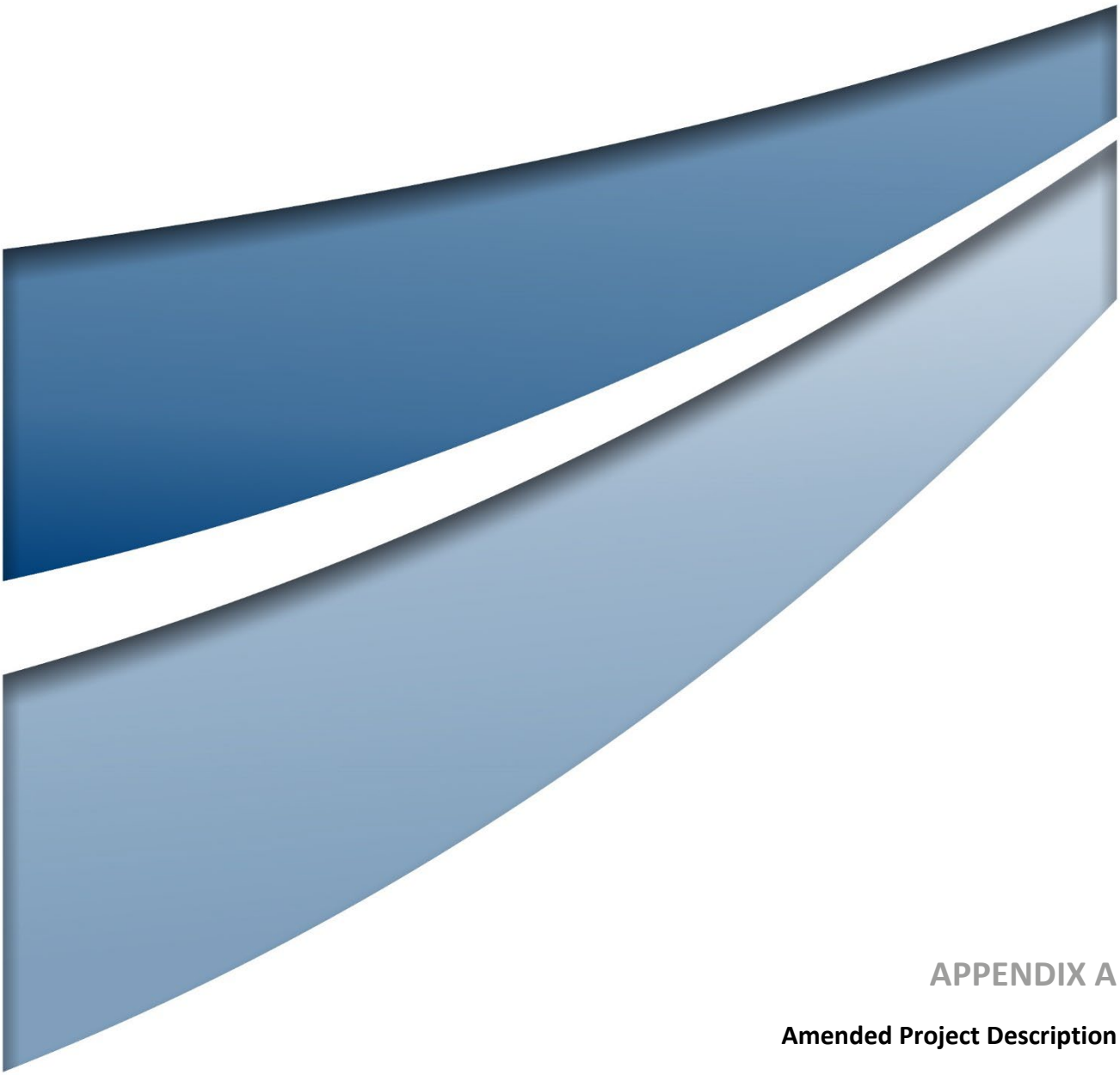

APPENDIX A

Amended Project Description

Appendix A Amended Project Description

The following provides an updated Project Description for the Project, previously presented as Section 3.0 of the EIS.

