



ANDITI

Bringing Insight to Data

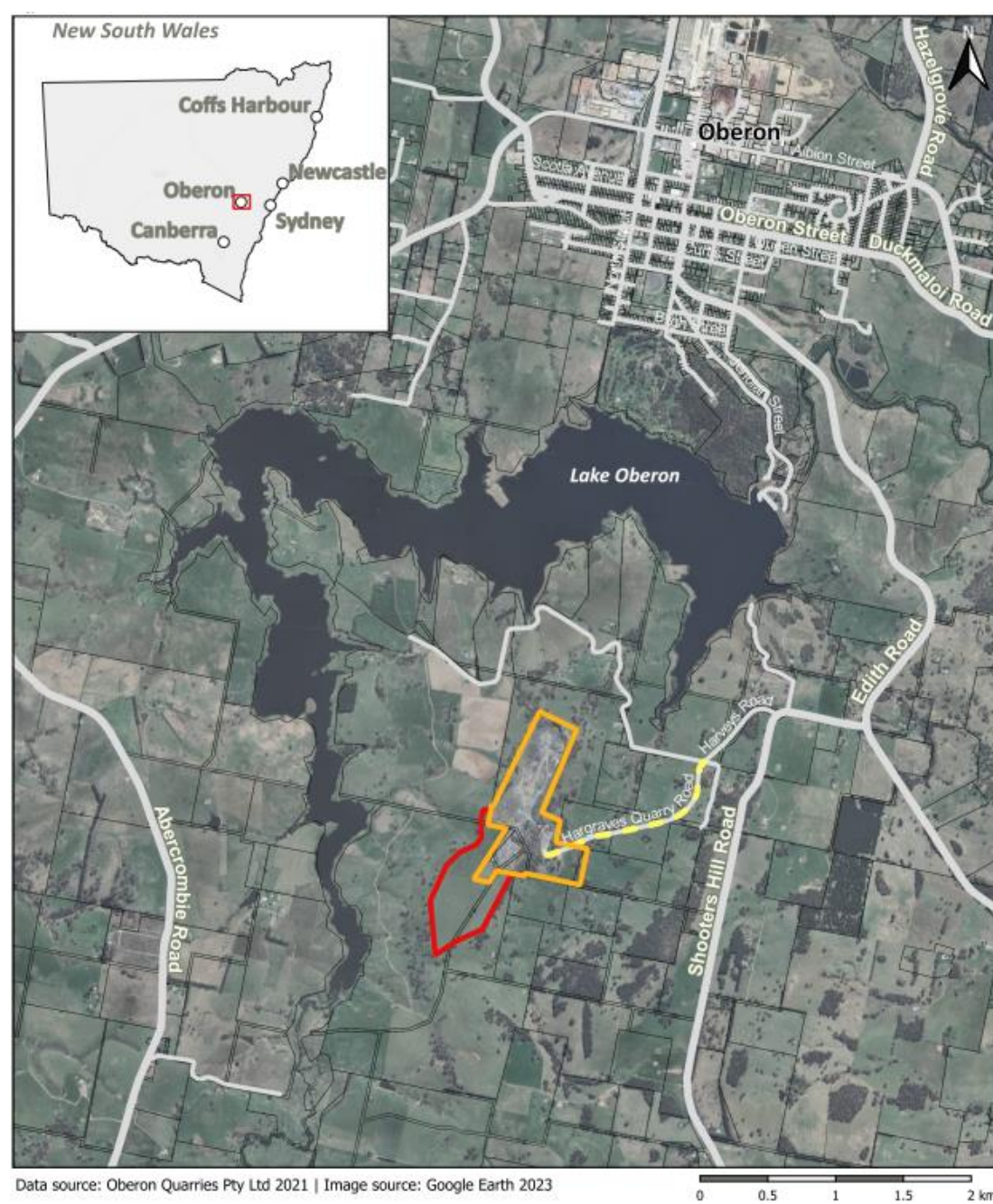
Oberon Quarries Extension Project (SSD-504364459)

February 2024



ANDITI

Locality



Existing Quarry



Data source: Anditi | Image source: Anditi 2023 Drone Survey, Google 2023

- Approval 1993
- Commercial operations 1995
- Consent SSD-6333 to 2045
- Approved area 30 ha
- Approval for up to 400,000 tpa
- Product delivery up to 3000 tpd
- Extraction within rim of Racecourse Hill
- All runoff drains to Sed Dams 1 & 2, 2 ML Dam the Racecourse Creek
- Final Rehabilitation – Benched quarry walls, grassed and timbered quarry floor free draining to Sediment Dams 1 & 2
- 30 years of operations with no significant environmental impacts

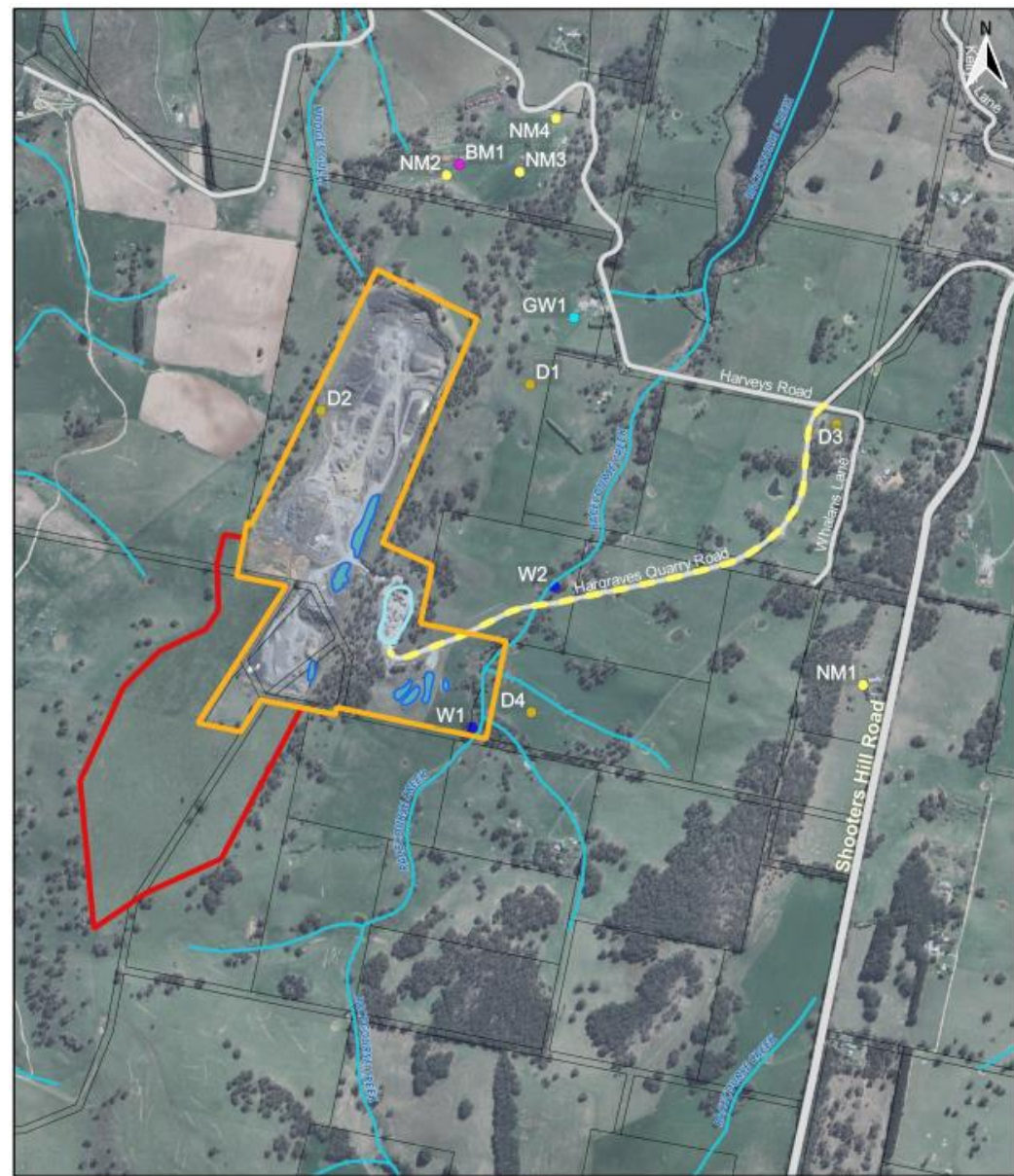
Existing Processing Plant



Environmental Monitoring Locations

www.oberonquarries.com.au/environment

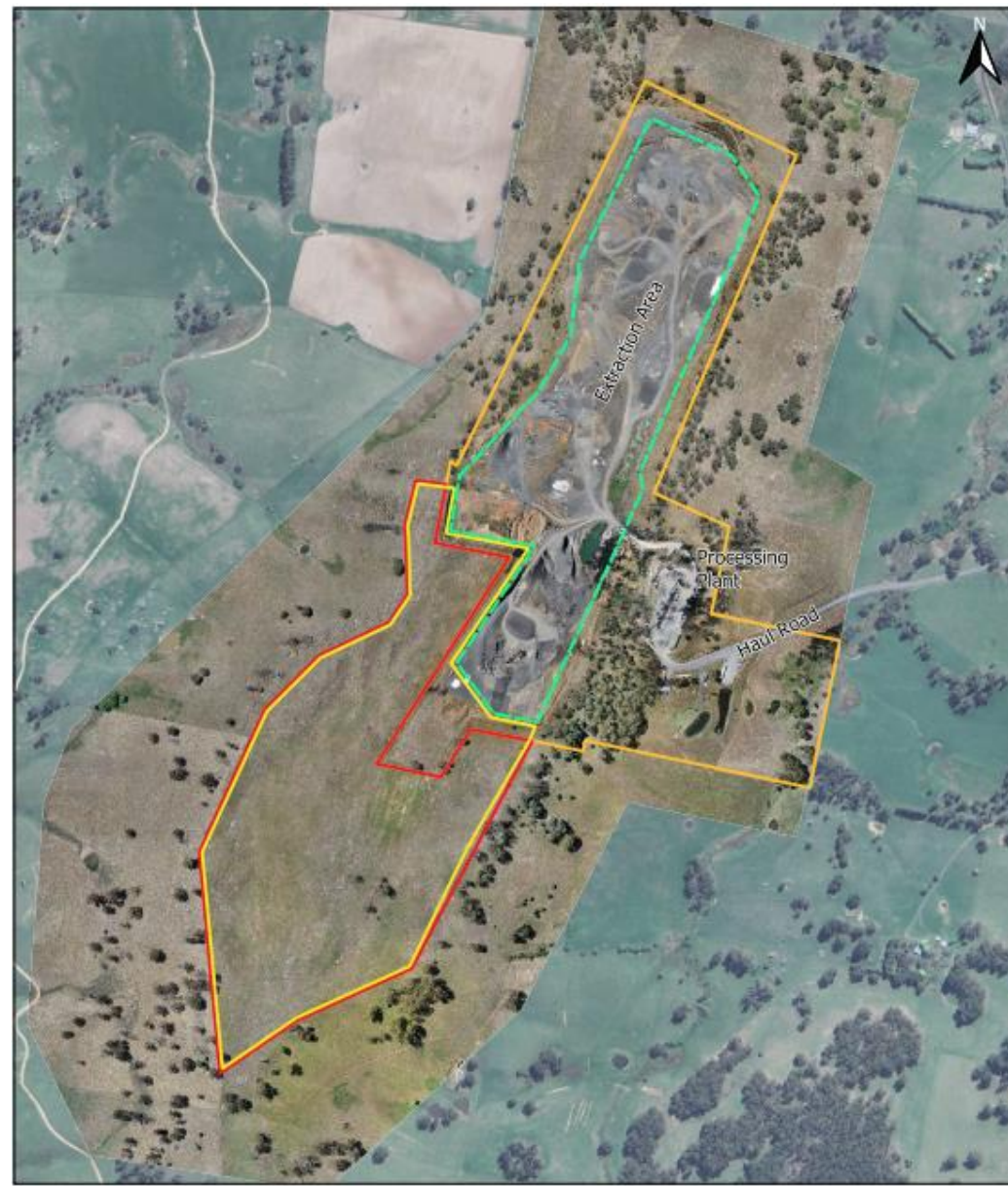
- Monthly monitoring dust & water
- Blast monitoring
- Noise monitoring as required
- Annual Return for EPL 4442
- Annual Review of Consent
- Tri-annual Independent Audit
- Community complaints register
- CCC reporting in future



Data source: Oberon Quarries Pty Ltd 2021 | Image source: Google Earth 2023

- | | |
|---------------------------------------|--|
| Existing Quarry Project Area | Noise monitoring location (NM1) |
| Proposed Quarry Extension | Surface water monitoring location (W1) |
| Lot | Processing area |
| Blast monitoring location (BM1) | Sediment Dams |
| Depositional dust gauge location (D1) | Right of carriageway |
| Groundwater monitoring location (GW1) | |

Proposed Extension Area



Data source: Anditi | Image source: Anditi 2023 Drone Survey, Google 2023

-  Existing Quarry Project Area
-  Existing Quarry Extraction Area
-  Proposed Extension Area Lease Boundary
-  Proposed Extension Area Extraction Boundary

- 31.5 ha Extension Area
- Improved pasture and 10 trees
- Resource 16 m to 19 m deep and contains ~ 15.7 million tonnes hard rock
- Seeking consent to 2057
- Access to extension from existing quarry floor
- Drain to existing quarry water management system

