lithology.

A cross section of the geology and groundwater bearing units is shown in a current and a pre-mining map in **3.4 REFERENCE MAPS - 3.4.6 and 3.4.7**.

2.1.8 MATERIAL CHARACTERISTICS

Existing soil survey data and soils data collected during annual rehabilitation monitoring assessments were collated to assess the characteristics of the available growth media. The two categories of materials available for rehabilitation are -

- Topsoil; and
- Waste materials.

Details of these materials are provided below. Soil description records and laboratory results from rehabilitation monitoring conducted by Landloch are provided in **Section 3.4.7** of this report. Existing data and sampling locations from the SKM soil survey for Commodore Coal Mine can be found in the **Impact Assessment Study Supplementary Report (Attachment 4).**

TOPSOIL

The physical characteristics of topsoil materials were relatively similar at all locations. In general, topsoil materials are black, dark grey, grey-brown or dark brown with texture as a light to medium heavy clay. Gravel content is generally less than 5 % and less than 60 mm in diameter. However, some chemical differences that effect soil recovery were identified. For this reason, topsoils have been characterised and named Non-sodic Topsoil and Sodic Topsoil for management purposes.

Generally, the topsoil material is considered adequate quality for use as primary growth media. Laboratory analysis of topsoil reported relatively similar results between samples. As such, the existing soils' data is considered sufficient to describe these materials.

In some locations, the main hazards limiting the suitability of topsoil materials for use in rehabilitation is sodicity and strong alkalinity. Amelioration of sodicity may be required the though incorporation of gypsum.

Due to the high degree of heterogeneity in sodicity and pH results within mapped topsoils and stripping depths, the laboratory data can be considered representative of the topsoil materials as a whole, and not representative of individual stockpiles.

The following recommendations apply to stockpiled topsoils;

1. If practicable, strip and stockpile soils with similar soil properties, maintaining accurate stripping depths outlined in the topsoil recovery map in Appendix A and the IAS (SKM, 1999, Attachment 4).

2. Undertake stockpile sampling to delineate sodic and non-sodic topsoil materials If this is not practicable then;
3. Treat all topsoil materials as Sodic Topsoil and apply amendments at the rates specified for Sodic Topsoil (Table 6).

NON-SODIC TOPSOIL

Key physicochemical properties include:

- Generally neutral to moderate alkalinity;
- Low salinity;
- Non-sodic;
- Moderate to high cation exchange capacity and ability to retain nutrients;
- Low nitrogen, available phosphorus, calcium and sulphur;
- Moderate levels of organic matter;
- Moderate to high potassium and magnesium; and
- Clay content of approximately 30–55 %.

SODIC TOPSOIL

The Sodic Topsoil has similar physicochemical properties to the Non-sodic Topsoil, except:

- Generally moderate to strong alkalinity;
- Marginally to highly sodic; and
- Prone to hardsetting.

Photographs 1 and 2 are representative of natural soils at the mine. Samples were collected during the 2020 rehabilitation monitoring assessment (Landloch, 2020, Attachment 13).

Photograph 1. Black vertosol soil profile sampled during 2020 rehabilitation monitoring at analogue transect AN5.

Photograph 2. Grey vertosol soil profile sampled during 2020 rehabilitation monitoring at analogue transect AN5.

WASTE MATERIALS

Waste materials consist of overburden (and inter-burden materials) above the coal seam and are predominantly consist of weathered shale, siltstone and sandstone waste rock material. Geochemical characterisation data of the overburden material from the initial assessment (IAS, 1998, Attachment 4) and most recent geochemical assessment in 2021 (Attachment 12) were collated, and a total of 382 spoil samples were collected and analysed across the two assessments.

SPOIL MATERIALS

Characterisation studies of the overburden were undertaken by Miller (1985) and SKM (1998) (See Attachment 4 – IAS). Waste rock materials at Commodore Coal Mine were found to be:

- Non-acid forming, relatively benign and with acid neutralising capacity
- Strongly alkaline;
- Highly sodic; and
- Low to moderately saline.

SKM (1998) concluded that the spoil alone was an undesirable growth media. Run-off from unprotected spoil was unlikely to be saline but may be alkaline and turbid. The primary management technique is to ensure spoil is covered with an average depth of 250 mm of topsoil after placement, then contour and revegetate.

Spoil characteristics were found to be similar across both studies and indicate spoil material becomes a more favourable growth media when exposed to weathering. Key physicochemical properties are:

- Generally, neutral to strongly alkalinity with median pH of 8.5 and typically range from 4.8–9.6;
- Contained negligible potential for acid mine drainage (AMD) and low sulphur; however 1 % of carbonaceous spoil material have moderate potential to generate AMD;
- Salinity is generally low, however sometimes moderate to high;
- Highly sodic and dispersive;
- Moderate cation exchange capacity and ability to retain nutrients; and
- Similar metals and metalloids to background levels;

Photographs 3 and 4 are representative of spoil material used in rehabilitation at the mine. These samples were collected during the 2020 rehabilitation monitoring assessment by Landloch (Attachment 13).

Photograph 3. Yellowish brown spoil material below topsoil at monitoring transect CD13.

Photograph 4. Pale brown spoil material below topsoil at monitoring transect CD16.

The laboratory analysis of spoil materials identified some limitations for use as a secondary growth media. However, trial and rehabilitation performances indicate that the chemical limitations are only minor and tolerable to rehabilitation species. Testing did not consider macro and micro nutrient fertility or its use as a primary growth media. Should the need to reduce topsoil capping layers be of interest to the mine, it is recommended that analysis of macronutrients be conducted to determine the fertility stores (needed to sustain healthy vegetation growth), and identify any additional amelioration.

2.1.9 WASTE MANAGEMENT

The waste materials consist of ash from the power plant, and overburden and inter-burden materials (spoil). The overburden generally consists of weathered shale, siltstone and sandstone waste rock material.

Waste materials consist of overburden (and inter-burden materials) above the coal seam and are predominantly consist of weathered shale, siltstone and sandstone waste rock material. Geochemical characterisation data of the overburden material from the initial assessment (IAS, 1998, Attachment 4) and most recent assessment (Terrenus Earth Sciences, 2021, Attachment 12) were collated, and a total of 382 spoil samples were collected and analysed across the two assessments.

ASH

Samples of ash were analysed as part of the IAS (Attachment 4) in 1998 and a waste characterisation report in 2021 (Attachment 12). The results show the ash has negligible potential to generate acid; has low salinity; is infertile and has quantities of trace metals that exceed reportable levels. The most notable of these being boron, molybdenum and selenium that are leachable. These characteristics indicate the ash is unsuitable as a growth medium and should be encapsulated to limit interaction with air and water.

Ash has been monitored for more than a decade for leachate potential using piezometers. The ash has been consistently dry in all piezometer locations. No contamination movement has been detected using the current controls and management techniques. It is expected this method of capping and containment will be a successful measure for perpetuity based on monitoring and chemical analysis.

The management of coal combustion ash generated by the Project will be consistent with the current approved management strategies for these materials. Approximately 25 % to 30 % of fly ash is transferred off lease to a third-party operator for recycling utilising the End of Waste approval (for use in the cement and building industries). The remaining coal combustion ash is trucked from the power station, disposed into the mine pit at CCM above the anticipated future groundwater table and buried by a minimum of eight metres (8 m) of spoil.

Based on the current assessment, coal combustion ash materials are regarded as posing a low Acid Mine Drainage (AMD) hazard (unmitigated) with respect to generation of acidity and/or sulfate, however will still be placed in-pit and buried by spoil to further reduce AMD risks and to assist rehabilitation by disposal well away from final landform surfaces. Seepage would be confined within the open-cut pit and would drain into/towards pit sump(s) and therefore be captured by the mine water system. Therefore, when buried deeply amongst alkaline Non Acid Forming (NAF) spoil the risk of environmental harm and health-risk that emplaced coal combustion ash poses is very low.

SPOIL

The management of overburden and interburden (spoil) materials generated by the Project will be consistent with the current approved mine waste management strategy – comprising the disposal of overburden and interburden as in-pit mine spoil, then progressively rehabilitated – with run-off and seepage captured by the mine water management system. During the initial development of mining at MDL301 spoil will be placed into an out-of-pit dump, which will be later rehandled and returned to the pit as part of final rehabilitation.

As a bulk material, spoil is Non Acid Forming (NAF) with excess Acid Neutralising Capacity (ANC) and has a negligible risk of developing acid conditions. Furthermore, spoil is expected to generate relatively low salinity surface water run-off and seepage with relatively low soluble metal/metalloid concentrations. However, spoil is expected to be sodic to strongly sodic with potential for dispersion and erosion. A small proportion of spoil materials (carbonaceous and non-carbonaceous) have some potential to generate Acid Mine Drainage (AMD) in an unmitigated and uncontrolled environment, however when mined and dumped, the overall AMD risk posed by bulk spoil is low.

Where highly sodic and/or dispersive spoil is identified it should, wherever practicable, not report to final landform surfaces and should not be used in construction activities. Tertiary spoil has generally been found to be unsuitable for construction use or on final landform surfaces (Australian Coal Association Research Program [ACARP], 2004[5] and 2019[6]).

It may not be practical to selectively handle and preferentially emplace highly sodic and dispersive spoil during operation of the Project. Therefore, in the absence of such selective handling, spoil landforms would need to be constructed with short and low (shallow) slopes and progressively rehabilitated to minimise erosion. Where practical, and where competent rock is available, armouring of slopes should be considered.

Where rock is used for construction activities, this should be limited (as much as practical) to unweathered Permian sandstone, as this material has been found (generally) to be more suitable for construction and for use as embankment covering on final landform surfaces. Regardless of the rock type, especially where engineering or geotechnical stability is required, laboratory testing and rehabilitation field trials should be undertaken to determine the propensity for dispersion and erosion of spoil landforms.

Surface water run-off and seepage from waste rock emplacements, including any rehabilitated areas, should be monitored for 'standard' water quality parameters including, but not limited to, pH, EC, major anions (sulfate, chloride and alkalinity), major cations (sodium, calcium, magnesium and potassium), total dissolved solids (TDS) and a broad suite of soluble metals/metalloids.

With the implementation of the proposed management and mitigation measures, the waste rock is regarded as posing a low risk of environmental harm.

2.1.10 HYDROGEOLOGY

Previous studies have identified the following three aquifers at the Mine:

- Alluvium associated with Back Creek;
- Commodore Coal Seam of the Walloon Coal Measures, predominantly located within the Commodore Syncline; and
- Marburg Sandstone.

The removal of the Commodore Coal Seam (within the Walloon Coal Measures) and Back Creek Alluvium will impact on the recharge mechanisms to the shallow groundwater systems. The impact will not extend beyond the target coal seam sub-crop. A cross section of the geology and groundwater bearing units is shown in a current and a pre-mining map in **3.4 REFERENCE MAPS - 3.4.6 and 3.4.7**.

[5] ACARP (2004) [Australian Coal Association Research Program]. *Rehabilitation of Dispersive Tertiary Spoil in the Bowen Basin*. Report C12031, July 2004.
[6] ACARP (2019) [Australian Coal Association Research Program]. *Prediction of Long-Term Salt Generation from Coal Spoils*. Report C25039, January 2019.

The local hydrogeological setting of the Mine was described in the Impact Assessment Study for the Millmerran Power Project as well as the IAS Supplementary Report. **See Attachment 4 Millmerran Power Project Impact Assessment Statement) Schedule 1 – Section 4.1.2 and the IAS Supplementary Report Section 4.22.** A baseline study is due for completion in 2022 and expansion of the groundwater monitoring network has recently been undertaken after a groundwater monitoring network review to update the EA (EPML00841513).

The local alluvium of Back Creek will be impacted by mining activities.

Back Creek Diversion has been constructed and will be commissioned in 2022. Clay liners and plugs are utilised in the design to funnel alluvial waters down the new diversion when Back Creek is mined through in 2023. A DNRM water licence 104534 authorises the disturbance to the alluvial waters. Refer **to Attachment 6 Back Creek Detailed Design Report 2007** for the design and description of the diversion.

More recently, the regional hydrogeological setting in which the Mine lies has been described in detail in the *Underground Water Impact Report for the Surat Cumulative Management Area*, (in 18 July 2012. State of Queensland by the Queensland Water Commission (QWC) and their successor, Queensland Government Department of Natural Resources and Mines, Office of Groundwater Impact Assessment (OGIA) in 2016, and July 2019).

The Marburg/Hutton sandstones aquifer lies below the Walloon Coal Measures and is not expected to be impacted by mining. The Power Station has rights to access water in the Marburg/ Sutton sandstones however it exercises an agreement with Toowoomba Regional Council to access water from the Wetalla Sewage Treatment Plant. The groundwater rights are maintained only for emergency purposes.

Note that, for the purposes of this report, the lowermost Jurassic aged formation present at the Mine will continue to be called the Marburg Sandstone, despite it being termed the Hutton Sandstone in the Surat Basin. This is to maintain consistency with the Mine's EA and historical Mine-related reporting. As reported by OGIA (2019), the Marburg Sandstone is the Clarence-Moreton Basin equivalent of the Hutton Sandstone in the Surat Basin.

Monitoring of groundwater is managed by EA (EPML00841513) conditions and a groundwater monitoring bore network that was expanded in 2020. The Commodore Mine bore monitoring network is outlined in **Figure 16 - Commodore Mine Groundwater Monitoring Network.** Bores can be seen in the cross section of the geology and groundwater bearing units is shown in a current and a pre-mining map in **3.4 REFERENCE MAPS - 3.4.6 and 3.4.7**.

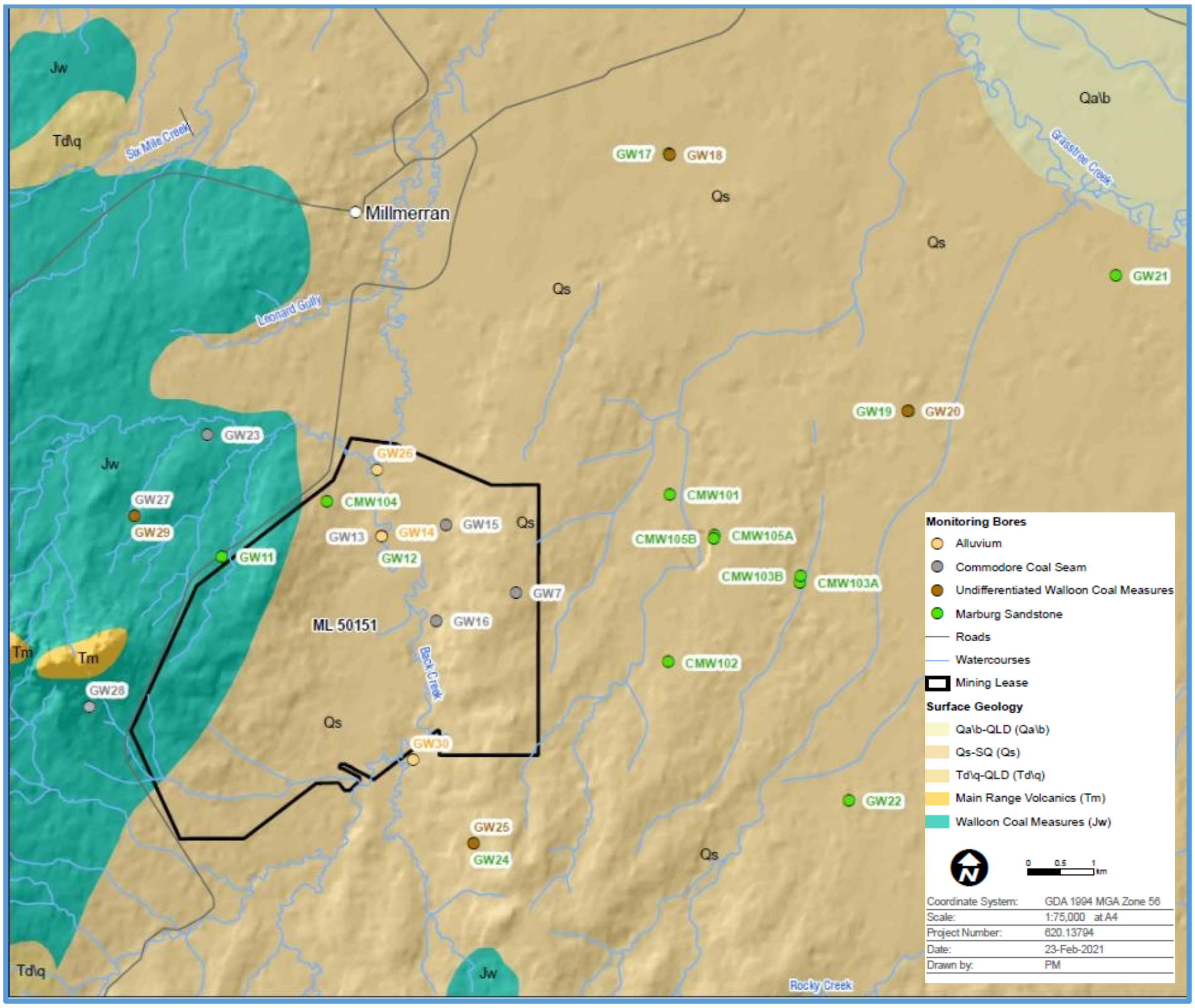


Figure 16 - Commodore Mine Groundwater Monitoring Network

2.1.11 FLORA & FAUNA

For the 1998 IAS (Attachment 4) terrestrial Flora and Fauna investigations for the project involved four stages of assessments:

- Background data collection and review;
- Agency consultation;
- Aerial photography interpretation, and
- field assessment.

The detailed terrestrial field assessment was undertaken over 6 days from the 22nd April, and the aquatic assessment over 6 days from the 25th May to the 30th, 1998.

For a complete list of all flora and fauna identified pre-mining, see **Attachment 4 Millmerran Power Project Impact Assessment Statement (IAS), Schedule 1 – Section 7 and Schedule 2 – Appendix K**.

The land pre-mining was typical of agricultural areas with regards to land clearing and the altered distribution of vegetation. Remnant patches of vegetation (**Figure 17 - Vegetation Communities Map**) were identified and classified into the following six communities:

- Acacia harpophylla tall open forest;
- Melaleuca low open forest
- Allocasuarina cristata tall open woodland
- Poplar box woodland
- Open eucalypt woodland
- Agricultural land

Fauna habitats that were identified (Figure 17) were:

- Brigalow Community
- Casuarina Community
- Open Eucalyptus Community
- Casuarina and Poplar Box Community, and
- Brigalow Creek Line Community

The main weeds identified were

- Verbena aristigera (Mayne's pest)
- Chloris virgata (feather-top Rhodes grass)
- Xanthium pungens (noogoora burr)
- Bryophyllum species (mother of millions)
- Verbena bonariensis (purple-top)
- Opuntia stricta (common pest pear)
- Lepidium species (peppercress)

More recently Harrissia cactus, african boxthorn and purple nightshade have been found onsite and are part of the weed management.

14 mammals (10 native), 64 birds (only the Indian myna was non-native) and 4 amphibians were identified in the site investigation. 11 fish of an expected 17 were found in Back Creek and the reference sites. 26,707 macroinvertebrates were found, from 16 orders, of which 64 taxa were identified. All sites consisted of similar community structures with differing dominant taxa. The taxa identified in this study are associated with still to slow-flowing waters. Few of the species found are able to tolerate permanent high-flow conditions.

The basic community structure comprised insect orders of:

- Diptera (true flies);
- Ephemeroptera (mayflies);
- Odonata (damsel and dragon-flies);
- Coleoptera (beetles), Hemiptera (true bugs);
- Lepidoptera (moths and butterflies);
- Trichoptera (caddis flies species.);
- Collembola (spring-tails);
- Mollusca (mainly gastropods, with few bivalves);
- Crustacea (freshwater shrimps and crayfish);
- Arachnida (mainly water-mites, with few spiders);
- Annelida (mostly oligochaetes); and
- Nematoda (round worms).

Microcrustacea were observed from most sites. These were not identified but observations of numerical abundance were noted.

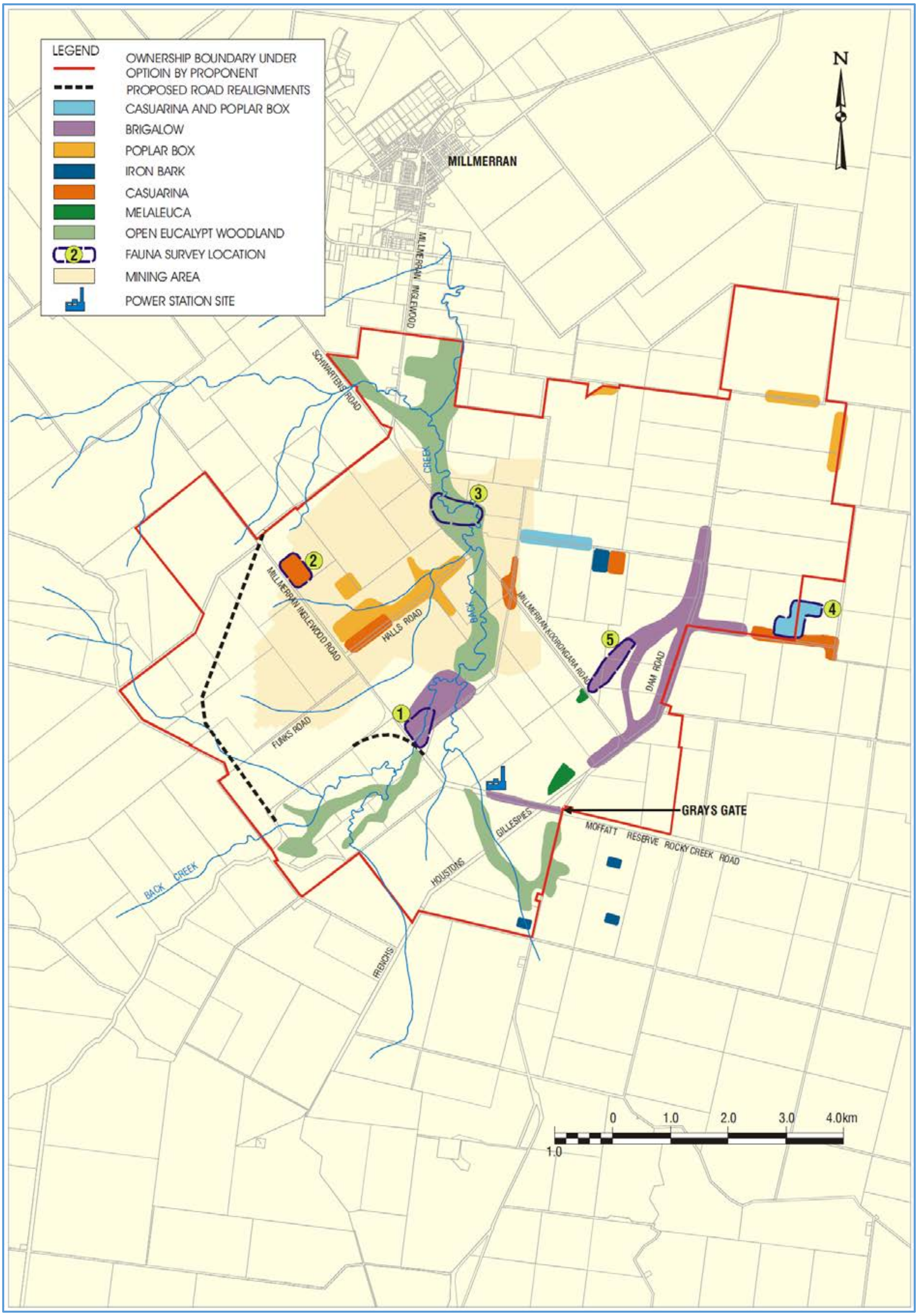


Figure 17 - Vegetation Communities Map

MITIGATION MEASURES

The majority of the site comprised agricultural land which had been used for cropping or grazing on improved pasture. Hence, impacts on native vegetation will be limited to removing some remnant vegetation. These remnants are found across the site and represent habitat which will be affected by the Project.

