



**NSW
Resources
Regulator**

FWP0001326

MARRANGAROO QUARRY FORWARD PROGRAM

Monday 1 January 2024 to Thursday 31 December 2026

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Summary

DETAIL	
Mine	Marrangaroo Quarry
Reference	FWP0001326
Forward program commencement date	Monday 1 January 2024
Forward program end date	Thursday 31 December 2026
Forward program revision (if applicable)	
Contact	Scott Hollamby
Mining leases	ML 1801 (1992), PLL 602 (1924), ML 1522 (1992), PLL 584 (1924), ML 6388 (1906), ML 4636 (1906), ML 4635 (1906), MPL 221 (1973)
Project location	Metromix Pty Limited
Date of submission	Thursday 29 February 2024

Important

The department may make the information in your program and any supporting information available for inspection by members of the public, including by publication on its website or by displaying the information at any of its offices. If you consider any part of your program to be confidential, please communicate this to the department via the message function on this submission within the NSW Resources Regulator Portal.

Three-year forecast – surface disturbance activities

Project description

The Marrangaroo Quartzite Quarry (the Quarry) is located approximately 4km northwest of Lithgow and is owned and operated by Metromix Pty Ltd (the Company). The Quarry currently operates under Development Approval (DA) 090/95 and DA486/01, both granted by Lithgow City Council. It is noted that neither development approval specifies a project life or end date for extraction operations within the Quarry Site. Based on current production rates at the Quarry and the extent of known mineralisation, extraction operations at the Quarry are anticipated to be completed by 2026. However, the identification of further mineralisation or modifications to the current production schedule may result in the actual completion date being extended.

Description of surface disturbance activities

Exploration activities

No further drilling is proposed during the Forward Program period. It is anticipated that the Company will undertake further analysis of core recovered from ML1522 during the 2023 drilling campaign (APO0001371) following receipt and review of petrographic results. A key focus will be analysis of physical and chemical properties to confirm the volumes of material suitable for production of high-quality aggregates for the construction and road maintenance industries.

Construction activities

No construction activities are anticipated to be undertaken during the Forward Program period.

Mining schedule

Mining development method and sequencing and general mine features.

It is anticipated that the Company will continue to confine the extraction of quartzite to the North-South Quarry while gradually extending extraction operations into the approved western extension producing up to the 220,000 tonnes per annum (tpa) maximum production capacity. Minor volumes (15,000tpa to 20,000tpa) of overburden / recovered clayey material are expected to be generated concurrently with quartzite materials, however, any overburden

material recovered will be utilised for on-site track maintenance, used as growth medium for rehabilitation operations or sold as general or select fill.

Areas identified for emplacements, the sequencing of emplacements, construction, and management.

Stripped topsoils will be placed either directly on areas requiring rehabilitation to minimise double handling and maximise efficiencies, or within a temporary stockpile area. The topsoil and subsoil stockpiles will be no higher than 2m and 3m respectively, and with slopes no greater than 1:2 (V:H) with a slightly roughened surface to minimise erosion. All waste rock/overburden material, unsaleable fines and split rock not sold as fill material will continue to progressively be placed as backfill within the South-West Quarry void. No stockpiling of this material is undertaken to avoid double handling.

Processing infrastructure activities and the location of tailings facilities and schedule for emplacement.

Processing of raw materials will continue to be undertaken using fixed plant located within the Infrastructure Area. The only processing residues are the fines and silts produced during washing of the <5mm fines to produce a washed sand product which are collected in BHP Dam and silt wedge pit. These fines and silts are either sold as sand product or blended to produce select products. Therefore, there are no 'tailings' areas or facilities.

Waste disposal and materials handling operations.

The principal wastes that will be generated can be categorised as production and non-production wastes. Production waste includes waste rock / overburden (see above). Non-production wastes may include:

- greases, oils, filters, tyres and batteries from maintenance of vehicles and equipment;
- bulk scrap metal and plastics from discarded equipment;
- general office wastes e.g. paper;
- general waste generated by employees – e.g. food scraps, paper, cardboard, aluminium and steel cans; and
- wastewater from ablution facilities.

