

Capricorn Stone Products PL Rehabilitation Management Plan



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STEER
ENVIRONMENTAL CONSULTING

Capricorn Stone Products Pty Ltd – Rehabilitation
Management Plan - Capricorn Sandstone Quarries, 227
Power Station Road, Stanwell 4702

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3 Abbreviations

• CSP	-	Capricorn Stone Products Pty Ltd
• EA	-	Environmental Authority
• EHP	-	Department of Environment and Heritage Protection
• ERA	-	Environmentally Relevant Activity
• STEER EC	-	STEER Environmental Consulting
• ML	-	Mining Lease
• RMP	-	Rehabilitation Management Plan
• LFA	-	Landscape Function Analysis
• DBH	-	Diameter at Breast Height

4 Executive Summary

STEER Environmental Consulting (STEER EC) has been commissioned by Capricorn Stone Products Pty Ltd to prepare and submit a “Rehabilitation Management Plan” (RMP) for their operations on mining leases (ML) 7341 and 80102 at 227 Power Station Road Stanwell 4702.

The RMP has been prepared in order to comply with conditions C3 and C4, contained in environmental authority (EA) EPML04041216, which was granted by the Department of Environment and Heritage Protection (EHP) on 4 August 2016. This plan is also intended to comply with the ‘Rehabilitation requirements for mining resource activities guidelines’ (EM1122) as outlined in said Environmental Authority (EA) conditions.

The RMP details actions that will be undertaken at the cessation of mining activities, to appropriately rehabilitate the applicable land covered by ML 7341 and 80102 and EA EPML04041216.

5 Background

5.1 Proponent

Capricorn Stone Products Pty Ltd (CSP), operated by Capricorn Sandstone Quarries Pty Ltd, is a family owned business with over 50 years of experience in the sandstone mining industry. CSP supply a range of high quality sandstone products for commercial, residential, restoration and export markets from Capricorn Sandstone Quarries, Stanwell.

Capricorn Sandstone Quarries has a rich local history dating back to the 1800s. CSP reinstated operations at the Stanwell site in 1994. They have since been successful in consolidating their business model, with contracts to supply Regional Councils, State Governments and competitive international export markets, including China. Capricorn Sandstone Quarries was recognised as Trade Queensland's 2011 Central Queensland Exporter of the Year. In 2010 Capricorn Sandstone Quarries was recognised at "The Premier of Queensland's Export Awards" as the winner of the Tom Burns Award and finalist in the Regional Exporter Award and were also the 2010 Winner of the Trade Queensland Emerging Exporter of the Year Award.

CSP products have been integral in several iconic local heritage projects including Rockhampton Customs House, Rockhampton Post office and Rockhampton Technical College to name but a few.

Aside from their operations at Stanwell, CSP also has an administrative centre located on Gladstone Road, Rockhampton. CSP continually strives to improve its operations and expand its business opportunities where possible. CSP is a significant local business and employer, with a strong commitment to expanding its operations in the Rockhampton region.

(The information contained in this section has been sourced and adapted from the CSP website)

5.2 Site History

The discovery of high grade sandstone was made at Stanwell around 1867 with the first quarry being opened soon after by a Mr G Sanderson. Several historic buildings in Rockhampton are built from Stanwell sandstone including Customs House, Rockhampton Post Office, and the Roman Catholic Cathedral. The quarry was leased by Bishop Carney of Rockhampton during the 1880's in order to secure the necessary stone for the cathedral (see Figure 1). In those early days, liberating the large blocks from the mountain was achieved with bars and black powder and would have been a far more arduous task than it is today.



Figure 1. Workers at Stanwell Quarry, circa 1898, preparing stone for the Catholic Cathedral, Rockhampton. Image courtesy of State Library of Queensland.

When Roy Gough and his son Reece reopened the quarry in 1994 the blocks were cut with Fantini chainsaws, then drilled underneath to extract the blocks. CSP has come a long way since then with substantial investments in excavator mounted cutting wheels (see Figure 2). These have enabled CSP to significantly improve efficiency whilst dramatically reducing physical workloads on employees concurrently.



Figure 2. Excavator mounted stone saw.

6 Setting

6.1 Site Location and Surrounding Area

Capricorn Sandstone Quarries is located at 227 Power Station Road, Stanwell 4702, Lot 179 LN2465, Lot 159 LN2465, Lots 1-6 LIV40877, Lot 184 LIV40877 and Lot 252 SP275125 (see Appendix A). This is approximately 2.5 kilometres east of the Stanwell Power Station and approximately 2.3 kilometres south east of the township of Stanwell (see Figure 3), which is home to around 300 residents. The residents of the area are accustomed to the quarry being in the area as it has a history dating back to the 1800's. The local residents are also familiar with heavy industry in the area, with Stanwell Power Station being located approximately 2.2 kilometres south of Stanwell Township since 1996. Immediate uses surrounding the quarry are zoned for medium and high impact industry, and special industry, with special management area overlay existing over much of the surrounding area, including Capricorn Sandstone Quarries. Stanwell Power Station to the west is zoned special industry and land to the east is zoned as rural. Neerkol Creek is situated approximately 850 meters to the north and two small ephemeral tributaries are nearby, with one situated approximately 550 meters to the west and the other around 400 meters to the north east of the mine (see Figure 3).



Figure 3. Position of Capricorn Sandstone Quarries in relation to Stanwell Power Station, Stanwell township, Neerkol Creek and two ephemeral creeks.

6.2 Regional Context

Capricorn Sandstone Quarries is located in the Fitzroy River Catchment, which makes up part of the Brigalow Belt Bioregion of Central Queensland.

Habitat in the surrounding area consists predominantly of open woodland to the east, north and south which is zoned primarily as non-remnant vegetation. Directly to the west is an elevated sandstone habitat which is zoned as non-remnant and remnant of least concern vegetation types.

Land use in the area consists of low value pasture, with some areas of sown pasture use. The surrounding area is also zoned for rural residential, medium impact industry, high impact industry and special industry under the Rockhampton Regional Council planning scheme (see Figure 4 and Appendix B). Much of the Stanwell corridor is also subject to special management area overlay.