1.0 Project Description

The conceptual design for Stone Ridge Quarry (the Project) has evolved throughout the environmental assessment process in response to preliminary environmental, social and cultural investigations, background monitoring, exploration and geological modelling, constraints and impacts identified during technical specialist studies. Project design has also taken into consideration the outcomes of stakeholder engagement undertaken during the scoping phase, EIS preparation and exhibition. A detailed description of the features of the Project is included in this section.

1.1 Project Overview

A summary of the key aspects of the Project is provided in **Table 1.1**.

Table 1.1 Summary of Key Project Aspects

Aspect	Proposed for the Project
Life of Extraction	30 years from the commencement of extraction. Some processing activities and decommissioning and rehabilitation activities will occur beyond the date extraction is completed.
Limits of production	Up to 1.5 Mtpa of quarry product/sales per year.
Project Area	Approximately 139 ha (including extraction, processing and stockpiling area and buffers), with a disturbance area of approximately 68 ha.
Extraction method	Drill, blast, load and haul.
Material processing	Processing on site with provision for both mobile crushing and screening plant, as well as modular/fixed processing plant.
Overburden management	Overburden will be minimal and any topsoil and overburden will be stockpiled on site for use in rehabilitation and/or water management structures and bunds.
Products	Concrete, asphalt and sealing aggregates, gabion, armourstone, roadbase and other crushed rock products.
Resource Estimate	• Approximately 49 Mt in situ resource. • Approximately 45 Mt product.
Product transport	• Road transport of up to 1.5 Mtpa of product via the Pacific Highway. • 1.5 Mtpa equates to average of 334 heavy vehicle movements (167 inbound and 167 outbound) each day (based on the transportation of materials using truck and dog combinations with a typical capacity of around 30 tonnes).
Site access	• Single site access point on Italia Road. • No truck traffic on Italia Road west of the site access towards East Seaham. • All trucks will turn right into the site from Italia Road and left out of the site onto Italia Road. • No trucks will turn right out of Italia Road onto the Pacific Highway.
Employment	• Construction: 10 to 15 full time employees. • Operation: Up to 10 full time employees, 3 to 5 part-time employees.

Aspect	Proposed for the Project
Hours of operation	Construction: • 7.00 am to 6.00 pm Monday to Friday. • 8.00 am to 1.00 pm Saturday. • No work on Sunday or Public Holidays. Operation: • Quarrying and processing – 7.00 am to 6.00 pm Monday to Friday, and 7.00 am to 3.00 pm Saturdays. • Truck loading, product transport and maintenance – 6.00 am to 10.00 pm Monday to Friday, and 7.00 am to 3.00 pm Saturdays. • No operation on Sundays or Public Holidays apart from maintenance activities as required.
Rehabilitation and final landform	Rehabilitation will be undertaken progressively where appropriate in the context of further resources remaining available in the Project Area at the end of the planned 30-year approval life. A conceptual final landform will be prepared for the Project.

1.2 Project Area

Wallaroo State Forest comprises three separate areas of land that have a combined area in excess of 3,600 ha. The Project Area (139 ha) is located within a Licence Area (391 ha) inside the boundaries of the western part of Wallaroo State Forest.

1.3 Project Layout

The conceptual layout of the Project Area is shown in **Figure 1.1** and comprises the following key features:

- an extraction area with sufficient resources to support the extraction and processing of material to enable the transport of approximately 1.5 Mtpa over a 30-year period
- processing and stockpiling/loading area, which includes provision for storage of mulched vegetation, soils and overburden
- surface water management infrastructure (including surface irrigation areas)
- weighbridge and administration area (offices, parking, amenities)
- site access and internal roadways
- buffer areas.

1.3.1 Disturbance Area

The Disturbance Area of the Project (i.e., those areas where physical disturbance of soils and vegetation may occur) occupies approximately 68 ha of the Project Area, with the remainder of the Project Area to remain as vegetated buffer areas. All disturbance associated with the Quarry operations will be contained with the Disturbance Area identified in **Figure 1.1**, except where otherwise approved under *Forestry Act 2012* processes where further development consent is not required.