Surrounding Residences

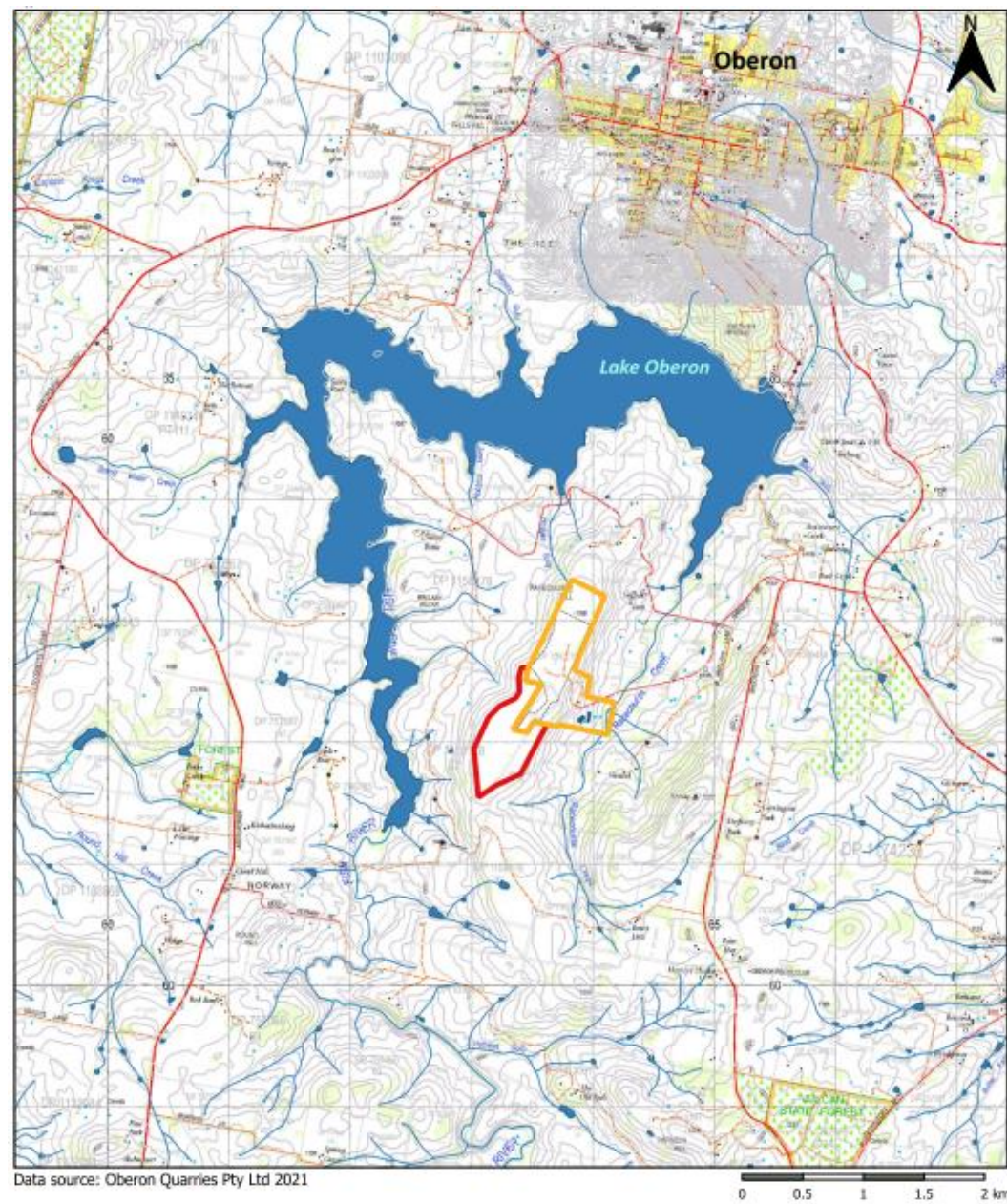


- Existing Quarry Project Area
- Proposed Quarry Extension
- Residences
- Lot

Closest Residences to Proposed Extension:

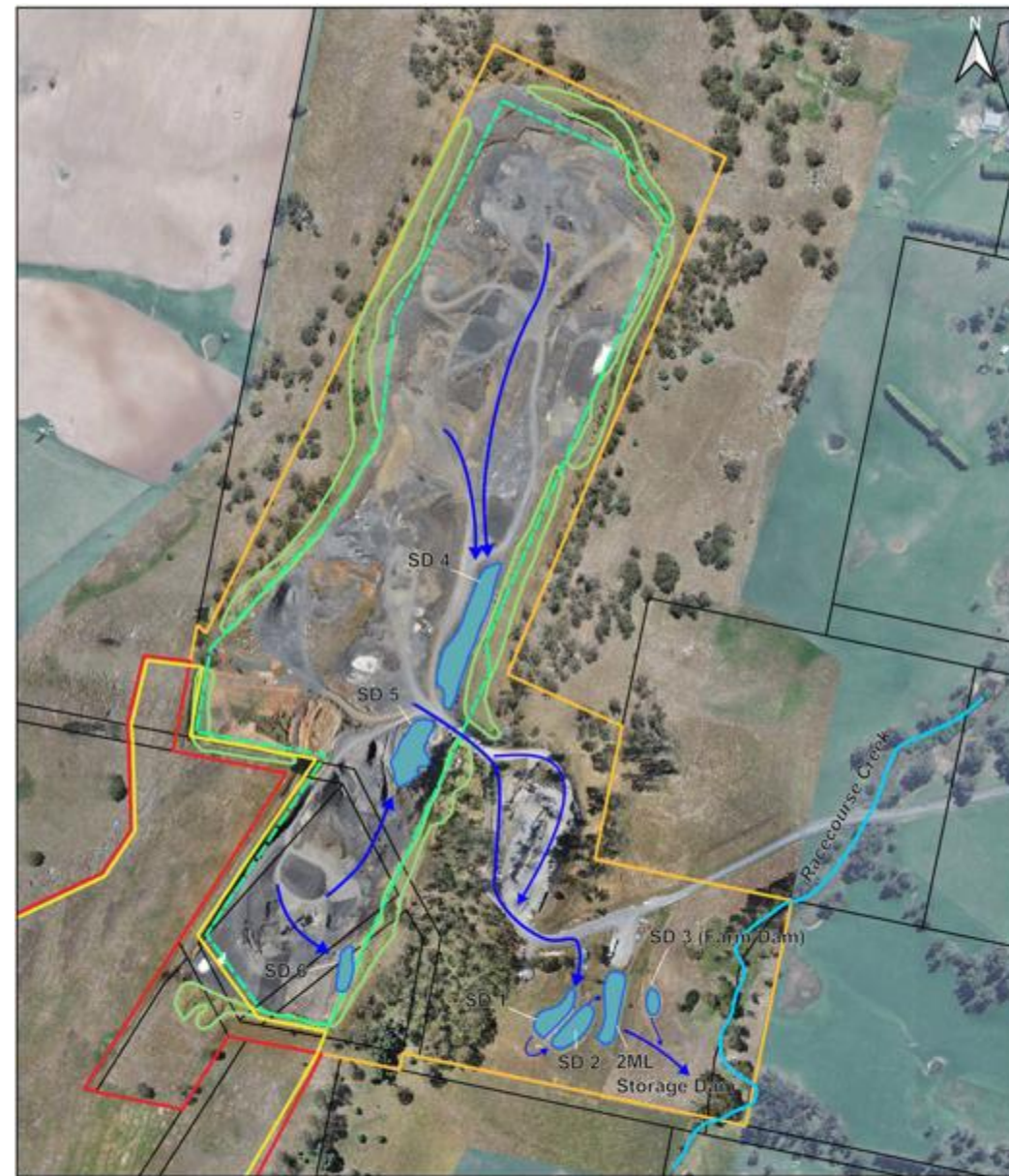
- 1.1 kms from Alveras property to the north
- 1.2 kms from Nestlebrae to the west
- 1.5 kms from Forest Hill to the southeast
- 1.5 km from Hackfath residence to the east

Topography & Drainage

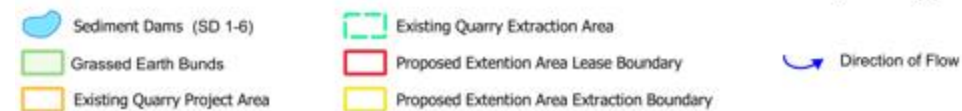


- Drainage line / stream
- Dam / water body
- Existing Quarry Project Area
- Proposed Quarry Extension

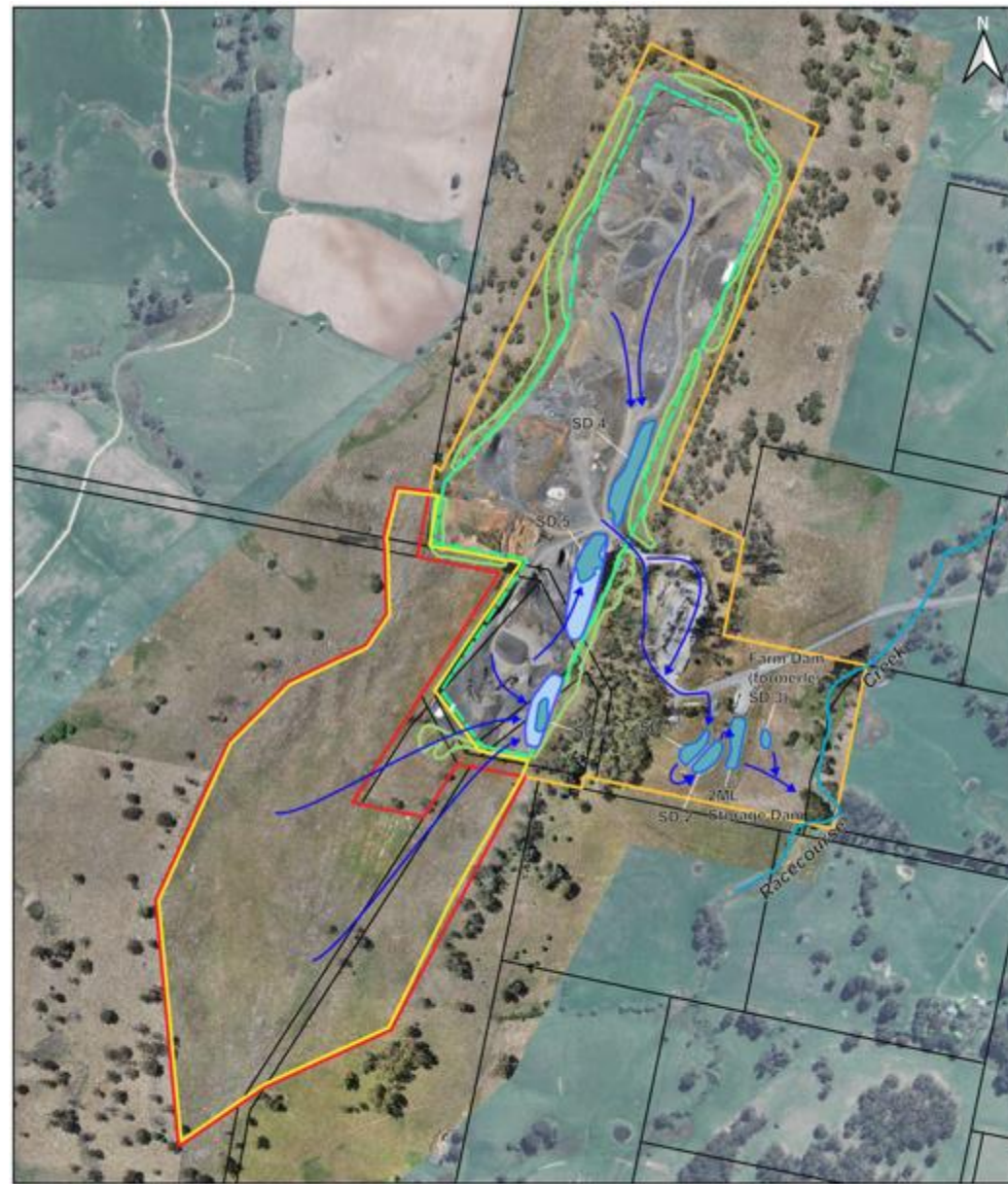
Existing Water Management System



Data source: Anditi | Image source: Anditi 2023 Drone Survey, Google 2023



Proposed Water Management System



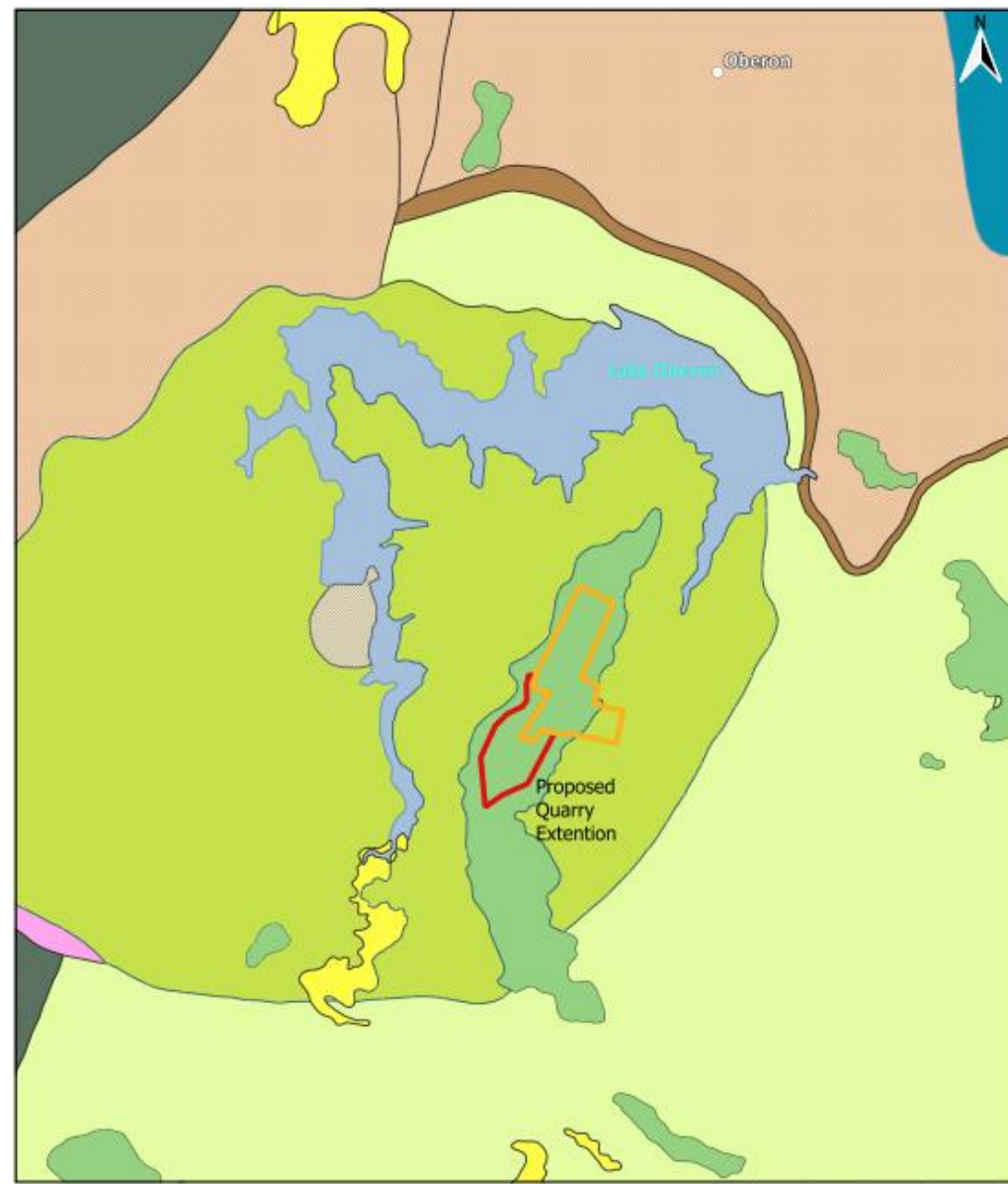
- Existing Quarry Project Area
- Existing Quarry Extraction Area
- Proposed Extension Area Lease Boundary
- Overburden-Topsoil_Stockpiles
- Sediment Dams
- Proposed Dam Extensions