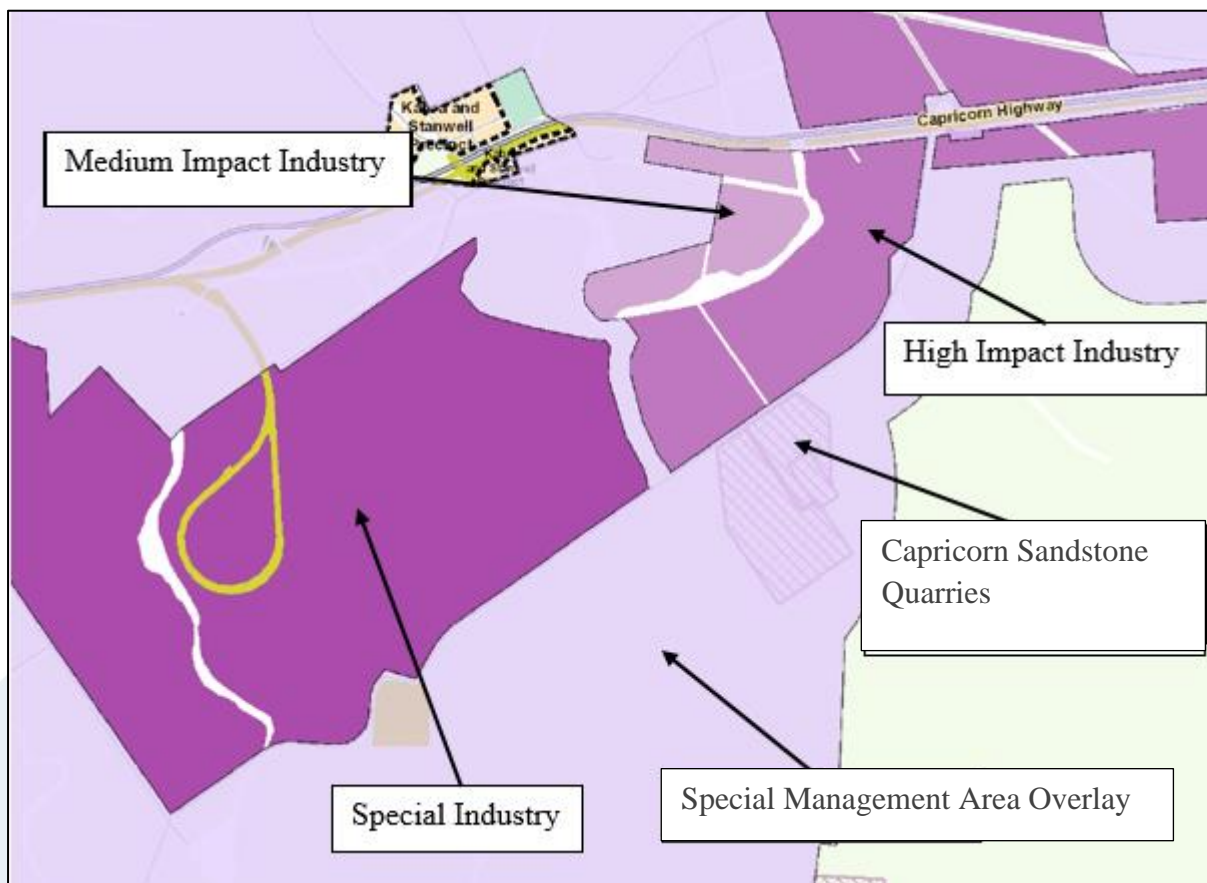


Figure 4. Industrial zoning in relation to Capricorn Sandstone Quarries.

6.3 Climate

The climate is classified as warm and temperate. The average rainfall is 773mm with the majority falling between October and March (see Figure 5). Average temperature ranges from 26.7 °C in January to 15.8 °C in July (see Figure 5).

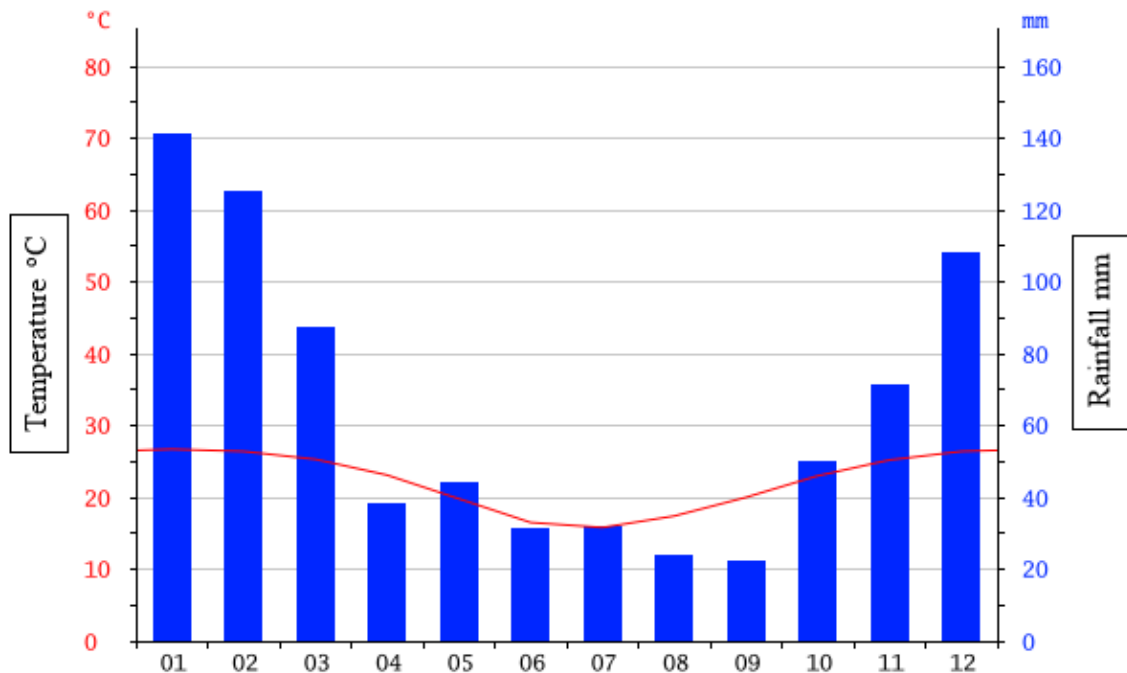


Figure 5. Average temperature and rainfall data for the Stanwell area.

6.4 Flooding susceptibility

The entire site of the mine is located in an elevated position on a sandstone outcrop and is therefore unlikely to be impacted in any significant manner by flooding. Consideration of the mine in relation to NRM Flood check mapping (<https://floodcheck.information.qld.gov.au/>) indicates no impacts from basin 1% AEP and only a very small potential impact on a single isolated area from basin extreme events (Fig. 6 & 7).

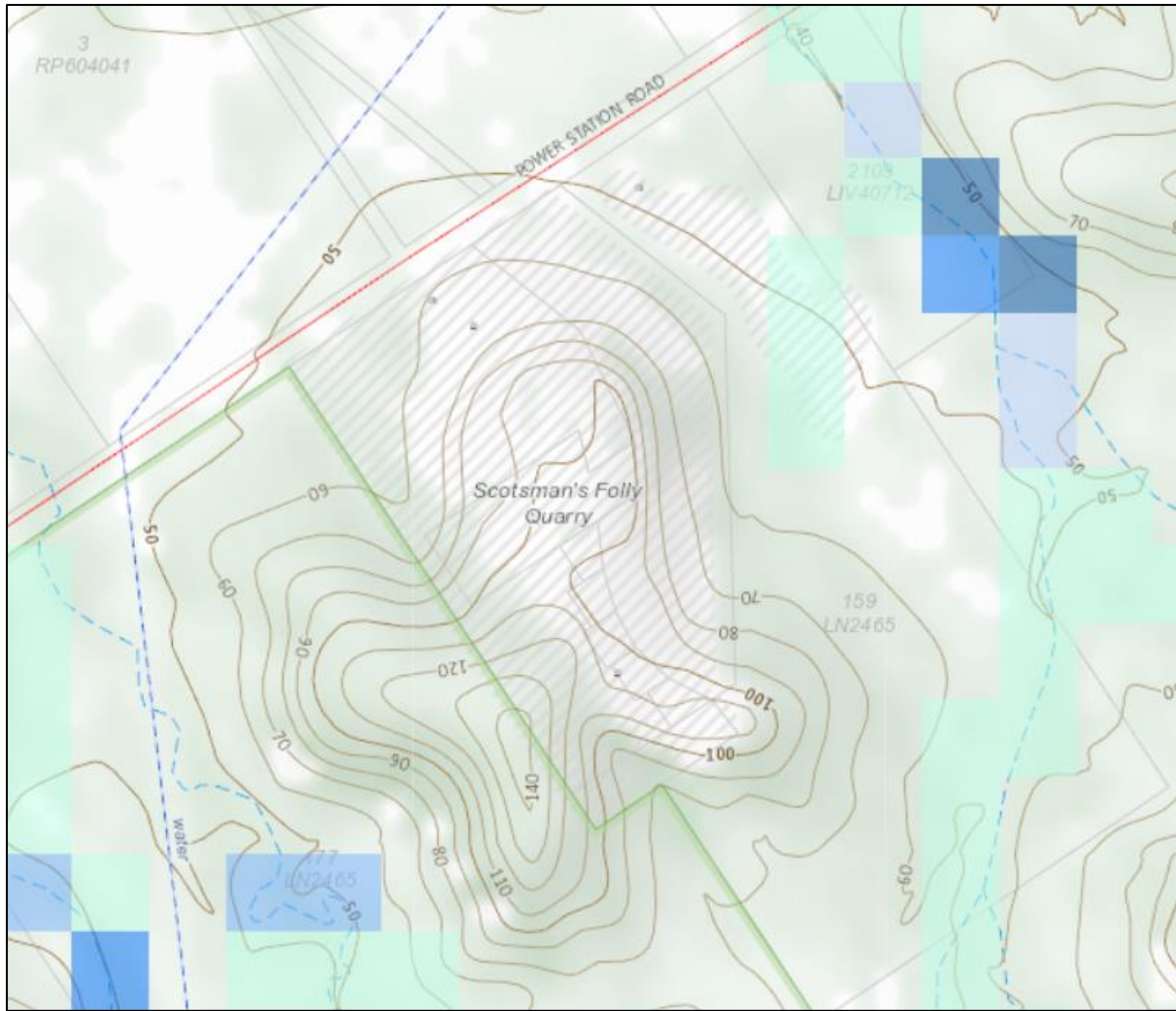


Figure 6. NRM Flood check mapping for Capricorn Sandstone Quarries from basin 1% AEP showing no impact.

