

**Wedgerock Pty Ltd**

ABN: 15 099 038 123

# **Amendment Report**

**for the**

# **Karuah South Quarry Project**

**State Significant Development 17\_8795**

*Prepared by:*



**RWCorkery&co**

**September 2023**



## ACKNOWLEDGEMENT

*R.W. Corkery & Co. acknowledge and pay our respects to the Traditional Custodians of the lands comprising NSW and Australia on which our projects are located. We appreciate the knowledge, advice and involvement of the Elders and extended Aboriginal community that contribute to our Projects and extend our respect to all Aboriginal and Torres Strait Islander peoples.*



# Wedgerock Pty Ltd

ABN: 15 099 038 123

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for the

## Karuah South Quarry Project

State Significant Development 17\_8795

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# Executive Summary

Wedgerock Pty Limited (the Applicant) proposes to develop the Karuah South Quarry (the Project) involving the extraction and processing of hard rock resources for use in construction and infrastructure projects within the Hunter and Greater Sydney Metropolitan Regions. The Karuah South Quarry Site (the Site) covers approximately 27ha and is located approximately 40km north of Newcastle and 4km northeast of Karuah, New South Wales. The local context of the Site is presented in **Figure ES1**.

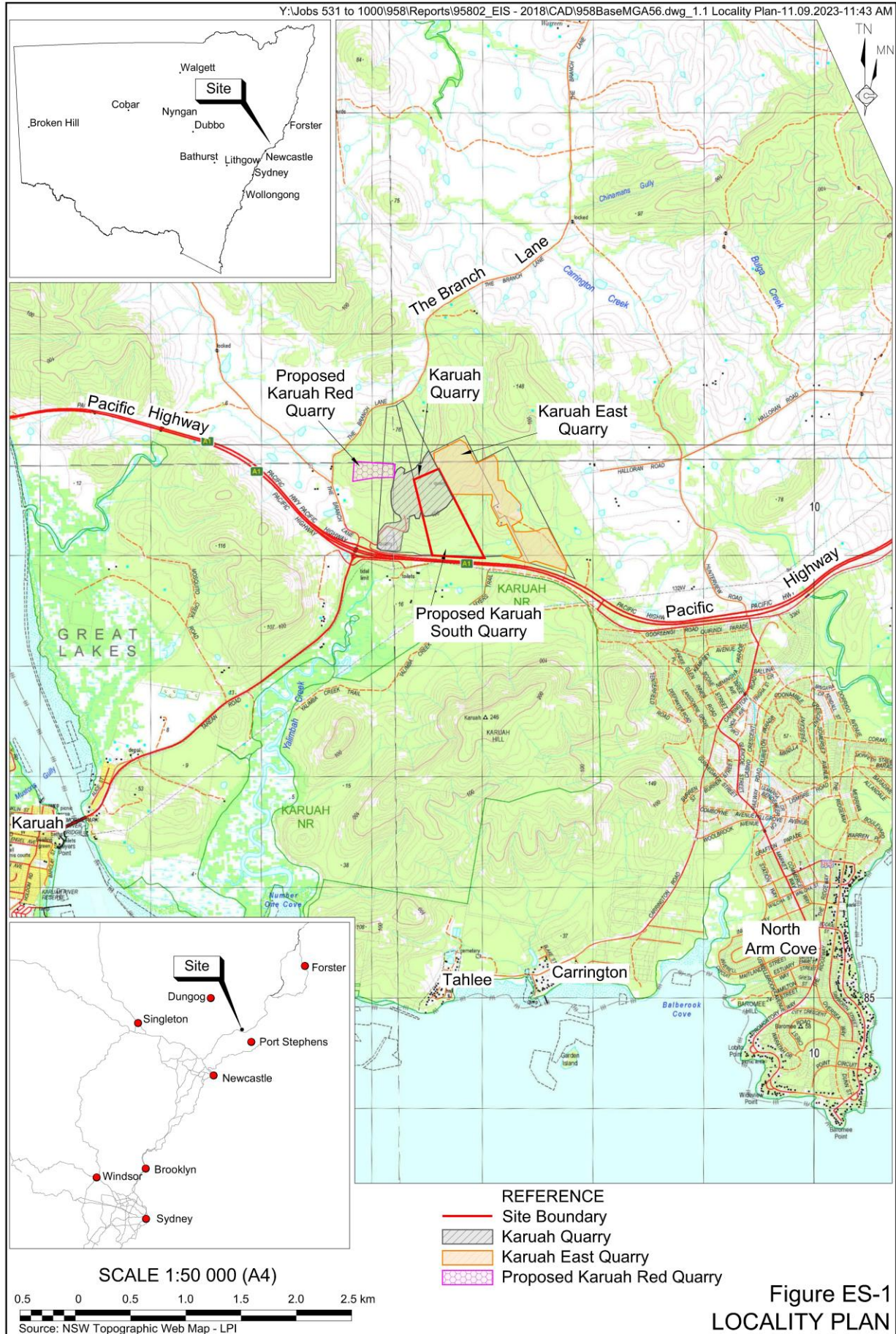
The Project would utilise conventional drill and blast, load and haul and processing methods to produce up to 600,000tpa of quarry products. These products would include aggregates, pavement products, manufactured sand and select fill. Extraction would be undertaken over five stages and it is expected that operations would continue for a period of approximately 25 years following Project commencement.

An Environmental Impact Statement (EIS) for the Karuah South Quarry (the Project) and supporting Specialist Consultant Studies Compendium (SCSC) were exhibited by the DPE from 24 April 2019 to 21 May 2019. A Submissions Report that responded to Government agency and community submissions and comments was submitted to DPE in October 2019.

After a period of delay, the Applicant proposes to amend Development Application SSD 17\_8795 (SSD 17\_8795) for the Project principally to relocate the Quarry Infrastructure Area to the extraction area floor of the existing Karuah Quarry due to the impending completion of extraction activities at this operation. The proposed relocation of the Quarry Infrastructure Area has necessitated the following changes the Project.

- The Extraction Area has been redesigned to commence in the north and expand progressively south. A smaller extraction area is also now proposed in order to provide visual mitigation and to increase the separation distance from the operation to the Pacific Highway.
- The Quarry Access Road has been redesigned to provide initial access to the Quarry Infrastructure Area with the development of a permanent access road between the Quarry Infrastructure Area to Blue Rock Close to include terminal operating areas, once developed.
- Redesign of the Project's surface water management system to account for the larger catchment area being used for the development and to capture and store water for on-site use while permitting occasional discharge of water of suitable quality.
- Up to 150,000t of clean fill material (virgin excavated natural material or VENM) would be imported during construction of the Quarry Access Road with ongoing import of VENM to be limited to 100,000tpa for construction activities and to support progressive rehabilitation of the Site.





Demand from industry sources supports the inclusion of ancillary activities in the development including aggregate pre-coating, concrete recycling, road base blending using a pugmill and a small concrete batching plant. These items were not included in the EIS. The inclusion of this infrastructure is consistent with modern quarrying practices. A range of materials would be imported to the Site for use including sand, cement and other components of concrete production, and concrete for recycling and blending with aggregates produced on site.

As a result of the proposed amendments, the following general outcomes have been achieved for the Project.

- All extractive industry processing equipment has been moved to the north, further from privately-owned residences and reducing the likely social amenity impacts.
- The Extraction Area has been reduced in scale and reoriented to provide for the orderly development of the Site from the north to the south.
- Vegetation clearing has been reduced by 4.54ha (from 11.59ha to 7.05ha) which is an approximately 40% decrease in native vegetation clearing.
- Additional vegetation retained on the southern section of Lot 11 DP 1024564 would improve visual shielding for views of the Quarry from the Pacific Highway compared to the original proposal. It is however noted that views from the Pacific Highway would still be possible during development of the amended Project. Views of quarry benches are present in this location and have been a feature of views in this location for many years.
- A separation distance between extraction operations and public road infrastructure has been increased to 300m, reducing the risk of blasting-related flyrock entering public areas.

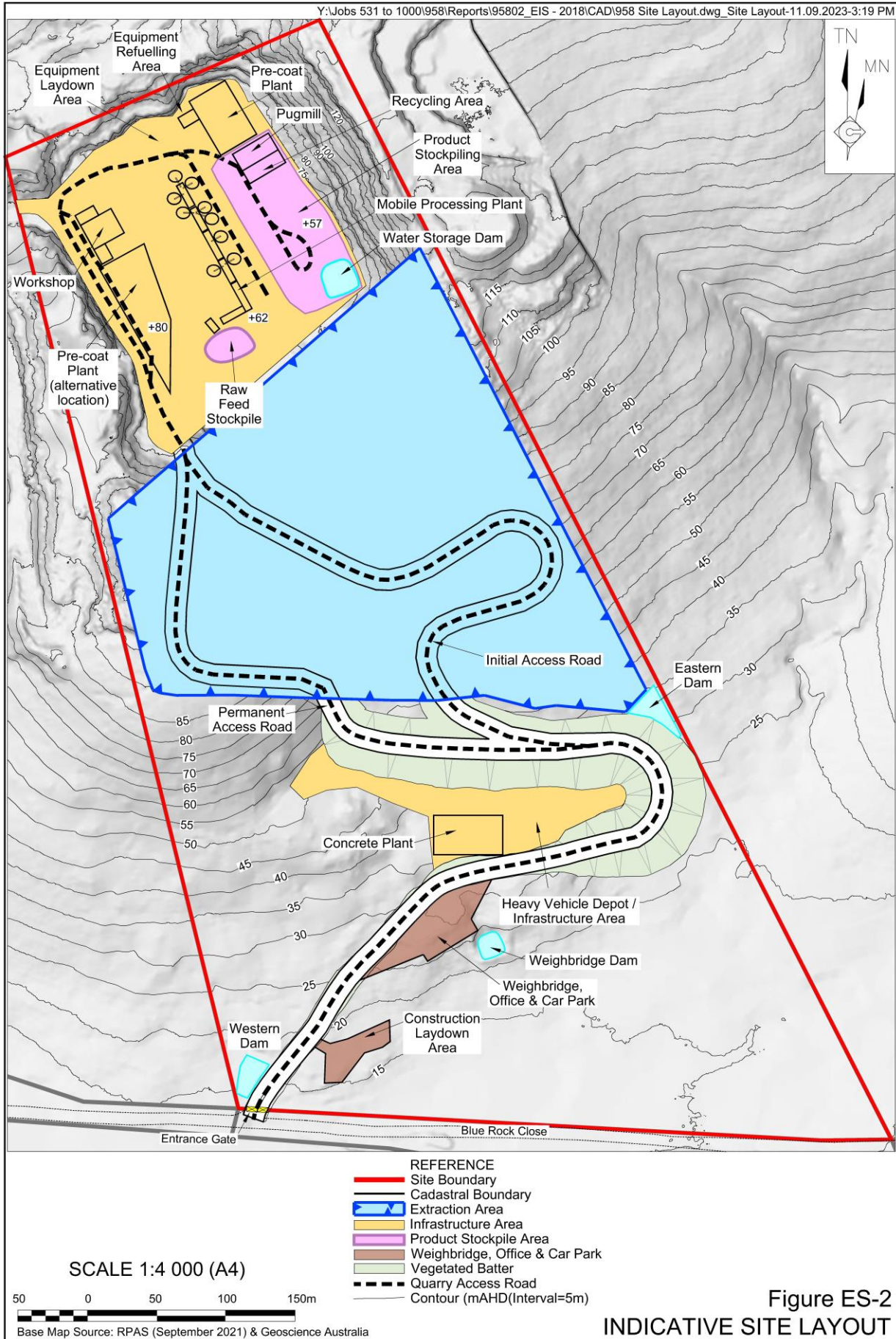
The importance of environmental flows to the Yalimbah Creek system has also been recognised in the design of the Site. The amended Project is a largely closed catchment and water storage dams have been designed and positioned to collect runoff from disturbed catchments, provide storage and where needed discharge. These areas have been separated from the south of the property to preserve the hydrologic function in receiving waters. The Applicant has also been mindful of previously identified concerns raised by oyster farmers with the Karuah River regarding water quality of discharge. The Site design ensures that, to the greatest extent possible, environmental flows would be retained and water quality remain acceptable. All water demand for the Project operations would be supplied under harvestable rights and therefore do not place any additional demand on the water resources of the Karuah River catchment or the Yalimbah Creek catchment.

**Table ES1** presents an overview of the proposed amendments to the original Project. **Figure ES2** displays the principal components of the Project and **Figure ES3** presents a comparison of the Site Layout presented within the EIS and the indicative Site Layout for the amended Project.



**Table ES1**  
**Amended Project Summary**

<b>Element</b>	<b>Original Project</b>		<b>Amended Project</b>	
Project Area	Lot 11 DP 1024564		Lot 11 DP 1024564	
Resource	<b>Rock Type</b>	<b>Tonnes</b>	<b>Rock Type</b>	<b>Tonnes</b>
	Overburden and Weathered Rock	2,197,000	Overburden and Weathered Rock	1,300,000
	Fresh Rock	10,140,000	Fresh Rock	7,257,000
	<b>Total Rock</b>	<b>12,337,300</b>	<b>Total Rock</b>	<b>8,556,000</b>
Project Area Footprint	<b>Project Area</b>	<b>Approximate Area (ha)</b>	<b>Project Area</b>	<b>Approximate Area (ha)</b>
	Quarry Site	21.0	Quarry Site	27.0
	Extraction Area	10.8	Extraction Area	7.6
Amended Staging	Two stages, each comprised of three sub-stages (six stages total)		Five stages	
Quarry Infrastructure Area	A purpose-built pad on the southern section of Lot 11 DP 1024564 that would be progressively enlarged.		Located in the terminal floor of the extraction area of the Karuah Quarry.	
Processing Facilities	Mobile processing plant		Mobile processing plant Pre-coat Plant Pugmill Concrete Recycling (20,000tpa)	
Ancillary Activities	None		Concrete Batching Plant (20,000m <sup>3</sup> per annum)	
Design Controls for Visual Amenity Mitigation	10m high faces with 5m wide benches to be revegetated.		5m high faces with 5m to 10m wide benches to be revegetated.	
Final Landform	Water storage with natural overflow at 28m AHD and possible industrial use.		Water storage with natural overflow at 35m AHD and possible industrial use.	
Production Rate	Staged increase to maximum production. <ul style="list-style-type: none"> <li>• 200 000tpa in Year 1</li> <li>• 250 000tpa in Year 2</li> <li>• 300 000tpa in Years 3 to 5</li> <li>• 600,000tpa from Year 6</li> </ul>		Maximum of 600,000tpa from Year 1.	
Project Life	Project life = 25 years		Project life = 25 years	
Water Management Strategy	Use of sumps and water storages to collect and store water for on-site use. Use of sediment basins with perimeter drains and clean water diversions to discharge water as needed.		Use of sumps and water storages to collect and store water for on-site use. Use of high efficiency sediment basins to treat and discharge water as needed.	
Native Vegetation Clearing	Total vegetation clearing of 11.59ha		Native vegetation clearing reduced to 7.05ha (approximately 40% reduction)	
Biodiversity Offsetting Obligations	Total of 274 ecosystem credits across four Plant Community Types 345 Koala species credits		Staged offsetting obligations including 176 ecosystem credits across four Plant Community Types 203 Koala species credits	
Blast Clearance Zone	146m from Blue Rock Close and the Pacific Highway		300m from Blue Rock Close and the Pacific Highway	





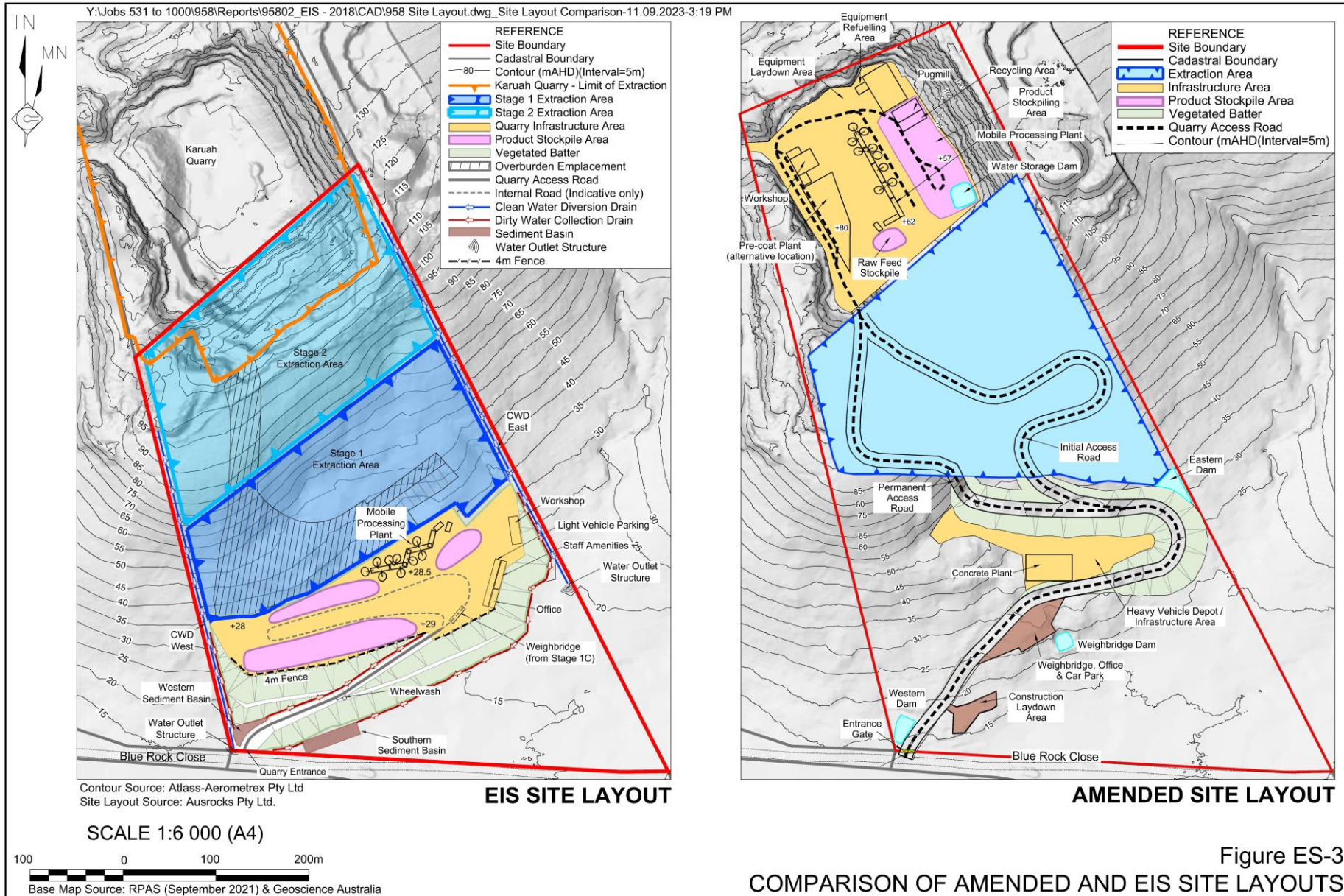


Figure ES-3  
COMPARISON OF AMENDED AND EIS SITE LAYOUTS

The following presents a summary of the environmental assessment outcomes for the amended Project.

### **Blasting Risks - Flyrock**

The *Flyrock Assessment* prepared by Prism (2023) has demonstrated that safe blasting can be achieved with clearance distances of less than 500m subject to strictly controlled conditions including the careful nomination of blasting parameters. The following summarises the outcomes of the assessment.

- Flyrock management through carefully controlled blasting parameters would be implemented to achieve the nominated maximum flyrock range of 75m.
- A blast clearance zone of 300m for personnel and public infrastructure would achieve a FOS of four based on the nominated conservative blasting parameters.
- Some Project-related infrastructure and infrastructure within the adjacent quarrying operation would be within 150m of blasting in some locations. Initial blasts are not likely to be at a greater distance and the Karuah Quarry operations are expected to cease by the end of 2023. Both the Applicant and Hunter Quarries acknowledge and accept the risks of blasting proximity and have signed a cooperative agreement on blast management to manage these risks for both parties.
- No public roads would need to be closed or temporary access restrictions implemented for blasting activities. Prism (2023) has recommended that management of traffic on Blue Rock Close be included in risk assessment processes but is not expected to be required. Blue Rock Close is a public road but generally only used to access the quarrying operations in the locality.

### **Visual Amenity**

The Project would result in a change to the landscape that would be most obvious over an approximately 1km stretch of Pacific Highway to the southeast of the Site. Views from this location are assessed to have a moderate landscape character impact but are ultimately considered acceptable given the short time of viewing and as this is a view already experienced along the Pacific Highway in this region. Views would be available for motorists travelling north on the Pacific Highway, however these would be minor when compared with the existing views of the Karuah Quarry. During Stage 1 of the Project, terminal operating areas of the Site would become visible. However, these would appear beside the existing Karuah Quarry and be mostly obscured by retained vegetation. The approach to rehabilitation of these faces would improve the appearance of this component of the Site compared to the Karuah Quarry.

The adoption of the proposed design and operational mitigation would reduce visual impacts to the greatest extent possible and mitigate possible views through the establishment of screening vegetation. The Site has been designed to encourage successful vegetation establishment on upper benches and to enable effective screening in the final landform. The establishment of vegetation on the upper benches would effectively minimise contrasts and soften views of the exposed upper sections of the extraction area. Importantly, the rehabilitated landform would blend into the surrounding vegetated landscape without any substantive long-term impacts. Possible visual impacts would also be reduced under the amended Project through the retention of vegetation to the south of the extraction area.

## **Air Quality**

The air quality impacts of the amended Project show a general overall decrease in predicted Project-related annual and 24-hour average emissions in comparison to those assessed for the EIS.

Northstar (2023) identified that the predicted contributions of all airborne dust emissions generated by Project-related activities, coupled with existing background concentrations and assumed contributions of surrounding quarrying operations would comply with all applicable short-term (i.e. 24-hour) and annual average assessment criteria at all privately-owned residences.

Exceedances were identified at receivers situated on adjacent quarry-owned land. However, these exceedances were driven by operations on those properties and were largely considered to be already present. Therefore, it is concluded that the Project would not lead to an unacceptable level of environmental harm or impact at assessed receivers.

## **Noise and Vibration**

Spectrum (2023) found that no exceedances of noise emission or blasting criteria are predicted to occur as a result of the Project. When compared to the assessment that accompanied the EIS, noise-related impacts for the Project have been reduced through the relocation of most noise sources to the former Karuah Quarry extraction area away from private residences. However, during operations the inclusion of concrete batching on the southern section of the Site would increase potential noise generation in this location and may result in noise levels that approach the nominated project trigger noise levels that have been adopted considering noise generated by vehicles on the Pacific Highway.

## **Biodiversity**

Impacts to native vegetation are anticipated through the direct clearing of approximately 7.05ha of native vegetation. The proposed amendment would result in a reduction to proposed vegetation clearing by approximately 4.54ha or approximately 40% of the originally proposed extent of clearing. This clearly demonstrates measures to avoid vegetation clearing as much as practically possible. The direct clearing and subsequent development of the proposed area of disturbance would represent a permanent impact, or loss, of this native vegetation and habitat.

No prescribed biodiversity impacts are anticipated from the Project, including impacts to threatened species. A number of threatened species have been identified within the Site, however an assessment of the impact to these species has concluded that the Project would not significantly exacerbate existing impacts. Limitations to fauna movement across Lot 11 DP1024564 have been identified as a greatest risk to fauna as a result of the Project. Measures have been incorporated into the Project design to maintain fauna movement across the property as described in Section 6.6.3. The amended Project has reduced obstacles to fauna movement to mostly a proposed 15m road and a canopy gap of an estimated 37m. Impacts to water quality and hydrological processes within the minor tributary of Yalimbah Creek could potentially constitute a prescribed impact, however, impacts to this tributary are to be avoided through the design of the Project.

Whilst the Project would result in residual impacts to native flora and fauna, it is not expected to result in significant impacts upon migratory or threatened species, assuming the implementation of the range of on-site mitigation measures and the proposed Biodiversity Offset Strategy.



## Surface Water

Based on the implementation of the proposed water management system as well as the installation and operation of the proposed discharge treatment infrastructure, the potential impacts of the Project, with regard to surface water would be negligible as:

- the proposed site water management strategy would ensure the efficient use of water resources whilst reducing impacts of water availability to downstream users to the extent practicable;
- most disturbed sub-catchments would be hydraulically disconnected and incapable of discharging sediment-laden runoff to the receiving environment; and
- when required, controlled discharge would be undertaken via “continuous flow” high efficiency sediment basins with inflows treated to ensure discharge water quality meets specified criteria.

Whilst the Project would cause a minor reduction in discharge to downstream environments as the result of the capture and storage of runoff from those sub-catchments disturbed by Project-related activities, this volume of runoff would not reduce water availability to downstream users.

In addition, as the water demand of the Project would be met by rainfall and runoff captured on the Site, no additional demand would be placed on the water resources of the area. This strategy of capture, re-use and recycling provides for the efficient use of water resources whilst simultaneously reducing the likelihood of the discharge of potentially sediment-laden water from the Site.

## Social Impacts

Although community consultation for the amended Project has identified that the community generally agrees that the amendments to the Project “make sense” and would improve social amenity outcomes, there remain concerns about exacerbation of existing impacts and the cumulative outcomes of the additional operation. This remains a key issue, especially for community members within the identified Principal Amenity Impact Area. These concerns would be somewhat mitigated by the expected completion of operations at the Karuah Quarry upon commencement of the Karuah South Quarry.

Overall, social risk outcomes have improved under the amended Project, principally due to the avoidance or reduction in social amenity impacts relating to noise, dust and visual amenity. In addition, the commitment to reduce vegetation clearing for the Project was positively perceived by the community, noting that several community members retain their objection to any vegetation clearing in this location.

As described in the EIS, a range of mechanisms have been proposed to present information to the community on an ongoing basis and to gather feedback annually for presentation in reporting to regulators. This is intended to establish a process to resolve or improve the identified conflict between community expectations and predicted operations, assuming that the identified mitigation and management measures are successfully implemented, the Project would operate with only minor additional social impacts and with acceptable cumulative social impacts. Where community concerns may remain, mechanisms would be established to incorporate this feedback into adaptive management of the operation. This would benefit the social outcomes of both the existing operations and the Project.

## Conclusion

The Project, incorporating the proposed amendments, continues to be considered in the public interest as it would provide an acceptable balance of environmental and social outcomes, whilst generating substantial economic and social benefits for the local, regional and State economies. The Project would effectively replace the resource supply currently provided by the Karuah Quarry but would do so in a manner that is consistent with modern quarrying development standards and regulations.

The Project has been amended to improve environmental outcomes, principally to social amenity (noise, dust and visibility), blast-related risks and through a 40% reduction in native vegetation clearing. These were all matters raised in consultation with the local community and NSW Government agencies. The location of the Site within an existing hard rock resource precinct would limit land use conflicts and build upon the existing successful extractive industry development that has been supplying essential construction materials for over twenty years. Importantly, the environmental aspects of the Project have been assessed cumulatively with those of the adjoining quarries with the collective impacts determined to be acceptable.

Consultation with the local community has identified that some in the community are experiencing impacts from existing quarrying operations and fear these would be exacerbated by an additional operation. Technical assessment undertaken for the Project predicts that both cumulatively and alone, the Project would satisfy the relevant guidelines and criteria established in the relevant environmental planning instruments and regulatory guidance. The perceptions of the community concerning the development would be monitored each year and reported in the Annual Review for the Project in order to track and adapt management of social risks.

The Project would have a visual impact legacy for motorists traveling on the Pacific Highway, however the design of the Project has allowed for measures to improve rehabilitation outcomes and retain screening vegetation in the southern section of the Site. In this manner the views of the Site would be obscured or would be blended with the natural environment as much as possible. Views of quarry benches are present in this location and have been a feature of views in this location for many years. As a result, the location is not as sensitive to the proposed change as may be expected and the management and mitigation would be an improvement on the current views of quarry faces.

On balance, the Project is considered to be in the public interest as it:

- has been designed to allow for efficient access to an important hard rock resource while incorporating feedback from the local community and government agencies;
- would be developed in an environmentally responsible manner that is mindful of the possible cumulative impact with nearby quarrying operations;
- is supported by comprehensive environmental, social and economic assessment that demonstrates that the Project may be operated to satisfy relevant statutory goals and criteria, environmental objectives and reasonable community expectations; and
- would contribute towards the supply of aggregates, pavement products and manufactured sand in the Hunter and Greater Sydney Regions;
- provide ongoing employment opportunities throughout the MidCoast and Port Stephens LGAs; and
- contribute to the continued economic growth at local, regional, State and National levels through flow-on effects.

# 1. Introduction

## 1.1 Scope

Wedgerock Pty Limited (the Applicant) proposes to amend Development Application SSD 17\_8795 (SSD 17\_8795) for the Karuah South Quarry (the Project) principally to relocate the Quarry Infrastructure Area to the extraction area floor of the existing Karuah Quarry due to the pending completion of extraction activities at this operation. The proposed relocation of the Quarry Infrastructure Area has necessitated the following changes the Project.

- The Extraction Area has been redesigned to commence in the north and expand progressively south. A smaller extraction area is also now proposed in order to provide visual mitigation and to increase the separation distance from the operation to the Pacific Highway.
- The Quarry Access Road has been redesigned to provide initial access to the Quarry Infrastructure Area with the development of a permanent access road between the Quarry Infrastructure Area to Blue Rock Close to include terminal operating areas, once developed.
- Redesign of the Project's surface water management system to account for the larger catchment area being used for the development and to capture and store water for on-site use while permitting occasional discharge of water of suitable quality.
- Up to 150,000t of clean fill material (virgin excavated natural material or VENM) would be imported during construction of the Quarry Access Road with ongoing import of VENM to be limited to 100,000tpa for construction activities and to support progressive rehabilitation of the Site.

Demand from industry sources supports the inclusion of ancillary activities in the development including aggregate pre-coating, concrete recycling, road base blending using a pugmill and a small concrete batching plant. These items were not included in the EIS. The inclusion of this infrastructure is consistent with modern quarrying practices. A range of materials would be imported to the Site for use including sand, cement and other components of concrete production, and concrete for recycling and blending with aggregates produced on site.

This *Amendment Report* describes the proposed development taking into account the relocation of the Quarry Infrastructure Area, ancillary operations and the resulting changes to the Site layout and design. An updated assessment of residual impacts for the amended Project is provided as well as an updated evaluation and justification of the Project, noting the overall benefits of the proposed amendments. This *Amendment Report* presents only the proposed amendment to incorporate the proposed changes to the Project. All other matters relating to the environmental, social and economic outcomes of the Project are presented in the EIS and *Submissions Report*. An Amended Project Description is presented in **Appendix 1** and an amended summary of all proposed environmental management and monitoring measures is presented in **Appendix 2**.



## 1.2 Background

An *Environmental Impact Statement* (EIS) (RWC, 2019a) was prepared for the Project and publicly exhibited from Wednesday 24 April 2019 until Tuesday 21 May 2019. During that period, 61 submissions were received by the Department of Planning and Environment ("DPE") from the public, community organisations and government agencies. A comprehensive response to the matters raised in submissions responding to the EIS is presented in the *Submissions Report* for the Project (RWC, 2019a) that has been provided to DPE. Each of these documents is available to be viewed from the DPE Major Projects Portal<sup>1</sup>.

A request for the agreement of the Planning Secretary (or their delegate) to an amendment to the Project in accordance with Clause 55AA of the *Environmental Planning and Assessment Regulation 2000* was submitted on 19 November 2021 through the Major Projects Planning Portal. Confirmation of agreement to the amendment was provided on 13 December 2021<sup>2</sup>.

## 1.3 Project Overview

Wedgerock proposes to develop the Karuah South Quarry (the "Site") involving the extraction and processing of hard rock resources for use in construction and infrastructure projects within the Hunter and Greater Sydney Metropolitan Regions. The Site covers approximately 27ha and is located approximately 40km north of Newcastle and 4km northeast of Karuah, New South Wales (see **Figure 1.1**). The local site context is presented in **Figure 1.2** including the location of approved adjacent quarrying operations and a proposed new quarry.

- Karuah Quarry – operated by Hunter Quarries Pty Ltd (Hunter Quarries)
- Karuah East Quarry – operated by Karuah East Quarry Pty Ltd (a subsidiary of Hunter Quarries).
- Karuah Red Quarry – proposed by Hunter Quarries (EIS in preparation)

The Project would utilise conventional drill and blast, load and haul and processing methods to produce up to 600,000tpa of quarry products. These products would include aggregates, pavement products, manufactured sand and select fill. Extraction would be undertaken over five stages and it is expected that operations would continue for a period of approximately 25 years following Project commencement.

After a period of delay, Wedgerock is now planning to take advantage of the pending closure of the Karuah Quarry and amend the development application to relocate site infrastructure to within the floor of the existing Karuah Quarry Extraction Area. As a result of the proposed amendments, the following general outcomes have been achieved for the Project.

- All extractive industry processing equipment has been moved to the north, further from privately-owned residences and reducing the likely social amenity impacts.
- Vegetation clearing has been reduced by 4.54ha (from 11.59ha to 7.05ha) which is an approximately 40% decrease in native vegetation clearing.