Impacts arise from land clearing, the Back Creek Diversion and disturbance from activities. The majority of the site Mitigation measures identified considerable vegetation in the diversion will offset vegetation loss. The natural processes of flooding and regeneration will continue until that time. These processes will allow the existing vegetation to provide catchment protection roles, such as creekbank stability and shading of water for aquatic fauna both before and after the diversion is commissioned.
Mitigation tools include:

- Revegetation Management Plan.
- Weed Control.
- Habitat Re-Establishment.
- Ensuring the design of Back Creek Diversion mimics the natural system.
- Permanent pools in the Back Creek Diversion provide remnant fauna which can be used to support recolonization.
- Natural dispersal mechanisms are encouraged to provide natural regeneration from upstream species.
- Monitoring.

2.1.12 REHABILITATION PLANNING

Rehabilitation has been undertaken since 2005 on the Western side of the mine. Commodore Mine undertakes a strip-mining operation which removes and stockpiles topsoil (minimum 300mm), removes and replaces overburden onto previous mined areas immediately behind the open face. Topsoil surveys of the ML50151 mining lease indicate sufficient resource of topsoil to meet rehabilitation requirements. Mining and rehabilitation initiated at the original box cut area (near the current ROM) and progressed in a western and north-western direction since 2003. Current mine activities are focused on the eastern side of ML50151 (2020 onwards) and following the Back Creek diversion is commissioned, the old Back Creek will be mined progressively (approximate timeframe of 2023). Current rehabilitation planning and similar mining techniques will be continued in these areas.

As part of the mining operation, bulk land forming (through overburden, ash burial and capping) will continue. Placement of topsoil resource and preparation of topsoil (including water management, planting preparation etc.) will be undertaken. General pasture mix seeding is undertaken as per seasonal conditions and following establishment of pastures additional tube-stock has been planted in rehabilitated areas of the mine, seeding with tree seed and natural self-seeding of trees has also taken place. This will support wildlife corridors and provide trees for shade and habitat. Typically seeding of pasture to meet the post mining land use (PMLU) of grazing, is based upon locally available, and sourced, pasture mixes**. Attachment 13 Rehabilitation Monitoring Report 2020,** shows the progress of the various rehabilitation areas as of the 1st of September 2020 (mine operational year).

Several land outcome documents guide rehabilitation planning and management on site, these are outlined below:

- The current Plan of Operations. **Attachment 1(2019-2024).** This guides the short-term planning and management of rehabilitation on site for an operational period.
- The Current EA (EPML00841513) has conditions relating to the requirements for final land use and rehabilitation milestone criteria. This includes **Attachment 2 Commodore Coal Mine Rehabilitation Completion Criteria**, the approved Receiving Environmental Management Plan (REMP) and Topsoil Management Plan (as required by the EA EPML00841513).

- The original IAS, **Attachment 4 Millmerran Power Project Impact Assessment Statement**), Volume 1 - Section 3, details the pre-existing land uses, land capability and decommissioning post-mining.
- The Back Creek Diversion has been a development that is subject to conditions in the EA EPML00841513, Water Licence 104534, and Development Permit 606304 with separate rehabilitation planning and requirements to the mine. **Attachments 6-9** detail those. This includes a specific revegetation management plan.
- **Attachment 3 Environmental Management Overview Statement (EMOS**) was prepared for the mining approval that detailed the environmental commitments made including rehabilitation planning and post-mining commitments. The EA (EPML00841513) is the dominant approval conditions document since it was transitioned from MIN100395406 in 2013. This document is still used for reference.
- Regional Land Suitability Frameworks for Queensland (DNRM and DSITIA, 2013), in particular, Section 7 Suitability Framework for the Western Downs, Balonne and Maranoa area.

Documents above are reference documents for land outcomes at Commodore Coal Mine.

Refer to **Attachment 4 Millmerran Power Project Impact Assessment Statement). See: Volume 1 – Section 3: Land Resources, Volume 2 – Appendix G, Supplementary Report – Section 3.8).**

2.2 COMMUNITY CONSULTATION

2.2.1 IAS COMMUNITY CONSULTATION

A comprehensive community consultation process was conducted in 1998 for the project IAS.

Refer to **Attachment 4 Millmerran Power Project Impact Assessment Statement, Volume 1, Section 13 and Volume 2- Appendix L** for details.

This community consultation process included public meetings and community forums, a telephone survey, meetings with all affected landowners, neighbours, the Millmerran Community and presentations to six councils. Aboriginal cultural groups were approached separately, and this culminated in the Cultural Heritage Agreements and subsequent studies. Non-government and government agencies were also consulted. This consultation was around all aspects of the combined power station and mine project and included the public consultation period for the IAS. The IAS included components on rehabilitation, decommissioning and post mining land use planning that could be commented on. It gave stakeholders an opportunity to provide input into the planning of the project.

- The consultation process incorporated one-on-one consultation with directly affected landowners, presentations, information evenings, community forums throughout Darling Downs, a community hotline, and a statistically valid survey with a sample of 300 randomly selected respondents stratified to ensure that at least 50 completed interviews were obtained from each of the 6 LGAs.
- Phase 1 consultation concentrated on those landowners and community member most likely to be directly impacted by the project.
- Phase 2 incorporated consultation with the landowners adjacent to the project site and the peripheral and broader communities of the Darling Downs.
- A full report of consultation is enclosed in the *Report on Community Consultation for Millmerran Power Project, Phase 1 and Phase 2* (Annie Barkl & Associates, 1998)
- A telephone survey was conducted on the Darling Downs from 1st to 5th of October 1998. A register of the anonymous consultation is in Appendix L of the IAS.

- A Consultation Log (1998-2000) for the IAS was made that included the name, Company (if applicable), type of communication, date/time, comments/issues, actions and notes were kept. A copy of this has been provided to DES to protect the private information contained in the log.
- 144 people attended forums.

The concerns raised regarding this project included its impact on the environment, weeds in agricultural lands, air quality, groundwater, disruption to community, and the impact of supplying water from Wetalla Sewerage Treatment Plant (STP) on irrigators and other operators on Gowrie Creek (which is located near Toowoomba).

Furthermore, for completeness with regards to consultation on PMLU's, during public consultation "*It was suggested that instead of backfilling the mining pit, all the overburden and ash could be used to form artificial hills and ridges. This would leave a large hole which could be used as a lake, leaving the area as a tourist destination after mining has finished*."- From **Attachment 4 Millmerran Power Project Impact Assessment Statement, Volume 1, Table 13.3.** This has never been taken into consideration, however was raised again by the same neighbour to the project in 2021.

A final void, of 40Ha, was approved (Refer to Maps in current EA), however it has been determined that the final void can be non-water bearing and be incorporated into an undulating final landform. A review of mining operations and rehabilitation does indicate that there appears to be an abundance of topsoil available and design of mine contours to reduce final voids is now incorporated into mine planning.

The purpose of the Supplementary Report to the IAS was to address comments submitted during the public comment period. The **Supplementary IAS – Section 3.8 (Attachment 4 Millmerran Power Project Impact Assessment Statement)** notes:

- Section 3.6 of the IAS and Section 3.2 (Commitment 3) of the EMOS (**Attachment 3 Environmental Management Overview Statement (EMOS)** indicate that post-mine land use will be grazing.
- Grazing has been chosen as the post-mine land use (**Section 3.6 of the IAS**) following extensive community consultation. In community forums, the community did not object to the return of productive, agriculture use of the land, rather than flora, fauna and aquatic park, recreational area and golf course.

2.2.2 PROJECT COMMITMENTS

The EMOS contains a summary of all the commitments made by the project during community consultation for the project including: pre and post mining land use as well as capability, rehabilitation design, topsoil management, revegetation, rehabilitation, decommissioning, waste overburden characterisation and management, water resources and more. Refer to **Attachment 3 Environmental Management Overview Statement (EMOS)**.

2.2.3 OFFICE OF THE CO-ORDINATOR GENERAL

After the public consultation period ended, Commodore Mine received approval from the Co-Ordinator General on the 24th April 1999.

Remarks around rehabilitation, by the Office of the Co-ordinator General in the Impact Assessment Study Review Report (s.3.3.2), are as follows:

"*The major impact on land resources will result from the mining operations. InterGen has committed in the Environmental Management Overview Strategy, (EMOS) for the mine to rehabilitate disturbed land to a grazing as a minimum. The project will result in a downgrading of approx. 700ha of land from agricultural to grazing use. The rehabilitation plan has been reviewed and accepted by Department of Natural Resources*

(DNR) and Department of Mines and Energy (DME). The nature of the mining operations will permit progressive rehabilitation of the land."

Following consultation with the Environmental Protection Agency (EPA) and the Environment Australia (EA), the rehabilitation plan was amended to include the establishment of new vegetation corridors on the mining area which will provide links between the undisturbed remnant vegetation. This will improve the conservation value of the new and retained vegetation."

No other recommendations were recorded for the mine rehabilitation. Refer to section 2.1.3 Commodore Coal Mine for the Coordinator Generals remarks on ash burial.

2.2.4 ONGOING CONSULTATION

To ensure a link to the community, buffer areas and non-mining area within ML50151 and the land owned by the project is occupied by local landholders under a licence to occupy (LTO) for agricultural activities. Fencing and agricultural activities take place, to this day, in consultation with all users of the lands. Additionally, in consultation with the Kambuwal Aboriginal Corporation with whom there is a cultural heritage agreement for the project, a post mining procedure was provided in a letter of their expectations. See **Attachment 5 Kambuwal Aboriginal Corporation** , for detail on returning artefacts to the land post mining and expectations with the future of the "Keeping Place" where artefacts and heritage are stored.

The Millmerran Power Project regularly hosts visits from local representatives including Toowoomba regional Council representatives (Councillors) and State MPs. These meetings and visits are designed to ensure links are made to the representatives of the local area. A mining lease application for surrounding lands is proposed in the next few years (part of MDL299 and MDL301). This shall be a voluntary EIS process with community consultation where additional consultation can be undertaken and changes to community views measured. It is also an opportunity to review learning and practices over the last 20 years and incorporate the practical findings with the continued mining operation and planning.

2.2.5 COMMUNITY CONSULTATION PLAN

Trigger	Consultation	Stakeholders
Under normal operation	As needs basis. Quarterly in Millmerran Newsletter	Neighbours, tenants, land occupiers for agricultural purposes, contractors, mine and power station personnel. Government Authorities Local Government Local Community
No EA Breaches	Normal everyday consultation for operational purposes with project employees/contractors, local occupiers of the land and neighbours	Neighbours, tenants, land occupiers for agricultural purposes, contractors, mine and power station personnel.
Minor change to Operations	Consult vicinity affected neighbours, tenants and occupiers of the land in one-on-one if anticipated changes will affect environmental values.	Neighbours, tenants, land occupiers for agricultural purposes, contractors, mine and power station personnel.
Substantial/Noticeable Change to Operations PRCP, ERC or EA	Notification in local newsletter Consult neighbours, tenants and occupiers of the land	DES Neighbours, tenants, land occupiers for agricultural purposes, contractors, mine and power station personnel.
Complaint	One on One Complaint Register	Complainant DES Commodore Coal Mine Consultants MPP and shareholders
Licence to Occupy tender period every 5 years (from Dec 2020)	Advertise land tender in local media and notification in local newsletter. Consult with current occupiers of land.	Current occupiers of land. Neighbours
Rehabilitation on Back Creek Diversion	Inspections and consultation	Kambuwal Aboriginal Corporation DES DNRME Local Community

2.3 POST-MINING LAND USE (PMLU)

Commodore Mine PMLU options are continually assessed and reconsidered as the mine advances to adaptively manage the landscape. An assessment of the existing and post-mining land options was undertaken in the project IAS (**Attachment 4 Millmerran Power Project Impact Assessment Statement). See: Volume 1 – Section 3: Land Resources, Volume 2 – Appendix G, Supplementary Report – Section 3.8).**

Attachment 3 Environmental Management Overview Statement (EMOS), recorded the commitments from the project **IAS in section 3.2.2 - Post-Mining Land Use**: "*It is proposed that after mining ceases, the rehabilitated land will be suitable for grazing. The recontoured landform will be similar to that at present, with low, grass-covered slopes. The feasibility of returning land to cropping will be investigated*." A commitment was made that "*Land will be progressively rehabilitated to be suitable for grazing. Alternative land uses will be investigated*."

From the project IAS (**Attachment 4 Millmerran Power Project Impact Assessment Statement) – Volume 1**), executive summary: "*The mine will be rehabilitated to a land form similar to that occurring at present and will be suitable for grazing use after mining ceases. The landform will be based on gentle slopes draining to ponds, to contain water. The mined area will be returned to within an average of 1-2 m of the existing land surface. The only elevated area will be an out-of-pit dump, which will be up to 20 m above the existing surface level. This will blend into the hills on the Western side*." From the current design the central eastern section of the mine has a final landform 10 to 12m below the current topographic level. This design removes the final water holding void to create a surface water draining landscape and undulating landform. The original design is consistent with the current design where the central crib hut area on the western side is around +16-18m above original topography.

"*Ash from the power station will be returned to the mine pit with the overburden prior to rehabilitation. Hence, there will be no ash dams as occur at other power stations*." The current design is also consistent with the ash descriptions from the IAS.

Attachment 2 Commodore Coal Mine Rehabilitation Completion Criteria, describes in **section 2.3** the PMLUs planned for post-mining at Commodore Coal Mine and the criteria required to achieve those PMLUs to a safe and stable level. PMLU's described are:

- Residual void (*no longer required*)
- Re-contoured spoil area (*grazing and wildlife corridor native ecosystems*)
- Sediment Dams (*water storage*)
- Creek Diversion (*native ecosystem*)
- Infrastructure (*permanent infrastructure*)

The current EA EPML000841513 – Schedule F – Land, has specific criteria relating to the final rehabilitation on site. **Attachment 2 Commodore Coal Mine Rehabilitation Completion Criteria** is consistent with the EA conditions and details the steps and criteria to meet those conditions.

In accordance with the EA, Commodore Mine Completion Criteria, the EMOS and project IAS, the final PMLU will be rehabilitated to grazing (land capability class) as a minimum, and most dams will be retained for agricultural purposes. These dams are built in undisturbed ground not spoil. The grazing areas will not hinder the progress of native wildlife and contain a mixture of grazing and treed areas.

Pre and post-mining land use and capability are described in **Attachment 4 Millmerran Power Project Impact Assessment Statement** – Section 3, and Supplementary Report – Section 3 as capable of grazing and cropping.

2.3.1 POST-MINE LAND CAPABILITY CLASSIFICATIONS

The Post-Mine Land Capability Classifications detailed in Table 5 refer to the specific agricultural uses appropriate to the designated area (DSITI & DNRM, 2015). With reference to areas that have already been progressively rehabilitated at the mine, the classes are identified and defined as:

- Class IV: "land primarily suited to pastoral use but which may be safely used for occasional cultivation with careful management";
- Class V: "land which in all other characteristics would be arable but has limitations which, unless removed, make cultivation impractical and/or economic";
- Class VI: "land which is not suitable for cultivation but is well suited to pastoral use and on which pasture improvement involving the use of machinery is practicable";
- Class VII: "land which is not suitable for cultivation but on which pastoral use is possible only with careful management. Pasture improvement involving the use of machinery is not practicable"; and
- Class VIII: "land that has such severe limitations that it is unsuitable for either cultivation or grazing".

2.3.2 Final Site Design

The mine's plan for post-mining land use is in accordance with the EA. These include:

- Grazing with wildlife corridors;
- Creek and floodplain areas; and
- Water storages.

The Total disturbed area is to 1958.7 ha. The final land use and approval schedule domains are detailed in Table 3 - Final land use and approval schedule for the Mine .

Table 3 - Final land use and approval schedule for the Mine

Disturbance type	Disturbance area (ha)	Pre-mined land description	Post-mined land description	Pre-mine land classification	Post-mine land classification
Residual void	0	Predominantly grazing with some cultivation	Possible water storage	II-IV	VIII
Re-Contoured spoil area	1658.6	Predominantly grazing with some cultivation, as well as Back Creek system and local roads	Grazing with wildlife corridors	II-IV VIII (creeks and roads)	IV (in pit) IV-VII (out of pit)
Sediment dams	47.6	Predominantly grazing with some cultivation	Water storage	II-IV	VIII
Creek diversion	195.4	Predominantly grazing with some cultivation and local roads	Creek and floodplain	II-IV	IV-VIII
Infrastructure	5.1 Buildings 50.8 Roads	Predominantly grazing with some cultivation	Infrastructure	II-IV	VIII
Regulated structures	All areas described during operations	Predominantly grazing with some cultivation, as well as Back Creek system and local roads	Grazing with wildlife corridors or possible water storage	II-IV	VIII

The rehabilitated landform design is based on gentle slopes of less than 5° for the in-pit dump and less than 10° for the out-of-pit dump. Around the ROM area, steeper hills less than 60° are approved in the EA. The ROM infrastructure is an asset under the power station infrastructure (including the conveyor), however the ROM stockpile area will be smoothed and rehabilitated as part of the mine rehabilitation. Final landform will be based on an undulating landform typical of the surrounding landscape.

A key part of the rehabilitation process to reduce the need for mine voids and to allow the construction of undulating areas, the Millmerran Power Station recycles/reuses the ash in two main distinct methods, 1) as mining void backfill to minimise the depressed landform and 2) through the concrete and cement industry (bound applications).

See Figure 18 - Final Site Rehabilitation Design for the PMLUs of the final site design as well as the flood limits. See Figure 19 - Final Site Landform Design Topography and Catchments for surface water management.

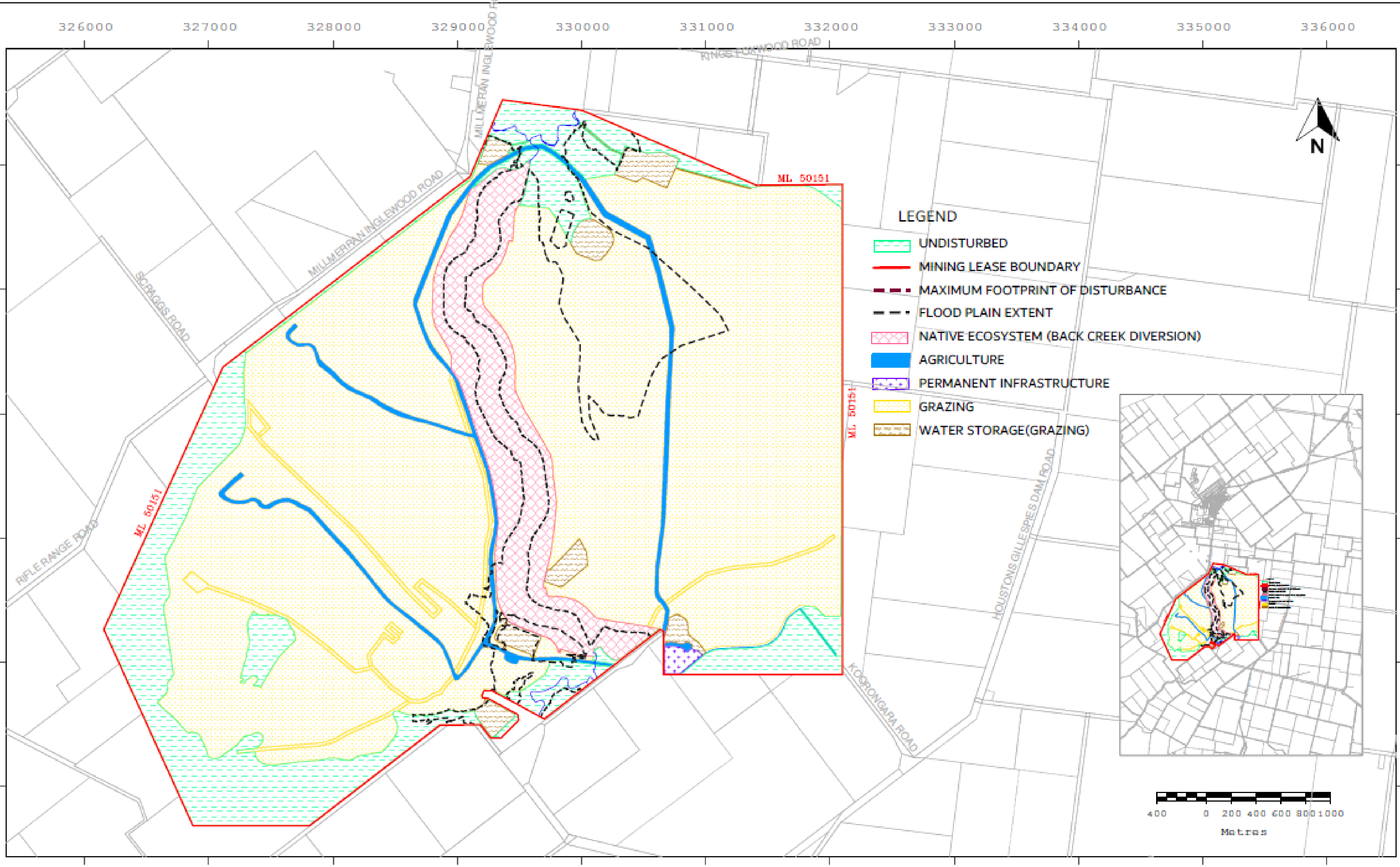


Figure 18 - Final Site Rehabilitation Design

COMMODORE COAL MINE

Final Site Design

PRCP 2021	
Plot File Name:	EPML00841513_PRCP_FSD_27082021.vpgz
Date: 27 08 2021	Scale: 1:30000 AMG84 ZONE 56

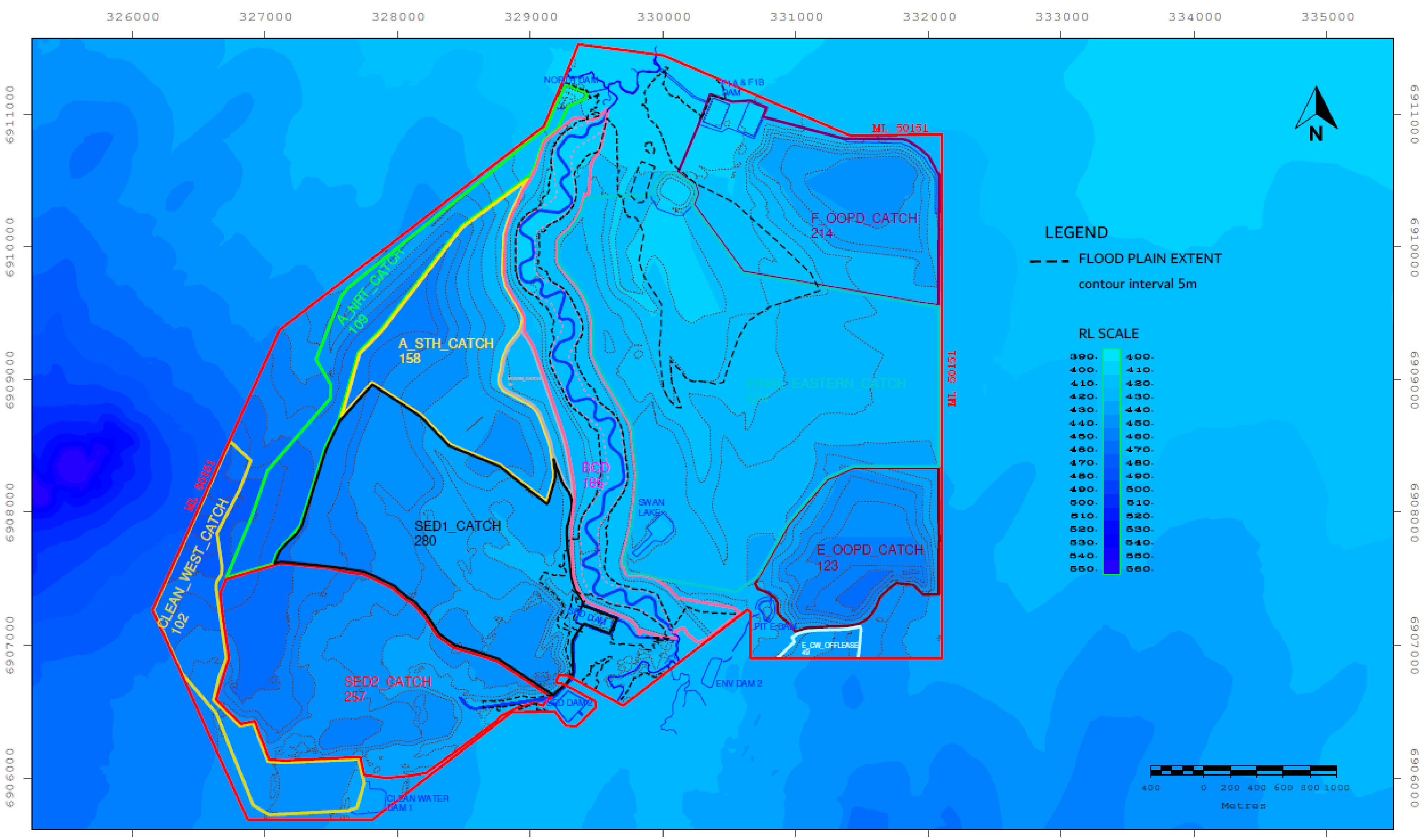


Figure 19 - Final Site Landform Design Topography and Catchments

COMMODORE COAL MINE

FINAL LANDFORM WATER MANAGEMENT

PRCP 2021

Plot File Name: EPML00841513_PRCP_WM_27082021.vpgz

Date: 27-Aug-2021

Scale: AMG84 ZONE 56 1:27500

2.3.3 WATER MANAGEMENT INFRASTRUCUTRE

The water management infrastructure consisting of dams, contour drains, sediment traps currently used at the mine, that will not be removed by progressive mining, will be converted to cattle and agricultural purpose dams, these dams are routinely inspected and register of structures is maintained. Water management infrastructure has been strategically constructed in locations undisturbed by mining and in competent local clays. They have all been designed and assessed for inclusion, or exclusion, in the regulated structures register on site and are deemed low risk following the QLD guideline, *Structures which are dams or levees constructed as part of environmentally relevant activities* (DES, *ESR/2016/1934*, 2019). Other water infrastructure such as sediment traps and drains will be smoothed out with final landforming or used to manage surface water in an agricultural sense (I.e. contour drains will remain to slow water across the landscape). Surface water will be redirected to natural watercourses once all rehab in the catchment is certified or has achieved suitable approved cover post-mining.