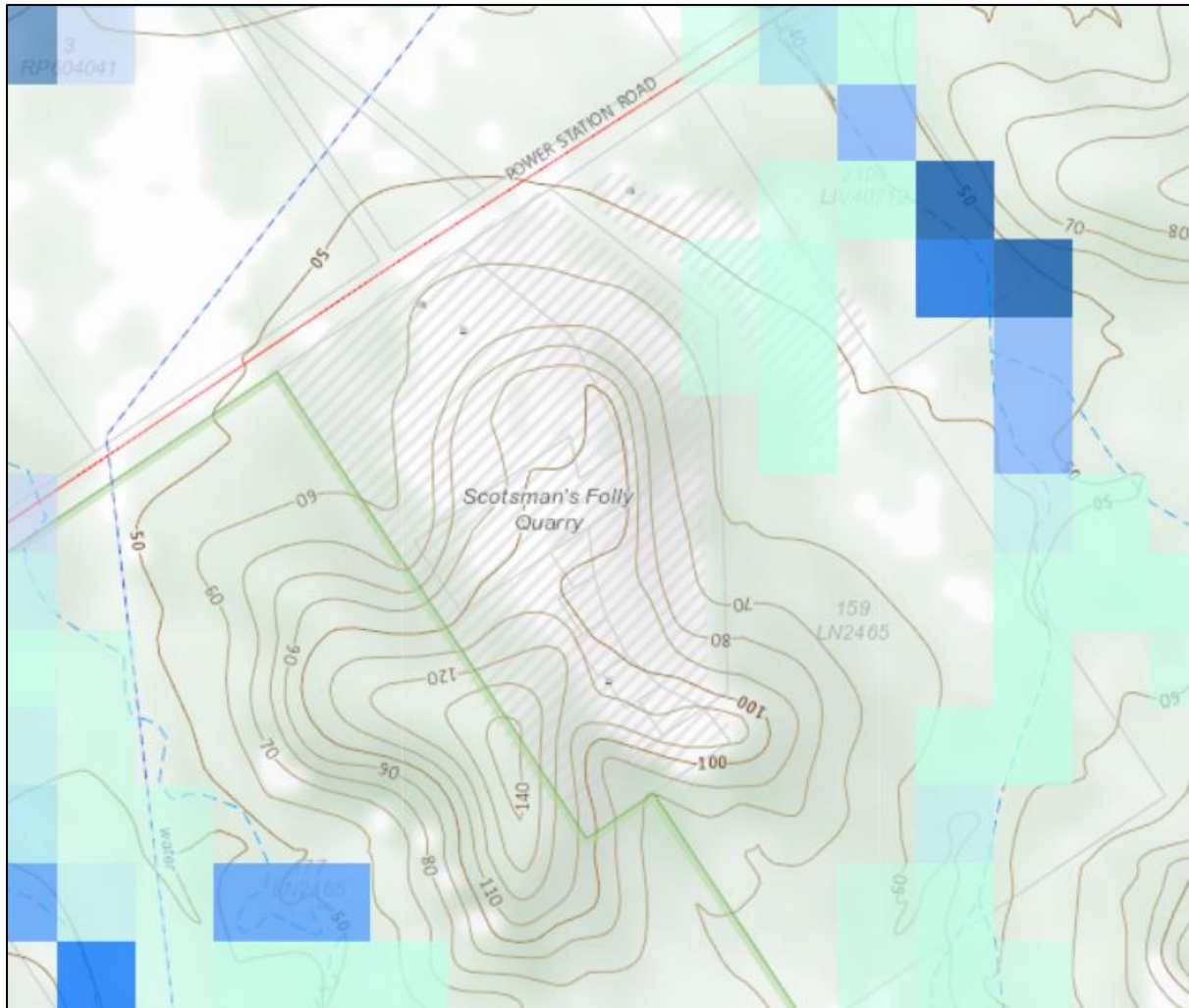


Figure 7. NRM Flood check mapping for Capricorn Sandstone Quarries from basin extreme events, showing very minor potential impact in one isolated area.

6.5 Soil

Soils in the region are Dermosols, which are typically comprised of clay loam, silty loam or sandy loam formation. The soils in the area surrounding generally have a pH of between 7 and 7.5 and salinity is relatively low with values of between 0.1 and 0.15 ds/m. Water infiltration is considered moderate with a rate of 3 – 30ml/hr and drainage in the area is classified as imperfect¹.

7 Legislative Context of RMP

7.1 Environmental Protection Act 1994

Approval and operation of Capricorn Sandstone Quarries from an environmental management perspective is predominantly subject to:

- *Environmental Protection Act 1994*
 - *Environmental Protection Regulation 2008*
 - *Environmental Protection (Air) Policy 2008*
 - *Environmental Protection (Noise) Policy 2008*
 - *Environmental Protection (Water) Policy 2009*

The mining activity conducted by Capricorn Stone Products Pty Ltd at Capricorn Sandstone Quarries is defined as an environmentally relevant activity (ERA) under section 18 of the *Environmental Protection Act 1994* (EP Act), and further defined as a resource activity under section 107 of the EP Act. The tonnage of material that is extracted per year sits within 100,000-1,000,000 tonnes, and the facility is therefore operated under resource activity “ERA 20(b)”, which is defined as:

“Clay pit mining, dimension stone mining or mining gemstones (including the material from which gemstones are extracted) - if the activity involves mining a quantity of material of more than 100,000t but not more than 1,000,000t in a year.”

7.2 Environmental Authority

Section 426 of the EP Act requires that an ERA may only be conducted under the approval of an environmental authority (EA). Capricorn Stone Products Pty Ltd operates Capricorn Sandstone Quarries under EA EPML04041216, which was granted by the Department of Environment and Heritage Protection (EHP) on 4 August 2016. The EA contains conditions that require rehabilitation of the mine following the cessation of mining activities. The particular conditions that relate to rehabilitation are conditions C3 and C4.

This RMP has been prepared in order to comply with conditions C3 and C4. The RMP is also designed to comply with the ‘Rehabilitation requirements for mining resource activities guidelines’ (EM1122) as outlined in condition C3 of EA EPML04041216.

Table 1. EA EPML04041216 rehabilitation conditions.

Number	Condition
C3	<p>Rehabilitation</p> <p>A Rehabilitation Management Plan (RMP) must be developed by an appropriately qualified person and must include at least the following;</p> <ul style="list-style-type: none"> a) The post-mining land use; b) Rehabilitation must comply with the Guideline Resource Activities – Rehabilitation requirements for mining resource activities (EM1122); c) State the rehabilitation objectives proposed to achieve the rehabilitation goal of; <ul style="list-style-type: none"> i. Safe to humans and wildlife; ii. Non-polluting; iii. Stable; iv. Able to sustain a post mining land use; d) Describe the methods of rehabilitation needed to achieve the rehabilitation objectives and goals; e) State the completion criteria proposed to measure the success of rehabilitation objectives and goals.
C4	The RMP must be submitted to the administering authority by 9 November 2016.