<sup>1</sup> See <https://www.planningportal.nsw.gov.au/major-projects/projects/karuah-south-quarry>

<sup>2</sup> Both the letter request and agreement response are available from the NSW Major Project Planning Portal page for the Project <https://pp.planningportal.nsw.gov.au/major-projects/projects/karuah-south-quarry>

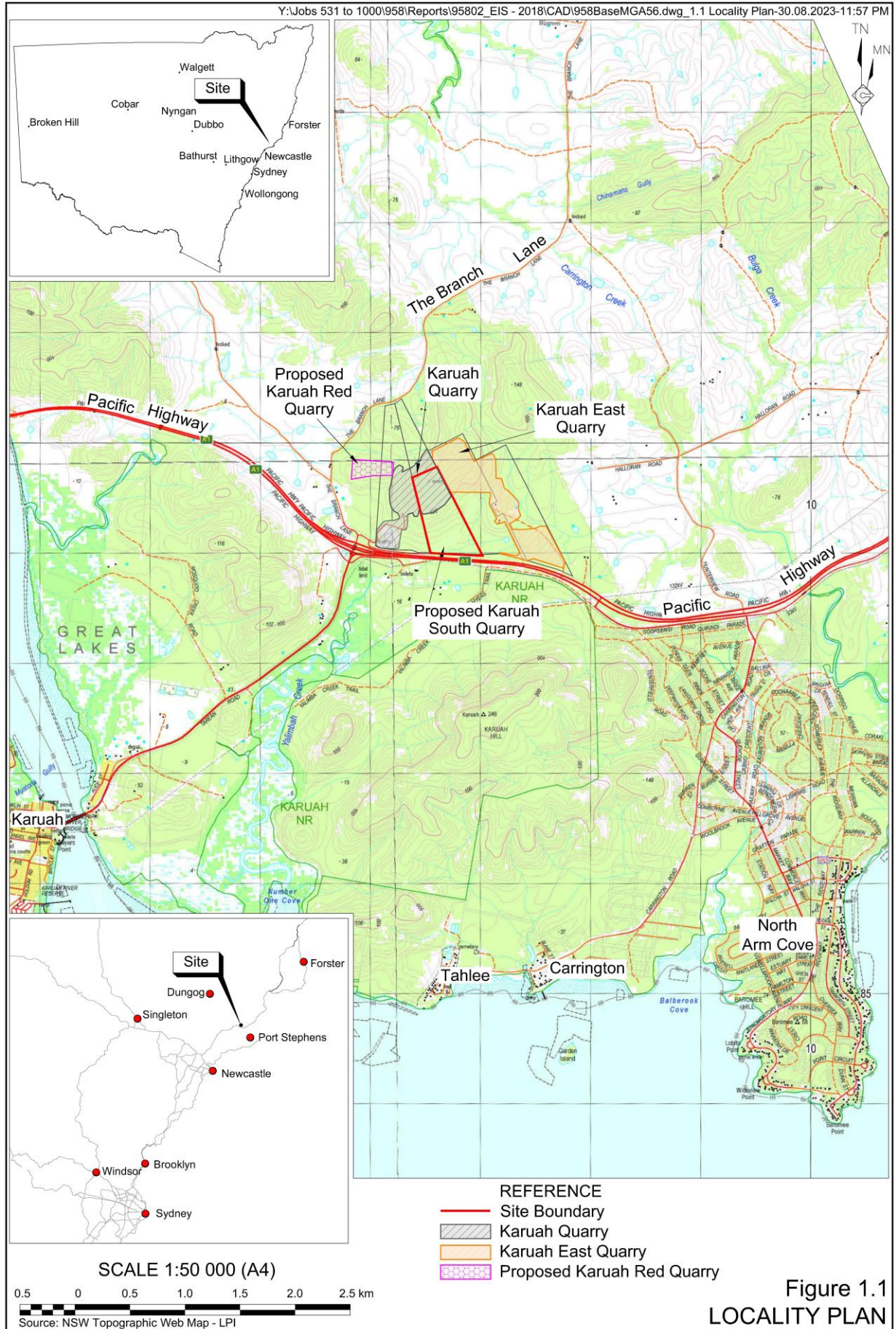


Figure 1.1  
 LOCALITY PLAN





Y:\Jobs 531 to 1000\958\Reports\95802 EIS - 2018\CAD\958BaseMGA56.dwg 1.2 Quarry Operations-15.08.2023-3:51 PM

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Base Photo Source: Nearmap 13 December 2022

REFERENCE

- Site Boundary
- ▨ Karuah Quarry
- Karuah East Quarry
- ▨ Proposed Karuah Red Quarry
- - - Karuah Red Quarry Access Road

Figure 1.2  
 LOCAL SITE CONTEXT

- Additional vegetation retained on the southern section of Lot 11 DP 1024564 would improve visual shielding for views of the Quarry from the Pacific Highway compared to the original proposal. It is however noted that views from the Pacific Highway would still be possible during development of the amended Project. Views of quarry benches are present in this location and have been a feature of views in this location for many years.
- A separation distance between extraction operations and public road infrastructure has been increased to 300m, reducing the risk of blasting-related flyrock entering public areas.

## 2. Strategic Context

### 2.1 Resource Demand

The Project is located in a strategic hard rock resource precinct that has been selected for historic development due to the high quality of the material to be extracted and location adjacent to the Pacific Highway. Previous development of the surrounding land as extractive industries and the testing undertaken on the hard rock resource within the Site support the conclusion that the Project would produce a high quality hard rock product for use in a variety of industries. Resource demand for the Hunter and Sydney regions remains strong with the following indicators of demand for the products of the Quarry.

- The pending closure of the Karuah Quarry would remove up to 500,000tpa of approved supply from the market.
- The need for infrastructure investment in NSW, including within the Hunter region, is identified in several key State and regional strategy documents and the NSW Government has committed over \$108 billion in infrastructure spending over the four years to 2025<sup>3</sup>.
- Demand for construction materials has grown due to investment in post-COVID infrastructure stimulus and to support maintenance of roads in response to recent flooding periods.

The Project would support the economy of the Hunter region by generating employment, supply contracts and in providing essential construction materials.

### 2.2 Local Landownership and Land Uses

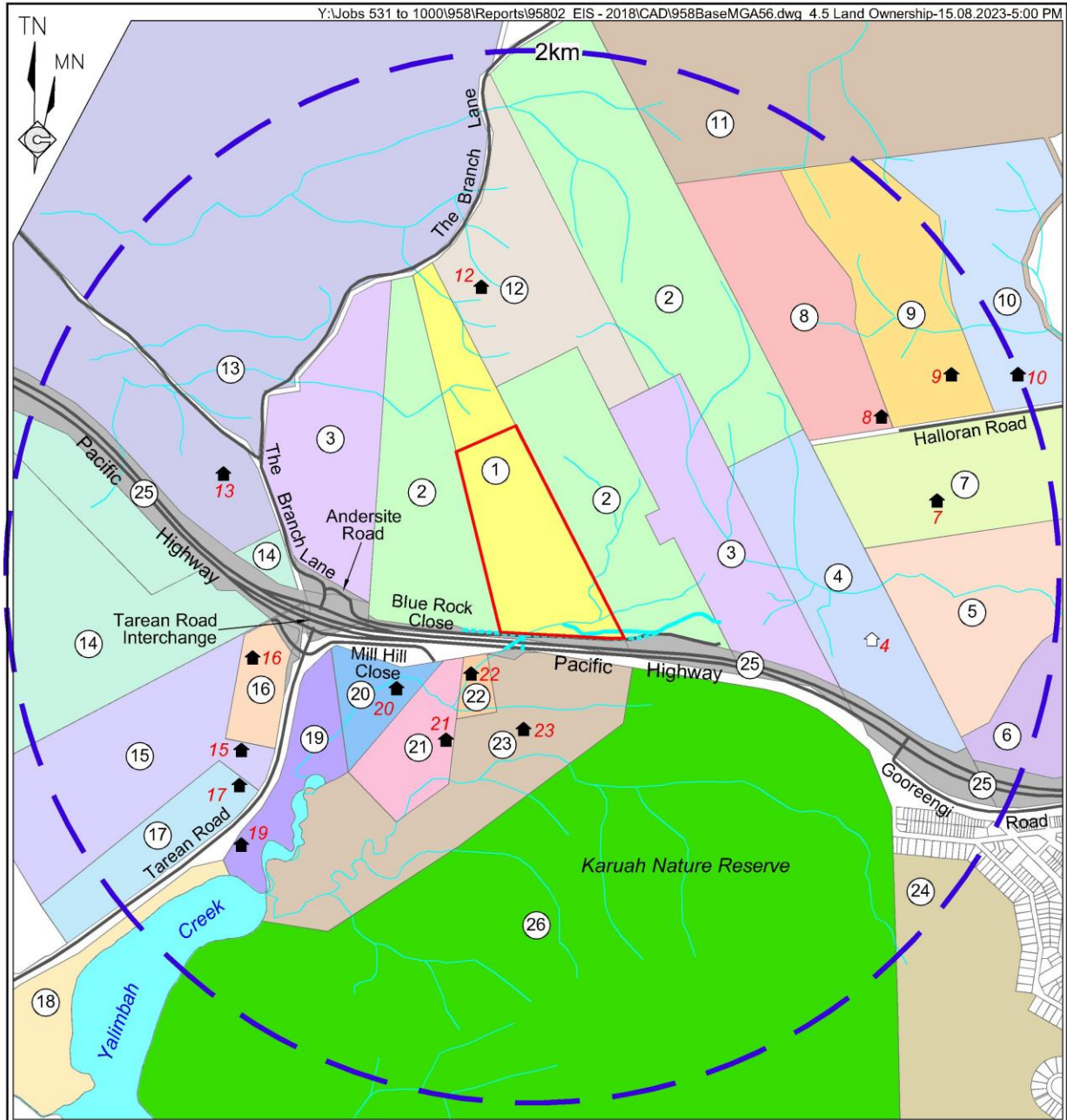
The existing land ownership within and surrounding the Site is shown on **Figure 2.1** and local land uses are displayed in **Figure 2.2**.

The Site is located between two existing quarries and the Pacific Highway. The location within an existing hard rock resource precinct would limit land use conflicts and build upon the existing successful extractive industry development that has been supplying essential construction materials for over twenty years. Extractive industry is the only known industry proximal to the Site.

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<sup>3</sup> See Future Transport 2056: Regional NSW Services and Infrastructure Plan (TfNSW, 2019), Hunter Regional Plan 2041 (NSW Government, 2022), NSW State Infrastructure Strategy (NSW Government, 2014 and Strategic Regional Land Use Plan: Upper Hunter Infrastructure (NSW Government, 2012)





- REFERENCE
- Site Boundary
  - Sealed Road
  - Watercourse/Drainage Line
  - Longitudinal Drain and Culvert
  - Former Watercourse
  - Cadastral Boundary
  - ① Landowner Reference
  - ▲ Privately-owned Residence
  - ⬜ Resource Company-owned Residence
  - 19 Sensitive Receiver Identifier

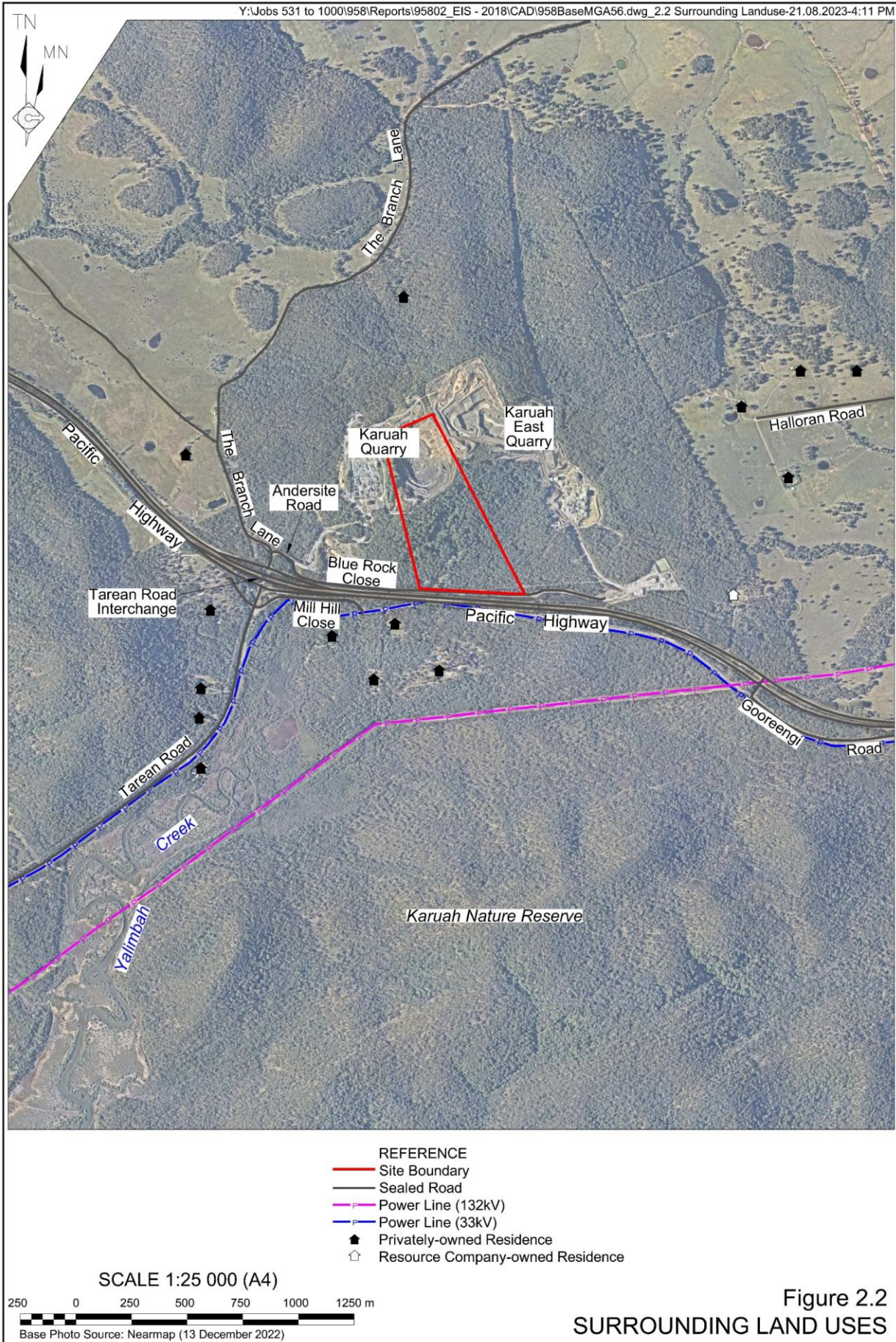
SCALE 1:25 000 (A4)

250 0 250 500 750 1000 1250 m

Landowner Source: Department of Lands Online Search - February 2019  
Cadastral Boundary Source: © NSW Department of Finance and Services  
Panorama Avenue Bathurst NSW 2795 www.lpi.nsw.gov.au

Figure 2.1  
LAND OWNERSHIP







Considering the pending closure of the Karuah Quarry, the Project would effectively replace the production capacity of that operation, albeit with both extraction and processing in slightly different locations. Given the close proximity of these two operations it may be considered that the Project effectively extends the production capacity of the land for a further 25 years. The key difference being that the Project would be operated and regulated in accordance with the strict standards of modern State Significant Development.

A total of fourteen privately-owned rural-residential properties are located within a 2km radius of the Site largely south of the Site on the southern side of the Pacific Highway. Larger rural properties are located to the north and west of the Site. Four residences are located east of the Site but are closer to the existing Karuah East Quarry.

The Pacific Highway is located immediately to the south of the Site. Land to the south of the Pacific Highway generally comprises a small number of medium sized landholdings, substantial areas of which are heavily vegetated. These landholdings primarily consist of residential lifestyle lots ranging between 2ha to 10ha. The Karuah Nature Reserve adjoins many of these lots and comprises heavily vegetated land spanning to the Karuah River approximately 4km to the southwest of the Site. North Arm Cove, a residential suburb within the MidCoast LGA, extends to within approximately 1.5km southeast of the Site.

Much of the land to the north of the Pacific Highway comprises large lifestyle lots (up to ~40ha) with many owners only present on the weekend. These lots are typically heavily vegetated. Extensive areas to the north of the Pacific Highway have also been cleared and are utilised for grazing. These lots typically range from between 40ha to >250ha.

The Site is currently used for quarrying (the Karuah Quarry), passive nature conservation and exploration activities. Selective logging has historically occurred on the Site however, the extent of logging has been limited due to the comparatively steep nature of the topography.

## 2.3 Hunter Regional Plan 2041

The Hunter Regional Plan 2041 (HRP) (NSW government, 2022) was released by the NSW Government in December 2022 with the aim of providing an overarching framework that would guide more detailed land use plans, development proposals, and infrastructure funding decisions within the Hunter region. The previous EIS discusses the strategic relevance of the Hunter Regional Plan 2036, which has since been superseded. A summary of key aims of the HRP is below, as well as how the amendment aligns with the HRP.

### **Objective 1: Diversify the Hunter's mining, energy, and industrial capacity**

The Hunter region is a coal dependent economy, and as the world begins transitioning away from coal as a source of energy, areas like the Hunter region need to diversify. Crushed hard rock quarries are in high demand in the Hunter and Sydney Metropolitan Regions, making extractive industries a viable way to continue diversifying away from coal.

The region is reliant on the coal industry for employment, so a crucial part of planning for the future is ensuring that employment in other industries can grow. Creating jobs on previously disturbed land is an effective way of diversifying and minimising environmental harm. By repurposing the former extraction area of the Karuah Quarry, the Project creates jobs while utilising previously disturbed land.



## **Objective 2: Support the right of Aboriginal residents to economic self-determination**

Throughout the preparation of the original EIS in 2018, an Aboriginal Cultural Heritage Assessment was undertaken, focusing on cultural, historic, archaeological, and aesthetic values. This process involved consultations with three registered Aboriginal parties. No Aboriginal sites, modified trees, or Potential Archaeological Deposits were found in the Study Area.

The recommendations that came from the assessment focus on ceasing work if unanticipated Aboriginal objects or Aboriginal Ancestral Remains are discovered, and continuing consultation with the registered Aboriginal Stakeholders. Upon approval, these recommendations will be followed.

## **Objective 3: Create 15-minute neighbourhoods to support mixed, multi-modal, inclusive and vibrant communities**

Objective 3 discusses the importance of developing '15-minute' neighbourhoods throughout the Hunter Region. A key element in developing connected communities in regional communities is high quality infrastructure and transport. The Project provides an increase in construction supplies in the region. The Project will not only contribute to developing neighbourhoods by providing construction materials, but also through supplying jobs in the general vicinity of the town of Karuah.

## **Objective 4: An inter-connected and globally-focused Hunter without car dependent communities**

The HRP discusses the need to move away from car dependent communities, as well as the importance of maintaining an efficient freight network.

As mentioned above, the Project provides high quality hard rock materials that can assist in infrastructure construction and restoration of freight infrastructure.

## **Objective 5: Plan for 'nimble neighbourhoods', diverse housing and sequenced development**

There is a significant need for more diverse, affordable, and resilient housing and development in the Hunter Region to support growing communities. Not only does there need to be an increase in housing, but elements such as infrastructure and employment must be improved to maintain nimble neighbourhoods.

The Project would be developed on land which was previously disturbed from extractive industry, and currently features an terminal extraction area. The surrounding properties are also being used for extractive industry. Therefore, this land would not be suitable for housing or residential uses. Developing a quarry on the Site allows for further resources, economic growth, and employment opportunity without sacrificing land that could be sufficient for housing.

### **Objective 6: Conserve heritage, landscapes, environmentally sensitive areas, waterways and drinking water catchments**

Conservation is an important consideration in many elements throughout the HRP. The amendment to the Project has been designed to further minimise effects on biodiversity in comparison to the original EIS. The Project would further minimise the vegetation clearing that is necessary and would relocate processing equipment to within the floor of the former extraction area of the Karuah Quarry.

The design process followed the ‘avoid, minimise, offset hierarchy’, in order to best conserve the environment in the area.

### **Objective 7: Reach net zero and increase resilience and sustainable infrastructure**

Safety and hazard-resilience have been a key focus in the HRP and in the development of the Project. The relocation of the extraction areas in the amendment have moved the activity further away from Blue Rock Close and the Pacific Highway, to reduce risks of flyrock.

The relocation of the extraction area reduces clearing of trees. The additional trees will contribute to reducing the Projects net carbon emissions.

### **Objective 8: Plan for businesses and services at the heart of healthy, prosperous and innovative communities**

The HRP discusses the importance of businesses and services within communities. This objective focuses on main streets and town centres, which is not relevant regarding the location of the Project.

### **Objective 9: Sustain and balance productive rural landscapes**

Objective 9 of the Plan discusses the importance of quarries for the supply of construction materials, aggregates, sand, and gravel in New South Wales

The Karuah South Project will allow the Region to continue meeting the future demand of essential construction materials. The Project will produce both hard rock construction materials and secondary aggregates that will contribute directly to development.

## **2.4 MidCoast 2032: Shared Vision, Shared Responsibility Community Strategic Plan 2022-2032**

The MidCoast 2032: Shared Vision, Shared Responsibility Community Strategic Plan 2022-2032 (CSP) (MidCoast, 2021) was developed in 2021 with the aim of outlining the key values and visions for the future of the community. The five key values are discussed in relation to the Project below.

## **Community Outcome 1: A Resilient and Socially Connected Community**

Community Outcome 1 of the CSP emphasises the importance of having a safe, connected, and diverse community. It is necessary to support the youth population and uphold health and safety standards.

The Project would benefit the community through increased employment opportunities and supply of construction materials for development. These factors positively contribute to connecting the community. Employment opportunities give people of all ages more reason to stay in the community for longer periods of time. This is especially relevant to youth, as they finish school and might otherwise feel inclined to leave the community for more employment opportunities.

Upholding health and safety standards is a key concern in creating a resilient and socially connected community. The Project would be operated in a manner that is mindful of the safety of both quarry personnel and the local community.

## **Community Outcome 2: An Integrated and Considered Approach to Managing our Natural and Built Environments**

Community Outcome 2 discusses how protection, maintenance, and rehabilitation of the natural environment is a key value for the MidCoast community.

Planning for the Project has placed an emphasis on balancing the needs of the natural environment with the social risks and benefits and the economic outcomes of the Project. The amended design has a focus on reducing environmental impacts as much as possible while still promoting the attainment of the economic and social benefits the Project. Reducing the disturbance footprint of the development and relocating the processing area to the former extraction area of the Karuah Quarry would positively affect environmental outcomes.

## **Community Outcome 3: A Thriving and Strong Economy**

Community Outcome 3 focuses on a need to continue growing the strong economy of the community and the region. Further education and employment opportunities are crucial to achieve this outcome.

Not only will the Project benefit the local economy by creating new employment opportunities, but it will also help to circulate more money into the community.

## 3. Description of the Amendment

**Table 3.1** presents an overview of the proposed amendments to the original Project. An Amended Project Description is presented as **Appendix 1**. All plans presented in the original Project Description have been updated in the amended Project Description. **Figure 3.1** displays the principal components of the Project and **Figure 3.2** presents a comparison of the Site Layout presented within the EIS and the indicative Site Layout for the amended Project.

**Table 3.1**  
**Amended Project Summary**

Page 1 of 2

Element	Original Project		Amended Project	
Project Area	Lot 11 DP 1024564		Lot 11 DP 1024564	
Resource	<b>Rock Type</b>	<b>Tonnes</b>	<b>Rock Type</b>	<b>Tonnes</b>
	Overburden and Weathered Rock	2,197,000	Overburden and Weathered Rock	1,300,000
	Fresh Rock	10,140,000	Fresh Rock	7,257,000
	<b>Total Rock</b>	<b>12,337,300</b>	<b>Total Rock</b>	<b>8,556,000</b>
Project Area Footprint	<b>Project Area</b>	<b>Approximate Area (ha)</b>	<b>Project Area</b>	<b>Approximate Area (ha)</b>
	Quarry Site	21.0	Quarry Site	27.0
	Extraction Area	10.8	Extraction Area	7.6
Amended Staging	Two stages, each comprised of three sub-stages (six stages total)		Five stages	
Quarry Infrastructure Area	A purpose-built pad on the southern section of Lot 11 DP 1024564 that would be progressively enlarged.		Located in the terminal floor of the extraction area of the Karuah Quarry.	
Processing Facilities	Mobile processing plant		Mobile processing plant Pre-coat Plant Pugmill Concrete Recycling	
Ancillary Activities	None		Concrete Batching Plant	
Design Controls for Visual Amenity Mitigation	10m high faces with 5m wide benches to be revegetated.		5m high faces with 5m to 10m wide benches to be revegetated.	
Final Landform	Water storage with natural overflow at 28m AHD and possible industrial use.		Water storage with natural overflow at 35m AHD and possible industrial use.	
Production Rate	Staged increase to maximum production. <ul style="list-style-type: none"> <li>• 200 000tpa in Year 1</li> <li>• 250 000tpa in Year 2</li> <li>• 300 000tpa in Years 3 to 5</li> <li>• 600,000tpa from Year 6</li> </ul>		Maximum of 600,000tpa from Year 1.	

**Table 3.1 (Cont'd)**  
**Amended Project Summary**

Page 2 of 2

<b>Element</b>	<b>Original Project</b>	<b>Amended Project</b>
Project Life	Project life = 25 years	Project life = 25 years
Water Management Strategy	Use of sumps and water storages to collect and store water for on-site use. Use of sediment basins with perimeter drains and clean water diversions to discharge water as needed.	Use of sumps and water storages to collect and store water for on-site use. Use of high efficiency sediment basins to treat and discharge water as needed.
Native Vegetation Clearing	Total vegetation clearing of 11.59ha	Native vegetation clearing reduced to 7.05ha (approximately 40% reduction)
Biodiversity Offsetting Obligations	Total of 274 ecosystem credits across four Plant Community Types 345 Koala species credits	Staged offsetting obligations including 176 ecosystem credits across four Plant Community Types 203 Koala species credits
Blast Clearance Zone	146m from Blue Rock Close and the Pacific Highway	300m from Blue Rock Close and the Pacific Highway

The following presents a summary of the amended Project components and a brief rationale for the changes proposed.

### **Extraction Area**

At full development, the extraction area would cover approximately 7.6ha to a floor with an elevation of approximately 12m AHD. The extraction area would be developed in a staged sequence to yield approximately 8.6 million tonnes of raw materials for processing or management.

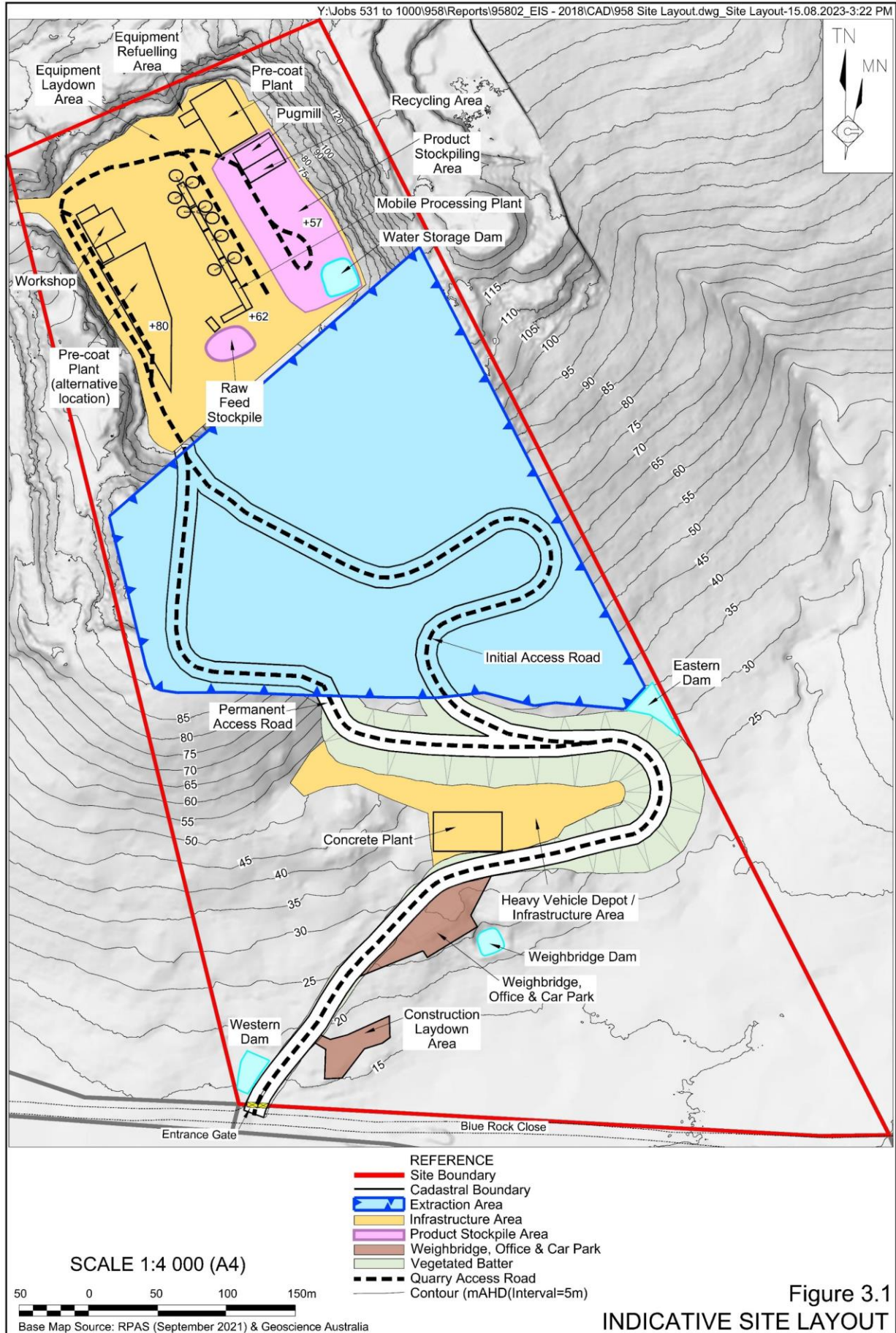
Changes to the extraction area design and location have necessitated a reduction to total accessible resource volume. Furthermore, these changes to the extraction area design would enable a greater separation distance to public areas (Blue Rock Close and the Pacific Highway) as well as retaining native vegetation on the southern section of Lot 11 DP 1024564.

### **Quarry Infrastructure Area**

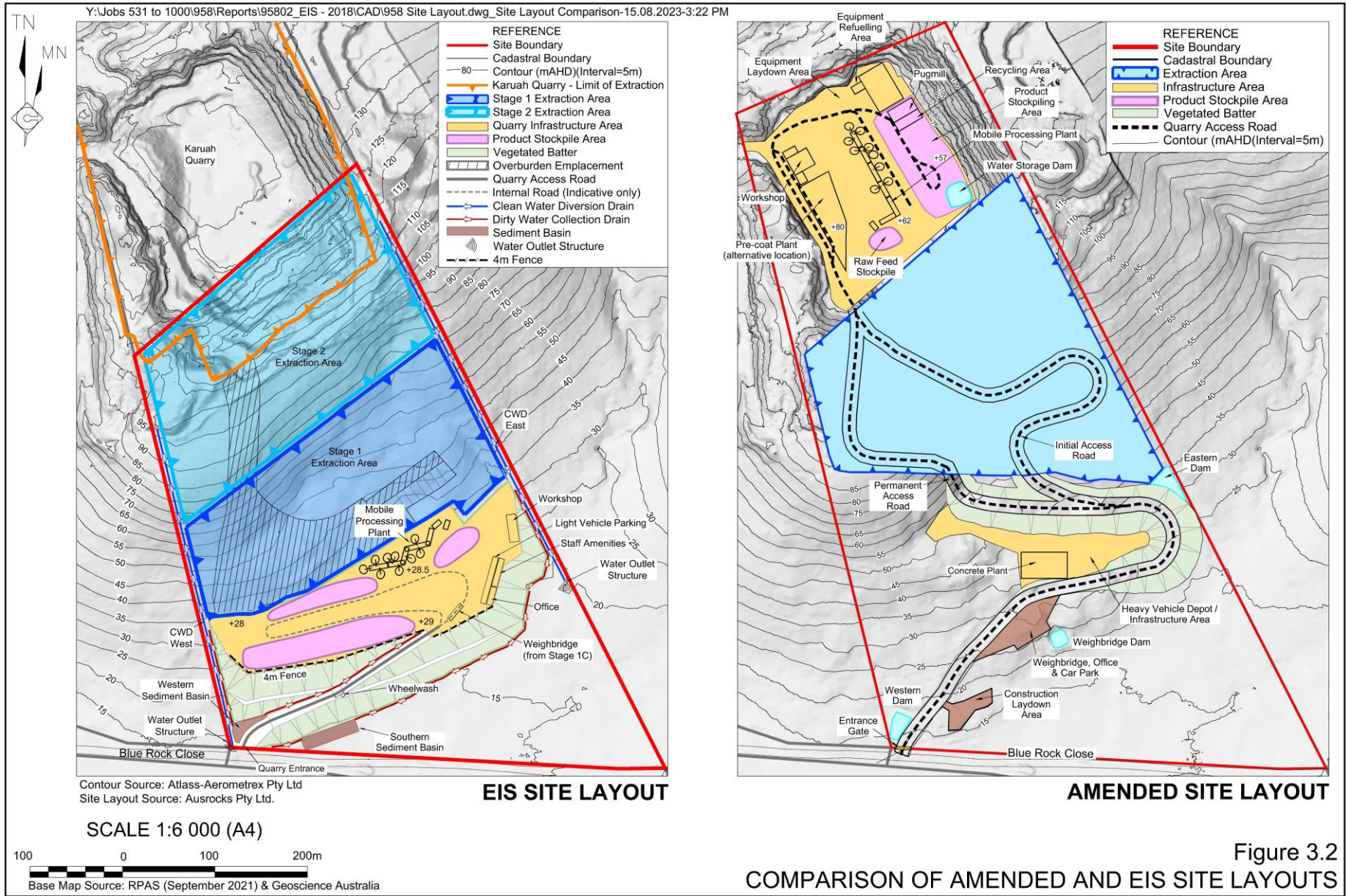
The approximately 3.5ha Quarry Infrastructure Area would comprise three sections, at different elevations, that would be located within the former extraction area of the Karuah Quarry. These sections would incorporate the product stockpiling area, ancillary infrastructure and Water Storage Dam (east), mobile processing plant and raw material stockpile (central) and the workshop area and possible pre-coat plant (west). The mobile processing plant would incorporate a range of crushers and screens and would be located in the central section of the Quarry Infrastructure Area.

The relocation of the Quarry Infrastructure Area to the north of the proposed extraction area would result in a reduction to social amenity impacts due to the greater separation distance of processing activities and product loading and despatch from privately-owned residences to the south of Lot 11 DP 1024564.









### **Weighbridge, Office and Car Park**

A weighbridge, office and car park would be constructed on previously disturbed land on the southern section of Lot 11 DP 1024564. The weighbridge would be located approximately 165m from the quarry entrance. The area would also include a wheel wash and a biocycle septic system. Water for the wheel wash would be supplied from the existing Weighbridge Dam to the south of the weighbridge area.

### **Internal Road Network**

The Quarry Access Road would extend from the quarry entrance, past the Weighbridge, Office and Car Park Area, through the western edge of the Extraction Area to the Quarry Infrastructure Area. To achieve suitable grade for trucks, this road would require sections of cut and fill. Areas of fill would be battered and vegetated once constructed. The realigned Quarry Access Road is necessary to provide access to the Quarry Infrastructure Area from Blue Rock Close. An initial access road would be constructed with a permanent access road developed during Stage 1 of the Project and then used for the remainder of the Project Life.

A network of roads would provide access for off-road haul trucks between the extraction and processing areas.

### **Heavy Vehicle Depot / Infrastructure Area**

The approximately 0.75ha Heavy Vehicle Depot / Infrastructure Area would be utilised for the parking of mobile equipment, principally heavy vehicles used for the road transportation of quarry product. A small concrete plant would be developed in this area. This area would be situated north of the Weighbridge, Office and Car Park Area.

