

## **STONE RIDGE QUARRY**

Amendment Report

**FINAL**

March 2024

# STONE RIDGE QUARRY

Amendment Report

## FINAL

Prepared by

Umwelt (Australia) Pty Limited

on behalf of

Australian Resource Development Group Pty  
Limited

Project Director: David Holmes

Project Manager: Penelope Williams

Report No. 4158C/R16

Date: March 2024



QMS Certification Services

This report was prepared using  
Umwelt's ISO 9001 certified  
Quality Management System.

### **Acknowledgement of Country**

*Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.*

### **Disclaimer**

This document has been prepared for the sole use of the authorised recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that for which it was supplied by Umwelt (Australia) Pty Ltd (Umwelt). No other party should rely on this document without the prior written consent of Umwelt.

Umwelt undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. Umwelt assumes no liability to a third party for any inaccuracies in or omissions to that information. Where this document indicates that information has been provided by third parties, Umwelt has made no independent verification of this information except as expressly stated.

**©Umwelt (Australia) Pty Ltd**

### **Document Status**

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
Final	David Holmes	27/03/2024	David Holmes	27/03/2024

# Executive Summary

Australian Resource Development Group Pty Limited (ARDG) is seeking to develop a new hard rock quarry, known as Stone Ridge Quarry (the Project), located within Wallaroo State Forest at Balickera NSW, approximately 30 km north of Newcastle. The Project is located within the Port Stephens Council Local Government Area.

The Project is seeking to access a high quality, hard rock resource suitable for producing a wide range of quarry products for the Lower Hunter, Central Coast and northern Sydney construction materials markets. The Project would produce up to 1.5 million tonnes per annum (Mtpa) of saleable quarry product with approval sought for an initial 30-year quarrying period.

The Project is a State Significant Development (SSD-10432) under the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP) as it is development that extracts more than 500,000 tpa of extractive material and also extracts from a resource of more than 5 million tonnes. An Environmental Impact Statement (EIS) (Umwelt, 2022) was prepared for the Project to support the development application and the development application and EIS were publicly exhibited between 22 June 2023 and 1 August 2023 by the former NSW Department of Planning and Environment (DPE) (now the Department of Planning, Housing and Infrastructure (DPHI)).

## Amended Project

Since exhibition of the EIS, the design of the Project has been reviewed to identify opportunities to improve operational efficiencies and further reduce environmental and social impacts. These Project revisions have also had regard to issues raised in submissions made during the EIS exhibition period and subsequent engagement with Government agencies, Port Stephens Council and other stakeholders.

The conceptual quarry layout has been revised to remove the previously proposed North Pit, associated sediment basin 2 and North Pit access road. The staging and extraction area of the Main Pit has also been revised to enable the relocation of processing and loading facilities into the pit in the later stages of the Project which will further reduce potential impacts. The changes will not result in any reduction to proposed extraction rates (and associated heavy vehicle movements) or life of operations.

The revisions to the conceptual quarry layout would result in a reduction in the overall Project disturbance footprint from 79.02 ha to 68.09 ha, a reduction of 10.93 ha (14 %) and increase the setback of the extraction area from Italia Road. The amended layout also increases the separation distance between the Project and residents.

Since exhibition of the EIS, Boral Resources (NSW) Pty Ltd submitted a development application (DA 16-2023 – 477-1) to Port Stephens Council on behalf of both Eagleton Rock Syndicate (Eagleton Quarry SSD-7332) and ARDG for the upgrades to the Italia Road and Pacific Highway Intersection (Intersection DA) described in the EIS. The Intersection DA and supporting assessment documentation was placed on public exhibition during February 2024 and is currently being assessed by PSC.

## Updated Assessment of Impacts

In response to issues raised in submissions and to support the proposed amendment to the conceptual quarry layout, the following assessments have been clarified, updated and/or supplemented:

- Biodiversity Development Assessment Report (**Appendix I**)
- Revised Traffic Impact Assessment Report (Appendix 3 of the Submissions Report)
- Traffic Impact Assessment Addendum (Appendix 4 of the Submissions Report)
- Revised Aboriginal Cultural Heritage Assessment Report (Appendix 5 of the Submissions Report)
- Surface Water Impact Assessment Report (**Appendix G**)
- Groundwater Impact Assessment Report (**Appendix H**)
- Noise Impact Assessment Addendum Report (**Appendix D**)
- Air Quality Impact Assessment Addendum Report (**Appendix F**)
- Blasting Impact Assessment Addendum Report (**Appendix E**)

The Statement of Environmental Effects lodged with the Intersection DA includes updated assessments of traffic flow through the Italia Road/Pacific Highway intersection which includes consideration of cumulative impacts associated with the currently approved Boral Seaham Quarry and truck movements associated with the Brandy Hill Quarry as well as increased heavy vehicle traffic associated with the Project, proposed Eagleton Quarry (SSD-7332) and proposed Boral Seaham Quarry expansion (SSD-59254474).

The reduced disturbance areas avoids direct impacts to one threatened species and an endangered ecological community previously impacted by the original Project design and increases habitat movement corridors. The reduced disturbance area reduces the scale of habitat loss for other fauna species. As detailed in the EIS, a range of additional management measures will be implemented to mitigate potential impacts on fauna such as tree felling procedures and speed limits on vehicle movements. Further assessment of the Project's potential impacts to bats present within Balickera Tunnel indicate that vibration from blasting and other Project impacts are unlikely to have a significant impact on species present within the Tunnel. All residual biodiversity offsets will be fully offset in accordance with NSW *Biodiversity Conservation Act 2016* requirements which are based on a no-net-loss principal.

The increased separation distance between the Project and residents further reduces the Project's potential noise, dust and blast related impacts at the nearest residents. The Assessment of the Amended Project demonstrates that potential amenity and public safety impacts can all be effectively managed to ensure that relevant assessment criteria can be met. These studies all include consideration of cumulative impacts.

The Project is not predicted to have a significant impact on traffic flow with the intersection for the Project access road onto Italia Road being designed to minimise or avoid traffic flow impacts along Italia Road. The proposed upgrade of the Italia Road/Pacific Highway intersection will also improve performance of this intersection (even allowing for the increased heavy vehicle movements) and improve intersection safety.

ARDG remains committed to the implementation of impact mitigation and management measures via the Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) and will continue to engage with the local community and Port Stephens Council through the construction period and operational life of the Project regarding impact mitigation and management.

## Conclusion

The proposed Project Area represents a rare opportunity within the LHCC region to develop a large tonnage, quarry operation on geology that has been demonstrated to be ideally suited to the production of the full range of high-quality quarry products (including concrete, asphalt and sealing aggregates, gabion and crushed rock and armourstone). The proximity of the Project Area to key markets and existing State Road infrastructure (i.e., the Pacific Highway) would enable the Project to significantly ameliorate the existing and forecast medium to long term supply-side pressures of quarry materials for the LHCC region, as well as provide direct access to the Sydney market if required. The need to address these supply issues in the region is further supported by the findings of the Infrastructure Market Capacity 2023 Report (Infrastructure Australia, 2023), specifically 'Recommendation 3'.

With the possible exception of potential impacts on biodiversity values, the Project will have relatively minor environmental and social impacts. While the Project will necessitate the removal of vegetation and habitat for threatened species, the disturbance area has been further reduced through the Amended Project design refinements which reduce the area of vegetation disturbance from approximately 79 hectares to approximately 68 hectares and avoid impacts to one threatened plant species and one threatened ecological community and reduce habitat loss for a wide range of species. The increased setback from the Balickera Tunnel and Nine Mile Creek also mitigate potential impacts to bats present in the tunnel through both reduced vibration impacts and reduced habitat loss.

Biodiversity impacts will be fully offset in accordance with the NSW biodiversity offsetting requirements which are based on a no-net-loss principle and impacts on koala habitat will be subject to a like-for-like offsetting requirements. Accordingly, the localised impacts on vegetation and fauna should be fully mitigated through offsetting requirements. It is noted that there are few opportunities for obtaining the quarry material necessary to meet the demand for quarry products which would not also require disturbance of similar or even larger areas of vegetation and potential threatened species habitat. Accordingly, the Project's impacts on biodiversity are largely unavoidable regardless of where the source of material is obtained.

In economic terms, the Project is predicted to have net benefits to the State of NSW of approximately \$290 million in NPV terms at a 7% discount rate. The Project is predicted to have significant economic benefits to NSW under different discount rates tested and sensitivities to different price and costs assumptions. The Project is estimated to provide the following annual direct and indirect annual effects to the local economy:

- \$102 M in output.
- \$58 M in value-added.
- \$14 M in gross wages.
- 176 jobs.

The Project therefore provides a large, economically viable hard rock resource to meet existing and projected demand for quarry products with limited or fully mitigated environmental impacts. Having regard to the costs associated with impact mitigation and potential externalities, the Project is predicted to have significant social and economic benefits to the State of NSW and local region.

# Table of Contents

<b>Executive Summary</b>	<b>i</b>
<b>1.0 Introduction</b>	<b>1</b>
1.1 Background	1
1.2 Applicant Details	3
1.3 The Project	3
1.4 Proposed Amendment	6
<b>2.0 Strategic Context</b>	<b>7</b>
<b>3.0 Description of the Amendments</b>	<b>8</b>
3.1 Project Area	12
3.2 Conceptual Quarry Layout	12
3.3 Disturbance Area	12
<b>4.0 Statutory Context</b>	<b>13</b>
<b>5.0 Stakeholder Engagement</b>	<b>14</b>
5.1 Agency Consultation	14
5.1.1 Transport for NSW	14
5.1.2 Biodiversity Conservation and Science	14
5.1.3 Hunter Water Corporation	14
5.1.4 Environment Protection Authority	14
5.1.5 Port Stephens Council	15
5.2 Community Consultation	15
<b>6.0 Assessment of Impacts</b>	<b>16</b>
6.1 Assessment Overview	16
6.2 Noise	18
6.3 Blasting	19
6.3.1 Impact Assessment	19
6.3.2 Mitigation and Management Measures	21
6.4 Air Quality and Greenhouse Gas	21
6.4.1 Methodology	21
6.4.2 Air Quality Impact Assessment	21
6.4.3 Greenhouse Gas Assessment	24
6.4.4 Mitigation and Management Measures	24
6.5 Surface Water	24

6.5.1	Water Management System	25
6.5.2	Water Balance	27
6.5.3	Impact Assessment	28
6.5.4	Mitigation and Management Measures	29
6.6	Groundwater	29
6.6.1	Regional Hydrogeology	30
6.6.2	Impact Assessment	32
6.6.3	Mitigation and Management Measures	35
6.7	Biodiversity	35
6.7.1	Amended Impact Assessment	35
6.7.2	Impact Avoidance and Mitigation	39
6.7.3	Biodiversity Offsets	39
6.8	Rehabilitation and Final Landform	40
<b>7.0</b>	<b>Justification of the Amended Project</b>	<b>42</b>
7.1	Ecologically Sustainable Development	42
7.1.1	The Precautionary Principle	42
7.1.2	Intergenerational Equity	43
7.1.3	Conservation of Biological Diversity and Ecological Integrity	44
7.1.4	Improved Valuation and Pricing of Environmental Resources	44
7.1.5	ESD summary	45
7.2	Project Justification	45
<b>8.0</b>	<b>References</b>	<b>47</b>

## Figures

Figure 1.1	Project Locality	2
Figure 1.2	Original Conceptual Project Layout	5
Figure 3.1	Amended Conceptual Quarry Layout	10
Figure 3.2	Original v Amended Quarry Layout	11
Figure 6.1	Groundwater Monitoring Network and Registered Bores	31
Figure 6.2	Plant Community Types and Vegetation Zones	36
Figure 6.3	Threatened Ecological Communities	37
Figure 6.4	Proposed Conceptual Final Landform	41

# Tables

Table 1.1	Applicant Details	3
Table 3.1	Overview of Key Project Components	8
Table 6.1	Assessment of Potential Impacts	16
Table 6.2	Conceptual Water Management System Components	25
Table 6.3	Vegetation Zones and Plant Community Types	35
Table 6.4	Threatened Ecological Communities	38
Table 6.5	Biodiversity Offset Credits	39

# Appendices

Appendix A	Amended Project Description
Appendix B	Amended Statutory Compliance Tables
Appendix C	Amended Mitigation Measures
Appendix D	Addendum to Noise Impact Assessment
Appendix E	Addendum to Blasting Impact Assessment
Appendix F	Addendum to Air Quality and Greenhouse Gas Assessment
Appendix G	Revised Surface Water Impact Assessment
Appendix H	Groundwater Impact Assessment, Version 2
Appendix I	Updated Biodiversity Development Assessment Report

# 1.0 Introduction

## 1.1 Background

Australian Resource Development Group Pty Limited (ARDG) is seeking to develop a new hard rock quarry, known as Stone Ridge Quarry (the Project), located within Wallaroo State Forest at Balickera NSW, approximately 30 km north of Newcastle (refer to **Figure 1.1**).

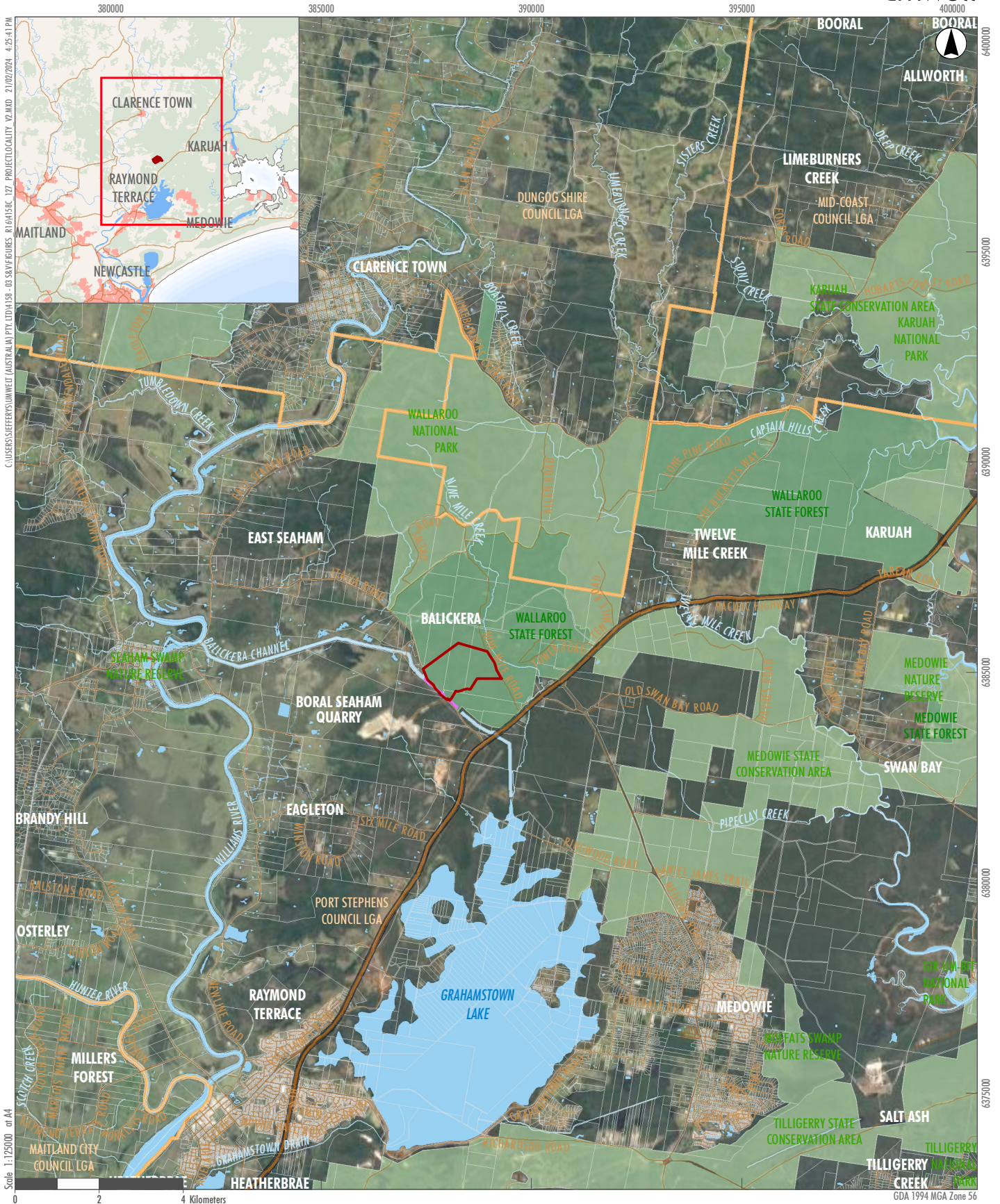
The Project is seeking to access a high quality, hard rock resource suitable for producing a wide range of quarry products for the Lower Hunter, Central Coast and northern Sydney construction materials markets. The Project would produce up to 1.5 million tonnes per annum (Mtpa) of saleable quarry product with approval sought for an initial 30-year quarrying period.