Water management system designed to contain and control runoff from 1 in 100 Year 24 hour rainfall event (154 mm of rain)

Groundwater Springs and Seepages



Geology

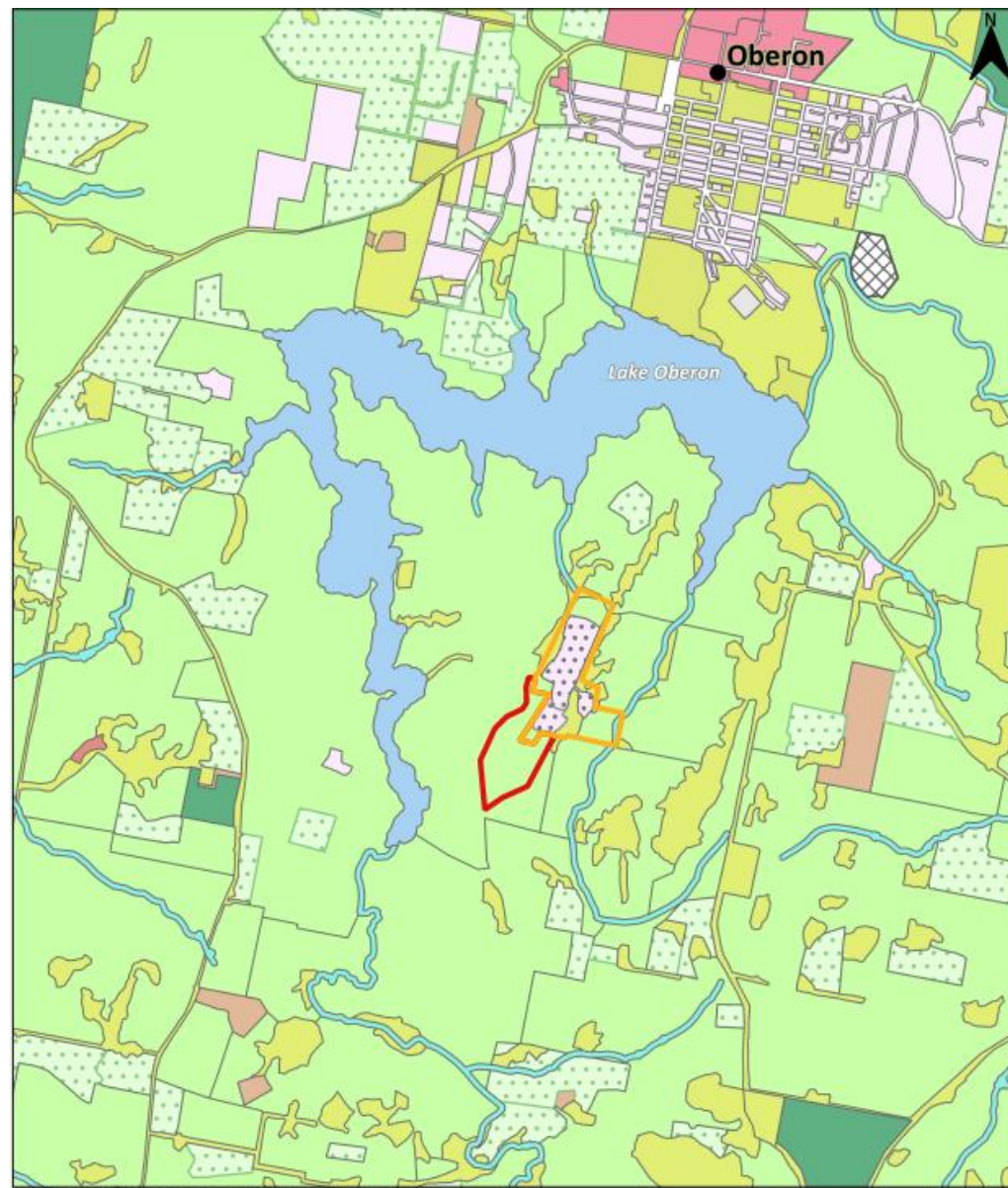


Data source: Bathurst S155-08 Digital Geology Data Package

- Alluvium: gravel, sand, silt, clay
- Carbonaceous slate, shale
- Chert, siltstone, mafic volcanolithic sandstone
- Coarse-grained, equigranular biotite hornblende granite
- Coarse-grained, porphyritic biotite hornblende granite
- Pink, coarse-grained, megacrystic biotite granite
- Pyroxene olivine basalt, plagioclase basalt, alkali basalt, trachybasalt, trachyandesite

- Quartz sandstone, siltstone, slate, phyllite, black carbonaceous slate, chert
- Slate, phyllite, siltstone, feldspathic and quartz sandstone, limestone
- Volcanic sandstone, minor breccia and conglomerate
- Lake
- Existing Quarry Project Area
- Proposed Quarry Extension

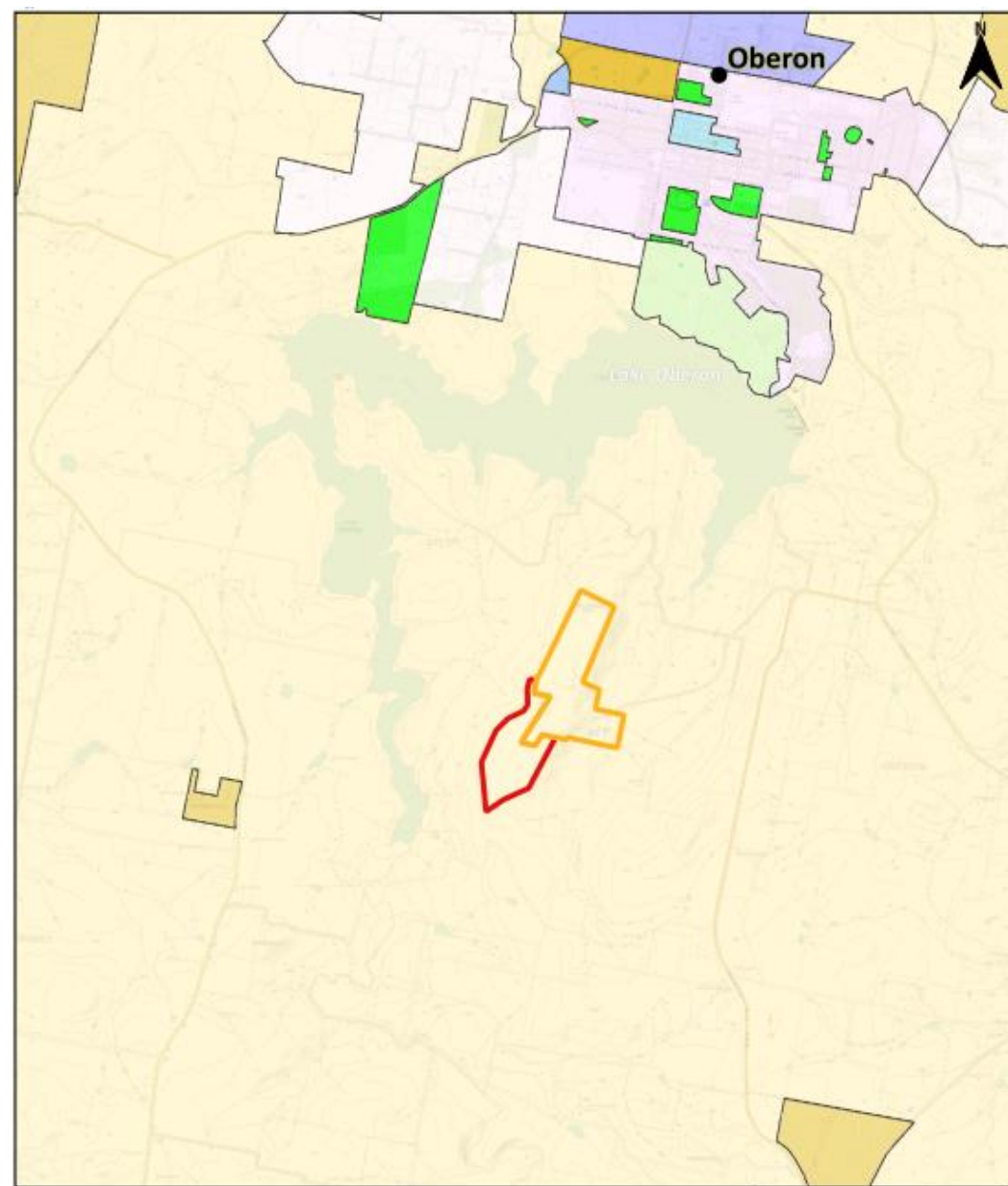
Surrounding Land Use



Data source: NSW Department of Planning, Industry and Environment 2021

- | | |
|---|------------------------------------|
| 1.3.0 Other minimal use | 5.5.0 Services |
| 2.1.0 Grazing native vegetation | 5.6.0 Utilities |
| 2.2.0 Production native forestry | 5.8.0 Mining |
| 3.1.0 Plantation forests | 5.9.0 Waste treatment and disposal |
| 3.2.0 Grazing modified pastures | 6.1.0 Lake |
| 3.3.0 Cropping | 6.2.0 Reservoir/dam |
| 5.3.0 Manufacturing and industrial | 6.3.0 River |
| 5.4.0 Residential and farm infrastructure | Existing Quarry Project Area |
| | Proposed Quarry Extension |