The Heavy Vehicle Depot / Infrastructure Area would not be developed at the commencement of the Project but only once demand for truck parking and/or concrete products are identified.

### **Water Management Infrastructure**

Water management infrastructure would have separate functions within the Site.

- Capture and storage of stormwater within the extraction area and Quarry Infrastructure Area for pollution control and use within the Site for dust management.
- Capture and storage of water within the Weighbridge Dam for use in the wheel wash.
- Internal transfer, treatment and discharge of water in the Western Dam and the Eastern Dam in order to manage dam capacities in the extraction area and Quarry Infrastructure Area.

### **Ancillary Processing Plant**

The Quarry Infrastructure Area has been designed to incorporate the following ancillary processing plant.

- Pre-Coat Plant – Pre-coat Plant operations would involve the application of a combination of diesel hydrocarbon and bituminous film to crushed aggregate to give the material an adhesive coating that benefits application in road construction and maintenance.



- Concrete Recycling – The Applicant would import and process approximately 20,000tpa of concrete and use the material as a component of blended products for sale.
- Pugmill – A Pugmill would be used to facilitate the production of road base products.

In addition, a conventional concrete batching plant may be developed within the Heavy Vehicle Depot and Infrastructure Area with the capacity to produce up to 20,000m<sup>3</sup> of concrete per annum.

Each of these items has been identified by industry partners as providing a benefit for the Applicant's customers, and to facilitate greater supply and competition for a wider range of value added quarry products. This equipment has become common in the modern quarrying industry and would expand the products able to be prepared at the Site and assist in meeting client demands. Given the location of this infrastructure, the inclusion of these items is not likely to increase the cumulative to have increased the social amenity impacts of the Project.

### Residual Biodiversity Impacts

The relocation of the Quarry Infrastructure Area and reduction to the extraction area for the Project has enabled an overall reduction to residual biodiversity impacts through vegetation clearing.

Vegetation clearing has been reduced by 4.54ha (from 11.59ha to 7.05ha) which is an approximately 40% decrease in native vegetation clearing. This reduction has resulted in a commensurate decrease in the biodiversity offsetting obligations of the Project.

Since the publication of the EIS, additional measures have also been applied to promote fauna movement across the property. These include the following.

- Retain a wider swathe of vegetation in the southern section of the property compared to that proposed in the EIS to remove obstacles to fauna movement.
- Construction of a 20m long culvert beneath the access road. The culvert would be a minimum of 1.5 m in height and width and include furniture (e.g. horizontal logs placed off the ground and no more than 600 mm below the culvert ceiling) for safe ground crossing in the vicinity of the access road.
- Vehicle speed on the Quarry access road would be limited to 30km/hr to reduce the potential for vehicle strike of crossing fauna.
- Signage at the entrance of the Quarry and again at the exit of the Infrastructure and Product Stockpile Areas would remind drivers of all vehicles of the possible presence of fauna and that the area may be used as a Koala crossing. There would also be signage indicating the required vehicle speed in this location.
- Overhead rope bridges would be constructed to permit arboreal fauna to cross safely at canopy height to enter vegetation on either side of the Quarry Access Road.

- Product despatch operations would be limited to the hours of 5:00am to 6:00pm Monday to Friday and 5:00am to 1:00pm Saturday. As fauna such as Koala are generally nocturnal movers, transport operations would avoid the highest risk periods for vehicle strike.

It is acknowledged that the land directly to the east of Lot 11 DP 1024564 has been established as a biodiversity offset and it is intended that the above measures would assist movement from that property across the locality. It is noted that the reduced overall vegetation clearing (by 4.54ha) would assist these processes. In addition, the relocation of Quarry Infrastructure Area has reduced the identified canopy gap to 37m, associated with only the Quarry Access Road.

## 4. Statutory Context

The proposed amendment does not change the statutory context for the Project as described in detail in Section 3.3 of the EIS. While there have been changes to legislation and planning policies and strategies since the exhibition of the EIS (and the provision of SEARs for the Project), these do not relate to the proposed amendment and therefore are not triggered by this *Amendment Report*.

The statutory context for the Project and the proposed amendment is presented in **Table 4.1**. Statutory compliance matters relating to pre-conditions to exercise the power to grant approval, and the mandatory matters that must be considered by the consent authority, are listed in Tables A3.1 and A3.2 in **Appendix 3**.

**Table 4.1**  
**Statutory Context for the Karuah South Project**

Page 1 of 2

Matter	Project Relevance
Power to grant consent	<p>The Project is classified as SSD under Clauses 7(1)(a &amp; b) of Schedule 1 of the <i>State Environmental Planning Policy (Planning Systems) 2021</i> (SEPP (Planning Systems)). The Project Development Application (DA) will therefore require assessment under Division 4.7 of Part 4 of the <i>Environmental Planning and Assessment Act 1979</i> (EP&amp;A Act).</p> <p>The consent authority for the Project will be the Minister for Planning and Environment or the Independent Planning Commission under delegation from the Minister.</p>
Permissibility	<p>The proposed Site is situated on land that is zoned RU2 (Rural Landscape) under the <i>Great Lakes Local Environmental Plan</i> (Great Lakes LEP).</p> <p>The Great Lakes LEP identifies that extractive industries are permissible with consent within this zone and as a result, the Project is permissible with consent.</p>
Other approvals (Consistent Approvals)	<p>Section 4.42 of the EP&amp;A Act identifies a range of approvals that must be applied consistently to any SSD consent granted. The following approvals will be required for the Project and are covered by this requirement.</p> <ul style="list-style-type: none"> <li>An Environment Protection Licence under Chapter 3 of the <i>Protection of the Environment Operations Act 1997</i> (POEO Act) to permit extractive activities as the Project would exceed the 30,000t extraction and processing trigger specified in Clause 19(3) of Schedule 1 of the POEO Act. The operation would also need to be licenced for resource recovery and waste storage associated with the proposed import of VENM for landscaping and rehabilitation and the proposed import and temporary storage of concrete for recycling.</li> <li>Permits issued by MidCoast Council under Section 138 of the Roads Act 1993 for works associated with the proposed site entrance intersection upgrades.</li> </ul>
Other approvals (EPBC Act Approvals)	<p>Approval under the Commonwealth Government's <i>Environment Protection and Biodiversity Conservation Act 1999</i> will not be required as an ecological survey of the Site concluded that the level of impact(s) on species and communities listed under the EPBC Act would be such that it is not necessary to refer the Project to the then Commonwealth Department of Environment.</p> <p>Therefore, approval from the Commonwealth Minister for the Environment will not be required for the Project to proceed.</p>

**Table 4.1 (Cont'd)**  
**Statutory Context for the Karuah South Project**

Page 2 of 2

Matter	Project Relevance
Other approvals (Not required)	<p>Section 4.41 of the EP&amp;A Act identifies that if development consent is granted for SSD the following relevant authorisations that would otherwise have been required for the Project are not required.</p> <ul style="list-style-type: none"> <li>• A permit under section 201, 205 or 219 of the <i>Fisheries Management Act 1994</i>;</li> <li>• An approval under Part 4, or an excavation permit under section 139, of the <i>Heritage Act 1977</i>;</li> <li>• An Aboriginal heritage impact permit under section 90 of the <i>National Parks and Wildlife Act 1974</i>;</li> <li>• A bush fire safety authority under section 100B of the <i>Rural Fires Act 1997</i>;</li> <li>• A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the <i>Water Management Act 2000</i>.</li> </ul>

## 5. Engagement

### 5.1 Government Agency Consultation

Wedgerock has consulted with NSW Government agencies throughout the development application process, and as assessment has progressed to provide updates on the Project and seek more information concerning requests or recommendations made during agency review of the assessment outcomes.

For the purpose of the proposed amendment the following specific engagement has occurred.

- The NSW Department of Planning and Environment have been informed of the application status and progressive planning of the amended Project. This has included several phone call and virtual meetings.
- Mid Coast Council were contacted on several occasions via email to provide an update on the application and the proposed amendment. No response was received to any attempt at consultation.
- The Department of Regional NSW – Fisheries and Aquaculture Management branch was contacted to identify the most appropriate contacts for consultation with oyster farmers within the Karuah River. No direct comments on the Project were received but information regarding the Project was passed on to relevant parties.

### 5.2 Community and Stakeholder Consultation

#### 5.2.1 Local Community

RWC continued to undertake community consultation for the Project on behalf of the Applicant following the exhibition period. A Community Information Session was held on 11 September 2019 at the Karuah Community Hall between 6:00pm and 7:30pm, principally to provide an overview of the responses to the key issues raised in submissions prior to the lodgement of the Submissions Report (RWC, 2019b). The discussion at the session enabled the draft text within the Submissions Report to be modified to more clearly explain the information assembled in some responses. The outcomes of the 2019 Community Information Session are further discussed in the Submissions Report (RWC, 2019b).

After a period of delay during which the proposed amendment was planned, a second Community Information Session was held on 13 April 2023 at the Karuah Community Hall between 5:30pm and 7:00pm to present an overview of the proposed amendment and invite any feedback from the community.

A flyer was distributed to the residents of Karuah, North Arm Cove, Carrington and The Branch during the week commencing 3 April 2023 inviting community members to attend the session and providing an overview of the amended Project (see **Appendix 4**). This flyer was also distributed to community members living beyond these localities where an address and/or email address was available (i.e. submitters and community members who had registered for Project

updates), and to Kate Washington MP, the Member of Parliament for Port Stephens. Furthermore, notification of the event was sent on 5 April 2023 via SMS to community members who had previously registered their mobile number for Project updates.

The Community Information Session was attended by a total of six community members, one of whom was a representative of Hunter Quarries. At the session, a presentation was made to inform attendees of the proposed amendment to the Project and justify the changes to the Site Layout. Questions raised by community members were also answered at the meeting. Community Feedback Forms were distributed to attendees with the invitation to provide written feedback during or after the event (see **Appendix 4**). No Community Feedback Forms were returned at the time this document was finalised.

Section 5.3 presents a summary of the principal matters raised by community members at the Community Information Session or through phone calls with RWC representatives, and where each issue is addressed in this report.

### 5.2.2 Registered Aboriginal Parties

As identified in Section 5.8 of the EIS, the following three Aboriginal parties registered their interest in the Project during initial consultation in 2018.

- Didge Ngunawal.
- Divine Diggers.
- Karuah Local Aboriginal Land Council (LALC).

The registered Aboriginal parties were engaged in the Aboriginal Cultural Heritage Assessment processes (Biosis, 2018a) and an additional meeting were held with the Karuah LALC in February 2019.

In early July 2023, an information letter describing the proposed amendment was distributed via email to all registered Aboriginal parties, requesting any comments or queries to be provided. A follow up email was sent in early August 2023. No responses were received at the time this document was finalised.

### 5.2.3 Oyster Committee and Port Stephens Shellfish Program

Consultation with the NSW Farmers Association: Oyster Committee and the Port Stephens Shellfish Program was undertaken following the public exhibition of the EIS to identify potential issues of concern to the local oyster industry. Based on discussions with representatives from these organisations held at Karuah on 1 August 2019, two key areas of concern were identified.

1. Disappointment that no approach was made by either the Applicant or NSW government agencies regarding to the Project, despite the potential implications to the oyster industry as the result of upstream land use changes.
2. The potential for sediment-laden discharges from the Site to impact on water quality at Port Stephens and the subsequent implications on the oyster industry.

During the discussions with the representatives of the organisations, RWC was able to explain the mitigation measures that would be adopted. It was also learnt that key issues affecting water quality in the various oyster leases were sewerage discharge, septic tank overflows, contaminated sediments and stormwater runoff. RWC was able to assure the representatives that the Project would not pose a risk to water quality from the Site as a result of sediment in stormwater runoff being generated on a contaminated catchment. In addition, it was identified that the Quarry would utilise a pump-out system for the management of human waste and would ensure that this system was properly maintained and operated.

In subsequent correspondence, dated 16 August 2019, RWC provided a formal response to the concerns raised by the Committee and the Port Stephens Shellfish Program including a detailed analysis of the mitigation measures that would be implemented by the Quarry Applicant to manage the risk of sediment-laden runoff. A written response from the Chair of the NSW Farmers Association: Oyster Committee (Mr Dean Cole) was received on 24 September 2019 which acknowledged that all members of the Committee were satisfied with the outcomes of the consultation undertaken by RWC in relation to the proposed Karuah South Quarry. A copy of this correspondence is included in **Appendix 4**.

In early July 2023, RWC attempted to contact the previously identified representatives of the NSW Farmers Association: Oyster Committee and the Port Stephens Shellfish Program. As these attempts were unsuccessful, RWC initiated contact with an officer from the Fisheries and Aquaculture Management branch within the Department of Regional NSW in order to identify relevant contacts within the local oyster industry and distribute information letters about the proposed amendment. No responses were received from local oyster industry representatives at the time this document was finalised.

## 5.2.4 Hunter Quarries

As discussed in Section 1.5.2 of the EIS, two existing quarry operations are located adjacent to the Site, namely:

- Karuah Quarry – operated by Hunter Quarries Pty Ltd (Hunter Quarries); and
- Karuah East Quarry – operated by Karuah East Quarry Pty Ltd (a subsidiary of Hunter Quarries).

The Karuah Quarry operations have previously been conducted on the central section of Lot 11 DP 1024564 by Hunter Quarries under a licence agreement with Mr Kiely, the Managing Director of Wedgerock Pty Ltd. The Karuah Quarry also operates on sections of Lot 21 DP 1024564. Due to the overlap between the originally proposed Stage 2 Extraction Area and Karuah Quarry's approved limit of extraction, the Applicant had engaged with Hunter Quarries to determine their expected date when extraction would cease within Lot 11 DP 1024564 and rehabilitation commence.

Since the publication of the EIS, the Applicant has continued to engage with Hunter Quarries on a range of matters and provided progressive updates on the proposed amendments. During this time the companies agreed to a Co-Operative Blasting Agreement that covers the following general elements.

- Identification of extraction areas and clearance offsets.
- Blast scheduling and notification.



- Blast clearance and shot firing requirements.
- Blast impact monitoring and reporting.
- Communication and information sharing.
- Dispute resolution.

The Applicant has been informed that extraction activities with the Karuah Quarry would cease upon commencement of the Karuah South Quarry, enabling the use of the former extraction area floor for the Quarry Infrastructure Area taking advantage of existing disturbance areas to reduce environmental impacts of the operation. In addition, Hunter Quarries has commenced rehabilitation of the Karuah Quarry with a focus on those areas that would not be used for the Project.

Prior to the Community Information Session held on 13 April 2023, a representative from Hunter Quarries was notified of the event. The representative commented that community members had been contacting Hunter Quarries regarding the proposed Quarry and requested that community members were made aware that the Karuah South Quarry was not proposed by nor the responsibility of Hunter Quarries. This matter was clarified with community members during the Community Information Session.

## **5.3 Community Feedback**

A number of questions were raised by attendees during the Community Information Session held on 13 April 2023 and two community members have contacted RWC representatives via telephone prior to and after the Community Information Session to discuss the Project. The matters raised are broadly summarised, as follows.

- Generally, community members agreed that the amended Site Layout – especially the relocation of the processing area into the completed Karuah Quarry extraction area and the retention of vegetation in the south of the Site “makes sense” and would improve noise, dust and visual amenity impacts, especially from vantage points along the Pacific Highway to the south. One attendee anticipated that the amended layout would worsen visual amenity impacts as they have direct view of the existing Karuah Quarry terminal faces from their property.
- It was also noted that the continued use of the completed Karuah Quarry extraction area would delay rehabilitation activities.
- The value held by the community for the natural environment in the vicinity of the Site is well understood and concerns were raised about the clearance of native vegetation and the need for wildlife corridors to mitigate impacts on local threatened species.
- Concerns were raised regarding the cumulative noise, dust, and traffic impacts of the existing Karuah East Quarry, the proposed Karuah South Quarry, and the Karuah Red Quarry proposed by Hunter Quarries. These concerns were consistent with comments made during the preparation of the EIS and from consultation for the Social Impact Assessment.

- Some community members commented that excessive dust and noise is generated by processing activities at existing quarries. One attendee believed that these impacts had caused health and safety risks such as nose bleeds and observable vibration at local properties (even at a distance of 11km from the existing operations). While the direct influence that existing operations are having on the health of the community cannot be determined, this is expected by the community to continue under the Project.
- One attendee expressed a lack of confidence in the quarry Applicants and in government regulators to investigate, manage and report on impacts adequately and to take corrective action if unacceptable or non-compliant impacts occur. There remains an issue of trust and the need for accountability.

Discussion with community members also included general Project queries regarding the development application lodgement status, the roles of Council and community in the decision-making process, and concerns relating to the potential of approved quarries to continue expanding through the modification process.

The outcomes of community engagement have been used to update the evaluation of potential social impacts. An updated review of social impacts is discussed in detail in Section 6.8.

## 5.4 Ongoing Consultation

Wedgerock maintains an “open door” policy for interested parties to seek information about the Project. Wedgerock will maintain its consultation program as the development assessment process continues. It is acknowledged that this document and specifically the Amended Project Description presented in **Appendix 1** is the culmination of investigations and operational and management commitments made to address outstanding uncertainties for the development application and to address matters raised in submissions by Government agencies and the community. Wedgerock will continue to inform the community of these changes and the Project as it is now proposed. This would be done through a combination of direct engagement with local residents and organisations, community meetings and newsletters.

The EIS proposed a range of standard social mitigation measures as well as additional measures that require the Applicant to address social performance criteria. These include a commitment to annual community meetings for the first two years of operations, at which feedback would be collected from the local community that will be presented in the Annual Review. This process would create a loop of feedback connecting the community, the Applicant and regulators.

# 6. Assessment of Impacts

## 6.1 Introduction

This section provides an assessment of the impacts associated with those features of the local environment which could potentially be affected by the amended Project including a summary of proposed mitigation and management measures that would be applied for each matter and an updated assessment of impacts. This Section concludes with an overview of those aspects that would be unchanged for the proposed amended Project, a summary of proposed mitigation and management and an overall assessment of impacts.

## 6.2 Blasting

### 6.2.1 Introduction

The Applicant commissioned Prism Mining Pty Ltd (now trading as Fromble Corp Pty Ltd) to undertake a *Flyrock Assessment* for planning and operational flyrock control and to demonstrate that flyrock would be appropriately managed to limit the risk of impact to personnel, the public and to private and public infrastructure including the Pacific Highway. A copy of the report by Prism (2023) is reproduced as **Appendix 5**. This report has been amended since it was submitted to support the *Submissions Report* for the Project and takes into account the amendments to the extraction area, extraction schedule and relocation of the Quarry Infrastructure Area.

Prism (2023) estimates maximum flyrock range based on the blasting parameters presented in Table 2.3 of Section 2.4.2 of the Amended Project Description (**Appendix 1**). The following presents a summary of the methodology applied to estimate flyrock range, proposed management of blasting and mitigation of flyrock risks and the nominated blast clearance distances for the Project. The assessment and management of blast-related vibration and overpressure is provided in Spectrum (2023) and discussed in Section 6.5.

### 6.2.2 Flyrock Risks

Flyrock is a technical term that describes the rock(s) propelled from a blast location by the force of the explosion. While the purpose of blasting for quarrying activities is to fragment rock for transportation and further shaping and sizing, flyrock refers to rock(s) that are thrown away from the blast location and create a risk of damage to people and property.

Flyrock can be generated by multiple mechanisms and travel over potentially large distances. The three mechanisms of flyrock are as follows.

- Face burst – ejection from the face of the blast.
- Cratering – ejection at the collar of the blast.
- Rifling – ejection of stemming materials

Each mechanism is caused by a number of blasting-related factors that must be controlled during blast design and implementation.

A 500m clearance distance has commonly been applied to control the risk of flyrock from blasting. The extraction area for the Karuah South Quarry is approximately 300m from Blue Rock Close and the Pacific Highway. It is also adjacent to existing quarrying operations owned by Hunter Quarries which are themselves a source of blast-related risks.

### 6.2.3 Assessment Methodology

For the purpose of assessing flyrock-related risks, Prism (2023) adopted a factor of safety (FOS) for blasting as the target for modelling blast-related risks in the absence of on-site monitoring data. The FOS is defined as the ratio of the blast clearance distance to the maximum anticipated flyrock range and quantifies the risk outcome for blast planning. A FOS of four has been adopted for the assessment based on a conservative approach to best practice management and ensuring the safety of people and public infrastructure. An FOS of two is often applied to private infrastructure or equipment. In order to achieve a FOS of four a maximum flyrock range of 75m has been set as a criteria against which initial blasting parameters have been established (see Table 2.3 of Section 2.4.2 of the Amended Project Description (**Appendix 1**) and Table 1 of Prism (2023) – **Appendix 5**).

Maximum flyrock range has been estimated using empirical models designed to predict face burst, cratering and rifling developed and published by Moore & Richards (2005) and called the Terrock Model. These models require inclusion of a ‘site constant’ or k-factor that represents the site-specific ground conditions as well as explosive and stemming properties, and variability in the drilling, charging and hole sequencing processes. For the purpose of the *Flyrock Assessment*, Prism (2023) assumed a k-factor of 27 as a conservative estimate used in quarrying applications previously.

The following formulae have been applied based on the Terrock Model.

#### **Face burst (free face) model**

$$\text{Maximum Range (m)} = (k^2/9.8) \times [(\sqrt{(\text{charge per metre})/\text{face burden}})]^{2.6}$$

#### **Cratering (stemming) model**

$$\text{Maximum Range (m)} = (k^2/9.8) \times [(\sqrt{(\text{charge per metre})/\text{stem height}})]^{2.6}$$

#### **Rifling (stemming ejection) model**

$$\text{Maximum Range (m)} = (k^2/9.8) \times [(\sqrt{(\text{charge per metre})/\text{stem height}})]^{2.6} \times \text{sine } (2\theta)$$

### 6.2.4 Maximum Flyrock Range and Blast Clearance Zones

The flyrock assessment outcomes are based on the conservative blast parameters applied by Prism (2023) and described in Table 2.3 of Section 2.4.2 of the Amended Project Description (**Appendix 1**) and Table 1 of Prism (2023). **Figure 6.1** presents the following outcomes of Prism (2023)

- A maximum flyrock range of 75m.



- A blast clearance zone to achieve a FOS of two of 150m based on the maximum flyrock range.
- A blast clearance zone to achieve a FOS of four of 300m based on the maximum flyrock range.

Prism (2023) notes that the conservative blast settings used initially should be reviewed after the first blast and can be progressively adjusted to meet blast performance requirements. Modifications to blast parameters may be made as actual flyrock outcomes are confirmed but the flyrock range would remain within the maximum range of 75m in order to achieve the nominated FOS.

### 6.2.5 Proposed Mitigation and Management Measures

Safe blasting relies upon careful planning and design of blasting activities and strictly controlled conditions for preparation and blast initiation. Regardless of these measures, flyrock may occur and management must account for these risks.

In order to manage blast planning and design, Prism (2023) has nominated blast parameters for an initial blast event as well as recommended modifications to blasting parameters that may progressively occur if supported by blast monitoring data. It is anticipated that blasting design and planning would take an adaptive approach and be consistently updated as blast monitoring data is recorded.

Blast management would be applied to achieve the following outcomes.

- Blast planning and design would be carefully managed to ensure risks are proactively reduced in this stage of the activity as much as possible.
- Blasting activities would be managed during drilling, blast preparation and firing to ensure the safety of personnel, the public, flora and fauna as well as public and private infrastructure.

The extraction sequence would generally take place from north to south, with blast faces oriented northwards, away from Blue Rock Close and the Pacific Highway. However, there may be situations where faces or end-walls would need to be oriented towards publicly accessible areas in the south, or adjacent quarrying operations to the east and west. Planning for these activities would need assessment for hazards principally associated with face bursting and cratering.

The following presents a summary of the operating measures that would be implemented to limit flyrock risks.

- A Blast Management Plan would be prepared and contain operating protocols for all blasting activities. Such plans are standard for the quarrying industry. The Blast Management Plan would nominate a blast clearance zone, within which evacuation or movement to a safe 'refuge' facility would be required. The nominated blast clearance zone would be progressively updated as justified by blast monitoring data.

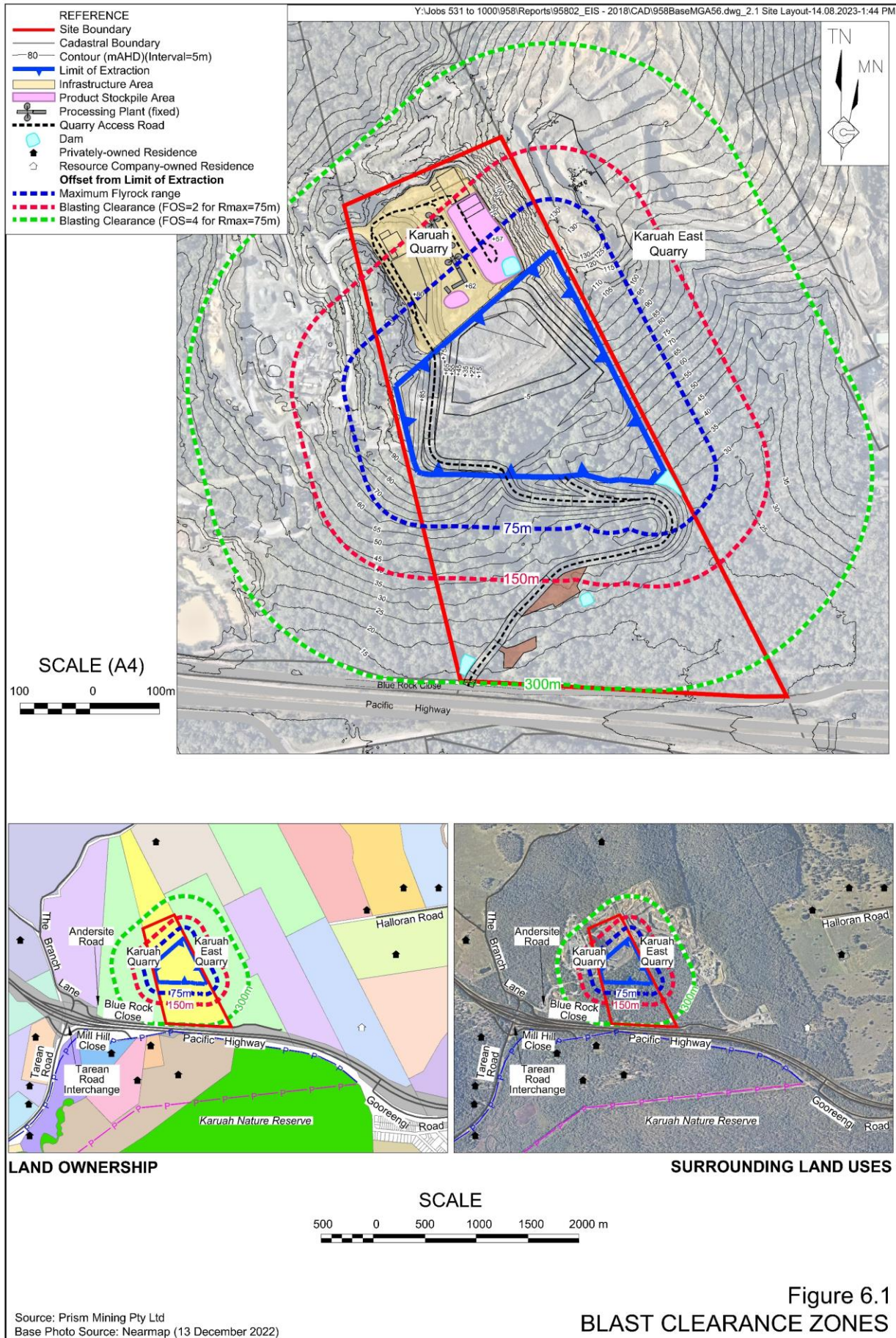


Figure 6.1  
 BLAST CLEARANCE ZONES



- All drilling and blasting processes will be appropriately supervised, including:
  - excavation of overlying fill, to ensure appropriate bench preparation for drill and blast;
  - blast planning and design; and
  - supervision of a tightly controlled blasting process (drilling, charging, stemming, tie-up, blast clearance and initiation).
- Review and audit of monitored blast outcomes, and adjustment of blast designs and operational processes, to ensure OH&S and environmental compliance. Detailed recording and assessment of material properties, ground stability, design depths, drilled depths, dipped depths, explosive column rise and charge mass, and stem height will be carried out for all blastholes. Designed and actual blast initiation sequence will be recorded for each blast showing the blast orientation, initiation point, timing, and the location of the free face and any buffered face.
- Depending on the depth of overlying overburden, consideration will be given to whether to remove that material (down to a ‘hard’ floor), or leave some of it in place to create a uniform bench surface for drilling. Where hard rock is not present at the collar, stem height adjustments will be made, and the depth of weak or broken material will not be included in the stem height.
- Free faces will be face profiled with front-row holes surveyed and profiled to determine blasthole alignment with respect to the free face. Charging design adjustments will be made for front-row holes with variable front-row burdens, partially blocked holes, or in the event of a lack of column rise. Overloaded holes will be rectified using an approved ‘scoop’ or purged to the correct stem height using water.
- Likely access points to the blast clearance zone will be risk assessed before, during and after blast initiation. Proper control of access to the blast clearance area may justify increasing blast clearance distances further than those specified in order to achieve effective control. The proximity of members of the public, during blast clearance and blast initiation, will be controlled and the presence of spectators should be avoided.
- Evacuation and operational constraints for the Quarry Infrastructure Area (and adjacent land within the blast clearance zone) will be reviewed for each blast event. All personnel within the blast clearance zone would be evacuated or moved to a safe ‘refuge’ facility when blasting.
- No road closures would be needed, however this would be reviewed in blast planning for Blue Rock Close as part of a specific operational risk assessment processes.
- All blasts will be videoed for blast behaviour and flyrock assessment, to ensure that control of the blasting process is being maintained. Maximum flyrock range from the blast boundary will be estimated for each blast where possible, based on video records and observation, to validate typical blast behaviour and the reliability of

flyrock models and factors of safety. Where flyrock is identified during the initiated blasts at distances greater than the planned blast envelope, an investigation would be carried out and design and operational adjustments or additional controls identified.

- Drill patterns beneath previous blasts will be laid out with an offset, in order to avoid collaring in highly fragmented material around previous toe locations and potentially misfired explosives. Broken ground would be stripped, where possible.
- If very shallow holes create unacceptable flyrock risk, mechanical rock breaking equipment will be used.
- Secondary blasting of oversize rock will be approached very cautiously, with small charges designed to split oversize into manageable pieces.

In addition, a Cooperative Blasting Agreement has been reached between the Applicant and Hunter Quarries that outlines mutually agreed management of blasting risks for all personnel and equipment within 500m of a blast location. The agreement covers the following general elements.

- Identification of extraction areas and clearance offsets.
- Blast scheduling and notification.
- Blast clearance and shot firing requirements.
- Blast impact monitoring and reporting.
- Communication and information sharing.
- Dispute resolution.

Both parties acknowledge and accept the risks associated with blasting practices in proximity to infrastructure. Blasting has been occurring on the Site and the adjacent Karuah East Quarry for many years.

## 6.2.6 Assessment of Impacts

The *Flyrock Assessment* prepared by Prism (2023) has demonstrated that safe blasting can be achieved with clearance distances of less than 500m subject to strictly controlled conditions including the careful nomination of blasting parameters. The following summarises the outcomes of the assessment.

- Ongoing flyrock management would be described in a Blast Management Plan and implemented to achieve the nominated maximum flyrock range of 75m.
- A blast clearance zone of 300m for personnel and public infrastructure would achieve a FOS of four based on the nominated conservative blasting parameters.
- Some Project-related infrastructure and infrastructure within the adjacent quarrying operation would be within 150m of blasting in some locations. Initial blasts are likely to be further away and the operations on land owned by Hunter Quarries are expected to cease by the end of 2023. Both the Applicant and Hunter Quarries acknowledge and accept the risks of blasting proximity and have signed a cooperative agreement on blast management to manage these risks for both parties.



- No public roads would need to be closed or temporary access restrictions implemented for blasting activities. Prism (2023) has recommended that management of traffic on Blue Rock Close be included in risk assessment processes but is not expected to be required. Blue Rock Close is a public road but generally only used to access the quarrying operations in the locality.

## 6.3 Visual Amenity

### 6.3.1 Introduction

A visual impact assessment for the Project was undertaken by R.W. Corkery and Co. Pty Limited, with particular emphasis placed upon the assessment of views from the Pacific Highway. The assessment presented in Section 5.3 of the EIS has been updated to assesses the amended Site layout and to include photomontage assessment from two vantage points on the Pacific Highway.

### 6.3.2 The Existing Visual Landscape

The existing visual landscape surrounding the Site varies significantly with the following features of the local setting.

- The Site is located within an area of variable terrain comprising the lower southern section of land adjacent to Blue Rock Close and the Pacific Highway, rising to a prominent northeast / southwest ridgeline that is largely covered by remnant native vegetation. The variable topography and substantial areas of vegetation, some of which is remarkably tall (20m to 30m), result in limited opportunities to view many features of the existing landscape in the vicinity of the Site. The ridgeline and vegetation shield views of the existing Karuah Quarry to the north.
- Infrastructure in the form of high voltage power lines, local roads and the Pacific Highway are also features of the local visual setting. Opportunities to view features of the existing landscape from local roads and the Pacific Highway are variable and dependent upon the extent of remnant vegetation, orientation of the view and time of day. It is noted that a 2m high wooden fence between the northbound lanes of the Pacific Highway and Blue Rock Close (see **Plate 6.1**) prevents motorists travelling north adjacent to the Site from observing the Site.
- A number of the extraction faces on the eastern side of the extraction area within the Karuah Quarry are observable from the Pacific Highway from the west of the Quarry (see **Plate 6.2**). Some more distant views of the eastern extraction faces of the Karuah Quarry are possible from areas to the west. It is understood the extraction faces are visible from elevated areas adjacent to Limeburners Road, Limeburners Creek approximately 11km west of Karuah Quarry.



**Plate 6.1** A 2m high wooden fence between the northbound lanes of the Pacific Highway and Blue Rock Close – preventing motorists viewing the Site when adjacent to the Site (Ref: E958D\_084)

- Parts of the Karuah East Quarry are observable from vantage points to the east of the Site near Halloran Road and Hunter View Road, however, the quarry is largely shielded by topography and vegetation from the Pacific Highway (GSS Environmental, 2012). **Plate 6.3** displays a view from the south-bound lanes of the Pacific Highway towards the Site.
- The Site has limited or no visibility from the residences on the southern side of the Pacific Highway. **Plate 6.4** shows the existing view from near Residence 22 towards the Site through scattered remnant tall vegetation. **Plate 6.5** shows the existing view from Residence 23 to the north with virtually none of the Site being visible.