All hydrocarbon wastes will typically be stored in 205L drums or a 14,000L bulk storage container within a bunded area until collected by a licensed contractor. Worn tyres will be temporarily stored and removed from site regularly. Paper, cardboard, steel and aluminium will be stored separately in 240L mobile garbage bins or skip bins and collected regularly by a licensed contractor for recycling. General waste material will also be collected and removed by a licensed contractor to a licensed landfill facility. All wastewater generated on the site will continue to be treated through the approved on-site septic tank system. No non-production wastes generated within or outside the Quarry will be disposed of at the Quarry.

Key production milestones

MATERIAL	UNIT	YEAR 1	YEAR 2	YEAR 3
Stripped topsoil <small>(if applicable)</small>	(m ³)	4,600	0	0
Rock/overburden	(m ³)	21,800	0	0
Ore	(Mt)	0.22	0.22	0.22
Reject material¹	(Mt)	0	0.01	0.01
Product	(Mt)	0.22	0	0

¹ This includes coarse rejects, tailings and any other wastes resulting from beneficiation.

Three-year rehabilitation forecast

Rehabilitation planning schedule

Rehabilitation planning schedule

Options for improvement of soil resources / growth medium will be investigated during the remaining life of the Quarry. Furthermore, following identification of a discrete zone of sulphides within the North South Quarry, Metromix has commissioned a geochemical assessment of the suspected acidic material and the subsequent preparation of a formalised management plan detailing ongoing and adaptive management measures for this material. It is anticipated that the management plan will also incorporate measures for the management of suspected acidic material in relation to rehabilitation and closure, as required.

Stakeholder consultation

Quarry activities during each calendar year are described in the Annual Environmental Management Report and provided annually to Lithgow City Council, the Resources Regulator, the NSW Environment Protection Agency and Water NSW. During the Forward Program period it is considered likely that additional consultation will be undertaken with relevant stakeholders in relation to the potential extension of extraction operations into ML1522. This consultation will also include aspects relating to the rehabilitation and final land use of the Quarry which will be addressed through a future development application for the extension.

Rehabilitation studies, risk assessments and/or design work

As part of a planned extension application, it is expected that additional environmental assessment will be undertaken regarding the management of the extension area, including the management of surface water, the void created by the extraction within the extension and the potential final landform. This assessment will be undertaken to support the integration of the management of the extension area with the existing water management system, existing final voids, and the approved final landform. No tailings dams are present within the Quarry Site, therefore no specific assessment or management measures are required in this regard.

Rehabilitation research and trials

RRT NUMBER	PROJECT/TRIAL NAME	OBJECTIVE OF TRIAL/PROJECT	METHODOLOGY	EXPECTED DATE OF COMPLETION	STATUS
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Rehabilitation maintenance and corrective actions

No rehabilitation performance issues or knowledge gaps have been identified in the latest Annual Rehabilitation Report, therefore, no specific corrective action measures are required.

Rehabilitation schedule

Quarrying activities will continue to be confined to the extraction of quartzite within the North-South Quarry and are expected to continue to expand into the approved western extension. As identified on Plans 2A to 2C, finer overburden, soil material and available biomass will continue to be placed within areas south of the North-South Quarry. Spray seeding to supplement the groundcover in these areas and in previous rehabilitation areas may also be undertaken to improve revegetation success and to stabilise against erosion.

Subsidence remediation for underground operations

As no underground operations are conducted as part of the Quarry's operations, no subsidence remediation is required.

Progressive mining and rehabilitation statistics

Three-yearly forecast cumulative disturbance and rehabilitation progression

FORECAST	UNIT	YEAR 1	YEAR 2	YEAR 3
A Total surface disturbance footprint	(ha)	24.82	24.82	24.82
B Total active disturbance	(ha)	18.96	18.54	18.54
P Total new area of land proposed for active rehabilitation	(ha)	0.42	0.83	0.83

Rehabilitation key performance indicators (KPIs)

FORECAST	UNIT	YEAR 1	YEAR 2	YEAR 3
O Total new active disturbance area	(ha)			
P Total new area of land proposed for active rehabilitation during the reporting period	(ha)	0.42	0.42	
Q Annual rehabilitation to disturbance ratio				