8 Post Mining Land Use

Sandstone mining operations at Capricorn Sandstone Quarries have been occurring for well in excess of 100 years, and are expected to continue for at least a further 100 years. The “winnable” high quality sandstone is a relatively low extraction volume, high value material, and therefore extraction activities do not occur at a high rate when compare to other mining activities such as coal or mineral ore mining. The sandstone resource at the site is a highly valuable commodity which is extracted at an extremely slow rate when compared to common mining operations of minerals and coal. The most recent lidar investigation (2012) identified in excess of 4,897,000 m³ of winnable sandstone remaining in the ML area. This volume of sandstone equates to approximately 11,500,000 tonnes of sandstone. Annual extraction at the mine ranges 20,000-50,000 tonnes. Therefore, even at maximum extraction rates of 50,000 tonnes per annum the mine would have a life of 230 years. However, for discussion relating to the life of the mine a much more conservative figure of 80-100 years is generally used.

Sandstone from the mine is of extremely high quality and is in demand for new works and restoration of historic structures. It is fully expected that the mine will continue to operate on exactly the same footprint as it currently occupies for at least the next century.

Once the winnable sandstone resource has been exhausted, any remaining adjoining hillside will be battered to an appropriate gradient for safety and stability. This area is intended for post-mining use as habitat for rock wallabies which already inhabit the area and the existing mine overburden stockpiles. Note that Capricorn Sandstone Quarries may make application at a future date to conduct sandstone mining over an expanded area to include the entire hill. In this instance, the RMP would have to be adjusted to allow for the changed activity, and it would be likely that there would be no need for battering of the remaining hillside, as the hillside will have been extracted. However, this RMP only identifies rehabilitation requirement for currently approved activities.

Infrastructure areas on site are to be left unchanged for proposed future set-down and storage area, in accordance with a landholder agreement. The remaining infrastructure will be managed as per the site based management plan and with respect to any EA conditions which may be relevant at the time.

These areas include:

- Workshops
- Administration buildings
- Set down areas
- Internal roads

Remaining areas will be returned to a safe, stable, self-supporting system, which functionally resembles the surrounding area.

These post mining land use objectives will result in three distinct domains from a land use point of view (see Figure 6). The exact size and location of these areas is subject to change prior to the implementation of the RMP and may be subject to various approvals or regulations current at that time. The domains are:

- **Battered rocky hillside** to be rehabilitated to a safe, stable, self-sustaining ecosystem for habitat for local rock wallaby populations.
- **Low plateau area** of a similar landform to the surrounding area, to be rehabilitated to a safe stable self-sustaining ecosystem resembling the surrounding area.
- **Set-down or storage area** for personal landholder use or commercial activities (subject to Council approval), as per landholder agreement.

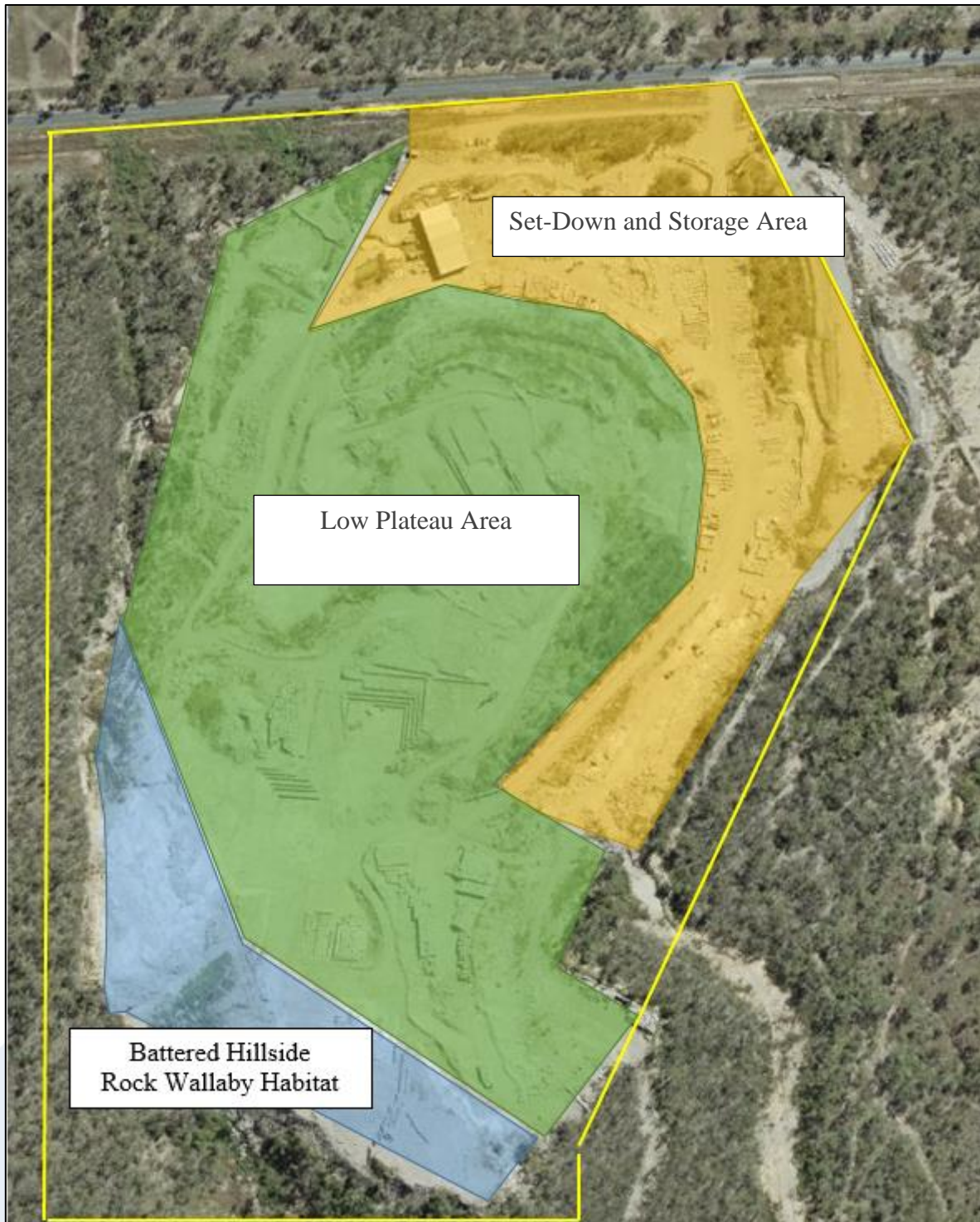


Figure 8. Post mining land use domains at Capricorn Sandstone Quarries.

9 Rehabilitation Goals

The Department of Environment and Heritage Protection (EHP) has developed a guideline document to assist with rehabilitation of mine sites. This document is titled, “Rehabilitation requirements for mining resource activities” (EM1122 Version 2) and provides information on both progressive and final rehabilitation requirements for site specific resource projects operating in Queensland under the *Environmental Protection Act 1994*.

“Rehabilitation requirements for mining resource activities” introduces four rehabilitation goals that are to be achieved during rehabilitation of a mine site. The rehabilitation goals have been developed from the ESD policy framework, especially in relation to intergenerational equity; polluter pays principle, protection of biodiversity and maintenance of essential ecological processes.

The four general rehabilitation goals require rehabilitation of areas disturbed by mining to result in sites that are:

- Safe to humans and wildlife
- Non-polluting
- Stable
- Able to sustain an agreed post-mining land use.

Each of the four goals are addressed separately in the following sections.

9.1 Safe to Humans and Wildlife

This objective relates to the creation of a site which is safe for both humans and wildlife from both a physical injury and an environmental pollution point of view.

The vast majority of the site will be relatively level at the end of the mine’s operational life, with an estimated slope incline of less than 20° over most of the site, this is not expected to pose any foreseeable risk to humans or wildlife. There will be no voids created during the mining operations and thus, there will be no safety hazards due to void wall stability.

The battered slope on the western and south-western edge of the mining lease (see Figure 6), has the potential to be hazardous to humans and wildlife due to subsidence and rock falls. The final design and construction of the slope will be designed and overseen by a suitably qualified engineer to ensure the slope is stable and safe.