Figure 1.1 Conceptual Quarry Layout

1.4 Quarrying Process

The quarrying process for the Project will consist of six principal operational activities:

1. site preparation
2. clearing and topsoil stripping and stockpiling
3. overburden removal and emplacement
4. blasting, loading and haulage of primary raw material
5. processing (crushing, screening and stockpiling)
6. decommissioning and rehabilitation.

These operational activities are described further below.

1.4.1 Clearing and Topsoil Stripping

The quarrying process will commence with clearing of vegetation and stripping of topsoil. Vegetation clearing will typically be undertaken using a dozer and/or excavator with all cleared material stockpiled for later re-use in habitat enhancement, water management and rehabilitation works. Larger woody material may be emplaced in adjoining areas of the Wallaroo State Forest for habitat enhancement purposes (refer to **Section 6.16.3** of the EIS).

Soil profile development over the Eagleton Volcanics is very poor to non-existent, and rhyodacite (the dominant rock type) outcrops extensively along the crest and flanks of Stone Ridge. Soils in these areas are generally less than 0.3 m in depth and are typically weakly structured, sandy loams. Soil profiles developed at lower elevations (generally below 50 m AHD), over less resistant volcanic and sedimentary rock types are more developed and are typically moderately structured, sandy light clays.

Where present, topsoil will be stripped using a dozer and then loaded into a haul truck for stockpiling. The proposed location of the stockpiling area is shown in **Figure 1.1**. Topsoil will remain in stockpiles until required for rehabilitation of the final landform. Topsoil stockpiles will have a maximum height of 3 m and will be planted with a cover crop if they are to remain in place for longer than 6 months. Where possible, freshly stripped topsoil will be placed directly onto areas identified for rehabilitation or earthworks areas requiring stabilisation, to reduce the potential for exposure of unconfined disturbed subsoil material and to make best use of soil seed stores. **Section 6.16.3** of the EIS contains further details regarding soil management for rehabilitation purposes.

1.4.2 Site Preparation

As the proposed quarry is a greenfield project, construction and initial site preparation works are required to prepare the Project Area for quarrying activities. The construction phase is expected to last 6–12 months and will including the following key activities:

- construction of the site access from Italia Road (an upgrading of the existing forestry road and intersection with Italia Road) is required
- installation of security fencing and gates to ensure public safety and security for the quarry operations

- removal of existing vegetation and topsoil along the access road, within the areas of initial extraction, the initial surface water infrastructure area, and processing, loading and administration areas (refer to **Section 1.3**)
- stockpiling of vegetation and topsoil material for future re-use
- removal and stockpiling of any surface rock considered suitable for eventual processing to produce quarry products
- construction of surface water management infrastructure necessary to support construction activities, administrative and processing areas and early extraction activities including stockpile and material handling areas
- construction of processing and loading areas
- construction of remaining facilities including administration area, visitor parking, equipment parking area, site roads, workshop and weighbridge.

1.4.3 Overburden Removal

The target resource is overlain by a very thin veneer of variably weathered rock that in almost all cases will require blasting and is suitable for processing to produce saleable quarry products. Any minor quantity of material deemed as being unsuitable for processing will be loaded by excavator into haul trucks and transported to an overburden emplacement within the stockpile area, in advance of being used for site earthworks (e.g., water management dams and bunds) or rehabilitation.

1.4.4 Blasting, Loading and Haulage

1.4.4.1 Blasting

The target resource will be drilled and blasted to allow the rock to be broken into sizes which can be readily handled and transported to the processing area. Blasting may also be required for the construction of site facilities and the access road due to the shallow rock. Drilling and blasting will be conducted using experience drill and blast contractors. No explosives would be stored on site, with all explosives transported to the site from licensed suppliers and/or magazines as needed and loaded directly into the drill holes.

Blasting will only be undertaken Monday to Friday between 9.00 am and 5.00 pm (excluding public holidays). Drilling activities will be undertaken during normal quarrying hours i.e. Monday to Friday between 7.00 am and 6.00 pm, and Saturdays from 7.00 am to 3.00 pm. It is anticipated that one to two blasts per fortnight will be required with an allowance for additional blasts where there are misfires or blasting activities are restricted by meteorological conditions. To avoid any cumulative impacts of blasting on the adjacent community, coordination with neighbouring quarry operations will be undertaken to ensure that no simultaneous blasting occurs.