Plate 6.2 View to the east from the northbound lanes of the Pacific Highway towards Karuah Quarry (Ref: E958F\_010)

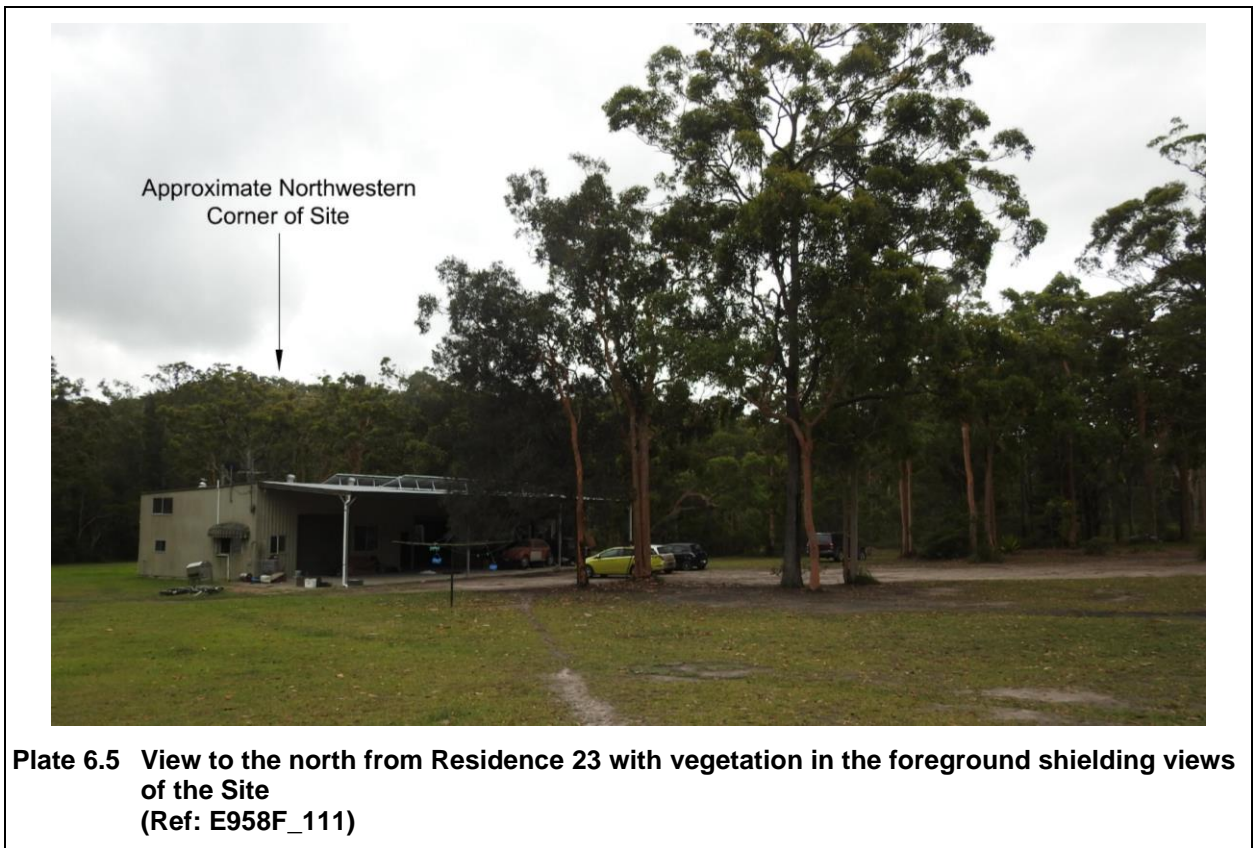




**Plate 6.3 View to the west from the southbound lanes of the Pacific Highway towards the Site (Ref: E958F\_044)**



**Plate 6.4 View to the northeast from near Residence 22 through existing trees towards the Site (Ref: E958F\_103)**



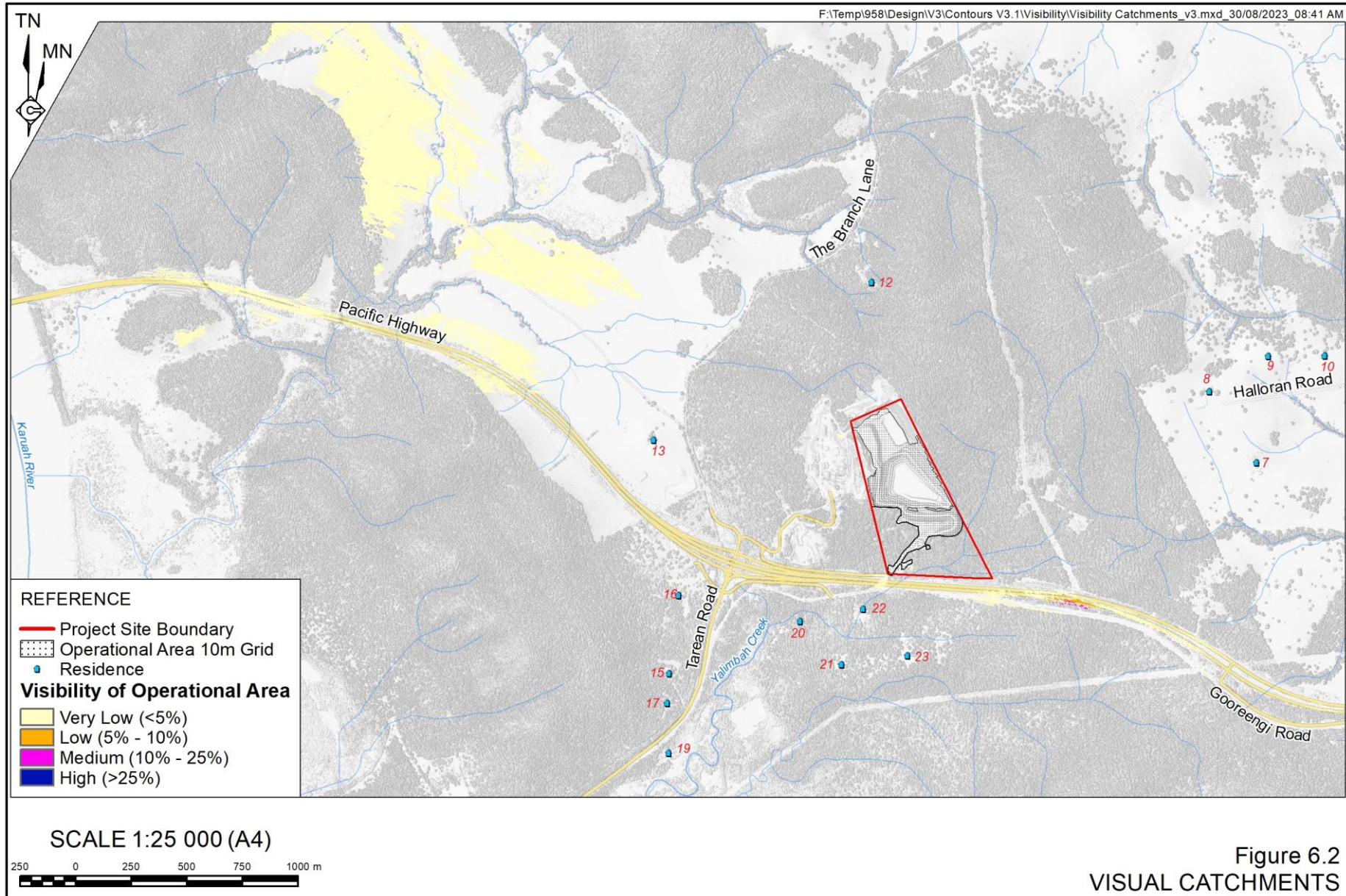
### 6.3.3 Potential Visual Impacts

Figure 6.2 presents locations from which the Site may be visible at full development. The visibility from these locations is given a nominal rating based on the views of gridded locations within the Site with 10m spacing.

The potential visual impacts generated by the Project are as follows.

1. Glimpses of the Quarry Entrance may be visible through existing vegetation at residences on the southern side of the Pacific Highway.
2. Views of Quarry faces from the Pacific Highway for traffic heading north would become available as the extraction area is developed. Visible areas would be directly adjacent to the existing Karuah Quarry terminal faces that are visible from this location (see **Plate 6.2**).
3. Views of Quarry faces from the Pacific Highway for traffic heading south would become available as the extraction area and Quarry Access Road are developed.
4. Glimpses of the Site may be possible from private land (but not residences) to the west of the Site and from distant vantage points to the north and northwest.
5. Blasts initiated within the Project Area would generate a plume of dust immediately following the blast. The extent to which the plume is visible would depend on the quantity of rock blasted, direction and strength of the prevailing winds, the depth of the blast within the extraction area.





### 6.3.4 Landscape Character Assessment

A Landscape Character Assessment has been undertaken having regard to the following guidelines.

- The TfNSW *Guideline for landscape character and visual impact assessment, June 2023*
- The DPE *Technical Supplement - Landscape and Visual Impact Assessment Large-Scale Solar Energy Guideline August 2022*.

A landscape character assessment recognises that visual impacts are not just limited to what may be viewed from a residence, property or public space (such as a road), but include the possible change to the character of a location and the sense of place that this character imparts. This includes the built, natural and cultural aspects of sense of place that are connected to a particular location.

The assessment considers three zones for impact as follows.

- Vehicles on the Pacific Highway travelling south and viewing the Site from the east.
- Vehicles on the Pacific Highway travelling north and viewing the Site from the west.
- Local residences to the south of the Site.

The assessment considered three matters.
















- Scenic quality and anticipated receptor rating of the zones assessed.
- The sensitivity of the area to change or to absorb the change considering the type and number of likely viewers.
- The predicted magnitude of visual change in terms of the scale, form and character of the change.

A visual reference guide for landscape scenic quality values is provided in the DPE *Technical Supplement - Landscape and Visual Impact Assessment Large-Scale Solar Energy Guideline August 2022* and is reproduced as **Figure 6.3**. Landscape character impact rating is determined using a matrix that combines the sensitivity and magnitude of the change using a matrix. The matrix applied for this assessment is presented in **Table 6.1** and is adapted from the TfNSW *Guideline for landscape character and visual impact assessment, June 2023*.

**Table 6.1**  
**Landscape Character and Visual Impact Rating Matrix**

		Magnitude			
		High	Moderate	Low	Negligible
Sensitivity	High	High	High-Moderate	Moderate	Negligible
	Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
	Low	Moderate	Moderate-Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible



Viewpoint type	Very low viewpoint sensitivity	Low viewpoint sensitivity	Moderate viewpoint sensitivity
Landform			
Vegetation			
Waterbodies			
Social / Cultural			
Human Presence			

**Figure 6.3**

**VISUAL REFERENCE GUIDE FOR LANDSCAPE SCENIC QUALITY VALUES**

Source: DPE (2022)

### Pacific Highway Southeast of the Site

Two visual transects displayed on **Figure 6.4** display the possible views of the Site from the Pacific Highway southeast of the Site during all stages of development. **Figure 6.5** and **Figure 6.6** present photomontages of the development in the existing setting, at the end of Stage 1 and at the end of Stage 5.

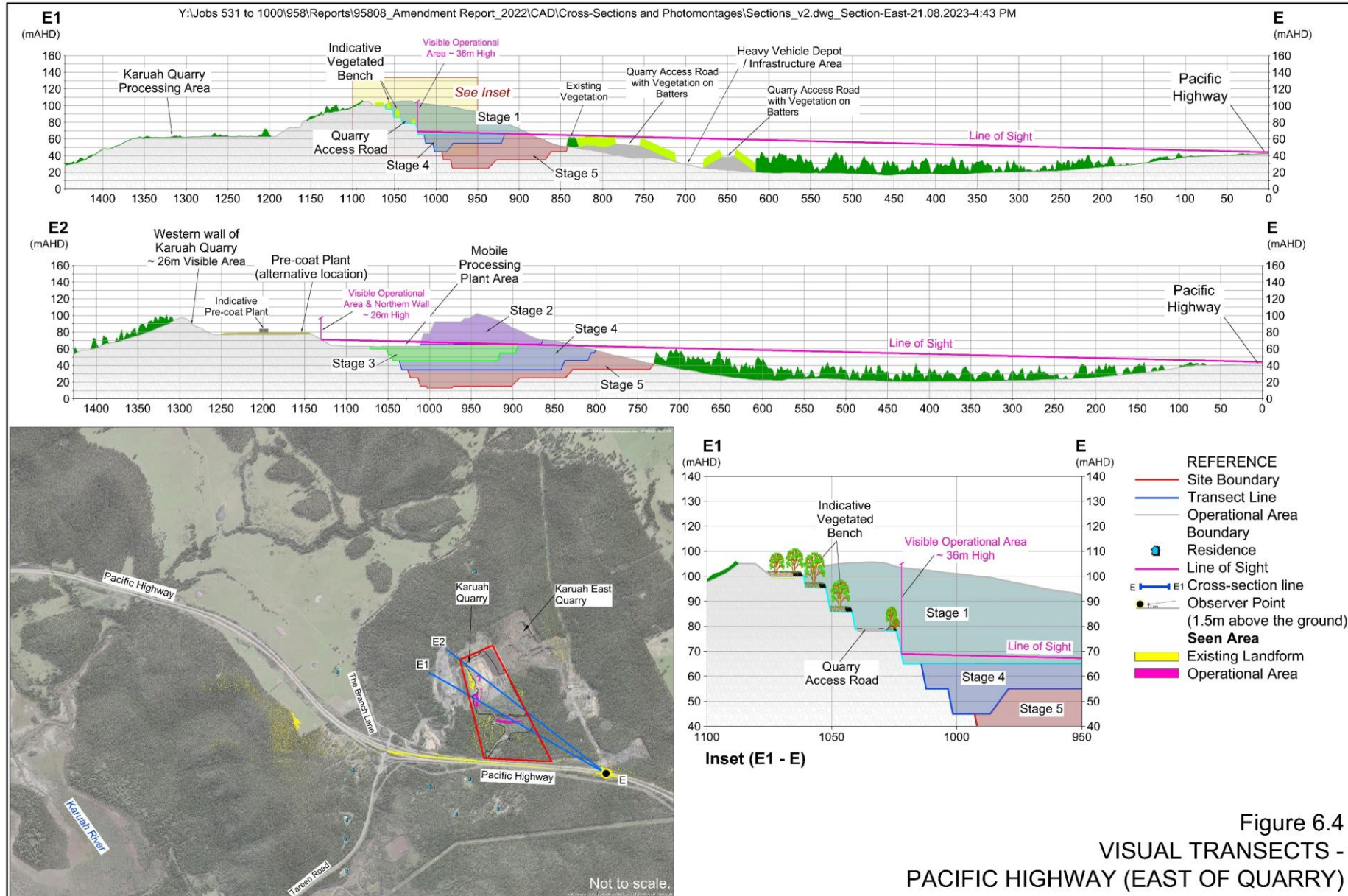
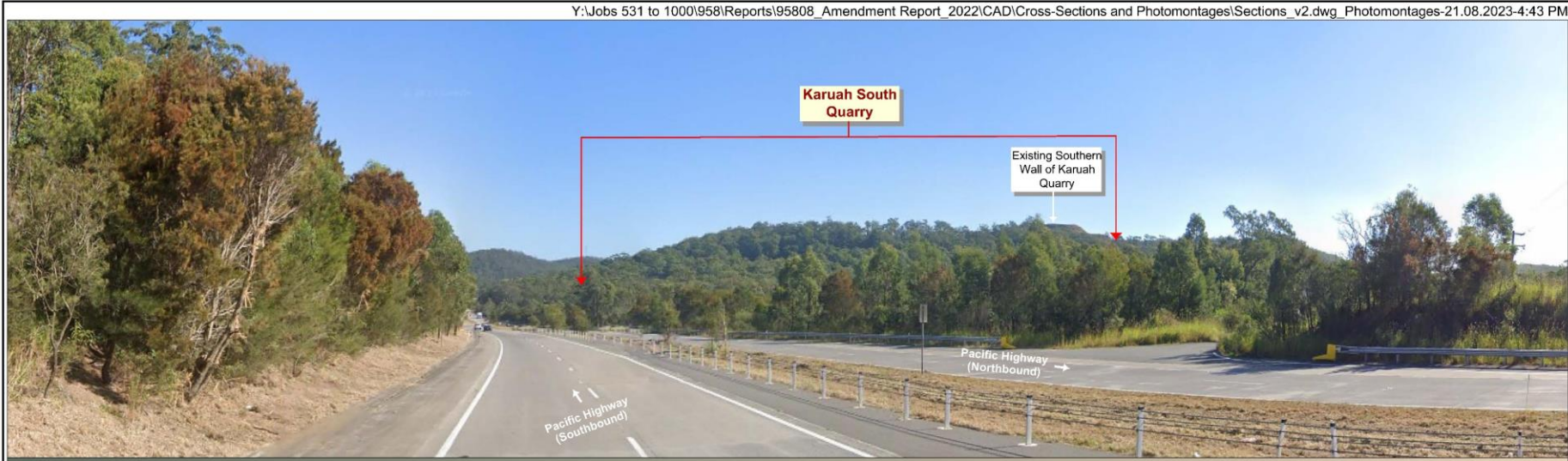


Figure 6.4  
VISUAL TRANSECTS -  
PACIFIC HIGHWAY (EAST OF QUARRY)

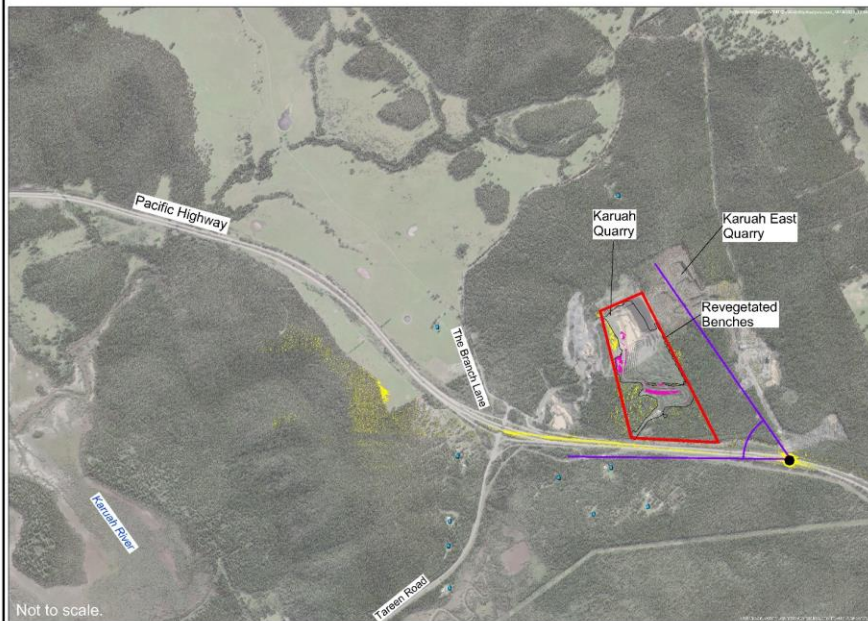


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Existing

Photo Source: Google Street View - May 2023



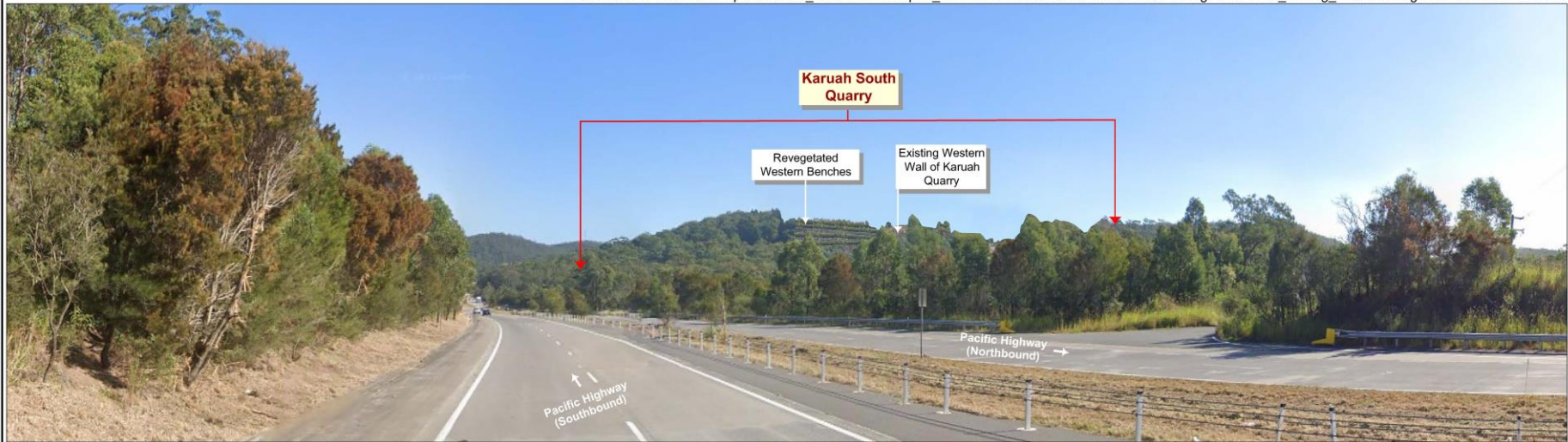
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- |                  |                           |                  |                   |
|------------------|---------------------------|------------------|-------------------|
| <b>REFERENCE</b> |                           | <b>Seen Area</b> |                   |
|                  | Site Boundary             |                  | Existing Landform |
|                  | Transect Line             |                  | Operational Area  |
|                  | Operational Area Boundary |                  |                   |
|                  | Residence                 |                  |                   |

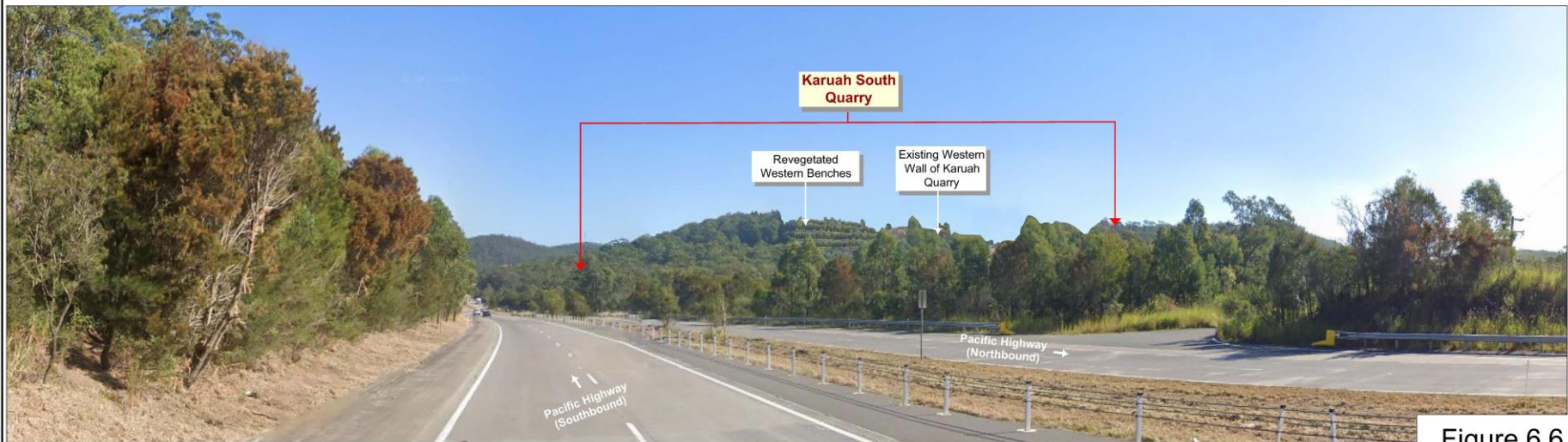
Figure 6.5  
 VIEW FROM PACIFIC HIGHWAY  
 (EAST OF QUARRY) - EXISTING QUARRY



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Stage 1



Stage 5

Figure 6.6  
VIEW FROM PACIFIC HIGHWAY  
(EAST OF QUARRY) - STAGE 1 AND STAGE 5

Photo Source: Google Street View - May 2023



From these transects and photomontages, it is clear that following the development of the Quarry Access Road and Stage 1 of the extraction area, the upper benches above approximately 65m AHD would be visible at a distance of between approximately 1.6km and 0.6km from the Pacific Highway by travellers heading south. Views of the Site would be possible over a distance of just over 1km where the Pacific Highway rises slightly as turns to the west.

In addition, views of the Site may also include the Quarry Access Road, although an approximately 3m bund would obscure views of vehicles in this location, especially once vegetation has established on top of this bund.

From the end of Stage 4 of development, glimpses between existing vegetation may be possible towards the existing terminal western highwall of the Karuah Quarry and aspects of the Quarry Infrastructure Area. However, these views would be limited and available for only short stretches of the road.

Views of the Project from the Pacific Highway southeast of the Site is assessed as follows.

- The section of Pacific Highway to the southeast of the Site passes through areas of low scenic quality due to the presence of roadside vegetation interspersed by glimpses of agricultural land (see **Figure 6.3**).
- While glimpses of the existing quarrying operations are possible, these are limited, and the view does not feature substantial modification by development. Views of the Site would interrupt existing views of vegetation and without mitigation would be clearly visible and apparent. For travellers that frequent that section of the Pacific Highway, the presence of views of quarrying operations that would gradually appear would become a common and regular experience, especially if the travellers also travel to the north on the Highway and have viewed the terminal faces of the Karuah Quarry over many years. The views of the modified and revegetated landscape would not be a surprise, nor unfamiliar to many people using the Pacific Highway. Therefore, the sensitivity of the land to change is considered to be moderate.
- Views of the Site from this location would be from a moderate distance and would represent a small portion of the total outlook (as demonstrated in **Figure 6.4**). Data used for the traffic assessment for the Project incorporated an estimated average daily traffic levels on the Pacific Highway at approximately 12,000 vehicles per day. This notwithstanding the time available to view the Site would be limited with the change in landscape apparent over a distance of approximately 1km. At a speed of 110km/h, these views would be visible to travellers over a period of approximately 30 seconds. These views would be at an angle of 20° to 30° to the right of the driver's line of sight and, while noticeable, would not be the dominant view, particularly for drivers. Therefore, the magnitude of the visual impacts is assessed to be moderate.

On the basis of this assessment, the landscape character visual assessment from the Pacific Highway to the southeast of the Site is considered to be moderate (see **Table 6.1**).

## Pacific Highway West of the Site

**Figure 6.7** presents three visual transects from a location on the Pacific Highway west of the Site. The only section of the extraction faces that would be visible from this location would be a section of the eastern face above approximately 90m AHD and covering a vertical area of approximately 20m. This area is currently visible as it was a component of existing Karuah Quarry operation, however it would also form a component of the amended Project. The cross section and photomontage presented in **Figures 6.7** to **Figure 6.9** demonstrate the eastern Extraction Area face would become visible from a distance of approximately 2.95km during Stage 2 but that revegetation operations would quickly obscure the extracted faces.

Views of the Project from the Pacific Highway west of the Site are assessed as follows.

- This section of the Pacific Highway passes through areas of moderate scenic quality<sup>4</sup> as it features roadside vegetation interspersed by agricultural areas (see **Figure 6.3**). The location was referred to by Council officers as the ‘gateway’ to Mid Coast Council for people travelling north during consultation in 2018. However, the existing view of the terminal faces of the Karuah Quarry represent substantial historic modification unrelated to the Project and would remain prominent from this location. Therefore, the visual sensitivity of this locations is considered to be low.
- The views of the Site from this location would represent distant views (from approximately 2.95km away), glimpsed through vegetation that would be retained in the landform. As the site is developed, existing disturbance in the area would be incorporated in the Site with the final Quarry design incorporating wide benches and reduced faces to enable growth medium placement and for established vegetation to successfully cover the terminal faces. As a result, the magnitude of visual impact in this location would be low.

On the basis of this assessment, the landscape character visual assessment from the Pacific Highway to the west of the Site is considered to be low.

## Nearby Residences

Only two residences to the south of the Pacific Highway could view activities undertaken within the Site. Visual transects from Residence 22 are presented in **Figure 6.10** and demonstrate that existing vegetation would limit views of the Site during all stages.

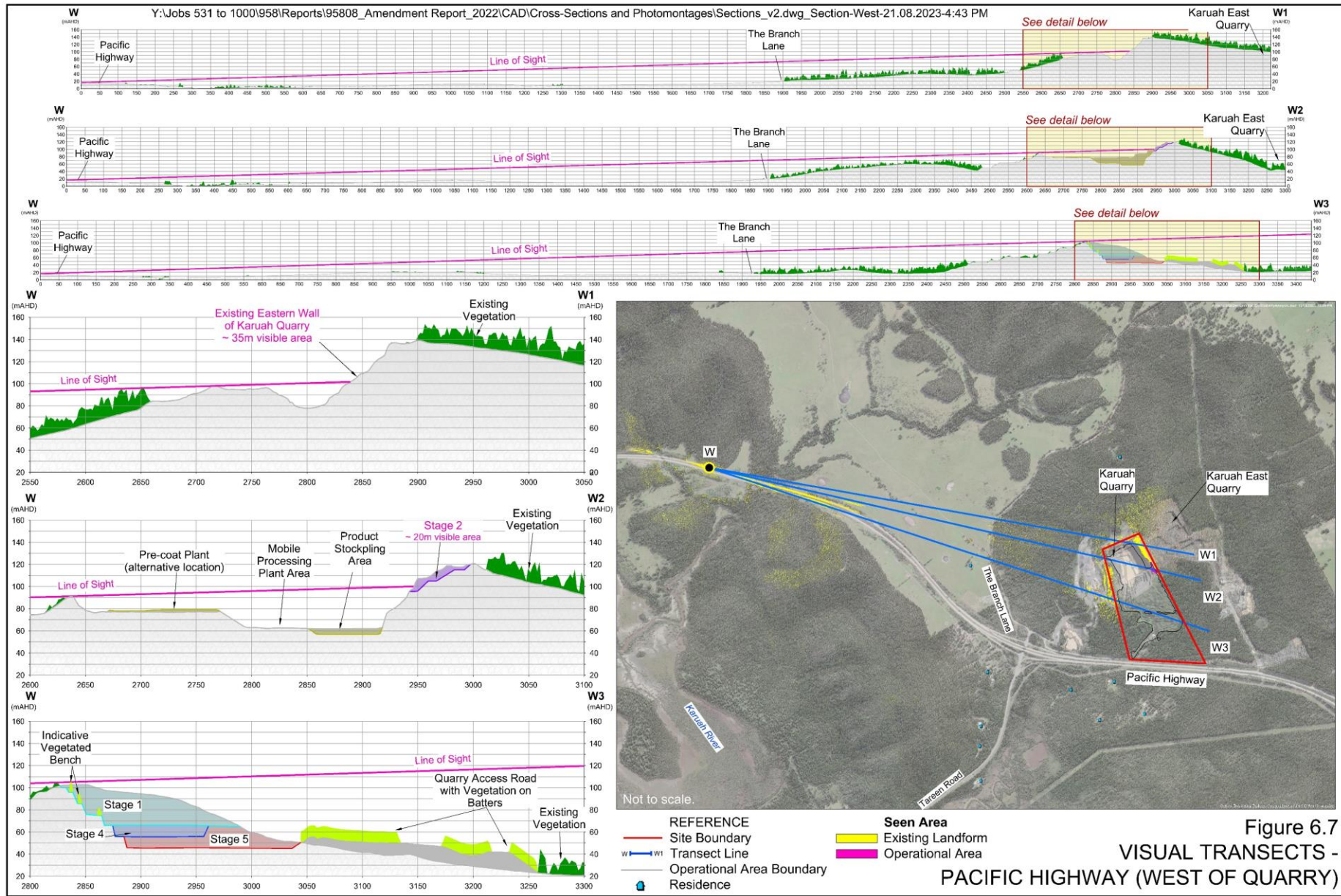
It is possible that views of the construction activities near the Quarry Entrance could be viewed through the trees between Residence 22 and the Pacific Highway (**Plate 6.3**). However, remaining activities should largely be shielded by intervening vegetation.

There is a possibility that a very elevated small section of the extraction area in the area of the northwestern corner of the Site would be visible from Residence 23 (**Plate 6.4**).

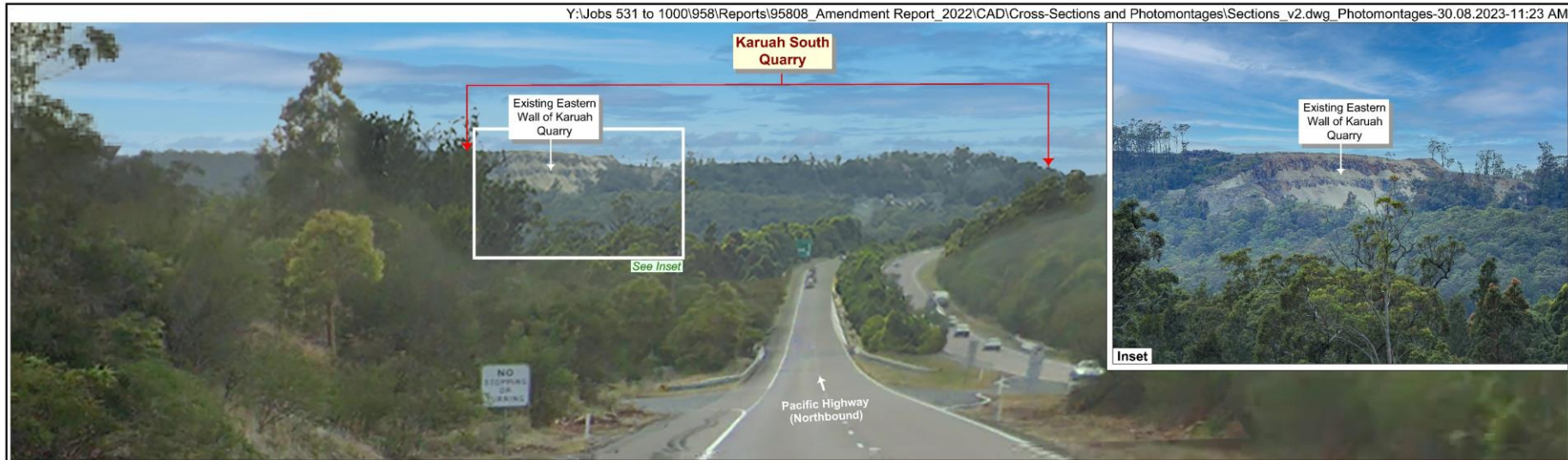
The landscape character visual assessment from these locations is considered to be negligible (see **Table 6.1**).

