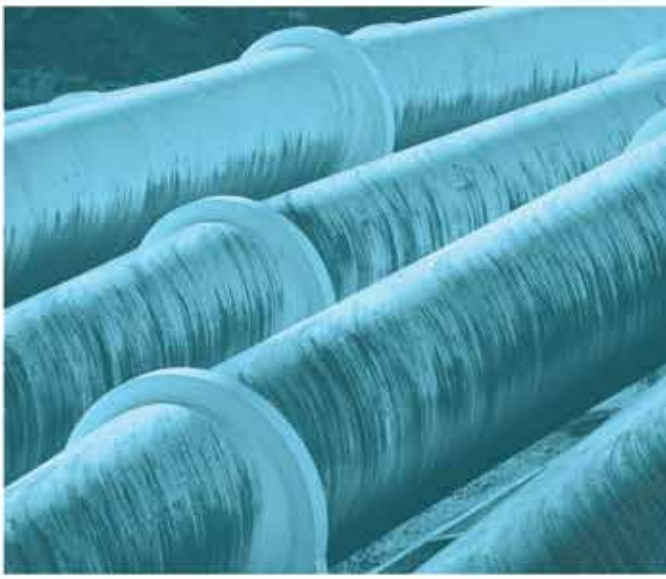



Visual Impact Assessment
Karuah East Quarry Modification 10

Prepared for Karuah East Quarry Pty Ltd
May 2022

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Visual Impact Assessment

Karuah East Quarry Modification 10

Report Number

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Client

Karuah East Quarry Pty Ltd

Date

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Version

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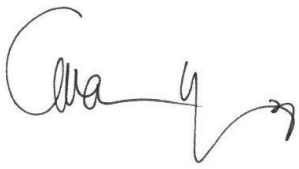
Prepared by



Allan Young
National Technical Leader, Urban and Regional Planning
18 May 2022

Approved by

Nicole Armit
Director
18 May 2022

Executive Summary

Karuah East Quarry Pty Ltd proposes to modify the State significant development approval for the Karuah East Quarry (SSD 09_0175) (MOD 10) under the provisions of section 4.55(2) of the *Environmental Planning and Assessment Act 1979*. The proposed modification seeks to increase the approved disturbance area of the quarry primarily to establish additional stockpiling areas. MOD 10 will also facilitate improved surface water management, a new administrative building, and improved areas for vehicle manoeuvring and parking.

The approved extraction area, extraction rates, quarrying activity and vehicle movements will not be affected by the proposal.

The Visual Impact Assessment identifies the area of theoretical visibility within a four kilometre radius of the proposed works.

The findings are that there is nil impact or negligible impact on residential premises to the north, south or west of the quarry site, including the town of Karuah. There is already very distant visibility of the quarry disturbance area for some rural residences to the east, generally in the Halloran Road area, or from higher elevations along the formed road. However, those view lines are generally filtered or obscured by landscaping vegetation or forested areas. The impact on rural residences to the east of the proposal (Hunterview Road and Halloran Road) is considered to be low.

The busiest road is the Pacific Highway and it is possible that the occupants of passing vehicles may achieve a fleeting glimpse of the south-eastern extension area of the disturbance area; however, the impact will be negligible given the likely speed of passing vehicles. All other roads support a very low volume of traffic, and any occasional view line is either distant or filtered.

Overall, the proposed modification has a low and acceptable visual impact.

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1 Introduction

1.1 Background and context

Karuah East Quarry Pty Ltd (the Applicant) propose to modify the State significant development approval for the Karuah East Quarry (KEQ) under the provisions of section 4.55(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The proposed modification (MOD 10) seeks to increase the approved disturbance area of the quarry primarily to establish additional stockpiling areas. MOD 10 will also facilitate improved surface water management, an administration building and improved areas for vehicle manoeuvring and parking.

Project Approval 09_0175 was granted for the KEQ on 17 June 2014 under the provisions of section 75J of the EP&A Act.