The Project is a State Significant Development (SSD-10432) under the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP) as it is development that extracts more than 500,000 tpa of extractive material and also extracts from a resource of more than 5 million tonnes. A development application (DA) for the Project is required to be submitted under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). An Environmental Impact Statement (EIS) (Umwelt, 2022) was prepared for the Project to support the development application and was application and EIS were publicly exhibited between 22 June 2023 and 1 August 2023 by the former NSW Department of Planning and Environment (DPE) (now the Department of Planning, Housing and Infrastructure (DPHI)).

During the public exhibition period, 163 submissions were received from members of the public, community organisations and government agencies (excluding duplicates). On 3 August 2023, the former DPE requested that ARDG prepare and submit a Submissions Report which responds to the issues raised in the submissions (including from local Councils) and agency advice, as required under section 59(2) of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation).

During the preparation of the Submissions Report, ARDG refined the conceptual layout of the quarry to further minimise potential impacts of the Project. The conceptual quarry layout has been refined to remove the North Pit and lowering the floor of the processing and stockpile area attached to Main Pit. Overall production rates and tonnages will be maintained. The proposed Amendment would result in a reduction in the overall Project disturbance footprint from approximately 79 ha to 68 ha, a reduction of 11 ha (14%), while optimising extraction of available resources from within this reduced footprint. These changes also address a number of issues raised in submission from Biodiversity Conservation and Science (BCS), Port Stephens Council and the community regarding the size of the quarry and associated disturbance of vegetation.

This Amendment Report has been prepared concurrently with the Submissions Report having regard to the *State Significant Development Guidelines – Preparing an Amendment Report (Appendix D of the State Significant Development Guidelines)* (DPE, 2022). The amendment does not influence the strategic or statutory context relevant to the Project which continues to be consistent with that outlined in the EIS. This report provides a revised Project description, overview of the engagement undertaken in relation to the Project change, an assessment of the associated impacts and updated Project justification.



- Legend**
- Project Area
  - LGA Boundary
  - National Park / SCA / Nature Reserve
  - State Forest
  - Pacific Highway
  - Road
  - Balickera Tunnel
  - Drainage Line
  - Waterbody
  - Lot Boundaries

**FIGURE 1.1**  
**Project Locality**

## 1.2 Applicant Details

The applicant for the Amended Project is Australian Resource Development Group Pty Limited (ARDG). ARDG is a Newcastle-based business with specialist expertise in identifying and developing quarry resources to supply the construction materials requirements of renewable energy projects and major construction materials markets. Its principals have over 50 years combined professional experience in the resource and planning sectors, with extensive experience in the extractive industries sector.

Since 2016, ARDG has undertaken extensive desktop and field investigations in relation to a new hard rock quarry to service the Lower Hunter and surrounding regions. It has also obtained approval for 12 quarry operations that have supplied construction materials to major NSW renewable energy projects, including the Sapphire Wind Farm Project, Crudine Ridge Wind Farm Project and Rye Park Wind Farm Project.

**Table 1.1 Applicant Details**

Requirement	Details
Full Name/s	Australian Resource Development Group Pty Limited
Postal Address	69 Ross St Belmont NSW 2280
Street Address (Project Location)	Corner of Italia Road and Hamburger Trail, Balickera NSW 2324
ABN	77 611 489 804
Contact Person	Justin Meleo
Contact Details	<a href="mailto:justin@ardg.com.au">justin@ardg.com.au</a> / 0427 180 923

## 1.3 The Project

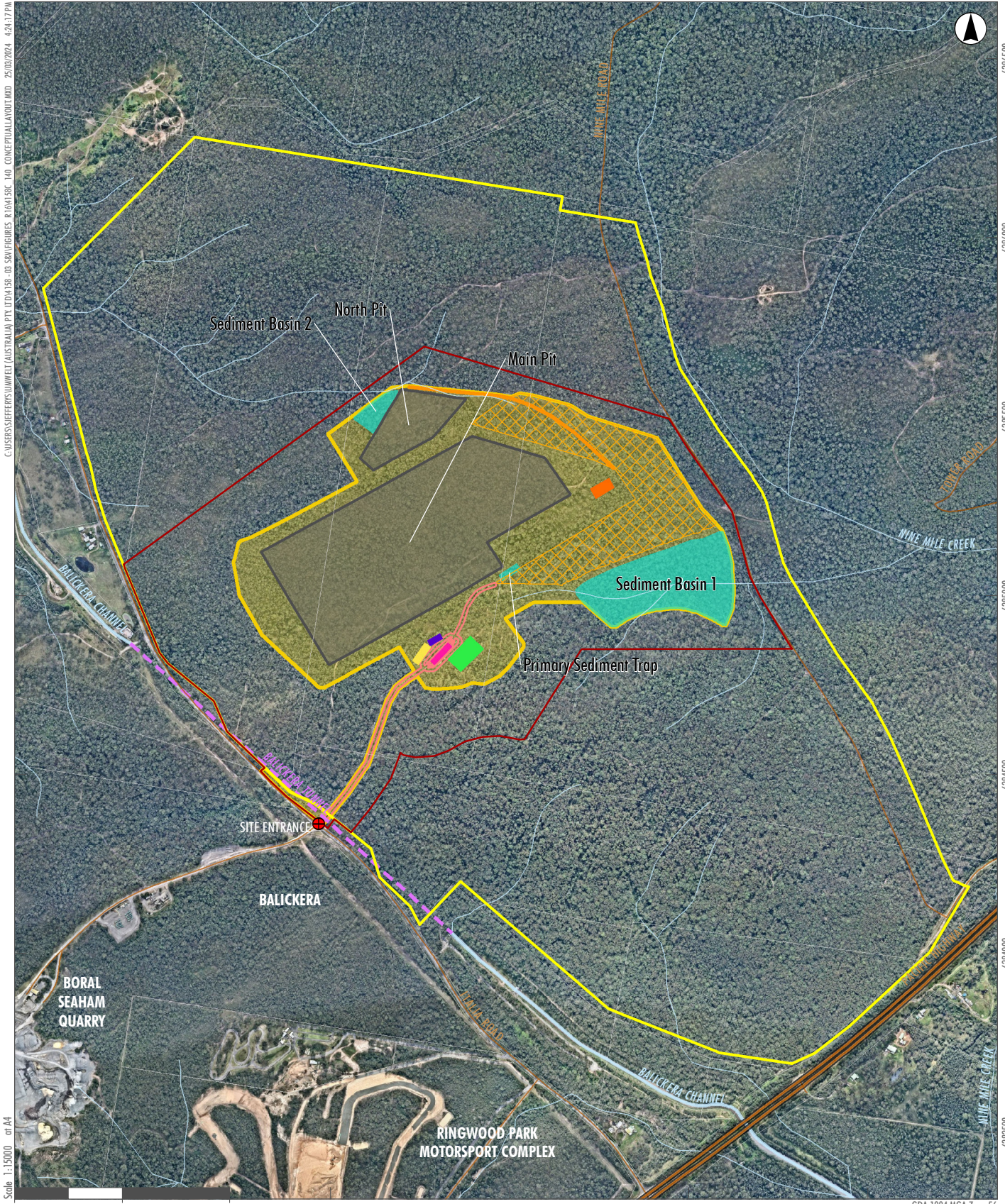
The Project is seeking to access a high quality, hard rock resource suitable for producing a wide range of quarry products for the Lower Hunter, Central Coast and northern Sydney construction materials markets. The proposed SSD quarry would produce up to 1.5 million tonnes per annum (Mtpa) of saleable quarry product with approval sought for an initial 30-year quarrying period.

The Project Area occupies 139 ha of land within the Wallaroo State Forest, which is managed by the Forestry Corporation of NSW (FCNSW). ARDG holds a Deed of Agreement (Deed) for a Forest Materials Licence (FML) with FCNSW which allows it to seek approval for the operation of a hard rock quarry within a defined Licence Area within the State Forest. Should the Project be approved, ARDG will obtain a FML from FCNSW over the Project Area which will govern management of the area and include a requirement for the payment of royalties to FCNSW on quarry materials extracted by the Project.

The conceptual layout of the Project Area is shown in Figure 1.2 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.



- Legend**
- |                        |                          |
|------------------------|--------------------------|
| Project Area           | Office                   |
| Disturbance Area       | Weighbridge              |
| Licence Area           | Access Road              |
| Pacific Highway        | Northern Haul Road       |
| Road                   | Workshop                 |
| Balickera Tunnel       | Truck Parking            |
| Drainage Line          | Light Vehicle Parking    |
| Lot Boundaries         | Stockpile and Plant Area |
| Pit Outlines (Stage 9) | Dams                     |

**FIGURE 1.2**  
Original Conceptual Project Layout

## 1.4 Proposed Amendment

The proposed Amendment will provide for refinement of the conceptual quarry layout to reduce the overall associated disturbance area and increase the separation distance from residents in Balickera and Balickera Tunnel to minimise operational blasting constraints associated with avoiding potential impacts on residents and the tunnel. The conceptual quarry layout has been refined to remove the previously proposed North Pit and its associated sediment basin and access roads, while also revising the stage plans associated with the Main Pit.

The proposed Amendment would result in a reduction in the overall Project disturbance footprint from approximately 79 ha to 68 ha, a reduction of 11 ha (14%), while optimising extraction of available resources from within this reduced footprint.

The proposed Amendment does not include any changes to the total resource extraction volumes or any other aspect of the Project.

Further detail on the proposed Amendment is provided in **Section 3.0**.

## 2.0 Strategic Context

The strategic context for the proposed Amendment remains unchanged from that of the Project.

The strategic justification for the Amended Project revolves around the forecast population growth and associated planned infrastructure investment in the Lower Hunter and Central Coast (LHCC) region, combined with supply-side pressure from existing hard rock resource suppliers. The existing supply of hard rock quarry products to the LHCC region is currently serviced by several large quarries, some of which are in the latter stages of their development lives, as well as from several relatively smaller operations with either comparatively short resource lives and/or suboptimal resource quality. Existing proposed quarry developments and extensions of existing projects (including the proposed Eagleton Quarry and the proposed modification to Boral Seaham Quarry) are not projected to fully meet this future demand and this will result in significant cost and delivery time pressures on construction projects, with a flow-on of negative productivity and inflationary pressures to the broader local and regional economy.

The Project site represents a rare opportunity within the LHCC region to develop a large-tonnage quarry operation on geology that is demonstrated to be favourable for production of the full range of high-quality quarry products (including concrete, asphalt and sealing aggregates, gabion and crushed rock and armourstone). The close proximity of the Project Area to key markets and the State Road network (i.e., the Pacific Highway) would enable the Project to significantly ameliorate the existing and forecast medium to long term supply-side pressures of quarry materials for the LHCC region, as well as provide direct access to the Sydney market if required. The quarry would also generate long-term revenue to the State through royalties payable to FCNSW on quarry products sold from the site.

## 3.0 Description of the Amendments

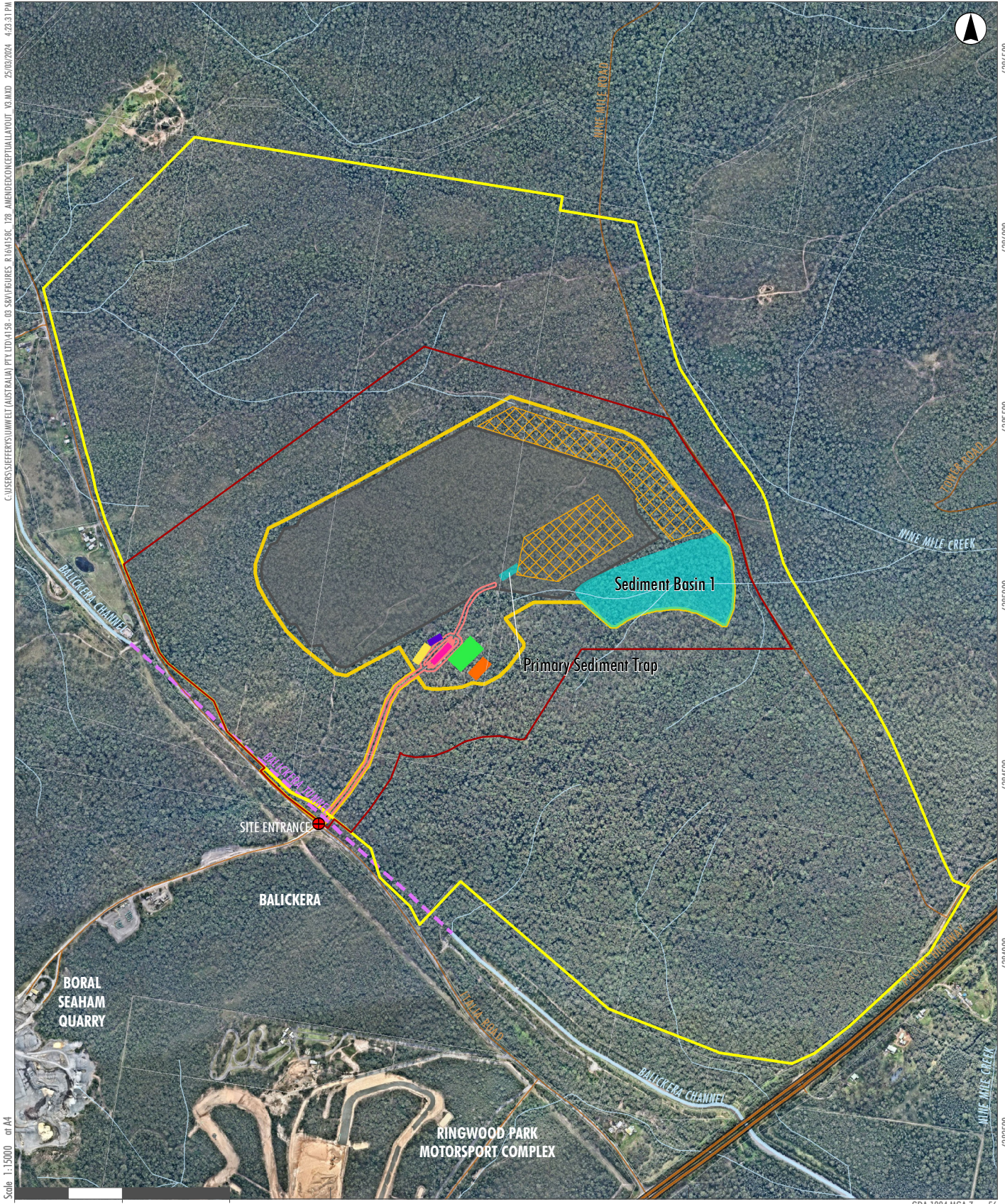
The amended conceptual quarry layout has been designed through a comprehensive process that has had regard to community and agency feedback received during the exhibition of the EIS, and the findings of further on-site investigations and specialist assessment. The proposed amendments maximise positive social, economic and environmental outcomes while avoiding and/or minimising adverse impacts to sensitive environmental features and neighbouring landholders.

The proposed Amendment will provide for refinement of the conceptual quarry layout which reduces the overall Project disturbance area. **Table 3.1** provides an updated overview of key components of the Project as presented in the EIS compared with the with the amended Project. **Figure 3.2** compares the original Project Disturbance Area with the Amended Project Disturbance Area. The proposed amended conceptual layout is described in detail in the following sections with a detailed revised Project Description provided as **Appendix A**.