A detailed design and predictive model will be completed for each blast to ensure that vibration and blast overpressure limits are met. Typically, the blasting operation sequence would commence with a bench survey and bench drilling using a drill rig. A typical bench is rectangular in shape with a uniform drilling pattern. The drill holes are loaded with explosive material and the top of the holes filled with a gravel material (stemming) to contain the energy release and to ensure a low air blast emission is achieved. The loaded explosives are then initiated through electronic detonators connected to each hole to provide the maximum level of control over the explosive charge. Charge sized used each hole will be designed to achieve vibration and overpressure levels which are below relevant blast criteria at all sensitive receivers. A delay system allows for single hole initiation with a small delay between each blasted hole to control the ground and air vibration impacts allowing lower environmental impact. The above techniques reflect current quarry industry practice for the use of emulsion or water gel products however other blast products may be developed over the life of the Project which provide more optimal blast performance and/or reduced environmental impacts and these may require slightly different blast practices. Blasting methods used at the quarry will be detailed in the Blast Management Plan prepared for the Project and, in the event of any proposed changes to blast practices, the Blast Management Plan will be updated to reflect the updated practices to be adopted.

1.4.4.2 Material Handling

Once blasted, rock material will be loaded by front-end loaders or excavators into haul trucks at the quarry face and transported to the processing area for the commencement of the crushing and screening processes. Should the blasting result in the formation of oversize rock fragments, where possible these will be broken up using an excavator with a rock hammer prior to being loaded onto trucks. Dozers will be used periodically to move blasted material within the pit to improve the efficiency of loading activities and will also be used for the construction of haul roads and loading areas within the pits and water carts will be used to manage dust impacts associated with handling and haulage activities.

1.4.5 Product Processing

Following extraction, quarry material will be processed through a series of crushers to reduce the rock into various sized fragments. A series of screens will then be used to sort the crushed rock into various sized categories, resulting in a number of different crushed rock products. The production cycle consists of a three-stage crushing and screening process (primary, secondary and tertiary stages), with each stage producing finer quarry products.

Products will be stockpiled in readiness for dispatch in nominated product-specific stockpile areas. Quarry products will be produced to meet market demand and will include:

- concrete aggregates
- asphalt aggregates
- sealing aggregates
- railway ballast
- armourstone
- aggregates for drainage, gabion baskets and wire mattresses
- roadbase materials.

The processing area is located towards the north of the Project area. From approximately Stage 5 onwards, the Main Pit will progress into the processing areas and the processing facilities will be located in the northern extent of the Main Pit.

1.5 Physical Layout and Design

1.5.1 Conceptual Quarry Development Sequence

Conceptual staged quarry development plans have been prepared for the Project Area to illustrate the proposed progression of quarry extraction activities to support the production and sale of up to 1.5 Mtpa of quarry products over a 30-year operational period, from a hard rock resource of approximately 49.5 Mt.

The conceptual plans comprise ten extraction stages that cover initial site establishment (Stage 0), followed by development of the main rhyodacite resource associated with the Stone Ridge (the Main Pit) over Stages 1–9. The conceptual development sequence integrates with quarry processing and stockpiling activities located on the southern side of Stone Ridge. Three main stages are presented in **Figure 1.2**, **Figure 1.3** and **Figure 1.4** to illustrate the early (Stage 1), mid (Stage 5) and late (Stage 9) extraction stages of the quarry that relate to the 30-year development horizon.

The progression of quarrying activities depicted in the conceptual mine plans shown in **Figure 1.2**, **Figure** 1.3 and **Figure 1.4**, represent the most likely extraction plans for the Project, however these conceptual plans are subject to change throughout the life of the Project due to a range of variables such as geological and geotechnical conditions, variations in product quality and market conditions, and changes to mining equipment and available technology.