Sediment leaving the site due to erosion has the potential to cause harm to wildlife should it reach water bodies, as this may cause turbidity and eutrophication issues. Given the site’s distance from any major water bodies this is unlikely to be problematic. However, erosion control is not only important from the perspective of the health of the receiving environment, it is paramount to the success of rehabilitation efforts on site. With these issues in mind, erosion control measures will be implemented during the rehabilitation phase, and ongoing monitoring and remediation of any erosion issues will be

implemented during the monitoring phase. Much of the erosion and sediment control measures that will be employed will be a continuation of the operational measures in place during the mine's operational life.

The benign nature of the sandstone product and proximity of the resource to the surface, means that the mining process produces no pyritic acid forming waste rock or saline regolith. Furthermore, the benign nature of the sandstone material and mining processes employed produces no toxic tailings and requires no chemical additions. Given these points, there will be no residual hazard to humans or wildlife from acid, chemical or heavy metal contaminated leachate.

9.2 Non Polluting

As outlined in section 9.1, there are no acid, saline, heavy metal or chemically contaminated waste materials produced during extraction or processing. Therefore, there is no residual risk of pollution entering the receiving environment from any of these sources. The only source of potential pollution is from mobilised sediment leaving the site into the surrounding environment. With this in mind, counter erosion measures will be implemented during rehabilitation works and judicious monitoring and remediation of erosion issues will be carried out during the monitoring process. Sediment and erosion control structures such as swales, rock armouring, check dams and sedimentation dams will remain in place during the rehabilitation phase in order to prevent sediment leaving the site. The water collected in these dams will provide a water source for irrigation in order to promote the establishment of vegetation.

9.3 Stable Landscape

The goal in this instance is to restore the site to a state of physical and geological stability. Furthermore, this goal relates to the creation of a stable ecosystem capable of sustaining itself without ongoing human inputs.

The landscape will be rendered stable both physically and biologically with the use of revegetation and counter erosion techniques including contour banks, across slope revegetation and a judicious monitoring and remediation program. This will also include engineering techniques which will be required to stabilise the remaining sandstone hillside.

The areas which will be set aside for post-mining set-down or storage areas will be managed in accordance with general environmental duty, or any approval requirements (eg. Site based management plan, EA conditions) which may be in place at the time.

9.4 Ability to Sustain Post-Mining Land Use

The aim of this goal is to develop physical, chemical, biological and administrative systems, which are able to satisfy the expectations of all stakeholders. Stakeholders may include the administering government authority, landholders and downstream interests. This goal will be realised through carefully planned and executed rehabilitation techniques and also through long term monitoring of the rehabilitation site.

10 Rehabilitation

10.1 Rehabilitation Schedule

Mining operations at Capricorn Sandstone Quarries are somewhat unusual, in that they provide a high value but low volume commodity. The sandstone that is extracted on site is not a homogenous resource. The characteristics of the stone is highly variable across the site (see Figure 7) and demand for stone with certain features can vary significantly from a temporal point of view. This characteristic means that mining is not performed on a progressive basis, as consumer demand dictates when and where extraction is occurring on site. Essentially, this results in the entire site being active for the entire life of the mine. The non-progressive nature of mining activities on the site precludes progressive rehabilitation of the site. Rehabilitation of a dormant area only to reopen extractive activities at a later date would be both economically and environmentally irresponsible.

Capricorn Sandstone Quarries contains enough winnable material for all areas of the mine to remain viable for many decades to come, quite possibly in excess of 100 years, depending on demand. As a result of the longevity of the mine, no rehabilitation works are proposed to be required for a number of decades, and the site will be operated under stormwater, sediment and erosion control plans until the site is fully exhausted. At this point, and given the relatively small 23 hectare footprint, the entire site will be rehabilitated at the same time.



Figure 9. Variability of product across Capricorn Sandstone Quarries.

10.2 Rehabilitation Methods

10.2.1 Battered Hillside Rock Wallaby Habitat Domain

10.2.1.1 Re-Contouring

Preparation of the battered hillside rock wallaby habitat will occur during mining operations. Removal of sandstone product will occur in such a way that the remaining slope will take on a stepped/battered landform. This extraction procedure and landform preparation will be governed by plans which will be designed and overseen by a suitably qualified engineer. Sandstone overburden will also be used in this area to provide additional rock wallaby habitat and refuge during events such as bushfires.

10.2.2 Low Plateau Area Domain

10.2.2.1 Re-Contouring

Re-contouring of the low plateau area will begin as soon as all winnable material is exhausted. Low lying areas will be filled with coarsely crushed waste rock and the landscape reshaped to a form resembling the surrounding area, with respect to required slope length and angle. Re-contouring will include the construction of water management and erosion control structures such as drains and contour banks.

Stored topsoil will be mixed with locally sourced crushed sandstone to aid in water infiltration and structural properties. Crushed sandstone is in plentiful supply as a natural by-product of the extraction process. As the mine approaches the time to begin rehabilitation, suitable quantities of crushed sandstone will be stored. Topsoil stored for lengthy periods can be subject to degradation from nutrient leaching, loss of biological activity and organic matter resulting in poor fertility. Therefore, where required, stored topsoil will be ameliorated with organic matter to increase cation exchange capacity and fertilizer applied as required. Soil analysis to determine nutrient content and pH will be carried out and suitable remediation techniques will be applied as necessary. Prepared topsoil will then be spread across the site to a minimum depth of 200mm. For the duration of topsoiling works, accurate accounts of truck and scraper movements will be recorded to allow for an evaluation of topsoil placement to ensure evenness of spreading.

Prior to the onset of the wet season, seedbed preparation will take place. This will involve deep ripping to a depth of 300mm.

10.2.2.2 Seeding and Establishment of Tube Stock

Tube stock planting will be supported by watering where required, which will be enabled by the recycling of water held in the onsite water management dams. This will allow for the establishment of tree and shrub species before the onset of the wet season, will enhance the establishment of native species, thereby accelerating trends towards rehabilitation goals. This will also facilitate root penetration of the soil with the view to enhance soil stability and thus reduce erosion. Tube stock plantings will be in rows across gradient and with the contour of the site, to effectively reduce slope length and assist in the retention of soil and resources on the rehabilitation site (see Figure 8).

Immediately prior to the onset of the wet season and if rains are forecast, seeding will occur across all prepared areas. Given the small footprint of the site, seeding may be facilitated by hand held spreader. This will help to prevent compaction of soils from heavy machinery.

10.2.3 Set-Down and Storage Area Domain

10.2.3.1 Re-Contouring

Minimal re-contouring of the set-down and storage area will be undertaken. This area will be managed for continued use as basically hard stand areas under a landholder agreement.

Re-contouring of the set-down and storage area will predominantly focused on the construction of water management and erosion control structures such as drains and contour banks.

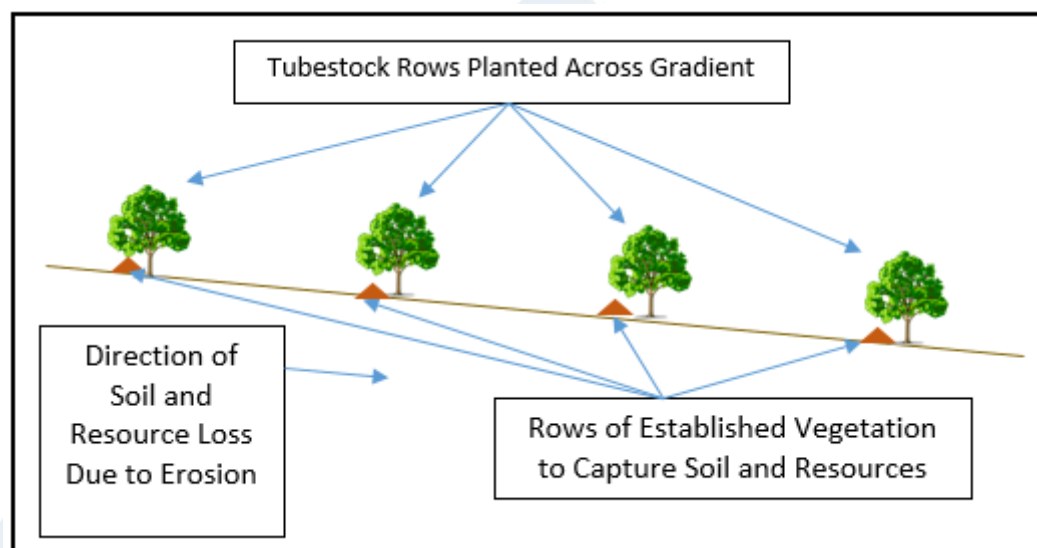


Figure 10. Across gradient rows of tube stock aimed at enhancing soil stability, reducing erosion and accelerating rehabilitation timeframes.