Current site EA (EPML00841513, has model mining conditions associated with regulated structures. The site water management infrastructure has been assessed according to these conditions and future water management infrastructure is designed in accordance to EA conditions.

Commodore Mine has no tailings dams. Due to the unique design and operation of the Millmerran Power Project, one of the sustainability design features was to design the power station operational performance in line with the Commodore Mine coal quality. This design feature ensures that the coal resource can be utilised with minimal processing or the requirement to have a coal wash plant or tailings dams on site. Additional to this design, the Millmerran Power Project also utilises “dry” ash storage/burial method as opposed to traditional ash slurry dams. These two unique design features reduce legacy water management issues.

2.3.4 PHYSICAL INFRASTRUCUTRE

The existing mine office and workshop sheds will remain for use post mining as a base for final works and finally as an agricultural homestead post rehabilitation. All transportable infrastructure will be removed such as the explosives magazine area. The washdown bay will remain for biosecurity uses. The fuel bays will be removed and rehabilitated. Roads will be used for agricultural purposes or will be removed and smoothed with final landforming post mining. Useful infrastructure not past its end-of life (eg. Tanks.) will remain for post mining use. Some permanent infrastructure will be removed, such as: fill point, water release points and permanent water monitoring equipment. Some fencing, such as the fence around the explosives storage area, or those fences not required post-mining, will be removed. As rehabilitated areas reach sufficient improvement, and are safe and stable, fencing for the final land use will be installed. Many existing fences will remain post-mining, for example: boundary fencing. See **Table 4 -** Permanent Infrastructure List for each item and a description of post-mining use or removal.

Risks of hydrocarbon contamination areas include the work shop, bioremediation/hydrocarbon remediation pad, fuel farm, wash bay, blast reload area. These will be investigated for contamination post mining and treated on site or disposed of as regulated waste.

The ROM area will be decommissioned as an asset under the power station infrastructure (including the conveyor), however the ROM stockpile area will be smoothed and rehabilitated as part of the mine rehabilitation.

Table 4 - Permanent Infrastructure List

Built Infrastructure Item	Description
Current Office/admin area	Current Office Building and pre-start shed can be converted to residential style house area with outside open entertaining area. The undercover parking can be maintained for agricultural equipment and vehicle/visitor parking.
Site Access Roads	Various light vehicle roads to be maintained as vehicle access. The bitumen entrance will be maintained for access to the residence.
Washdown Area	To be maintained for biosecurity reasons for agricultural PMLUs.
Workshop	To be maintained post mining as a workshop and shed for agricultural equipment. Some redesign may occur.
Transportable Buildings and equipment	All transportable buildings and equipment will be removed from site unless explicitly required for agricultural uses (eg. Transportable pipelines may be repurposed for inter dam water transfer).
Explosives Magazine	Fences and bunds will be demolished and smoothed. All transportable containers removed. Area will then be rehabilitated.
Fuel bays and fuel farm	These areas will be demolished and investigated for hydrocarbon contamination. Pending the results of the investigation, contamination will be remediated, and the area will be rehabilitated.
ROM Stockpile	Area will be smoothed and rehabilitated. NOTE: Physical infrastructure will be decommissioned with the power station and conveyor.
Fire & Water Services	Any physical infrastructure deemed at end of life will be removed. Water tanks and systems that are still serviceable will be used for agricultural purposes. Some redesign may be required for this activity. The fill point for water trucks will be demolished.
Water monitoring Infrastructure	All water monitoring bores, release points and water monitoring points will be decommissioned and rehabilitated.
Fencing	Typically fencing will be retained post mining and fencing will be installed progressively with rehabilitation to meet PMLU requirements. Some permanent fencing will be removed such as that around the explosives magazine or workshop.
Water Management Infrastructure	All dams constructed outside of mined areas will be retained for post-mining agricultural water storage dams. Some sediment traps, contours, drainage channels or water management structures may not be required post-mining and will be smoothed and rehabbed with final rehabilitation planning.

Commodore Mine has an approved **Commodore Coal Mine Rehabilitation Completion Criteria** required under the EA (Section 3 of Attachment 2 Commodore Coal Mine Rehabilitation Completion Criteria). This is the main land outcome document relating to rehabilitation at Commodore Coal Mine.

The rehabilitation goals for the Mine are for the post mining landscape to be:

- Safe;
- Stable;
- Sustainable; and
- Suitable.

Key Points for Rehabilitation:

- Commodore Mine is a low strip ratio coal mine (of 3-4:1), meaning the pits are generally only 25 – 40m deep. This assists in future safety, as the subsidence within the mining area will be minimal.
- The strip-mining process allows for progressive rehabilitation to occur following the mining process (see **Figure 21 - Mining process from topsoil stripping to replacement.**).
- A 3rd party consultant specialising in mine rehabilitation undertakes monitoring of Commodore Mine annually
- Analogue (original) and rehabilitation sites are monitored and compared back to the original intent of the rehabilitation.
- Topsoil stocks and mining method allow for sufficient replacement of topsoil for rehabilitation use. This will be guided by the Topsoil Management Plan.

The Back Creek Diversion has a particular set of design requirements which can be reviewed in **Attachments 6 to 9.** These documents are part of a suite of approval documents from the EA, Water Licence 104534, and Development Permit 606304.

Attachment 3 Environmental Management Overview Statement (EMOS details environmental commitments from the EIS and the general philosophy for the site. It summarises the final land use negotiated with the community to be that of grazing, which is similar to pre-mining land use.

2.3.5 CONSISTENCY WITH LAND PLANNING

The mine is surrounded by Western Downs Strategic Cropping Land (SCL). See **Figure 20 - Western Downs SCL Areas around Commodore Mine**. SCL areas are in green, and orange is Western Downs zone of the Western Cropping areas (QLD Globe, 2021).

Toowoomba Regional Council Planning Scheme V26 lists the area as R1 (Rural,100ha) and Extractive Resources. The post mining land use outlined in this document are consistent with this scheme.

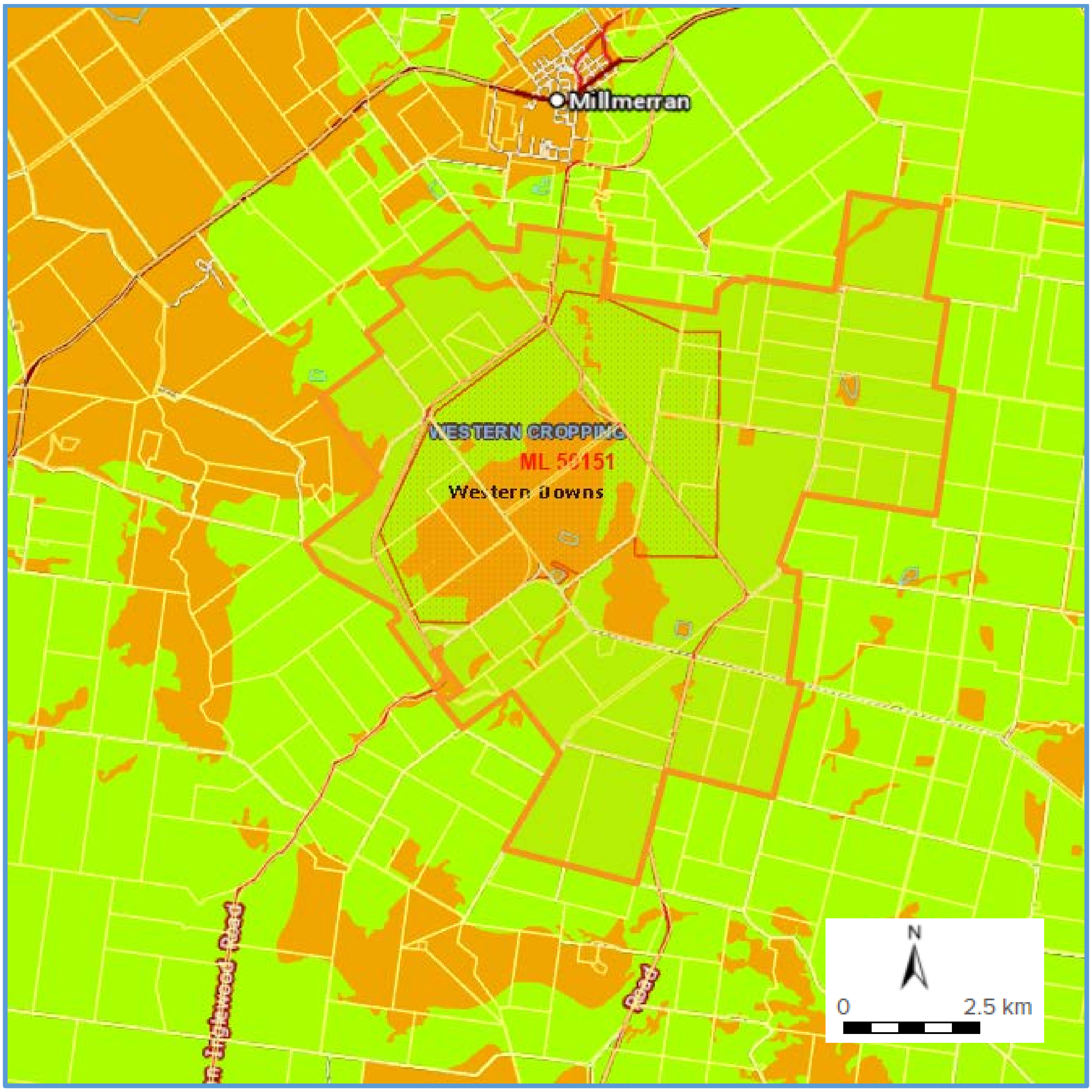


Figure 20 - Western Downs SCL Areas around Commodore Mine

The current Queensland Land Uses within the SCL areas are primarily grazing modified pastures, grazing native vegetation and cropping. See **section 3.4.3** for an A3 map of the local land uses.

The PMLU’s identified in the IAS and rehabilitation completion criteria are all consistent with the Queensland Land Uses around the mine and from pre-mining.

2.4 NON USE MANAGEMENT AREAS

No Non-Use Management Areas (NUMAs) are proposed. A final void, of 40Ha, is approved (Refer to Maps in current EA), however it has been determined that the final void can be non-water bearing and be incorporated into an undulating final landform.

No condition conversion application proposed.

2.5 REHABILITATION MANAGEMENT METHODOLOGY

Figure 21 - Mining process from topsoil stripping to replacement.

The coal resource and mine plan guide the progression of proposed rehabilitation and methodology. A description of the methods to be followed to meet rehabilitation milestone is in section 2.5.4.

Several procedures and management plans are maintained by the mine contractor for the management of rehabilitation and the management of water run-off. The EA requires a topsoil management plan be approved and followed on site. Refer to **Attachment 1 Commodore Coal Mine Plan of Operations 2019-2024 f**or rehabilitation planning and management.

Current EA EPML00841513 conditions for ML50151 considers other areas of potential impact to environmental values for air and dust emissions, land management, noise management, waste, surface and groundwater.

2.5.1 COVER SYSTEM DESIGN

Landloch were engaged to develop a Cover Design for Commodore Mine. This involved:

i. Reviewing growth medium and cover thickness studies for the site.
ii. Assessing gradients and slope heights for rehabilitated landforms and comparing those with the surrounding landscape.

iii. Erosion modelling using the Revised Universal Soil Loss Equation (RUSLE) (Renard et al. 1997[7]) to assess vegetative cover levels required for slope stability.
iv. Interpreting the information collected and preparing this report.

COVER DESIGN OBJECTIVES

Typically, cover systems are required to address two key objectives:

a) Support the designated target vegetation community and meet land use objectives; and
b) Be stable to erosion.

In this case, there is an obvious linkage between the two requirements. Soil surfaces that support a high level of vegetation cover are typically stable to erosion and are also likely to meet requirements for successful return to a grazing land use.

There is already evidence from existing rehabilitation (and its monitoring) that grazing targets are being met (see Rehabilitation Reports Attachment 13 & Attachment 14). This section considers requirements for cover layer design in greater detail.

LANDFORM STABILITY

A range of factors can influence rates of erosion of rehabilitated batter slopes, including:

- Rainfall erosion hazard in the local area;
- Soil erodibility;
- Batter height;
- Batter length; and
- Vegetation cover.

For those factors, the Revised Universal soil Loss Equation (RUSLE) (Renard et al. 1997[7]) can be used to assess erosion potential of a site. Its application is described below.

In considering rehabilitated slopes at Commodore Mine, available data indicate:

- Rainfall erosivity of 1862 (SI units of MJ mm $ha^{-1}h^{-1}$)[8]
- Soil erodibility factor of 0.039 (SI units)[9]
- Maximum Length/Slope (LS) factor of 6.53[10]
- Cover factors of 0.004 and 0.001 for grass cover levels of 80% and 95% as reported by rehabilitation monitoring studies
- Practice (P) factor of 1.0.

Estimates of maximum gradient and height (length) of rehabilitated batters are based on data provided for the final project landforms (See Figure 22 to Figure 26Figure 22 - Distribution of gradients on the proposed final

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[7] Renard, K.G., Foster, G R., Weesies, G.A., McCool, D.K., and Yoder, D.C. (1997). *Predicting soil erosion by water: A guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE).* US Department of Agriculture, Agriculture Handbook No. 703. National Technical Information Service, Springfield, Virginia.
[8] Based on data for Dalby and Pittsworth in Rosenthal, K.M. and White, B.J. (1980). *Distribution of a rainfall erosion index in Queensland*. Division of Land Utilisation Report 80/8.
[9] Based on data for a grey clay on the Darling Downs of similar texture to site soils, reported by Freebairn, David & Silburn, David & Loch, Robert. (1989). *Evaluation of three soil erosion models for clay soils.* Australian Journal of Soil Research - AUST J SOIL RES. 27. 10.1071/SR9890199.
[10] Based on gradient of 20%, batter height of 30 m, and slope length response in RUSLE 1.06 of low rill/interrill ratio.

mine landform, showing quadrants.), which show gradients of rehabilitated batters are typically 10 – 15% gradient, with some small areas at 20%. The figures also – generally – show batter slopes with maximum heights of 20 m. However, for the purposes of the RUSLE calculations, the highest slope gradient and a greater height of 30 metres were adopted.

The RULSLE calculations show predicted long-term average erosion rates for that maximum batter slope gradient and height of 1.9 t/ha/y for 80% vegetative cover, and 0.5 t/ha/y for 95% vegetative cover. These values are considerably lower than the proposed tolerance value for rangeland of 4.5 t/ha/y (Wight and Siddoway 1979[11]), and strongly support the conclusion that – for this site – **batter slopes with grass cover of 80% or greater will be stable over the long term**.

These estimates are consistent with the observations reported from site monitoring, which have not reported any significant erosion on revegetated slopes carrying similar levels of vegetative cover (Attachment 13 & Attachment 14).

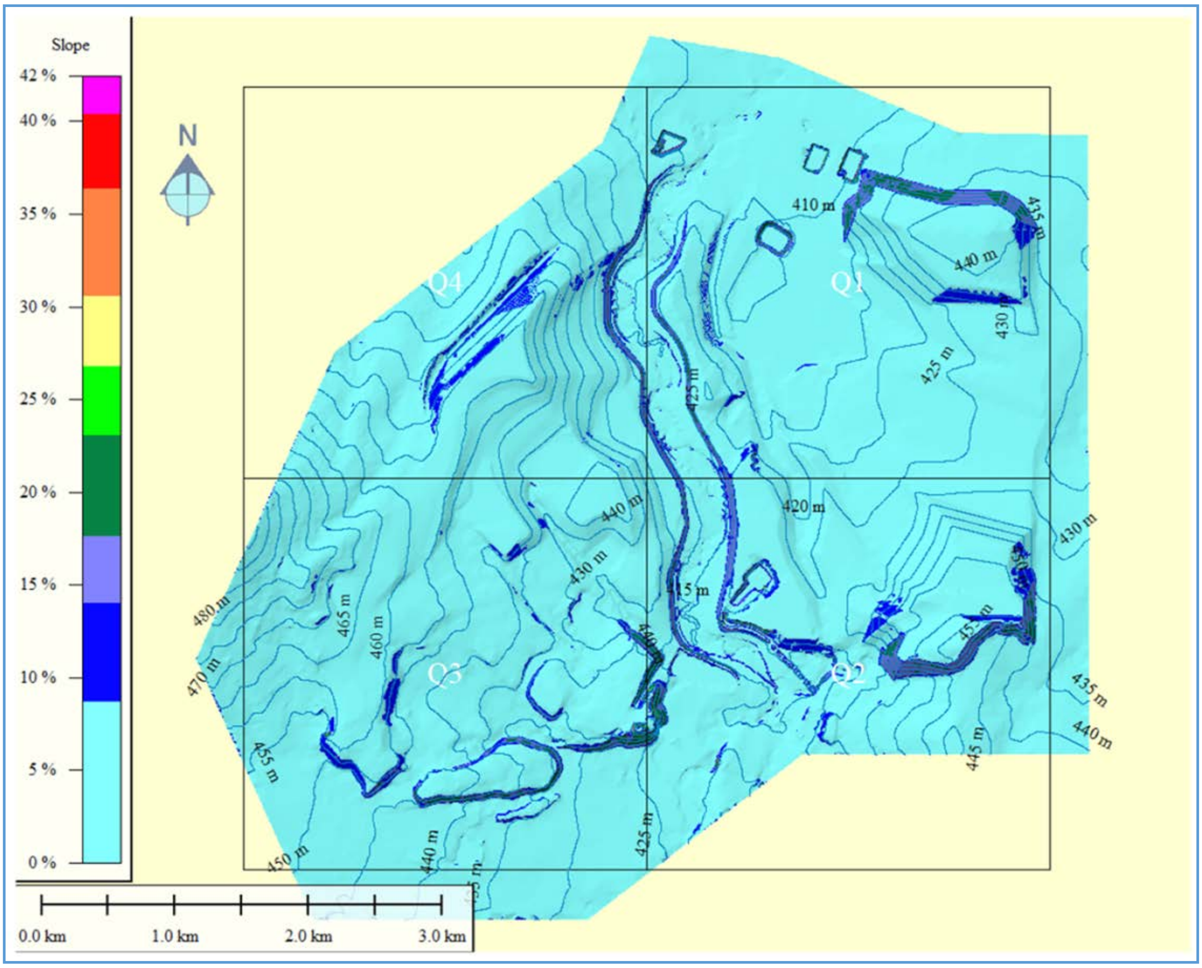

Figure 22 - Distribution of gradients on the proposed final mine landform, showing quadrants.

[11] Wight, J.R. and Siddoway, F.H. (1979). Determinants of soil loss tolerance for rangelands. In "Determinants of Soil Loss Tolerance", American Society of Agronomy (ASA) Publication 45, pp. 67-74.

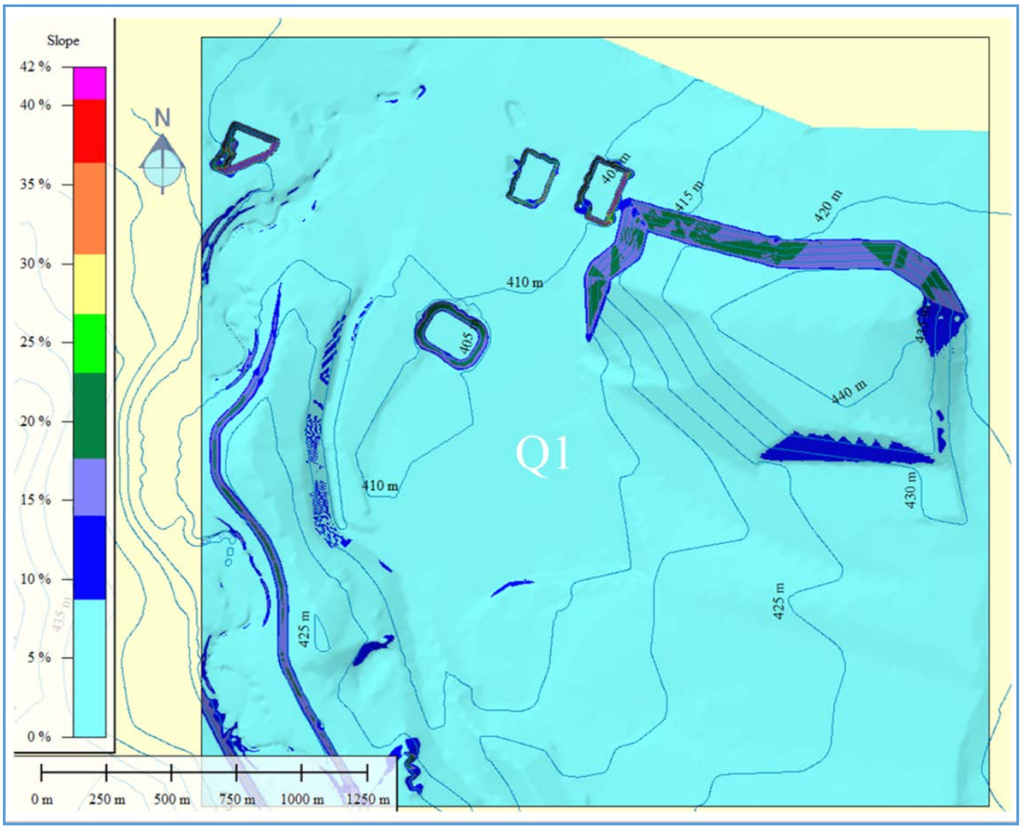

Figure 23 - Distribution of gradients on the proposed final mine landform, quadrant 1.