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<sup>4</sup> Refer to Table 7 within the DPE Technical Supplement - Landscape and Visual Impact Assessment Large-Scale Solar Energy Guideline (August 2022)

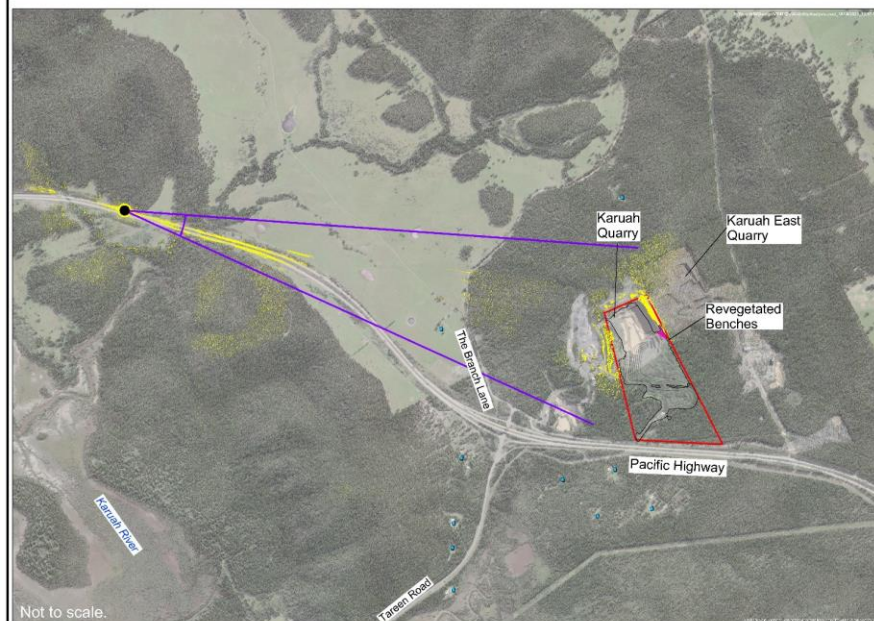






Existing

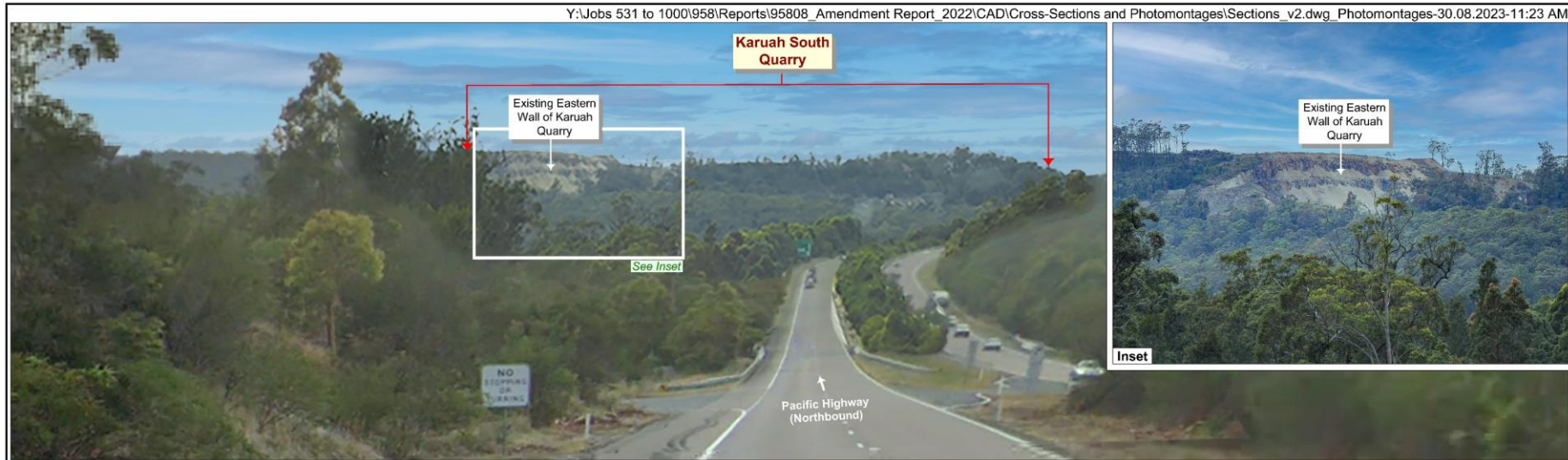
Photo Source: Google Street View - May 2023



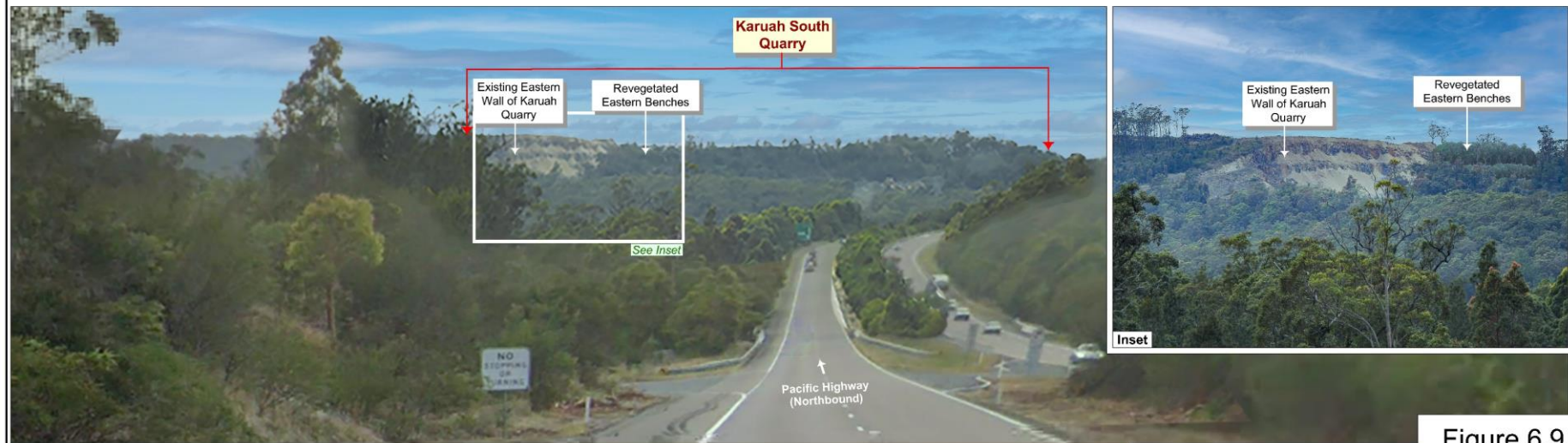
- |           |                           |           |                   |
|-----------|---------------------------|-----------|-------------------|
| REFERENCE |                           | Seen Area |                   |
|           | Site Boundary             |           | Existing Landform |
|           | Transect Line             |           | Operational Area  |
|           | Operational Area Boundary |           |                   |
|           | Residence                 |           |                   |

Figure 6.8  
VIEW FROM PACIFIC HIGHWAY  
(WEST OF QUARRY) - EXISTING QUARRY





Stage 1



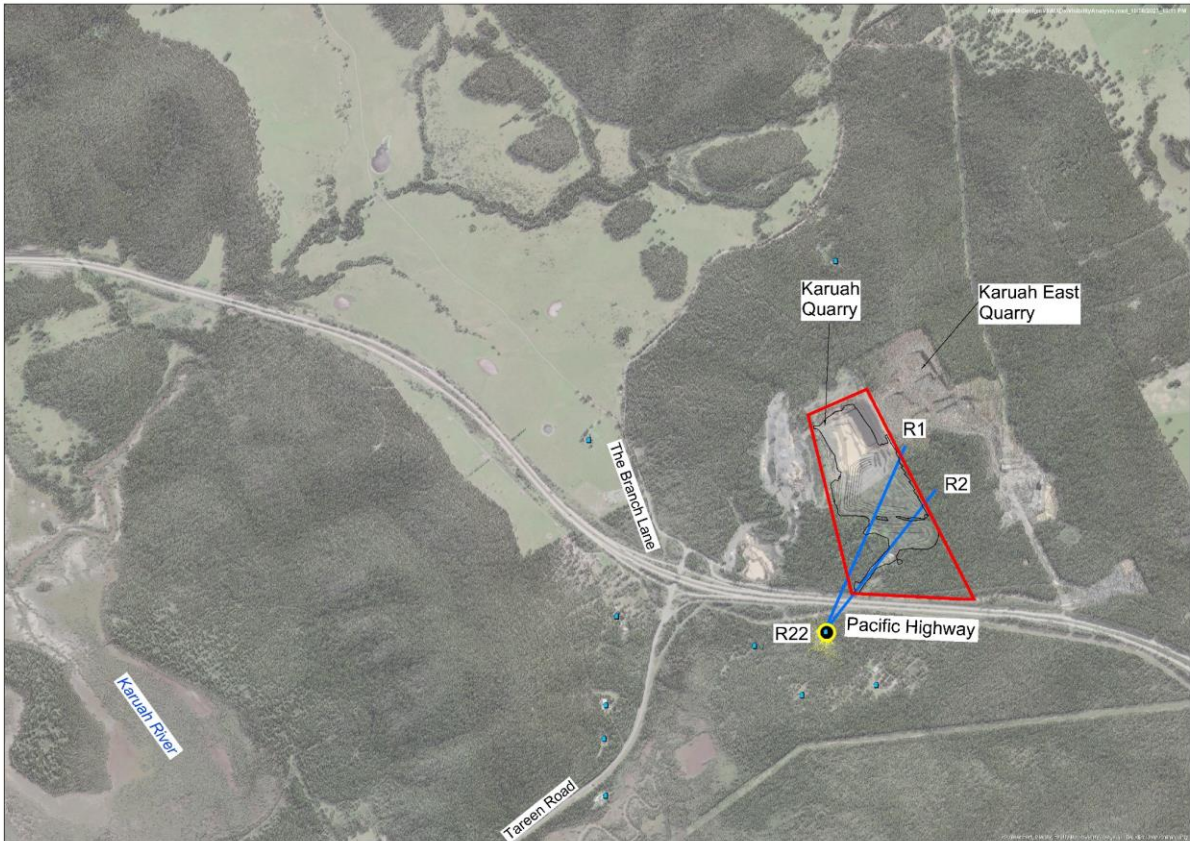
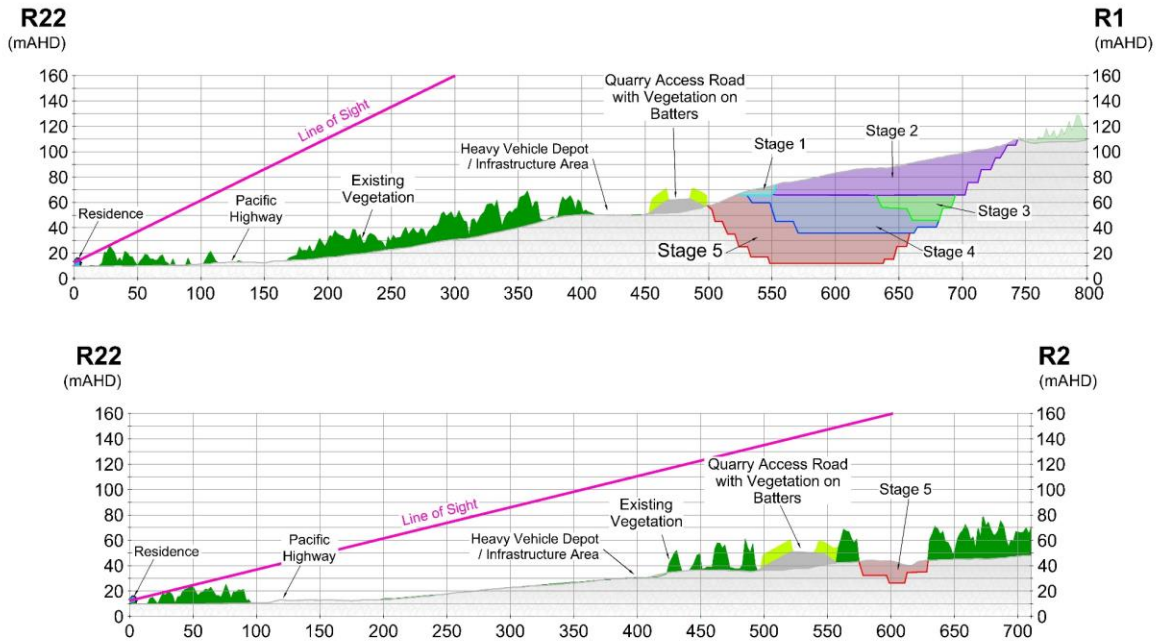
Stage 5

Figure 6.9  
VIEW FROM PACIFIC HIGHWAY  
(WEST OF QUARRY) - STAGE 1 AND STAGE 5

Photo Source: Google Street View - May 2023



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- |                  |  |
|------------------|--|
| <b>REFERENCE</b> |  |
|                  | Site Boundary                          |
|                  | Transect Line                          |
|                  | Operational Area Boundary              |
|                  | Residence                              |
|                  | Line of Sight                          |
|                  | E1 Cross-section line                  |
|                  | Observer Point (1.5m above the ground) |
| <b>Seen Area</b> |  |
|                  | Existing Landform                      |
|                  | Operational Area                       |

Figure 6.10  
VISUAL TRANSECTS -  
RESIDENCE 22

### 6.3.5 Mitigation and Management Measures

The Applicant is cognisant of the need to manage the possible visual impacts of the Site and has proposed a range of design and operational mitigation measures to minimise visual impacts of the Quarry's operation.

The principal design mitigation measures to be adopted to minimise visual impacts would comprise the following.

- The bulk of the existing vegetation between Blue Rock Close and the Extraction Area would be retained to provide the best possible shielding of the operations. The proposed amendment would result in approximately 4.54ha of vegetation clearing being avoided and the retention of many tall trees (20m to 30m in height).
- Extraction would advance in five stages throughout the life of the Quarry, with vegetation clearing being undertaken in each stage only a short period before the commencement of extraction. This approach would retain screening vegetation for as long as possible which, in turn, would provide time for various operational mitigation measures to be implemented.
- The upper benches on the eastern and western sides of the extraction area (above 85m AHD) would be developed with 5m faces, where safe to do so<sup>5</sup>, and with bench widths ranging from 5m to 10m. The wide benches would result in resource being foregone but would allow space for a growth medium to be placed and result in a higher likelihood of revegetation success. The reduced height of the faces would ensure that they are more likely to be covered by the established vegetation.

The Applicant would adopt the following supplementary operational mitigation measures to complement the previously outlined design mitigation measures.

- The effectiveness of the retained vegetation on the southern side of the Quarry Infrastructure Area to shield views of the activities on Site would be reviewed early in the Project life to establish whether supplementary plants of trees and shrubs would be beneficial in reducing visibility from Blue Rock Close.
- The batters of the Quarry Access Road would be revegetated immediately following construction, with vegetation in this location once established expected to shield views of Quarry-related vehicles, especially in later stages of the development.
- In order to limit the long-term exposure of unrehabilitated extraction faces from the Pacific Highway, the Applicant would progressively rehabilitate terminal benches as soon as practical following completion. The practice of progressively rehabilitating quarry benches in this manner is recognised as best practice.
- A strip of vegetation between the Quarry Access Road and the Stage 5 extraction area would be retained as long as possible and revegetation of the initial access road would be prioritised once the permanent access road is commissioned. This would enable shielding of the terminal faces on the western side of the Site.

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<sup>5</sup> Other sections of the Extraction Area would be developed with average 10m faces.

- Following the completion of extraction above the 70m AHD level, the Applicant would review the exposed colour of rock and determine whether it would be beneficial to progressively apply a bitumen emulsion to the visible area to darken the subject area and limit its visibility from the Pacific Highway.
- The Quarry and associated areas of disturbance would be maintained in a clean and tidy condition at all times.

Changes to the visual landscape would be monitored on an annual basis with photo monitoring (from safe locations) undertaken and presented in the Annual Review for the Project. In this manner, visual impacts would be tracked, reported and additional mitigation proposed as needed.

### 6.3.6 Conclusion

The Project would result in a change to the landscape that would be most obvious over an approximately 1km stretch of Pacific Highway to the southeast of the Site. Views from this location are assessed to have a moderate landscape character impact but are ultimately considered acceptable given the short time of viewing and as this is a view already experienced along the Pacific Highway in this region. Views would be available for motorists travelling north on the Pacific Highway, however these would be minor when compared with the existing views of the Karuah Quarry. During Stage 1 of the Project, terminal operating areas of the Site would become visible. However, these would appear beside the existing Karuah Quarry and be mostly obscured by retained vegetation. The approach to rehabilitation of these faces would improve the appearance of this component of the Site compared to the Karuah Quarry.

The adoption of the proposed design and operational mitigation would reduce visual impacts to the greatest extent possible and mitigate possible views through the establishment of screening vegetation. The Site has been designed to encourage successful vegetation establishment on upper benches and to enable effective screening in the final landform. The establishment of vegetation on the upper benches would effectively minimise contrasts and soften views of the exposed upper sections of the extraction area. Importantly, the rehabilitated landform would blend into the surrounding vegetated landscape without any substantive long-term impacts. Possible visual impacts would also be reduced under the amended Project through the retention of vegetation to the south of the extraction area.

## 6.4 Air Quality

### 6.4.1 Introduction

An *Air Quality Impact Assessment* was prepared by Northstar Air Quality Pty Ltd to support the EIS for the Project (Northstar, 2018). The dust dispersion modelling and assessment of predicted air quality impacts of the Project has been updated to take into account amended Project components. An addendum to the *Air Quality Assessment* has been prepared by Northstar and is reproduced as **Appendix 6**, with the addendum hereafter referred to as Northstar (2023).

The principal changes to the air quality assessment, compared to the previous version, are associated with the relocation of the Quarry Infrastructure Area and product stockpiles, subsequent relocation of the quarry access road, weighbridge and administrative infrastructure.



The following subsections provide a summary of the amended air quality impact assessment and describe the operational safeguards and management measures that would be implemented by the Applicant.

## 6.4.2 The Existing Environment

### 6.4.2.1 Meteorological Environment

The meteorology experienced within a given area can govern the generation, dispersion, transport and eventual fate of pollutants in the atmosphere. The meteorological data used for the air quality assessment utilised data from the Nobbys (Newcastle), Williamtown RAAF and Paterson (Tocal) meteorological stations. A full description of the modelling exercise, methods and input data used to establish Site-specific meteorological conditions is presented in Annexure 1 of Northstar (2018). This data was not changed for the updated dust dispersion modelling.

### 6.4.2.2 Air Quality Environment

The existing air quality in the area surrounding the Site was determined by examining measurements collected by the then NSW Office of Environment and Heritage (OEH) from air quality monitoring stations (AQMS) in the Newcastle area and monitoring data collected at the Karuah and Karuah East Quarries.

Background regional air quality was determined by analysing data acquired from the Wallsend AQMS. This data was modified slightly by Northstar to reflect local conditions in recognition of the fact that Wallsend is influenced by various external sources. **Table 6.2** identifies the regional air quality adopted for the assessment. A full description of the methodology used to determine regional background air quality is provided in Annexure 4 of Northstar (2018). This data was not changed for the updated dust dispersion modelling.

**Table 6.2**  
**Background (Regional) Air Quality\***

Pollutant	Averaging Period	Value
PM <sub>10</sub>	24-hour	Hourly varying
	Annual	14.9µg/m <sup>3</sup>
PM <sub>2.5</sub>	24-hour	Hourly varying
	Annual	5.1µg/m <sup>3</sup>
TSP	Annual	26.3µg/m <sup>3</sup>
Dust Deposition	Monthly	2g/m <sup>2</sup> /month
NO <sub>2</sub>	1-hour	88.1µg/m <sup>3</sup>
	Annual	16.4µg/m <sup>3</sup>
* Excludes modelled impacts from Karuah Quarry and Karuah East Quarry		
Source: Modified after Northstar (2018) – Table 11		

Karuah East Quarry, Karuah Quarry, and the proposed Karuah Red Quarry were identified by Northstar as contributors to dust emissions. It is noted that concurrent with Project-related activities, the Karuah East Quarry would continue to extract and process material. It has been assumed that the proposed Karuah Red Quarry is granted approval for the purpose of this

assessment and the extraction and processing of material is occurring concurrently with the Project. The Karuah Quarry would cease operations before the Project would commence. Northstar considered these activities when determining the cumulative air quality impacts. **Table 6.3** provides a summary of the activities. **Figure 1.2** displays the surrounding quarries.

**Table 6.3**  
**Surrounding Quarry Production Summary**

Operational Stage at Karuah South Quarry	Karuah Quarry	Karuah East Quarry	Karuah Red Quarry
Site Establishment and Construction	No extraction or processing	Stage 3. 1,500,000t/yr <sup>-1</sup>	Extraction and processing of 100,000t/yr <sup>-1</sup>
Stage 4 Extraction: 600,000 t/year Max Extraction: 4,200 t/day  Pugmill: up to 180,000 t/yr Max. Pugmill: 3,300t/day <sup>(A)</sup>  Concrete Recycling: 20,000t/yr Max. concrete recycling: 214t/day <sup>-1(B)</sup>  Pre-coating: 30,000t/yr Max. Pre-coating: 214t/day <sup>(C)</sup>  Concrete Production: 48,400t/yr <sup>(D)</sup> Max. concrete production: 535t/day <sup>(E)</sup>	No extraction or processing	Stage 3 1,500,000t/yr <sup>-1</sup>	Extraction and processing of 100,000t/yr <sup>-1</sup>
(A) assuming 330t/hr <sup>-1</sup> × 11 hours per day. (B) maximum daily concrete recycling rate assumed to be 3 × the daily average. (C) maximum daily pre-coat production assumed to be the capacity of the material bins, which represents approximately 2 × the daily average production rate. (D) assuming 20,000m <sup>3</sup> of concrete requires 44,000t of raw materials plus balance in water. (E) assuming peak daily production of 220m <sup>3</sup> per day.			
Source: Modified after Northstar (2023) – Table 3			

Northstar (2023) identifies that any emissions from Pacific Highway vehicular traffic are not required to be assessed as a separate emissions source as these emissions would have been accounted for in the assumed background data.

### 6.4.2.3 Air Quality Receivers

**Figure 2.1** identifies the air quality receivers that are situated in the vicinity of the Site. These receivers are identified as being either sensitive (i.e. privately-owned residences) or quarry-related receivers (i.e. residences on landholdings associated with the adjacent quarries). As the NSW EPA impact assessment criteria are intended to protect individuals who may be susceptible to air quality impacts (e.g. sick, frail or elderly persons) and present at a location for extended periods, the principal focus of the air quality assessment were sensitive receivers, not quarry-related receivers.

Whilst Northstar (2023) also predicted and assessed air quality at non-residential receiver locations within the adjacent quarries, the NSW EPA impact assessment criteria are not considered applicable to these locations as they are essentially “industrial receivers” where:

- workplace air quality standards are set to manage worker health at industrial receptors, with an anticipated higher level of air quality impacts;

- only healthy individuals (workers) who are less susceptible to dust exposure than a sensitive individual would be present; and
- healthy individuals (workers) are unlikely to be present at that location for more than 24-hours at a time.

Therefore, the results and assessment of their implications that is provided in this section, is solely focussed on the sensitive receivers that represent privately-owned residences in the vicinity of the Site.

### 6.4.3 Potential Sources of Air Quality Contaminants

Dust generating activities over the Project-life can be expected to occur in each of the following stages.

- Site establishment and construction stage.
- Operational stage.
- Surrounding quarries.

#### Site Establishment and Construction Stage

The key emissions to air during the site establishment and construction stage would include:

- dust generated by vegetation clearing, bulk earthworks, construction, vehicular traffic on site; and
- plant and vehicle engine exhaust emissions.

#### Operational Stages

The key emissions to air during the operational stage would include:

- particulate emissions from the extraction, processing and storage of the material;
- wheel-generated particulate emissions from the haulage of material on internal roads;
- blasting emissions of particulates and products of combustion; and
- plant and vehicle exhaust emissions.
- dust generated by the pugmill, concrete batch, concrete recycling and the pre-coat plant.

#### Surrounding Quarries

The operations that are assumed to occur at Karuah Red Quarry and Karuah East Quarry will contribute to the dust emissions experienced at privately-owned residences. **Table 6.3** identified the nominal rates of production assessed as concurrently occurring at these locations.



## 6.4.4 Assessment Methodology

Northstar (2023) assessed potential air quality impacts at maximum operation in line with *The Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2022)*. More information on the methods applied is presented in Section 3 of Northstar (2023).

### 6.4.4.1 Criteria for Assessment

**Table 6.4** presents the NSW EPA impact assessment criteria that has been adopted for the Project.

**Table 6.4**  
**Air Quality Impact Assessment Criteria**

Pollutant	Averaging Period	Units	Criterion	Notes
PM <sub>10</sub>	24 hours	µg/m <sup>3</sup>	50	Numerically equivalent to the AAQ NEPM <sup>a</sup> standards and goals.
	1 year	µg/m <sup>3</sup>	25	
PM <sub>2.5</sub>	24 hours	µg/m <sup>3</sup>	25	
	1 year	µg/m <sup>3</sup>	8	
TSP	1 year	µg/m <sup>3</sup>	90	N/A
Dust Deposition	1 year	g/m <sup>2</sup> /month	2	Maximum increase in deposited dust level
	1 year	g/m <sup>2</sup> /month	4	Maximum total deposited dust level
NO <sub>2</sub>	1-hour	µg/m <sup>3</sup>	164	Equivalent to the AAQ NEPM
	1 year	µg/m <sup>3</sup>	31	
Note: (a) - National Environment Protection (Ambient Air Quality) Measure				
Source: Modified after Northstar (2023) – Table 2				

### 6.4.4.2 Emissions Estimation

Northstar quantified potential emissions during operations and developed an emissions inventory for the key dust generating activities within the Project Site. This included adoption of emission factors for material handling, vehicle movements, processing operations and wind erosion. The emission factors used were consistent with those adopted for the original assessment.

A full description of the emission sources, emission factors and assumptions adopted for the air quality assessment are presented in Appendix 1 of Northstar (2023).

### 6.4.4.3 Dispersion Modelling

Two scenarios were selected for the updated dispersion modelling to predict potential Project-related impacts at privately-owned sensitive receivers. One scenario was developed for the site establishment and construction stage whilst the other was developed to represent Stage 4 operations (i.e. extraction and processing operations). Stage 4 of extraction operations was selected for the operational stage as it represents a timeframe where dust generating activities will be occurring closest to sensitive receivers.

The modelling approximates average and likely maximum operational characteristics which are appropriate to assess against longer term (annual average) and shorter term (24-hour) criteria for particulate matter, and the longer term (annual average) and short term (1-hour) criteria for NO<sub>2</sub>.

#### **6.4.4.4 Crystalline Silica**

Despite a lack of applicable criterion in NSW, Northstar (2023) assessed predicted annual average respirable silica emissions in order to address possible community concern. The annual average criterion adopted by the Victoria EPA and South Australia EPA for respirable crystalline silica (as PM<sub>2.5</sub>) of 3µg/m<sup>3</sup> has been assessed.

#### **6.4.5 Proposed Management and Mitigation Measures**

The Applicant would employ a number of best practice mitigation measures on site to ensure that dust impacts are minimised. These measures would be summarised in an Air Quality Management Plan and include:

- sealing the Quarry access road from the weighbridge to the Quarry Entrance;
- use of a water cart to control emissions from unsealed internal haul roads and other exposed areas;
- use of misting water sprays on mobile crushing and screening equipment;
- minimising exposed areas by implementing progressive vegetation clearing and progressive rehabilitation, where practicable;
- implementation of a wheel wash to limit material tracking from the Site;
- enforcement of speed limits on site and on the Quarry access road;
- training and implementation of standard operating procedures;
- minimising drop height of material during truck loading and unloading where possible;
- sheltering of stockpiles and transfer points, where possible;
- adopting all required safeguards for controlled blasts as set out in the Blast Management Plan for the Quarry;
- management of dust generating activities during unfavourable meteorological conditions, ceasing dust-generating activities, if necessary; and
- implementation of a real-time particulate monitoring program.

The effectiveness of the above measures would be established through a comparison of predicted and monitored air quality. The Air Quality Management Plan would also detail the monitoring program including monitoring locations.

### 6.4.5.1 Monitoring

The air quality monitoring program that would be undertaken for the Project would be designed to complement the monitoring activities undertaken by Hunter Quarries. Hunter Quarries representatives recognise that coordinated monitoring of the combined operations would be beneficial for all quarries.

Real-time data would be collected using dedicated monitoring equipment (TEOM, E-BAM or equivalent) and be used in conjunction with a Trigger Action Response Plan (TARP) to proactively manage the generation and subsequent transport of particulate matter from the Site. Where real-time data identifies that a trigger level is being approached, it would be interpreted in conjunction with the prevailing meteorological data and, if appropriate, shared with Hunter Quarries to ensure that the offending source of dust is identified and curtailed.

All other air quality monitoring results would be reviewed regularly and compared to a range of factors, including meteorology and the data collected from the adjacent quarries. This data would then be used to discriminate between the Project's contribution to measured particulate matter concentrations and those of the adjoining quarries. Details of the proposed coordinated monitoring program, TARP and the methods employed to determine the Project's contribution to the air quality environment to establish its compliance status would be included in the Quarry's Air Quality Management Plan.

All air quality monitoring results would be posted on the Applicant's website and included in each Annual Review.

## 6.4.6 Assessment of Impacts

### 6.4.6.1 Introduction

The following subsections present the predicted dust emissions derived from the modelling and assumptions of Northstar (2023) and at the receivers identified in **Figure 2.1**. The tables below present the results of the modelling scenarios used to predict the Project's individual contributions to the air quality environment ("Project") and those predicted when background concentrations and other incremental sources (i.e. from the adjacent quarries) are also considered ("Cumulative"). Sections 4.2.1 and 4.2.2 of Northstar (2023) provide the details of the predicted incremental emissions assumed for each of the surrounding quarries.

### 6.4.6.2 Annual Average Particulate Matter Concentrations

**Tables 6.5** and **6.6** present the predicted annual average PM<sub>2.5</sub> and PM<sub>10</sub>, TSP, and Deposited Dust concentrations for the assessed stages of the Project at the sensitive receivers identified on **Figure 2.1**.



**Table 6.5**  
**Predicted Project and Cumulative Annual Average Particulate Matter Concentrations for the Site Establishment and Construction Stage**

Emission Type	PM <sub>2.5</sub> (µg/m <sup>3</sup> )		PM <sub>10</sub> (µg/m <sup>3</sup> )		TSP (µg/m <sup>3</sup> )		Deposited Dust (g/m <sup>2</sup> /month)	
	8		25		90		2	4
Criteria	Project	Cumulative	Project	Cumulative	Project	Cumulative	Project	Cumulative
<b>Sensitive</b>								
7	< 0.1	5.4	< 0.1	17.0	< 0.1	29.7	< 0.1	2.3
8	< 0.1	5.4	< 0.1	17.1	< 0.1	29.9	< 0.1	2.3
10	< 0.1	5.2	< 0.1	15.9	< 0.1	27.8	< 0.1	2.1
12	< 0.1	5.4	< 0.1	17.1	< 0.1	29.7	< 0.1	2.2
13	< 0.1	5.3	< 0.1	16.1	< 0.1	28.4	< 0.1	2.2
15	< 0.1	5.3	< 0.1	16.0	< 0.1	28.1	< 0.1	2.1
16	< 0.1	5.4	< 0.1	16.4	< 0.1	29.4	< 0.1	2.3
17	< 0.1	5.3	< 0.1	15.8	< 0.1	27.8	< 0.1	2.1
19	< 0.1	5.2	< 0.1	15.7	< 0.1	27.5	< 0.1	2.1
20	< 0.1	5.6	0.1	17.6	0.2	32.8	< 0.1	2.6
21	< 0.1	5.4	0.1	16.8	0.2	30.0	< 0.1	2.3
22	< 0.1	5.9	0.2	18.8	0.4	35.9	< 0.1	3.1
23	< 0.1	5.6	0.1	17.9	0.2	32.3	< 0.1	2.5
<b>Quarry-related</b>								
4	< 0.1	7.0	<0.1	<b>27.2</b>	0.1	45.4	< 0.1	3.3
Note: <b>Bold</b> = exceeds criteria								
Source: Northstar (2023) – after Table 5, Table 6, Table 7, and Table 8								

**Table 6.6**  
**Predicted Project and Cumulative Annual Average Particulate Matter Concentrations for Stage 4**

Emission Type	PM <sub>2.5</sub> (µg/m <sup>3</sup> )		PM <sub>10</sub> (µg/m <sup>3</sup> )		TSP (µg/m <sup>3</sup> )		Deposited Dust (g/m <sup>2</sup> /month)	
	8		25		90		2	4
Criteria	Project	Cumulative	Project	Cumulative	Project	Cumulative	Project	Cumulative
<b>Sensitive</b>								
7	< 0.1	5.4	0.2	17.2	0.3	30.0	< 0.1	2.3
8	< 0.1	5.4	0.2	17.3	0.2	30.1	< 0.1	2.3
10	< 0.1	5.3	0.1	16.0	0.1	27.9	< 0.1	2.1
12	< 0.1	5.5	0.5	17.4	0.7	30.3	< 0.1	2.3
13	< 0.1	5.3	0.4	16.2	0.5	28.8	< 0.1	2.2
15	< 0.1	5.3	0.4	16.2	0.4	28.5	< 0.1	2.2
16	< 0.1	5.4	0.4	16.6	0.5	29.9	< 0.1	2.3
17	< 0.1	5.3	0.3	16.1	0.4	28.2	< 0.1	2.1
19	< 0.1	5.3	0.3	15.9	0.3	27.8	< 0.1	2.1
20	< 0.1	5.7	1.0	18.5	1.4	34.0	< 0.1	2.7
21	< 0.1	5.5	0.9	17.6	1.1	30.9	< 0.1	2.3
22	0.2	6.0	2.1	20.7	2.7	38.3	0.1	3.2
23	< 0.1	5.7	0.8	18.5	1.0	33.2	< 0.1	2.6
<b>Quarry-related</b>								
4	< 0.1	7.0	0.7	<b>27.8</b>	0.8	46.1	< 0.1	3.3
Note: <b>Bold</b> = exceeds criteria.								
Source: Northstar (2023) – after Table 13, Table 14, Table 15, and Table 16								

In summary, the modelling predictions for annual average concentrations shown in **Tables 6.4** and **6.5** identify the following.