10.3 Revegetation Criteria

Revegetation for the post mine environment is highly dependent on the designated land use for the site. The designated post mine land use controls what species of plants are likely to colonise the area, as well as other target vegetation factors such as species diversity, abundance and dominance. For the areas where revegetation is proposed, the post mine land use is native ecosystem.

Native species which are established in the surrounding area should be used for the majority of the seed mix and for the propagation of tube stock. Tree, shrub and ground cover should be provided at

sufficient density to allow habitat value and structure to be retained. These areas should be self-functioning, with minimal inputs required after establishment to ensure healthy survival.

Revegetation criteria should be assessed against local reference sites that are to be used as benchmarks for final species diversity, abundance and dominance. Soil surface indicators will also require analysis in order to gain data for soil property comparison across reference and rehabilitation sites. Reference sites will be assessed using the principles of Landscape Function Analysis (LFA). This system uses a series of indicators including landscape organisation, which looks at the structures present in the landscape and how they interact to either retain or lose resources. LFA also considers a series of 11 soil surface indicators, the results of which are used to calculate three synthetic soil surface indices which show the sites ability to resist erosion, retain and store water and cycle nutrients in order to enhance and support plant growth (see Figure 9).

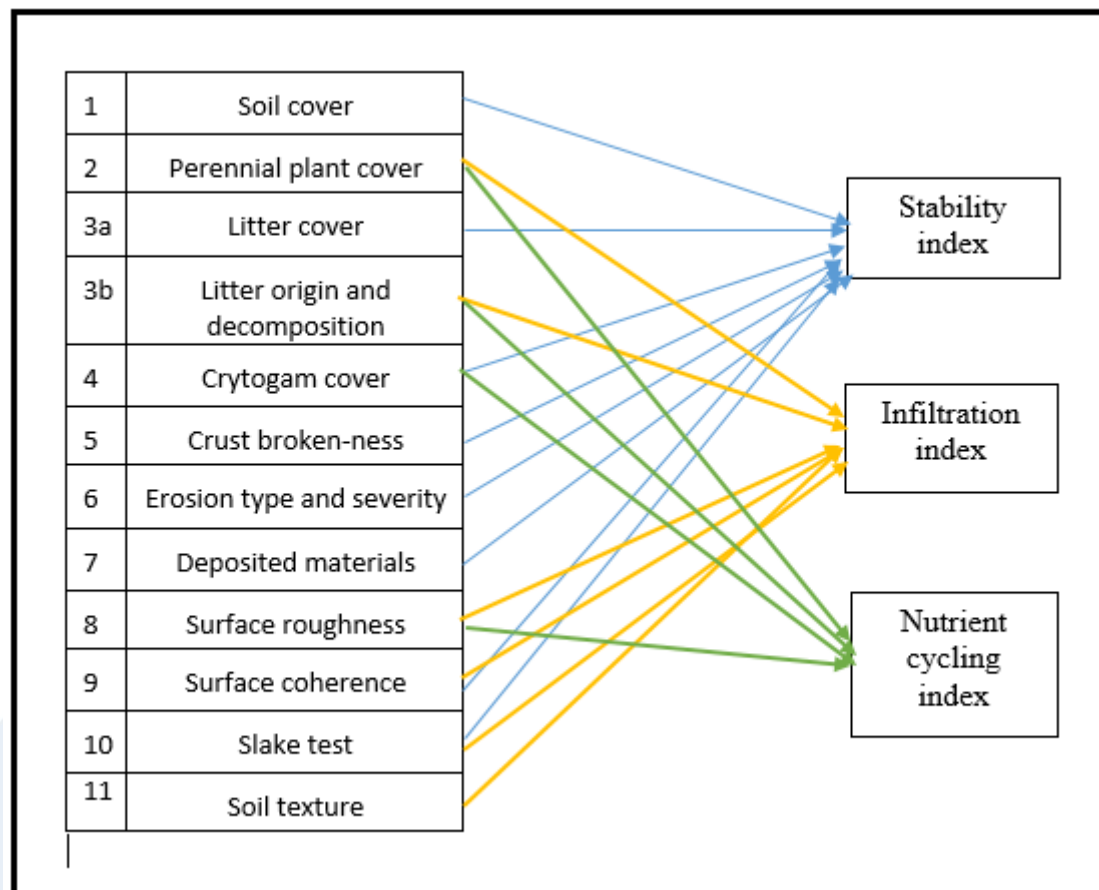


Figure 11. The 11 soil surface indicators and their relationship with the synthetic soil indices².

Initial flora investigations in the surrounding area have identified species which may be used as a preliminary seed mix and for the propagation of tube stock. As the mine is expected to continue active production for up to at least 100 years, reassessment of the surrounding flora and reference sites will be required to establish the exact species required.

Possible/likely species include:

Canopy/tree species:

- *Corymbia clarksoniana*
- *Corymbia erythrophloia*
- *Eucalyptus crebra*
- *Eucalyptus tereticornis*
- *Acacia excelsa*
- *Acacia salicina*

Herbaceous/understory species:

- *Sida rohlenae*
- *Jasminum didymium*
- *Senna artemisioides* subsp. *Artemisioides*
- *Desmodium brachypodum*
- *Evolvulus alsinoides*

Grass/groundcover species:

- *Eragrostis elongate*
- *Heteropogon contortus*
- *Themeda triandra*
- *Bothriochloa decipiens*
- *Dichanthium sericeum*

11 Monitoring

Monitoring rehabilitation success is an essential part of any rehabilitation program. Monitoring will consist of a Land Survey and Vegetation Survey to be conducted annually. Each of these are discussed below.

Monitoring will be conducted until the rehabilitation success criteria have been met (see Section 11.4 and Appendix C).

11.1 Land Survey

Rehabilitation areas will be inspected for erosion rills, erosion gullies and topsoil depth to determine their erosion rating (see Table 2). Two 50 m transects will be placed along the contour for every 5 ha of rehabilitated land. Transects will be placed across the contour of the benched domain.

Table 2. Erosion rating system.

Erosion Rating	Rills per Transect	Average Depth of Rills	Topsoil Depth	General Observations
0	0 - 3	< 10cm	> 90% of original depth	Generally little erosion. The majority of rills are only <10 cm depth.
1	2 - 6	< 20cm	>70% of original depth	Minimal instances of sheet-wash and gully erosion.
2	3 - 8	< 50cm	>50% of original depth	Minimal-moderate erosion occurring but limited to localised areas.
3	4 +	> 50cm	>40% of original depth	Moderate erosion occurring.
4	4 +	Any > 80cm depth	>30% of original depth	Heavy erosion occurring.

A general inspection of each slope for rills, gullies and washouts will be undertaken in addition to transect inspection. This can be accomplished by a walkover of the site. The purpose of this walkover is to document significant erosion that may be present outside of the transect area. Where a washout is encountered, an estimate will be made of its area. If multiple washouts are encountered, an estimate of the percentage of the rehabilitation area disturbed by washouts will then be made (i.e. 5%). Within the annual rehabilitation report the results of each 50m transect will be presented with additional areas of significant erosion documented. Surface inspection following significant rain events will be undertaken in order to identify erosion events and allow for remedial action to be taken

LFA analysis of soil surface indices will be performed concurrently along with the erosion inspection. The same transects will be suitable for this purpose and will contribute to the efficiency and cost effectiveness of the monitoring program.