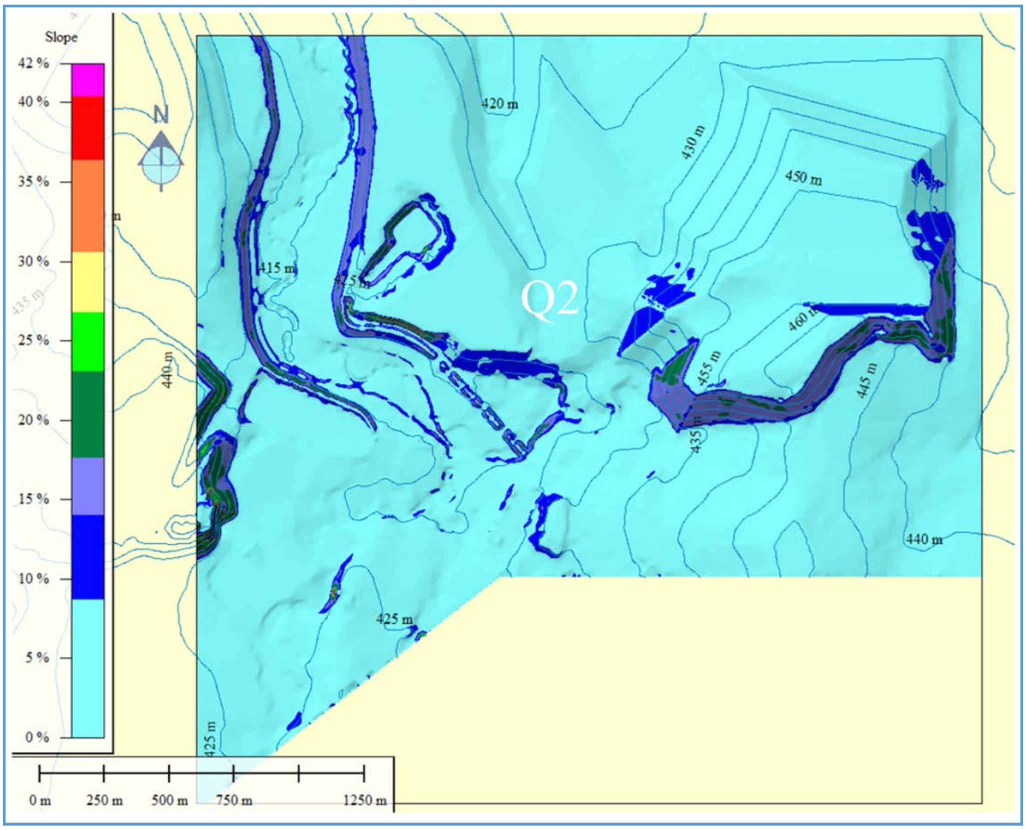

Figure 24 - Distribution of gradients on the proposed final mine landform, quadrant 2.

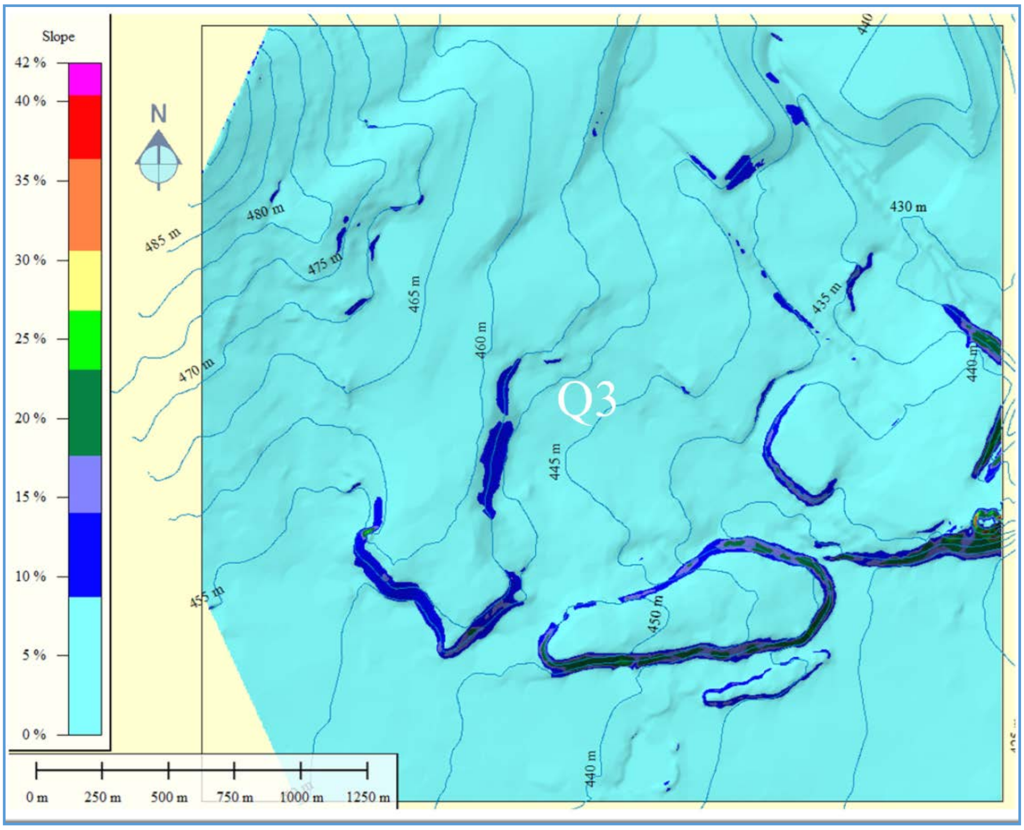

Figure 25 - Distribution of gradients on the proposed final mine landform, quadrant 3.

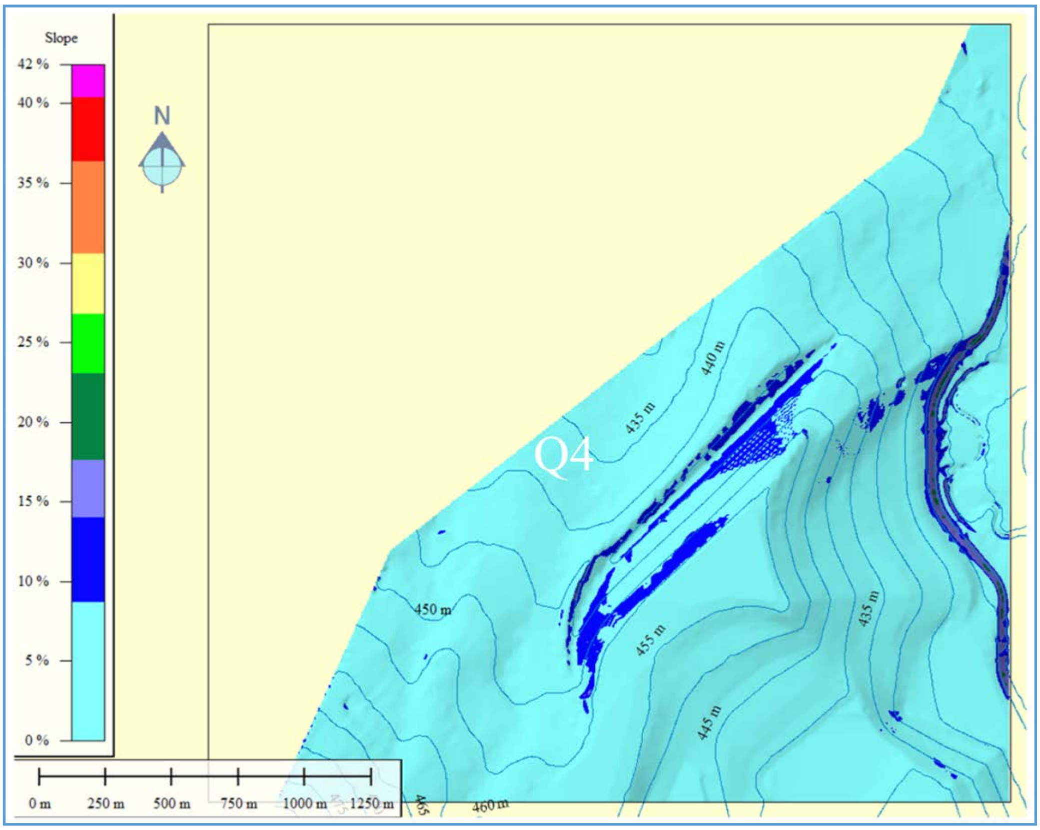

Figure 26 - Distribution of gradients on the proposed final mine landform, quadrant 4.

PASTURE PRODUCTIVITY & SUSTAINABILITY

As a general rule, pastures established on soil profiles with a minimum depth of 60 cm of clay soil are expected to suffer no limitations to productivity due to any limitation to soil water storage capacity (Shields and Williams 1991[12]). As that publication specifically considered an area 150 km north of Emerald, with higher annual evaporation and lower annual rainfall, extrapolation of that assessment to the Millmerran area is quite justified.

Assessments of both analogue and rehabilitated areas on the Commodore Mine (Landloch, 2020 - Attachment 13 & 2021 - Attachment 14) report rooting depths for both rehabilitated and analogue sites of generally >0.8 m.

Although the water storage capacity of the overburden underlying the topsoil layer would be lower than that of the clay soil, there is evidence from both recent measurements of pasture growth and quality Landloch 2020 - Attachment 13 ; 2021 - Attachment 14) and the initial study by Roberts (1996[13]) that the “soil” profiles formed using the current methods are effective and successful in producing levels of plant growth that equal or exceed those of analogue sites.

COVER SUMMARY AND STRATEGY

In terms of design of a cover layer for rehabilitated sites on the Commodore Coal Mine, the current practice of placing approximately 250 mm of clay topsoil over overburden has been shown to be effective by both initial trials and subsequent monitoring of rehabilitated areas.

Specifically, this cover:

- Produces sufficient surface vegetative cover to reduce potential erosion on batter slopes to a very low and sustainable level; and
- Generates pasture growth of quality and quantity sufficient to support a stocking rate higher than that of appropriate local analogue sites.

Because both topsoils and wastes are of reasonably consistent properties, this cover layer design can be applied (with some amendment of specific issues that may arise) as a general and continuing rehabilitation methodology.

2.5.2 REVEGETATION PRACTICES

A Revegetation Management Plan has been developed for Commodore Coal Mine. **See Attachment 11 MPP Revegetation Plan 2021.** The existing rehabilitation methods are based on the methodology detailed in the EMOS (**Attachment 3**). Revegetation practices for all types of land will normally consist of:

- Respreading topsoil to an average depth of 250 mm;
- Respreading of cleared vegetation on rehabilitated areas;
- Contour deep ripping to 500 mm depth;
- Seeding with an appropriate mix of locally sourced grasses (The current mine mix is detailed in Table 5);
- Establishment of corridors and clumps of native trees and shrubs to provide protection for cattle and native fauna; and
- Application of appropriate fertiliser for plant establishment where required.

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[12] Shields, P.G. and Williams, B.G. (1991). *Land resource survey and evaluation of the Kilcummin area*, Queensland. Qld Dept Primary Industries, Publication QV91001.

[13] Roberts, B.R., and Russel, M.J. (1996). *Revegetation of Coal Mine Spoil Using Pasture of the Darling Downs of Queensland, Australia*. Reclamation and Revegetation Research, 5 (1996) 509-519.

Table 5 - Commodore Coal Mine Rehabilitation Seed Mix provided by Downer Group Mining.

Common Name	Species	Volume of total seed mixture (%)
Reclaimer Rhodes	*Chloris gayana*	20
Bambatsi Panic	*Panicum coloratum var. makarikariense*	16
Bisset Creeping Blue	*Bothriochloa insculpta*	24
Medix Mix	*Medicago sp.*	4
Burgandy Bean	*Macroptilium bracteatum*	8
Lucerne	*Medicago sativa*	8
Jap Millet	*Echinochloa esculenta*	20

A weed management plan will also be implemented as part of the revegetation methods and is included in the Revegetation Management Plan (Attachment 11).

2.5.3 GROWTH MEDIA SUITABILITY AND AMELIORATION

The materials encountered were classified as either primary or secondary growth media, according to their ability to support plant growth.

PRIMARY GROWTH MEDIA

Primary growth media infers the ability of materials to be used as a topsoil or topsoil surrogate.

It is the upper-most layer of soil/material placed over the rehabilitated area. In many situations it will be up to 0.3 m deep and consist of surface soil (topsoil) materials recovered prior to mining.

Compared to subsoil and overburden materials, it is typically higher in organic matter and micronutrients, and has low to negligible limitations to plant growth.

SECONDARY GROWTH MEDIA

Secondary growth media infers the ability of materials to be used as a substrate or substrate surrogate.

It may consist of the waste/spoil material being capped with the primary growth media or an intermediately layer placed on the waste/spoil material, and then capped with primary growth media.

The prime purpose of the secondary growth media is to increase the soil water storage capacity of the soil profile and/or to meet the soil depth criterion for certain vegetative post-mining land uses and target vegetation communities.

In some circumstances, it may be improved by the addition of amendments (e.g. gypsum, lime, organic matter) to convert it into a primary growth media. However, the cost and practicability of such amendments are often prohibitive.

SUITABILITY CLASSIFICATION

A four-class suitability system is applied in the evaluation of materials as growth media. These classes are defined as follows:

- Class A – Good Quality
  - Negligible limitations to plant growth.
  - Good quality material for intended purpose.
  - Nil to low levels of amendment will be required.

- Class B – Fair Quality
  - Minor limitations to plant growth.
  - Reasonable quality material for intended purpose.
  - Low to moderate levels of amendment may will be required.
- Class C – Marginal Quality
  - Moderate limitations to plant growth.
  - Moderate to high levels of amendment may be required to improve material quality to support plant growth.
- Class D – Not Suitable
  - Severe limitations to plant growth.
  - It will generally be uneconomic or unviable to amend materials to the degree needed to support plant growth.

Suitability of materials as primary or secondary growth media is presented with recommendations, and fertiliser and ameliorants rates, in Table 6.

FERTILISER AND AMELIORANTS

The recommended fertiliser and amendments rates (Table 6) aim to provide:

- Phosphorus (Colwell) content of the topsoil to within a target concentration of 25–40 mg/kg. This is recommended for healthy grassland ecosystem development during establishment.
- An appreciable source of starter nitrogen;
- Adequate macro and micro-nutrients;
- Reduced potential for dispersion; and
- A reduction in the high pH of spoil material.

Table 6 - Fertiliser and ameliorant treatment rates for materials and growth media suitability classification.

Material	Limitations	Amendments	Growth Media Suitability (Classes)	
			Primary (1)	Secondary (2)
Non-sodic topsoil	• Sometimes moderately alkaline. • Low nitrogen, available phosphorus, calcium and sulphur.	• MAP fertiliser: 300 kg/ha • Coated Urea: 100 kg/ha • Gypsum: 100 kg/ha	1A	2A
Sodic topsoil	• Moderately to strongly alkaline. • Marginally to strongly sodic. • Low nitrogen, available phosphorus, calcium and sulphur.	• Gypsum: 1-2 t/ha per 0.1 m soil depth • MAP fertiliser: 300 kg/ha • Coated Urea: 100 kg/ha	1B	2A
Spoil Material	• Very strongly alkaline. • Low to moderate ability to retain nutrients. • Low levels of calcium. • Highly sodic. • Up to 40 % coarse fragments limiting ability to retain water. • N.B. Nutrient status was not assessed.	• Gypsum: 5 t/ha per 0.1 m soil depth (If spoil is to be used as a primary growth media, further assessment is required.)	1D	2C

Notes:

Class A – Good Quality: Negligible limitations to plant growth.

Class B – Fair Quality: Minor limitations to plant growth.

Class C – Marginal Quality: Moderate limitations to plant growth.

Class D – Not Suitable: Severe limitations to plant growth.

GYPSUM

Gypsum is recommended for sodic/dispersive materials or where calcium is low. It should be applied during the soil preparation stages, in a manner that allows for as thorough mixing as is practicable of the surface materials. Gypsum should be applied prior to seeding and fertilising.

Depth of sodicity amelioration should be dependent upon erosion risk / gradient. For slopes with gradients

- less than approximately 33 % - incorporate gypsum into the upper 0.3 m of materials of sodic materials.
- Greater than approximately 33 % - incorporate gypsum into the upper 0.5 m of materials of sodic materials.

Considering the annual rainfall at the mine is approximately 660 mm, it is expected gypsum will dissolve at a rate of 0.5–1 t/ha/y. Hence, there is a benefit in applying gypsum when materials are recovered, or as soon as is practicable in the rehabilitation program.

FERTILISER

Mono-ammonium phosphate (MAP) (N: ~10 %, P: ~22 %, S: ~1.5%) has been specified as it will provide an initial source of nitrogen and phosphorus with some additional sulphur to plants during rehabilitation. Also, MAP has an acidifying effect that will reduce alkalinity of soil.

Coated Urea fertiliser (N: ~46 %) will supplement the low nitrogen levels found across all soils and is needed for healthy vegetation growth.

Fertiliser should be applied at seeding. It can be broadcast with a spreader, applied hydraulically, or pneumatically. Spreaders are typically suitable for slopes with gradients less than 33 %, and pneumatic or hydraulic applications will be required for steeper slopes.

2.5.4 Site Specific Milestone Criteria

Commodore Mine's reference milestones to certified rehabilitation post mining disturbance are listed below. Specific detailed rehabilitation milestones and criteria are in **Appendix 1 PRCP Schedule, Rehabilitation Area Milestones Tab**.

Reference milestones	Description
Infrastructure decommissioning and removal Note: ROM infrastructure is not included in the ML EA.	Disconnect and terminate services such as water, electricity and gas where not required post-mining. Remove all transportable infrastructure. Demolish any permanent infrastructure not required post-mining. Remove bitumen, blue metal, aggregate, etc. not required for roads post mining Remove fencing not required post-mining. Decommission boreholes and environmental monitoring infrastructure. Clear all waste (associated with infrastructure decommissioning).

Remediation of contaminated land	Carry out preliminary and intrusive contaminated land investigations. Removal and appropriate disposal or onsite-treatment of contaminated water/soils (e.g. affected by hydrocarbons) post-mining. Conduct validation testing to confirm that contaminated water/soils have been removed/remediated.
Landform development and reshaping/reprofiling	Finalise engineering and landform design plans in accordance with EA conditions. Bulk earthworks to achieve required landform and slopes. General reshaping and pushing/trimming to achieve final landform. Remove roads and access routes not required for agricultural PMLUs. Fill/smooth sediment traps, voids, and flatten bunding etc. not required for agricultural PMLUs. Erosion and sediment control systems installed for final landform design.
Surface preparation	Remediate any erosion or subsidence, that is identified annually, as requiring intervention by a suitably qualified person. Prepare overburden/spoil for topsoiling. Rip over-compacted overburden >200mm deep where required. Spread growth media (topsoil) as per the EA. Apply ameliorants to improve or stabilise soils (e.g. gypsum) where required, that is identified annually, as requiring intervention by a suitably qualified person. See Table 6 in section 0. A soil test is required. Trim, rake, roll and/or deep rip where required.
Revegetation	Direct seeding. Planting tube stock where appropriate and practical. Apply fertiliser where appropriate. Nitrogen fertilisers are not to be used near water bodies. Install stock fencing to protect planting, the creeks, and to prevent overgrazing in paddocks.
Achievement of surface requirements	Monitoring to determine whether vegetation is self-sustaining. Monitoring to determine whether species richness, diversity and density meet required criteria. Monitoring annually by suitably qualified person. Ensure water run-off is managed and drainage follows appropriate drainage paths.
Achievement of post-mining land use to stable condition	Be able to show that the land is safe, structurally stable, does not cause environmental harm and is able to sustain the PMLU. Rehabilitation certified and signed off against Commodore Coal Mine Completion Criteria from suitably qualified person. Rehabilitation certified by DES.
Achievement of sufficient improvement	Cause no environmental harm outside of the relevant tenure. Rain fall run off diverted to natural catchment or agricultural dams. Relinquish mining lease area and return land to agricultural uses.

Table 7 - Reference milestones

2.5.5 REHABILITATION AREAS

The final site design PMLUs (shown in **Figure 18)** have been broken up into rehabilitation areas. As a transitioning site, some of those areas have been partially rehabilitated and met the completion criteria of **Attachment 2 Commodore Coal Mine Rehabilitation Completion Criteria**. Further details of the progress of the rehabilitated areas is in Attachment 13 Rehabilitation Monitoring Report 2020 and Attachment 14 Rehabilitation Monitoring Report 2021.

The rehabilitation areas are shown in **Figure 27 - Commodore Mine Rehabilitation Areas**.

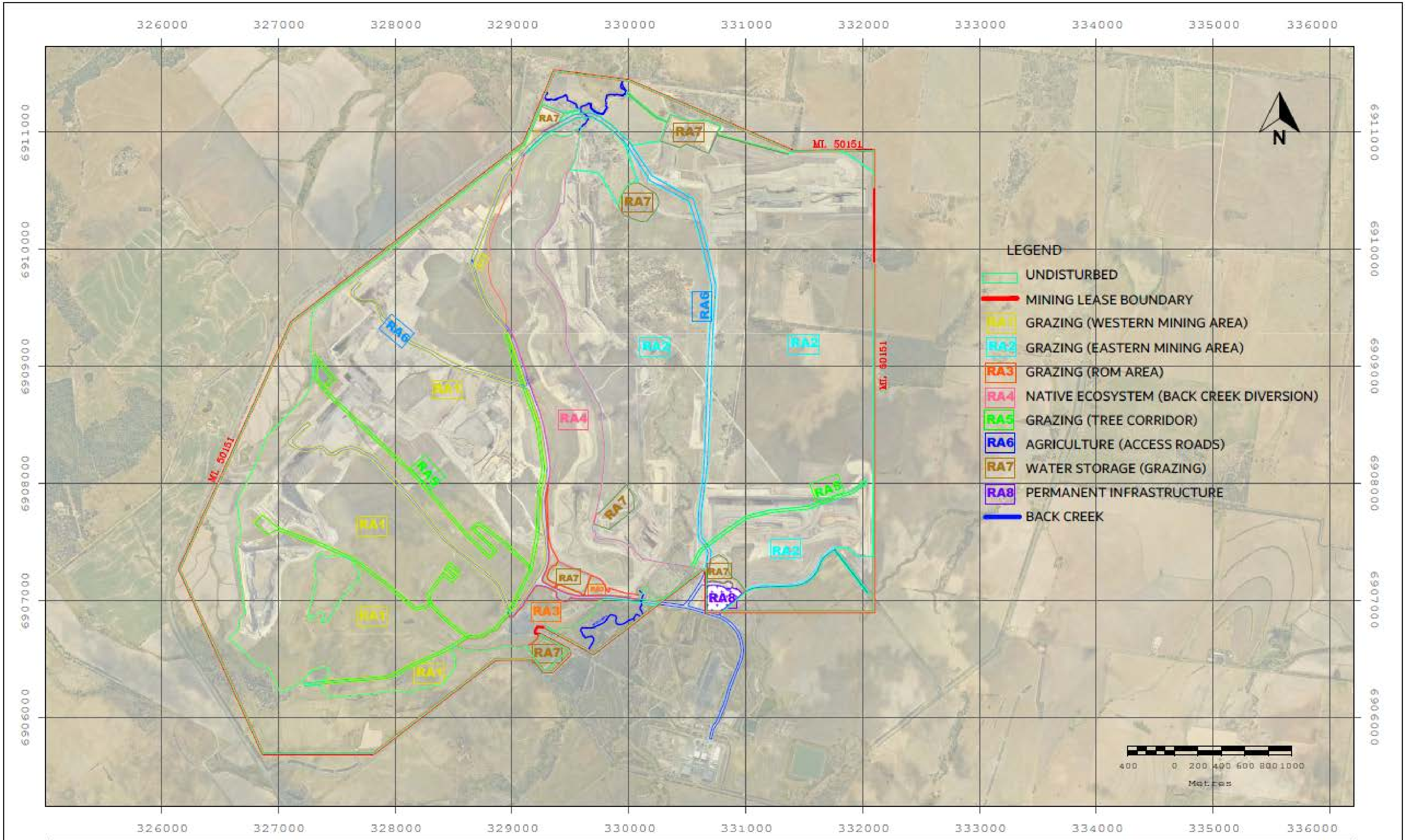

Figure 27 - Commodore Mine Rehabilitation Areas

COMMODORE COAL MINE	PRCP 2021
Rehabilitaiton Areas	Plot File Name: EPML00841513_PRCP_RA_27082021.vpgz
	Date: 27-Aug-2021 — Scale: AMG84 ZONE 56 1:30000

2.5.6 MONITORING

Rehabilitation monitoring on the mine occurs annually until an area is certified, and in accordance with approvals. See **Attachments 2, and 6 to 9**. In accordance with the EP Act, the PRCP schedule progress will be audited every 3 years from the 1st of September 2020 and by the annual returns for the EA.