- No exceedances of the Cumulative or Project annual average air quality criteria are predicted to occur at any of the surrounding residential receptors.
- The maximum predicted cumulative annual average PM<sub>2.5</sub> concentrations at a sensitive receiver for both scenarios occur at R22 with:
  - 5.9µg/m<sup>3</sup>, or 73.5% of the maximum criteria during site establishment and construction, with the Project’s predicted incremental contribution to this concentration being <0.01µg/m<sup>3</sup>; and
  - 6.0µg/m<sup>3</sup>, or 75.3% of the maximum criteria during the operational stage with the Project’s predicted contribution to this concentration being 0.2µg/m<sup>3</sup>, or 2.5% of the maximum criteria.
- The prediction for the cumulative concentration of PM<sub>10</sub> exceeds the criterion at the quarry-related receiver R4 during both scenarios. However, Northstar (2023) identifies this criterion as already being exceeded at this receiver, with the Project’s contributions not the cause of this exceedance.

### 6.4.6.3 Maximum 24-Hour Average Particulate Matter Concentrations

#### Cumulative

**Tables 6.6** presents the predicted maximum 24-hour average PM<sub>2.5</sub> and PM<sub>10</sub> concentrations for both scenarios assessed and at the receivers shown on **Figure 2.1**.

**Table 6.7**

#### Predicted Maximum Project and Cumulative 24-Hour Average Particulate Matter Concentrations

Emission Type	PM <sub>2.5</sub> (µg/m <sup>3</sup> )		PM <sub>10</sub> (µg/m <sup>3</sup> )		PM <sub>2.5</sub> (µg/m <sup>3</sup> )		PM <sub>10</sub> (µg/m <sup>3</sup> )	
	Criteria	25	50	50	25	25	50	50
Stage	Operational				Site Establishment and Construction			
Receiver	Project	Cumulative	Project	Cumulative	Project	Cumulative	Project	Cumulative
<b>Sensitive</b>								
7	< 0.1	16.3	< 0.1	37.7	< 0.1	16.3	<0.1	37.7
8	< 0.1	16.3	< 0.1	37.5	< 0.1	16.3	<0.1	37.5
10	< 0.1	16.3	< 0.1	37.5	< 0.1	16.3	<0.1	37.5
12	< 0.1	16.3	6.7	38.2	< 0.1	16.3	<0.1	37.5
13	< 0.1	16.3	1.7	39.1	< 0.1	16.3	0.9	38.4
15	< 0.1	16.3	5.9	39.5	< 0.1	16.3	<0.1	37.5
16	< 0.1	16.3	5.7	42.2	< 0.1	16.3	1.7	38.2
17	< 0.1	16.3	< 0.1	37.5	< 0.1	16.3	<0.1	37.5
19	< 0.1	16.3	< 0.1	37.5	< 0.1	16.3	<0.1	37.5
20	0.3	17.3	7.8	44.4	< 0.1	17.1	4.7	41.2
21	0.4	16.9	< 0.1	38.2	0.2	16.8	<0.1	38.2
22	0.6	17.7	8.7	49.3	0.3	17.3	5.4	46.0
23	0.4	17.1	10.5	43.8	< 0.1	16.9	0.1	39.6
<b>Quarry-related</b>								
4	< 0.1	18.3	6.9	<b>75.1</b>	< 0.1	18.3	3.6	<b>71.8</b>

Note: **Bold** = exceed criteria.

Source: Northstar (2023) – after Table 9, Table 11, Table 17, and Table 19

In summary, the modelling predictions for maximum 24-hour average particulate matter concentrations shown in **Table 6.6** identifies the following.

- No exceedances of the maximum cumulative 24-hour average particulate matter concentration criteria are predicted to occur at any surrounding sensitive receivers.
- The maximum predicted cumulative 24-hour average PM<sub>10</sub> concentration at a sensitive receiver during both the site establishment and construction and operational stages is at R22, with:
  - 49.3µg/m<sup>3</sup>, or 98% of the criteria with the Project's predicted contribution to this concentration during the site establishment stage as 8.7µg/m<sup>3</sup>, or 10.8% of the criteria; and
  - 48.1µg/m<sup>3</sup>, or 96.2% of the maximum criteria during the operational stage. The Project's contribution to this concentration is 7.5µg/m<sup>3</sup>, or 17.4% of the maximum criteria.
- Sensitive receiver R22 is also assessed as having the maximum predicted cumulative 24-hour average PM<sub>2.5</sub> concentration during both scenarios with:
  - 17.3µg/m<sup>3</sup>, or 69.4% of the maximum criteria during the site establishment and construction stage. The Project's contribution to this predicted concentration is just 0.3µg/m<sup>3</sup>, or 1.7% of the maximum criteria; and
  - 17.3µg/m<sup>3</sup>, or 69.2% of the predicted maximum criteria during the operational stage. The Project's contribution to this predicted concentration is 0.3µg/m<sup>3</sup>, or 1.2% of the maximum criteria.

### Incremental Concentration

**Table 6.8** presents the predicted maximum 24-hour average incremental PM<sub>2.5</sub> and PM<sub>10</sub> concentration at each receiver (sensitive and quarry-related), for both scenarios assessed.

Although the following results are on average higher than the cumulative data, they do not sum with the impacts of adjacent quarries plus background concentrations to result in total concentrations that are greater than those shown in the tables above.

The incremental impacts presented in **Table 6.8** reflect the 24-hours period where the maximum intensity of operations is occurring at the Site.

In summary, the modelling predictions for maximum 24-hour average particulate matter concentrations shown in **Table 6.8** identifies the following.

- No incremental exceedances are predicted to occur at any of the surrounding sensitive receivers during either scenario assessed.
- The highest predicted maximum 24-hour incremental concentration is at R22 with a PM<sub>10</sub> concentration of 16.6µg/m<sup>3</sup> during the operational stage. However, this predicted concentration is well below the 50µg/m<sup>3</sup> criteria.



**Table 6.8**  
**Predicted Maximum Incremental 24-hour Average Concentrations**

Type	Incremental impact			
Stage	Site Establishment and Construction		Operational	
Emission Type	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )
Criterion	25	50	25	50
Max % of criterion	3.9 %	15.2 %	9.9 %	33.1 %
<b>Sensitive</b>				
7	0.2	1.8	1.0	5.1
8	0.2	1.5	1.0	4.0
10	0.1	1.0	0.7	2.7
12	0.4	3.3	1.8	11.2
13b	0.4	3.2	1.4	7.6
15	0.3	2.5	1.2	6.2
16	0.4	2.6	1.2	6.2
17	0.3	2.4	0.8	5.0
19	0.2	1.4	0.6	3.4
20	0.7	5.5	1.5	10.2
21	0.5	4.0	1.5	9.7
22	1.0	7.6	2.5	16.6
23	0.7	6.3	2.1	14.0
<b>Quarry-related</b>				
4	0.4	3.6	1.2	6.9

Source: Northstar (2023) – after Table 10, Table 12, Table 18 and Table 20

#### 6.4.6.4 Nitrogen Dioxide

Dispersion modelling of Nitrogen Dioxide was not completed in Northstar (2023), but highly conservative and cumulative modelling was undertaken for the original EIS and can be found in detail in Section 6.2 and 6.3 of Northstar (2018). The predictions assumed that blasting was occurring simultaneously at the Site, Karuah East and Karuah Red quarries, on every day of the year. The results at any surrounding receptor location were as follows:

- Maximum cumulative 1-hour average NO<sub>2</sub> concentration of 82.2µg/m<sup>3</sup>, or 50% of the maximum criterion.
- Maximum annual average NO<sub>2</sub> concentration of 16.5µg/m<sup>3</sup>, or 53% of the maximum criterion.

#### 6.4.6.5 Crystalline Silica

The Project's maximum predicted incremental concentration during the operational stage results in a respirable crystalline silica concentration at all residential receptors that is, less than 0.4µg/m<sup>3</sup>. When this is considered with the impacts of all other quarries, and assuming that the existing background is silica free, the predicted maximum crystalline silica concentration is likely to be < 1.2µg/m<sup>3</sup> and therefore well below the 3µg/m<sup>3</sup> criterion.

## 6.4.7 Conclusion

The air quality impacts of the amended Project show a general overall decrease in predicted Project-related annual and 24-hour average emissions in comparison to those assessed for the EIS.

Northstar (2023) identified that the predicted contributions of all airborne dust emissions generated by Project-related activities, coupled with existing background concentrations and assumed contributions of surrounding quarrying operations would comply with all applicable short-term (i.e. 24-hour) and annual average assessment criteria at all privately-owned residences.

Exceedances were identified at receivers situated on adjacent quarry-owned land. However, these exceedances were driven by operations on those properties and were largely considered to be already present. Therefore, it is concluded that the Project would not lead to an unacceptable level of environmental harm or impact at assessed receivers.

## 6.5 Noise and Vibration

### 6.5.1 Introduction

A *Noise and Vibration Impact Assessment* was prepared by Spectrum Acoustics Pty Ltd in 2018 to support the EIS for the Project (Spectrum 2018). An *Amended Noise and Vibration Impact Assessment* has been prepared to include the changes associated with the proposed amendment. The *Amended Noise and Vibration Impact Assessment* is included as **Appendix 7** and is hereafter referred to as Spectrum (2023).

The principal changes to the noise impact assessment, compared to the previous version, are associated with the relocation of the Quarry Infrastructure Area into the existing Karuah Quarry extraction area, the associated relocation of the quarry access road, weighbridge and administrative infrastructure. The addition of ancillary infrastructure such as a pugmill and concrete batching plant have also been assessed.

### 6.5.2 The Existing Environment

#### 6.5.2.1 Meteorological Environment

The meteorological environment at the Site consists of minimal wind and low humidity. The *NSW Noise Policy for Industry* (NPI) (EPA, 2017) states that wind effects need to be considered in a noise impact assessment where source to receiver winds of 3m/s or below occur for 30% or more of an assessment period. Spectrum (2023) found that winds up to 3m/s occurred less than 20% of the time during all seasons, and therefore the noise modelling was completed under the condition of neutral conditions.

#### 6.5.2.2 Acoustic Environment

In order to quantify the existing acoustic environment, an environmental noise logger was deployed from 10-16 September 2018 at residential receiver location R21, as it was predicted to be the most impacted receiver (Spectrum, 2023).

**Table 6.9** summarises the ambient  $L_{Aeq}$  and Rating Background Levels (RBL) according to procedures in the NSW NPI.

**Table 6.9**  
**Ambient  $L_{Aeq}$  and RBLs**

Location	$L_{eq}(\text{day})$	$L_{eq}(\text{eve})$	$L_{eq}(\text{night})$	$L_{90}(\text{day})$	$L_{90}(\text{eve})$	$L_{90}(\text{night})$
Mill Hill Road (R21 / NM4)	58	57	54	53	52	44

Source: Spectrum 2018 – Table 4

### 6.5.3 Assessment Methodology

#### 6.5.3.1 Noise

Spectrum (2023) was prepared in accordance with the *NSW Noise Policy for Industry* (EPA, 2017) and *Road Noise Policy* (OEH, 2011). The assessment modelled the noise emissions of the Project using two scenarios; site establishment and construction, and extraction Stage 3. Stage 3 has been chosen to represent the worst-case scenario, with maximum extraction while still being a higher elevation, and therefore closer to receivers than Stage 4 of extraction.

Further detail on the assessment methodology is presented in Section 4 of Spectrum (2023).

#### 6.5.3.2 Blasting and Vibration

Spectrum (2023) assessed the blasting and vibration impacts against the criteria proposed by the Australian and New Zealand Environment and Conservation Council (ANZECC) publication “*Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration – September 1990*”. The “annoyance” ANZECC criteria are the most stringent and will be taken as the governing criteria.

Further detail on the assessment methodology is presented in Section 4 of Spectrum (2023).

### 6.5.4 Proposed Mitigation and Management Measures

The following management measures are proposed by Spectrum (2023) to mitigate noise emissions and effects from the Project.

- Restrict noise-generating activities to nominated hours of operation.
- Fit mobile equipment with original equipment manufacturer standard muffling apparatus.
- Stockpiles and ancillary equipment are positioned to limit potential noise impacts.
- All equipment on site is maintained to adhere to existing noise standards and ensure that noise generated by equipment is not exacerbated.
- Operations at exposed locations and under unfavourable weather conditions are modified, where necessary, to reduce potential noise-related impacts.
- The internal road network is maintained to reduce body noise from empty trucks.



- All drivers would be required to review and sign a Driver’s Code of Conduct) that directs driver behaviour during transportation activities. The code of conduct would include advice for quiet driving practices and measures to reduce vehicle noise as well as directions to limit the use of compression braking unless required for safety reasons.
- Implement attended noise monitoring at the most appropriate nearby receivers quarterly during first year of operations and biannual thereafter.
- Airblast overpressure and ground vibration monitoring would initially be undertaken at the Quarry Entrance as a control point to determine whether monitoring would be required at more distant locations..
- Prepare and implement a Noise and Vibration Management Plan prior to commencement.
- Adopt a complaints management system to ensure that all complaints are dealt with through investigation and implementation of corrective treatments.

## 6.5.5 Assessment of Impacts

The following subsections present the predicted noise emissions derived from the modelling and assumptions of Spectrum (2023). **Figure 6.11** and **Figure 6.12** present the surrounding receivers and the noise emission contours from the assessment.

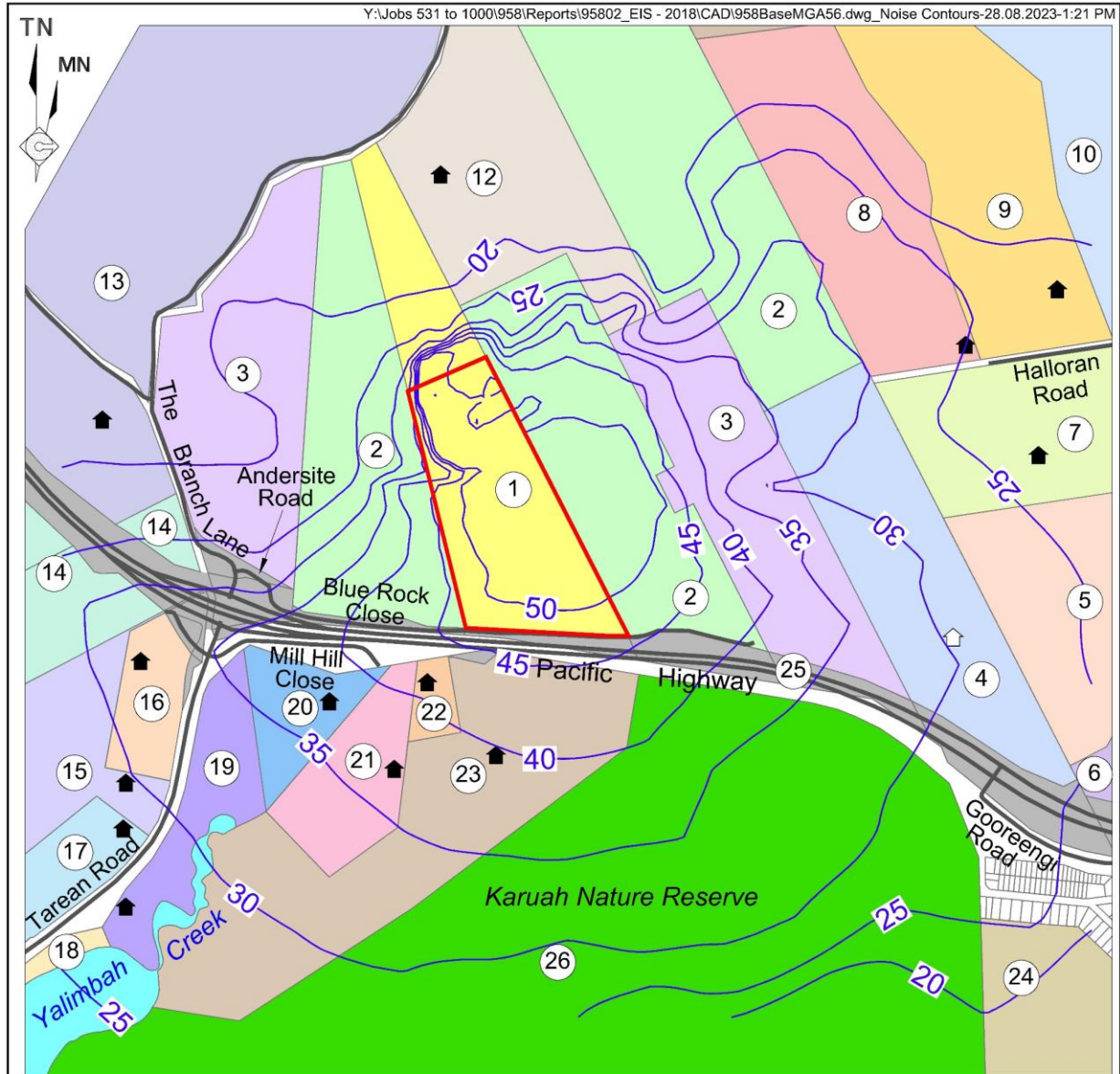
### 6.5.5.1 Predicted Noise Levels

**Table 6.10** displays the predicted noise levels for both scenarios, alongside the product noise trigger level for each surrounding receiver.

**Table 6.10**  
**Predicted Project Noise Levels**

Receiver	Product Noise Trigger Level (dB(A), $L_{eq}(15min)$ )	Predicted Project Noise Level (dB(A), $L_{eq}(15min)$ )	Product Noise Trigger Level (dB(A), $L_{eq}(15min)$ )	Predicted Project Noise Level (dB(A), $L_{eq}(15min)$ )
	Site Establishment and Construction		Stage 3 Extraction	
R7	39	24	39	22
R8	39	25	39	<20
R9	39	22	39	<20
R12	35	<20	35	23
R13	49	<20	49	23
R15	49	30	49	34
R16	49	32	49	36
R17	49	29	49	33
R19	39	27	39	31
R20	49	37	49	44
R21	49	36	49	44
R22	50	41	50	50
R23	49	40	49	46

Source: Modified after Table 11 and 12 of Spectrum (2023).



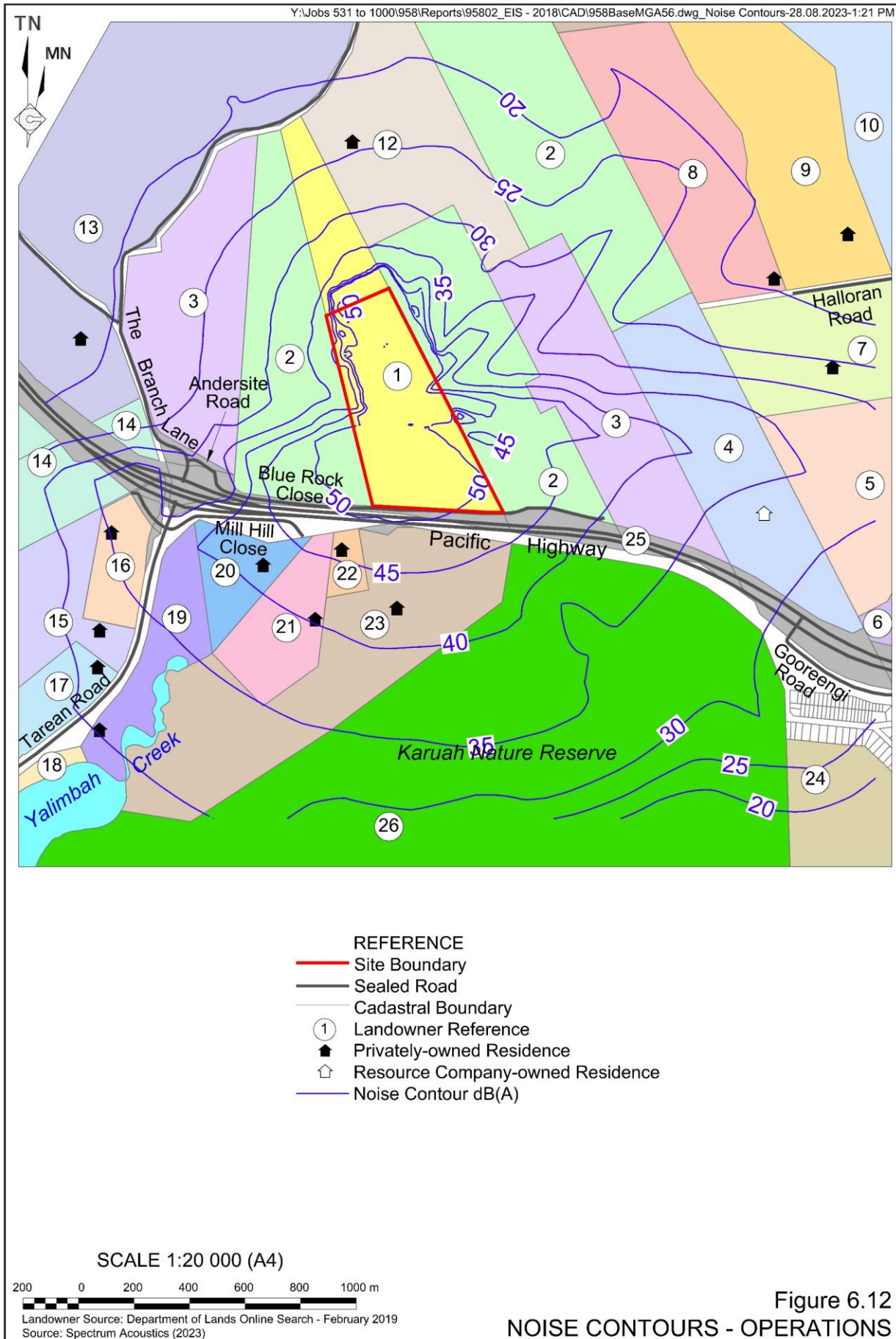
- REFERENCE
- Site Boundary
  - Sealed Road
  - Cadastral Boundary
  - ① Landowner Reference
  - 🏠 Privately-owned Residence
  - 🏠 Resource Company-owned Residence
  - Noise Contour dB(A)

SCALE 1:20 000 (A4)



Landowner Source: Department of Lands Online Search - February 2019  
Source: Spectrum Acoustics (2023)

Figure 6.11  
NOISE CONTOURS - CONSTRUCTION





The predicted noise levels for the Project at all assessed receivers are equal to or below the project noise trigger levels (Spectrum 2023).

### 6.5.5.2 Cumulative Noise

Table 6.11 presents the cumulative noise levels predicted to occur at all surrounding receivers for which the predicted noise levels from the nearby quarries are available. The results represent the worst-case scenario, assuming the greatest predicted noise level at each receiver and quarry, regardless of meteorological or operational scenarios (Spectrum, 2023).

**Table 6.11**  
**Predicted Cumulative Noise Levels**

Receiver	Industrial Noise levels dB(A), $L_{eq(15min)}$		Cumulative Noise Level	Allowable Amenity Level
	Karuah East Quarry	Karuah South Quarry		
R7	37	22	41	55
R13	19	23	48	55
R15	31	34	45	55
R16	30	36	45	55
R20	34	44	50	55
R22	37	50	51	55
R23	40	46	48	55

The predicted cumulative noise levels for the Project and the surrounding quarries are below the allowable cumulative amenity level at all assessed receivers (Spectrum, 2023).

### 6.5.5.3 Maximum Noise Levels

The maximum noise level criteria are only applicable to noise generated during the night-time period. Spectrum (2023) assessed the noise emissions from the loading of product trucks between the hours of 5:00am and 7:00am. Table 6.11 presents the results.

**Table 6.12**  
**Maximum Noise Levels**

Receiver	Criterion (dB(A), $L_{max}$ )	Predicted Maximum Noise Level (dB(A), $L_{max}$ )
R7	52	<30
R8	52	<30
R9	52	<30
R12	52	<30
R13	52	<30
R15	52	<30
R16	52	<30
R17	52	<30
R19	52	<30
R20	52	30
R21	52	36
R22	52	38
R23	52	40

Source: Spectrum (2023) – Table 14

Predicted maximum noise levels are well below the maximum noise level criterion at all receivers (Spectrum, 2023).

### 6.5.5.4 Blast Overpressure and Ground Vibration

Table 6.13 presents the predicted blast overpressure and ground vibration levels at the nearest residential receivers in each direction. Calculations are based on charge weights (Maximum Instantaneous Charge weight) of a nominal 60kg and a likely maximum value of 80kg.

**Table 6.13**  
**Predicted Blast Overpressure and Ground Vibration Impacts**

Receiver	Distance (m) <sup>a</sup>	Criterion		MIC = 60kg		MIC = 80kg	
		PPV <sup>b</sup>	OP <sup>c</sup>	PPV	OP	PPV	OP
R22 (south)	455	5	115	1.1	110	1.3	111
R16 (west)	950	5	115	0.5	104	0.6	106
R12 (north)	720	5	115	0.8	107	1.0	108
R8 (east)	1260	5	115	0.3	100	0.4	101

<sup>a</sup> Distance from receiver to closest point of extraction area.  
<sup>b</sup> Peak vertical ground vibration, mm/s.  
<sup>c</sup> Blast overpressure, dB

Source: Spectrum (2023) – Table 15

Spectrum (2023) also assessed the potential blast impacts to the Pacific Highway. The predicted PPV levels for an 80kg MIC blast are 1.4mm/s, which is below the 5% exceedance limit of 5mm/s.

Predicted blast impacts to residential receivers and the Pacific Highway are below the human “annoyance” ANZECC criteria (Spectrum, 2023).

### 6.5.5.5 Off-site Traffic Noise

Traffic levels would vary substantially on a daily basis throughout the life of the Project. For the purposes of the assessment, the number of daily loads would vary from approximately 20 to 120, averaging approximately 72 loads. Table 6.14 presents a summary of the traffic types and levels expected for the Project.

**Table 6.14**  
**Predicted Transport Types and Levels**

Transport Type	Transport Levels (loads / movements)		
	Average Daily <sup>1</sup>	Maximum Daily	Total Daily <sup>2</sup>
Aggregate Despatch	72/148	120/240	120/140
VENM Import	15/30	60/120	
Concrete Raw Material Delivery	3/6	5/10	
Concrete Despatch	12/22	25/50	

Notes:  
1 Assumes 280 operating days in a 12-month period.  
2 Represents the maximum number of traffic loads/movements in any day across all transport types. That is, peaks in one type of traffic would require a similar decrease in other traffic types on a given day.

Source: Spectrum (2023) – Table 14

Based on the maximum annual product despatch rate of 600 000t, the Project would generate up to 240 movements per day, or 52 movements per hour, half as arriving empty trucks and half as departing full trucks. Since 95% of departing trucks would head south on the Pacific Highway, the potentially most impacted receiver is R16 at 185m south of the southbound interchange. Point calculation modelling resulted in a road traffic noise level of 47 dB(A), $L_{eq(1hour)}$  based on a nominal entry speed of 70km/h. This is significantly below the criterion of 55 dB(A), $L_{eq(9hour)}$ . Consequently, there is minimal potential for adverse traffic noise impacts from the Project.

### 6.5.6 Conclusion

Spectrum (2023) found that no exceedances of noise emission or blasting criteria are predicted to occur as a result of the Project. When compared to the assessment that accompanied the EIS, noise-related impacts for the Project have been reduced through the relocation of most noise sources to the former Karuah Quarry extraction area away from private residences. However, during operations the inclusion of concrete batching on the southern section of the Site would increase potential noise generation in this location and may result in noise levels that approach the nominated project trigger noise levels that have been adopted considering noise generated by vehicles on the Pacific Highway.

## 6.6 Biodiversity

### 6.6.1 Introduction

Ecoplanning Pty Ltd was commissioned by the Applicant to undertake an ecological assessment of the Site in accordance with the NSW Biodiversity Assessment Methods (BAM) and prepare a Biodiversity Development Assessment Report (BDAR) for the Project to document potential impacts to biodiversity and to assess the residual impacts of the Project. An amended BDAR has been prepared to take into account the amended Project. The amended BDAR is provided as **Appendix 8** and hereafter referred to as Ecoplanning (2023). No additional field surveys were required for the amendment of the Project as all land included in the Quarry Site Layout was either previously assessed or has previously been disturbed for quarrying activities at the Karuah Quarry.

Section 2.16 of the Amended Project Description (**Appendix 1**) presents the assessed biodiversity offsetting obligations of the Project. This subsection of the Amendment Report presents an updated assessment of the significance of proposed biodiversity impacts and the presents the residual biodiversity impacts of the Project. It is noted that the amendment has resulted in an overall reduction or avoidance of vegetation clearing in the order of 4.54ha or approximately 40% of the originally proposed extent of clearing.

As there has been no change to the vegetation types and the total area of vegetation disturbance has been reduced, the original conclusion that a referral is not required due to impacts regulated by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) has not changed.



## 6.6.2 Existing Environment

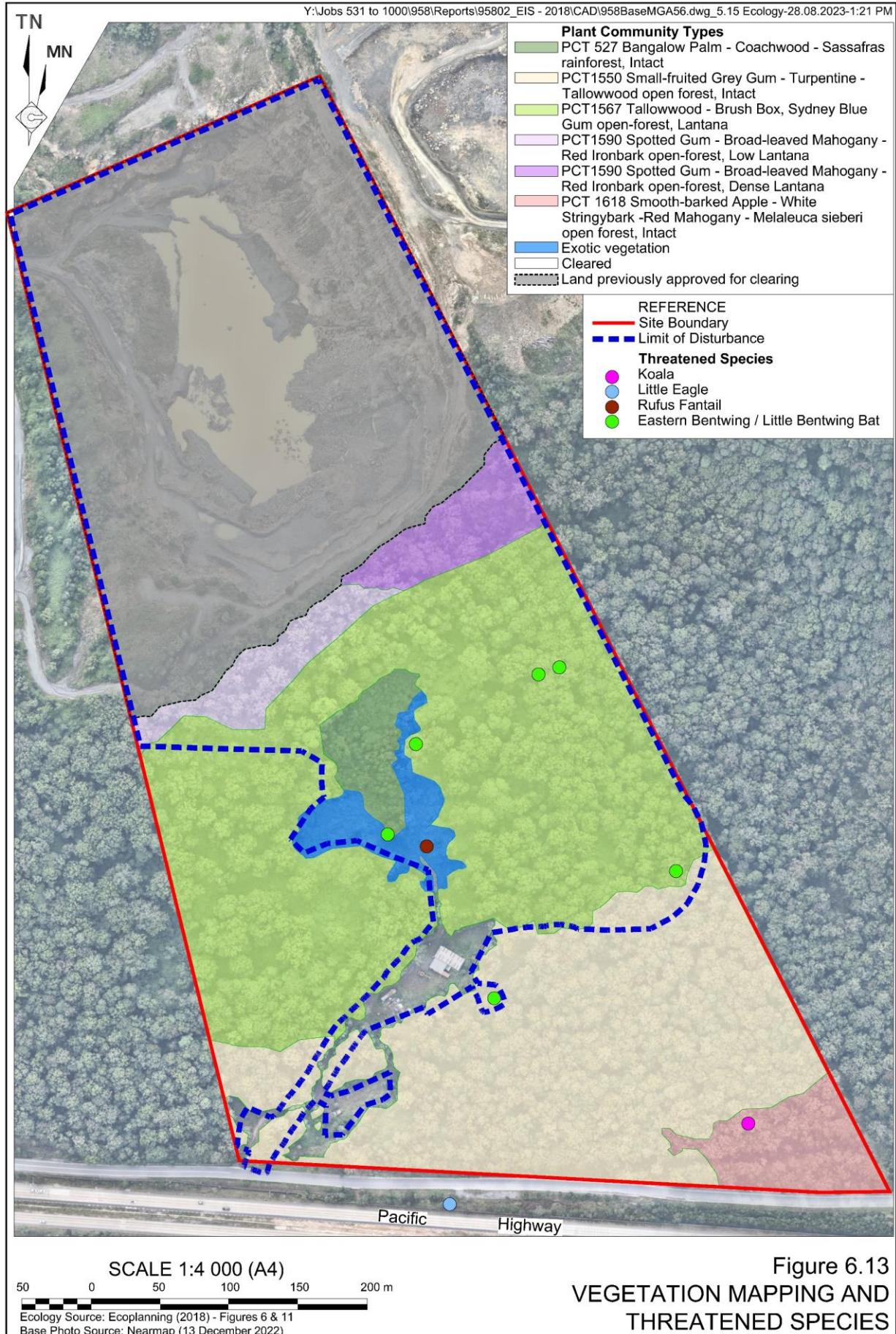
A detailed description of the local landscape context, native vegetation and flora and fauna identified within the Site and the methods used for analysis are presented in Section 2, Section 3 and Section 4 of the BDAR.

Native vegetation was identified and mapped across the Site. Areas which did not support native vegetation included areas identified as being ‘cleared’ or areas supporting ‘exotic vegetation’. Four PCTs were identified across the proposed area of disturbance, with the distribution of these communities related to their topographical position, slope and aspect within the Site. **Figure 6.13** displays the spatial distribution of the four PCTs mapped by Ecoplanning (2023) as well as the identified threatened species distribution. **Table 6.15** identifies the vegetation zone, area and threatened ecological community status of the four PCTs identified within the proposed area of disturbance.

**Table 6.15**  
**Plant Community Types within the Proposed Area of Disturbance**

PCT	Vegetation Class	Vegetation zones	Proposed Clearing Area (ha)	Original Area (ha)	Threatened Ecological Community (TEC)
1590 - Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Hunter-Macleay Dry Sclerophyll Forests	Dense Lantana	0.64	0.58	'Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions' (BC Act)
		Low Lantana	0.56	0.56	
1567 - Tallowwood - Brush Box - Sydney Blue Gum moist shrubby tall open forest on foothills of the lower North Coast	North Coast Wet Sclerophyll Forest	Lantana	4.95	7.45	None
1527 - Bangalow Palm - Coachwood - Sassafras gully warm temperate rainforest of the Central Coast	Northern Warm Temperate Rainforests	Intact	0.46	0.46	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (BC Act) 'Lowland Rainforest of Subtropical Australia' (EPBC Act)
1550 - Small-fruited Grey Gum - Turpentine - Tallowwood moist open forest on foothills of the lower North Coast	Northern Hinterland Wet Sclerophyll Forests	Intact	0.43	2.53	None
Exotic Vegetation	-	-	0.47	0.53	-
<b>Total</b>			<b>7.05</b>	<b>11.59</b>	

Source: Modified after Ecoplanning (2023) – Table 18



**Figure 6.13**  
**VEGETATION MAPPING AND**  
**THREATENED SPECIES**

### 6.6.3 Mitigation and Management Measures

The Project has been designed to minimise impacts on native species by firstly avoiding and then mitigating potential biodiversity impacts. The amended site layout has specifically been designed to take advantage of the completion of extraction activities at the Karuah Quarry and the previously disturbed land within Lot 11 DP1024564.