For each rehabilitation area requiring monitoring, soil analyses are required to confirm factors outlined in the Completion Criteria. It is recommended that soil sampling must adopt the following methods as adapted from the Australian Soil and Land Survey Field Handbook³:

- One soil sampling site for each 5 ha inspected.
- At each soil sampling site, samples should be collected from 0cm, 10cm, 20cm and 50cm depth.
- Soil samples should be analysed for the following at a NATA accredited laboratory:
 - ph and electrical conductivity.
 - Nutrients (ammonia, total nitrogen and total phosphorous).
 - Cation exchange capacity.
 - Total organic matter and total organic carbon.

The ratio of carbon (total organic carbon) to nitrogen (total nitrogen, percentage by weight) is useful to determine the capacity of the soil to support microbial populations. Comparison to reference site data will determine when conditions are suitable and meet the surrounding areas.

LFA and soil analysis will be carried out at both the rehabilitation and reference sites. Over time this will provide sufficient data sets to perform detailed statistical comparisons between the sites. This

analysis will allow the identification of soil chemistry and soil surface indices trends either towards or away from rehabilitation goals.

11.2 Vegetation Survey

Within each 5ha of rehabilitation area a 50m by 10m belt transect must be sighted. Each belt transect will be surveyed as follows:

- Ten random quadrats (1m²) analysing overall vegetation cover, percentage of dry matter cover, percentage of vegetation cover and groundcover species composition.
- Trees/shrubs identified to a species level, approximated for height, measured for diameter at breast height (DBH) and counted for species abundance.

This information will be required to assess the Completion Criteria (see Appendix C). Any signs of adverse health conditions will be noted. Fauna use of the rehabilitation areas will also be noted. All vegetation surveys will be completed in accordance with the Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland⁴ (or appropriate similar reference documents).

11.3 Reference Sites

Reference sites for monitoring will be established to assess how rehabilitation is progressing for the mine in relation to localised vegetation. These reference sites are used as benchmarks for rehabilitation success. Two reference sites will be established in areas that are unlikely to be affected by mining. The suitability of these sites will be verified in the field for their appropriateness as reference sites. All reference sites will be assessed using the same methods to those adopted for rehabilitation sites.

Potential reference sites have been identified in Figure 10. These potential reference sites will be evaluated for suitability at an appropriate time in the future, closer to activation of rehabilitation actions.



Figure 12. Potential rehabilitation reference sites.

11.4 Rehabilitation Success Criteria

Rehabilitation success criteria for the rehabilitation site are contained in Appendix C.

12 Rehabilitation Plan Administration

12.1 Implementation and Maintenance of the Rehabilitation Plan

Capricorn Stone Products Pty Ltd, as the EA holder has sole and full responsibility for ensuring full implementation of this Rehabilitation Management Plan, including:

- That the post mine land use objective and final rehabilitation occurs across the site in accordance with the RMP.
- Monitoring and maintenance of rehabilitated landforms as constructed in accordance with the RMP is the responsibility of the EA holder until they meet the success criteria.

12.2 Performance and Review of the Rehabilitation Plan

It is recommended that this RMP is reviewed and audited with each Plan of Operations submission. Any changes in operational practices must be incorporated into the rehabilitation plan and communicated to employees and contractors on-site. As operation of the mine progresses and closure of the mine is approached, it is vital that the RMP is carefully reviewed.

The following criteria will be used to determine if the RMP is effective.

- Rehabilitated areas are safe to humans and wildlife.
- Post mine land uses are non-polluting.
- Post mine land uses are stable.
- Able to sustain the agreed mining land use.

12.3 Responsibilities

Responsibilities of all personnel associated with the site towards the effective management of rehabilitated areas are outlined in Table 3.

Table 3. Responsibilities under RMP.

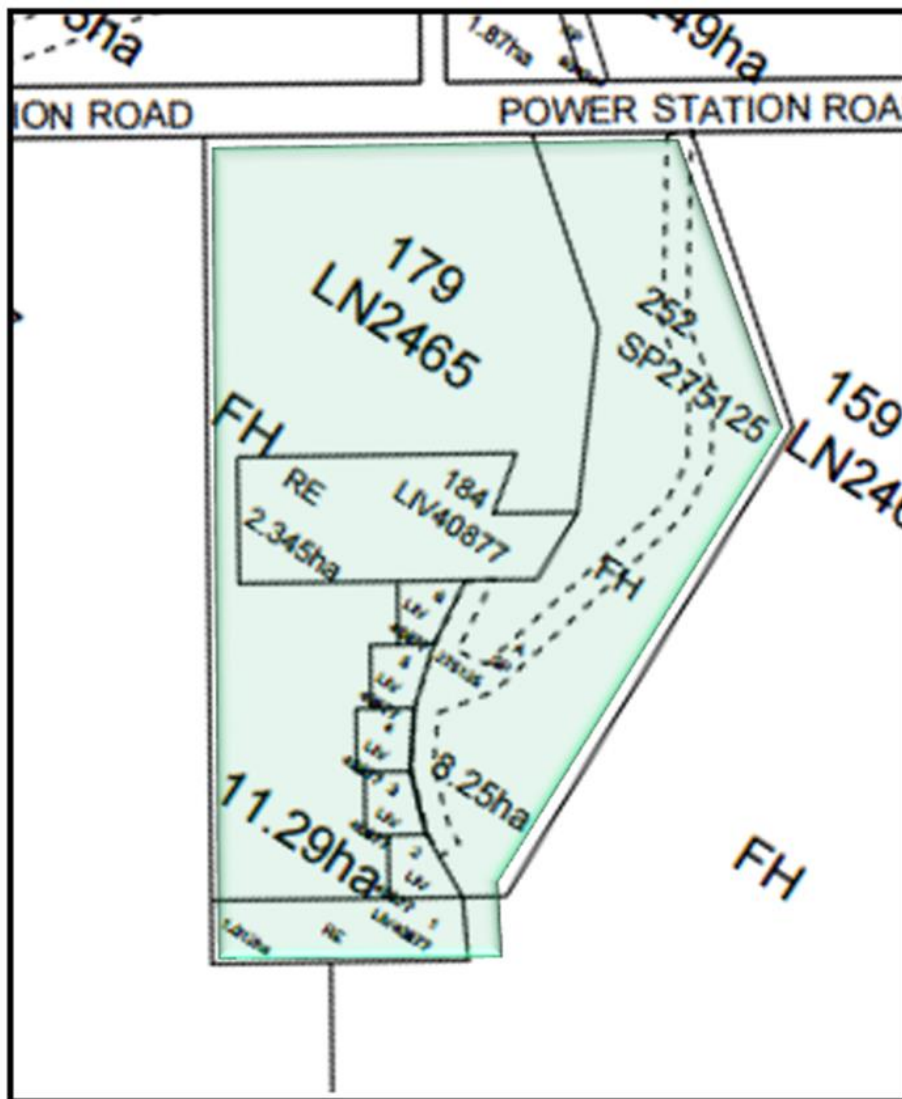
Personnel	Responsibilities
Capricorn Stone Products Pty Ltd Senior Executive	<ul style="list-style-type: none"> • Shall ensure that a formal review of this RMP is made with each Plan of Operations submission. • Shall ensure that adequate resources and direction are available for this RMP to be further developed (where required) and effectively implemented. • Shall ensure appropriate communication of the RMP to all applicable mine staff.
All Supervisors	<ul style="list-style-type: none"> • Shall ensure that the RMP outline is followed. • Shall recommend or act on recommendations to rectify any deficiencies found in this RMP.
Mine Workers and Contractors	<ul style="list-style-type: none"> • Shall comply with this RMP and ensure rehabilitation management issues are adequately dealt with.