Monitoring will be undertaken by a 3rd party with a recommendations and assessment against the completion criteria provided. All monitoring sites were assessed in 2020 against the new completion criteria and only a portion (including new sites) were assessed in 2021. See Attachment 13, and Attachment 14. Current monitoring transects can be seen in Figure 28. The methodology and completion criteria for monitoring were reviewed in 2020 (Attachment 2 Commodore Coal Mine Rehabilitation Completion Criteria).

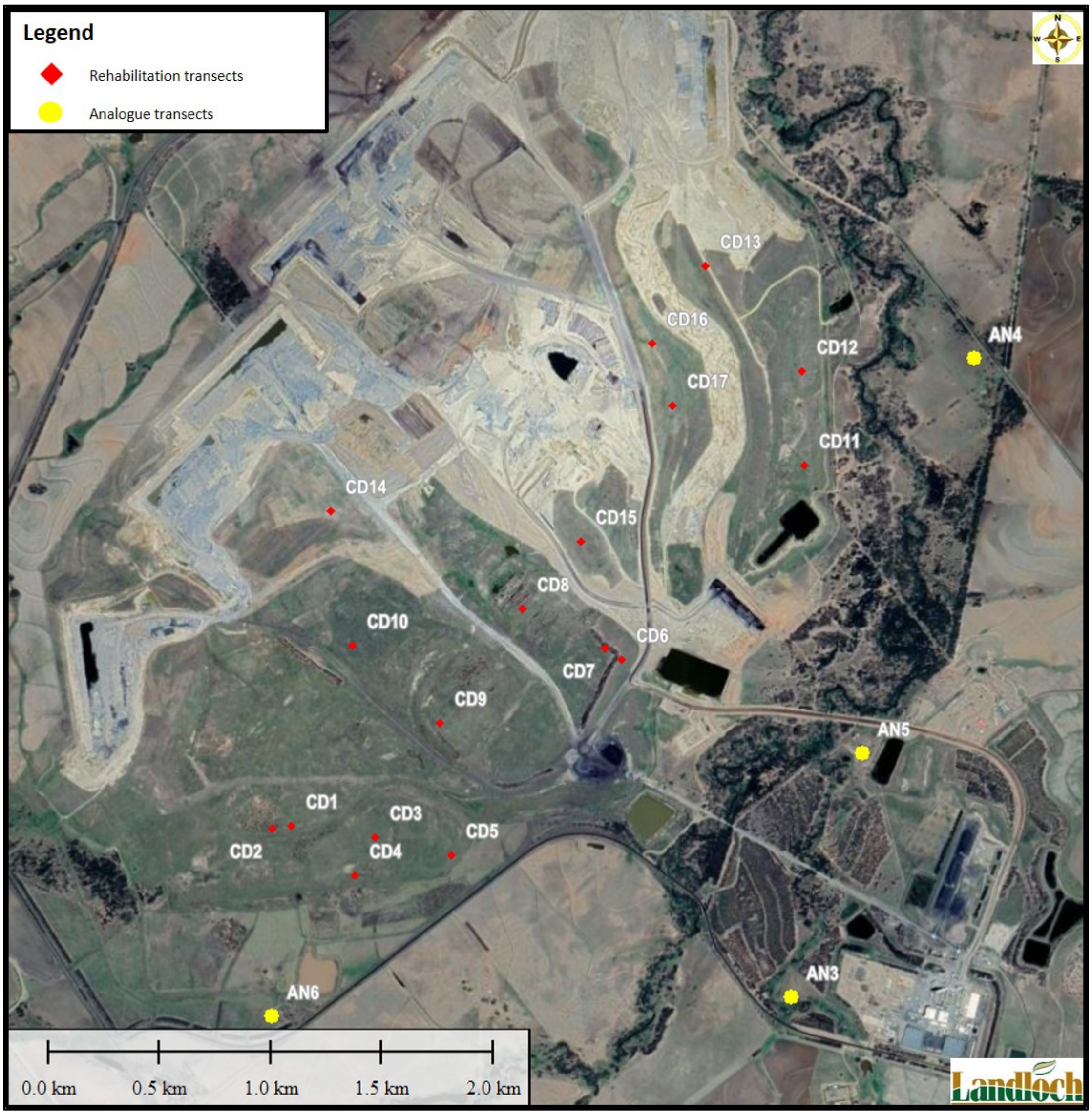

Figure 28 - Locations of transects established at Commodore Coal Mine as part of the Monitoring Program

The same annual monitoring shall occur post-mining until all rehabilitation is certified as safe and stable. Monitoring Analogue sites are also described in the Revegetation Management Plan (Attachment 11).

Rehabilitation within the Back Creek Diversion occurs will be completed in 2022. Monitoring will occur in accordance with the water licence, and the EA. A 10-year monitoring period will commence postcommissioning and the diversion will be monitored by the mine for the life of the mine. The design of the diversion was targeted to a long-term stable creek to exist into perpetuity.

MPP will continue to undertake environmental geochemical test-work of coal combustion ash samples generated by the Project, and as required under the current EA conditions, the QLD End of Waste Code for Coal Combustion Products[14], and the NSW Coal Ash Order[15]. Test-work includes a broad suite of environmental geochemical parameters, such as pH, EC (salinity), acid-base account parameters and total and soluble metals/metalloids.

Post mining, piezometers will be removed for unobstructed final agricultural landuses. This will be after the ash has been capped appropriately, all ash monitoring continues to indicate no contamination movement and the success of the ash management strategies has been shown.

EXISTING REHABILITATION TRIALS

Prior to mining operations commencing, a rehabilitation trial was conducted on overburden and soils associated with the bulk sample pit constructed in the 1970's (Roberts, 1986). The stockpiled overburden spoil was approximately 200 m long, 70 m wide and 20 m high, with slopes up to 30 %. In 1979, 300-400 mm of topsoil was stripped from an adjacent area and placed on the overburden stockpile. Topsoil was placed on the overburden material in two separate sections, one with a thickness of 200-300 mm and the other with a thickness of 300-500 mm.

Both sections were seeded with a variety of exotic pasture grasses (buffel, green panic and Rhodes grass) and legumes (siratro and lucerne). The sections were then further divided into four parts and each part fertilised with different fertilisers.

Roberts (1986) concluded persistent pastures can be established on overburden at Millmerran with 60 % cover achieved after three seasons. Key findings were:

- Soil depth
  - A surface covering of 200-300 mm of suitable soil is adequate for good pasture establishment and persistence on overburden even on slopes up to 33 %;
  - There is no significant difference in growth between to 200-300 mm and 300-500 mm topsoil depths.
- Fertiliser
  - Buffel or green panic suppressed Rhodes grass and there was a significant response to superphosphate fertiliser for two years as well as nitrogen in the first year; and
  - Initial applications with phosphatic and nitrogenous fertilisers produced a small positive response in pasture cover and yield. Although the fertilisers disappeared with time, the pasture continued to persist and flourish.

Monitoring results in 1998 report the grasses persisted and the banks of the rehabilitated overburden and provided a stable surface (IAS, 1998, Attachment 4).

Recent fieldworks by Landloch report observed the grasses persist and landform remains stable when grazed by livestock.

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[14] QLD Department of Environment and Science, *End of Waste Code, Coal Combustion Products (ENEW07359717)*, Waste Reduction and Recycling Act 2011

[15] NSW EPA, Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 - *The coal ash order 2014*

2.5.7 FIRST MILESTONES COMMENCEMENT DATE

The First Milestones Commencement Date is proposed to be **1st of September 2020** as a transitioning site.

The mine works on an operational time frame of 1st September to 31st of August each year. This will align with the Estimated Rehabilitation Calculator (ERC).

Rehabilitation has been undertaken on site since 2005 and is reflected in the rehabilitation areas shown in the rehabilitation reports of 2020 & 2021 (See Attachment 13 & Attachment 14). While some areas within the rehabilitation areas have been certified by a suitably qualified person as having met the completion criteria, no rehab areas have been certified by DES under the EP Act as of 2021.

2.5.8 Proposed Milestone Timing

After an area is mined, overburden is returned to the area and allowed to settle. This a may take one to three years. Typically, once an area becomes safe and available for rehabilitation it is land formed within a year, topsoiled and seeded within the next year and enters a phase of annual monitoring until it has met rehabilitation criteria described in **Attachment 2 Commodore Coal Mine Rehabilitation Completion Criteria**. a number of out of pit dumps will be placed for future rehandle to move the material to meet final landform design and avoid NUMAs.

Rehabilitation Milestone criteria are detailed in **Appendix 1 and Site Specific Milestone Criteria 2.5.4**. Each rehabilitation area's (**Figure 27 - Commodore Mine Rehabilitation Areas**) milestone timing is also detailed in the Schedule.

2.6 RISK ASSESSMENT

A risk assessment identifying the risks of a stable condition for land not being achieved and controls to manage or minimise the identified risks can be reviewed in **Section 3.6.**

The risk was determined to be low.

Following the risk assessment process there is no moderate or significant residual risk that the disturbed areas of Commodore Coal Mine will not be able to be rehabilitated to a safe and stable condition and reach the final PMLU of being able to be used for agricultural purposes.

Controls or factors that achieve this include:

- Sufficient stockpiles of topsoil are available (quantities reported annually and managed as per Topsoil Management Plan).
- Commodore Mine has demonstrated that rehabilitation can be undertaken progressively and successfully to date (as per Final Rehabilitation Completion Criteria).
- ERC and Financial Provisioning Scheme (FPS) decisions are up to date.
- The small nature of the mine and the consistent approach to progressive rehabilitation.
- The sodic soils present challenges but are a low risk and have been demonstrably managed with soil amelioration if required or in problem areas.
- Existing rehabilitation shows that stable and safe rehabilitation areas are readily achievable without any intervention.
- Low settlement rates have been observed historically. This is due to the use of dozers in the operation as well as the shallow nature of the mine. These can be demonstrated through the Back Creek Diversion project.

- If disturbance occurs within the vicinity of a drainage line, this could impact on water quality of downstream watercourses through an increase in sediment load. This risk is managed by erosion and sediment control structures and dams, until rehabilitation areas can be certified.
- Recently the EA was amended to include the use of recycled water on the mine site. This is to reduce reliance in drought on groundwater resources when an abundant water resource is available. This also presents and opportunity to irrigate rehabilitation when required.
- Contaminant risk is low and confined to known permanent infrastructure areas. Geochemical analysis in the IAS (1998) and the 2021 Terranus report show overburden and spoil risks are low.
- Ash has negligible potential to generate acid; has low salinity; is infertile and has quantities of trace metals that exceed reportable levels. The most notable of these being boron, molybdenum and selenium that are leachable. These characteristics indicate the ash is unsuitable as a growth medium and this is managed by the ash being encapsulated to limit interaction with air and water.
- Ash has been monitored for more than a decade for leachate potential and has been consistently dry in all piezometers. No contamination movement using the current controls.

2.6.1 RESIDUAL RISK

Initial risk assessment included in this PRCP has identified residual risk to be low. Post mining the final land-forming and revegetation is expected to take 2 to 3 years before the final rehabilitation areas can be left to establish.

No contamination movement has been detected using the current controls and management techniques for capping ash. It is expected this method of capping and containment will be a successful measure for perpetuity based on monitoring and chemical analysis.

The mine will enter a care and maintenance phase and be monitored annually against the completion criteria post mining. From historical rehabilitation monitoring this period should be less than 10 years to meet all completion criteria and be able to be certified.

Upon surrender of the EA, MPP will complete a post-surrender management report, including a risk assessment that complies with the residual risk assessment guideline and will include a risk management plan (if required).

2.7 MONITORING & MAINTENANCE

The Millmerran Power Partners, as the EA holders, organise mine surveying and annual audits on compliance. Audits of the annual mine plan are undertaken to monitor progress. Post final rehabilitation, a rehabilitation care and maintenance plan will be prepared to guide final land use monitoring and maintenance.

Rehabilitation at Commodore Mine is monitored annually by a suitably qualified person, against the completion criteria detailed in **Attachment 2** Commodore Coal Mine Rehabilitation Completion Criteria and reported in the annual return. Receiving Environment Monitoring and environmental monitoring are addressed by current EA conditions. See also annual rehabilitation reports Attachment 13 & Attachment 14.

Annual monitoring of the Back Creek Diversion is in accordance with Attachments 6 to 9. **Attachment 6** Back Creek Detailed Design Report 2007 details the design requirements of the diversion and the vegetation management plan. Attachment 8 Back Creek Diversion Vegetation Baseline 2008 established a baseline for vegetation monitoring.

Attachment 9 Baseline Back Creek Monitoring Report 2009 describes the monitoring program as required by the water licence and **Attachment 7** Back Creek Diversion VMP review 2019 reviewed the vegetation management plan for the diversion and made recommendations with a contemporary view.

3 APPENDICES & ATTACHMENTS

3.1 APPENDICES

Appendix 1 PRCP Schedule

Appendix 2 Geospatial Data

3.2 ATTACHMENTS

Attachment 1 Commodore Coal Mine Plan of Operations 2019-2024

Attachment 2 Commodore Coal Mine Rehabilitation Completion Criteria

Attachment 3 Environmental Management Overview Statement (EMOS)

Attachment 4 Millmerran Power Project Impact Assessment Statement (IAS)

Attachment 5 Kambuwal Aboriginal Corporation Clearance Procedure and Post-Mining Expectations

Attachment 6 Back Creek Detailed Design Report 2007

Attachment 7 Back Creek Diversion VMP review 2019

Attachment 8 Back Creek Diversion Vegetation Baseline 2008

Attachment 9 Baseline Back Creek Monitoring Report 2009

Attachment 10 CCM Catchment Areas and SW Infrastructure Plan

Attachment 11 MPP Revegetation Plan 2021

Attachment 12 Geochemical Assessment of Potential Spoil and Coal Combustion Ash Materials 2021

Attachment 13 Rehabilitation Monitoring Report 2020

Attachment 14 Rehabilitation Monitoring Report 2021

3.3 DEFINITIONS

Refer to definitions of the *Guideline - Progressive Rehabilitation and Closure Plans* (ESR/2019/4964, DES, 1 NOV 2019)

Definition included in the EP Act

AEP has the meaning given under the ARR.

ARR means the guideline called the Australian Rainfall and Runoff published by the Commonwealth.

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

Artificial feature, for land the subject of a PRCP schedule, means–

a) a structure or feature that is temporary and, under the PRCP schedule or otherwise, is to be removed from the land, or

b) a structure or feature that, under the PRCP schedule, will require a level of maintenance after the land is surrendered that is greater than the level of maintenance that would be required for the land if the relevant activities the subject of the PRCP schedule had not been carried out, or

c) a feature forming part of the landform of the land, other than a natural landform, if the feature interferes with or affects –

i. a relevant watercourse, or

ii. the natural flow of water on the land.

Available for improvement means if the land is not being mined, unless–

a) the land is being used for operating infrastructure or machinery for mining, including, for example, a dam or water storage facility, or

b) the land is identified in the PRCP schedule or the application for an EA relating to the schedule as containing a probable or proved ore reserve, under section 126D(6) of the EP Act, that is to be mined within 10 years after the land would otherwise have become available for improvement, or

c) the land is required for the mining of a probable or proved ore reserve mentioned in paragraph (b).

Available for rehabilitation* means if the land is not being mined, unless—

a) the land is being used for operating infrastructure or machinery for mining, including, for example, a dam or water storage facility, or

b) the land is identified in the proposed PRCP schedule or the application for an EA for relevant activities to which the schedule relates as containing a resource to be mined within 10 years after the land would otherwise have become available for rehabilitation, or

c) the land is required for the mining of a probable or proved ore reserve mentioned in paragraph (b), or

d) the land contains permanent infrastructure identified in the proposed PRCP schedule as remaining on the land for a PMLU.

Contaminant* is defined in section 11 of the EP Act:

A contaminant can be-

a) a gas, liquid or solid, or

b) an odour, or

c) an organism (whether alive or dead), including a virus, or

d) energy, including noise, heat, radioactivity and electromagnetic radiation, or

e) a combination of contaminants.

Draft PRCP schedule is the PRCP schedule issued to the applicant and any submitters with the administering authority's decision on the PRCP schedule. The applicant has the ability to refer the draft PRCP schedule to Land Court or a submitter can make an objection to the draft PRCP schedule. A final PRCP schedule is issued separately and this is the document that is enforceable.

Flood plain modelling, for land the subject of a PRCP schedule, means modelling of the landform of the land–

a) carried out under the ARR, and

b) excluding any artificial features for the land.

Improvement area, for a NUMA, means an area of land in the NUMA to which a management milestone for the NUMA relates.

****Land outcome document***, for land, means the following documents relating to the land- Guideline– Progressive rehabilitation and closure plans (PRC plans)

a) an EA for a resource activity on the land,

b) a document made under a condition of an EA, if-

i. the document relates to the management of a void on the land, or the rehabilitation of the land, and

ii. the document was received by the administering authority before the assent date, and

iii. the administering authority has not, within 20 business days after the assent date, given notice to the EA holder that the document is insufficient in a material particular relevant to a matter mentioned in paragraph (i), and

iv. before the assent date, the document has not been superseded,

c) a document made under a condition of an EA, if-

i. the document relates to the management of a void on the land, or the rehabilitation of the land; and

ii. the EA requires the document to be given to the administering authority on a stated day that is on or after the assent date, or does not state a day when the document must be given, and

iii. the document is received by the administering authority within three years after the assent date, and

iv. the administering authority does not, within 20 business days after receiving the document, give the EA holder a notice that the document is insufficient in a material particular relevant to a matter in paragraph (i),

d) a report evaluating an EIS under the SDPWO Act, section 34D,

e) an EIS assessment report,

f) a written agreement between the EA holder and the State that is in force on the assent date.

***Management milestone**, for a NUMA, means each significant event or step necessary to achieve best practice management of the area and to minimise risks to the environment (section 112 of the EP Act).

Milestone criteria, for a management milestone or a rehabilitation milestone, means a requirement that must be met to achieve the milestone.

***Mined** means mine within the meaning of the MR Act, section 6A.

***Non-use management area (NUMA)** means an area of land the subject of a PRC plan that cannot be rehabilitated to a stable condition after all relevant activities for the PRC plan carried out on the land have ended (section 112 of the EP Act).

Operating infrastructure or machinery means infrastructure or machinery required for the operation of the mine site, for example a dam or water storage.

Operational phase means the period including the prospecting, exploration, development and production stages of the life of the mine.

***Post-mining land use (PMLU)**, for land, means the purpose for which the land will be used after all environmentally relevant activities carried out on the land have ended (section 112 of the EP Act).

PRCP start date the day prescribed is 1 November 2019.

***Probable or proved ore reserve** means a probable ore reserve or proved ore reserve mentioned in the listing rules made by ASX Limited (CAN 008 624 691) for the listing of corporations on the Australian stock exchange (section 126D of the EP Act).

Proposed PRC plan is the PRC plan submitted by the applicant for the administering authority to assess. The proposed PRC plan is not enforceable until it is approved by the administering authority and a final PRCP schedule is issued. The proposed PRC plan may be changed by the administering authority.

***Progressive Rehabilitation and Closure Plan (PRC plan)** for land the subject of an ineligible mining activity, means a progressive rehabilitation and closure plan for the land that consists of two part—

- the rehabilitation planning part – PRC plan, and
- the approved part - PRCP schedule that includes milestones and conditions.

****Public interest consideration*** is listed in section 316PA of the EP Act, including–

a) the benefit, including the significance of the benefit, to the community resulting from the mining activity or resource project the subject of the EA application to which the PRCP schedule relates,

b) any impacts, including long-term impacts for the environment or the community, that may reduce the benefit mentioned in (a) or have other negative impacts on the environment or community,

c) whether there are any alternative options to approving the area as a NUMA having regard to-

i. the costs or other consequences of the alternative options, and

ii. the impact of the costs or other consequences on the financial viability of the mining activity or resource project,

d) whether the benefit to the community mentioned in (a), weighed against the impacts mentioned in (b), is likely to justify the approval of the NUMA having regard to any alternative options mentioned in (c),

e) another matter prescribed by regulation.

****Public interest evaluation (PIE)*** means an evaluation of a proposed NUMA conducted under section 316PA of the EP Act.

****Qualified entity*** means an entity, other than the applicant, that has the experience and qualifications, prescribed by regulation, necessary to carry out a PIE (section 136A of the EP Act).

Rehabilitation area, for a PMLU, means an area of land in the PMLU to which a rehabilitation milestone for the post-mining use relates.

****Rehabilitation milestone***, for the rehabilitation of land, means each significant event or step necessary to rehabilitate the land to a stable condition (section 112 of the EP Act).

Relevant watercourse means–

a) a watercourse that, under the Strahler method, is a stream ordered as a fourth order stream or higher, or

b) if a watercourse mentioned in paragraph (a) is permanently diverted under–

i. a condition, or proposed condition, of an environmental authority mentioned in the *Water Act 2000*, section 98, or

ii. a water licence or proposed water licence under the *Water Act 2000*,

the watercourse as permanently diverted.

Spatial information is defined in the guideline ‘Spatial Information Submission’ (ESR/2018/4337).

****Stable condition*** as defined in section 111A of the EP Act:

Land is in a stable condition if—

- the land is safe and structurally stable, and
- there is no environmental harm being caused by anything on or in the land, and
- the land can sustain a PMLU.

Sufficient improvement, of a NUMA, means the last management milestone for the area has been achieved.

Transitional PRC plan means the holder of an existing EA for an ineligible mining activity relating to a mining lease that is transitioning into the new PRC plan framework.