**Table 3.1 Overview of Key Project Components**

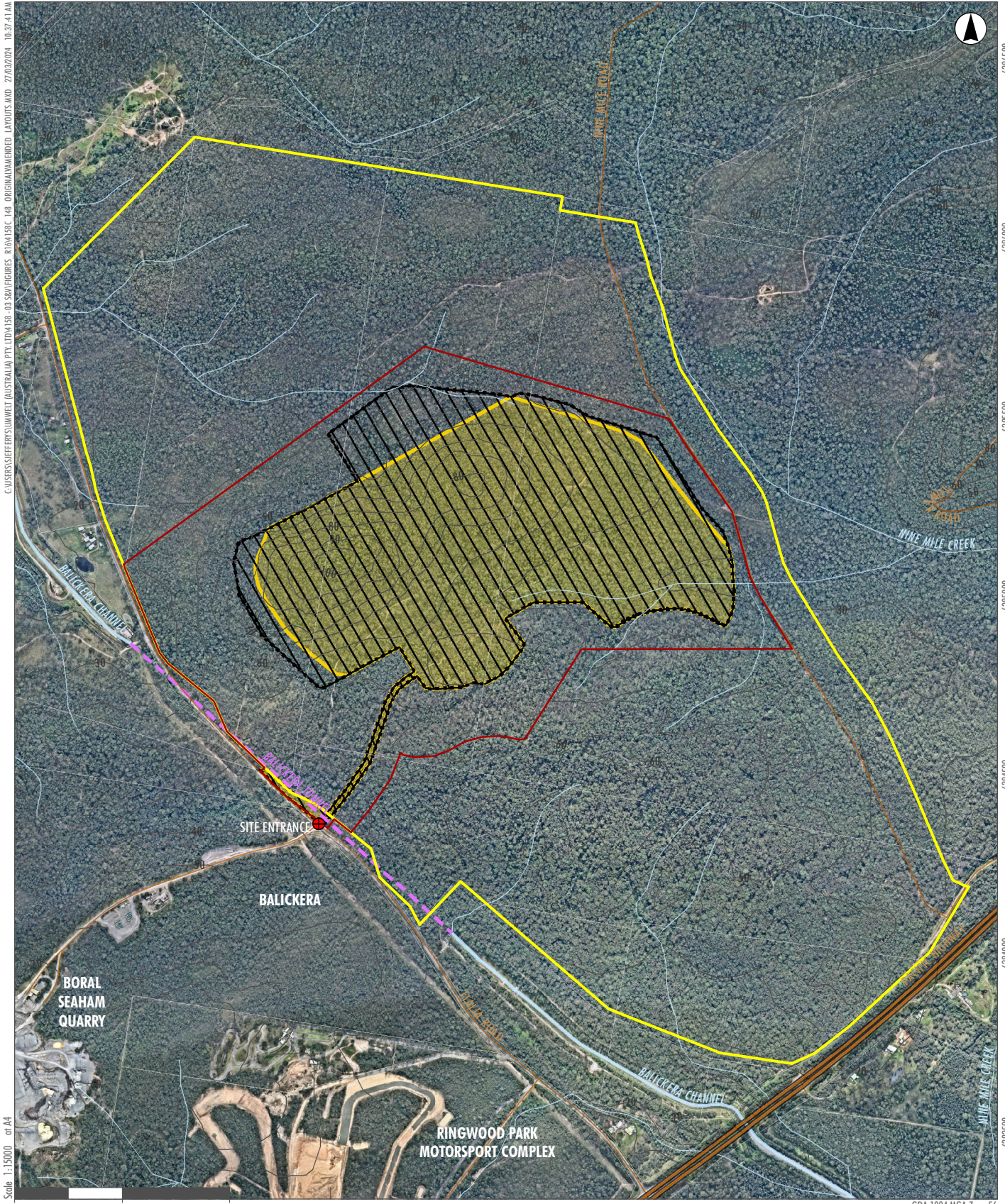
Aspect	As presented in the EIS	Amended Project
<b>Life of Extraction</b>	30 years from the commencement of extraction.  Some processing activities and decommissioning and rehabilitation activities will occur beyond the date extraction is completed.	No change
<b>Limits of production</b>	Up to 1.5 Mtpa of quarry product/sales per year.	No change
<b>Project Area</b>	Approximately 139 ha (including extraction, processing and stockpiling area and buffers), with a disturbance area of approximately 79 ha.	Approximately 139 ha (including extraction, processing and stockpiling areas and buffers) with a disturbance area of approximately 68.09 ha (reduction of approximately 10.93 ha (14%)).
<b>Extraction method</b>	Drill, blast, load and haul.	No change
<b>Material processing</b>	Processing on site with provision for both mobile crushing and screening plant, as well as modular/fixed processing plant.	No change
<b>Overburden management</b>	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.	No change
<b>Products</b>	Concrete, asphalt and sealing aggregates, gabion, armourstone, roadbase and other crushed rock products.	No change
<b>Resource Estimate</b>	Approximately 49 Mt in situ resource. Approximately 45 Mt product.	No change

Aspect	As presented in the EIS	Amended Project
<b>Product transport</b>	<p>Road transport of up to 1.5 Mtpa of product via the Pacific Highway.</p> <p>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).</p>	No change
<b>Site access</b>	<p>Single site access point on Italia Road.</p> <p>No truck traffic on Italia Road west of the site access towards East Seaham.</p> <p>All trucks will turn right into the site from Italia Road and left out of the site onto Italia Road.</p> <p>No trucks will turn right out of Italia Road onto the Pacific Highway.</p>	No change
<b>Employment</b>	<p>Construction: 10 to 15 full time employees.</p> <p>Operation: Up to 10 full time employees, 3 to 5 part-time employees.</p>	No change
<b>Hours of operation</b>	<p>Construction:</p> <ul style="list-style-type: none"> <li>• 7.00 am to 6.00 pm Monday to Friday.</li> <li>• 8.00 am to 1.00 pm Saturday.</li> <li>• No work on Sunday or Public Holidays.</li> </ul> <p>Operation:</p> <ul style="list-style-type: none"> <li>• Quarrying and processing – 7.00 am to 6.00 pm Monday to Friday, and 7.00 am to 3.00 pm Saturdays.</li> <li>• 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.</li> <li>• No operation on Sundays or Public Holidays apart from maintenance activities as required.</li> </ul>	No change
<b>Rehabilitation and final landform</b>	<p>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.</p>	<p>No change to rehabilitation processes.</p> <p>Design of final landform modified associated with amendment to conceptual quarry layout.</p>



- Legend**
- Project Area
  - Proposed Disturbance Area
  - Licence Area
  - Pacific Highway
  - Road
  - Balickera Tunnel
  - Drainage Line
  - Lot Boundaries
  - Pit Outlines (Stage 9)
  - Office
  - Weighbridge
  - Access Road
  - Workshop
  - Truck Parking
  - Light Vehicle Parking
  - Stockpile and Plant Area
  - Dams

**FIGURE 3.1**  
**Amended Conceptual Quarry Layout**



Scale 1:15000 at A4  
0 300 600 Meters  
GDA 1994 MGA Zone 56

- Legend**
- Project Area
  - Previously Proposed Disturbance Area
  - Amended Proposed Disturbance Area
  - Licence Area
  - Pacific Highway
  - Road
  - Balickera Tunnel
  - Drainage Line
  - Contour (10m Interval)
  - Lot Boundaries
  - Pit Outlines (Stage 9)

FIGURE 3.2

Original v Amended Layouts

### 3.1 Project Area

Wallaroo State Forest comprises three separate areas of land that have a combined area in excess of 3,600 ha. As shown on **Figure 1.1**, the Project Area (139 ha) is located within a Licence Area (391 ha) inside the boundaries of the western part of Wallaroo State Forest. No change is proposed to the Project Area.

### 3.2 Conceptual Quarry Layout

The amended conceptual quarry layout is shown in **Figure 3.1** and comprises the following key features:

- removal of previously proposed North Pit, associated sediment basin 2 and North Pit access road and modified Main Pit to provide 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
- revised processing and product stockpiling/loading areas including lowering the floor of the processing and stockpile area attached to Main Pit
- provision for storage of mulched vegetation, soils and overburden for rehabilitation purposes
- revised surface water management infrastructure (including surface irrigation areas) to accommodate revised Main Pit configuration and removal of previously proposed North Pit
- retention of weighbridge and administration area (offices, parking, amenities)
- no change to site access and revision to internal roadways to accommodate revised conceptual quarry layout.

### 3.3 Disturbance Area

The Disturbance Area of the Project (i.e., those areas where physical disturbance of soils and vegetation may occur) previously occupied approximately 79 ha of the Project Area (as presented in the EIS), with the remainder of the Project Area to remain as vegetated buffer areas. The amended conceptual quarry layout would result in a reduction in the overall proposed disturbance area to approximately 68 ha (reduction of approximately 11 ha).

All disturbance associated with the Quarry operations will be contained with the proposed Disturbance Area identified in **Figure 3.1** except where otherwise approved under *Forestry Act 2012* processes where further development consent is not required.

## 4.0 Statutory Context

Under section 37 of the EP&A Regulation, the applicant for an SSD project may – with the agreement of the consent authority – amend or vary an application at any time before it is determined. This Amendment Report has been prepared to satisfy the requirements of the EP&A Regulation and the *State significant development guidelines – preparing an amendment report* (DPE, 2022) to assess the environmental social and economic impacts of the proposed Amendment allowing the consent authority to make an informed decision on the merits of the amended Project.

The statutory context for the Amendment remains unchanged from that of the Project. Revised statutory compliance tables, incorporating any new assessment findings from this Amendment Report, are provided in **Appendix B**.

## 5.0 Stakeholder Engagement

Ongoing stakeholder engagement has continued throughout the assessment process. Consultation undertaken with Government agencies, Port Stephens Council (PSC) and the community since submission of the EIS is summarised below. Further details regarding this consultation and submissions made by Government agencies, PSC and community members are contained in the Submissions Report prepared for the Project. The Submissions Report also includes further discussion how the Amended Project addresses issues raised in submissions.

### 5.1 Agency Consultation

#### 5.1.1 Transport for NSW

ARDG, Umwelt and GHD met with Transport for NSW (TfNSW) on 4 September 2023 to discuss the TfNSW submission on the EIS. The issues raised in the submission were discussed in detail and an intended approach to the response to the submission confirmed with the TfNSW team.

#### 5.1.2 Biodiversity Conservation and Science

A meeting request was sent to Biodiversity Conservation and Science (BCS) division on 24 August 2023 to discuss the BCS submission and clarify the requests in order to inform the preparation of the Submissions Report and any required updates to the Biodiversity Development Assessment Report (BDAR). BCS responded on 30 October 2023 and declined to meet and requested any questions be provided in writing for a written response. A written request was provided to BCS on 19 September 2023 with BCS providing a response on 8 November 2023.

#### 5.1.3 Hunter Water Corporation

ARDG and Umwelt met with Hunter Water on 19 September 2023 to discuss the surface water related aspects of the Hunter Water submission. ARDG also provided an update on the preparation of the Submissions Report and an overview of the proposed changes to the conceptual quarry layout detailed in this Amendment Report. Further consultation was also undertaken with John Simpson from Hunter Water via the Community Consultative Committee (CCC) meeting.

Further discussion was undertaken relating to additional blasting assessment undertaken and proposed measures to protect Hunter Water infrastructure and the bat colonies (refer to **Section 6.3** for details).

#### 5.1.4 Environment Protection Authority

A meeting was requested with the EPA however the EPA advised that due to internal reorganisation of teams the relevant contact and team that prepared the submission no longer related to the region of the Project. Umwelt requested the contact details of the relevant team and a meeting to discuss the submission however a response was not received.

### **5.1.5 Port Stephens Council**

Consultation was undertaken separately with each of the Council's Traffic Engineering Team and Environment Team.

To address the comments included in Council's submission relating to traffic, written consultation was provided to Council's Traffic Engineering team on 2 November 2023. A response was received on 16 November 2023 acknowledging the approach to addressing the traffic related comments in Council's submission and suggested conditions of consent to be applied to the development consent should the Project be approved.

A meeting was held on 23 November 2023 with ARDG, Umwelt and Council's Environment Team. A written response to Council's comments included in the submission was provided prior to the meeting outlining the intended approach to responding to the comments. During the meeting the comments and approach to response was discussed. Council advised that the main concern relates to cumulative biodiversity impact, impact to habitat corridors and potential impact on bats inhabiting the Balickera Tunnel. Council resolved to provide minutes of the meeting and updated comments following their detailed review of ARDG's written response to the Council submission. Meeting minutes were received from Council on 30 January 2024.

## **5.2 Community Consultation**

A CCC meeting was undertaken on 28 October 2023. The Committee was provided with an overview of the analysis of the submissions, a Project update including description of the proposed amendments to the conceptual quarry layout and additional assessment undertaken, and the opportunity to ask questions. Key aspects discussed and concerns raised were related to traffic safety, blasting and cumulative impact.

## 6.0 Assessment of Impacts

### 6.1 Assessment Overview

Section 6 of the EIS included a detailed assessment of the Project based on the identification of:

- the environmental and planning context for the locality
- outcomes of the stakeholder engagement process
- the SEARs for the Project
- a risk analysis of potential environmental and social impacts associated with the Project
- specialist assessments completed as part of the preparation of this EIS.

A review of the proposed Amendment to the Project against the relevant specialist assessments, with consideration of any changes to the level of potential impact associated with the original Project is outlined in **Table 6.1**. Where additional assessment or mitigation/management measures are required, these are identified and references to the relevant report section(s) provided.

**Table 6.1 Assessment of Potential Impacts**

Specialist Assessment	Potential Impacts
<b>Noise and Vibration</b>	An Addendum to the Noise Impact Assessment has been prepared by Umwelt to assess noise impacts associated with the amended quarry design. Results are summarised in <b>Section 6.2</b> and a copy of the Addendum is provided as <b>Appendix D</b> .
<b>Blasting</b>	An Addendum to the Blasting Impact Assessment has been prepared by Enviro Strata Consulting Pty Ltd to assess blasting impacts associated with the amended quarry design and potential blasting impacts on bat colonies within the Balickera Tunnel. A summary of key outcomes is provided in <b>Section 6.3</b> with the Addendum attached as <b>Appendix E</b> .
<b>Air Quality and Greenhouse Gas</b>	An Addendum to the Air Quality and Greenhouse Gas Assessment has been prepared by GHD to assess impacts associated with the amended quarry design. Results are summarised in <b>Section 6.4</b> and a copy of the Addendum is provided as <b>Appendix F</b> .
<b>Surface Water</b>	An Addendum to the Surface Water Impact Assessment has been prepared by Engeny to update the conceptual water management system design, the operational water balance, impact assessments and final void recovery model to reflect the amended quarry design. A summary of key outcomes is provided in <b>Section 6.5</b> and a copy of the Addendum is provided in <b>Appendix G</b> .
<b>Groundwater</b>	A revised Groundwater Impact Assessment has been prepared by GHD to update the assessment of groundwater impacts based on the amended quarry design. Results are summarised in <b>Section 6.6</b> and a full copy of the report is provided in <b>Appendix H</b> .
<b>Biodiversity</b>	The proposed Amendment results in a reduction in the area of disturbance and therefore reduces the area of direct impacts on biodiversity. The Biodiversity Development Assessment Report (BDAR) has been updated to reflect the reduced Disturbance Area. The summary of the results of the revised BDAR are outlined in <b>Section 6.7</b> with the BDAR attached as <b>Appendix I</b> .