12.4 Reporting

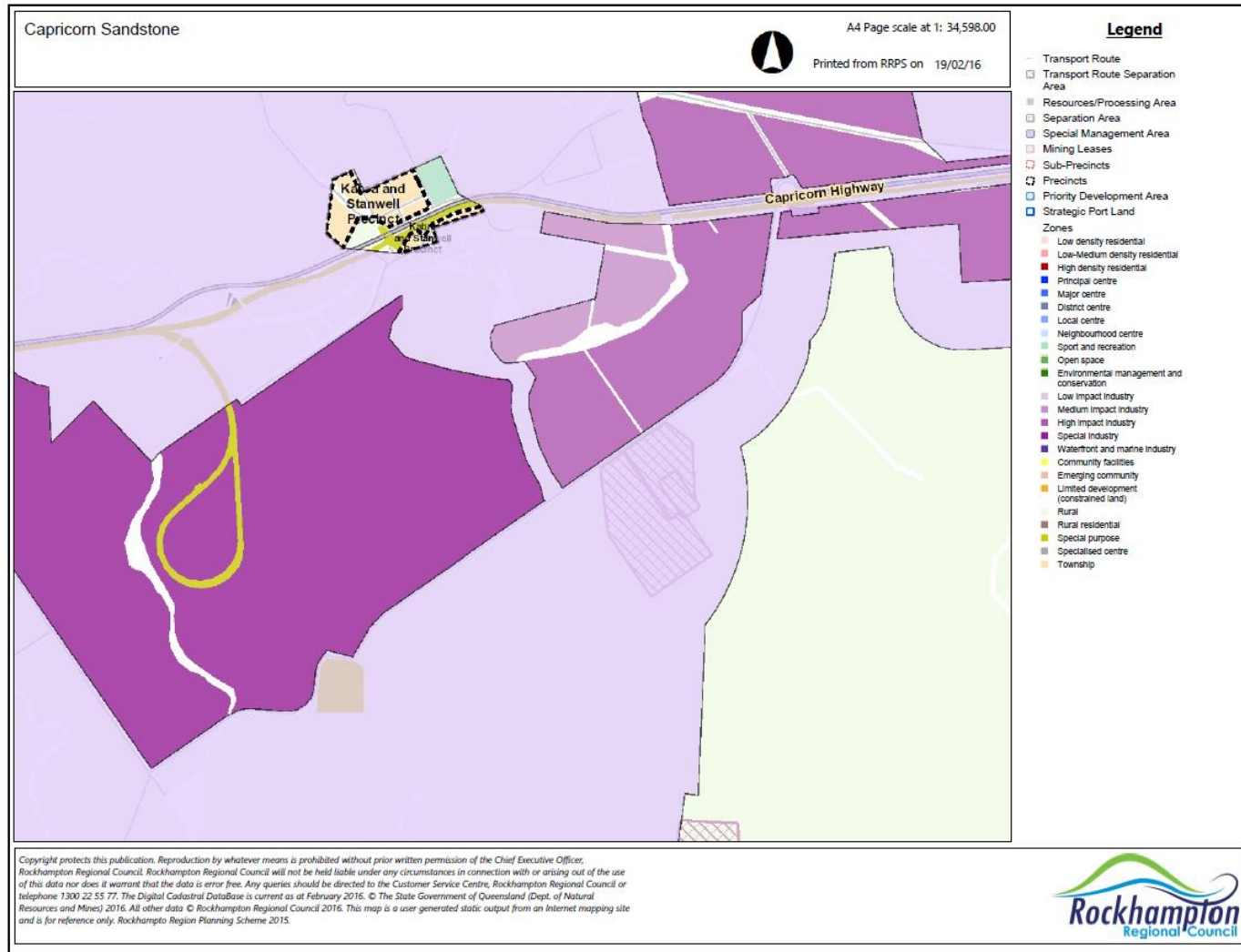
Monitoring of rehabilitated areas will be undertaken in accordance with section 8 of this report. This will involve annual site inspections and reporting for the first three years after the completion of initial rehabilitation work, and every five years thereafter until rehabilitation success criteria are met. This monitoring schedule is indicative of a best case scenario situation and may require alteration in accordance with site requirements.

13 Appendices

13.1 Appendix A – Land parcels covered by ML 7341 and 80102 (Approximate).



13.2 Appendix B – Surrounding Land Uses



13.3 Appendix C – Rehabilitation Success Criteria

Mine Site Rehabilitation Goal	Mine Site Rehabilitation Objective	Rehabilitation Indicators	Rehabilitation Completion Criteria	Evidence of Compliance to be Supplied with Completion Criteria
Long Term Safety	Quarry/mine floor remains safe for humans and animals now and in the future.	Slopes are suitable for human and/or animal traffic.	Certification in rehabilitation report that slopes are safe and risk of future failure is determined to be acceptable.	Geotechnical assessment and certification by a suitably qualified person to determine slip hazard and stability of batters.
		Erosion ratings are suitable for long term safety.	Erosion ratings (as adopted by the erosion rating system) are less than or equal to 2 (as defined in Table 2) at all rehabilitation transects undertaken.	Evidenced in inspections of rehabilitation.
Non-Polluting	Erosion controlled to prevent sediment from entering waterways.	Erosion ratings represent sufficient soil stability to indicate a safe level of sediment loss.	Certification that erosion ratings represent sufficient soil stability to indicate a safe level of sediment loss.	Certification that erosion ratings represent sufficient soil stability to indicate a safe level of sediment loss.
Stable	Topsoil is stable and resistant to erosion.	Erosion rates.	Erosion rates measured or modelled using suitable modelling methods such as RUSLE and are no higher than 50% that of the surrounding environment.	Certification report comparing erosion losses (measured or modelled) from the rehabilitation site with surrounding environment.
		Erosion indicators such as rills, gullies and washouts are minimal.		

			Areas where washout occur do not exceed 5% of the total rehabilitation area of the site.	Analysis from ground inspections outlined in final rehabilitation report.
			Each individual washout does not exceed 100m ² .	
	Functional erosion structures.	Erosion structures are fit for purpose.	Inspection and certification of erosion and water control structures such as contour banks.	Certification from a suitably qualified person showing structures are fit for purpose after mine closure. Certification evidenced in final rehabilitation report.
	Vegetation cover.	Vegetation cover, percentage and type.	Total ground cover (i.e. grasses) must not be below 70%.	On ground rehabilitation inspection, outlined in final rehabilitation report.
Sustainable Land Use	Soil properties that support and will continue to support the desired final land use.	Chemical properties of topsoil and soil profiles that are within the root zone of proposed vegetation.	pH range of soil is between 5.0 and 9.0 to at least 0.3m.	On ground rehabilitation inspection, outlined in final rehabilitation report.
			Evidence that nutrient and organic matter cycling is occurring (this can be provided by continued sampling for organic carbon and nitrogen for a period of 3 years).	On ground rehabilitation inspection, outlined in final rehabilitation report.
			Cation exchange capacity greater than 10meq/100g.	On ground rehabilitation inspection, outlined in final rehabilitation report.
			Root zone salinity is less than 0.6 dS/m (in a 1:5 soil mixture)	On ground rehabilitation inspection, outlined in final rehabilitation report.
	Vegetation is suitable for the post mining land use.	Physical parameters of the soil.	Topsoil is >150mm thick across all vegetated areas.	On ground rehabilitation inspection, outlined in final rehabilitation report.

			Erosion ratings (as adopted by the erosion rating system) are less than or equal to 2 (as defined in Table 2)	On ground rehabilitation inspection, outlined in final rehabilitation report.
		Vegetation diversity.	Weed prevalence and occurrence is no greater than the pre-mining land use	On ground rehabilitation inspection, outlined in final rehabilitation report.
			An appropriate shrub density within 1 standard deviation of an appropriate reference site measured in shrubs per ha occurs across the rehabilitation site.	On ground rehabilitation inspection, outlined in final rehabilitation report.

13.4 Appendix D – References

1. Australian Government Department of Agriculture Fisheries and Forestry 2016, Australian Soil Resource Information System, viewed 20 October 2016, <http://www.asris.csiro.au/index.html>
2. Tongway, D, J & Ludwig, J, A 2011, Restoring Disturbed Landscapes, Island Press, Washington.
3. Mc Donald, R, C, Isbell, R, F, Hopkins, M, S, Walker, J, & Speight, J, G 1998, Australian Soil and Land Survey: Field Handbook, 2nd edn, CSIRO Publishing.
4. Neldner, V, J, Wilson, B, A, Thompson, E, J and Dillewaard, H, A 2005, Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. Version 3.1. Updated September 2005. Queensland Herbarium, Environmental Protection Agency, Brisbane, 128 pp.