****Void*** means an area of land to be excavated in the carrying out of a mining activity (section 126D of the EP Act).

3.4 REFERENCE MAPS

3.4.1 ML 50151 Tenure Page 67

3.4.2 MPP Owned Lands Page 68

3.4.3 Local Land Uses Page 69

3.4.1 ML 50151 TENURE

Commodore Mine - ML50151

Location and tenure boundary

27°51'59"S 151°12'29"E | 27°51'59"S 151°19'57"E

27°58'35"S 151°12'29"E | 27°58'35"S 151°19'57"E

A product of Queensland Globe

Legend

ML Permit Granted

Road

- Highway
- Main
- Local
- Private

N

0 1 km

Scale: 1:70000

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Print date: 5/5/2021

Datum: Geocentric Datum of Australia 1994
Projection: Web Mercator EPSG 102100

For more information, visit https://qldglobe.information.qld.gov.au/help-info/Contact-us.html

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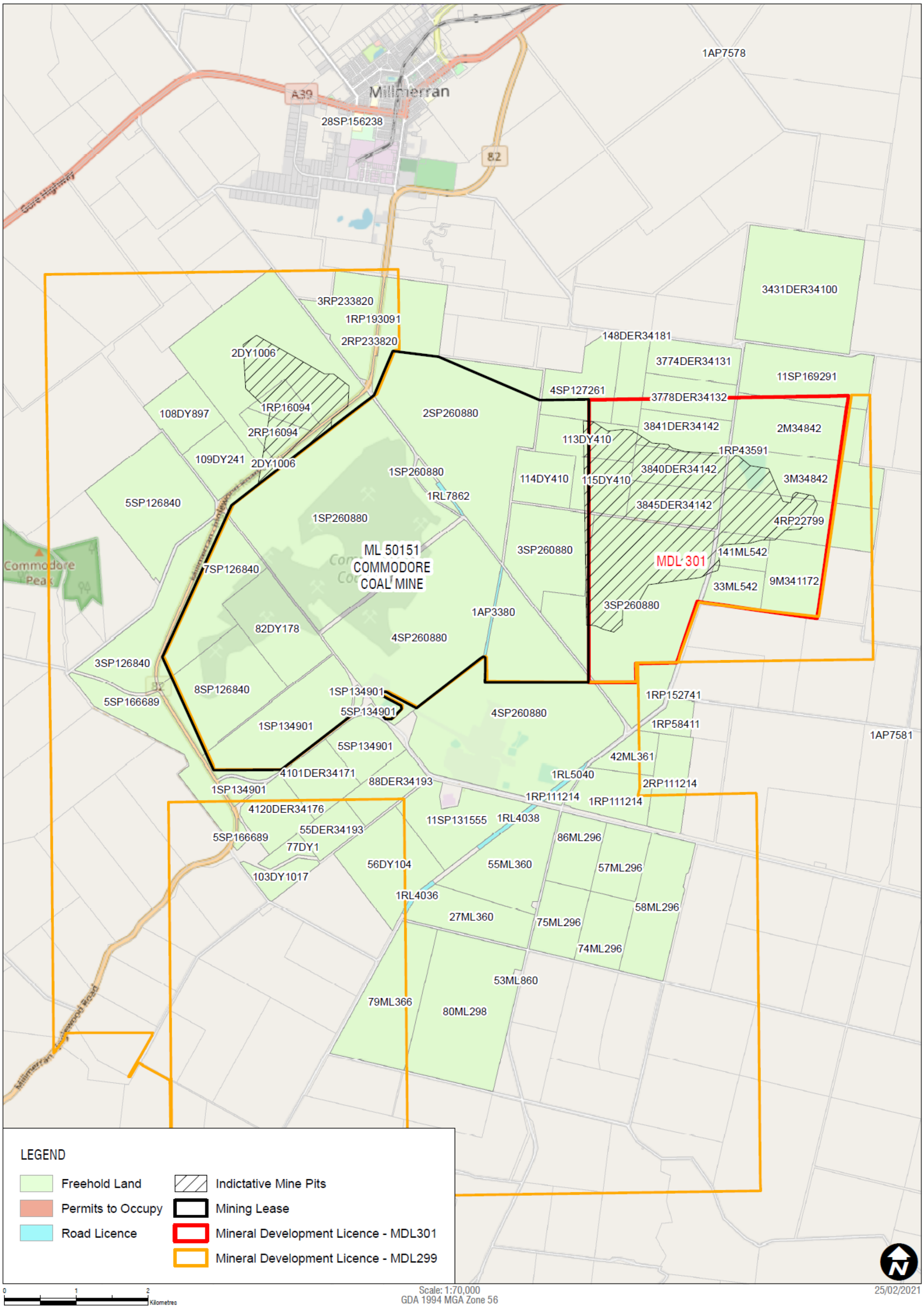
3.4.2 MPP OWNED LANDS

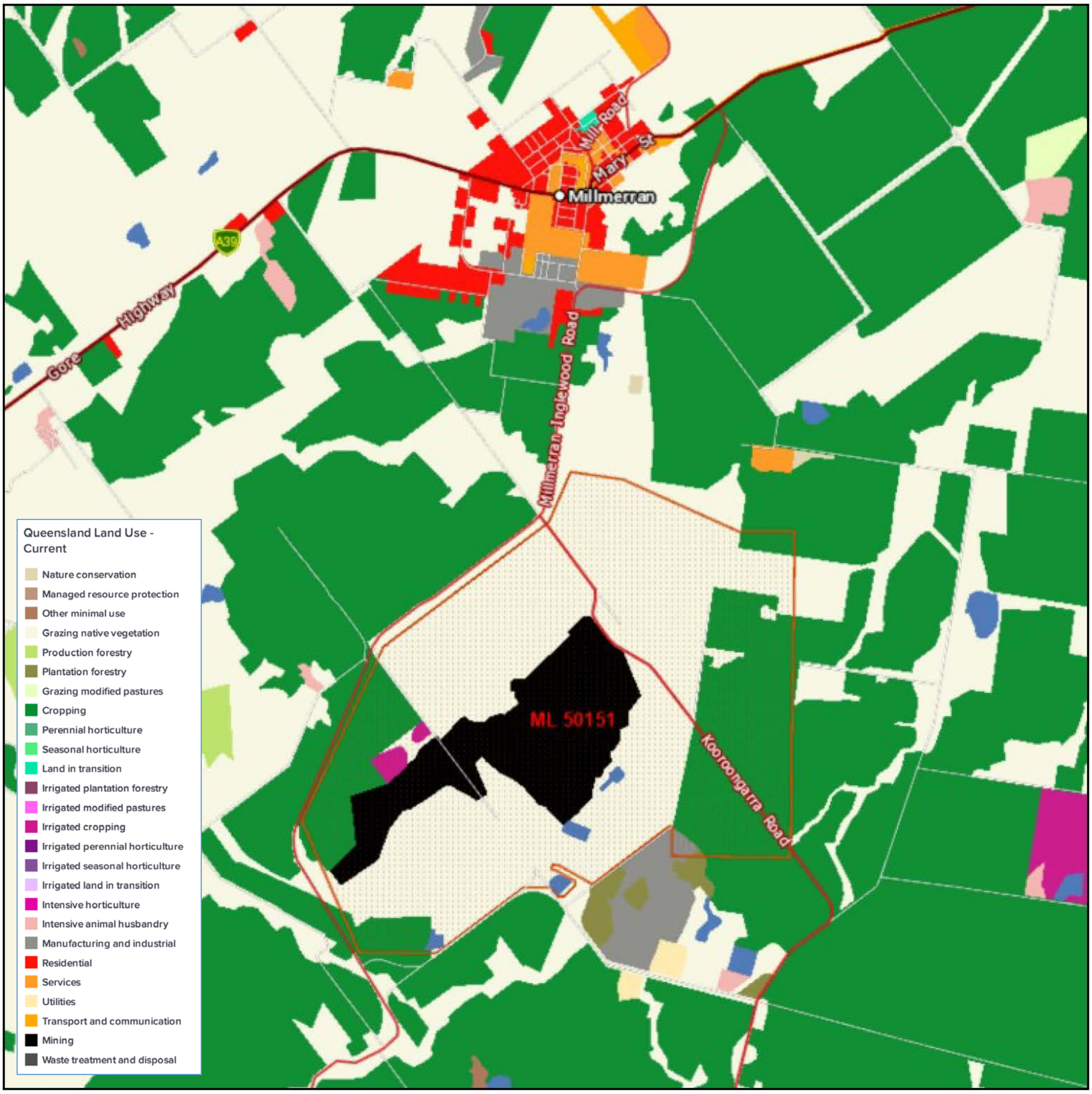


Queensland Land Use May 2021

Land use around ML50151

27°51'28"S 151°11'50"E

27°51'28"S 151°19'51"E



27°58'33"S 151°11'50"E

27°58'33"S 151°19'51"E

A product of Queensland Globe

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Scale: 1:75000

Printed at: A4

Print date: 25/5/2021

Datum: Geocentric Datum of Australia 1994

Projection: Web Mercator EPSG 102100

For more information, visit https://qldglobe.information.qld.gov.au/help-info/Contact-us.html

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3.4.4 SITE SOILS

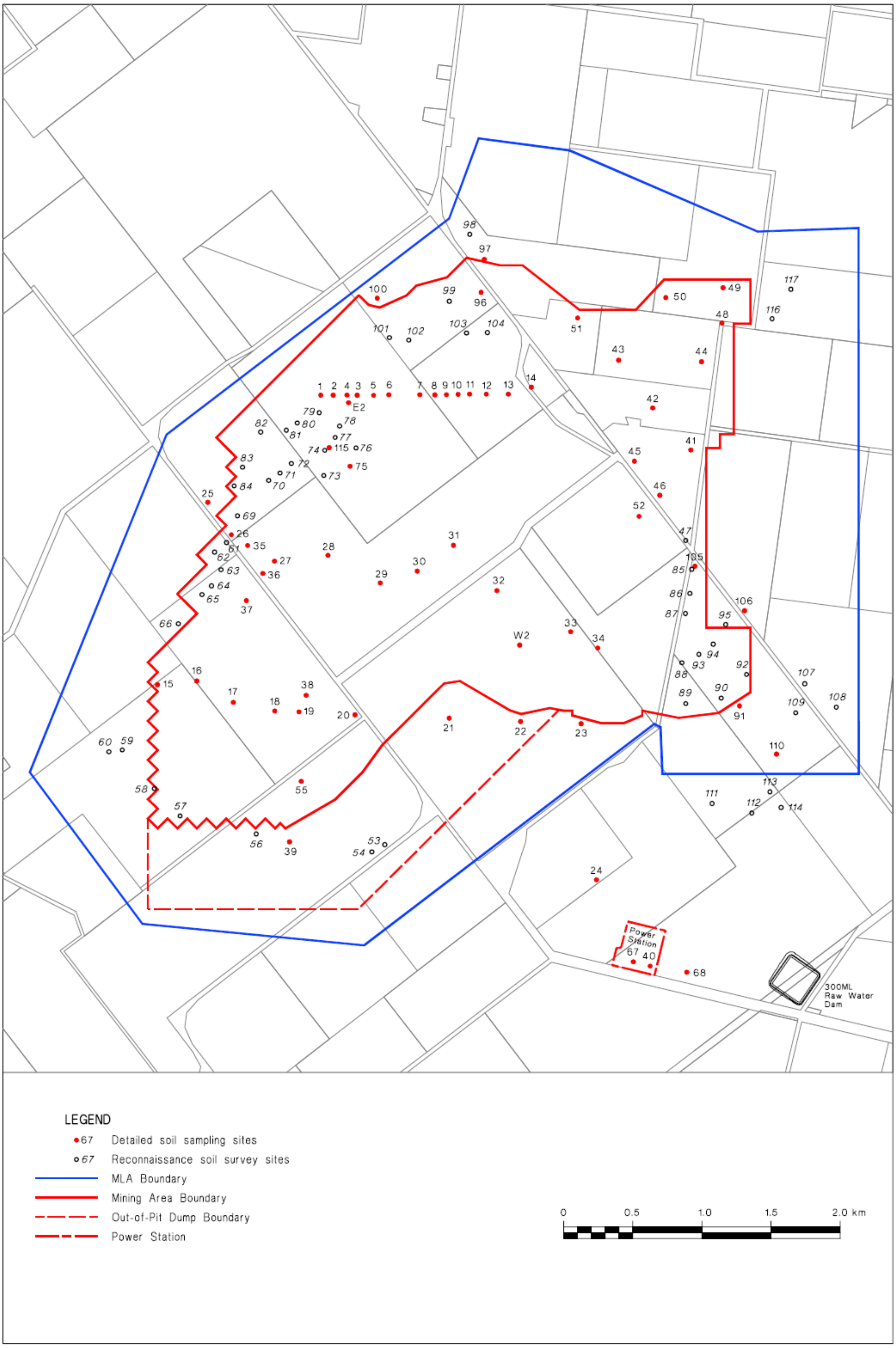


Figure 29 - Soil assessment test pit locations for the previous soils' assessment (IAS, 1999).

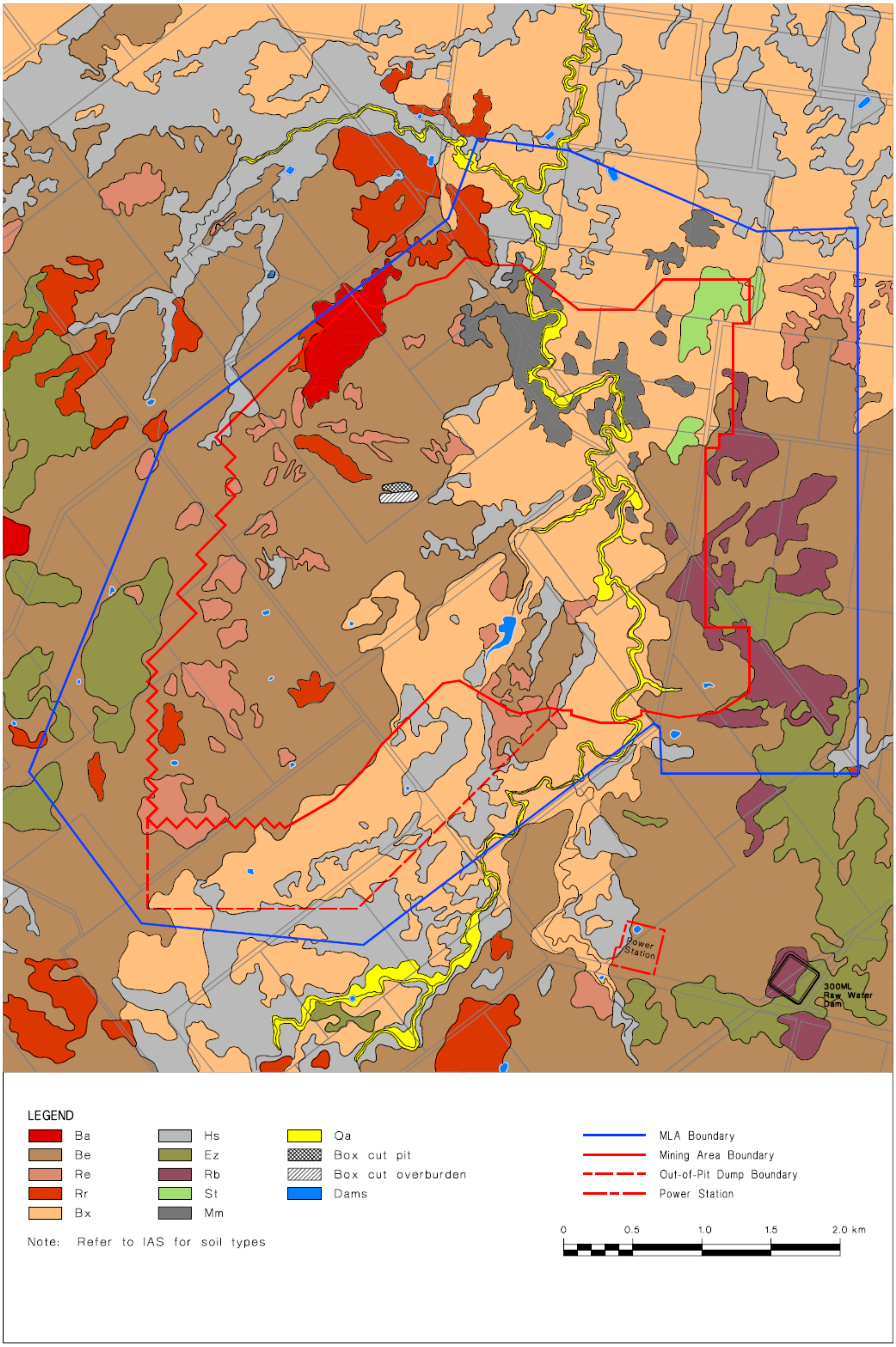


Figure 30 - Soil types identified in the previous soils' assessment (IAS, 1999).

Table 8 -Summary details of the major SMUs identified in the previous soil assessment for the mine (IAS, 1998).

SMU	Landscape Position	Surface Soil	Subsoil	ASC	Area (%)
Ba	Ridge	Very dark brown to grey brown light medium to medium clay soil. pH neutral to mildly alkaline (6.6-7.8)	Dark grey to reddish brown going to yellowish brown medium to medium heavy clay soil. pH moderately to strongly alkaline (7.9-9.0). Decomposing basalt parent material at depth.	Black vertosol	7
Be	Mid – low slope	Very dark grey brown to black light medium to medium clay soil. pH mildly to moderately alkaline (7.4-8.4)	Dark yellowish brown, grey brown to dark grey medium to heavy clay. pH moderately to strongly alkaline (7.9-9.0).	Black & grey vertosol	31
Nri	Mid slope	Very dark grey medium heavy clay soil. pH moderately alkaline (7.0-8.4)	Brown to dark grey brown mottled light grey to light yellowish brown medium heavy to heavy clay. pH moderately to strongly alkaline (7.9-9.0).	Black vertosol	4
Rb	Mid – low slope	Dusky red, dark brown to dark grey brown (silty) light to medium clay soil. pH neutral to mildly alkaline (6.6-7.8)	Strong brown, dark greyish, yellowish to reddish brown mottled yellowish brown to brown medium to medium heavy clay. pH moderately to strongly alkaline (7.9-9.0).	Grey & brown vertosol	11
Re	Mid slope	Brown to strong brown medium heavy clay soil. pH moderately alkaline (7.9-8.4)	Yellowish brown to brown mottled very pale brown to light grey medium heavy clay. pH strongly alkaline (8.5-9.0).	Brown vertosol	1
Hs	Low slope – flats	Very dark grey to black light medium to medium clay soil. pH mildly to moderately alkaline (7.4-8.4)	Yellowish brown to brown mottled grey, brown medium to medium heavy clay, some silt present. pH moderately to strongly alkaline (7.9-9.0).	Black vertosol	13
Bx	Low slope – flats	Very dark grey to black light medium to medium clay, silt present. pH mildly to moderately alkaline (7.4-8.4)	Yellowish brown, brown to grey brown mottled brownish yellow to greyish brown medium to medium heavy clay, some fine sand. pH moderately to strongly alkaline (7.9-9.0).	Grey & black vertosol	33

3.4.5 TOPSOIL STOCKPILES

Information about current stockpile materials (2021) and their locations was provided by Downer Group. Stockpile volumes are provided in Table 9 and locations are displayed in Figure 31.

The approximate total volume of available stockpiled topsoil materials is 1,394,559 m^3.

Table 9 - Summary of stockpiled topsoil materials and volumes for rehabilitation (provided by Downer Group).

Stockpile ID	Total Volume (m^3)	Stockpile ID	Total Volume (m^3)
1	108,228	25	6,309
2	12,901	26	2,349
3	1,784	27	3,398
4	405	28	2,490
5	6,742	29	1,803
6	14,851	30	2,391
7	366	31	449
8	57,101	32	3,973
9	9,278	33	2,061
10	16,251	34	4,476
11	229,440	35	812
12	104,405	36	18,843
13	3,305	37	12,904
14	8,715	38	4,910
15	70,337	39	3,986
16	174,570	40	102,199
17	928	41	2,160
18	847	42	1,378
19	3,053	43	15,715
20	102,344	44	7,249
21	2,640	45	16,671
22	13,903	46	8,746
23	6,695	47	151,708
24	10,270	48	58,220

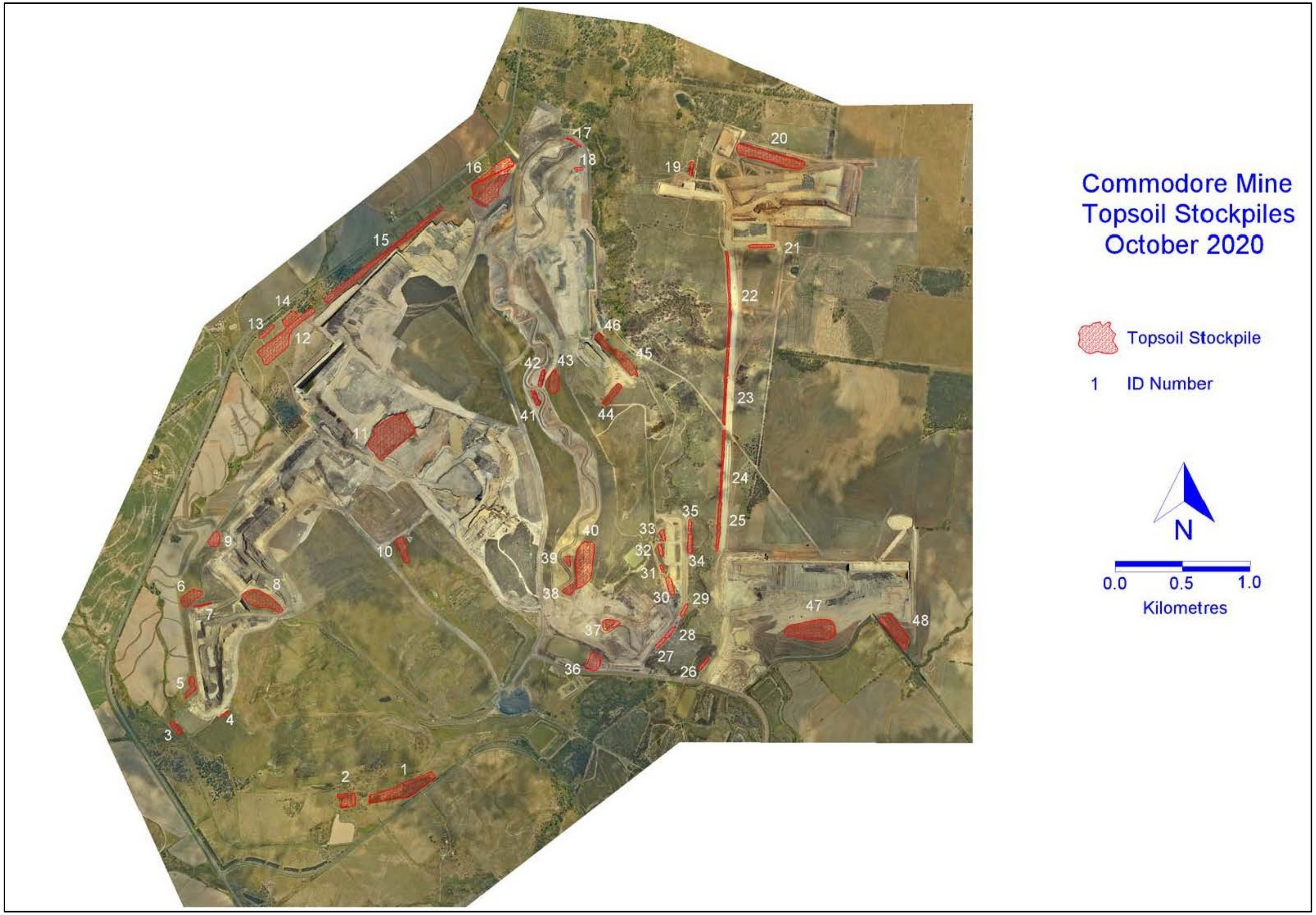
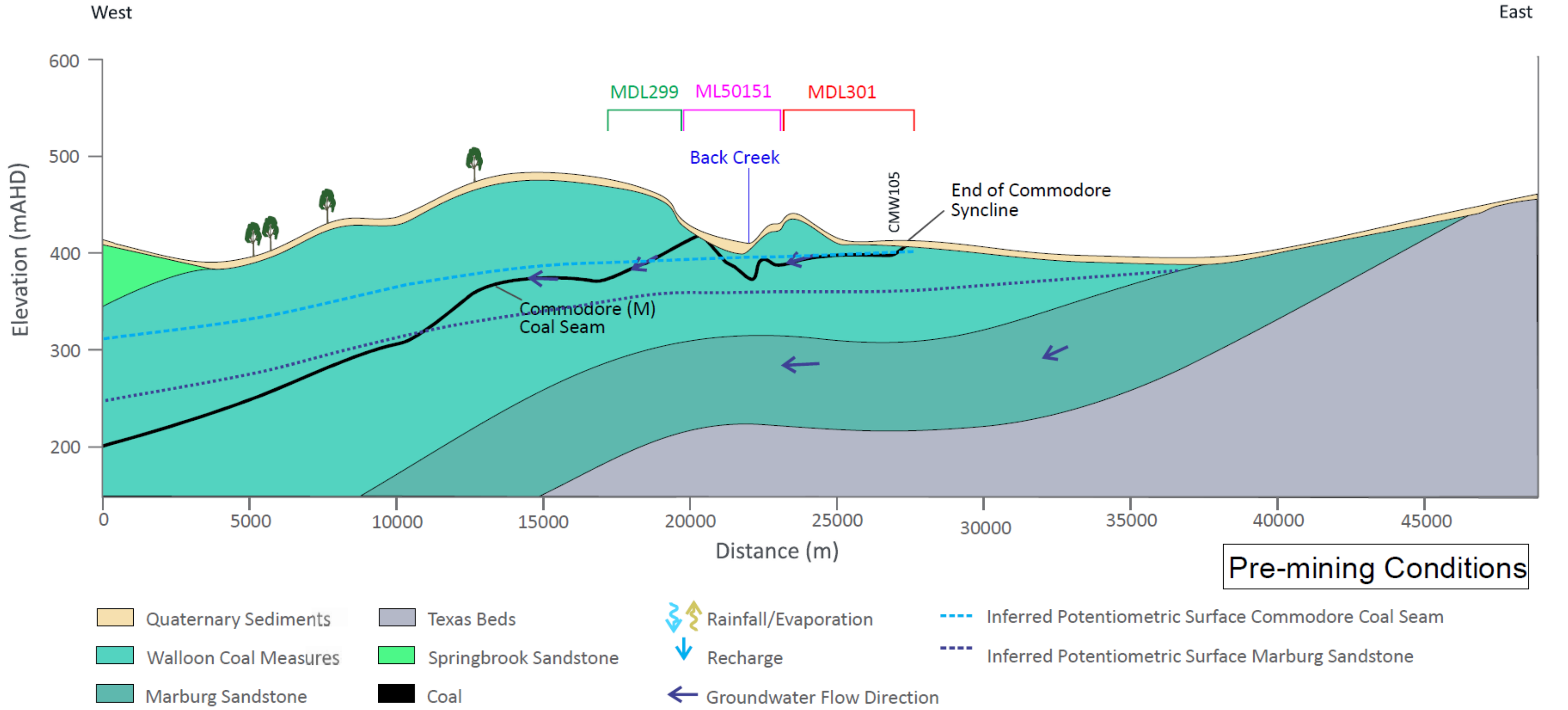
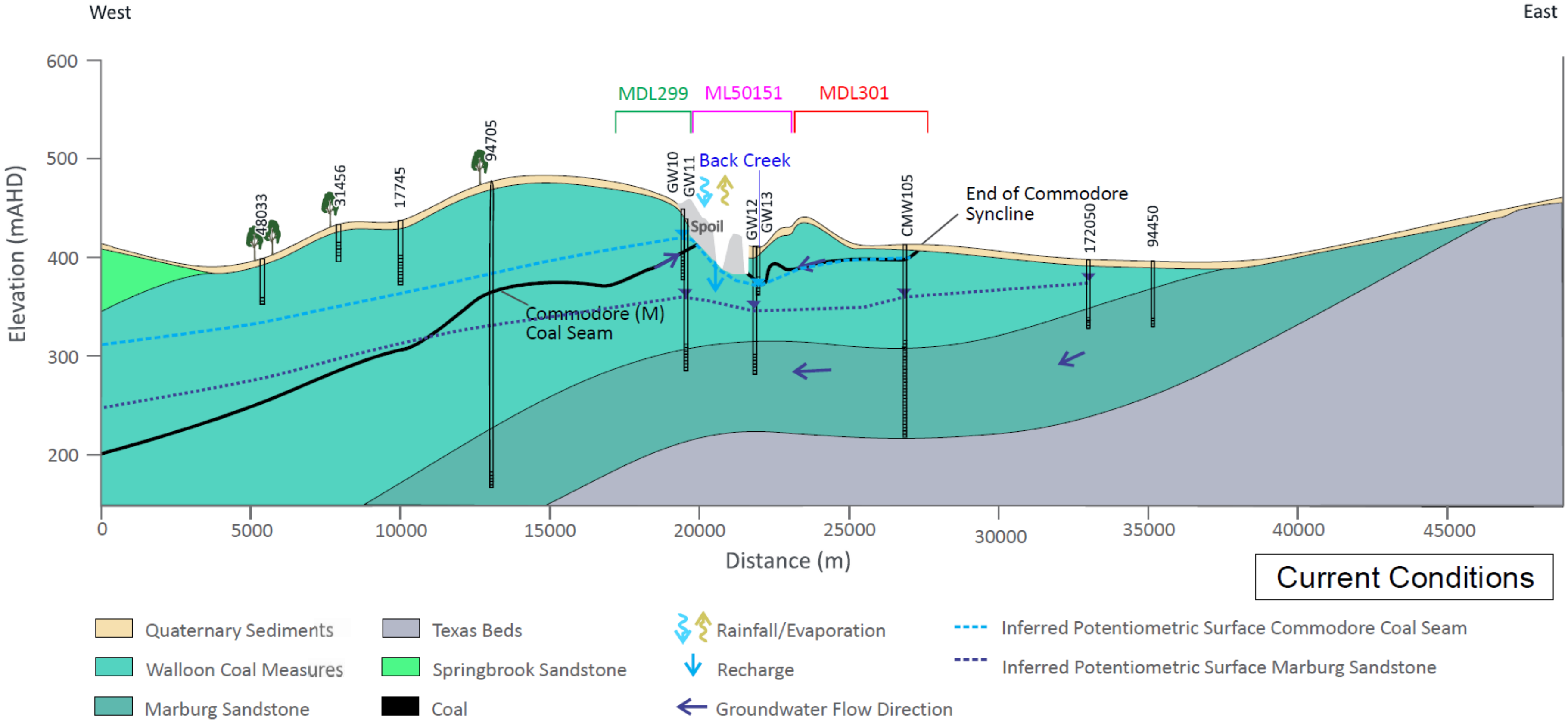