Management and preservation of biodiversity values within the Site would be guided by a Landscape and Rehabilitation Management Plan that would be prepared in consultation with BCD and other relevant Government agencies. That plan would include protocols for the following activities.

- Soil stripping and stockpiling.
- Vegetation clearing protocols.
- Clearing, handling and placement of hollow-bearing trees.
- Measures to maintain fauna movement across the property.
- Weed management.
- Bush fire management.
- Threatened species management.
- Erosion and sediment controls.
- Progressive and final rehabilitation of the Site.

Additional details describing some of these protocols are presented in Section 6.3 of the BDAR (Ecoplanning, 2023) with the majority consistent with standard best practice management within the extractive materials industry.

Measures to promote fauna movement across the property would include the following.

- Retain a wider swathe of vegetation in the southern section of the property compared to that proposed in the EIS to remove obstacles to fauna movement.
- Construction of a 20 m long culvert beneath the access road. The culvert would be a minimum of 1.5 m in height and width and include furniture (e.g. horizontal logs placed off the ground and no more than 600 mm below the culvert ceiling) for safe ground crossing in the vicinity of the access road.
- Vehicle speed on the Quarry access road would be limited to 30km/hr to reduce the potential for vehicle strike of crossing fauna.
- Signage at the entrance of the Quarry and again at the exit of the processing and stockpiling area would remind drivers of all vehicles of the possible presence of fauna and that the area may be used as a Koala crossing. There would also be signage indicating the required vehicle speed in this location.
- Overhead rope bridges would be constructed to permit arboreal fauna to cross safely at canopy height to enter vegetation on either side of the Quarry access road.



- Product despatch operations would be limited to the hours of 5:00am to 6:00pm Monday to Friday and 5:00am to 1:00pm Saturday. As fauna such as Koala are generally nocturnal movers, transport operations would avoid the highest risk periods.

## 6.6.4 Assessment of Impacts

Impacts to native vegetation are anticipated through the direct clearing of approximately 7.05ha of native vegetation. The proposed amendment would result in a reduction to proposed vegetation clearing by approximately 4.54ha or approximately 40% of the originally proposed extent of clearing. This clearly demonstrates measures to avoid vegetation clearing as much as practically possible. The direct clearing and subsequent development of the proposed area of disturbance would represent a permanent impact, or loss, of this native vegetation and habitat.

No prescribed biodiversity impacts are anticipated from the Project, including impacts to threatened species. A number of threatened species have been identified within the Site, however an assessment of the impact to these species has concluded that the Project would not significantly exacerbate existing impacts. Limitations to fauna movement across Lot 11 DP1024564 have been identified as a greatest risk to fauna as a result of the Project. Measures have been incorporated into the Project design to maintain fauna movement across the property as described in Section 6.6.3. The amended Project has reduced obstacles to fauna movement to mostly a proposed 15m road and a canopy gap of an estimated 37m. Impacts to water quality and hydrological processes within the minor tributary of Yalimbah Creek could potentially constitute a prescribed impact, however, impacts to this tributary are to be avoided through the design of the Project.

Whilst the Project would result in residual impacts to native flora and fauna, it is not expected to result in significant impacts upon migratory or threatened species, assuming the implementation of the range of on-site mitigation measures and the proposed Biodiversity Offset Strategy.

## 6.7 Surface Water

### 6.7.1 Introduction

Management of surface water within the Site would be a critical component of the Project with R.W. Corkery & Co. Pty. Limited commissioned by the Applicant to prepare an *Amended Surface Water Assessment* (RWC 2023) which is provided as **Appendix 9** and hereafter referred to as RWC (2023). The objective of the surface water assessment was to assess the potential impacts to local and regional surface water resources and users as a result of the Project and identify appropriate management measures to mitigate any identified impacts. The water sources and water uses expected for the Project are described in Section 2.9 of the Amended Project Description (**Appendix 1**) including a detailed site water balance.



The proposed site water management system has been developed as the principal surface water mitigation measure that maximises opportunities for reuse and recycling and ensures any off-site discharge is tested and treated prior to release. The site water management system has been developed in a manner that allows for the following:

- The prevention of surface water flows entering disturbance areas from undisturbed areas.
- The efficient recovery and use of runoff from internally draining disturbance areas such as the Quarry Infrastructure Area and extraction area.
- The permissible capture and storage of runoff from externally draining sub-catchments for Project-related activities.
- Effective water quality management, where the controlled discharge of runoff from disturbance areas is required, to prevent the discharge of poor-quality water to receiving environments.

Whilst groundwater was encountered in some exploration holes, this was assumed to be hosted by fractures of limited extent and connectivity. As groundwater is highly unlikely to be encountered during extraction operations, no specific management measures are proposed to account for groundwater and surface water interactions. Groundwater resources are discussed in more detail in Section 6.9.2 and in Section 5.7 of the EIS.

## 6.7.2 Existing Environment

The surface water environment within and surrounding the Site is described in detail in Section 3 of the *Amended Surface Water Impact Assessment* (RWC 2023). In summary, the surface water environment of the Site may be described as follows.

- The Site experiences annual average rainfall of 1,223mm and annual average evaporation of approximately 1,450mm<sup>6</sup>.
- Surface water drainage within the Site comprises topographically controlled, ephemeral, first order drainage features that historically converged to form the second order watercourse, Yalimbah Creek.
- The construction of Blue Rock Close and the Pacific Highway has removed much of the former flow path of Yalimbah Creek with all discharge from the Site directed to a bank of culverts which discharge via overland flow to the Yalimbah Creek coastal wetland.

## 6.7.3 Mitigation and Management Measures

Following site establishment and during operations, surface water drainage within, and adjacent to the Site, would be comprised of seven sub-catchments. These sub-catchments would be topographically defined, with the underlying landform being either undisturbed (i.e. vegetated

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<sup>6</sup> RWC (2023) based on Scientific Information for Landowners data obtained for the grid point -32.65° South and 152.00° North for the period 1 January 1889 to 31 December 2022.

and unaltered) or disturbed (i.e. altered by historical / proposed extraction activities or Project-related infrastructure). Generally, most disturbed sub-catchments are, or would, become internally draining as the result of historical or proposed extraction activities with uncontrolled discharge from these sub-catchments not possible. The proposed mitigation measures would be based on the Site water classification that would correspond with two sub-catchment types as follows.

- “Clean” refers to runoff from undisturbed sub-catchments.
- “Dirty” refers to runoff from disturbed sub-catchments.

The proposed site water management system would be the principal surface water mitigation measure. This system would be constructed, operated and maintained to achieve the following:

- Divert clean runoff from undisturbed sub-catchments to maintain hydrologic function in the downstream environment.
- Ensure that site water management infrastructure on internally draining, disturbed sub-catchments has sufficient capacity to manage dirty runoff in most conditions whilst:
  - meeting the Project’s water demand (e.g. processing and dust suppression);
  - limiting the need for controlled discharge; and
  - limiting disruption to operations.
- Ensure that site water management infrastructure has sufficient capacity to treat controlled discharge prior to release.

**Table 6.16** provides an overview of the Site sub-catchments, site water classification and runoff management. The Site sub-catchments are also shown on **Figure 6.14**. Further detail is provided in Section 4 of RWC (2023).

**Table 6.16**  
**Site Sub-catchments, Site Water Classification, Water Management and Discharge**

Sub-catchment	Classification	Description	Runoff Management
Southeastern	Clean	Southeastern section of the Site including stabilised and vegetated batters of the Quarry access road.	None
West	Clean	Western section of the Site. including stabilised and vegetated batters of the Quarry access road.	Clean water bunds
East	Clean	Eastern section of the Site. including stabilised and vegetated batters of the Quarry access road.	Clean water bunds
Quarry Infrastructure Area	Dirty	Internally draining.	Captured and stored
Extraction Area	Dirty	Internally draining.	Captured and stored
Weighbridge Dam	Dirty	Section of the Quarry Access Road, externally draining.	Captured and stored

Source: RWC (2023) – after Table 5

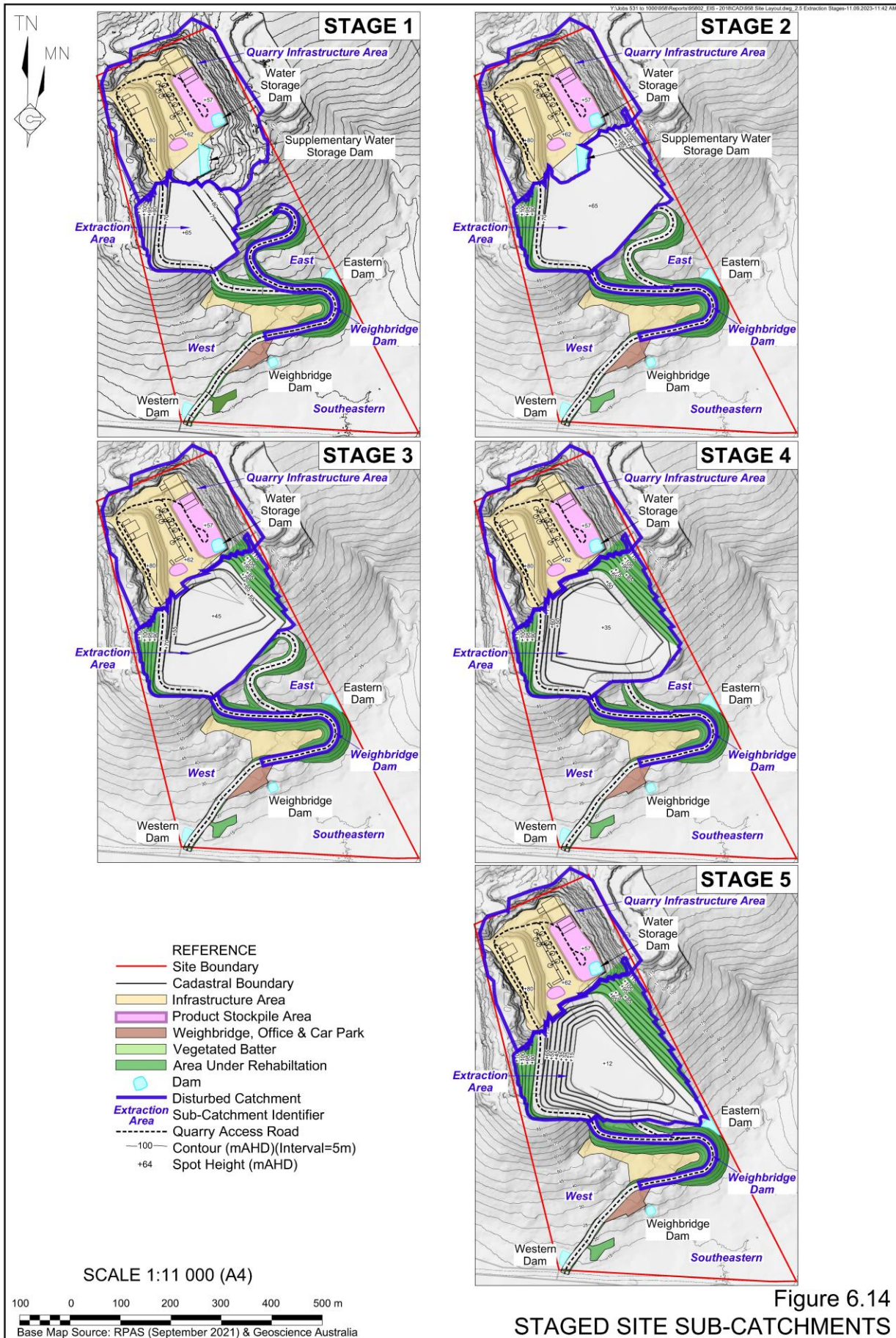


Figure 6.14  
 STAGED SITE SUB-CATCHMENTS



A brief description of the proposed infrastructure for runoff management from the sub-catchments identified in **Table 6.16** is provided below.

### Clean Runoff

Runoff generated on undisturbed (clean) Site sub-catchments and external catchments would be prevented from entering disturbed sub-catchments and conveyed offsite via overland flow or first order drainage features. These bunds would be constructed at the coincident boundaries of undisturbed and disturbed sub-catchments with no other water management infrastructure required to manage clean runoff.

### Dirty Runoff

**Table 6.17** presents the Site’s proposed dirty runoff management infrastructure and nominal sizing throughout the various Project stages for the dirty sub-catchments identified in **Table 6.16**. **Table 6.17** also includes the proposed infrastructure that would be used to receive controlled discharge for treatment prior to off-site release.

**Table 6.17**  
**Dirty Water Sub-catchment Water Management Infrastructure**

Storage	Sub-Catchment	Stage	Size (ML)	Discharge
Water Storage Dam	Quarry Infrastructure Area	All	18	Controlled for treatment
Supplementary Water Storage Dam	Quarry Infrastructure Area	1 and 2	4.8	Controlled for treatment
Extraction Sump	Extraction Area	1	6.7	Controlled for treatment
		2	15.2	
		3	16.8	
		4	20.5	
		5	26.0	
Weighbridge Dam	Quarry Access Road	All	3.4	Uncontrolled
Western Dam	None	All	2.8	Treated
Eastern Dam	None	All	2.8	Treated

Source: RWC (2023) – Table 6

### Controlled Discharge

Controlled (i.e. pumped) discharge from the Quarry Infrastructure Area and extraction area sub-catchments may be required periodically throughout the Project-life when storage volumes of the water management infrastructure in these sub-catchments is exceeded under certain rainfall conditions. All water intended for controlled discharge would be pumped to either the Western and /or the Eastern Dam for treatment prior to release. The Western Dam and Eastern Dam would be “turkeys nest” style dams that would be fitted with a chemical dosing system at the point of inflow and a rock armoured spillway at their respective outlets.

When receiving discharge, these dams would operate as “continuous flow” high efficiency sediment basins where inflows are dosed with chemical flocculant. As the discharge travels across the dam to the outlet, the flocculant would attract, bind and accumulate suspended sediments in the water column, causing them to form large particle agglomerates that would settle

out of the water column. Provided chemical dosage occurs at the design rate, the water quality of dam discharge would meet the criteria proposed for the Quarry’s Environmental Protection Licence (refer **Table 6.18**). Water balance modelling for the Project identifies that on average, the Site would release treated discharge between 28 and 59 days per year at rates between 3.3 and 7.2 litres per second (refer Section 5.1.7 of RWC [2023]).

**Table 6.18**  
**Controlled Discharge Water Quality Criteria**

Pollutant	Unit of Measure	Criteria
Oil and grease	Not applicable	None visible
Turbidity	NTU	6-50
pH	pH	6.5-8.5
Source: RWC (2023) – Table 7		

### Uncontrolled Discharge

Like farm dams in the area, the Weighbridge Dam would discharge in an uncontrolled manner when runoff volumes exceed its 3.4ML capacity. However, whilst its sub-catchment is classed as “developed”, uncontrolled discharge from the Weighbridge Dam would not result in sediment-laden runoff entering the receiving environment as the compacted surface of the Quarry access road would not result in a calculated soil loss that is greater than 150m<sup>3</sup>/ha/year.

The design of the Quarry Infrastructure Area and the Extraction Area are such that uncontrolled discharge would not occur during operations.

### Sewage and Effluent Disposal

Sewage and effluent disposal would be managed on location through a biocycle septic system, similar to the existing system currently utilised but with an increased capacity.

## 6.7.4 Monitoring

### 6.7.4.1 Introduction

Monitoring undertaken to demonstrate compliance with best practice for surface water management would include the monitoring of water quality, flow monitoring during periods of discharge and the monitoring of water management infrastructure on site.

All surface water-related monitoring results would be posted on the Applicant’s website and included in each Annual Review.

### 6.7.4.2 Discharge Water Quality

As the intention is to capture all sediment-laden runoff for re-use and recycling in order to meet site water demand, water quality monitoring would only apply to water discharged from the Eastern Dam and the Western Dam. Water quality monitoring would be conducted at the commencement of any discharge from the Eastern Dam and the Western Dam. Monthly water quality monitoring would be conducted at these two dams.

### 6.7.4.3 Flow Monitoring

During discharge, an assessment of the flow conditions downstream of the discharge would be undertaken. The methods for determining flow when sampling for discharge water quality are presented in Section 4.5.5 of RWC (2023) and have been modified from the velocity-area method of Part 3 of Australian Standard (AS) 3778-2009: Measurement of water flow in open channels (AS, 2009).

### 6.7.4.4 Water Management Infrastructure Monitoring

Weekly inspections would be undertaken of all water management infrastructure on the Site. Inspections would also be undertaken following a rainfall event of >25mm/24hr.

In any areas where active erosion is observed, additional erosion and sediment controls would be installed, as required.

## 6.7.5 Assessment of Impacts

Based on the implementation of the proposed water management system as well as the installation and operation of the proposed discharge treatment infrastructure, the potential impacts of the Project, with regard to surface water would be negligible as:

- the proposed site water management strategy would ensure the efficient use of water resources whilst reducing impacts of water availability to downstream users to the extent practicable;
- most disturbed sub-catchments would be hydraulically disconnected and incapable of discharging sediment-laden runoff to the receiving environment; and
- when required, controlled discharge would be undertaken via “continuous flow” high efficiency sediment basins with inflows treated to ensure discharge water quality meets specified criteria.

Whilst the Project would cause a minor reduction in discharge to downstream environments as the result of the capture and storage of runoff from those sub-catchments disturbed by Project-related activities, this volume of runoff would not reduce water availability to downstream users.

In addition, as the water demand of the Project would be met by rainfall and runoff captured on the Site, no additional demand would be placed on the water resources of the area. This strategy of capture, re-use and recycling provides for the efficient use of water resources whilst simultaneously reducing the likelihood of the discharge of potentially sediment-laden water from the Site.

## 6.8 Social Impacts

### 6.8.1 Existing Social Context

The following key groups were identified through consultation and engagement for the Project.

- The planning and development staff within MidCoast Council and Port Stephens Council.



- Landowners and residents in the area directly surrounding the Site.
- Members of the local community action group – Ironstone Community Action Group (ICAG).
- Landowners, residents and business owners within the township of Karuah.
- Landowners and residents in the broader community including North Arm Cove, Limeburners Creek, Tahlee, Carrington and Tea Gardens / Hawks Nest.

The local Aboriginal community in Karuah were also identified as a potential stakeholder group. However, discussion with the Karuah Local Aboriginal Land Council identified that the existing operations were not affecting the local Aboriginal community.

Local community stakeholders have been defined geographically. This includes the Principal Amenity Impact Area (**Figure 6.15**), defined to include those community members that would be most likely to experience negative amenity impacts. It is noted that community members outside this area may also experience negative amenity impacts, however, these are not expected as frequently or at the same intensity as those within the Principal Amenity Impact Area.

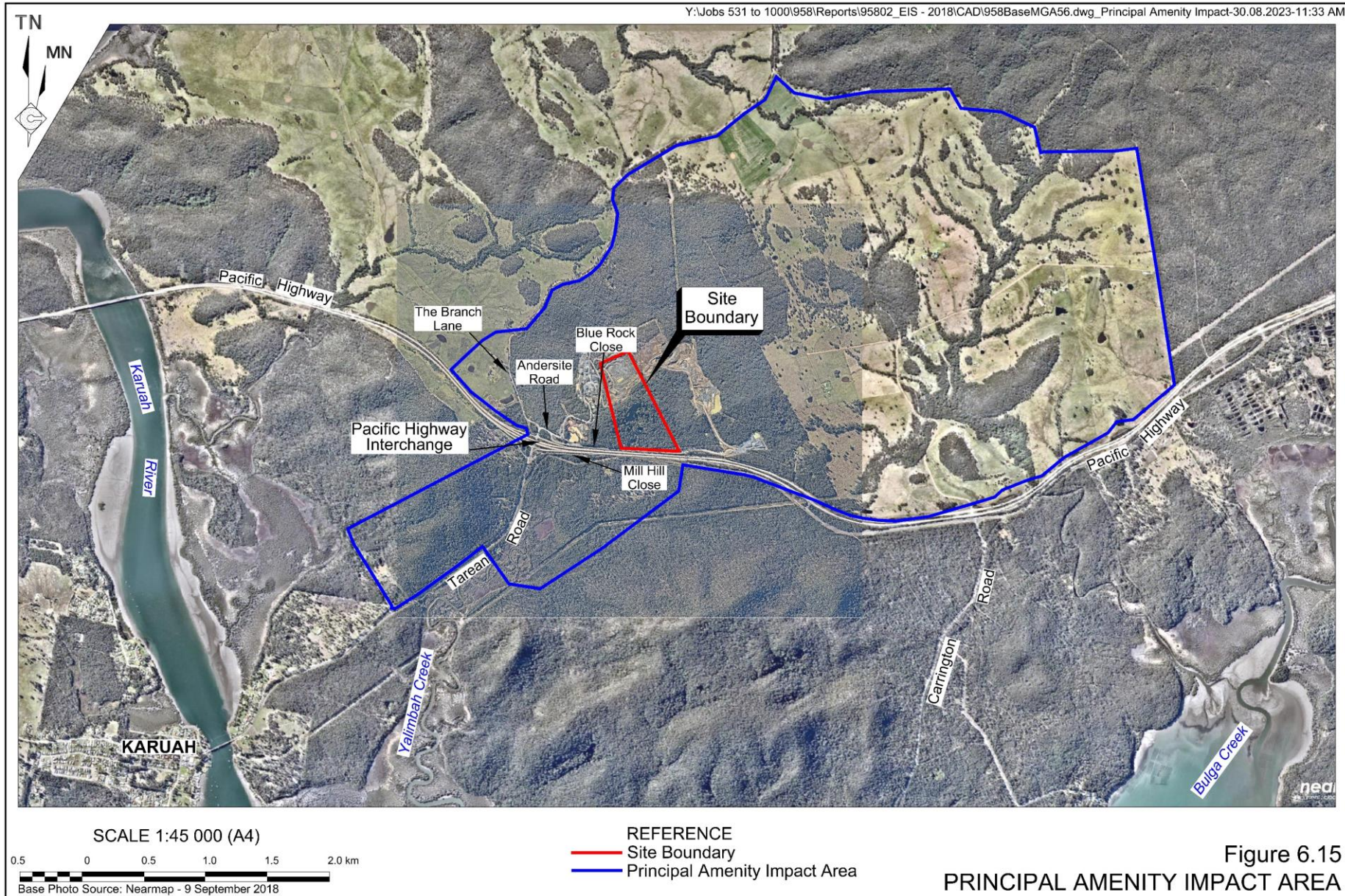
The Principal Amenity Impact Area also includes two existing quarries and the Pacific Highway in the vicinity of the Site.

## 6.8.2 Issues Identified in Stakeholder Consultation

Section 5 provides a summary of the consultation undertaken with government, industry, local community and Aboriginal stakeholders. Through stakeholder engagement a range of potential impacts were identified which included the following.

- Social amenity impacts from noise, dust, water management and the visibility of operations.
- Changes to way of life through how people experience their homes.
- Access to public and private infrastructure.
- The potential for a decrease in property value.
- Impacts to the natural environment.
- Local culture and heritage.
- Impacts to decision making systems, particularly the ability of the community to influence matters that impact them.
- Fears and aspirations for how the operations would impact their lives in the future.
- Changes to the local sense and experience of community.
- Changes to individual or collective sense of place.
- Health and wellbeing.







### 6.8.3 Assessment of Social Impacts

Potential impacts were evaluated taking into account the current perception of impacts from the local community and the mitigated Project outcomes. Impacts were evaluated in terms of the extent, duration, severity and sensitivity of each impact to affected stakeholder groups and at different periods throughout the life of the Project. The detailed evaluation of social impacts is presented in Table 9 and Section 5.1 of the Social Impact Assessment (RWC, 2019c).

Each of the potential impacts was further assessed through a social risk review that considered the potential impact in terms of the social risk consequences and the likelihood of occurrence against a social risk matrix developed in accordance with the Australian Standards for risk analysis (AS/NZS ISO 31000:2009). These risk matrices are described in Section 5.2 of the Social Impact Assessment (RWC, 2019c) prepared as part of the EIS.

**Table 6.19** presents a summary of the mitigated risk outcomes anticipated from the original proposal described in the EIS, the mitigated risk outcomes anticipated from the amended proposal described in this Amendment Report, and risk outcomes expected by the community and presents the management or mitigation that would be implemented to address each matter. Management and mitigation measures in relation to impacts to biodiversity, surface water, noise, air quality, traffic and transport, and visual amenity are further described in Section 6 of this document.

### 6.8.4 Management and Mitigation Measures

A range of standard social mitigation and ongoing community engagement activities would be implemented for the Project to address potential residual social impacts including the following.

- Establish and support a Community Consultative Committee with meetings to be held twice a year. If supported by Hunter Quarries, one of the meetings of the committee each year would be held in conjunction with the CCC meeting for the Hunter Quarries operations. It would be important that the CCC includes people living within the Principal Amenity Impact Area.
- A complaints management protocol would be established so that complaints are recorded, addressed by the appropriate person and feedback provided to the complainant in a timely manner.
- A Community and Stakeholder Engagement Plan would be developed in consultation with the local community and would describe ongoing consultation commitments.
- A notification register would be established with community members able to register for blast notifications, Project updates and community open days.
- A Drivers Code of Conduct would be developed and implemented to guide driver behaviour.
- Support for community organisations, groups and events would occur on a case by case basis.

**Table 6.19**  
**Updated Summary of Social Risk Outcomes and Mitigation**

Potential Impact of Risk	Original Proposal		Amended Proposal		Mitigation / Discussion
	Mitigated Risk Outcome	Community Expected Risk Outcome	Mitigated Risk Outcome	Community Expected Risk Outcome	
Social amenity	Medium (2D)	High (3B)	Low (2E)	Medium (2C)	<p>Dust impacts and noise generation would be reduced by the relocation of processing equipment to the floor of the existing Karuah Quarry. Residual impacts would be mitigated through a range of measures described in Sections 6 and summarised in <b>Appendix 2</b> of this document. In addition, potential impacts to water resources would be minor assuming the implementation of a range of erosion and sediment controls and water management (see Section 6.7). Although visual impacts would remain, the potential for visual impacts would be improved as the amended layout allows for the retention of vegetation in the south of the Quarry Site, reducing visibility of the Quarry from the Pacific Highway. A plan for rehabilitation of the Site has been proposed to ensure the operation has a positive legacy.</p> <p>The community's lack of confidence in the Applicants and regulators will require that amenity impacts are monitored and regularly reported to the community in a manner that is meaningful and easy to understand.</p> <p>Monitoring activities should, where feasible, be done on the basis of trying to understand the cumulative impacts of operations in the area. Discussions with Hunter Quarries regarding this matter are ongoing.</p> <p>Demonstrations of operations and management would improve community familiarity with the processes involved in operating a quarry. This will occur through a Community Consultative Committee, regular reporting on monitoring outcomes, annual reporting on operations and environmental management and community open day visits to the Site.</p>
Way of Life	Medium (2D)	High (3C)	Medium (2D)	High (3C)	<p>Reported impacts to the community's way of life would be largely resolved through greater confidence and trust in the Applicant and improved experiences and accountability. As a result, the proposed mitigation, monitoring and reporting as well as creating a loop of feedback and accountability through the annual community meetings is expected to resolve these issues.</p>
Access to public and private infrastructure	Low (2E)	Low (2E)	Low (2E)	Medium (2D)	<p>Potential impacts to local traffic and road infrastructure are addressed in Section 6.9.1 and would be minor assuming a range of mitigation and management measures. The expected risk outcome has been slightly adjusted to account for community concern regarding the cumulative impact of traffic levels when considering other quarrying operations in the region and the possible delays and other risks on the Pacific Highway. A Drivers Code of Conduct would be implemented to direct and manage driver behaviour on public roads. This code of conduct will make it clear that unacceptable behaviour will be subject to disciplinary action and possible employment termination.</p>



**Table 6.19 (Cont'd)**  
**Updated Summary of Social Risk Outcomes and Mitigation**

Potential Impact of Risk	Original Proposal		Amended Proposal		Mitigation / Discussion
	Mitigated Risk Outcome	Community Expected Risk Outcome	Mitigated Risk Outcome	Community Expected Risk Outcome	
Property Value	Low (2E)	Medium (2C)	Low (2E)	Medium (2C)	Community concerns regarding property value are expected to be resolved through the ongoing management of amenity impacts and communication of these actions to the community.
Sense of Community	Low (2E)	Low (2E)	Low (2E)	Low (2E)	It is not expected that the community interactions, community cohesion or the benefits of community would change under the Project.
Sense of Place	Low (2E)	High (4C)	Low (2E)	High (3C)	Where the community sense of place is influenced by social amenity outcomes, impacts would occur but are expected to be mitigated through the amended Site Layout and further resolved through ongoing management.  Feedback on community sense of place would be recorded during the annual community meetings.
Health and Well Being	Low (1E)	Medium (2C)	Low (1E)	Medium (2C)	Community concerns regarding health and wellbeing are expected to be resolved through the ongoing management of amenity impacts and communication of these actions to the community.
Natural Environment	Medium (2D)	High (3C)	Medium (2D)	Medium (2C)	A range of mitigation and management measures are proposed to avoid, reduce or mitigate impacts to the surrounding natural environment (see <b>Appendix 2</b> ). The amended Proposal allows for the retention of 4.8ha vegetation in the south of the Quarry Site that was previously indicated for clearing.  Reporting on these measures would be presented in the Annual Review and at the annual community meetings.
Fears and Aspirations	Medium (2D)	Very High (4B)	Medium (2D)	Very High (4B)	The existing community fears and concerns regarding the future would be mitigated and to the greatest extent resolved through satisfaction of amenity-based criteria and reporting of these outcomes.  Feedback and progress on these concerns would be recorded during the annual community meetings.
Decision-making Systems	Medium (2D)	Very High (4B)	Medium (2D)	Very High (4B)	The inclusion of annual community meetings is intended to provide the community with a feedback mechanism for impacts being experienced. This provides the community with greater involvement in the Project and the outcome of environmental management.
Culture and Heritage	Low	Low	Low	Low	No social mitigation is proposed for this potential impact. Management of matters of Aboriginal cultural heritage are discussed in the EIS including protocols for the identification of unexpected artefacts or sites.

Mitigation and management measures in addition to those proposed to mitigate the environmental impacts of the operation and the standard mitigation measures described above include the following.

- A range of social performance criteria would be established in a Community and Stakeholder Engagement Plan and performance against these criteria would be reported in each Annual Review. These criteria would include but not be limited to the following.
  - The number and nature of complaints received.
  - The number of employees and, where appropriate, the number of employees living locally.
  - Compliance with criteria relating to social amenity.
  - The number of traffic incidents or near misses.
  - An overview of community engagement activities undertaken throughout the year including open days or other opportunities to familiarise the community with operations.
- For the first two years of operations, the outcomes of the Annual Review, including environmental management, water management, rehabilitation progress and the social performance of the operation would be presented at a community meeting.

The meeting would provide an opportunity for the community to provide feedback on the activities over the year and the community experience of the operation. This would be an opportunity for direct discussion of the potential conflict between operating expectations and the community expectations. The Annual Review is reviewed and approved by the compliance division of the Department of Planning and Environment and therefore community concerns would be made available to the regulator through this process.

After the first two years of meetings, the activity would be re-evaluated with the local community.

### 6.8.5 Conclusion

Although community consultation for the amended Project has identified that the community generally agrees that the amendments to the Project “make sense” and would improve social amenity outcomes, there remain concerns about exacerbation of existing impacts and the cumulative outcomes of the additional operation. This remains a key issue, especially for community members within the identified Principal Amenity Impact Area. These concerns would be somewhat mitigated by the expected completion of operations at the Karuah Quarry upon commencement of the Karuah South Quarry.

Overall, social risk outcomes have improved under the amended Project, principally due to the avoidance or reduction in social amenity impacts relating to noise, dust and visual amenity. In addition, the commitment to reduce vegetation clearing for the Project was positively perceived by the community, noting that several community members retain their objection to any vegetation clearing in this location.

As described in the EIS, a range of mechanisms have been proposed to present information to the community on an ongoing basis and to gather feedback annually for presentation in reporting to regulators. This is intended to establish a process to resolve or improve the identified conflict between community expectations and predicted operations, assuming that the identified mitigation and management measures are successfully implemented, the Project would operate with only minor additional social impacts and with acceptable cumulative social impacts. Where community concerns may remain, mechanisms would be established to incorporate this feedback into adaptive management of the operation. This would benefit the social outcomes of both the existing operations and the Project.

## 6.9 Other Considerations

### 6.9.1 Traffic and Transport

An assessment of the potential impacts of the Project associated with traffic generation was presented in the *Traffic and Transport Assessment* undertaken by The Transport Planning Partnership Pty Ltd (TTPP, 2018) and included as Part 3 of the *Specialist Consultant Studies Compendium* that was presented with the EIS. The outcomes of this assessment were also summarised in Section 5.4 of the EIS.

Although there would be a change to the type of vehicles entering and exiting the Site under the proposed amendment, the total number of vehicles generated by the Project would not change. Therefore, the conclusions of the Traffic and Transport Assessment would not change. That is, the road network could sufficiently support the traffic generated by the Project. The proposed transport routes are suitable for 19m trucks and trailers used for transporting quarry products, and the traffic loads on affected road sections along the Pacific Highway ramps would remain sufficiently low with the additional Project generated traffic.

The mitigation measures proposed to be implemented would also not change under the amended Project and would include the following.

- The Applicant would prepare a detailed Traffic Management Plan, following the receipt of development consent, to safely manage traffic impacts during all stages of the Project.
- The Applicant would require all truck drivers travelling to and from the Quarry to sign a Driver's Code of Conduct that clearly outlines the Applicants expectations of each driver whilst travelling to and from the Quarry and whilst on Site e.g. all loads would be required to be covered.
- Overtaking of any product trucks would be prohibited on the transport route between the Pacific Highway and the Site. It is noted that the double barrier centreline in The Branch Lane, Andersite Road and Blue Rock Close would effectively restrict overtaking manoeuvres.
- In the event that overtaking is required (e.g. due to a vehicle breakdown), drivers would be required to undertake the manoeuvre only when safe to do so and when in a position with adequate line of sight.



- Communication between Project-related heavy vehicle truck drivers and heavy vehicle drivers from adjoining quarry operations would be encouraged in the event of a traffic incident.
- Rapid response to traffic incidents would be prioritised to minimise traffic impacts.

### 6.9.2 Groundwater

A groundwater assessment for the Project was previously undertaken by Larry Cook Consulting Pty Ltd (Cook, 2018). The resulting report was presented as Part 6 of the *Specialist Consultant Studies Compendium* that supported the Project's original EIS.