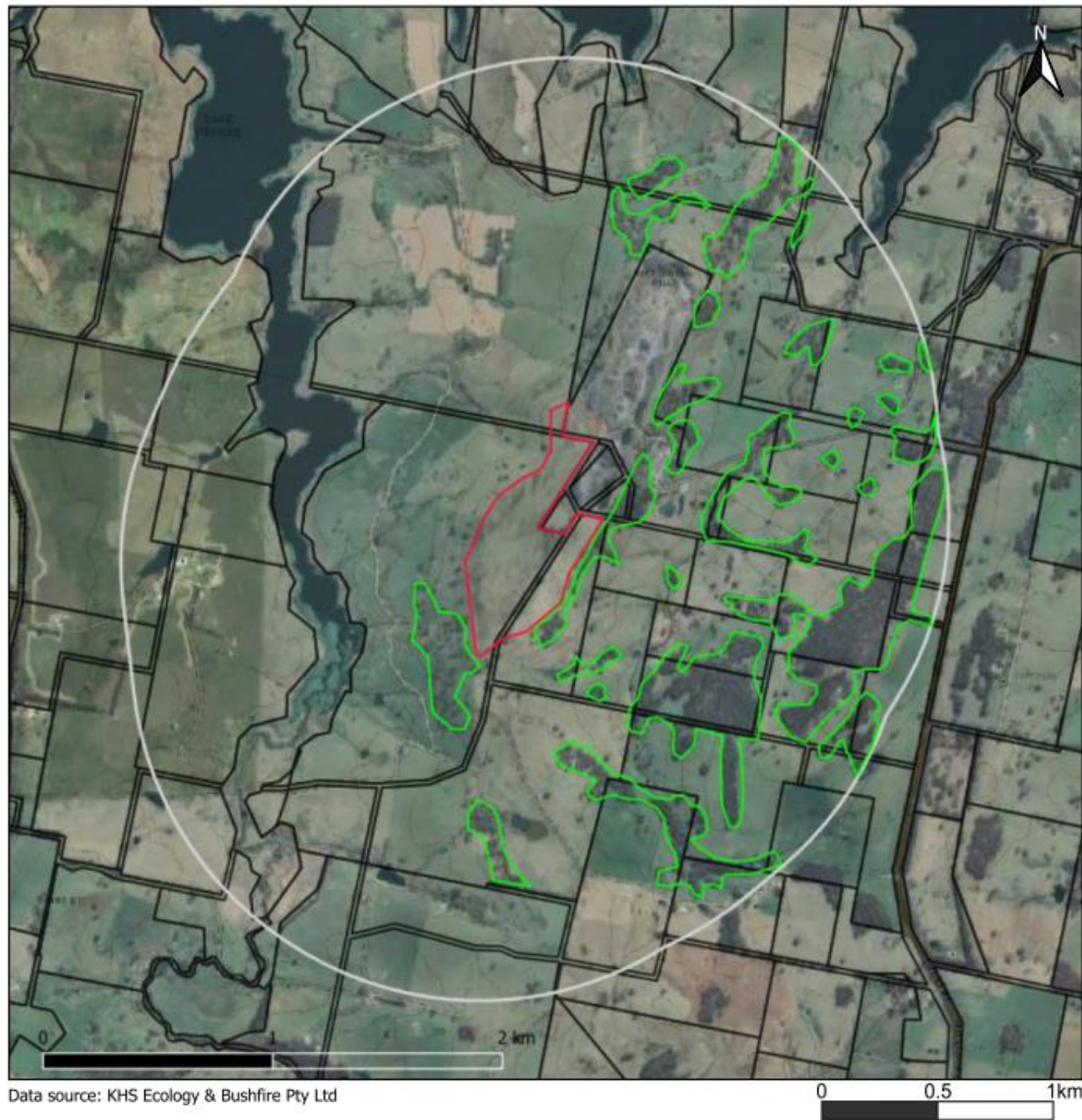
Land Use Zoning and Planning



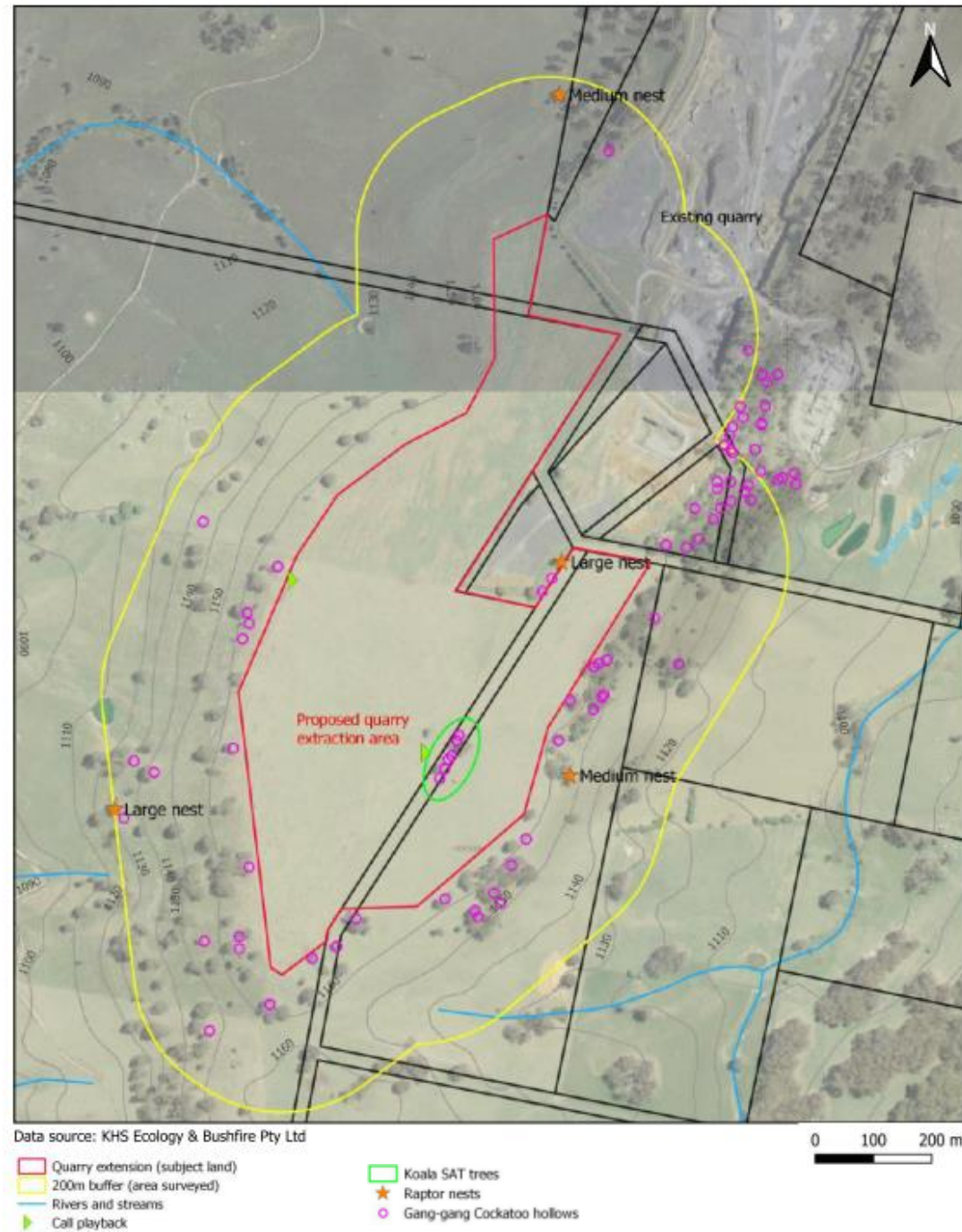
Data source: NSW Department of Planning, Industry and Environment 2021

- | | |
|----------------------------|------------------------------|
| B2 - Local Centre | RU6 - Transition |
| IN1 - General Industrial | B6 - Business Development |
| R5 - Large Lot Residential | RU1 - Primary Production |
| RE1 - Public Recreation | Existing Quarry Project Area |
| RE2 - Private Recreation | Proposed Quarry Extension |
| RU3 - Forestry | |

Woody Vegetation Mapping

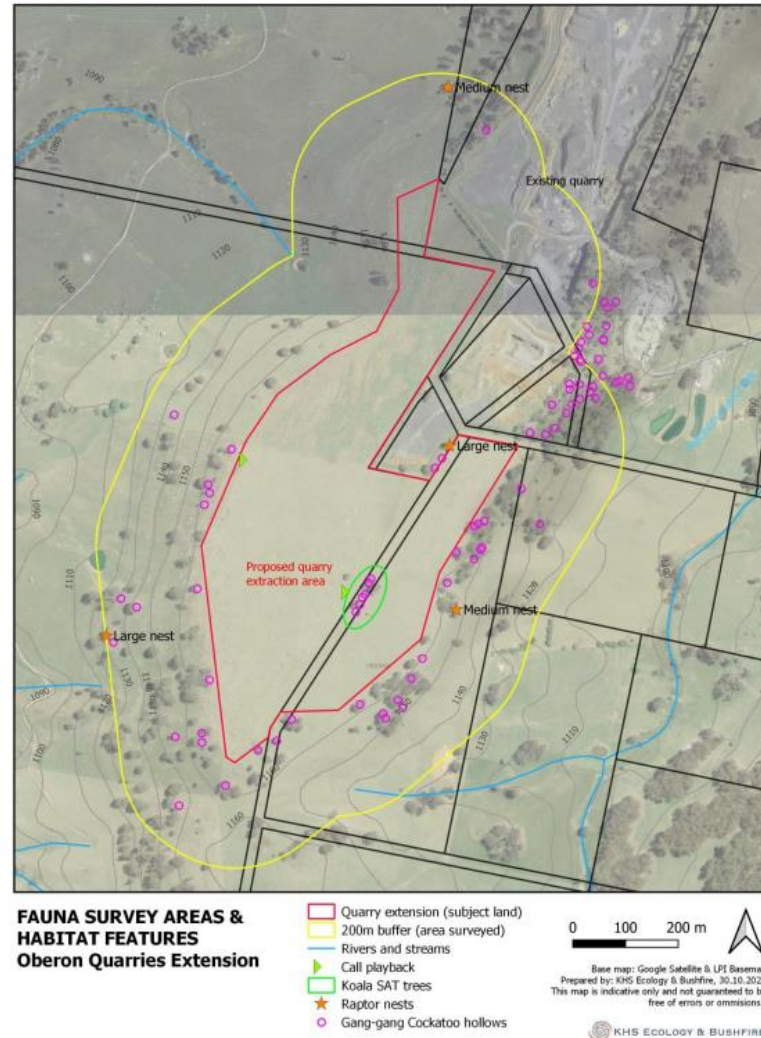


Fauna Surveys



Biodiversity Assessment and Findings

Figure 1-5. Map of fauna survey areas and habitat features.



- Predominantly improved pasture with isolated trees over improved pasture
- Ecosystem credits – Nil as improved pasture and isolated trees on project site do not meet required thresholds required
- Species credits – Nil as candidate species are excluded due to lack of suitable habitat, habitat constraints being absent from the site or species have been surveyed and not found

Aboriginal Sites



Data source: NSW DTDB and SIX Maps aerial with Heritage Now additions

AHIMS Sites

- Artefact
- Artefact + Burial
- Artefact + Burial + Stone Arrangement
- Ceremonial Ring (Stone or Earth)
- Stone Arrangement

AHIMS Sites Status

- + Destroyed

No Aboriginal sites or potential archaeological deposits were identified during the survey and there are no proposed impacts to Aboriginal sites.

Hours of Operation



Activity	Approved Hours of Operation
Quarrying and Processing Areas	Approved 7.00 am to 6.00 pm, Mondays to Fridays 7.00 am to 5.00 pm, Saturdays No quarrying or processing shall be undertaken on Sundays or public holidays. Proposed 6 am start Monday to Saturday except for blast hole drilling which will start at 7am. No changes otherwise
Loading Haul Trucks	Approved 6.00 am to 10.00 pm, Mondays to Fridays 6.00 am to 5.00 pm, Saturdays No loading of haul trucks shall be undertaken on Sundays or public holidays. Proposed 5 am start Monday to Saturday. No changes otherwise
Maintenance	Approved 7.00 am to 6.00 pm Mondays to Fridays 7.00 am to 4.00 pm Saturdays Proposed No change

Hours of Operation

Activity	Approved Hours of Operation
Construction of Haul Road and Quarry Infrastructure	Approved 7.00 am to 6.00 pm, Mondays to Fridays 7.00 am to 4.00 pm, Saturdays No construction shall be undertaken on Sundays or public holidays. Proposed No Change
Product Delivery	Approved 6.00 am to 10.00 pm, Mondays to Fridays 6.00 am to 5.00 pm, Saturdays No product delivery trucks are to enter the quarry prior to 6.00am on any day During the periods 6.00am to 7.00am and 6.00pm to 10.00pm a maximum of 4 laden delivery trucks shall leave the site per hour (total 8 truck movements per hour) Proposed 5 am start Monday to Saturday including receiving backload material from offsite. No changes otherwise

Proposed Extraction Sequence



- Existing Quarry Project Area
- Proposed Extension Area Lease Boundary
- Proposed Extension Area Extraction Boundary
- Fence
- Extraction blocks

- Each Block is approx. 2 ha
Contains ~ 1 million tonnes of hard rock resource
- Negligible topsoil/overburden

Proposed Annual Extraction:

- Aggregate and road base – 650,000 tpa
- 5mm minus/Crusher dust – 200,000 tpa
- Stockpile drawdown - 100,000 tpa

Blasting: 12 times per year

Crushing & Processing: Existing plant

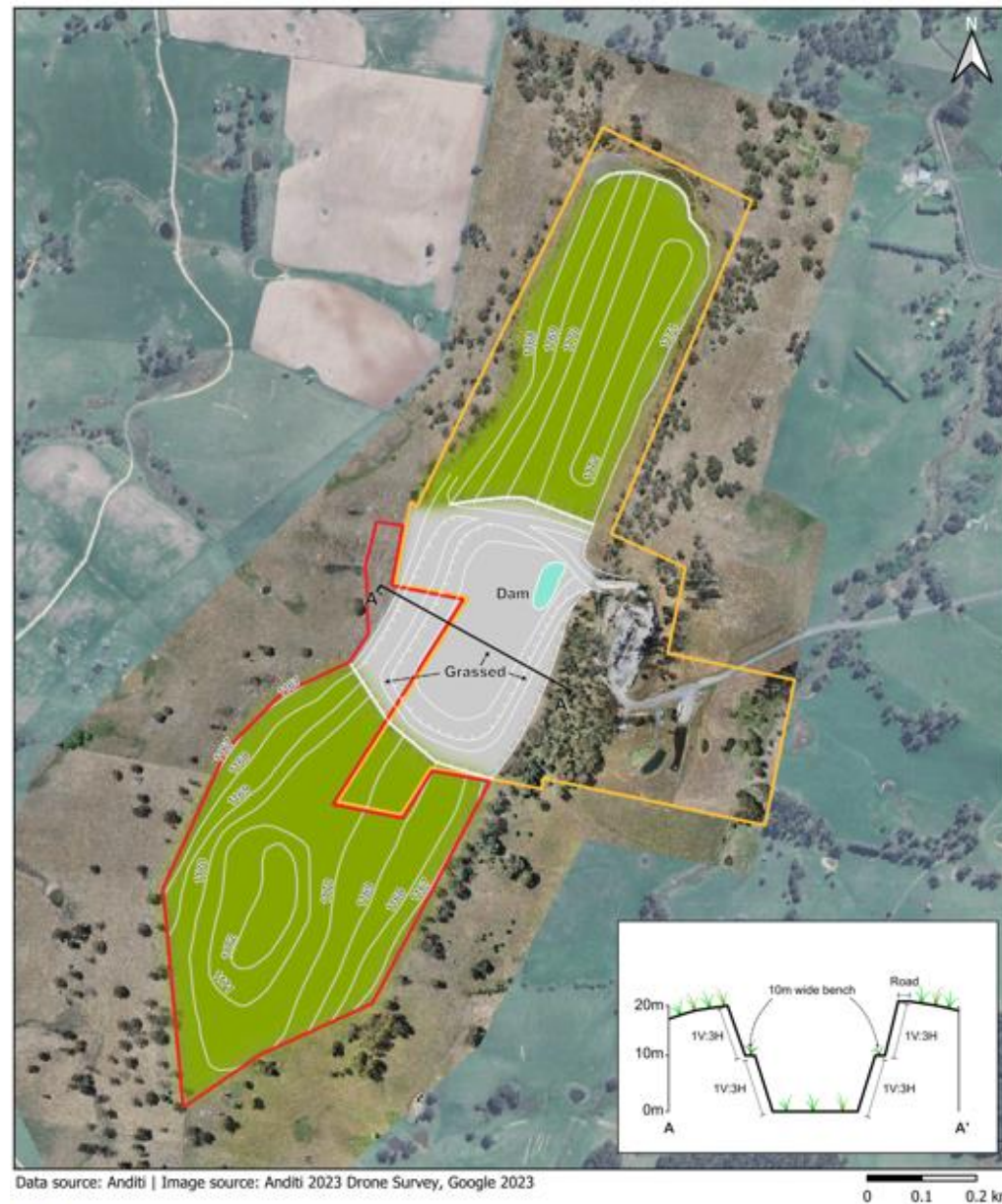
ENM & VENM Emplacement Sequence



- Existing Quarry Project Area
- Proposed Extension Area Lease Boundary
- Backfilling Sequence
- Backfilling Blocks
- Final Landform Contours (mAH)

- Backloading up to 500,000 tpa
- Potential for emplacement of up to 10 to 15 million tonnes of ENM and VENM over life of quarry