Specialist Assessment	Potential Impacts
<b>Aboriginal Cultural Heritage</b>	<p>The proposed Amendment will not change the outcomes of the Aboriginal Cultural Heritage Assessment as reported in the EIS as the Amended Project Disturbance Area is located wholly within the originally assessed Project Disturbance Footprint and no impacts to any sites or areas identified as having significant cultural value were identified. Accordingly, all proposed mitigation and management measures remain valid and no further assessment is required.</p> <p>The Registered Aboriginal Parties (RAPs) were notified regarding the proposed Amendment during the preparation of this Amendment Report</p>
<b>Historic Heritage</b>	<p>The proposed Amendment will not change the outcomes of the Historic Heritage Assessment as reported in the EIS and proposed mitigation and management measures remain valid. No further assessment is required.</p>
<b>Traffic and Transport</b>	<p>No change is proposed to the total resource extraction volumes or any aspect of traffic or transportation for the Project including access, transport routes and vehicle numbers. No further assessment is required. An updated assessment of intersection performance was undertaken as part of the Submissions Report to address comments raised by Boral, Transport for NSW and PSC. This updated assessment did not identify any changes to assessed intersection performance. A copy of the Addendum to the Traffic Impact Assessment is contained in Appendix 4 of the Submissions Report.</p>
<b>Land Resources</b>	<p>The proposed Amendment does not change the outcomes of the land resources assessment and proposed mitigation and management measures as reported in the EIS remain valid. No further assessment is required.</p>
<b>Waste Management</b>	<p>The proposed Amendment will not change waste management associated with the Project and proposed mitigation and management measures as reported in the EIS remain valid. No further assessment is required.</p>
<b>Bushfire</b>	<p>The proposed Amendment will not change bushfire management associated with the Project and proposed mitigation and management measures as reported in the EIS remain valid. No further assessment is required.</p>
<b>Hazardous Materials</b>	<p>The proposed Amendment will not change the operational processes or hazardous materials to be stored and used on site therefore the outcomes of the preliminary risk screening as reported in the EIS remain valid. No further assessment is required.</p>
<b>Visual Amenity</b>	<p>The proposed Amendment will not result in any change to the visibility of the quarry extraction area and associated infrastructure areas and proposed mitigation and management measures as reported in the EIS remain valid. No further assessment is required.</p>
<b>Social</b>	<p>The Amended Project will not change the potential social impacts of the Project and proposed mitigation and management measures as reported in the EIS remain valid. No further assessment is required.</p>
<b>Economic</b>	<p>The amendment does not affect the economic impacts or benefits of the Project. No further assessment is required.</p>
<b>Rehabilitation and Final Landform</b>	<p>The proposed Amendment will not change the approach to rehabilitation of the Project, however the proposed amendments to the conceptual quarry layout will result in changes to the conceptual final landform, and this is discussed further in <b>Section 6.8</b>.</p>

## 6.2 Noise

A Noise Impact Assessment (NIA) was prepared by Umwelt to address the noise and vibration impacts associated with the construction, operation and transportation phases of the Project and submitted as part of the EIS. Following the amendment of the conceptual quarry layout, a supplementary addendum letter was prepared by Umwelt to address any changes to noise impacts from those originally reported. A copy of the addendum letter is provided in **Appendix D** and the key findings are summarised below.

Receiver noise levels attributed to the Amended Project are expected remain the same or be lower than those predicted in the NIA. This is due to the following:

- Equipment is primarily remaining in the same location, so noise sources would not be moving any closer to the nearest receivers. The removal of the North Pit and increased setback from residential receivers and Italia Road to the south and west will increase the distance to the most-affected receivers.
- The Reduced Level (RL) of the processing area in Stages 0 to 5 will remain unchanged however processing facilities will be located lower than originally assessed and within the Main Pit itself in later stages. The location of processing facilities within the Main Pit increases the level of shielding provided by pit walls (discussed further below).
- Although the quarry bench widths are increasing, the quarry bench heights will remain the same, so the acoustic shielding provided for extraction equipment and haul trucks will be similar to the original quarry design. Any changes to the stockpile heights and positioning would have no impact, as the stockpiles were not included as noise barriers in the NIA noise model. The location of processing and stockpiling areas within the pit in later stages will increase the shielding effect provided by the pit walls and should result in lower noise impacts at nearby receivers in all directions relative to the Project design assessed in the NIA.
- The NIA predicted that daytime period noise levels would comply with the criteria at all receivers. Noise levels were predicted to be below relevant Project Noise Trigger Levels with all except R14, R16, R17, R18 and R21 more than 6 dB(A) below the PNTLs for the particular residence. Receivers R14, R16, R17, R18 and R21 are located to the west of the quarry along Italia Road and exposure to equipment previously proposed for operation in the North Pit drove the higher noise predictions at these residences. Given the North Pit does not form part of the amended conceptual quarry design, noise levels are expected to be lower at these receivers than predicted in the NIA and below the PNTLs for these residences.
- The NIA evening and shoulder period noise levels were predicted to be well below PNTLs at all receivers and the Amendment to Project layout are not expected to change this.
- There is no change to proposed road haulage arrangements and therefore no change to traffic noise predictions.

ARDG remains committed to the extensive compliance and validation monitoring program detailed in Section 7 of the NIA to ensure that noise emissions associated with the Amended Project will be monitored and managed appropriately to meet relevant criteria.

## 6.3 Blasting

An Addendum to the Blasting Impact Assessment (BIA) has been prepared by Enviro Strata Consulting Pty Ltd to assess blasting impacts associated with the amended quarry design and to further define potential blasting impacts on bat colonies within the Balickera Tunnel. A summary of key outcomes is provided below with a full copy of the Addendum report attached as **Appendix E**.

### 6.3.1 Impact Assessment

Based on the amended conceptual quarry layout, the minimum distances to the closest residential receiver (residence R18) and the closest infrastructure (i.e., Balickera Tunnel/Italia Road) have increased by 70 m each and are now in the order of 490 m and 340 m respectively. As a result, the predicted blast impacts on residential receivers, infrastructure facilities and heritage sites were re-assessed and compared with the applicable ground vibration and/or airblast overpressure criteria. The methodology and assessment methods used were consistent with those applied in the original BIA, based on four different maximum instantaneous charge (MIC) scenarios. Additional commentary was also provided on potential blasting impacts on animals (including livestock, domestic pets and native fauna) to address concerns raised in community submissions.

#### 6.3.1.1 Residences

All residential receivers located within 1 km of the quarry are predicted to have lower vibration and overpressure levels under the Amended Project relative to the design assessed in the original BIA. The assessment indicates that only limited blast management measures (in the north-western corner of the pit) will be required to satisfy the applicable ground vibration and airblast overpressure criteria, with the predictions indicating that a higher MIC of up to 75 kg can now be used without exceeding vibration and overpressure criteria at the closest residence (R18).

The assessment indicated that there will be minor increases in predicted vibration levels at receivers to the south-east along Nine Mile Creek Road (R5, R6, R7, R9, R10 and R22) associated with the extended extraction zone to the south-east, however predicted vibration levels at all of these residences remain well below relevant assessment criteria.

#### 6.3.1.2 Infrastructure

With respect to infrastructure, modelling indicates that predicted vibration and overpressure levels associated with the Amended Project will meet criteria for infrastructure and heritage items under all assessed blast scenarios. Importantly, this includes Hunter Water Corporation's Balickera Tunnel, where the modelled maximum vibration is well below the damage criterion for underground rock strata and concrete material.

#### 6.3.1.3 Animals

Within a 2 km radius of the Project, livestock were observed within properties R19 and R13. Also, as there are a number of private rural residences in the area, the presence of pet animals on the premises may be expected. ANZECC guideline limits (ANZECC, 1990) which apply to private residences are designed to protect human comfort and, as such, it can be inferred that blasting impacts can be fully managed in relation to livestock and pets/animals within these properties. The updated estimates of ground vibration and airblast overpressure impacts for the Amended Project (refer to Appendix E in the Amendment Report)

predict that impacts can be effectively managed to be below 5mm/s and 106 dBL respectively, (i.e., below the ANZECC guideline limits for human residences); the predicted vibration levels and overpressure levels at most residences are predicted to be well below these criteria.

Studies undertaken to assess potential impacts from blasting on feedlots have identified that blasting impacts have little to no impact on domestic stock (Nelson, 2011). Similar effects would be expected for native fauna and, anecdotally, it is noted that many fauna species have been recorded adjacent to active mining operations where larger and more frequent blasts than those proposed for the Project are undertaken. Due to the periodic nature (weekly or fortnightly) and very short duration (1 to 2 seconds) of blasting proposed, blasting associated with the Amended Project is not anticipated to have any significant impacts on livestock, domestic animals or native fauna.

#### **6.3.1.4 Balickera Tunnel Bat Colonies**

Further detailed assessment was undertaken on potential blasting impacts on bat colonies located within Balickera Tunnel to address comments from the former DPE Biodiversity and Conservation Division (BCD).

Balickera Tunnel extends over a length of approximately 1,220 m and is positioned parallel to the proposed extraction area and at a lower reduced level (RL) (refer to **Figure 3.1**). Due to the orientation and lower RL of the tunnel, the entries to the tunnel are well shielded from any direct overpressure impact that may result from the Project therefore no overpressure impacts are predicted. It is noted that overpressure, rather than vibration, is typically identified as the primary cause of animal disturbance, and the absence of this type of impact within Balickera Tunnel is likely to significantly mitigate potential impacts on bats associated with blasting. The orientation of the tunnel also effectively precludes flyrock and blast fume from entering the tunnel and these are therefore not identified as a potential risk for bats present within Balickera Tunnel. Previous assessments also confirmed there is no risk of strata movement or detachment of small rock debris within the tunnel at the estimated vibration levels. The blasting assessment for the Balickera Tunnel was therefore focused on the assessment of vibration impacts.

Different parts of the tunnel will experience different levels of blast vibration due to variation in separation distance from the point of the blast. To account for this variation, three locations were used for the amended assessment (upstream, at minimum distance from the extraction area, and downstream). Results can be summarised as follows:

- The Balickera Tunnel presents a dynamic and noisy environment, which differs significantly from a secluded dry cave environment. The bats living in the tunnel will have already experienced some exposure to different levels of vibration over a number of years due to the movement of water through the tunnel, blasting at the adjacent Boral Seaham Quarry, passing vehicle traffic on Italia Road and tunnel remediation works (noting that microbats were progressively excluded from the tunnel during remediation works in 2021/22).
- A comparative study using vibration and biological monitoring on a bat colony residing in a tunnel in a mine in Western Australia confirmed that exposure to vibration limits imposed for human beings within houses (i.e., 10 mm/s as specified in Australian Standard AS2187.2-2006) did not negatively impact the colony. Moderate vibration impacts up to 12.2 mm/s did not negatively impact on long-term behaviour of bats nor was any significant risk to the colony identified.

- Modelling results confirmed that vibration impacts will be low in the initial stage of quarry excavation when operations are located further from the Balickera Tunnel, however will increase as quarrying progresses towards the west.
- Maximum vibration levels in the tunnel will be experienced when blasting is conducted in the westernmost corner of the quarry, limited to a few critical blasts during Stages 8 and 9. By reducing the MIC to approximately 98 kg, the 10 mm/s criterion adopted from AS2187.2-2006 can be achieved for the whole length of the tunnel.
- Predicted vibration impacts for the Amended quarry design are lower than for the original Project assessed in the BIA.
- Controls relevant to meeting blast criteria at R18 will ensure that the 10 mm/s vibration criterion will be met for all blasts in the north-western section of the quarry, and extending this to all blasts located within the western 30 m of the pit will enable the 10 mm/s criterion to be satisfied through all sections of the tunnel.

### **6.3.2 Mitigation and Management Measures**

The blast emission control measures and commitments for the Project identified in the EIS remain applicable to the Amended Project. No additional measures are required.

## **6.4 Air Quality and Greenhouse Gas**

An Addendum Air Quality and Greenhouse Gas Assessment (Addendum AQGHGA) was prepared by Jacobs Group (Australia) Pty Ltd (Jacobs) to document the process, findings and outcomes of their review of the revised conceptual quarry layout. The Addendum AQGHGA also included a comparison of air quality outcomes between the revised conceptual quarry layout and those presented in the original assessment. The Addendum AQGHGA is provided in **Appendix F**.

### **6.4.1 Methodology**

Changes to potential air quality impacts as a result of design changes to the conceptual quarry layout were assessed by Jacobs using the same methods and receiver locations as the original AQGHGA presented in the EIS. Emissions were updated to reflect the revised design and the meteorological and dispersion model was re-run to predict potential impacts at surrounding sensitive receivers, including an assessment of potential changes to cumulative impacts.

Greenhouse gas inventories were updated for the Addendum AQGHGA to reflect the revised conceptual quarry layout, and impacts were assessed using the same approach of comparing greenhouse gas emissions with national and state inventories as that used in the original AQGHGA.

### **6.4.2 Air Quality Impact Assessment**

#### **6.4.2.1 Construction Dust**

The Addendum AQGHGA determined that potential impacts from construction dust are expected to remain unchanged as a result of the revised conceptual quarry design and resulting air emissions will remain as only a portion of those expected to be generated during operations, as reported in the original AQGHGA.

### **6.4.2.2 Operational Dust (Project Only)**

#### **Particulate Matter (as PM<sub>10</sub>)**

Updated predictions for annually averaged PM<sub>10</sub> concentrations at modelled receiver locations showed that with the revised conceptual quarry design, and the changes in local background air quality conditions as discussed in **Section 6.4.1** above, overall concentrations due to the Amended Project alone are predicted to be less than 1 µg/m<sup>3</sup> and are well below the EPA's 25 µg/m<sup>3</sup> annual average criterion.

Similarly, for maximum 24-hour average PM<sub>10</sub>, overall concentrations due to the Amended Project alone were predicted to be less than 8 µg/m<sup>3</sup> and remain well below the EPA's 50 µg/m<sup>3</sup> criterion for all modelled stages.

#### **Particulate Matter (as PM<sub>2.5</sub>)**

As with PM<sub>10</sub> predictions, predicted PM<sub>2.5</sub> concentrations at surrounding sensitive receptors due to the Project alone remained well below the EPA's 8 µg/m<sup>3</sup> criterion with the revised conceptual quarry design.

Similarly, for maximum 24-hour average PM<sub>2.5</sub>, concentrations associated with the Project alone were predicted to remain well below the EPA's 25 µg/m<sup>3</sup> criterion for all modelled stages.

As for PM<sub>10</sub>, the Addendum AQGHGA determined that the revised conceptual quarry layout would not result in unacceptable changes to air quality with regards to PM<sub>2.5</sub>.

#### **Particulate Matter (as TSP)**

With the revised conceptual quarry design and updated local background conditions, overall annual average TSP concentrations at surrounding sensitive receptors would remain below the EPA's 90 µg/m<sup>3</sup> criterion for all modelled stages.

#### **Deposited Dust**

With the revised conceptual quarry design and updated local background conditions, deposited dust levels at surrounding sensitive receptors would remain below the EPA's 4 g/m<sup>2</sup>/month criterion for all modelled stages.

#### **VLAMP Assessment**

The original AQGHGA determined that exceedances of the relevant Voluntary Land Acquisition and Mitigation Policy (VLAMP) criteria were limited to the Project Area and surrounding State Forest and the Project would therefore comply with the policy at all private receivers and land holdings. This outcome remains unchanged for the revised conceptual quarry layout.

### **6.4.2.3 Operational Post-Blast Fume**

Changes in predicted worst-case post-blast fume concentrations (1-hour average NO<sub>2</sub>) as a result of the revised conceptual quarry design are expected to be minimal, with blasting operations now located further away from the closest residences.

### **6.4.2.4 Operational Diesel Exhaust**

Emissions from diesel exhausts associated with off-road vehicles and equipment were also considered in the original assessment. The inputs applied to develop the emission estimates remain applicable for the

revised conceptual quarry design. Even with the addition of higher background concentrations recorded at the EPA reference station in Beresfield in 2023 (as described in **Section 6.4.1** above) resulting cumulative concentrations would still remain well below the EPA's annual average and 1-hour average assessment criteria of 31 and 164  $\mu\text{g}/\text{m}^3$  respectively, and the outcomes of the original assessment remain unchanged.

#### **6.4.2.5 Road Transport**

As the maximum production rates, transportation rates and transportation routes remain unchanged, the outcomes determined in the original assessment for diesel emissions from road transportation of quarry product remain applicable, i.e. diesel exhaust emissions from quarry traffic along public roads will not lead to any exceedances of the EPA's impact assessment criteria.

#### **6.4.2.6 Crystalline Silica**

As respirable crystalline silica is a subset of PM<sub>2.5</sub>, the original AQGHGA considered the potential for off-site impacts from crystalline silica by comparing the results from PM<sub>2.5</sub> modelling with the air pollution assessment criterion adopted from the Victorian EPA. The highest predicted results for the revised conceptual quarry layout (Stage 9) were predicted to remain below the adopted criterion, therefore the outcomes of the original assessment remain unchanged.

#### **6.4.2.7 Odour**

The original AQGHGA determined that odour from the mobile road chip precoating plant is unlikely to present an issue to surrounding amenity. The inputs applied to the odour modelling are unchanged as a result of the revised conceptual quarry layout and as such, the outcomes from the original assessment are also expected to remain unchanged.

#### **6.4.2.8 Cumulative Impacts**

An updated assessment of cumulative impacts is included in the Addendum AQGGIA. As with the original assessment, the assessment of cumulative impacts has conservatively added the highest daily and annual rates of emissions recorded at the EPA's Beresfield monitoring station to the highest predicted impacts at all receivers from Eagleton Quarry, Boral's Seaham Quarry, Brandy Hill and the Project.