Figure 31 - Locations of topsoil stockpiles at Commodore Coal mine.

3.4.6 GROUNDWATER & GEOLOGY CROSS SECTION PRE-MINING



3.4.7 GROUNDWATER & GEOLOGY CROSS SECTION DURING MINING



3.5 REFERENCE SOIL & SPOIL ANALYSIS

PART 1 OF 2. MORPHOLOGICAL DESCRIPTION OF NATURAL SOIL MATERIALS.

Site ID	Total Depth (m)	Layer	Horizon	Layer Depth	Boundary	Texture	Roots per 100mm^2 (fine / coarse roots)	Colour (rapid)				Consistence	
								Primary	Secondary	Mottles	Streaks	Moisture	Strength
AN3	**0.7**	**1**	A11	0.15	Clear (20-50mm)	Medium Clay	Common (10-25 / 2-5)	Dark Grey				Dry	Strong (crushes underfoot with small force)
		2	A12	0.5	Gradual (50-100mm)	Medium Heavy Clay	Common (10-25 / 2-5)	Dark Brown				Dry	Very Firm (strong force - thumb and forefinger)
		3	B1	0.7		Medium Heavy Clay	Few (1-10 / 1-2)	Dark Brown				Moderately Moist	Firm (moderate or firm force)
AN4	**0.9**	**1**	A1	0.25	Clear (20-50mm)	Medium Clay	Many (25-200 / >5)	Dark Brown				Dry	Firm (moderate or firm force)
		2	B11	0.6	Clear (20-50mm)	Light Clay	Many (25-200 / >5)	Pale Brown		Orange		Moderately Moist	Very Weak (very small force)
		3	B12	0.9		Light Clay	Few (1-10 / 1-2)	Yellow	Pale Brown	Pale Grey		Moderately Moist	Very Weak (very small force)
AN5	**0.7**	**1**	A1	0.2	Clear (20-50mm)	Medium Clay	Many (25-200 / >5)	Dark Grey				Dry	Strong (crushes underfoot with small force)
		2	B11	0.5	Gradual (50-100mm)	Medium Heavy Clay	Common (10-25 / 2-5)	Brown				Moderately Moist	Very Firm (strong force - thumb and forefinger)
		3	B12	0.7		Medium Heavy Clay	Few (1-10 / 1-2)	Brown				Moderately Moist	Very Firm (strong force - thumb and forefinger)
AN6	**0.9**	**1**	A11	0.2	Gradual (50-100mm)	Medium Clay	Many (25-200 / >5)	Dark Brown				Moderately Moist	Very Firm (strong force - thumb and forefinger)
		2	A12	0.6	Gradual (50-100mm)	Medium Heavy Clay	Many (25-200 / >5)	Dark Brown				Moderately Moist	Very Firm (strong force - thumb and forefinger)
		3	B1	0.9		Medium Heavy Clay	Few (1-10 / 1-2)	Dark Brown				Moderately Moist	Very Firm (strong force - thumb and forefinger)

PART 2 OF 2. MORPHOLOGICAL DESCRIPTION OF NATURAL SOIL MATERIALS.

Site ID	Total Depth (m)	Layer	Pedality		Coarse Fragments			Comments
			Grade	Size	%	Size	Shape	
AN3	**0.7**	**1**	Strong (pedal - when displaced >2/3 peds)	20-50mm	<2%			carbonates at depth
		2	Strong (pedal - when displaced >2/3 peds)	20-50mm	<2%			
		3	Strong (pedal - when displaced >2/3 peds)	20-50mm	<2%			
AN4	**0.9**	**1**	Moderate (pedal - when displaced >1/3 peds)		<2%			possible powdery carbonates below 0.4
		2	Weak (pedal - when displaced <1/3 peds)		<2%			
		3	Weak (pedal - when displaced <1/3 peds)		<2%			
AN5	**0.7**	**1**	Moderate (pedal - when displaced >1/3 peds)		<2%			carbonates at depth
		2	Strong (pedal - when displaced >2/3 peds)		<2%			
		3	Strong (pedal - when displaced >2/3 peds)		<2%			
AN6	**0.9**	**1**	Moderate (pedal - when displaced >1/3 peds)	20-50mm	<2%			carbonates at depth
		2	Strong (pedal - when displaced >2/3 peds)	50-100mm	<2%			
		3	Strong (pedal - when displaced >2/3 peds)	50-100mm	<2%			

TOPSOIL LABORATORY RESULTS – DETAILED SUITE.

	Lab No	150450-1		150450-5		150450-9		200656-3		200656-4		-	
	Sample ID	AN2		AN3		AN4		AN5		AN6		Sed Dam 3	
	Sample Depth (m)	0-0.1		0-0.1		0-0.1		0-0.1		0-0.1		0-0.1	
	Field Texture	MC		MC		MC		MC		MC		MC	
Analyses	**Unit**												
pH - Water	pH units	7.4	*Neutral*	7.0	*Neutral*	8.4	*M.Alk*	8.0	*M.Alk*	7.6	*L.Alk*	8.2	*M.Alk*
Electrical Conductivity	dS/m	0.05	*VL.Sal*	0.06	*VL.Sal*	0.12	*L.Sal*	0.05	*VL.Sal*	0.06	*VL.Sal*	0.16	*L.Sal*
Chloride	mg/kg	13	*VL.Sal*	19	*VL.Sal*	9	*VL.Sal*	6	*VL.Sal*	13	*VL.Sal*		*VL.Sal*
Total Nitrogen - Kjeldahl	mg/kg	767	*L*	1612	*M*	1102	*L*	890	*L*	1009	*L*	944	*L*
Total Phosphorus - Nitric/Perchloric	mg/kg	115	*	164	*	317	*	111	*	181	*	167	*
Phosphorus - Colwell extr	mg/kg	7	*L*	11	*L*	5	*L*	8	*L*	13	*L*		*L*
Potassium - Colwell ext	mg/kg	116	*VL*	231	*M*	308	*H*	93	*VL*	82	*VL*		*VL*
Sulphur - KCl	mg/kg	6.66	*L*	5.41	*L*	5.69	*L*	5.89	*L*	3.00	*VL*	5.00	*L*
Organic Carbon	%	1.06	*M*	1.93	*H*	1.28	*M*	1.12	*M*	1.18	*M*	1.16	*M*
Copper	mg/kg	1.38	*M*	1.48	*M*	1.03	*M*	*	*FALSE*	*	*FALSE*	*	*FALSE*
Iron	mg/kg	52	*	63	*	22	*	*	*	*	*	*	*
Manganese	mg/kg	18.70	*M*	35.70	*M*	12.70	*M*	*	*FALSE*	*	*FALSE*	*	*FALSE*
Zinc	mg/kg	0.47	*L*	0.97	*M*	0.65	*L*	*	*FALSE*	*	*FALSE*	*	*FALSE*
Boron	mg/kg	0.78	*L*	0.84	*L*	0.78	*L*	*	*FALSE*	*	*FALSE*	*	*FALSE*
Cation Extraction Method	Rayment& Lyons	15C1	*	15A1	*	15C1	*	15C1	*	15C1	*	15A1	*
Cation Exchange Capacity	meq/100g	14.7	*M*	19.2	*M*	30.5	*H*	10.1	*L*	12.9	*M*	39.9	*H*
Ex Calcium Percent	%	73.4	*Normal*	62.6	*L*	88.0	*H*	61.0	*L*	54.1	*L*	76.2	*Normal*
Ex Magnesium Percent	%	22.2	*H*	26.4	*H*	10.2	*Normal*	25.4	*H*	34.1	*H*	20.6	*H*
Ex Potassium Percent	%	1.5	*Normal*	3.3	*Normal*	1.0	*Normal*	2.2	*Normal*	1.4	*Normal*	0.4	*L*
Ex Sodium Percent	%	2.9	*N.Sodic*	7.7	*Sodic*	0.7	*N.Sodic*	11.2	*Sodic*	10.4	*Sodic*	2.7	*N.Sodic*
Ex Aluminium Percent	%	0.0	*VL*	0.0	*VL*	0.0	*VL*	0.1	*VL*	0.1	*VL*		*VL*
Exchangeable Calcium	mg/kg	2162.0	*	2405.0	*	5372.0	*	1229.0	*	1392.0	*		*
Exchangeable Magnesium	mg/kg	392.0	*	610.0	*	375.0	*	307.0	*	526.0	*		*
Exchangeable Potassium	mg/kg	86.9	*	248.0	*	119.0	*	88.3	*	68.5	*		*
Exchangeable Sodium	mg/kg	98.8	*	339.0	*	49.5	*	259.0	*	307.0	*		*
Exchangeable Aluminium	mg/kg	0.5	*	0.6	*	0.7	*	1.0	*	1.0	*		*
Exchangeable Calcium	meq/100g	10.8	*H*	12.0	*H*	26.9	*VH*	6.1	*M*	7.0	*M*		*VL*
Exchangeable Magnesium	meq/100g	3.3	*H*	5.1	*H*	3.1	*H*	2.6	*M*	4.4	*H*		*VL*
Exchangeable Potassium	meq/100g	0.2	*L*	0.6	*M*	0.3	*M*	0.2	*L*	0.2	*VL*		*VL*
Exchangeable Sodium	meq/100g	0.4	*M*	1.5	*H*	0.2	*L*	1.1	*H*	1.3	*H*		*VL*
Exchangeable Aluminium	meq/100g	0.0	*M*	0.0	*M*	0.0	*M*	0.0	*H*	0.0	*H*		*L*
Calcium/Magnesium Ratio	-	3.3	*Low Ca*	2.4	*Low Ca*	8.6	*Low Mg*	2.4	*Low Ca*	1.6	*Low Ca*	3.7	*Low Ca*

SUMMARY STATISTICS OF TOPSOIL STOCKPILE LABORATORY RESULTS – DETAILED SUITE.

	Lab No	Mean		LCL 95%	UCL 95%	Std Dev	Count	CI 95% (+/-)	10%ile		90%ile		Min	Max
	Sample ID													
	Sample Depth (m)													
	Field Texture													
Analyses	**Unit**													
pH - Water	pH units	7.8	L.Alk	7.4	8.2	0.5	6	0.4	7.2	Neutral	8.3	M.Alk	7.0	8.4
Electrical Conductivity	dS/m	0.08	VL.Sal	0.05	0.12	0.05	6	0.04	0.05	VL.Sal	0.14	L.Sal	0.05	0.16
Chloride	mg/kg	12	VL.Sal	7	16	5	5	4	7	VL.Sal	17	VL.Sal	6	19
Total Nitrogen - Kjeldahl	mg/kg	1054	L	817	1291	296	6	237	829	L	1357	L	767	1612
Total Phosphorus - Nitric/Perchloric	mg/kg	176	*	116	236	75	6	60	113	*	249	*	111	317
Phosphorus - Colwell extr	mg/kg	9		6	12	3	5	3	6		12		5	13
Potassium - Colwell ext	mg/kg	166		79	253	99	5	87	87		277		82	308
Sulphur - KCl	mg/kg	5.28	L	4.28	6.27	1.24	6	1.00	4.00	L	6.28	L	3.00	6.66
Organic Carbon	%	1.29	M	1.03	1.55	0.32	6	0.26	1.09	M	1.61	M	1.06	1.93
Copper	mg/kg	1.30	M	1.03	1.56	0.24	3	0.27	1.10	M	1.46	M	1.03	1.48
Iron	mg/kg	46	*	21	70	22	3	24	28	*	61	*	22	63
Manganese	mg/kg	22.37	M	8.87	35.87	11.93	3	13.50	13.90	M	32.30	M	12.70	35.70
Zinc	mg/kg	0.70	L	0.41	0.98	0.25	3	0.29	0.51	L	0.91	M	0.47	0.97
Boron	mg/kg	0.80	L	0.76	0.84	0.03	3	0.04	0.78	L	0.83	L	0.78	0.84
Cation Extraction Method	Rayment& Lyons	*	*	*	*	*	*	*	*	*	*	*	*	*
Cation Exchange Capacity	meq/100g	21.2	M	11.9	30.5	11.6	6	9.3	11.5	L	35.2	H	10.1	39.9
Ex Calcium Percent	%	69.2	Normal	59.4	79.1	12.3	6	9.9	57.6	L	82.1	H	54.1	88.0
Ex Magnesium Percent	%	23.2	H	16.9	29.5	7.9	6	6.3	15.4	H	30.3	H	10.2	34.1
Ex Potassium Percent	%	1.6	Normal	0.8	2.5	1.0	6	0.8	0.7	L	2.8	Normal	0.4	3.3
Ex Sodium Percent	%	5.9	N.Sodic	2.4	9.5	4.4	6	3.5	1.7	N.Sodic	10.8	Sodic	0.7	11.2
Ex Aluminium Percent	%	0.1	VL	0.0	0.1	0.0	5	0.0	0.0	VL	0.1	VL	0.0	0.1
Exchangeable Calcium	mg/kg	2512.0	*	1044.4	3979.6	1674.4	5	1467.6	1294.2	*	4185.2	*	1229.0	5372.0
Exchangeable Magnesium	mg/kg	442.0	*	334.2	549.8	123.0	5	107.8	334.2	*	576.4	*	307.0	610.0
Exchangeable Potassium	mg/kg	122.1	*	58.5	185.8	72.7	5	63.7	75.9	*	196.4	*	68.5	248.0
Exchangeable Sodium	mg/kg	210.7	*	97.6	323.7	129.0	5	113.1	69.2	*	326.2	*	49.5	339.0
Exchangeable Aluminium	mg/kg	0.8	*	0.6	1.0	0.2	5	0.2	0.5	*	1.0	*	0.5	1.0
Exchangeable Calcium	meq/100g	12.6	H	5.2	19.9	8.4	5	7.3	6.5	M	20.9	VH	6.1	26.9
Exchangeable Magnesium	meq/100g	3.7	H	2.8	4.6	1.0	5	0.9	2.8	M	4.8	H	2.6	5.1
Exchangeable Potassium	meq/100g	0.3	M	0.1	0.5	0.2	5	0.2	0.2	VL	0.5	M	0.2	0.6
Exchangeable Sodium	meq/100g	0.9	H	0.4	1.4	0.6	5	0.5	0.3	M	1.4	H	0.2	1.5
Exchangeable Aluminium	meq/100g	0.0	M	0.0	0.0	0.0	5	0.0	0.0	M	0.0	H	0.0	0.0
Calcium/Magnesium Ratio	-	3.7	Low Ca	1.6	5.7	2.5	6	2.0	2.0	*	6.1	*	1.6	8.6

PART 1 OF 3. SPOIL LABORATORY RESULTS – DETAILED SUITE.

	Lab No	200477-3		210632-7		210632-		210632-9		210632-5		210632-1		210632-3	
	Sample ID	CD1 Spoil		CD2 Spoil		CD3 Spoil		CD4 Spoil		CD5 Spoil		CD6 Spoil		CD7 Spoil	
	Sample Depth (m)														
	Field Texture	MC		MC		MC		MC		MC		MC		MC	
Analyses	**Unit**														
pH - Water	pH units	9.2	*E.Alk*	9.4	*E.Alk*	9.3	*E.Alk*	9.3	*E.Alk*	9.0	*H.Alk*	9.1	*E.Alk*	8.1	*M.Alk*
Electrical Conductivity	dS/m	0.41	*M.Sal*	0.29	*M.Sal*	0.29	*M.Sal*	0.31	*M.Sal*	0.21	*L.Sal*	0.20	*L.Sal*	0.51	*M.Sal*
Chloride	mg/kg	3	*VL.Sal*	2	*VL.Sal*	2	*VL.Sal*	2	*VL.Sal*	2	*VL.Sal*	2	*VL.Sal*	4	*VL.Sal*
Cation Extraction Method	Rayment& Lyons	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*
Cation Exchange Capacity	meq/100g	16.2	*M*	14.9	*M*	19.5	*M*	16.1	*M*	12.0	*M*	12.3	*M*	28.3	*H*
Ex Calcium Percent	%	44.7	*L*	41.5	*L*	43.1	*L*	44.5	*L*	42.5	*L*	55.7	*L*	50.3	*L*
Ex Magnesium Percent	%	34.3	*H*	39.1	*H*	35.7	*H*	37.4	*H*	40.0	*H*	30.7	*H*	37.1	*H*
Ex Potassium Percent	%	1.4	*Normal*	0.6	*L*	0.6	*L*	0.5	*L*	0.3	*L*	0.3	*L*	0.6	*L*
Ex Sodium Percent	%	19.5	*H.Sodic*	18.8	*H.Sodic*	20.6	*H.Sodic*	17.5	*H.Sodic*	17.2	*H.Sodic*	13.2	*Sodic*	12.0	*Sodic*
Ex Aluminium Percent	%	0.1	*VL*	0.1	*VL*	0.1	*VL*	0.1	*VL*	0.1	*VL*	0.1	*VL*	0.0	*VL*
Exchangeable Calcium	mg/kg	1448.0	*	1238.0	*	1683.0	*	1437.0	*	1023.0	*	1365.0	*	2847.0	*
Exchangeable Magnesium	mg/kg	666.0	*	700.0	*	836.0	*	723.0	*	578.0	*	452.0	*	1262.0	*
Exchangeable Potassium	mg/kg	89.0	*	36.7	*	42.5	*	34.2	*	12.0	*	16.3	*	65.6	*
Exchangeable Sodium	mg/kg	726.0	*	645.0	*	925.0	*	649.0	*	476.0	*	372.0	*	779.0	*
Exchangeable Aluminium	mg/kg	1.0	*	1.0	*	1.0	*	1.0	*	1.0	*	1.0	*	1.0	*
Exchangeable Calcium	meq/100g	7.2	*M*	6.2	*M*	8.4	*M*	7.2	*M*	5.1	*M*	6.8	*M*	14.2	*H*
Exchangeable Magnesium	meq/100g	5.6	*H*	5.8	*H*	7.0	*H*	6.0	*H*	4.8	*H*	3.8	*H*	10.5	*VH*
Exchangeable Potassium	meq/100g	0.2	*L*	0.1	*VL*	0.1	*VL*	0.1	*VL*	0.0	*VL*	0.0	*VL*	0.2	*VL*
Exchangeable Sodium	meq/100g	3.2	*VH*	2.8	*VH*	4.0	*VH*	2.8	*VH*	2.1	*VH*	1.6	*H*	3.4	*VH*
Exchangeable Aluminium	meq/100g	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*
Calcium/Magnesium Ratio	-	1.3	*Low Ca*	1.1	*Low Ca*	1.2	*Low Ca*	1.2	*Low Ca*	1.1	*Low Ca*	1.8	*Low Ca*	1.4	*Low Ca*
Gravel >2.0mm	%	2.8	*	1.5	*	2.2	*	1.1	*	0.3	*	0.7	*	6.6	*
Coarse Sand 0.2-2.0mm	%	10.4	*	5.1	*	24.1	*	19.3	*	8.9	*	8.4	*	24.9	*
Fine Sand 0.1-0.2 mm	%	24.5	*	32.2	*	15.2	*	30.7	*	20.6	*	25.6	*	12.8	*
Silt 0.002-0.02mm	%	13.1	*	18.5	*	11.1	*	14.4	*	17.2	*	27.4	*	10.8	*
Clay <0.002mm	%	49.2	*	42.7	*	47.4	*	34.5	*	53.0	*	37.9	*	44.9	*

PART 2 OF 3. SPOIL LABORATORY RESULTS – DETAILED SUITE.