The retention of 30-m wide benches at the completion of each stage of quarry development (versus development of narrow terminal width benches) reflects ARDG's intention to maintain operational width benches at all stages of quarry development to facilitate:

- maximum operational flexibility across multiple quarry faces and at different levels within the quarry by maintaining access to all bench levels
- safe and stable quarry face conditions at all stages of development, achieved by the design parameters considered highly conservative as they retain an overall face slope angle of between 24˚ and 25˚
- use of the lower level of quarry when required for surface water storage to meet the requirements of the quarry's surface water management system.

Should the quarry not be extended following the currently proposed 30-year life of operations, the wider benches also provide more opportunities for the rehabilitation of pit areas including revegetation on benches and/or battering of internal slopes. Closure planning options are considered further in **Section 6.16** of the EIS.

Figure 1.2 Conceptual Extraction Plan – Stage 1

Figure 1.3 Conceptual Extraction Plan – Stage 5

Figure 1.4 Conceptual Extraction Plan – Stage 9

1.5.2 Extraction Volumes

Stage 0 of the conceptual development sequence relates to site establishment works (i.e., creation of access road, office and weighbridge area, etc) and would require approximately 230 kt of topsoil and overburden to be removed. Topsoil would be stockpiled for future remediation works, whereas overburden would be either stockpiled or used for the creation of onsite tracks and works areas.

Development of the Main Pit would require the staged stripping and stockpiling of topsoil and overburden over the 30-year life of quarrying operations in order to provide access to the rhyodacite (primary raw feed).

At an estimated production yield of 90%, rhyodacite extracted from the Main Pit would produce approximately 43 Mt of saleable quarry products over the 30-year quarrying period.

1.5.3 Extraction Depths

The maximum extraction depth in the Main Pit is approximately -15 m AHD. The Quarry pit reaches its lowest point of extraction in Stage 8. Slighter deeper extraction will be required in the pit during each stage than what is shown in **Figure 1.2** to Figure 1.4 to establish sumps to collect rainfall run-off into the pit enable operations to be maintained in the floor of the pit following rainfall. Water in these sumps will be pumped to SB1 or be used directly for operational purposes such as dust suppression.

1.6 Plant and Equipment

The Project will utilise a fleet of mobile earthmoving plant and equipment for initial and ongoing site operations. The type of mobile equipment used at the site may change during the life of the Project to meet operational demands and reflect changes in technology. Locations of plant and equipment across the quarry will also change as extraction progresses through each stage.

The Project will initially commence crushing and screening operations with mobile plant and transition to include modular/fixed plant in accordance with production demand.

Potential impacts associated with all earthmoving, mobile plant and crushing and screening plant have been assessed. A list of typical plant and equipment is provided in **Table 1.2**.

Table 1.2 Summary of Typical Plant and Equipment

Typical Activity	Typical Plant and Equipment
Clearing, topsoil stripping, overburden removal, bench development, shaping emplacement areas, on site haulage, vegetation mulching	Front-end loader, dozer, grader, excavator, dump truck (rigid body and articulated), tub grinder
Drilling for blasting activities	Blast hole drill rig
Product processing	Mobile and modular/fixed crushing, screening and blending plant, pre-coat plant
Stockpiling and dispatch loading	Wheel loader
Road haulage	Road trucks (e.g., B-double, semi-trailer/truck and trailer)
Dust suppression, miscellaneous jobs	Watercarts, water pumps, light 4WD vehicles, maintenance and servicing trucks

Typical Activity	Typical Plant and Equipment
Power supply	Diesel generators
Truck wheel washing	Wheel wash

1.7 Product Loading and Transportation

Product haulage will be undertaken using road trucks. Depending on the product and customer, different truck configurations (with different payloads) may be used including rigid, truck and dog, semi-trailer and B-double configurations.

The vast majority of inbound truck movements would turn left into Italia Road from the Pacific Highway to access the quarry. The Project includes a new site access point located directly opposite the existing Boral Seaham Quarry on Italia Road. A Channelised Right Turn (CHR) treatment would be provided for right turns into the site from Italia Road. The access point would be Stop controlled, complete with all statutory line marking and signage, including Truck Warning signage. A strip of vegetation would be cleared on the north-west side of the junction to provide sufficient safe intersection sight distance in accordance with the *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2021).