The Addendum AQGGIA includes consideration of the 2023 monitoring data from the EPA's Beresfield station which has a higher PM<sub>10</sub> annual average and 24-hour average concentrations and higher annual average PM<sub>2.5</sub> concentrations than those adopted for the original AQGGIA which used data from 2021. The higher of the two data sets for each particular emission assessed was carried through to the cumulative assessment for the Amended Project and this has resulted in higher predicted cumulative impacts for PM<sub>10</sub> and annual average PM<sub>2.5</sub>. The Addendum AQGGIA includes consideration of the 2023 monitoring data from the EPA's Beresfield station which has a higher PM<sub>10</sub> annual average and 24-hour average concentrations and higher annual average PM<sub>2.5</sub> concentrations than those adopted for the original AQGGIA which used data from 2021. The higher of the two data sets for each particular emission assessed was carried through to the cumulative assessment for the Amended Project and this has resulted in higher predicted cumulative impacts for PM<sub>10</sub> and annual average PM<sub>2.5</sub>.

The updated assessment concludes that the amended project is unlikely to result in exceedances of cumulative criteria for particulate matter with the potential exception of 24-hour PM<sub>10</sub>. Even with the addition of higher background concentrations recorded at the EPA reference station in Beresfield in 2023,

resulting cumulative concentrations would still remain well below the EPA's 1-hour average assessment criterion of  $164 \mu\text{g}/\text{m}^3$ , and the outcomes of the original assessment remain unchanged.

The method used for 24-hour PM<sub>10</sub> cumulative predictions indicates a potential exceedance of the EPA's  $50 \mu\text{g}/\text{m}^3$  criterion at receivers R1, R18 and R20 under worst case conditions where predicted worst case background conditions coincide with modelled worst case modelled impacts at these receivers from the four modelled quarries. Assumed worst case background levels ( $41 \mu\text{g}/\text{m}^3$ ) are the primary driver of the exceedances and the Project's predicted contribution to the exceedances are  $2.6 \mu\text{g}/\text{m}^3$ ,  $7.9 \mu\text{g}/\text{m}^3$  and  $3.4 \mu\text{g}/\text{m}^3$  respectively at the three receivers. Adopting the lower 2021 background level of  $36 \mu\text{g}/\text{m}^3$ , no exceedances from cumulative emissions are predicted. In practice, it is unlikely that the peak predicted impacts from all four modelled quarries would coincide with the highest 24-hour background levels. This is particularly the case for the three receivers identified as having potential exceedances of criteria using this method as these receivers are located between Stone Ridge Quarry and the Boral and Eagleton Quarries and prevailing winds driving high levels of PM<sub>10</sub> from Stone Ridge would align with lower contributions from these other sources.

### 6.4.3 Greenhouse Gas Assessment

The only potential change to greenhouse gas emissions as a result of the revised conceptual quarry layout is expected to be a minor reduction in Scope 1 emissions associated with reduced vegetation removal. The disturbance footprint in the revised conceptual quarry design is approximately 10 ha smaller than that originally assessed, with vegetation noted as being present across some retained areas.

Considering this, the greenhouse gas emissions predicted in the original AQGHGA remain appropriate, if marginally conservative with respect to the revised design, and the national and state significance of these emissions remains unchanged.

### 6.4.4 Mitigation and Management Measures

The mitigation and management measures from the original AQGHGA remain appropriate, however the Addendum AQGHGA also recommends that operations at the Project be scaled down during periods when high particulate matter levels are observed. Based on the recommendations in the Amended AQGHGA ARDG propose to use the PM<sub>10</sub> levels recorded at the EPA's Beresfield Station (which are reported in real time) as a trigger for additional operational controls and scale back potential dust generating activities and/or implement additional dust suppression measures when 1-hour average background levels exceed  $80 \mu\text{g}/\text{m}^3$ . 1-hour averaged PM<sub>10</sub> concentrations above  $80 \mu\text{g}/\text{m}^3$  provides an indication that the 24-hour averaged  $50 \mu\text{g}/\text{m}^3$  would be exceeded and are therefore an appropriate trigger for the implementation of additional measures to reduce the Project's contribution to cumulative impacts.

## 6.5 Surface Water

A revised Surface Water Impact Assessment (SWIA) was prepared by Engeny Australia Pty Ltd (Engeny) to assess the potential surface water impacts associated with the revised conceptual quarry layout. The full SWIA is contained in **Appendix G** and the key outcomes are included in the sections below.

The revised SWIA addresses both the SEARs and the additional agency advice (provided by the former DPE Water and the Biodiversity and Conservation Division (BCD)) which was received in response to the original SWIA and EIS for the Project. Background information on the existing surface water environment presented in the EIS and original SWIA remains valid for the revised assessment and is not repeated here.

### 6.5.1 Water Management System

A conceptual operational Water Management System (WMS) has been developed for Stage 1 and Stage 9 of the amended quarry. The conceptual water management strategy developed for the original quarry layout remains valid, however the sizing and locations of some components of the WMS have changed to accommodate the amended quarry design and sediment dams associated with the previously proposed Northern Pit are no longer required.

The conceptual Stage 1 WMS has an area of approximately 30 ha and includes the features presented in **Table 6.2**. Plan and schematic drawings of the conceptual Stage 1 WMS are presented in Figure 3.1 and Figure 3.2 of the SWIA respectively. The conceptual Stage 9 WMS has an area of approximately 62 ha and is generally the same as the conceptual Stage 1 WMS but includes increased storage within the Pit Sump as well as some changes to the clean water drainage network as presented in **Table 6.2**. Plan and schematic drawings of the conceptual Stage 9 WMS are presented in Figure 3.3 and Figure 3.4 of the SWIA respectively.

The conceptual design of proposed water storages will have adequate capacity to contain runoff from the 24-hour duration, 0.2% AEP storm event required by Hunter Water to meet water quality requirements for Grahamstown Dam. Further, water storages will have adequate capacity such that they are not predicted to spill under the historical climatic conditions modelled in the operational water balance.

**Table 6.2 Conceptual Water Management System Components**

Item	Functional Description	Proposed Minimum Capacity (ML)	
		Stage 1	Stage 9
Pit sump	Captures runoff from the western portion of the Pit. Serves as surge storage capacity during wet periods (i.e., will receive transfers of surplus water from Sediment Basin 1).	86	100 <sup>3</sup>
Primary sediment trap	Captures coarse sediment in runoff from the processing plant area before it drains to SB1. Will operate as a flow through sediment trap. Additional sediment traps may be constructed in the processing and stockpile areas to reduce SB1 sediment loads.	0.2	0.2

Item	Functional Description	Proposed Minimum Capacity (ML)	
		Stage 1	Stage 9
Sediment Basin 1 (SB1)	<p>Constructed on a second order tributary of Nine Mile Creek. Captures runoff from the stockpile areas and carpark, office/amenities and weighbridge and overflow from the Primary Sediment Trap.</p> <p>Primary site water storage and supply for operational demands.</p> <p>Sized to minimise the risk of uncontrolled discharges in storm events not exceeding the 24-hour duration, 0.2% AEP storm event (as specified by Hunter Water).</p> <p>Exceeds the required capacity determined in accordance with <i>Managing Urban Stormwater – Soils and Construction Volume 1</i> (Landcom 2004) and <i>Volume 2e – Mines and quarries</i> (DECC, 2008) (hereafter collectively referred to as the Blue Book) of 22.8 ML in Stage 1 (15.2 ML settling zone<sup>1</sup> and 7.6 ML sediment zone<sup>2</sup>) and 18.8 ML in Stage 9 (12.5 ML settling zone<sup>1</sup> and 6.3 ML sediment zone<sup>2</sup>).</p> <p>Will be managed to maintain a storage inventory of at least 15 ML but with a target maximum operating capacity of approximately 20 ML (Stage 1) or 30 ML (Stage 9) to minimise the risk of uncontrolled discharges.</p> <p>Should water inventories exceed the required freeboard to accommodate the Blue Book settling zone capacity (i.e., 15.2 ML in Stage 1 and 12.5 ML in Stage 9), SB1 will be dewatered to ensure freeboard is restored within five days of runoff generating rainfall.</p> <p>Water inventory to be managed through supply of operational demands (material processing and dust suppression), irrigation of undisturbed Project Area catchments and controlled discharges. Irrigation will be applied within the Project area at a rate that does not result in runoff to local drainage lines.</p>	110	110
Clean drains	Directs runoff from undisturbed catchment upslope of SB1 around SB1.	To be determined at detailed design	
Licensed groundwater bore	Supplies water to meet operational demands during dry periods.	Up to 87 ML/yr	Up to 56 ML/yr
Water treatment plant	<p>Removal of suspended solids and nutrients prior to controlled discharge.</p> <p>Water treatment plant technology to be confirmed during Project detailed design phase.</p>	Up to 65 ML/yr	Up to 286 ML/yr

Notes: 1 Settling zone capacity based on runoff from the Newcastle 5 day 95th percentile rainfall depth of 76.7 mm sourced from the Blue Book.

2 Sediment zone equal to 50% of the settling zone capacity.

3 Note that exceedance of in-pit sump capacity will not result in spills to the WMS or environment as surplus water will be contained in the larger pit shell

It is noted that in its submission on the original EIS, the BCD indicated that the proposed location of sediment basin SB1 on a second order watercourse does not represent best practice, and recommended that SB1 should be relocated to an off-line location.

Engeny considers that the location of SB1 on the second order stream is justified for the following reasons:

- the basin is located at the top of the catchment and runoff from disturbed areas will naturally drain to this location as the quarry footprint expands, with minimal undisturbed catchment upslope of the basin
- the natural landform provides for the construction of a large capacity dam with limited excavation
- the basin capacity is large due to containment requirements (0.2% AEP as specified by Hunter Water) limiting potential locations within the proposed disturbance boundary
- given the large capacity of SB1, the likelihood of uncontrolled releases to the downstream watercourse is considered very low.

## 6.5.2 Water Balance

### 6.5.2.1 Operational

The operational water balance presented in the original SWIA has been updated by Engeny to simulate the performance of the revised conceptual Stage 1 and Stage 9 WMSs. Stages 1 and 9 were chosen for the impact assessment as:

- Stage 1 represents a period where there is limited available in-pit storage other than the Pit Sump to accommodate surplus rainfall runoff during wet periods and, while the WMS catchment area is smaller than in latter stages, the limited in-pit storage capacity results in an increased likelihood of uncontrolled discharges from the WMS. Further, with the limited WMS catchment area and depth of extraction being above the groundwater table, Stage 1 will have reduced capacity to meet operational water demand requires through run-off captured in the WMS and there represent the period with highest potential demand for external imports during dry periods.
- Stage 9 represents the maximum WMS catchment area and therefore the stage in which the largest volumes of rainfall runoff will require management through reuse and controlled discharges.

Gross water balance results indicate that the amended quarry design is likely to:

- have a water deficit and a requirement for imports to meet operational demands in dry years for both modelled stages, but particularly in Stage 1
- have limited requirements for discharge in Stage 1 during median rainfall years
- have surplus water and a requirement for discharges for Stage 1 during wet rainfall years
- have surplus water and a requirement for discharges for Stage 9 during median and wet rainfall years.

Detailed water balance results are provided in Section 4.4 of the revised SWIA in **Appendix G**.

### 6.5.2.2 Final Void

The final landform design will include a final void, however it is anticipated that SB1 and all other sediment traps/basins will be decommissioned to produce a free draining landform outside of the final void.

The final void water balance was updated to estimate the equilibrium water level in the final void for the amended conceptual quarry layout. Rainfall inflows will predominantly be associated with direct rainfall on the void surface as there will be negligible external runoff due to the location of the void on a ridgeline. A maximum groundwater inflow rate of 14.3 ML/year (equal to the groundwater inflow rate applied for the Stage 9 operational water balance scenario) was used in the final void recovery water balance model when the pit is empty, progressing linearly down to 0 ML/year when the water surface elevation in the final void reaches 23.4 mAHD (equivalent to the pre-quarrying water table level).

The water balance model predicts that the final void will spill approximately 135 years after quarry closure however this may be affected by outflow seepage to regional groundwater. The water level is expected to reach the pre-quarrying water table level (i.e. 23.4 mAHD) approximately 53 years after quarry closure.

### **6.5.3 Impact Assessment**

#### **6.5.3.1 Water Quality**

As the Project is located within the Hunter Water's drinking water catchment, a Neutral or Beneficial Effects (NorBE) on water quality analysis must be undertaken to estimate whether the post-development pollutant loads discharged from the amended Project are greater than, equal to or less than the pollutant loads discharging from the pre-developed site. The pollutants of concern associated with the Project are considered to be total suspended solids and nutrients (Total Nitrogen and Total Phosphorus).

With the reduced WMS catchment areas and modified operating rules applied in the amended quarry water balance, the average annual volume of controlled discharges in has been reduced by approximately 38% and 45% for Stage 1 and Stage 9 respectively when compared to the original Project water balance predictions. As such the controlled discharge pollutant concentrations required to achieve a Neutral or Beneficial Effect (NorBE) on water quality may be marginally higher than those proposed in the original SWIA and EIS. Water treatment measures will be implemented as required to reduce pollutant concentrations in controlled discharges to levels where a NorBE on water quality can be achieved.

The updated SWIA compared the pre-development and post-development pollutant loads for the Stage 1 and Stage 9 WMS catchment areas and concluded that on average, a NorBE on water quality can be achieved for the amended Project in both the Stage 1 and Stage 9 conceptual WMS designs. The updated SWIA also considered that intermediate stages (i.e., Stages 2 to 8) will also on average achieve a NorBE on water quality by ensuring:

- adequate water storage capacity is constructed for each Stage
- the water treatment system (if required) is operating to design specifications, and
- operational water management practices to minimise site water inventories prior to wet conditions are implemented to minimise the likelihood of uncontrolled discharges for storm events up to the 24 hour duration, 0.2% AEP and historical climate conditions modelled in the water balance.

#### **6.5.3.2 Water Quantity**

Water balance modelling predicts that for the Stage 1 scenario there will be a reduction in catchment yield during all years while in Stage 9 reductions in catchment yields are predicted for all but the wettest years. Data presented in the updated SWIA shows that the amended quarry design results in smaller catchment

reductions when compared to the original quarry design for all waterways. The updated SWIA considers that the loss in catchment yield for Grahamstown Dam and the Williams River during dry years will be negligible. The percentage reduction in catchment yields in Nine Mile Creek and Caswells Creek are higher, however still minor, and less than the reductions associated with the original quarry design.

Water balance modelling indicates that rainfall runoff and groundwater bore imports will provide an adequate and reliable supply of water to meet operational water demands for all stages of the amended Project. The groundwater import demand for the amended quarry layout is lower than that estimated for the original quarry layout therefore Engeny considers that the original assessment of groundwater entitlement availability remains valid.

### **6.5.3.3 Flow Regimes and Stream Stability**

Given the amended Project will capture rainfall runoff and discharge water (controlled and uncontrolled discharges), flow regimes will be altered and impacts to stream stability are possible in downstream watercourses.

Consistent with the original SWIA, ARDG remains committed to engaging a suitably qualified and experienced specialist to undertake a baseline riparian corridor assessment (including an assessment of baseline stream stability) of downstream watercourses that will receive controlled and uncontrolled discharge prior to Project construction. ARDG will also commission a detailed hydrological and hydraulic assessment to determine the potential for scouring in downstream watercourses and inform maximum discharge flow rates (for controlled discharges) and the requirement for scour protection.

### **6.5.3.4 Flooding**

Consistent with the original Project, no local flooding issues are expected on-site nor are any impacts on local flood regimes expected downstream of the Project.

## **6.5.4 Mitigation and Management Measures**

All licensing, monitoring and reporting measures included in the original EIS and SWIA remain valid for the amended Project, with minor changes to predicted water takes for both surface and groundwater which will be addressed through licensing requirements as needed.

The DPE Water submission noted that SB1 exceeds the typical design requirements for sediment basins. The revised SWIA explains that the Project's location within the Grahamstown Dam drinking water catchment necessitates pollution prevention measures beyond those normally recommended in relation to sediment basins to meet Hunter Water specifications. As far as practicable, undisturbed catchments upslope of SB1 will be diverted around SB1 and it is noted that only minimal areas of undisturbed catchment will drain to SB1.