Attachment 1 – Reporting Definitions

REPORTING CATEGORY	DEFINITION
<p>A Total disturbance footprint – surface disturbance</p>	<p>All areas within a mining lease that either have at some point in time or continue to pose a rehabilitation liability due to surface disturbance activities.</p> <p>The total disturbance footprint is the sum of the total active disturbance, decommissioning, landform establishment, growth medium development, ecosystem and land use establishment, ecosystem and land use development and rehabilitation completion (see definitions below).</p> <p>Underground mining operations should not include the footprint of underground mining areas/subsidence management areas in the total disturbance footprint.</p>
<p>B Total active disturbance</p>	<p>Includes on-lease exploration areas, stripped areas ahead of mining, infrastructure areas, water management infrastructure, sewage treatment facilities, topsoil stockpile areas, access tracks and haul roads, active mining areas, waste rock emplacements (active/unshaped/in or out-of-pit), tailings dams (active/unshaped/uncapped) and temporary stabilised areas (e.g. areas sown with temporary cover crops for dust mitigation and temporary rehabilitation).</p>
<p>C Rehabilitation – land preparation</p>	<p>Includes the sum of all disturbed land within a mining lease that have commenced any, or all, of the following phases of rehabilitation – decommissioning, landform establishment and growth medium development.</p> <p>Refer to the glossary of terms in this document for the definition of these phases of rehabilitation.</p>
<p>D Ecosystem and land use establishment</p>	<p>Includes the area which has been seeded/planted with the target vegetation species for the intended final land use. However, vegetation has not matured to a stage where it can be demonstrated that it will be sustainable for the long term and or require only a maintenance regime consistent with target reference/analogue sites.</p> <p>Typically, rehabilitation areas would be in this phase for at least two years (and usually more) before rehabilitation can be classified as being in the ecosystem and land use development phase. This phase does not apply to infrastructure areas that are being retained as part of final land use for the site.</p>

REPORTING CATEGORY	DEFINITION
O	The area of any new active disturbance that will be created during the next three years, as defined under definition A1 (definition A1 Table 5).
P	The sum of any new rehabilitation to be commenced in the next three years. These areas may be in the phases “Rehabilitation - Land Preparation” or the “Ecosystem & Land Use Establishment” (definitions C & D in Table 5).
Q	The rehabilitation to disturbance ratio (S / R) indicates how many hectares of new rehabilitation are undertaken for each hectare of land disturbed during the three years. A ratio of 1/1 indicates that the area of new rehabilitation and disturbance in that period are the same.

Attachment 2 – Definitions

WORD	DEFINITION
Active	In the context of rehabilitation, land associated with mining domains is considered 'active' for the period following disturbance until the commencement of rehabilitation.
Active mining phase of rehabilitation	In the context of rehabilitation, the active mining phase of rehabilitation constitutes the rehabilitation activities undertaken during mining operations such as salvaging and managing soil resources, salvaging habitat resources, and native seed collection. This phase also includes management actions taken during operations to manage risks to rehabilitation and enhance rehabilitation outcomes such as selective handling of waste rock and management of tailings emplacements.
Analogue site	In the context of rehabilitation, an analogue site is a 'reference site' that represents an example of the defining characteristics (such as vegetation composition and structure or agricultural productivity) of the final land use. Characteristics of analogue sites can be assessed to develop the rehabilitation objectives and completion criteria for final land use domains.
Annual rehabilitation report and forward program	As described in the Mining Regulation 2016.
Annual reporting period	As defined in the Mining Regulation 2016.
Closure	A whole-of-mine-life process, which typically culminates in the relinquishment of the mining lease. It includes decommissioning and rehabilitation to achieve the approved final land use(s).
Decommissioning	The process of removing mining infrastructure and removing contaminants and hazardous materials.
Decommissioning Phase of Rehabilitation	Activities associated with the removal of mining infrastructure and removal and/or remediation of contaminants and hazardous materials. In the context of the rehabilitation management plan this phase of rehabilitation may also include studies and assessments associated with decommissioning and demolition of infrastructure or works carried out to make safe or 'fit for purpose' built infrastructure to be retained for future use(s) following lease relinquishment.