Final Landform



Data source: Anditi | Image source: Anditi 2023 Drone Survey, Google 2023

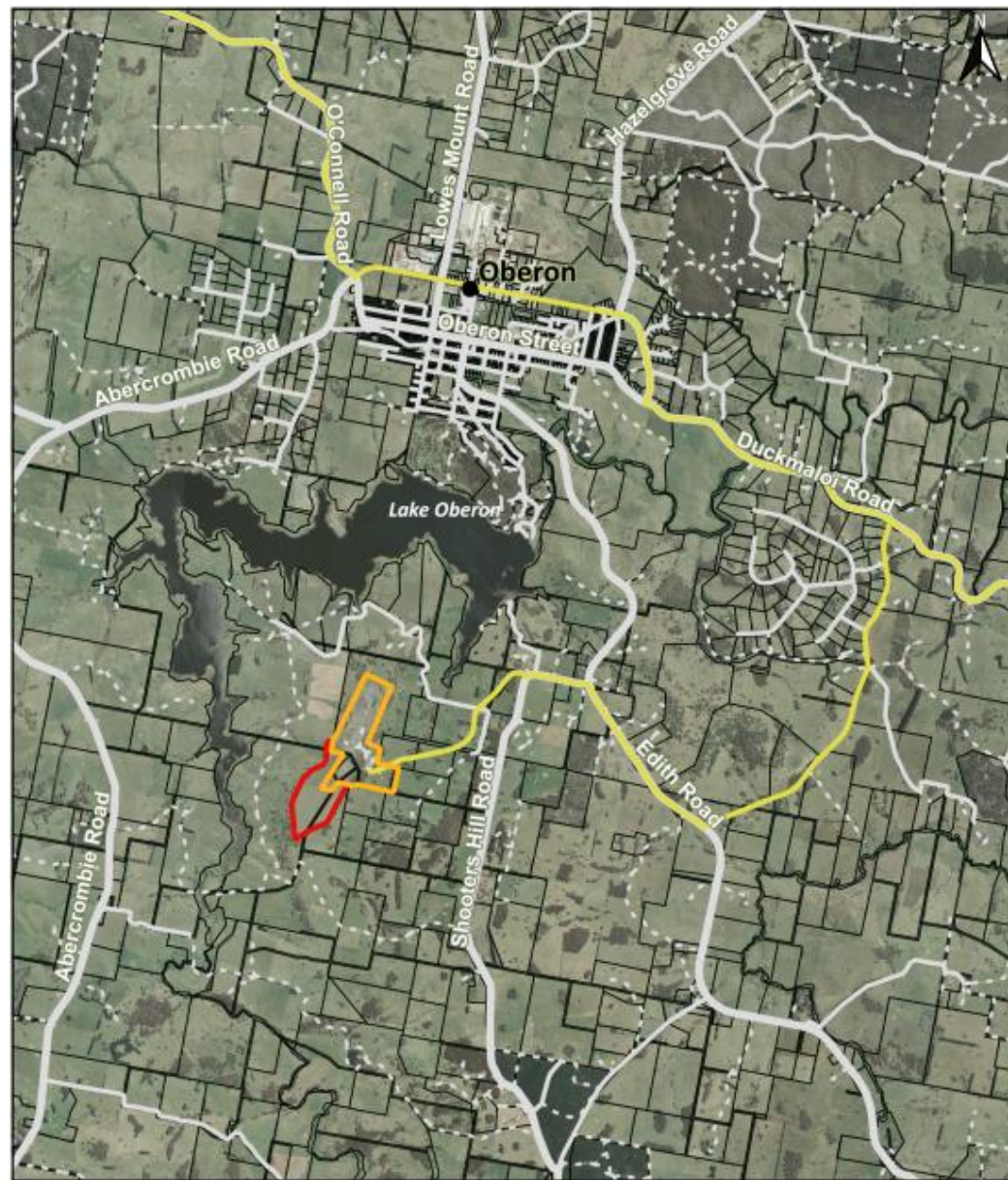
- Quarry Project Area - Existing
- Quarry Project Area - Extension
- Final Landform - Contours
- Final Landform - Lines
- Quarry floor and benches grassed
- Final Landform Breaklines

- Combination of benched and backfilled landform
- Extent of backfilling dependent on volume of ENM and VENM
- 500,000 tonnes of stockpiled topsoil and overburden
- Free draining or will drain to water management system

Traffic Impacts

- 950,000 tpa of product delivery
 - Increase in maximum daily tonnage from 3000 tpd to 6000 tpd
 - Since 1995 maximum legal payload per truck has increased from 29 t to 68 t
 - Average payload per truck will increase from 35 t to 55 t over next decade
 - Laden trips at maximum daily transport will increase from 104 trips to 172 trips for an average payload of 35 t. This will subsequently decrease to a maximum of 109 trips/day for an average payload of 55 t.
 - average of 91 trucks per day or 8 trucks/hr
 - At peak of 6000 tpd there will be 15 trucks/hr
- ENM and VENM will be backloaded on quarry trucks so will not increase overall truck movements
- CPI indexed Road Maintenance contribution paid to Oberon Council of \$0.55/tonne (2024)
- Existing intersections can accommodate increased truck numbers from quarry

Product Haulage Routes



Data source: Oberon Quarries Pty Ltd 2021 | Image source: Google 2023

0 0.5 1 1.5 2 km

- Existing Quarry Project Area
- Proposed Quarry Extension
- Haulage Routes
- Lot

Traffic Count Locations



No.	Site Location
9789_01	Harveys Road west of Shooters Hill Road
9789_02	Shooters Hill Road east of Harveys Road
9789_03	Shooters Hill Road south of Harveys Road
9789_04	Edith Road north of Shooters Hill Road
9789_05	Edith Road south of Shooters Hill Road
9789_06	Shooters Hill Road west of Edith Road



No.	Site Location
9789_07	Edith Road north of Titania Road
9789_08	Edith Road south of Titania Road
9789_09	Titania Road east of Edith Road



No.	Site Location
9789_10	Duckmaloi Road west of Titania Road
9789_11	Duckmaloi Road east of Titania Road
9789_12	Titania Road south of Duckmaloi Road



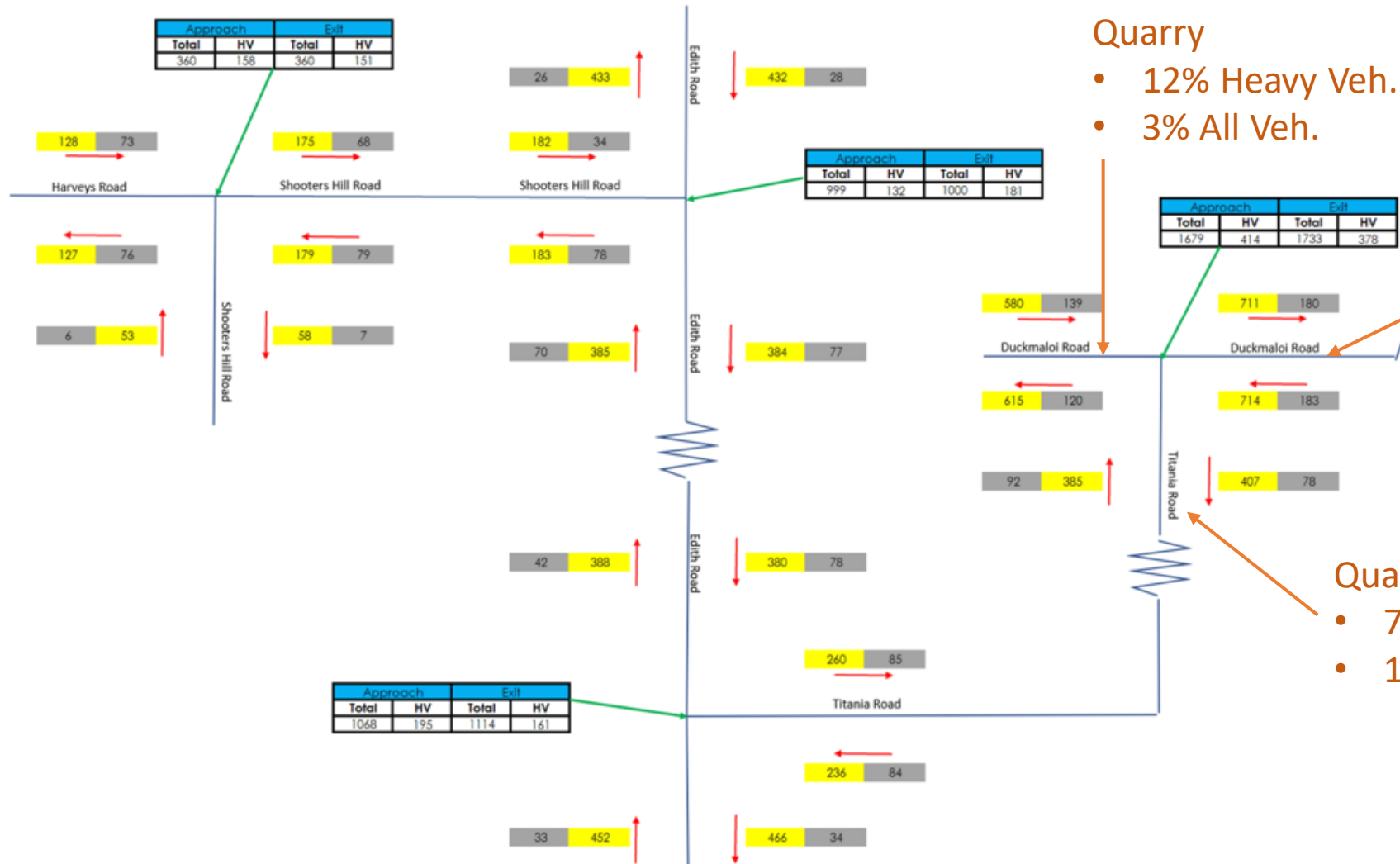
No.	Site Location
9789_13	Duckmaloi Road west of Jenolan Caves Road
9789_14	Jenolan Caves Road north of Duckmaloi Road
9789_15	Jenolan Caves Road south of Duckmaloi Road



No.	Site Location
9789_16	Jenolan Caves Road south of Great Western Highway
9789_17	Great Western Highway north-west of Jenolan Caves Road
9789_18	Great Western Highway south-east of Jenolan Caves Road

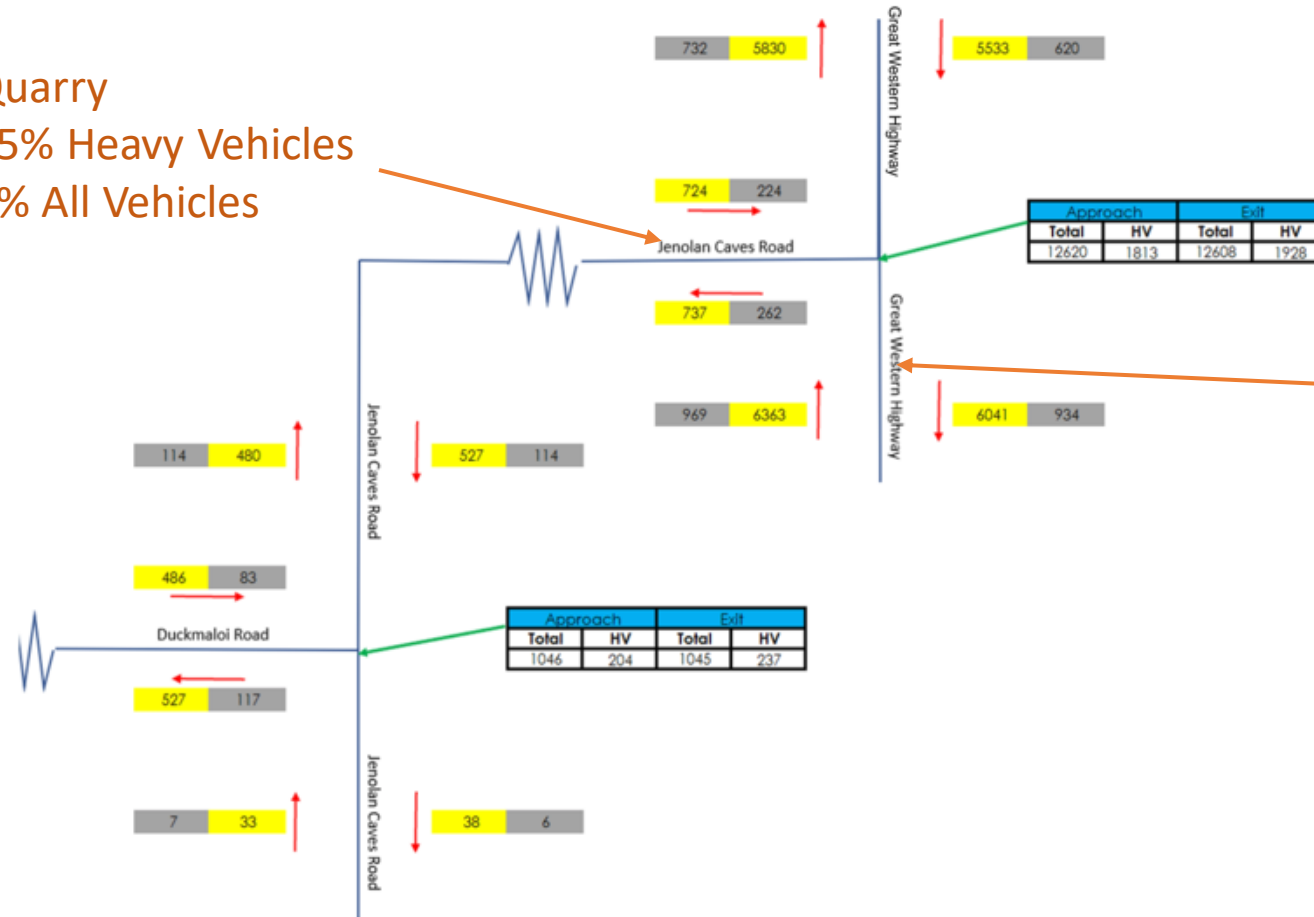


Existing Traffic Volume & Composition



Existing Traffic Volume & Composition

Quarry
25% Heavy Vehicles
8% All Vehicles



Quarry
6% Heavy Vehicles
1% All Vehicles

Air Quality Impact Assessment Findings

AQIA indicates:

- incremental concentrations from Project are small, and
- no exceedances of the annual average TSP, PM10 and PM2.5 criteria are predicted.

Green House Gas assessment:

- Direct emissions associated with the Project contribute up to 0.005% of NSW total GHG emissions in 2020, and up to 0.001% of Australia's GHG emissions in the 12 months to June 2022.

The Project can be operated in accordance with best management practice, to minimise the concentrations of air pollutants on the surrounding environment.