Cook (2018) identified that principally, one type of water-bearing zone (aquifer) exists beneath the Site. This aquifer is associated with the relative thick rhyodacite resource belonging to the Nerong Volcanics and the underlying sedimentary rocks of the Karuah Formation. However, Cook (2018) recognised that extraction operations for the proposed quarry would not intersect the underlying sedimentary sequence. Cook (2018) considered that groundwater occurrence in the rhyodacite aquifer would be associated with secondary defects such as discontinuous fractures and shear zones and aquifer recharge would primarily occur via rainfall infiltration. Cook (2018) identified one registered bore was within 3km of the Site and this remains the case. However, Cook (2018) considered this bore up gradient of the Site and, with a screened interval at a depth below the floor of the extraction area, concluded the Project would not adversely impact this bore.

Cook (2018) concluded that, as groundwater flow is typically limited to within secondary defects, minimal impacts would occur upon the limited groundwater occurrences surrounding the Site. As the proposed depth of extraction would remain similar to that assessed by Cook (2018), it is considered that the groundwater impacts of the amended Project would also be similar to those already assessed.

### 6.9.3 Public Safety Hazards

The proposed amendment would not change the possible risks associated with the transport, handling and storage of hydrocarbons. The proposed management of hydrocarbons would not change from that originally proposed, which would include the following.

- Hydrocarbons and hazardous materials would only be received by licensed suppliers for the transport of dangerous goods in accordance with *Dangerous Goods (Road and Rail Transport) Act 2008 No 95*.
- Diesel would be stored on the Site in a self-bunded container and in accordance with *AS 1940 – 2004 and Amendment – 2004 The Storage and Handling of Flammable and Combustible Liquids*, or updated or replacement standard.
- Hydrocarbon waste would be disposed of by a licenced waste contractor to a licenced waste facility.
- Hydrocarbon spill kits would be appropriately located to ensure spill response and clean up can be carried out immediately following the detection of any spills.

- In the event of a hydrocarbon leak or spill, the Applicant would implement the following spill management procedure.
  - Phase 1 – Source Control: isolate the source of spill or leak and stop the leak either by maintenance or placing the leaking item within or over the fuel/oil storage area.
  - Phase 2 – Recovery: recover as much as possible at the source by pumping free hydrocarbon from the surface and excavating hydrocarbon-contaminated materials. Contaminated materials would be stockpiled on site under cover and on an impermeable surface, e.g. a high-density polyethylene sheet. This material would later be bio-remediated on site and/or transported to an approved waste facility.
  - Phase 3 – Remediation: transport the contaminated material to a facility licensed to accept and treat hydrocarbon contaminated material.
- Spills or leaks of other pollutants would be handled in accordance with the relevant Materials Safety Data Sheet.

The risks and proposed management of bush fires at the Site were described in Section 5.11.3 of the EIS, which concluded that the bush fire hazard associated with the Project would be considered acceptable under the requirements of “*Planning for Bush Fire Protection*” (RFS, 2006). The potential bush fire hazards would not change with the amendment of the Project. An Asset Protection Zone (APZ) of 30m was determined necessary in the original assessment, requiring a 30m buffer zone between any infrastructure and the adjoining vegetation. Relocating the infrastructure area into the former Karuah Quarry extraction area easily establishes an APZ, as the infrastructure will be at least 30m from surrounding vegetation. An APZ would also be included around the proposed Heavy Vehicle Depot / Infrastructure Area, and the Weighbridge, Office & Car Park.

Other proposed management and mitigation measures relating to the bushfire risk management are as follows.

- A proposed bush fire management plan would be documented in a *Biodiversity Management Plan*.
- Asset Protection Zones would be maintained with a tree canopy of less than 15% with trees located greater than 30m from any part of the roofline. Trees would have lower limbs removed up to a height of 2m above the ground.
- All employees would be trained in the proper use of fire fighting equipment held on the Site.
- Water would be especially set aside for fire fighting on Site and the on-site water cart made available for fire fighting purposes.
- A protocol would be developed for restricting work in forested areas during high fire danger periods of the bush fire season (in accordance with the hazard category notifications).
- Procedures for hot works would be developed to prevent ignition sources for a bush fire.

- The local Rural Fire Service would be consulted prior to each bush fire season.
- Site fire fighting equipment would be made available to the local Rural Fire Service, if required, in the event of a bush fire on the land surrounding the Site.
- Firebreaks would be developed and maintained within the proposed extraction areas at the edge of forested areas as required and in consultation with the local Rural Fire Service.
- The local Rural Fire Service would be consulted regarding any controlled burns planned by these agencies for asset protection and / or ecological management.

### 6.9.4 Cultural and Historic Heritage

An assessment of the potential impacts on cultural heritage was presented in the *Aboriginal Cultural Heritage Assessment* undertaken by Biosis Pty Ltd (Biosis, 2018a) and included as Part 7a of the *Specialist Consultant Studies Compendium* that was presented with the EIS. The outcomes of this assessment were also presented in Section 5.8 of the EIS.

In summary, the original assessment found no Aboriginal Sites or Potential Archaeological Deposits (PADs) within the survey area. The Study Area included the entire site, meaning the survey included any areas that changed as part of the proposed amendment. As no Aboriginal Sites or PADs were present on site, the Cultural Heritage impacts will not change.

The proposed operational safeguards from the original assessment would remain unchanged and include the following.

- Should any Aboriginal objects be encountered during works associated with the Project, works in the vicinity of the find would cease immediately. The object would not be moved until assessed by a qualified archaeologist who would provide further recommendations which may include notifying OEH and relevant Aboriginal stakeholders.
- If any suspected human remains are discovered during activities being undertaken on Site, all activities at that location would cease immediately and the remains would not be further moved or disturbed. Both the NSW Police and OEH would be notified of the location and details of the remains. Work would not recommence at that location unless authorised in writing by OEH.
- The Applicant would continue to inform the RAPs about the management of any Aboriginal cultural heritage sites discovered within the Site throughout the life of the Project.

The potential effects the Project could have on Historic Heritage were presented in the *Historic Heritage Assessment* undertaken by Biosis Pty Ltd (Biosis, 2018b) and included as Part 7b of the *Specialist Consultant Studies Compendium*. The outcomes of the assessment were also presented in Section 5.9 of the EIS.

In summary, the field survey did not identify any items or places of historic heritage significance within the Site. As the Study Area included the entire site, the amendment would not change the potential Historic Heritage impacts assessed for the EIS. No specific management measures are proposed or historic heritage risks.

### 6.9.5 Land Resources

Section 5.10 of the EIS addressed potential impacts on soils and land capability. The soils on site can be classified as Class 5, 6 and 7 under *The Land and Soil Capability Assessment Scheme – Second approximation* published by the Office of Environment and Heritage in 2012.

In summary, the EIS determined that with sufficient management measures, the Project would have a minimal impact to soil and land capability. It would also not impact adversely on the agricultural potential of the land. The amendment would not change the original impacts to soil and land capability in any way.

The proposed management measures from the EIS would remain the same.

- Clearly mark areas for stripping and stockpiling.
- Strip soil from all areas of disturbance and store in stockpiles orientated parallel to the contours no more than 2m high.
- Refrain from stripping or placing soil during wet conditions.
- Ensure that the soil stockpile surfaces have a surface that is as ‘rough’ as possible, in a micro-scale, to assist in surface water runoff control and seed retention and germination.
- Spread seed of a suitable cover crop on all soil stockpiles to facilitate revegetation.
- Ensure that soil stockpiles are constructed with side slopes of 1:3 (V:H) or less and that the surface of all stockpiles achieves an effective 70% cover within 10 days of formation. This may be achieved through the use of mulches, spray on polymer-based products or hessian that would allow a vegetative cover to become established.
- Signpost the soil stockpile and limit operation of machinery on the stockpile to minimise compaction and further degradation of soil structure.
- Rip or scarify all areas to be respread with topsoil to allow the respread material to be keyed into the underlying material.

### 6.9.6 Economic Impacts

A qualitative assessment of the economic impacts and benefits of the Project was completed by R.W. Corkery & Co. Pty Limited in 2018 and is included in the EIS in Section 5.12. The original assessment found that the resource would have various economic benefits in both a regional and local context. The cost benefit analysis found that the Project would allow for increased spending, indirect and direct positive impacts on employment, tax revenues to both State and Federal Governments and rates to MidCoast Council.

As the resource being extracted and the employment opportunities remain the same in the amendment, the economic impacts would likewise remain the same.



The following management measures to be implemented from the EIS would remain unchanged.

- Where appropriate, give preference when engaging new employees to candidates who live within the Karuah area over candidates with equivalent experience and qualifications based elsewhere.
- Encourage and support participation of locally-based employees and contractors in appropriate training or education programs that would provide skills and qualifications that may be of use at the Site (and potentially elsewhere within the extractive, mining or related industries).
- Give preference, where practicable, to suppliers of equipment, services or consumables located within the Hunter Region.

# 7. Evaluation of Merits

## 7.1 Introduction

A detailed evaluation of the Project and justification for its approval was presented in Section 7 of the EIS. This section updates that evaluation and justification taking into account the amendments that are proposed.

## 7.2 Evaluation of the Project

### 7.2.1 Design of the Project

The Applicant has substantially amended the design of the Project in order to improve environmental and social outcomes. The proposed amendments principally take advantage of the pending closure of the Karuah Quarry to:

- relocate Site infrastructure to a location in the floor of the former extraction area of the Karuah Quarry, thereby reducing dust and noise impacts on nearby residences;
- avoid vegetation clearing by approximately 40%, reducing residual biodiversity impacts and minimising the biodiversity offsetting obligations of the Project; and
- reorient the Extraction Area to provide for the orderly development of the Site from the north to the south.

In addition, the Extraction Area for the Project has been reduced in scale in order to avoid vegetation clearing and to increase the distance available as a blast clearance zone to ensure safety for vehicles travelling on Blue Rock Close and the Pacific Highway.

A dedicated Quarry Access Road would need to be constructed between Blue Rock Close and the Quarry Infrastructure Area. Up to 150,000tpa of clean fill material (VENM) would be imported during construction of the Quarry Access Road with ongoing import of VENM to be limited to 100,000tpa for construction activities and to support progressive rehabilitation of the Site.

A range of ancillary activities have been incorporated into the amended Project that increase or improve production capabilities. These include aggregate pre-coating, concrete recycling, road base blending using a pugmill and a small concrete batching plant. Demand from industry sources supports the inclusion of these activities in this location and the assessment has demonstrated that their inclusion does not substantially increase environmental impacts of the Project.

The importance of environmental flows to the Yalimbah Creek system has also been recognised in the design of the Site. The amended Project is a largely closed catchment and water storage dams have been designed and positioned to collect runoff from disturbed catchments, provide storage and where needed discharge. These areas have been separated from the south of the property to preserve the hydrologic function in receiving waters. The Applicant has also been mindful of previously identified concerns raised by oyster farmers with the Karuah River

regarding water quality of discharge. The Site design ensures that, to the greatest extent possible, environmental flows would be retained and water quality remain acceptable. All water demand for the Project operations would be supplied under harvestable rights and therefore do not place any additional demand on the water resources of the Karuah River catchment or the Yalimbah Creek catchment.

## 7.2.2 Demand for Resource

As noted in Section 2.1 the following indicators of demand for the products of the Quarry support the development.

- The pending closure of the Karuah Quarry would remove up to 500,000tpa of approved resource supply from the market. The proposed 600,000tpa production from the Project would effectively replace this supply.
- The need for infrastructure investment in NSW, including within the Hunter region, is identified in several key State and regional strategy documents and the NSW Government has committed over \$108 billion in infrastructure spending between 2023 and 2025<sup>7</sup>.
- Demand for construction materials has grown due to investment in post-COVID infrastructure stimulus and to support maintenance of roads in response to recent flooding periods.

It is also likely that aggregates from the Site would be transported to the Sydney region to support infrastructure and road development demand from that area.

## 7.2.3 Residual Environmental and Social Impacts

The EIS for the Project identified a number of residual biophysical and social impacts and risks for the development. These are mostly unchanged as a result of the proposed amendment. The residual impacts and risks are described as follows, including how these have been avoided or mitigated and how they would be managed.

### High Risks

- Changes in the visual character of the locality resulting in a decreased visual amenity for motorists travelling along the Pacific Highway.

*The Project would result in a change to the landscape that would be most obvious over an approximately 1km stretch of Pacific Highway to the southeast of the Site. Views of the Site are assessed to have a moderate to low landscape character impact and are ultimately considered acceptable. This is due to the short time of viewing (approximately 30 seconds) and as this is a view already experienced along the Pacific Highway in this region.*

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<sup>7</sup> See Future Transport 2056: Regional NSW Services and Infrastructure Plan (TfNSW, 2019), Hunter Regional Plan 2041 (NSW Government, 2022), NSW State Infrastructure Strategy (NSW Government, 2014 and Strategic Regional Land Use Plan: Upper Hunter Infrastructure (NSW Government, 2012),

*The adoption of the proposed design and operational mitigation would reduce visual impacts to the greatest extent possible and mitigate possible views through the establishment of screening vegetation. The Site has been designed to encourage successful vegetation establishment on upper benches and to enable effective screening in the final landform. The establishment of vegetation on the upper benches would effectively minimise contrasts and soften views of the exposed upper sections of the extraction area. Importantly, the rehabilitated landform would blend into the surrounding vegetated landscape without any substantive long-term impacts.*

*The amended Project would improve visual amenity outcomes when compared to the original proposal by retaining native vegetation on the southern section of the Property. This would not remove visual impacts but would reduce the magnitude of the impact during development. Many of the trees that would be retained on the Property are 20m to 30m tall and provide substantial screening.*

- Impacts associated with a loss of local amenity as a result of noise, visual or dust impacts that results in a changed experience for any individual with regard to their sense of place or home.

*Changes to the local environmental setting are likely to occur and these may result in social impacts. However, the technical assessments of predicted noise generation, dust dispersion and changes to visual amenity have considered the potential impacts of the Project and cumulatively, taking into account existing quarries. The outcomes of these assessments indicate that the Project would operate in accordance with the relevant NSW guidelines and legislation and that cumulative impacts would remain within the acceptable criteria levels described in the relevant NSW guidelines and legislation.*

*Any changes to the local environment may be experienced as a negative social impact. Therefore, the residual risk is considered to be high in acknowledgement of the community concerns and existing experience in this regard. The ongoing operations would include continued community engagement and reporting. The Applicant has committed to present annual environmental performance against agreed social performance criteria to the community and to report on the feedback from the community in the Annual Review. This measure would provide a feedback loop between the community, the Applicant and the regulator to ensure adverse social impacts are identified and addressed.*

*Social amenity impacts would be reduced under the proposed amendments, with the relocation of Site infrastructure into the former extraction area of the Karuah Quarry, greatly reducing these impacts. However, the development of a concrete batching plant on the southern section of the property may result in industrial noise being evident (albeit within criteria levels) for properties on the southern side of the Pacific Highway. Traffic noise would remain the most apparent noise in these locations.*



## Medium Risks

- Flyrock is a residual risk associated with blasting activities and appropriate management remains important for the Project given the proximity of extraction activities to public roads and private land.

*The assessment of flyrock risks has estimated a maximum flyrock range of 75m assuming standard assessment techniques. A blast clearance zone of 300m from blasting activities would be established to ensure there is a sufficient buffer and a conservative factor of safety of four for blasting activities. Blasting design, planning and implementation is a highly controlled activity and standard blasting controls would be applied for the Project. Initial blasting activities would use highly conservative blasting parameters and progressively adapt blasting activities and management as experience is gained with the resource setting and through the detailed review of blast monitoring data.*

- Dust from extraction and processing operations, stockpiles and exposed surfaces on the Site as well as that generated by vehicle movements would be an ongoing management focus. This is due to the potential for increased deposited dust levels at local residences and water tanks and airborne fine dust and the risk for associated adverse health impacts for local residents as well as inviting increased regulatory and community scrutiny.

*The assessment of potential air quality impacts included predictive dust dispersion modelling which demonstrated that the Project would comply with the air quality criteria for TSP, PM<sub>10</sub>, PM<sub>2.5</sub> and deposited dust at all residences.*

*The implementation of a real time air quality monitoring program would ensure that short-term elevations in incremental PM<sub>10</sub> concentrations do not result in exceedances of the criterion at any surrounding residence.*

*Air quality impacts at privately-owned residences would be improved under the amended Project with formerly predicted exceedance at Residence 16 now not likely to occur.*

- Greenhouse gas emissions from operational activities (extraction, processing or product transport) resulting in increased release of greenhouse gas to the atmosphere.

*The greenhouse gas assessment indicates that emissions from the Project would represent a very small proportion of Australian greenhouse emissions.*

*This is unchanged under the proposed amendments.*

- Noise from fixed or mobile processing plant or product transport operations resulting in detrimental effects to local residents or native fauna.

*The assessment of potential operational noise and road traffic noise impacts, as a result of the Project (Spectrum, 2023), predicted noise levels less than the noise assessment criteria at all non-project-related residences. Noise impacts over privately owned land were also lower than the acceptable amenity levels.*

*Under the proposed amendment, noise-related impacts would be reduced. However, the proposed concrete batching plant may result in industrial noise being heard (albeit at acceptable levels) at properties on the southern side of the Pacific Highway.*

- Ongoing truck traffic and possible congestion for road users of the Pacific Highway increasing the risk of accidents or inconveniencing road users.

*The traffic and transport assessment (TTPP, 2018) identified that at maximum production, employee and visitor light vehicles are estimated to represent approximately 1% of total traffic and 9% of heavy vehicle traffic on the Pacific Highway in the vicinity of the Site. TTPP (2018) has considered these additional traffic movements against interpreted background traffic levels, including traffic generated by approved and proposed Hunter Quarries operations, and determined that the moderate increase in traffic levels associated with the Project would not generate adverse impacts on the road network.*

*There were no changes to traffic generation under the proposed amendments. The only change was to possible traffic types assuming the development of a concrete batching plant and the addition of occasional deliveries of fine aggregates and cement for concrete production. These changes would not change the assessed outcomes for traffic impacts of the Project.*

- The clearing of native vegetation for the Project resulting in a significant impact to local biodiversity values or known threatened species, populations and endangered ecological communities.

*Impacts to native vegetation would occur through the direct clearing of the approximately 7.05ha of native vegetation. Whilst the principal components of the Project have been defined based upon the occurrence of the underlying hard rock resource and local topographic constraints, both the extraction area and Quarry Infrastructure Area have been designed to optimise the recovery of the hard rock resource whilst minimising impacts to native vegetation and riparian buffer areas.*

*The proposed amendment would result in a reduction to proposed vegetation clearing by approximately 4.54ha or approximately 40% of the originally proposed extent of clearing.*

- Impacts to a community or stakeholder's way of life including the experience of their homes and reduced community interaction or cohesion associated with a loss of local amenity.

*While the Project is not expected to significantly change community interactions or cohesion, changes to local amenity may impact a stakeholder's experience of their homes. The potential change to the existing or preferred way of life is closely tied to experiences of local amenity which have been the subject of technical assessment and mitigation and management commitments.*

*The outcomes of technical assessments indicate that the Project would not result in significant additional or cumulative impacts and the local community would continue to enjoy their existing way of life under the operation. Feedback through annual community meetings and the Annual Review process would provide for adaptive management in this regard.*

*Although community consultation for the amended Project has identified that the community generally agrees that the amendments to the Project “make sense” and would improve social amenity outcomes, there remain concerns about exacerbation of existing impacts and the cumulative outcomes of the additional operation.*

- Community fears and concerns for the future exacerbated by perceived inability to adapt or be involved in decisions that affect their lives

*The Social Impact Assessment (RWC, 2018) identified that the community remains highly concerned about the possibility of existing impacts being prolonged or exacerbated. These impacts relate principally to matters of amenity and have been subject to technical assessment. It is expected that residual risks would remain medium in the short term, however, would more closely align with the mitigated outcomes overtime. This aspect would remain a key topic of discussion in annual community meetings and subject to the satisfaction of social performance criteria.*

*Social impact assessment outcomes would be expected to improve under the proposed amendments, however the community remains concerned about the change to the area that is beyond their control.*

- Rehabilitation outcomes not achieved due to lack of soil and vegetation quality and suitability for future land use.

*The assessment of potential soil impacts as a result of the Project identified strategies to strip, separate and manage topsoil disturbed as a result of the Project. The assessment also identified strategies for soil handling and replacement during rehabilitation activities. In addition, the assessment of soil impacts identified that the soils in the areas affected by the Project are land and soil capability Class 5 (moderate – low capability land); the lands are not prime agricultural land or less suitable (Class 6 and Class 7). Therefore, the loss of agricultural productive capacity would be limited.*

*The Applicant’s objectives for rehabilitation are centred upon the shaping of the final floor in the extraction area and the establishment of a suitable substrate and a vegetative cover on the terminal Quarry benches to re-establish native vegetation in those areas. This would ensure these areas are suitable for the proposed long-term land uses.*

*The rehabilitation outcomes for the Project are largely unchanged under the amended Project. Areas of the final landform may suit future industrial land use that would be considered closer to closure. The Applicant has re-stated the importance of progressive rehabilitation to mitigate possible visual amenity impacts.*

- Initiation of bush fire due to on-site activities.

*The bush fire hazard assessment indicates that even after vegetation is cleared from the Site, the area is directly adjacent to a heavily wooded area, and therefore the potential for bush fire to spread both within the Site and adjacent to the Site would be high if management measures are not adopted to mitigate this hazard. With the implementation of the proposed safeguards and controls, it is considered that the bush fire hazard associated with the Project would be acceptable and would not significantly contribute to raising the risk of bush fires impacting the community, property or environmental assets.*

*Bush fire risks are largely unchanged under the proposed amendments, however the Project would avoid the need to clear 4.54ha of vegetation or 40% of the originally planned biodiversity impacts.*

The risks associated with all remaining potential environmental impacts are considered low to moderate and therefore, while these may result in impacts deemed unacceptable to some stakeholders, the development and operation of the Project, with the implementation of appropriate management plans, is on balance considered acceptable.

## 7.2.4 Economic Outcomes

The Project provides for the removal, processing and despatch of aggregates, pavement products and manufactured sand for use predominantly within the Hunter and Greater Sydney Regions. The extraction of this resource would ensure downward pressure is exerted on costs associated with construction material supply and influence market costs associated with construction and infrastructure projects. The Project would further assist in generating local employment and contribute to Local, Regional, State and National economies through flow-on effects.

Acknowledging any minor costs associated with residual environmental and/or social impacts, it is concluded that the net economic benefits of the Project would outweigh the costs as the Project would:

- contribute towards the supply of aggregates, pavement products and manufactured sand in the Hunter and Greater Sydney Regions;
- provide ongoing employment opportunities throughout the MidCoast and Port Stephens LGAs; and
- contribute to the continued economic growth at local, regional, State and National levels through flow-on effects.

## 7.2.5 Objects of the Environmental Planning and Assessment Act 1979

The assessment of the Project must consider the Objects of the EP&A Act 1979 that are provided in Clause 1.3 of the Act. **Table 7.1** identifies the objects of the EP&A Act and confirms that each would be satisfied by the Project.



**Table 7.1**  
**Objects of the EP&A Act**

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Object	Discussion
The objects of this Act are as follows:	
a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,	<p>The Site would be developed in a natural resource precinct, recognised as a source of high quality construction materials. There would be no land use conflict as the Site is located adjacent to two existing quarry operations and the Pacific Highway. The Applicant has designed the Project to reduce impacts to native vegetation and avoid clearing as much as possible. Minimal impacts are expected to the surrounding groundwater and surface water environments assuming the implementation of best practice management.</p> <p>Given the implementation of proposed design and operational mitigation measures proposed by the Applicant, the social and economic welfare of the surrounding community would not be substantially impacted by the Project.</p>
b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	Section 7.2.4 reviews and confirms the Project would be undertaken in accordance with the principles of ecologically sustainable development which embrace relevant economic / environmental and social considerations.
c) to promote the orderly and economic use and development of land,	The Project has been designed to produce hard rock products at a rate expected to satisfy demand whilst permitting for progressive rehabilitation of the terminal benches within the extraction area. The Project would provide a net benefit to the local and regional economy and the final landform may be suitable for a range of subsequent uses.
d) to promote the delivery and maintenance of affordable housing,	The Project would not contribute to any additional pressure on local housing within either the Port Stephens or MidCoast LGAs. The operation of the proposed Quarry would assist to maintain the cost of quarry products which in turn would assist to contain building and construction costs.
e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,	Significant effort would be taken to minimise the impacts of the Project on local and regional biodiversity. Residual ecological impacts would be offset in accordance with the NSW Biodiversity Offset Scheme.
f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	No sites of Aboriginal cultural and/or historic heritage value have been identified within the Site. Given the ongoing implementation of an unexpected finds protocol, impacts to Aboriginal cultural and historic heritage would be minimal.
g) to promote good design and amenity of the built environment,	Built environment components of the Project would be obscured from view from private or public land. The design of the Project incorporates measures to retain native vegetation, where feasible and use existing vegetation or planted vegetation to enhance the appearance of the site from distant views.

**Table 7.1 (Cont'd)**  
**Objects of the EP&A Act**

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Object	EIS Coverage
h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,	All structures, etc. within the Quarry would be correctly installed in accordance with the required standards which are underpinned by the objective of creating a safe work place for the entire workforce on site.
i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,	As State Significant Development the Project has been placed on public exhibition with comments expected from both State and local Government representatives as well as the community. The assessment of the Project has considered the relevant environmental planning instruments including local and State focused legislation.
j) to provide increased opportunity for community participation in environmental planning and assessment.	The Applicant has taken a transparent approach to information distribution and consideration of community concerns. It is proposed to adopt a proactive approach with the local community throughout the life of the Project to ensure the current level of concern regarding existing and possible cumulative impacts of the Project are identified and where possible remediated.

## 7.2.6 Ecologically Sustainable Development

Sustainable practices by industry, all levels of government and the community are recognised to be important for the future prosperity and well-being of the world. In order to achieve sustainable development, recognition needs to be placed upon the integration of both short-term and long-term environmental, economic, social and equitable objectives. The principles of Ecologically Sustainable Development (ESD) that have been recognised for over two decades were based upon meeting the needs of the current generation while conserving our ecosystems for the benefit of future generations.

Each of the sustainable development principles has been considered throughout the design of the Project. **Table 7.2** presents the features of the Project that reflect the four principles of ESD, namely:

- the precautionary principle;
- the principle of social equity;
- the principle of the conservation of biodiversity and ecological integrity; and
- the principle for the improved valuation and pricing of environmental resources.

**Table 7.2**  
**Review of the Principles of Ecologically Sustainable Development**

Principle	Description	Discussion
The Precautionary Principle	<p>If there are threats of serious and irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</p> <p>In order to satisfy the principles of ESD, emphasis must be placed on anticipation and prevention of environmental damage, rather than reacting to it.</p>	<p>During the planning phase for the Project, and throughout the preparation of the EIS and Amendment Report, the Applicant has engaged specialist consultants to examine the existing environment, predict possible impacts and recommend controls, safeguards and/or mitigation measures in order to ensure that the level of impact satisfies statutory requirements or reasonable community expectations and that the maximum or worst case potential impacts are considered for assessment. The proposed environmental safeguards, controls and mitigation measures that would be implemented are summarised in <b>Appendix 2</b>.</p> <p>The precautionary principle has been considered and adopted during all stages of the design and assessment of the Project. The approach adopted, i.e. initial assessment, consultation, specialist investigations and safeguard design, provides a high degree of certainty that the Project would not result in any major unforeseen impacts.</p>
Social Equity	<p>Social equity embraces value concepts of justice and fairness so that the basic needs of all sectors of society are met and there is a fair distribution of costs and benefits to the community. Social equity includes both inter-generational (between generations) and intra-generational (within generations) equity considerations.</p> <p>Equity within generations requires that the economic and social benefits of the development be distributed appropriately among all members of the community. Equity between generations requires that the non-material well-being or “quality of life” of existing and future residents of the local community would be maintained throughout and beyond the life of the Project.</p>	<p>Both elements of social equity are addressed through the design of the Project itself and the implementation of operational safeguards to mitigate any short-term or long-term environmental impacts. The Project would contribute to the economic activity of the local and regional community through the generation of employment, and increased demand for local goods and services and flow-on effects. As such, the benefits of the Project would be distributed throughout the local community. The Project was also designed such that elements of the existing environment available to this generation, including water and existing local biodiversity would continue to be available to future generations. The Applicant would adopt a pro-active approach in identifying and addressing any issues identified by the local community.</p>

**Table 7.2 (Cont'd)**  
**Review of the Principles of Ecologically Sustainable Development**

Principle	Description	Discussion
Conservation of Biological Diversity and Ecological Integrity	The protection of biodiversity and maintenance of ecological processes and systems are central goals of sustainability. It is important that developments do not threaten the integrity of the ecological system as a whole or the conservation of threatened species in the short- or long-term.	The Project satisfies the principle of conservation of biological diversity and ecological integrity through limiting the area of disturbance to retain as much native vegetation on site as possible. The Project would not risk the integrity of the local ecological setting or the conservation of threatened species. Weed eradication and feral animal control programs would be implemented as appropriate and would further assist in addressing this principle of sustainable development.
Improved Valuation and Pricing of Environmental resources	The issues that form the basis of this principle relate to the acceptance that the polluter pays, all resources are appropriately valued, cost-effective environmental stewardship is adopted and the adoption of user-pays principle based upon the full life cycle of the costs.	The value placed by the Applicant on environmental resources is evident in the identification of Project objectives, extent of, planning and mitigation measures to be implemented to prevent irreversible damage to the environment on and surrounding the Site. The operation of the quarry is a commercial undertaking and it would enable the Applicant to undertake all environmentally-related tasks and meet all commitments in all approvals, licences and permits and those made to the landowners and local community.



## 7.3 Justification

### 7.3.1 Suitability of the Site

The suitability of the site for extractive industry development is supported by three factors.

1. The identified resource is high quality rhyodacite and is located within a recognised extractive industry precinct that has been the source of concrete grade aggregates and other construction materials for more than 20 years.
2. The Site is located in an area of few nearby private residences, all of which are separated from the Site by other development or the Pacific Highway. Technical assessment of predicted noise, dust and water resources supports the conclusion that there would be limited social amenity impacts as a result of the Project.
3. The Site is directly adjacent to the Pacific Highway and therefore traffic entering and leaving the property would not need to pass private properties but would directly enter the highway.

### 7.3.2 Consequences of Not Proceeding with the Development

The consequences of not proceeding with the Project include the following.

- i) The opportunity to establish secure access to a long-term hard rock resource to provide a range of aggregates, road pavement products and manufactured sand for use in the Hunter and Greater Sydney metropolitan regions would be foregone. This is particularly important in the context of the pending closure of the Karuah Quarry and removal of 500,000tpa resource supply from the market.
- ii) The proposed Karuah South Quarry, with its direct access to and from the Pacific Highway, provides a long-term opportunity for the supply of aggregates, road pavement products and manufactured sand via a major transport corridor. Accessing a hard-rock resource at another possibly less appropriate greenfield location within the Hunter Region, and at greater distances from markets, could have more substantial impacts.
- iii) The opportunity to increase employment opportunities in the local area would be foregone. This would also impact on the economic activity of the local community and the MidCoast and Port Stephens LGAs.
- iv) Payments for elevated rates (to MidCoast Council), State and federal taxes and affected landowners within the Site would be foregone.
- v) The existing environmental and amenity issues experienced by the local community from the Karuah East Quarry and potentially the Karuah Red Project would continue, regardless of the outcomes of the current application for the Project. It is considered that the observed environmental performance of the combined operation of all quarries near Karuah would improve as a result of the development of the Karuah South Quarry through the greater emphasis placed upon cumulative environmental management, genuine community engagement and feedback.

- vi) The various adverse impacts attributed to the Project would not occur. It is considered that the level of predicted impacts arising from the Project are acceptable given the extent of mitigation measures integrated within the various aspects of the Project and the proposed approach to communicating with neighbouring landowners to discuss individual issues relating to the development and operation of the Quarry.

The benefits of proceeding with the proposed Karuah South Quarry are considered to outweigh the predicted impacts on the environment that would result if the Project is approved. The consequences of not proceeding with the Project also weigh heavily in favour of proceeding with the Project.

### 7.3.3 Conclusion

The Project, incorporating the proposed amendments, continues to be considered in the public interest as it would provide an acceptable balance of environmental and social outcomes, whilst generating substantial economic and social benefits for the local, regional and State economies. The Project would effectively replace the resource supply currently provided by the Karuah Quarry but would do so in a manner that is consistent with modern quarrying development standards and regulations.

The Project has been amended to improve environmental outcomes, principally to social amenity (noise, dust and visibility), blast-related risks and through a 40% reduction in native vegetation clearing. These were all matters raised in consultation with the local community and NSW Government agencies. The location of the Site within an existing hard rock resource precinct would limit land use conflicts and build upon the existing successful extractive industry development that has been supplying essential construction materials for over twenty years. Importantly, the environmental aspects of the Project have been assessed cumulatively with those of the adjoining quarries with the collective impacts determined to be acceptable.

Consultation with the local community has identified that some in the community are experiencing impacts from existing quarrying operations and fear these would be exacerbated by an additional operation. Technical assessment undertaken for the Project predicts that both cumulatively and alone, the Project would satisfy the relevant guidelines and criteria established in the relevant environmental planning instruments and regulatory guidance. The perceptions of the community concerning the development would be monitored each year and reported in the Annual Review for the Project in order to track and adapt management of social risks.

The Project would have a visual impact legacy for motorists traveling on the Pacific Highway, however the design of the Project has allowed for measures to improve rehabilitation outcomes and retain screening vegetation in the southern section of the Site. In this manner the views of the Site would be obscured or would be blended with the natural environment as much as possible. Views of quarry benches are present in this location and have been a feature of views in this location for many years. As a result, the location is not as sensitive to the proposed change as may be expected and the management and mitigation would be an improvement on the current views of quarry faces.

On balance, the Project is considered to be in the public interest as it:

- has been designed to allow for efficient access to an important hard rock resource while incorporating feedback from the local community and government agencies;
- would be developed in an environmentally responsible manner that is mindful of the possible cumulative impact with nearby quarrying operations;
- is supported by comprehensive environmental, social and economic assessment that demonstrates that the Project may be operated to satisfy relevant statutory goals and criteria, environmental objectives and reasonable community expectations; and
- would contribute towards the supply of aggregates, pavement products and manufactured sand in the Hunter and Greater Sydney Regions;
- provide ongoing employment opportunities throughout the MidCoast and Port Stephens LGAs;
- contribute to the continued economic growth at local, regional, State and National levels through flow-on effects.

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