All outbound trucks will exit the site via a left turn towards the Pacific Highway. No heavy vehicles hauling quarry products will be permitted to travel west on Italia Road past the quarry access point toward Seaham (either to or from the quarry site). At the Italia Road-Pacific Highway intersection, all heavy vehicles associated with the quarry will turn left onto the Pacific Highway. Should heavy vehicles have a destination to the south, after turning left out of Italia Road onto the Pacific Highway these vehicles would utilise the existing Tarean Road interchange (approximately 11 km to the north) to undertake a U-turn before continuing their journey south. This approach to accessing the Pacific Highway from Italia Road has the in-principle agreement of TfNSW.

As part of the quarry development, all internal access roads would be either constructed or upgraded from their current condition to accommodate quarry vehicle traffic and to enable one-way circulation throughout the site. Road trucks will be loaded from the stockpiles using wheeled loaders prior to exiting the site via the weighbridge and wheel wash.

During operations, based on the transportation of materials using truck and dog combinations (approximate capacity of 30 tonnes) there would be an average of 334 heavy vehicle movements (167 inbound and 167 outbound) per day generated by the quarry. These heavy vehicle movements would generally be spread across the day, however during busy periods it is expected that up to 18% of the average daily movements might occur during the peak operating hours, equivalent to 30 inbound and 30 outbound movements. Light vehicle traffic would generate up to 30 vehicle movements per day, most likely 15 inbound in the AM peak and 15 outbound in the PM peak. It should also be noted, however, that Italia Road is a designated B-double route between the Pacific Highway and the site access on Italia Road. The use of B-double or semitrailer trucks would result in a reduction in heavy vehicle movements given their larger capacity.

Noting the requirements of site establishment, traffic generated during the construction phase of the Project is expected to be limited.

1.8 Other Infrastructure

Lockable gates and barriers to prevent access will be provided on the main access road to prevent unauthorised out-of-hours access. Any forest tracks that access the Project Area will be closed at the Project Area boundary, modified to prevent unauthorised access and signposted accordingly. Fencing will be installed progressively around all extraction areas and modified in line with staged quarry development to ensure site security and safety. Appropriate signage will be provided to warn against unauthorised access and safety hazards associated with the quarry.

As the Project will primarily utilise mobile processing equipment, infrastructure to be established on site would be minimal, consisting of an administration office, plant and equipment workshop facility (approximately 25 m x 30 m) and 30 m fixed weighbridge. Administration buildings would initially be of demountable construction and any other fixed buildings (e.g. sheds) would be approved/certified (if required) through Port Stephens Council.

Lighting will be required in the stockpile area due to the requirement for early morning and evening product loading. Lighting will be kept to the minimum required for operational needs and safety. All lights will have shields and be directed down onto working areas to ensure that fugitive light emissions are limited in compliance with Australian Standard *AS4282 - 1997 Control of the obtrusive effects of outdoor lighting*.

Separate parking areas will be provided for light and heavy vehicles to ensure that no vehicle parking or queuing on Italia Road will occur.

1.9 Services and Utilities

The Project Area is not currently serviced by electricity, telecommunications, water or sewerage infrastructure. Electricity for the Project will initially be provided by two 420 kVA diesel generators to be located in proximity to the administration and workshop areas. Notwithstanding, ARDG has commenced the process of consulting with the relevant authorities regarding connection to the Ausgrid network, located adjacent to the Pacific Highway. Future connection to the network would provide for the most efficient operation of the quarry however solar panels and small-scale batteries may also be used to supply power to buildings.

Telecommunications would be managed through mobile network connection.

Potable water for amenities use will be supplied to the site by water tanker and stored in tanks on site. A rainwater tank will also collect roof runoff to be utilised for non-potable water demands (e.g., toilet flushing). Wastewater from the amenities will be collected in a tank and removed from the site by a licensed waste contractor as required.

Operational water requirements for the Project will include:

- dust suppression on haul roads, exposed areas and stockpiles as required
- operation of the crushing and screening plant.

Operational water requirements will be sourced via surface water runoff captured in the Water Management System (WMS) and supplemented by a groundwater bore. Further details on the proposed WMS and operational water balance are provided in **Section 6.5** of the Amendment Report.