## **6.6 Groundwater**

The Groundwater Impact Assessment (GIA) included with the EIS was updated by GHD Pty Ltd (GHD) to reflect the amended quarry design (Up dated GIA) (refer to **Appendix H**). The Updated GIA also includes an assessment of potential impacts associated with the use of ARDG=P06 as a production pore to supply shortfalls in water supply. Where outcomes have changed from the original GIA submitted with the EIS, these are summarised below.

## 6.6.1 Regional Hydrogeology

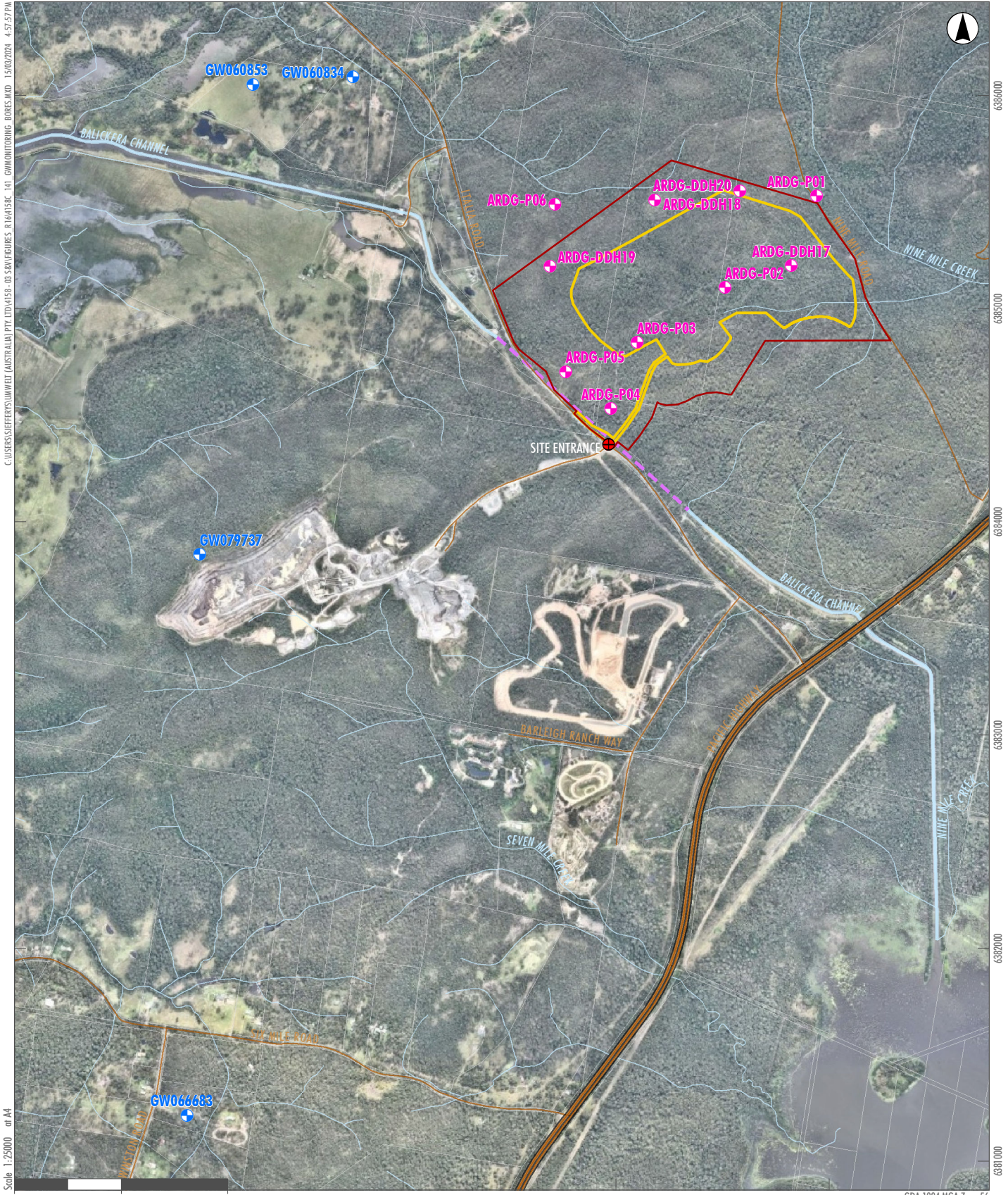
The groundwater flow systems occur in unconfined and confined fractured rock aquifers within the Eagleton Volcanics and within shallow, perched aquifers. Groundwater levels in the fractured rock aquifer reflect and are controlled by topography. Groundwater is recharged by rainfall infiltration on the upper slopes and ridgelines and flows towards lower lying areas and drainages where it is discharged. The shallow, perched aquifers on the western flank which overlie a dacite aquitard are recharged via rainfall, surface runoff and shallow water movement from upslope within the regolith and soil material. Flow is topographically controlled, and disconnected from the deeper, fractured rock groundwater system.

The conceptual hydrogeological model consists of five hydrostratigraphic layers (note that this was previously modelled as three layers in the previous version of the GIA):

- clay layer, up to 11 m thick, discontinuous across the Project area
- shallow perched aquifer system (on the lower western flanks)
- low permeability dacite aquitard (on the lower western flanks)
- unconfined fractured rock aquifer (Eagleton Volcanics)
- confined fractured rock aquifer (Eagleton Volcanics).

The nearest high priority Groundwater Dependent Ecosystems (GDEs) identified in the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources are located near the Williams River to the north and east of Seaham, approximately 8 km and 5 km from the Project, respectively. With reference to the Probable Vegetation Groundwater Dependent Ecosystems – Hunter/Central Rivers dataset (DPE Water, 2022), high probability GDEs are associated with Nine Mile Creek to the north and north-east of the Project, and Caswell’s Creek and Williams Creek to the west. Four registered bores are located within a 5 km radius of the Project, including three basic landholder rights bores (refer to **Figure 6.1**).

The groundwater monitoring network of ten bores installed in the Project Area by ARDG in 2019 and 2020 was described in detail in the EIS (refer to **Figure 6.1**). Based on standing water levels measured in groundwater monitoring bores, the average depth to groundwater (potentiometric surface) in the fractured rock aquifer in the Project Area varies between 7.31 and 23.3 m below ground level. Average groundwater levels (potentiometric surface) in the area where the high probability GDEs are present (within the maximum extent of predicted drawdown) are between approximately 7 m and 13 m below ground level. However, the aquifers in these areas associated with the groundwater heads observed in bores near high probability GDEs is actually significantly lower (i.e., 20 m below the surface) due to the presence of an extensive zone of low permeability dacite which acts as an aquitard, confining groundwater in the deeper, more permeable units at a depth. The Updated GIA includes cross sections of the Project Area showing the measured and predicted groundwater levels and the relationship of groundwater to the Project and sensitive receptors.



C:\USERS\JEFFERS\umwelt\AUSTRALIA\PTY.LTD\0158-03\SRVFIGURES\_R\046158C\_M41\_GWMONITORING\_BORES.MXD 15/02/2024 4:57:57 PM

Scale 1:25000 at A4

6386000  
6385000  
6384000  
6383000  
6382000  
6381000

GDA 1994 MGA Zone 56

- Legend**
- Project Area
  - Disturbance Area (Development Footprint)
  - Groundwater Monitoring Bores
  - Landholder Bores
  - Pacific Highway
  - Road
  - Balickera Tunnel
  - Drainage Line
  - Lot Boundaries

**FIGURE 6.1**  
**Groundwater Monitoring Network and Registered Bores**

## 6.6.2 Impact Assessment

### 6.6.2.1 Model predictions

Quantification of likely groundwater inflow rates and the radius of drawdown due to the amended quarry layout was undertaken using a steady-state analytical model. Considering that the distance to the few registered landholder bores is greater than one kilometre, the low hydraulic conductivity of the aquifer and deep groundwater levels through the rhyodacite resource that would not support GDEs, the GIA considered that the risk to identified groundwater receptors due to the Project is low and did not warrant numerical modelling. The level of complexity of analytical equations used by GHD was therefore considered appropriate to assess this risk.

Using hydraulic conductivity estimates based on monitoring results and literature review, the GIA predicted that Stage 8 groundwater inflows to the quarry pit would range from 8.7 ML/year to 14.3 ML/year.

Based on the results of a pumping test conducted near ARDG-P06 and forward analyses, continuous pumping at 1.25 L/s or discontinuous pumping at 2.5 L/s (assuming complete recovery following each 12-hour pumping period), is likely to be sustainable for at least a year in the fractured rock aquifer. Therefore, it is possible that the 90th percentile bore import volume could be obtained from a production bore targeting the fractured rock aquifer in the ARDG-P06 area.

The most conservative predicted radius of drawdown for Stage 8 (468 m; Scenario 1 based on  $K_{max}$ ) was used to assess the impact of the Project on existing groundwater users. Landholder bores are well outside the Project's radius of drawdown. No drawdown is therefore expected to occur at any of the landholder bores. Therefore, landholder bores will not be impacted by any drawdown associated with the project. Therefore, the impact of the project therefore meets the NSW Aquifer Interference Policy (AIP) Level 1 Minimal Impact Considerations for landholder bores.

Based on the most conservative predicted radius of drawdown for the potential production bore, drawdowns exceeding one metre are not expected to occur at distances beyond 600 m. Given that the nearest water supply bores (GW060834 and GW060853) are located more than one kilometre to the north-west of ARDG-P06, it is unlikely that a production bore located near ARDG-P06 will cause more than a 2 m water table decline cumulatively at any water supply work. Therefore, the impact of the potential production bore therefore meets the NSW Aquifer Interference Policy (AIP) Level 1 Minimal Impact Considerations for landholder bores.

The most conservative predicted radius of drawdown for Stage 8 (468 m; Scenario 1 based on  $K_{max}$ ) was used to assess the impact of the project on GDEs. High priority GDEs identified in Section 3.6 are well outside the Project's radius of drawdown. These GDEs are also well outside the conservative radius of influence of a potential production bore located near ARDG-P06. No drawdown is therefore expected to occur at any of the high priority GDEs as a result of the project or potential production bore.

A refined, conservative predicted radius of drawdown (389 m; Scenario 2 based on  $K_{max}$ ) was used to assess the potential impact of the project on high probability GDEs located in the western flank area. This scenario is based on a reduced groundwater level which more closely represents impacts to the terrain surrounding the quarry footprint. Drawdowns greater than one metre are not expected to occur at distances exceeding 300 m from the centre of the pit. Therefore, drawdowns in the area of the high probability GDEs are not expected to be greater than one metre.

Based on standing water levels measured in groundwater monitoring bores, the average depth to groundwater in the fractured rock aquifer at the project varies between 7.31 and 23.3 metres below ground level. Average interpolated groundwater levels (potentiometric surface) in the area where the high probability GDEs are present, within the maximum extent of predicted drawdown (468 m; Scenario 1 based on  $K_{max}$ ), are between approximately seven and 13 metres below ground level. However, aquifers associated with groundwater heads in these areas are actually significantly lower (i.e., 20 m below the surface) due to the presence of a zone of low permeability dacite which acts as an aquitard, confining groundwater in the deeper, more permeable units below the likely rooting depths (particularly having regard to the hard nature of overlying rock strata).

### 6.6.2.2 Licensing requirements

The Project area is located within the New England Fold Belt Coast Groundwater Source which is managed by the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources. Any take of groundwater associated with the project (through passive inflow or direct take through extraction for operational purposes) will require a WAL under the WM Act. Based on water balance modelling results as part of the Surface Water Impact Assessment, ARDG requires 39 ML/year in the early stages of the Project. A WAL will therefore be required for direct take using the proposed production bore prior to the commencement of pumping for supply purposes. Based on recent (2021/2022) trades within the New England Fold Belt Coast Groundwater Source there is sufficient market depth for ARDG to obtain a licence for 39 ML/year which is the predicted 90th percentile bore import demand for Stage 1 of the Project.

Predicted demand for water decreases through the life of the project as water captured in the WMS can be used to meet demand requirements. By Stage 8, predicted demand shortfall is expected to be less than 5ML/year under a 90th percentile scenario.

Updated annual passive groundwater inflow predictions for the Main Pit range from approximately 1.5ML to 8.3 ML in Stage 5 up to between 9ML to approximately 50ML in Stage 8. Based on the more likely inflow predictions for Stage 8 (the final and deepest stage of quarry operations), a WAL for approximately 9 – 15 ML/year would be required. As the 39 ML/year take is only required to meet operational demands in the early stages of the project, a WAL covering this direct take is also likely to be sufficient to cover both passive and direct take in the latter stages. Therefore, assuming passive inflow rates are consistent with the likely inflow predictions in the GWIA, no additional licencing would be required for the pit inflows.

Based on recent trades within the New England Fold Belt Coast Groundwater Source there is sufficient market depth for ARDG to obtain a WAL. The ongoing groundwater monitoring program (refer to **Section 6.6.3**) will be used to validate inflows into the pit as quarry development proceeds and will directly inform the WAL requirement. Updated predictions will be obtained based on groundwater monitoring and observed inflows into the pit as the pit progresses to confirm and WAL holdings are sufficient to meet licencing requirements.

### 6.6.2.3 Impacts to shallow, perched groundwater system

The shallow, perched groundwater system is disconnected from the fractured rock aquifer in which the quarry pit is located and therefore groundwater level drawdown associated with quarry operations will not have an impact on the perched system.

#### **6.6.2.4 Impacts to GDEs and groundwater users**

Based on the most conservative hydraulic conductivity value, the predicted radius of drawdown for Stage 8 of the Amended Project is between 336 m and 363 m from the centre of the pit. All existing groundwater users and high priority GDEs are well outside this distance, therefore the GIA concludes that no drawdown is expected to occur at any of the bores or high priority GDEs as a result of the Project.

Areas of Probable Vegetation GDEs within the radius of predicted drawdown align with locations where the shallow perched aquifer system is disconnected from the deeper, fractured rock aquifer system. In the areas outside the proposed Disturbance Area, only the northern extent of drawdown has potential to impact areas of vegetation mapped as having a high probability of being a GDE. This vegetation is associated with the unnamed first and second order tributary of Caswells Creek. This tributary and associated riparian vegetation have not been mapped as a high ecological value aquatic ecosystem (HEVAE) by DPE-Water. Further information on GDEs is provided in **Section 6.7**.

Given the depth to aquifers in this area (i.e., 20 m below the surface) the GIA concludes that the presence of high probability GDEs is due to shallow groundwater in the overlying alluvial/colluvial material (recharged from creeks and rainfall), rather than the deeper regional groundwater table from which it is disconnected in this area. The terrestrial vegetation in these areas that have groundwater dependence would therefore be highly unlikely to be impacted by any drawdown induced in the much deeper bedrock layers. Even if drawdowns in the fractured rock aquifer of up to 5 m occurred, given that groundwater is at 20 m below the surface, it would be unlikely to have a material impact on vegetation associated with the perched systems, which are primarily influenced by rainfall and surface flow recharge. Therefore, the modelled drawdown of groundwater in the deeper, fractured rock system is not predicted to adversely impact these high probability GDEs.

The impact of the Amended Project therefore meets the NSW Aquifer Interference Policy (AIP) Level 1 Minimal Impact Considerations for landholder bores and GDEs.

#### **6.6.2.5 Groundwater quality impacts**

The Project is not expected to cause any significant change in groundwater quality or in the beneficial use of the groundwater. The model predictions in the GIA show increased groundwater recharge in the post-closure phase may in fact result in a localised improvement in groundwater quality. The impact of the Amended Project therefore meets the NSW AIP Level 1 Minimal Impact Considerations for groundwater quality.

#### **6.6.2.6 Post-closure impacts**

The Project is expected to be completed after 30 years. With time, groundwater levels in the aquifer surrounding the Amended Project will recover until equilibrium within the system occurs, and a pit lake forms within the final voids. Once the system is in equilibrium, the flux of water within the pit lake will only be from rainfall and evaporation. During the recovery stage however, groundwater inflows will occur, and a WAL will still be required in the initial post-closure phase of the Amended Project. Any enhanced recharge that occurs as a result of the quarry in the post-closure phase would reduce the time required for groundwater levels to recover.

### 6.6.3 Mitigation and Management Measures

As previously described in the EIS for the Project, the existing groundwater monitoring program will be continued and extended to include an additional bore to the north-west, and will involve regular monitoring of water levels and water quality, as well as groundwater inflow rates to the quarry.