Max. 24-hour average PM10 - (50 $\mu\text{g}/\text{m}^3$)

Figure 10 Maximum 24-hour average PM₁₀ – Scenario 1

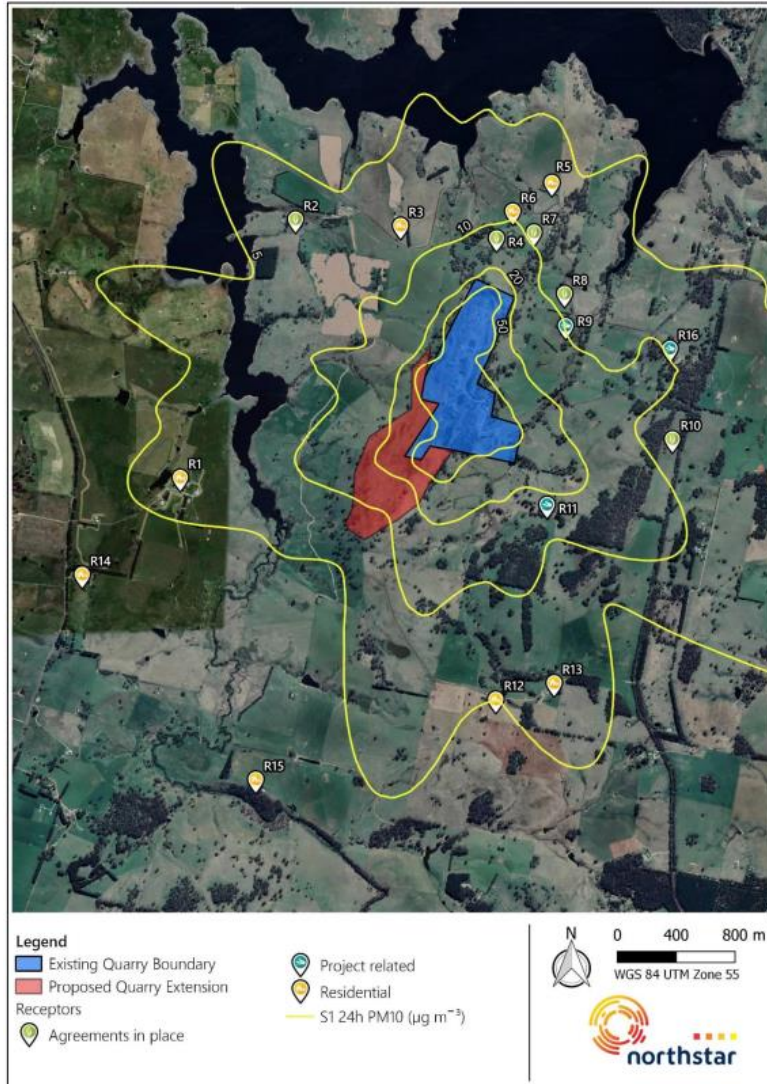
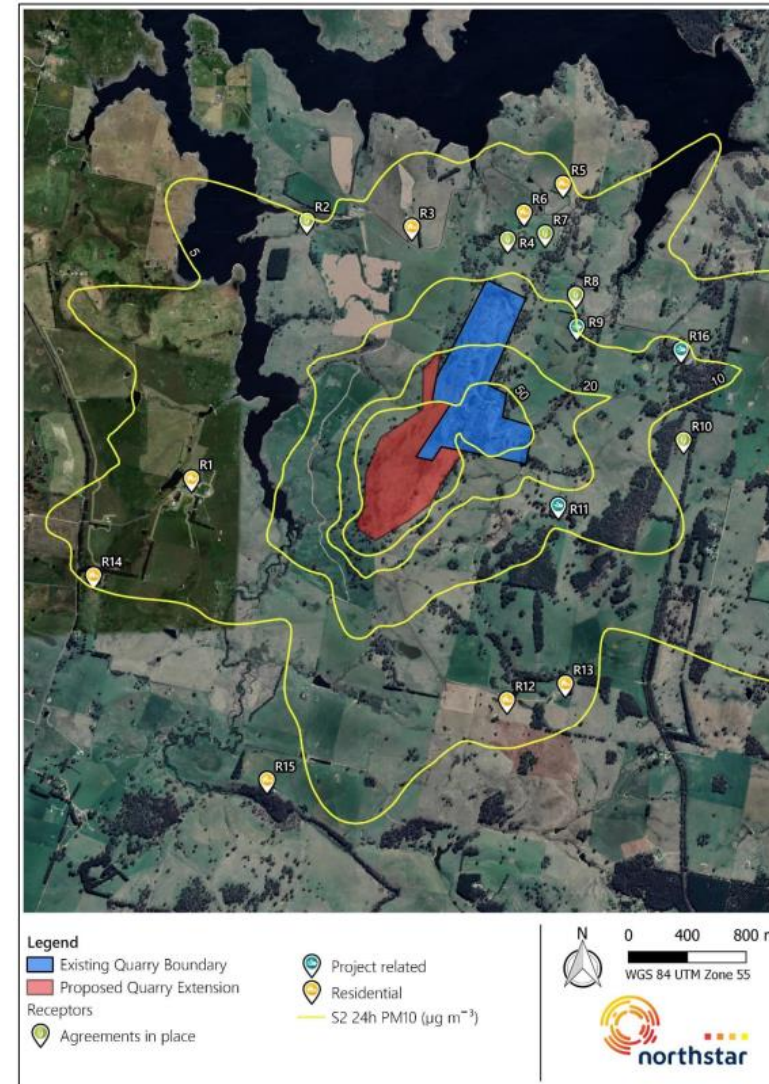


Figure 11 Maximum 24-hour average PM₁₀ – Scenario 2



Noise & Blasting assessment



Data source: Anditi | Image source: Anditi 2023 Drone Survey, Google 2023

-  Existing Quarry Project Area
-  Proposed Extension Area Lease Boundary
-  Proposed Extension Area Extraction Boundary
-  Fence
-  Extraction plots
-  Location of Operations for Modelling

- Scenario 1 – Drill and Blast in Block a with continued operations in existing extraction area
- Scenario 2 - Drill and Blast in Block h with quarry operations in Blocks e to g
- Scenario 3 - Drill and Blast in Block m with quarry operations in Blocks i to j

Noise & Vibration Findings



- Operational noise levels will achieve Noise Policy for Industry (NPI) criteria for all non-project related residences under noise enhancing meteorological conditions
- Maximum noise levels will be below EPA trigger levels for sleep disturbance at residences
- Quarry road traffic noise will meet Road Noise Policy objectives at nearest residential receivers under worst case conditions
- Air-blast overpressure and vibration will meet all criteria for blast up to 160 kg MIC

Muller Acoustic Consulting Pty Ltd (MAC)

Operational Noise Contours – Scenario 1

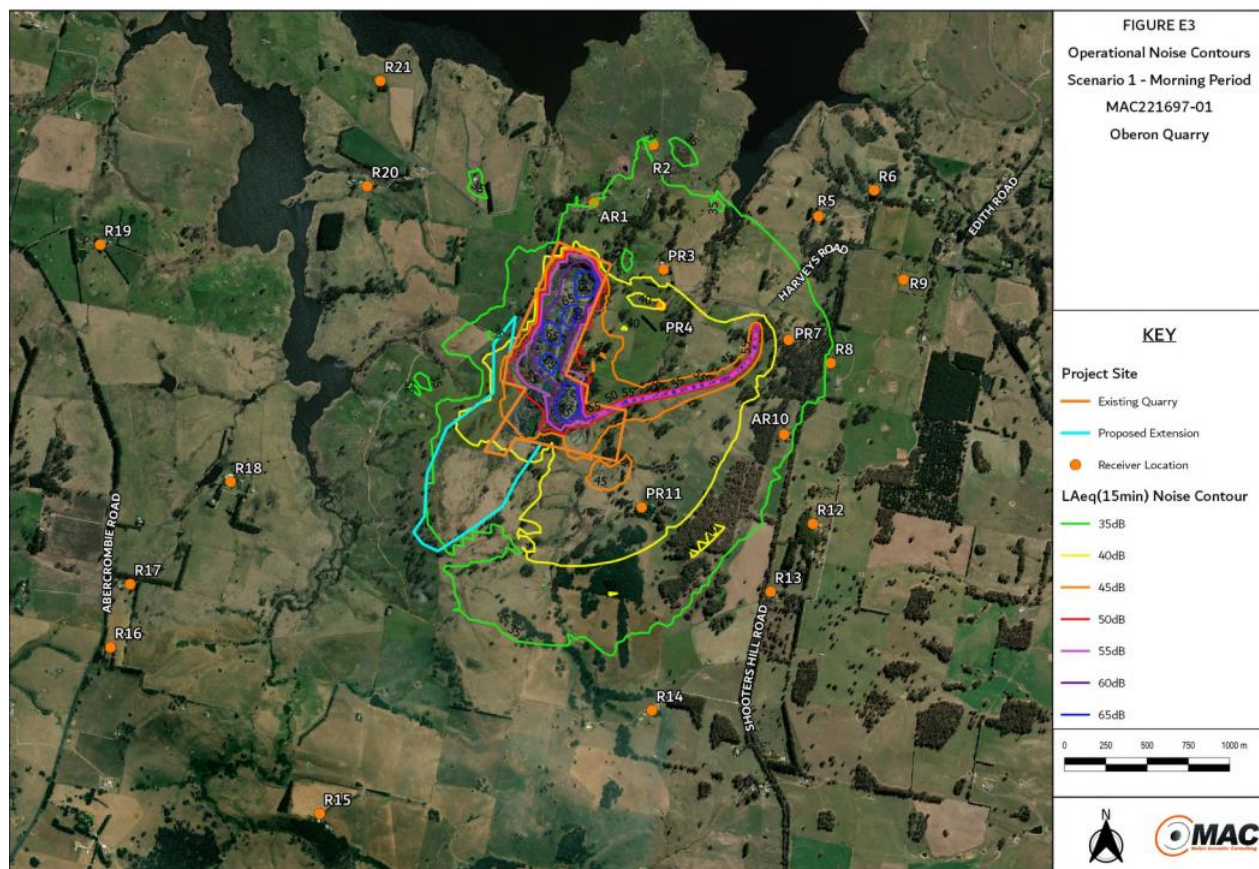
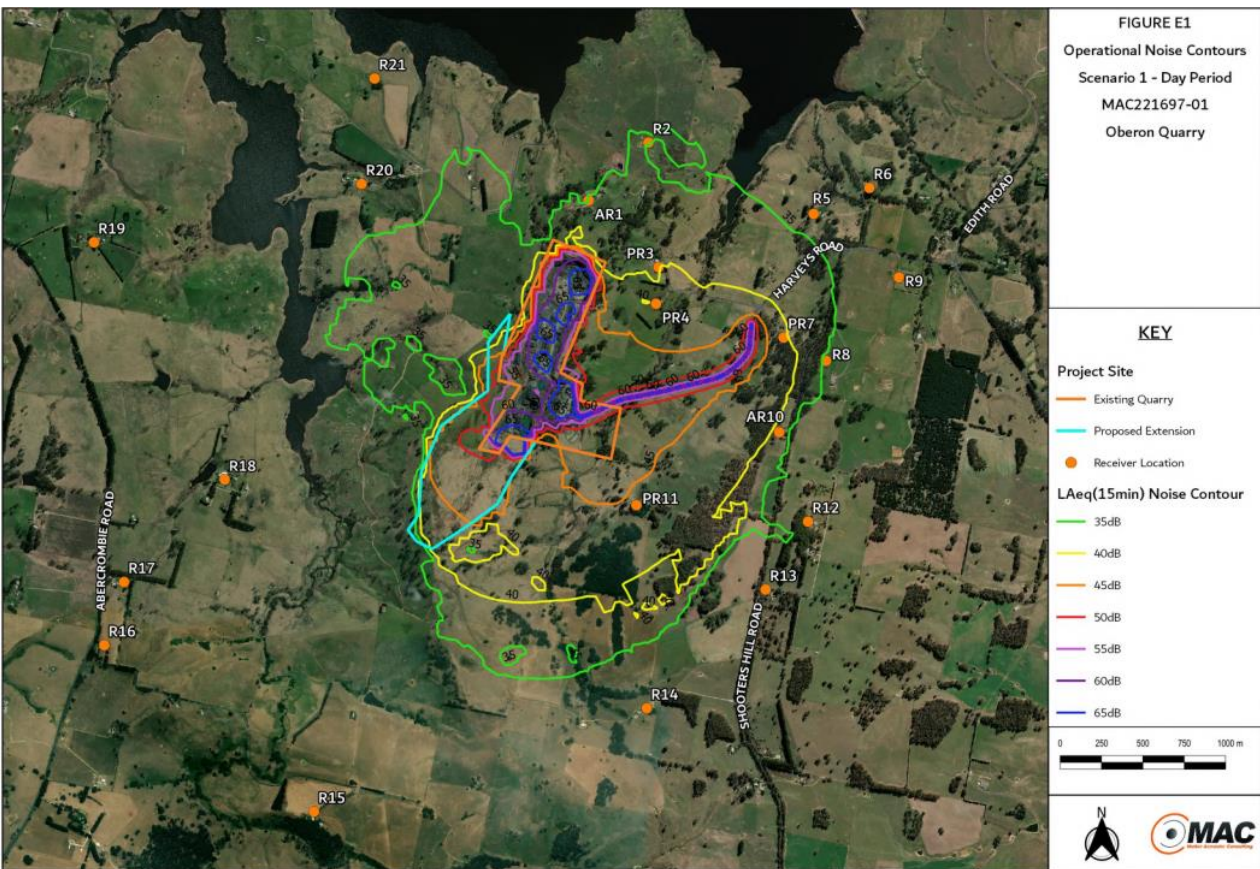


Table 10 Project Noise Trigger Levels

Receiver Type	Period	RBL	PINL dB LAeq(15min)
Residential	Morning Shoulder	30	35
	Day	35	40
	Evening	30	35