Fuelling would be undertaken at one or more refuelling stations located on the hard stand area in the general vicinity of the workshop and truck parking areas. Equipment servicing would also be undertaken in hardstand areas. Storage areas would comprise up to 20,000 litre diesel storage tanks and a grease and oil storage area for the storage of grease drums and intermediate bulk containers (IBC) for engine oils. These storage areas, refuelling areas and equipment servicing areas would be fully bunded and fitted with oil water separators to process any petrochemical spills. All waste products would be stored within dedicated IBC that are emptied periodically by licensed waste contractors.

Mobile plant may also be refuelled using a portable diesel fuel tank mounted on the rear of a quarry service vehicle.

1.10 Hours of Operation

1.10.1 Construction Phase

The proposed construction hours will be in accordance with the *Interim Construction Noise Guidelines* (DECC, 2009) which identify standard hours for construction activities in NSW:

- Monday to Friday: 7.00 am to 6.00 pm.
- Saturday: 8.00 am to 1.00 pm.
- Sunday and Public Holidays: no work.

1.10.2 Operational Phase

The proposed hours of operation for the key quarry activities are shown in **Table 1.3**.

Table 1.3 Operational Phase Hours of Operation

Activity	Hours of Operation
Blasting	9.00 am to 5.00 pm Monday to Friday Anticipated need for 1 to 2 blasts per fortnight
Quarrying and processing	7.00 am to 6.00 pm Monday to Friday 7.00 am to 3.00 pm Saturday
Truck loading, product transport and maintenance	6.00 am to 10.00 pm Monday to Friday 7.00 am to 3.00 pm Saturdays
No operation on Sundays or Public Holidays apart from maintenance activities as required	

1.11 Workforce

1.11.1 Construction

The construction/site establishment phase of the Project is expected to run for approximately six to twelve months. During this time, the size of the construction workforce will vary depending on the construction activities being undertaken at the time, however it is anticipated to generate approximately 10–15 full time equivalent (FTE) jobs.

1.11.2 Operations

During operations, the Project will employ up to 10 FTE employees and 3–5 part time employees.

In addition, specialist contractors will also be required to complete specific maintenance tasks and to provide other specialist services to the quarry including blasting. Road transport will be undertaken by external transport companies under contract arrangements, and this is expected to generate employment for approximately 40–60 persons at full production.

1.12 Rehabilitation

The exact timing of specific rehabilitation works will be dependent upon on the rate of resource extraction and any future plans to seek approval for the continuation of extraction beyond the initial 30-year approval term currently being sought. Any inactive disturbed areas surrounding the active extraction and processing areas where quarrying, processing, stockpiling or other management activities are not proposed would be subject to progressive rehabilitation once it is identified that areas will not be required for ongoing operations.

A detailed Quarry Closure Plan will be developed approximately 3 years prior to cessation of quarrying activities. The Quarry Closure Plan will describe the proposed operational and progressive rehabilitation procedures for the remainder of the quarry life and following quarry closure. The final land use option proposed is focused on promoting the surrounding forest landscape by re-establishing pockets of woodland species across the benches consistent with endemic vegetation types. The Conceptual Final Landform at the cessation of quarrying activities is shown in **Figure 1.5**.

Further detail on the proposed rehabilitation objectives and methodology are provided in **Section 6.16** of the EIS.

Figure 1.5 Conceptual Final Landform

1.13 Environmental Management

ARDG will develop and implement an Environmental Management Strategy (EMS) as part of the Project to provide the strategic framework for environmental management of all components of the Project. The EMS would:

- incorporate a Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP), including all required sub-plans, protocols, management and mitigation measures proposed in this EIS
- identify all relevant statutory approvals
- establish roles, responsibilities, authority and accountability of all key personnel involved in the environmental management of the Project
- establish procedures for consulting with the local community and relevant stakeholders about the operation and environmental performance of the Project
- establish procedures for handling of complaints, disputes, non-compliances and emergency response.

Appendix C provides a consolidated summary of the management measures to be implemented during the construction and operation of the Project to manage, mitigate and/or monitor potential impacts identified within the EIS and the Amendment Report.