	Lab No	210632-7		210632-		210632-15		200477-3		210632-7		210632-13		210632-9	
	Sample ID	CD8 Spoil		CD9 Spoil		CD10 Spoil		CD11 Spoil		CD12 Spoil		CD13 Spoil		CD14 Spoil	
	Sample Depth (m)														
	Field Texture	LC		MC		LMC		MC		LMC		LC		MC	
Analyses	**Unit**														
pH - Water	pH units	9.4	*E.Alk*	9.3	*E.Alk*	8.9	*H.Alk*	9.4	*E.Alk*	9.3	*E.Alk*	9.7	*E.Alk*	9.1	*E.Alk*
Electrical Conductivity	dS/m	0.27	*M.Sal*	0.25	*M.Sal*	0.18	*L.Sal*	0.26	*M.Sal*	0.35	*M.Sal*	0.47	*H.Sal*	0.44	*M.Sal*
Chloride	mg/kg	2	*VL.Sal*	2	*VL.Sal*	1	*VL.Sal*	2	*VL.Sal*	3	*VL.Sal*	4	*VL.Sal*	4	*VL.Sal*
Cation Extraction Method	Rayment& Lyons	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*
Cation Exchange Capacity	meq/100g	9.9	*L*	11.0	*L*	12.6	*M*	12.0	*L*	12.8	*M*	10.2	*L*	16.7	*M*
Ex Calcium Percent	%	34.5	*L*	45.0	*L*	56.2	*L*	44.6	*L*	41.5	*L*	26.2	*L*	43.4	*L*
Ex Magnesium Percent	%	38.4	*H*	40.7	*H*	33.3	*H*	34.5	*H*	34.6	*H*	43.4	*H*	40.1	*H*
Ex Potassium Percent	%	0.9	*L*	0.8	*L*	1.6	*Normal*	1.1	*Normal*	1.4	*Normal*	0.7	*L*	1.2	*Normal*
Ex Sodium Percent	%	26.1	*H.Sodic*	13.3	*Sodic*	8.8	*Sodic*	19.7	*H.Sodic*	22.4	*H.Sodic*	29.6	*H.Sodic*	15.2	*H.Sodic*
Ex Aluminium Percent	%	0.1	*VL*	0.1	*VL*	0.1	*VL*	0.1	*VL*	0.1	*VL*	0.1	*VL*	0.1	*VL*
Exchangeable Calcium	mg/kg	681.0	*	989.0	*	1414.0	*	1068.0	*	1066.0	*	535.0	*	1446.0	*
Exchangeable Magnesium	mg/kg	454.0	*	537.0	*	503.0	*	496.0	*	532.0	*	532.0	*	803.0	*
Exchangeable Potassium	mg/kg	36.0	*	34.9	*	76.5	*	50.9	*	70.4	*	28.5	*	77.5	*
Exchangeable Sodium	mg/kg	591.0	*	337.0	*	256.0	*	544.0	*	661.0	*	696.0	*	584.0	*
Exchangeable Aluminium	mg/kg	1.0	*	1.0	*	1.0	*	1.0	*	1.0	*	1.0	*	1.0	*
Exchangeable Calcium	meq/100g	3.4	*L*	4.9	*L*	7.1	*M*	5.3	*M*	5.3	*M*	2.7	*L*	7.2	*M*
Exchangeable Magnesium	meq/100g	3.8	*H*	4.5	*H*	4.2	*H*	4.1	*H*	4.4	*H*	4.4	*H*	6.7	*H*
Exchangeable Potassium	meq/100g	0.1	*VL*	0.1	*VL*	0.2	*VL*	0.1	*VL*	0.2	*VL*	0.1	*VL*	0.2	*VL*
Exchangeable Sodium	meq/100g	2.6	*VH*	1.5	*H*	1.1	*H*	2.4	*VH*	2.9	*VH*	3.0	*VH*	2.5	*VH*
Exchangeable Aluminium	meq/100g	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*
Calcium/Magnesium Ratio	-	0.9	*Low Ca*	1.1	*Low Ca*	1.7	*Low Ca*	1.3	*Low Ca*	1.2	*Low Ca*	0.6	*Low Ca*	1.1	*Low Ca*
Gravel >2.0mm	%	15.0	*	3.7	*	1.9	*	0.8	*	2.1	*	5.6	*	1.1	*
Coarse Sand 0.2-2.0mm	%	30.3	*	10.7	*	20.2	*	24.4	*	33.7	*	33.0	*	19.1	*
Fine Sand 0.1-0.2 mm	%	31.4	*	31.9	*	34.4	*	31.6	*	30.1	*	29.8	*	33.8	*
Silt 0.002-0.02mm	%	3.8	*	18.7	*	13.9	*	9.1	*	4.4	*	7.9	*	11.7	*
Clay <0.002mm	%	19.5	*	35.0	*	29.6	*	34.1	*	29.7	*	23.7	*	34.3	*

PART 3 OF 3. SPOIL LABORATORY RESULTS – DETAILED SUITE.

	Lab No	210632-5		210632-1		210632-3		210632-7		210632-11		210632-14		210632-15	
	Sample ID	CD15 Spoil		CD16 Spoil		CD17 Spoil		CD18 Spoil		CD19 Spoil		CD20 Spoil		CD21 Spoil	
	Sample Depth (m)														
	Field Texture	MC		LC		MC		MC		LC		LC		LMC	
Analyses	**Unit**														
pH - Water	pH units	9.2	*E.Alk*	9.4	*E.Alk*	9.3	*E.Alk*	9.0	*E.Alk*	9.2	*E.Alk*	9.1	*E.Alk*	8.7	*H.Alk*
Electrical Conductivity	dS/m	0.34	*M.Sal*	0.13	*L.Sal*	0.26	*M.Sal*	0.31	*M.Sal*	0.32	*M.Sal*	0.32	*M.Sal*	0.14	*L.Sal*
Chloride	mg/kg	3	*VL.Sal*	1	*VL.Sal*	2	*VL.Sal*	197	*L.Sal*	73	*VL.Sal*	283	*L.Sal*	3	*VL.Sal*
Cation Extraction Method	Rayment& Lyons	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*
Cation Exchange Capacity	meq/100g	14.4	*M*	17.0	*M*	24.7	*M*	12.1	*M*	11.3	*L*	7.6	*L*	16.1	*M*
Ex Calcium Percent	%	48.5	*L*	44.4	*L*	37.8	*L*	34.0	*L*	49.7	*L*	39.3	*L*	57.5	*L*
Ex Magnesium Percent	%	32.5	*H*	50.2	*H*	54.3	*H*	44.6	*H*	36.1	*H*	46.3	*H*	39.3	*H*
Ex Potassium Percent	%	0.6	*L*	0.4	*L*	0.2	*L*	2.0	*Normal*	1.5	*Normal*	2.2	*Normal*	1.0	*Normal*
Ex Sodium Percent	%	18.3	*H.Sodic*	5.0	*N.Sodic*	7.7	*Sodic*	19.3	*H.Sodic*	12.7	*Sodic*	12.1	*Sodic*	2.2	*N.Sodic*
Ex Aluminium Percent	%	0.1	*VL*	0.1	*VL*	0.0	*VL*	0.1	*VL*	0.1	*VL*	0.1	*VL*	0.1	*VL*
Exchangeable Calcium	mg/kg	1398.0	*	1507.0	*	1872.0	*	825.0	*	1125.0	*	595.0	*	1855.0	*
Exchangeable Magnesium	mg/kg	561.0	*	1021.0	*	1611.0	*	650.0	*	490.0	*	420.0	*	760.0	*
Exchangeable Potassium	mg/kg	35.6	*	24.5	*	16.0	*	95.0	*	65.0	*	65.0	*	65.0	*
Exchangeable Sodium	mg/kg	605.0	*	195.0	*	436.0	*	540.0	*	330.0	*	210.0	*	80.0	*
Exchangeable Aluminium	mg/kg	1.0	*	1.0	*	1.0	*	1.0	*	1.0	*	1.0	*	1.0	*
Exchangeable Calcium	meq/100g	7.0	*M*	7.5	*M*	9.4	*M*	4.1	*L*	5.6	*M*	3.0	*L*	9.3	*M*
Exchangeable Magnesium	meq/100g	4.7	*H*	8.5	*VH*	13.4	*VH*	5.4	*H*	4.1	*H*	3.5	*H*	6.3	*H*
Exchangeable Potassium	meq/100g	0.1	*VL*	0.1	*VL*	0.0	*VL*	0.2	*L*	0.2	*VL*	0.2	*VL*	0.2	*VL*
Exchangeable Sodium	meq/100g	2.6	*VH*	0.8	*H*	1.9	*H*	2.3	*VH*	1.4	*H*	0.9	*H*	0.3	*M*
Exchangeable Aluminium	meq/100g	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*	0.0	*H*
Calcium/Magnesium Ratio	-	1.5	*Low Ca*	0.9	*Low Ca*	0.7	*Low Ca*	0.8	*Low Ca*	1.4	*Low Ca*	0.9	*Low Ca*	1.5	*Low Ca*
Gravel >2.0mm	%	1.6	*	0.3	*	0.5	*	0.2	*	0.1	*	1.9	*	13.4	*
Coarse Sand 0.2-2.0mm	%	17.1	*	35.0	*	31.8	*	10.3	*	32.6	*	16.3	*	13.9	*
Fine Sand 0.1-0.2 mm	%	23.1	*	27.7	*	20.6	*	25.3	*	31.9	*	40.9	*	24.7	*
Silt 0.002-0.02mm	%	12.7	*	10.4	*	8.8	*	23.4	*	6.6	*	14.2	*	11.4	*
Clay <0.002mm	%	45.5	*	26.6	*	38.3	*	40.8	*	28.8	*	26.7	*	36.6	*

SUMMARY STATISTICS OF SPOIL LABORATORY RESULTS – DETAILED SUITE.

Analyses	Lab No / Sample ID / Sample Depth (m) / Field Texture / Unit	Mean		LCL 95%	UCL 95%	Std Dev	Count	CI 95% (+/-)	10%ile		90%ile		Min	Max
pH - Water	pH units	9.2	E.Alk	9.1	9.4	0.2	11	0.1	9.0	E.Alk	9.4	E.Alk	8.7	9.7
Electrical Conductivity	dS/m	0.30	M.Sal	0.24	0.37	0.11	11	0.06	0.14	L.Sal	0.44	M.Sal	0.13	0.47
Chloride	mg/kg	52	VL.Sal	-5	110	97	11	57	2	VL.Sal	197	L.Sal	1	283
Cation Extraction Method	Rayment& Lyons	*	*	*	*	*	*	*	*	*	*	*	*	*
Cation Exchange Capacity	meq/100g	14.1	M	11.4	16.8	4.6	11	2.7	10.2	L	17.0	M	7.6	24.7
Ex Calcium Percent	%	42.4	L	37.5	47.4	8.3	11	4.9	34.0	L	49.7	L	26.2	57.5
Ex Magnesium Percent	%	41.4	H	37.3	45.6	7.0	11	4.1	34.5	H	50.2	H	32.5	54.3
Ex Potassium Percent	%	1.1	Normal	0.7	1.5	0.6	11	0.4	0.4	L	2.0	Normal	0.2	2.2
Ex Sodium Percent	%	14.9	H.Sodic	10.1	19.7	8.1	11	4.8	5.0	N.Sodic	22.4	H.Sodic	2.2	29.6
Ex Aluminium Percent	%	0.1	VL	0.1	0.1	0.0	11	0.0	0.1	VL	0.1	VL	0.0	0.1
Exchangeable Calcium	mg/kg	1208.4	*	939.9	1476.8	454.3	11	268.5	595.0	*	1855.0	*	535.0	1872.0
Exchangeable Magnesium	mg/kg	716.0	*	512.4	919.6	344.5	11	203.6	490.0	*	1021.0	*	420.0	1611.0
Exchangeable Potassium	mg/kg	53.9	*	39.3	68.6	24.9	11	14.7	24.5	*	77.5	*	16.0	95.0
Exchangeable Sodium	mg/kg	443.7	*	320.1	567.4	209.2	11	123.6	195.0	*	661.0	*	80.0	696.0
Exchangeable Aluminium	mg/kg	1.0	*	#NUM!	#NUM!	0.0	11	#NUM!	1.0	*	1.0	*	1.0	1.0
Exchangeable Calcium	meq/100g	6.0	M	4.7	7.4	2.3	11	1.3	3.0	L	9.3	M	2.7	9.4
Exchangeable Magnesium	meq/100g	6.0	H	4.3	7.7	2.9	11	1.7	4.1	H	8.5	VH	3.5	13.4
Exchangeable Potassium	meq/100g	0.1	VL	0.1	0.2	0.1	11	0.0	0.1	VL	0.2	VL	0.0	0.2
Exchangeable Sodium	meq/100g	1.9	H	1.4	2.5	0.9	11	0.5	0.8	H	2.9	VH	0.3	3.0
Exchangeable Aluminium	meq/100g	0.0	H	#NUM!	#NUM!	0.0	11	#NUM!	0.0	H	0.0	H	0.0	0.0
Calcium/Magnesium Ratio	-	1.1	Low Ca	0.9	1.3	0.3	11	0.2	0.7	*	1.5	*	0.6	1.5
Gravel >2.0mm	%	2.5	*	0.2	4.8	3.9	11	2.3	0.2	*	5.6	*	0.1	13.4
Coarse Sand 0.2-2.0mm	%	24.3	*	18.8	29.7	9.2	11	5.5	13.9	*	33.7	*	10.3	35.0
Fine Sand 0.1-0.2 mm	%	29.0	*	25.7	32.4	5.7	11	3.3	23.1	*	33.8	*	20.6	40.9
Silt 0.002-0.02mm	%	11.0	*	8.0	13.9	5.0	11	2.9	6.6	*	14.2	*	4.4	23.4
Clay <0.002mm	%	33.2	*	29.2	37.2	6.8	11	4.0	26.6	*	40.8	*	23.7	45.5

3.6 RISK ASSESSMENT

3.6.1 RISK MATRIX

Impact	Likelihood (Chance of reoccurrance with no action)			
4	4 S	8 S	12 S	16 S
3	3 M	6 M	9 S	12 S
2	2 L	4 L	6 M	8 M
1	1 L	2 L	3 L	4 L
	1	2	3	4

Significance:

… S	Significant
… M	Moderate
… L	Low

Likelihood	Chance of reoccurrance with no further action taken
4	Occurs in most circumstances.
3	Likely to occur
2	Could occur, but unlikely
1	Occurs in exceptional circumstances

Impact	Environmental (Actual or Potential Outcomes)
4	**MAJOR Environmental Risk:** Release offsite or Environmental Incident with major environmental impacts or Permit violation/ Environmental Regulatory Action (ERA) in temporary or permanent prohibition of any key operational activity requiring the Crisis Management Plan to be initiated.
3	**MINOR Environmental Risk:** Offsite release or Environmental Incident with minor environmental impacts or Environmental Regulatory Action (ERA) taken by a Government Agency or Regulating Authority in response to an environmental incident.
2	**Reportable Environmental Incident:** Any reportable non-compliant release to the environment or Environmental Incident resulting in breach of the Environmental Authority conditions.
1	**SLIGHT Environmental Risk:** -Spill, damage or release (or any other environment related incident) within a facility in containment and captured onsite. -Uncontained spill or release of a small volume of material contained on site. -Registered complaint from an external stakeholder regarding facilities operation (e.g. noise, dust). - Impact contained on site and non-reportable.

3.6.2 RISK ASSESSMENT

Activity	**Commodore Coal Mine Rehabilitation (ML50151)**			
Business reason to undertake this activity?	Under QLD legislation a mine is required to undertake progressive rehabilitation and implement a PRCP. It is a requirement of the legislation that the risks, of the disturbed areas at Commodore Coal Mine that *will not be* able to be rehabilitated, to a safe and stable condition, be analysed. This risk assessment identifies the risks of a stable condition for land **not being achieved** and controls to manage or minimise the identified risks.			
Assessment Team Members	Leticia Tolson	Joel Rickuss	Downer Mining	Wayne McAuliffe
	Civil Mining & Environment Coordinator	External Resources Manager	Mining Contractor	Engineering Manager
Assessment Team Recommendations	**Low risk** that the land cannot meet the designed PMLU criteria or that PRCP Milestones cannot be met.			
Manager Review and Approval	Chris Seydel – Plant Manager, Millmerran Operating Company			
Date Approved	28 May 2021	**Date Approved To**	31 August 2024	

Risk Factor #1 – Landforming not adequate to achieve PMLU	Risk Rating
Significance Landforming to the final design landform is the foundation for topsoil and revegetation. Spoil needs to be placed to minimise settlement and tunnelling erosion. Spoil on site is typically sodic in nature. If landform is not addressed correctly it represents a risk of sediment load in mine water run-off, erosion, cost or remediation, damage and failure risks to future rehabilitation, risk of non-compliance with slope conditions and environmental conditions in the EA. If slopes, depressions and voids are not adequately addressed, the final PMLU is at risk of not being met. Sediment loaded run-off is a potential risk while landforming takes place makes the activity reportable but does not prevent rehabilitation. Additional issues are stability of the land form into perpetuity and migration of capped contaminants from waste overburden and ash.	Reportable 2
Likelihood Some tunnelling and erosion have been observed in older dumps and rehabilitation areas has required rework. This rework has been a low-cost activity to easily remedy the issue prior to topsoiling or rework. No non-compliances have occurred on rehabilitation. Water management infrastructure is established to hold mine-water run-off from rehabilitated areas successfully. Water management infrastructure is installed prior to landforming. Limited settlement risks due to the shallow nature of the mine and the mining techniques. Historical experience shows low settlement rates and minimal difficulties with spoil shaping. From experience on site and knowledge of the spoil it is unlikely that landforming activities would prevent rehabilitation areas meeting their certifying criteria. Encapsulated ash monitoring has shown no migration in contaminants since the installation of each piezometer. Monitoring has show that piezometers in ash are consistently dry. Chemical analysis shows low risk of leaching potential. An 8m minimum surface cap and ash burial away from water resources ensures the materials are not going to be exposed in the current landform.	Unlikely 2
Default Control Measures and Risk Level Final landform design in place. Surveying of the landform, against design, shows where material may be required to be added or removed. It also measures settlement rates. Water management infrastructure contains any mine-water run-off from rehabilitated areas. Mining techniques, particularly the dozer push used for dump progression, consolidates and compacts the spoil. Landform can be repaired, if required, prior to topsoiling while equipment is in area. Ash burial must be managed and monitored with piezometers as per EA conditions. Annual sampling for TCLP and ongoing characterisation occurs to monitor the ash for changes. • That burial of ash will occur below at least 8m of overburden; and • The burial of ash will only occur above the likely groundwater levels; and • That ash will not be buried under surface water storage dams; and • That ash will not be buried within 150 metres of the edge of the final void; and • That no burial of ash will occur within 150m of the edge of the final pit outline; • That ash will not be buried under Back Creek Diversion; and	4L. Low.

• That lysimeters will be placed within ash to monitor water content and quality.	
Additional Control Measures The sodic soils present challenges but are a low risk and have been demonstrably managed with soil amelioration if required or in problem areas. Soil amelioration is a potential additional control measure that has been utilised in higher risk erosion areas (Back Creek Diversion for example).	
Final Significance The risk that landforming would prevent land from meeting its PMLU is reportable (2). Significance is LOW.	Reportable 2
Final Likelihood The likelihood that landforming would prevent land from meeting its PMLU is very unlikely (1)	Unlikely 1
Action and Responsible Person Continue following current mining and rehabilitation procedures (Mining Contractor).	

Risk Factor #2 – Land Contamination Remediation preventing PMLU	Risk Rating
Significance Land contamination may require specialist treatment in certain areas that risk the timing and/or desired final PMLU. Considered at worst a reportable event. Water management infrastructure would contain impacts on site. Release offsite not expected. Water management infrastructures to remain in place to contain surface waters until rehabilitation areas are certified.	Reportable 2
Likelihood Exceptional circumstances would need to happen to create a situation that prevented timely remediation/disposal.	Unlikely 1
Default Control Measures and Risk Level Waste Management Plan in place. Hydrocarbon remediation pad on site. Treatment/disposal can occur off site. Contaminants stored and used on site can be remediated. Thorough understanding of chemicals on site. Ash is low risk. Low/no TCLP potential. Capped with 8m of spoil. Site is registered for storage of chemicals under ERA.	Low 2L
Additional Control Measures Consultants and service providers to be used where onsite management is unavailable.	
Final Significance Slight risk that very small areas may not be able to be rehabilitated to the design PMLU making it a reportable issue.	Reportable 2
Final Likelihood It is possible that contamination could delay rehabilitation, but unlikely it would prevent it.	Unlikely 1
Action and Responsible Person Nil. Mining Contractor during mining and consultant/contractor post-mining.	

Risk Factor #3 – Topsoil Placement not providing sufficient coverage for rehabilitation.	Risk Rating
Significance No perceived risk that topsoil replacement would prevent achievement of a PMLU. Sufficient stocks of topsoil are available. Perceived risks are around issues such as weeds and undesirable seed bank stored in the topsoil. IT would not prevent a PMLU but may hinder short-term success.	Slight 1
Likelihood From on site experience the risk to final PMLU from topsoil is very unlikely. Soil surveys indicate sufficient topsoil resource available for rehabilitation criteria.	Unlikely 1
Default Control Measures and Risk Level Commodore Mine has secure supplies of topsoil. Seed as soon as topsoil is placed. Amelioration of topsoil is typically not required. Surveys undertaken to ensure landform design met.	Low 1L
Additional Control Measures Ameliorated topsoil where necessary (engage 3rd party rehabilitation specialist for monitoring). Transport topsoil from farther away on the mine at a greater cost. Borrow topsoil from other areas.	
Final Significance Slight risk that topsoil characteristics may delay final certification but not the rehabilitation design.	Slight 1
Final Likelihood It is unlikely that topsoil has any bearing on achieving the rehabilitation design PMLU at any point.	Unlikely 1
Action and Responsible Person Survey topsoil stockpiles and report annually. Mining Contractor.	

Risk Factor #4 – Vegetation Establishment (failure to establish and meet PMLU criteria).	Risk Rating
Significance Failure to establish appropriate vegetation and meet vegetation criteria may delay the ability of land to meet PMLU. Equally, should a dominant species control the area the PMLU may not be able to be achieved until it is managed. Perceived risks are delays to achieving the PMLU criteria and timelines associated with PRCP. Seed availability and climate all affect this outcome and cause delays. For example, up to 5 year delays could be experienced from drought conditions. These conditions affect seed availability as well.	Slight 1
Likelihood Unlikely. Existing rehabilitation shows that stable and safe rehabilitation areas are readily achievable.	Unlikely 1
Default Control Measures and Risk Level Contours and water run-off control structures in place. Locally sourced pasture seed mixes have a proven, and successful, record of use on site. Ongoing monitoring by suitably qualified person. If disturbance occurs within the vicinity of a drainage line before vegetation is established, this could impact on water quality of downstream watercourses through an increase in sediment load. This risk is managed by erosion and sediment control structures and dams, until rehabilitation areas can be certified.	Low 1L
Additional Control Measures Rework the topsoil. For example, plough organic material in and reseed. Investigate alternative species to improve establishment, manage climatic conditions and mitigate seed availability. Place habitat locations along tree corridors to encourage seed distribution. Place timber in rehabilitation for birds to rest on, encourage habitat. Undertake small cool burn-offs to promote native growth and control weeds. Annual monitoring reports to provide feedback and recommendations for rehabilitation. Various trials and study opportunities available, to identify alternate methods. Irrigation is available at a cost to water resources in a drought.	
Final Significance There's a likely chance that rehabilitation could be delayed, but almost no chance (if controls are followed) that it would be prevented from achieving the final PMLU.	Slight 1
Final Likelihood Unlikely that vegetation establishment would prevent rehabilitation to the final PMLU.	Unlikely 1
Action and Responsible Person Annual monitoring and review. Mining Contractor. Consultants and specialist contractors.	