Groundwater quality monitoring requirements post-closure will be reviewed as part of closure planning with a focus on understanding the impacts of groundwater recharge from a recovering pit lake on the local groundwater system. Groundwater levels will continue to be monitored in the post-closure phase until groundwater levels stabilise and/or regulation requirements are met.

## 6.7 Biodiversity

The Biodiversity Development Assessment Report (BDAR) included with the EIS was updated by Umwelt to reflect the amended quarry design (refer to **Appendix I**). Where outcomes have changed from the original BDAR submitted with the EIS, these are summarised below.

### 6.7.1 Amended Impact Assessment

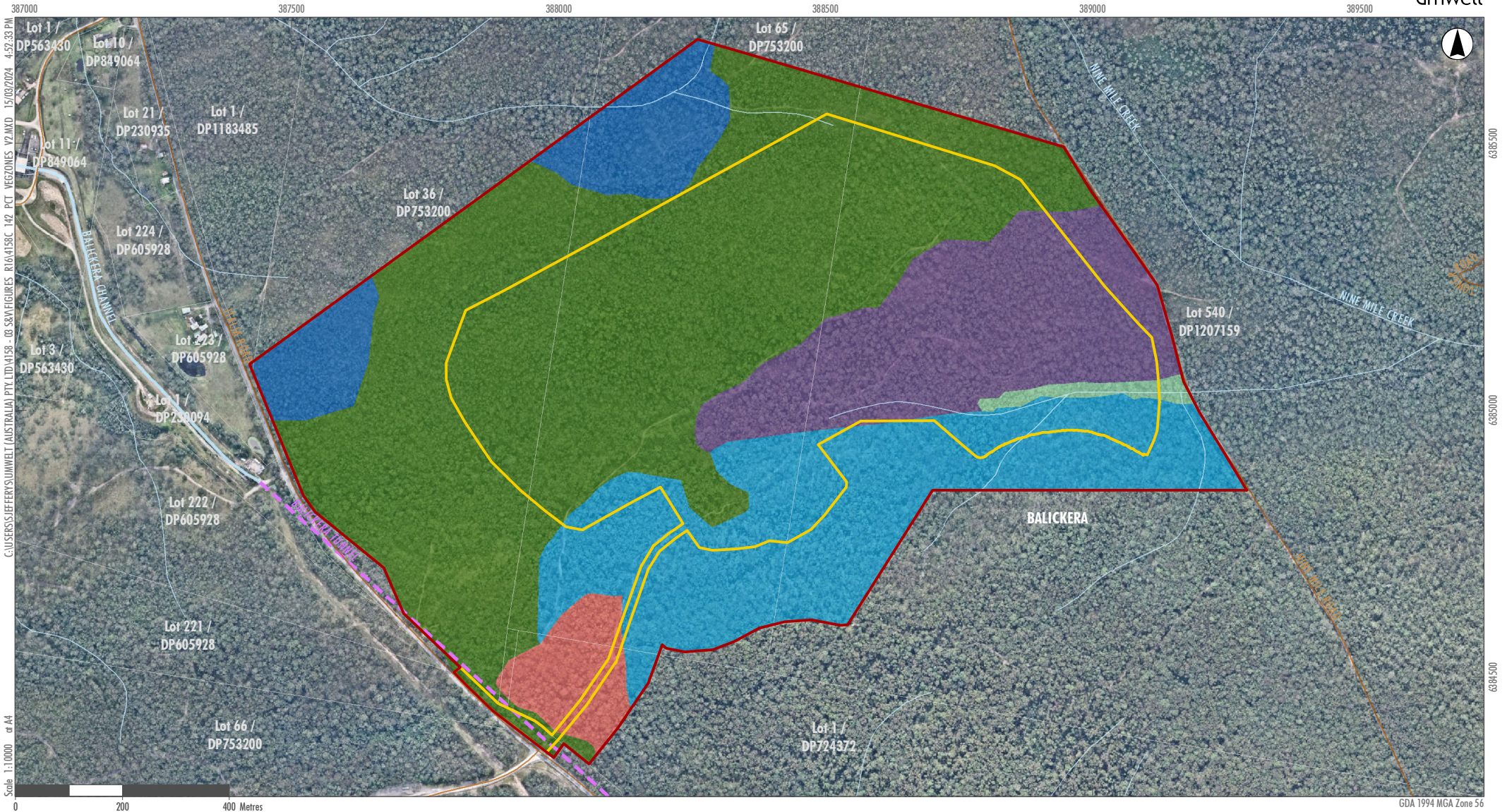
#### 6.7.1.1 Native Vegetation

Details of the Plant Community Types (PCTs) impacted in the amended Disturbance Area is provided in **Table 6.3** and shown on **Figure 6.2**.

**Table 6.3 Vegetation Zones and Plant Community Types**

Zone	PCT ID	PCT Name	Condition	Area (ha)
1	762	Cabbage Gum open forest or woodland on flats of the North Coast	Intact	0.33
2	1590	Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Intact	39.27
3	1618	Smooth-barked Apple - White Stringybark - Red Mahogany - Melaleuca sieberi shrubby open forest on lowlands of the lower North Coast	Intact	0.88
4	1619	Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	Intact – Apple variant	18.91
5			Intact – Apple-Ironbark variant	8.63
<b>Total area</b>				<b>68.02 ha</b>

The amended conceptual quarry layout results in the disturbance of approximately 11 ha less native vegetation than the previous design and also avoid impacts on PCT 1716 Prickly-leaved Paperbark Forest on Coastal Lowlands of the Central Coast and Lower North Coast.



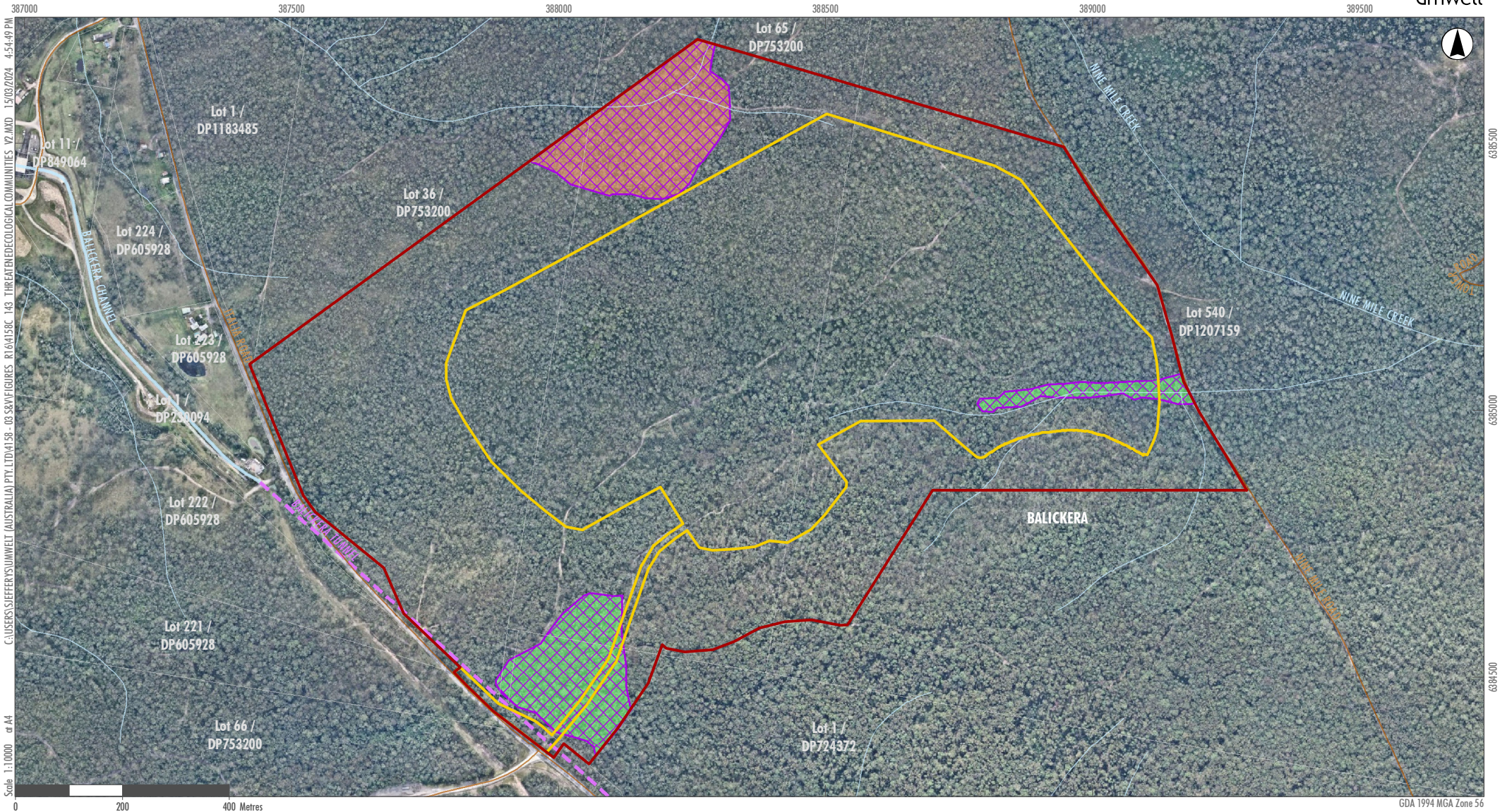
**Legend**

- Project Area (Subject Land)
- Disturbance Area (Development Footprint)
- Road
- Balickera Tunnel
- Drainage Line

**Plant Community Types**

- PCT 762, Cabbage Gum open forest or woodland on flats of the North Coast - Intact
- PCT 1590, Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest - Intact
- PCT 1618, Smooth-barked Apple - White Stringybark - Red Mahogany - Melaleuca sieberi shrubby open forest on lowlands of the lower North Coast - Intact
- PCT 1619, Smooth-barked Apple-Red Bloodwood-Brown Stringybark-Hairpin Banksia heathy open forest of coastal lowlands - Intact / Apple variant
- PCT 1619, Smooth-barked Apple-Red Bloodwood-Brown Stringybark-Hairpin Banksia heathy open forest of coastal lowlands - Intact / Apple-Ironbark variant
- PCT 1716, Prickly-leaved Paperbark Forest on Coastal Lowlands of the Central Coast and Lower North Coast - Regenerating

**FIGURE 6.2**  
**Plant Community Types and Vegetation Zones**



**Legend**

- Project Area (Subject Land)
- Disturbance Area (Development Footprint)
- Road
- Balickera Tunnel
- Drainage Line
- EPBC TEC**
- Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions
- BC TEC**
- River Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney and South East Corner Bioregions
- Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion

**FIGURE 6.3**  
**Threatened Ecological Communities**

### 6.7.1.2 Threatened Ecological Communities

The Threatened Ecological Communities (TECs) listed within the NSW *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act); observed within the amended Disturbance Area are listed in **Table 6.4** and the extent of each TEC is mapped in **Figure 6.3**.

**Table 6.4 Threatened Ecological Communities**

TEC Name	Act and Listing Status	Associated PCTs within amended Disturbance Area	Area (ha)
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community Listed under the BC Act	PCT 762 Intact PCT 1618 Intact	1.21
Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions	Endangered Ecological Community Listed under the EPBC Act	PCT 762 Intact PCT 1618 Intact	1.21

Due largely to the avoidance of impacts on PCT 1716, the Amended Project has resulted in a reduction in impacts to TEC of approximately 3.91 Hectares relative to the original Project design.

### 6.7.1.3 Threatened Species

The completion of surveys and assessments has identified habitat within the amended Disturbance Areas for the following threatened entities listed within the BC Act and/or the EPBC Act:

- squirrel glider (*Petaurus norfolcensis*)
- brush-tailed phascogale (*Phascogale tapoatafa*)
- koala (*Phascolarctos cinereus*)
- south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)
- varied sitella (*Daphoenositta chrysoptera*)
- little lorikeet (*Glossopsitta pusilla*)
- white-bellied sea-eagle (*Haliaeetus leucogaster*)
- little bent-winged bat (*Miniopterus australis*)
- large bent-winged bat (*Miniopterus orianae oceanensis*)
- greater broad-nosed bat (*Scoteanax rueppellii*).

The reductions in Disturbance Area associated with the Amended Project will reduce the scale of impact to all species relative to the original Project layout.

Changes to the quarry design have resulted in the avoidance of previously reported impacts to the BC Act-listed rusty greenhood (*Pterostylis chaetophora*).

## 6.7.2 Impact Avoidance and Mitigation

The following key impact avoidance measures have been identified for the Amended Project:

- Reduction of the Disturbance Area over multiple iterations to reduce the disturbance footprint, including further substantial reduction through removal of the northern pit area as part of the current revised Project development footprint.
- Avoidance of the north-western section of the subject land, which contains areas occupied by the rusty greenhood (*Pterostylis chaetophora*) and a habitat which potentially facilitates wildlife movement to the west.
- Avoidance of impacts to PCT 1716, which corresponds to the Subtropical Coastal Floodplain Forest endangered ecological community listed under the BC Act and Subtropical eucalypt floodplain forest and woodland listed under the EPBC Act.
- Alignment of the site access to the existing access track from Italia Road, to minimise impacts to PCT 762 Cabbage Gum open forest or woodland on flats of the North Coast.

Additionally, ARDG remains committed to the implementation of management measures via the Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) to mitigate residual impacts on biodiversity as detailed in the EIS and Section 8.4 of the BDAR (refer to **Appendix I**).

## 6.7.3 Biodiversity Offsets

Following the application of avoidance and mitigation measures, the biodiversity credits detailed in **Table 6.5** below are required to offset the impacts of the Amended Project.

**Table 6.5 Biodiversity Offset Credits**

Entity	Credits Required
PCT 762 Cabbage Gum open forest or woodland on flats of the North Coast	13
PCT 1590 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	1,092
PCT 1618 Smooth-barked Apple - White Stringybark - Red Mahogany - Melaleuca sieberi shrubby open forest on lowlands of the lower North Coast	34
PCT 1619 Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	763
squirrel glider ( <i>Petaurus norfolcensis</i> )	2,519
brush-tailed phascogale ( <i>Phascogale tapoatafa</i> )	2,519
koala ( <i>Phascolarctos cinereus</i> )	2,519