Operation Noise Contours – Scenario 2

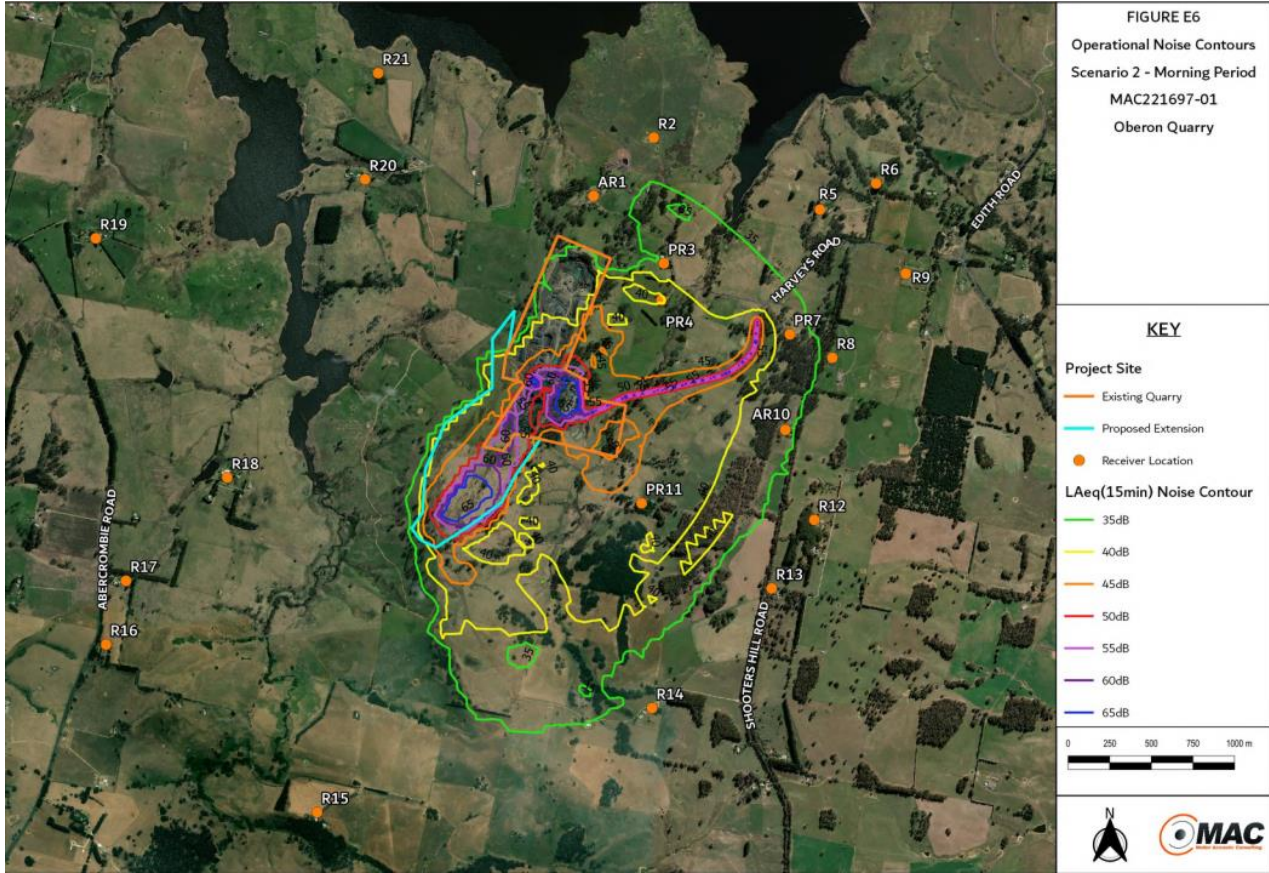
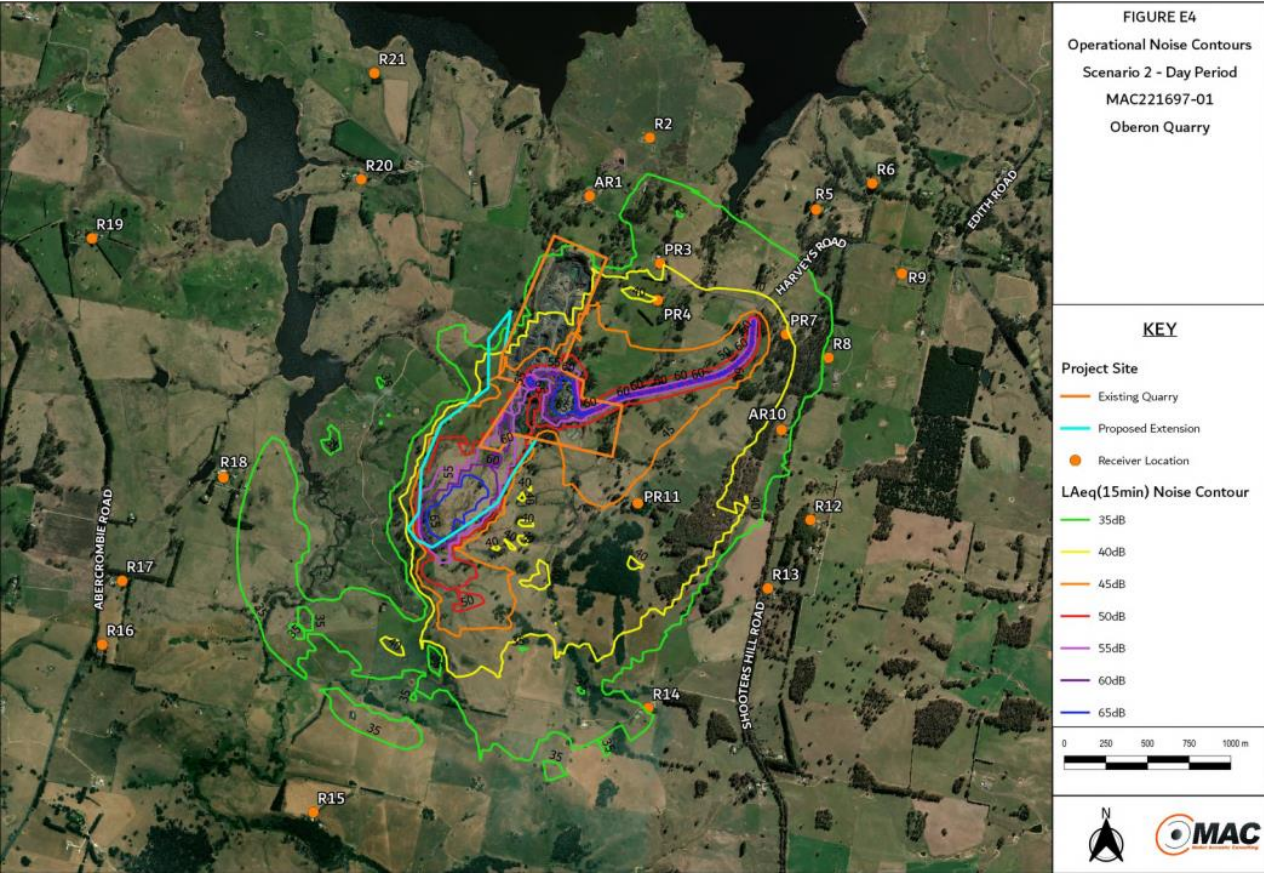


Table 10 Project Noise Trigger Levels

Receiver Type	Period	RBL	PINL dB LAeq(15min)
Residential	Morning Shoulder	30	35
	Day	35	40
	Evening	30	35

Operational Noise Contours – Scenario 3

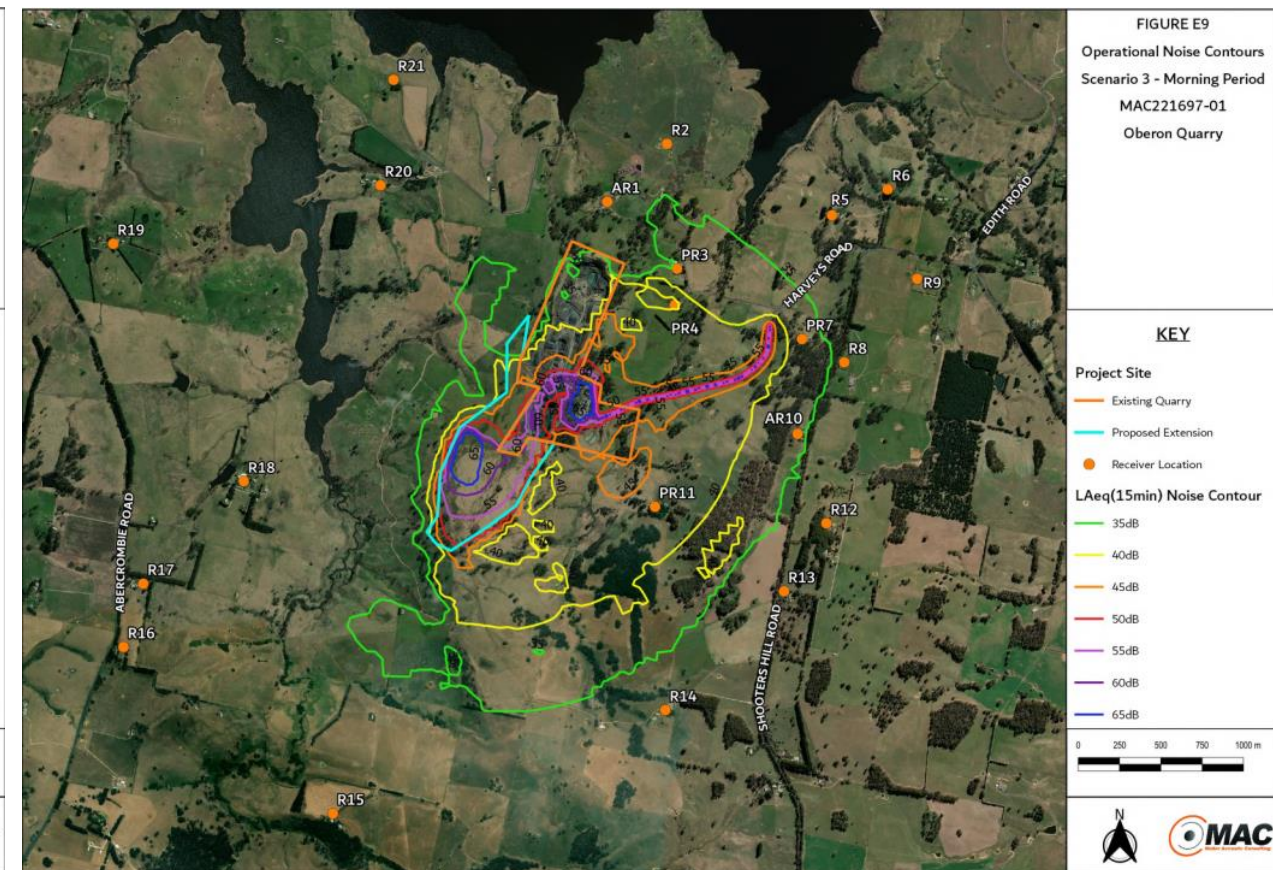
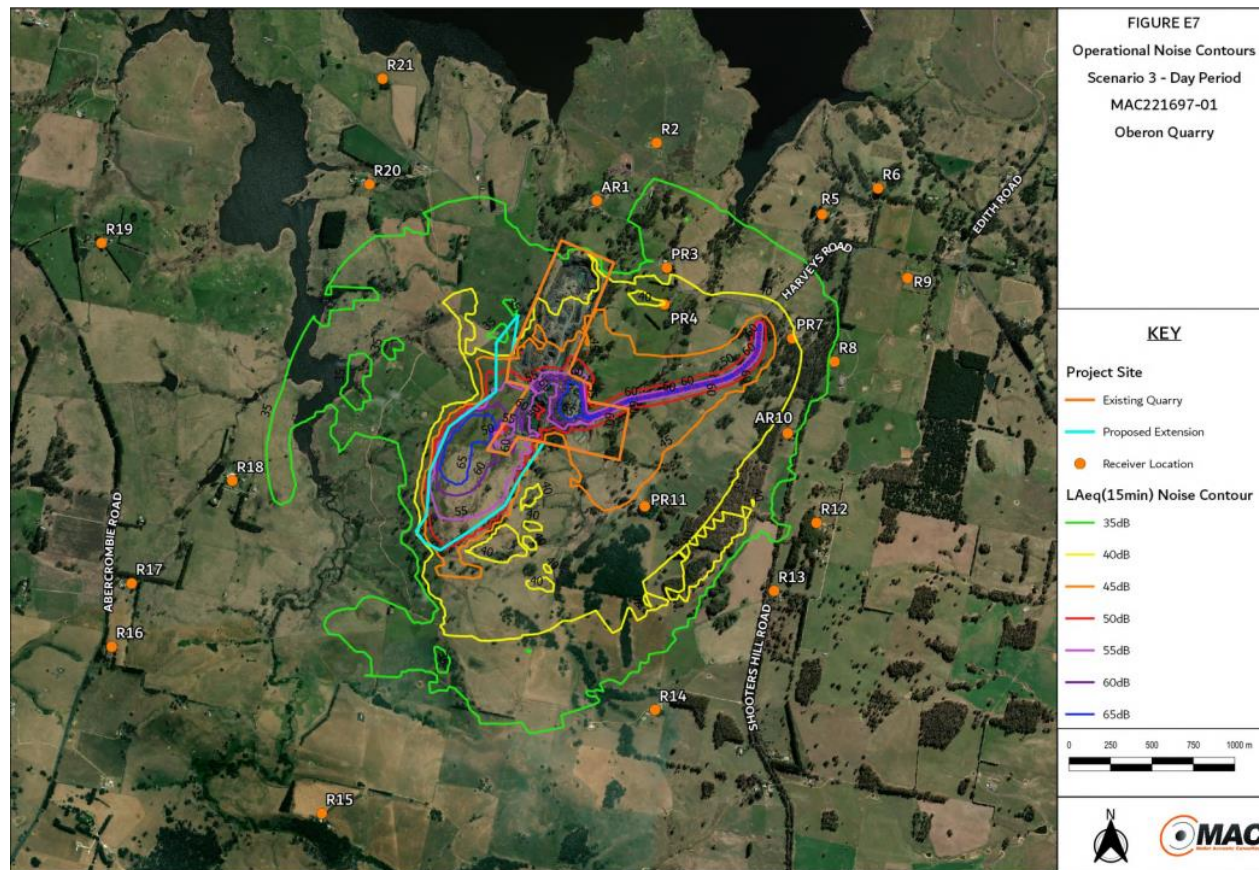
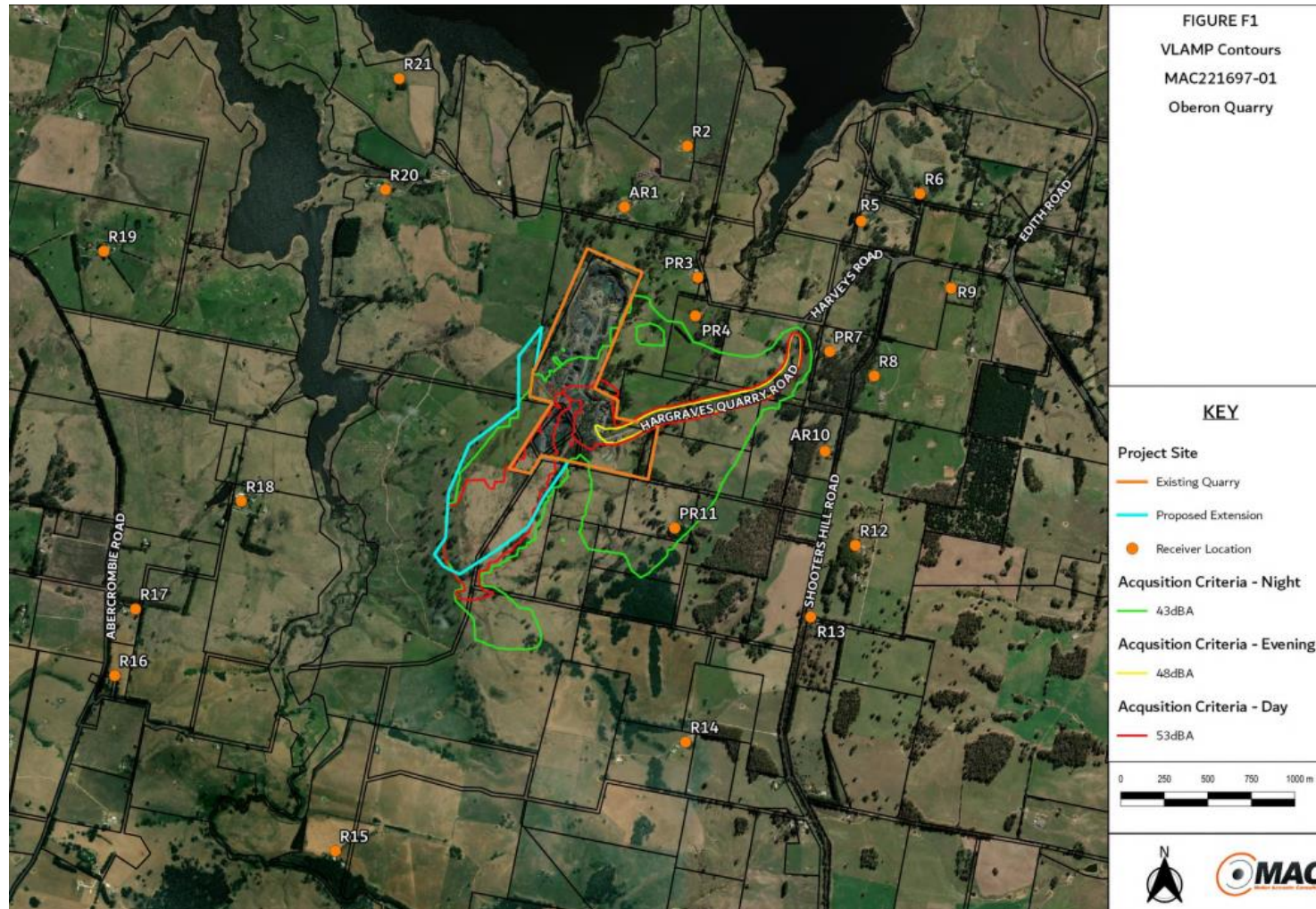