WORD	DEFINITION
Department	The Department of Regional NSW.
Disturbance	See Surface Disturbance.
Disturbance area	<p>An area that has been disturbed and that requires rehabilitation.</p> <p>This may include areas such as on-licence exploration areas, stripped areas ahead of mining, infrastructure areas, water management infrastructure, sewage treatment facilities, topsoil stockpile areas, access tracks and haul roads, active mining areas, waste emplacements (active/unshaped/in or out-of-pit), tailings dams (active/unshaped/uncapped), and areas requiring rehabilitation that are temporarily stabilised (i.e. managed to minimise dust generation and/or erosion).</p>
Domain	<p>An area (or areas) of the land that has been disturbed by mining and has a specific operational use (mining domain) or specific final land use (final land use domain). Land within a domain typically has similar geochemical and/or geophysical characteristics and therefore requires specific rehabilitation activities to achieve the associated final land use.</p>
Ecosystem and Land Use Development	<p>This phase of rehabilitation consists of the activities to manage maturing rehabilitation areas on a trajectory to achieving the approved rehabilitation objectives and completion criteria.</p> <p>For vegetated land uses this phase may include processes to develop characteristics of functional self-sustaining ecosystems, such as nutrient recycling, vegetation flowering and reproduction, and increasing habitat complexity, and development of a productive, self-sustaining soil profile.</p> <p>This phase of rehabilitation may include specific vegetation management strategies and maintenance such as tree thinning, supplementary plantings and weed management.</p>
Ecosystem and Land Use Establishment	<p>This phase of rehabilitation consists of the processes to establish the approved final land use following construction of the final landform.</p> <p>For vegetated land uses this rehabilitation phase includes establishing the desired vegetation community and implementing land management activities such as weed control. This phase of rehabilitation may also include habitat augmentation such as installation of nest boxes.</p>
Exploration	Has the same meaning as that term under the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

WORD	DEFINITION
Final landform and rehabilitation plan	As defined in the Mining Regulation 2016.
Final land use	As defined in the Mining Regulation 2016.
Form and way	Means the form and way approved by the Secretary. Approved form and way documents are available on the Department’s website.
Growth Medium Development	<p>This phase of rehabilitation consists of activities required to establish the physical, chemical and biological components of the substrate required to establish the desired vegetation community (including short lived pioneer species).</p> <p>This phase may include spreading the prepared landform with topsoil and/or subsoil and/or soil substitutes, applying soil ameliorants to enhance the physical, chemical and biological characteristics of the growth media, and actions to minimise loss of growth media due to erosion.</p>
Habitat	Has the same meaning as that term under the <i>Biodiversity Conservation Act 2016</i> and the <i>Fisheries Management Act 1994</i> (as relevant).
Indicator	An attribute of the biophysical environment (e.g. pH, topsoil depth, biomass) that can be used to approximate the progression of a biophysical process. It can be measured and audited to demonstrate (and track) the progress of an aspect of rehabilitation towards a desired completion criterion (i.e. defined end point). It may be aligned to an established protocol and used to evaluate changes in a system.
Land	As defined in the <i>Mining Act 1992</i> .
Landform Establishment	<p>This phase of rehabilitation consists of the processes and activities required to construct the final landform.</p> <p>In addition to profiling the surface of rehabilitation areas to the approved final landform profile this phase may include works to construct surface water drainage features, encapsulate problematic materials such as tailings, and prepare a substrate with the desired physical and chemical characteristics (e.g. rock raking or ameliorating sodic materials).</p>
Large mine	As defined in the Mining Regulation 2016.
Lease holder	The holder of a mining lease.