## 6.8 Rehabilitation and Final Landform

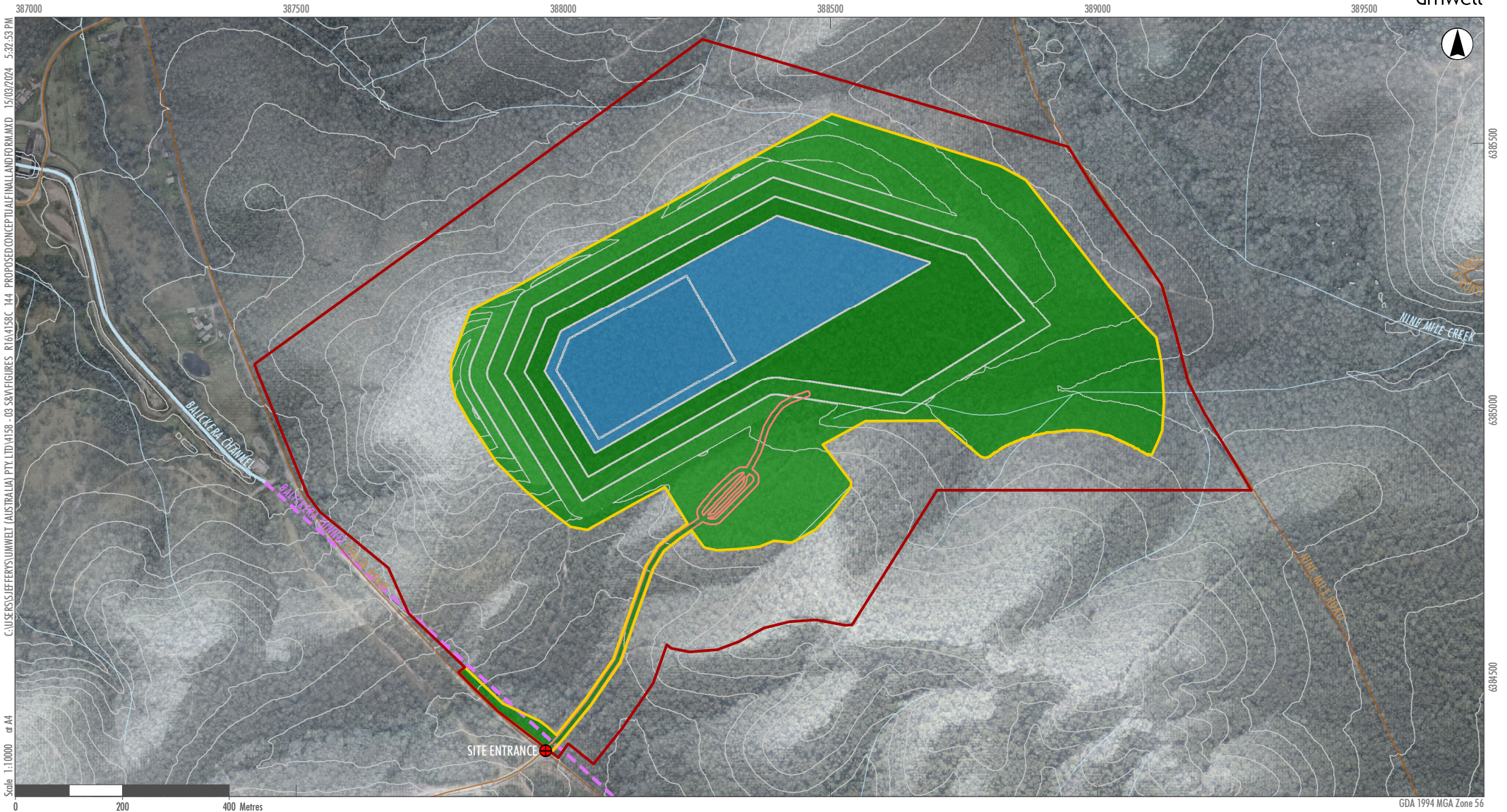
ARDG remains committed to the effective rehabilitation and closure of the quarry at the cessation of operations. The overarching principle to be applied, as previously described in the EIS, is the development of a safe, stable and non-polluting landform. Rehabilitation at the quarry will address the long-term stabilisation of both quarried and disturbed areas, including rehabilitation of the upper quarry benches and available areas within and surrounding the quarry pit, with one final void (Main Pit) to remain after closure as water storage. It is anticipated that all other water storages (SB1 and any other sediment traps/sumps) will be decommissioned, all infrastructure removed, and the landform outside of the Main Pit will be free draining. This proposed rehabilitation and final landform has been developed in consultation with FCNSW.

The location of the resource within the Wallaroo State Forest limits the post-closure land use options for the site to those permitted within the State Forest and consistent with the underlying object of being safe, stable and non-polluting. The ability to return the entire site to a viable native forest is also limited by the shallow rock depth, limited topsoil resources (due to existing shallow soils over target rock resource) and likelihood that the final void will hold water. Despite these limitations, the quarry site can be rehabilitated to provide biodiversity habitat values associated with the resulting pit lake, retained and/or battered highwalls, and vegetated benches and processing area. The formation of a pit lake within the void would also provide additional end land use opportunities associated with the water storage, including emergency fire-fighting water supply opportunities for FCNSW.

The proposed conceptual final landform will consist of vertical/steep face slopes, horizontal benches, flat or gently sloping surrounds and a pit void lake as illustrated in **Figure 6.4**. Opportunities for selected battering of high walls will be considered as part of the detailed quarry closure processes but will be subject to safety, biodiversity and future land use constraint considerations. The proposed amendments to the quarry design have resulted in a different proposed final landform to that shown in the EIS however the broad principles associated with benches, highwalls/slopes and the surrounding flatter areas remain consistent.

A life of operations rehabilitation management strategy relevant to achieving the conceptual final landform will be outlined within the OEMP. A Detailed Quarry Closure Plan will be developed 3 years prior to planned cessation of quarrying activities. Both the conceptual closure plan in the OEMP and the Detailed Quarry Closure Plan will be based on a final land use focused on promoting the surrounding forest landscape by re-establishing pockets of woodland species across the benches consistent with endemic vegetation types with retaining access opportunities to the void/lake for safety purposes and future uses consistent with management objectives for the State Forest. Alternative land uses will be investigated as part of the development of the Detailed Quarry Closure Plan and will include consultation with FCNSW, Hunter Water, Port Stephens Council and DPHI.

The strategic context, rehabilitation objectives and proposed rehabilitation methodologies remain consistent with those described in the EIS.



C:\USERS\SJ\JEFFERS\UMWELT (AUSTRALIA) PTY. LTD\4156 - 03 38\FIGURES\_R\6.4\56C\_144 - PROPOSED CONCEPTUAL FINAL LANDFORM.MXD 15/09/2024 5:32:53 PM  
Scale 1:10000 at A4

- Legend**
- Project Area
  - Disturbance Area (Development Footprint)
  - Road
  - Balickera Tunnel
  - Drainage Line
  - Access Road
  - Pit Lake
  - Revegetation Area

**FIGURE 6.4**  
**Proposed Conceptual Final Landform**

## 7.0 Justification of the Amended Project

### 7.1 Ecologically Sustainable Development

An objective of the EP&A Act is to encourage ecologically sustainable development (ESD) within NSW. This section provides an assessment of the Project in relation to the principles of ESD.

To justify the Project with regard to the principles of ESD, the benefits of the Project in an environmental and socio-economic context should outweigh any negative impacts. The principles of ESD encompass the following:

- the precautionary principle
- inter-generational equity
- conservation of biological diversity, and
- valuation and pricing of resources.

Essentially, ESD requires that current and future generations should live in an environment that is of the same or improved quality than the one that is inherited.

#### 7.1.1 The Precautionary Principle

The EP&A Regulation defines the precautionary principle as:

*'if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*

- careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
- an assessment of the risk-weighted consequences of various options.'*

In order to achieve a level of scientific certainty in relation to the potential impacts associated with the Project, the EIS and this Amendment Report have undertaken an extensive evaluation of all the key components of the Project. Detailed assessment of all key issues and necessary management procedures have been conducted and is comprehensively documented in the EIS and this Amendment Report.

The preparation of the EIS and this Amendment Report have involved a detailed analysis of the existing environment (refer to Section 2.0 of the EIS and Section 6.0 of the EIS and **Section 6.0** of this Amendment Report), and the use of engineering and scientific modelling to assess and determine potential impacts as a result of the Project. To this end, there has been careful evaluation as part of the project design and assessment process to avoid, where possible, irreversible damage to the environment and this has been further improved through the changes to Project Layout described in this Amendment Report. Specialist studies were undertaken to provide accurate information to assist with the evaluation and development of the Project. Mitigation measures are provided in **Appendix C**. The BDAR prepared for the Amended Project

(**Appendix I**) includes a specific consideration of serious and irreversible impacts on biodiversity values and concludes that the Project is unlikely to have serious or irreversible impact on any threatened species or communities. The Project design, together with the implementation of the proposed mitigation and management measures (refer to **Appendix C**) incorporates precautionary elements and will ensure that the Project does not result in serious or irreversible impacts to the environment.

The decision making process for the design, impact assessment and development of management processes has been transparent in the following respects:

- Government authorities, landholders potentially affected by the Project, the local community, the Aboriginal community and other stakeholders were extensively consulted during EIS preparation (refer to Section 5.0 and Appendix 15 of the EIS). This enabled comment and discussion regarding potential environmental impacts and proposed environmental management procedures.
- The community has been comprehensively engaged throughout the development and assessment of the Project through a range of mechanisms including face to face meetings, presentations and community newsletters to inform Project design and proposed management of key issues (refer to Section 5.0 and Appendix 15 of the EIS), which provided stakeholders with both information and the opportunity to influence Project outcomes.
- Government stakeholders and the community were provided further opportunities to comment on the Project and the EIS through the public exhibition process. The Submissions Report provides a summary of submissions received during the exhibition stage and detailed responses to the issues raised. ARDG also engaged with Government agencies and PSC following submission of the EIS to discuss issues raised in submissions and the proposed amendments to the Project described and assessed in this Amendment Report.
- ARDG will develop and implement a CEMP and OEMP, which will implement best practice management and will incorporate all identified mitigation and management measures identified in the EIS and this Amendment Report. Additionally, the Project will be subject to an independent auditing and verification process consistent with relevant requirements for SSD projects. The CEMP and OEMP will incorporate the controls committed to in this Amendment Report (refer to **Appendix C**).

### 7.1.2 Intergenerational Equity

The EP&A Regulation defines the principal of intergenerational equity as:

*‘that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.’*

Intergenerational equity refers to equality between generations. It requires that the needs and requirements of today’s generations do not compromise the needs and requirements of future generations in terms of health, biodiversity and productivity.

The Project is consistent with the principle of intergenerational equity in that the benefits provided by the Project to either the current generation or future generations are not at the expense of either.

The Project has relatively few environmental and social impacts to the present generation due to the proposed mitigation, offset and compensation provided. The benefits provided by the Project relate to

both the use of the products from the quarry (many of which will be used for the construction of infrastructure or other developments that will service both the current and future generations) and the economic benefits to the local and broader community, which assist the present generation but also support the continued economic development of the local region and State which will benefit future generations.

In particular, the Project will:

- Provide construction material that will support the construction and maintenance of roads and commercial development that will provide benefits to many future generations.
- Generate royalties (and other taxes) to the State which can be used to provide services to present generations and infrastructure which supports both present and future generations.

A range of environmental management and mitigation measures (summarised in **Appendix C**) have been developed and evaluated to minimise the impact on the environment as far as practicable. The design of the Project and commitment to the management of environmental issues as outlined in the EIS and this Amendment Report will maintain the health, diversity and productivity of the environment for future generations.

### **7.1.3 Conservation of Biological Diversity and Ecological Integrity**

The EP&A Regulation identifies that the principle of conservation of biological diversity and ecological integrity should be a fundamental consideration in the decision-making process. The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them. All environmental components, ecosystems and habitat values potentially affected by the Project and measures to ameliorate any negative impacts are described in the BDAR (refer to Appendix I). The NSW biodiversity offsetting scheme established under the *Biodiversity Conservation Act 2016* is specifically designed to ensure the conservation of biological diversity and ecological integrity.

The conceptual layout has been developed to maximise the use of existing disturbed areas and avoid and minimise impact to identified biodiversity and these impacts have been further reduced through the Amended Project design. Following the application of avoidance and mitigation measures, the BAM assessment has identified the biodiversity credit requirement to offset the impacts of the residual impacts of the Project and the required management and mitigation measures to be implemented. The principle of Conservation of Biological Diversity is therefore considered to be satisfied.

### **7.1.4 Improved Valuation and Pricing of Environmental Resources**

The goal of improved valuation of natural capital has been included in Agenda 21 of Australia's Intergovernmental Agreement on the Environment. The principle has been defined in the EP&A Regulation as:

*'that environmental factors should be included in the valuation of assets and services, such as:*

- (i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*

- (ii) *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
- (iii) *environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems’.*

The environmental consequences of the Project have been assessed in the EIS (refer to Section 6.0) and this Amendment Report (refer to **Section 6.0**) and mitigation measures identified for factors with potential for adverse impact (**Appendix C**). Implementing the mitigation measures would impose an economic cost on the proponent, increasing both the capital and operating costs of the Project. This signifies those environmental resources have been given appropriate valuation.

The Project has been designed with the objective of minimising potential impacts on the receiving environment. This indicates that the design for the Project has been developed with an environmental objective in mind.

### **7.1.5 ESD summary**

The aims, structure and content of the EIS and this Amendment Report have had regard to the consideration of ESD principles. The mitigation measures in **Appendix C** provide an auditable environmental management commitment to these parameters.

The Project is considered to meet the aims of ESD, due to the social, economic and environmental benefits identified in Section 6.14 and Section 6.15 of the EIS and the mitigation measures put in place to protect from adverse impacts on the environment (refer to **Appendix C**).

## **7.2 Project Justification**

The proposed Project Area represents a rare opportunity within the LHCC region to develop a large tonnage, quarry operation on geology that has been demonstrated to be ideally suited to the production of the full range of high-quality quarry products (including concrete, asphalt and sealing aggregates, gabion and crushed rock and armourstone). The proximity of the Project Area to key markets and existing State Road infrastructure (i.e., the Pacific Highway) would enable the Project to significantly ameliorate the existing and forecast medium to long term supply-side pressures of quarry materials for the LHCC region, as well as provide direct access to the Sydney market if required. These supply issues were identified in the Infrastructure Market Capacity 2023 Report (Infrastructure Australia, 2023), specifically ‘Recommendation 3’. These supply issues in turn affect concrete production (Infrastructure Australia, 2023).

With the possible exception of potential impacts on biodiversity values, the Project will have relatively minor environmental and social impacts. While the Project will necessitate the removal of vegetation and habitat for threatened species, the disturbance area has been further reduced through the Amended Project design refinements which reduce the area of vegetation disturbance from approximately 79 hectares to approximately 68 hectares and avoid impacts to one threatened plant species and one threatened ecological community and reduce habitat loss for a wide range of species. The increased

setback from the Balickera Tunnel and Nine Mile Creek also mitigate potential impacts to bats present in the tunnel through both reduced vibration impacts and reduced habitat loss.

Biodiversity impacts will be fully offset in accordance with the NSW biodiversity offsetting requirements which are based on a no-net-loss principle and impacts on koala habitat will be subject to a like-for-like offsetting requirements. Accordingly, the localised impacts on vegetation and fauna should be fully mitigated through offsetting requirements. It is noted that there are few opportunities for obtaining the quarry material necessary to meet the demand for quarry products which would not also require disturbance of similar or even larger areas of vegetation and potential threatened species habitat. Accordingly, the Project's impacts on biodiversity are largely unavoidable regardless of where the source of material is obtained.

The location of potential quarry projects is dictated by the location, scale and quality of rock material. The Stone Ridge resource is a scarce, large, high-quality hard rock resource suited to a wide range of quarry products which are in high demand. The Project is located close to areas with high demand for quarry product and its close proximity to the Pacific Highway means it is able to readily transport product to customers with minimal impacts on the local road network and surrounding residences and communities.

As outlined in Section 7.5 of the EIS and **Section 7.0** of the Amendment Report, the Project has been assessed against the principles of ecologically sustainable development as required by the EP&A Act and EP&A Regulation. This assessment has indicated that while the Project, like any large-scale development, would have impacts, these impacts can be effectively managed, mitigated and offset and the development will result in significant economic benefits to both the local and regional area as well as the State of NSW.

In economic terms, the Project is predicted to have net benefits to the State of NSW of approximately \$290 million in NPV terms at a 7% discount rate. The Project is predicted to have significant economic benefits to NSW under different discount rates tested and sensitivities to different price and costs assumptions. The Project is estimated to provide the following annual direct and indirect annual effects to the local economy:

- \$102 M in output.
- \$58 M in value-added.
- \$14 M in gross wages.
- 176 jobs.

The main environmental impacts associated with the Project are internalised into the production costs of ARDG via mitigation, offset and compensation costs. Residual local environmental impacts after mitigation, offset and compensation are likely to be immaterial.

The Project therefore provides a large, economically viable hard rock resource to meet existing and projected demand for quarry products with limited or fully mitigated environmental impacts. Having regard to the costs associated with impact mitigation and potential externalities, the Project is predicted to have significant social and economic benefits to the State of NSW and local region.

The assessment therefore concludes that the Project is consistent with the principles of ESD.

## 8.0 References

Australian & New Zealand Environment and Conservation Council (ANZECC), 1990. *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration*. September 1990.

Department of Environment and Climate Change (DECC), 2008. *Managing Urban Stormwater: Soils and construction - Volume 2e: Mines and quarries*.

Department of Planning and Environment (DPE), 2022. *State significant development guidelines – preparing an amendment report. Appendix D to the state significant development guidelines*.

Department of Planning and Environment – Water (DPE Water), 2022. Probable Vegetation Groundwater Dependent Ecosystems - Hunter / Central Rivers Dataset, available at:  
<https://datasets.seed.nsw.gov.au/dataset/probable-vegetation-gde-hunter-central-rivers>

Landcom, 2004. *Managing Urban Stormwater: Soils and construction - Volume 1, 4th Edition*.

Umwelt, 2022. Stone Ridge Quarry Project Environmental Impact Statement. Prepared on behalf of Australian Resource Development Group Pty Limited.