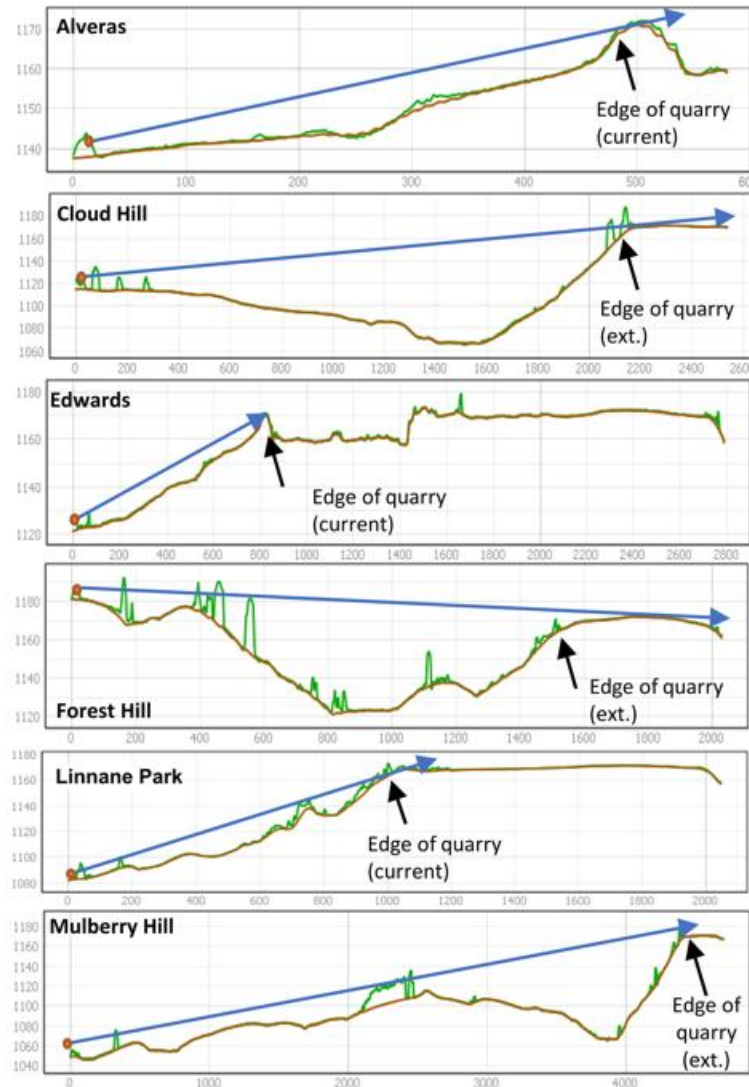
Table 10 Project Noise Trigger Levels

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	Day	35	40
	Evening	30	35

Voluntary Land Acquisition and Mitigation Policy

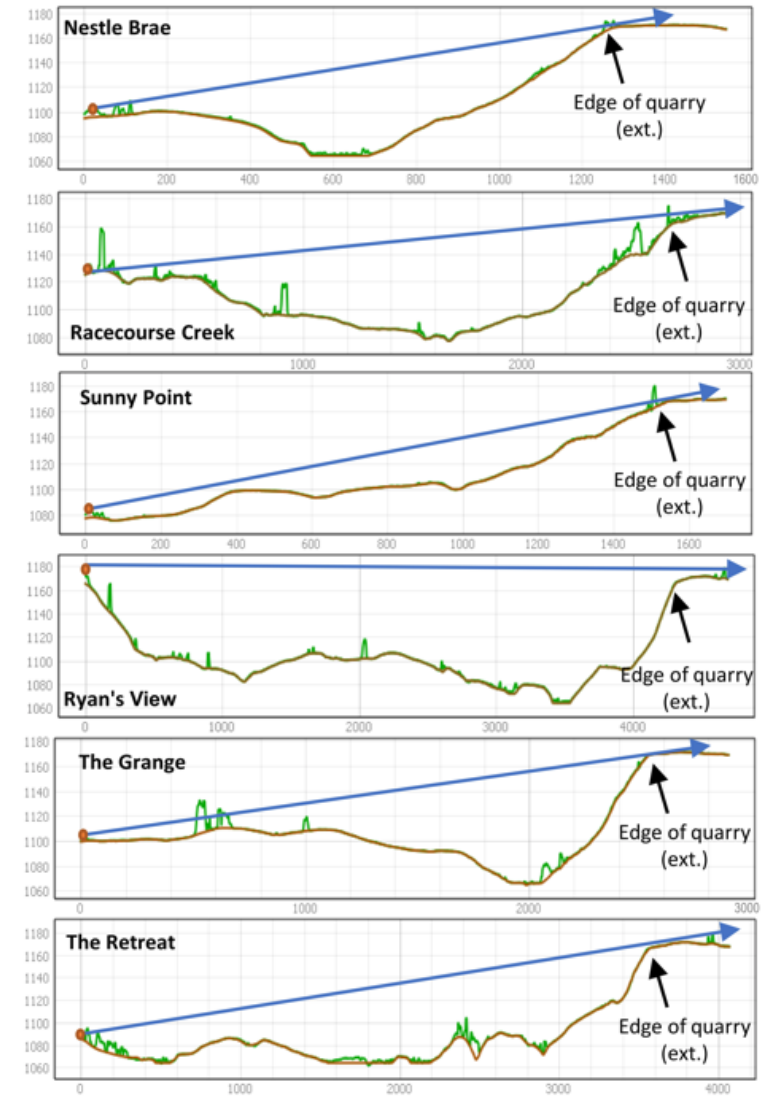


Visual Impact Assessment



Ground
Vegetation
Line of sight
Building view point

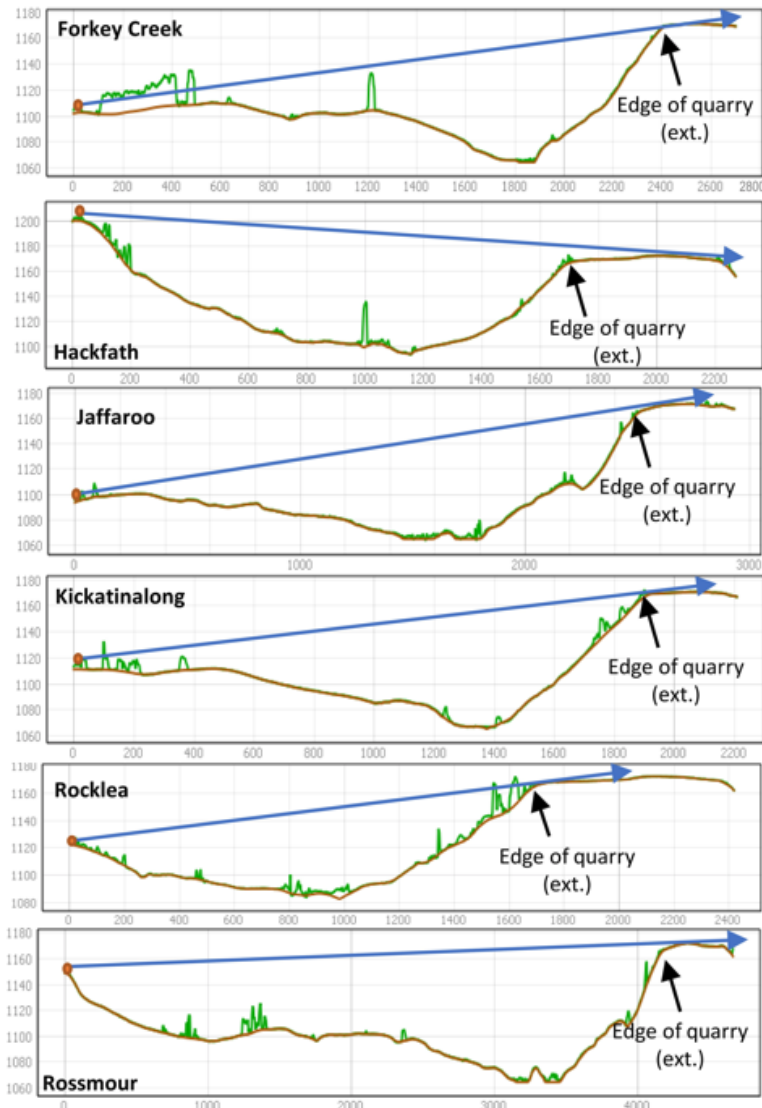
Data source: Ground: ELVIS 2013 UDAR
Notes: Y axis is elevation (m), X axis is distance (m)



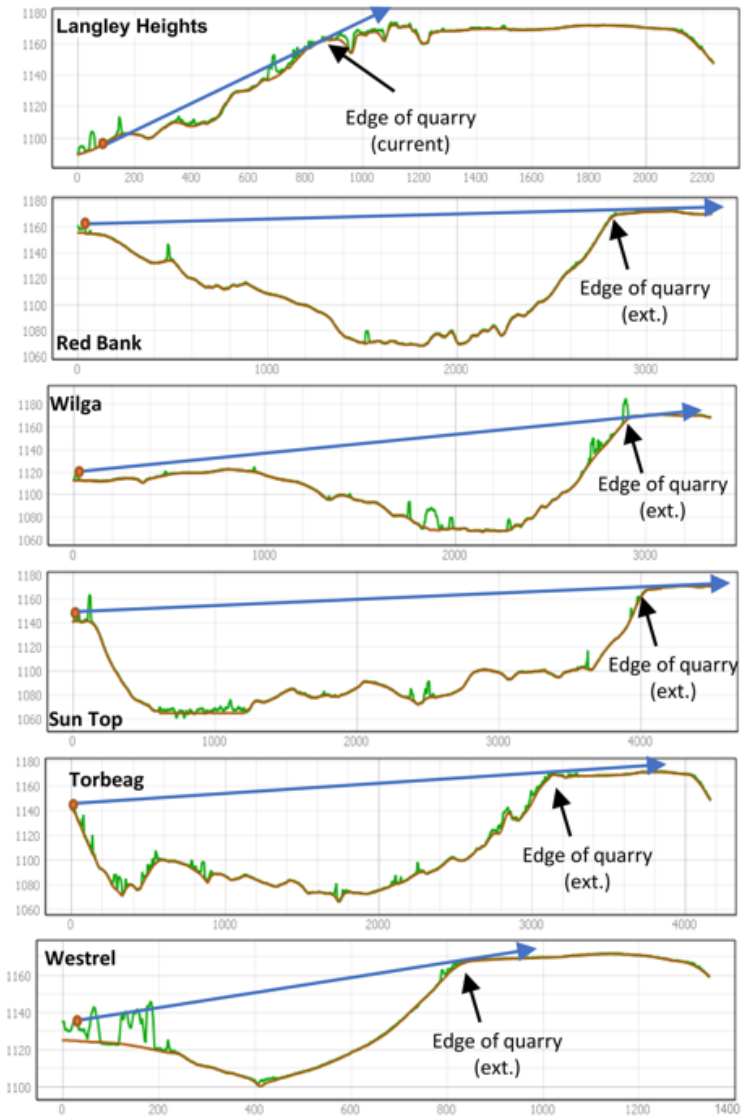
Ground
Vegetation
Line of sight
Building view point

Data source: Ground: ELVIS 2013 UDAR
Notes: Y axis is elevation (m), X axis is distance (m)

Visual Impact Assessment



Data source:
Notes: Y axis is elevation (m), X axis is distance (m)



Data source: Ground: ELVIS 2013 LIDAR
Notes: Y axis is elevation (m), X axis is distance (m)

Alternatives

- Do nothing - leave an untapped hard rock resource that can be readily accessed from existing infrastructure efficiently with low impact on the surrounding environment, land uses and residences
- Move extraction and processing operations to a greenfield site
- Do not increase annual production from 400,000 tpa to 950,000 tpa
- Add additional fixed crushing and processing equipment in extraction area
- Construct an alternate haul route to access proposed extension area
- Do not backfill with ENM and VENM
- Do not explore production of potential CDR products
- Supply quarry electricity needs using renewable energy – Solar and Wind

Justification for Project



- Site and infrastructure are well established and highly suitable for proposed extension
- 30 years of demonstrated ability to operate the quarry in a way that has low impact on surrounding residents and negligible impact on surrounding environment
- Low demand on social infrastructure.
- Quarry makes significant contribution to the maintenance and upkeep of roads in surrounding area. Only business in Oberon LGA that financially contributes to use of the roads. At full production of 950,000 tpa with backloading this will equate to >\$700k/year.
- Access to approx. 15.7 million tonnes of high-quality hard rock resource that is highly sought after.

Justification for Project



- Products have high utility and enable rapid development – Western Sydney Airport
- Potential use of 5 mm minus as CDR product
- Continued employment for 35 staff and contractors with potential increase to 45 staff and contractors
- Continued utilisation of established infrastructure that can be used for many years to come
- Utilisation of void created by quarrying for emplacement of ENM and VENM in an energy efficient manner by backloading to the quarry
- Consistent with Planning Objectives and Policies
- Consistent with Ecologically Sustainable Development principles