WORD	DEFINITION
Life of mine	The timeframe of how long a mine is approved to mine, from commencement to closure.
Mine rehabilitation portal	<p>Means the NSW Resources Regulator’s online portal that lease holders must use (via a registered account) to:</p> <ul style="list-style-type: none"> ■ upload rehabilitation geographical information system (GIS) spatial data ■ develop rehabilitation GIS spatial data (using online tracing functions) ■ generate rehabilitation plans and rehabilitation statistics using the map viewer and Rehabilitation Key Performance Indicator functionalities. <p>Data submitted to the mine rehabilitation portal is collated in a centralised geodatabase for use by the NSW Resources Regulator to regulate rehabilitation performance of lease holders.</p>
Mining area	As defined in the <i>Mining Act 1992</i> .
Mining domain	A land management unit with a discrete operational function (e.g. overburden emplacement), and therefore similar geophysical characteristics, that will require specific rehabilitation treatments to achieve the final land use(s).
Mining land	As defined in the <i>Mining Act 1992</i> .
Native vegetation	Has the same meaning as that term under section 60B of the <i>Local Land Services Act 2013</i> .
Overburden	Material overlying coal or a mineral deposit.
Performance indicator	An attribute of the biophysical environment (for example pH, slope, topsoil depth, biomass) that can be used to demonstrate achievement of a rehabilitation objective. It can be measured and audited to demonstrate (and track) the progress of an aspect of rehabilitation towards a desired completion criterion, that is, a defined end point. It may be aligned to an established protocol and used to evaluate changes in a system.

WORD	DEFINITION
Phases of rehabilitation	<p>The stages and sequences of actions required to rehabilitate disturbed land to achieve the final land use. The phases of rehabilitation are:</p> <ul style="list-style-type: none"> ■ active mining ■ decommissioning ■ landform Establishment ■ growth medium development ■ ecosystem and land use establishment ■ ecosystem and land use development.
Progressive rehabilitation	<p>The progress of rehabilitation towards achieving the approved rehabilitation completion criteria. This may be described in terms of domains, phases, performance indicators and rehabilitation completion criteria.</p>
Rehabilitation Completion	<p>The final phase of rehabilitation when a rehabilitation area has achieved the approved rehabilitation objectives and rehabilitation completion criteria for the final land use. Rehabilitation areas may be classified as complete when the NSW Resources Regulator has determined in writing that the relevant rehabilitation obligations have been fulfilled following submission of <i>Form ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate</i> application by the lease holder.</p>
Rehabilitation Completion criteria	<p>As defined in the Mining Regulation 2016.</p>
Rehabilitation cost estimate	<p>As defined in the Mining Regulation 2016.</p>
Rehabilitation management plan	<p>As defined in the Mining Regulation 2016.</p>
Rehabilitation objectives	<p>As defined in the Mining Regulation 2016.</p>
Rehabilitation risk assessment	<p>As defined in the Mining Regulation 2016.</p>
Rehabilitation schedule	<p>The defined timeframes for progressive rehabilitation set out in the forward program.</p>

WORD	DEFINITION
Relevant stakeholders	<p>Means any persons or bodies who may be affected by the mining operations, including rehabilitation, carried out on the lease land, and includes:</p> <ul style="list-style-type: none"> ■ the relevant development consent authority ■ the local council ■ the relevant landholder(s) ■ community consultative committee (if required under the development consent) or equivalent consultative group ■ affected land holder(s) ■ government agencies relevant to the final land use ■ affected infrastructure authorities (electricity, telecommunications, water, pipeline, road, rail authorities) ■ local Aboriginal communities, and ■ any other person or body determined by the Minister to be a relevant stakeholder in relation to a mining lease.
Risk	The effect of uncertainty on objectives. It is measured in terms of consequences and likelihood (AS/NZS ISO 31000:2009).
Secretary	The Secretary of the Department.
Security deposit	An amount that a mining lease holder is required to provide and maintain under a mining lease condition, to secure funding for the fulfilment of obligations under the lease (including obligations that may arise in the future).
Surface disturbance	Includes activities that disturb the surface of the mining area, including mining operations, ancillary mining activities and exploration.
Tailings	A combination of the fine-grained solid material remaining after the recoverable metals and minerals have been extracted from the mined ore, and any process water ² .
Waste	Has the same meaning as that term under the <i>Protection of the Environment Operations Act 1997</i> .

² Commonwealth of Australia (DITR), 2007. *Tailings Management*.

Attachment 3 – Plans

Plan 2A.pdf

Plan 2B.pdf

Plan 2C.pdf

Forward Program (LARGE MINE) v2.1