Key features of the Project Approval include:

- quarrying operation is permitted on the site until 31 December 2034;
- extraction (excluding overburden), processing and transport of quarry products is limited to 1.5 million tonnes in any calendar year;
- a permitted disturbance area of 33.01 hectares (ha);
- establishment of a biodiversity offset area on lands adjacent to the quarry (Part Lot 13 DP 1024564, Lot 14 DP 1024564 and Lot 5 DP 838128); and
- conditions apply to manage and mitigate potential impacts associated with a range of environmental conditions including noise; blasting; air quality; soil and water; transport; biodiversity; heritage; emergency and hazards management and waste.

The Project Approval has subsequently been modified to provide for:

- MOD 1 – Expansion to the approved area of disturbance by 2,500 m^2 to allow for improved vehicle manoeuvring in proximity of the crushing plant and quarry infrastructure;
- MOD 2 - A small (1.133 hectare) increase to the site disturbance area to allow for improved environmental management and improved operational safety;
- MOD 8 - Revised operational acoustic criteria in line with the *NSW Noise Policy for Industry 2017* and formalisation of a number of industry best practice acoustic mitigation measures installed at the quarry*;* and
- MOD 9 – Extended hours of operation.

MOD's 3 – 7 were withdrawn by the applicant.

This currently proposed modification, the subject of this visual impact assessment, is referred to as Modification 10.

1.2 Previous Visual Impact Assessment

A Visual Impact Assessment (VIA) was undertaken to inform the original Project Approval by GSSE (November 2012). The findings and recommended mitigation measures of that VIA (which are contained in Section 9.0 of the Statement of Commitments of the Development Consent) remain current and include:

- Trees will be planted as soon as practical on the initial benches on the western face of the quarry; and
- The proposed infrastructure area will be painted in an appropriate colour to blend in with the natural surroundings.

Noting that MOD 10 proposes new areas of disturbance, this VIA will supplement the 2012 VIA (GSSE).

2 Description of the project

2.1 The proposed development

The proposed modification seeks to expand the approved quarry disturbance area by approximately 7.17 ha inclusive of:

- an area of approximately 4.911 ha immediately north of the established southern stockpile area;
- an area of approximately 2.093 ha immediately south of the established southern stockpile area; and
- an approximate area of 0.166 ha adjacent to the crushing plant.

The proposed additional disturbance areas north and south of the established southern stockpile area are primarily proposed to be used for additional stockpiling. The nominal 0.166 ha proposed additional disturbance area adjacent to the crushing plant is to facilitate improved vehicle manoeuvrability and operational safety around the crushing / processing area.

The new total disturbance footprint for the proposed quarry will increase from 33.01 ha to approximately 40.18 ha.

The modification also proposes to accommodate:

- improved surface water management works including:
  - the relocation and re-sizing of Dam 2; and
  - the resizing of Dam 3.
- an administrative building;
- staff and visitor parking; and
- heavy vehicle parking.

The project approval as it relates to the extraction area, extraction rates, quarrying activity and vehicle movements will not be affected by the proposal.

Plans of the proposed modification are provided in Appendix A.

3 Approach and methodology of assessment

3.1 Purpose

The visual landscape is important because it provides:

- a public good;
- a setting for the day-to-day lives of local communities;
- habitat for flora and fauna;
- a sense of place; and
- opportunities for aesthetic enjoyment.

A visually attractive landscape can also provide economic benefits through recreation and tourism, plus indirect benefits to health and wellbeing.

Projects are also important to communities and local economies, and there is generally some visual effect arising from development because it typically generates a new element in the landscape. Not all development has a negative visual impact and not all impacts are unacceptable. There is a need to consider the extent to which the proposed development integrates or contrasts with the local landscape, and the extent to which sensitive receptors in the vicinity will be affected by the proposed development.

The purpose of this visual impact assessment is to understand the likely interactions between the proposed modification and visual receptors in the vicinity.

3.2 Study method

This assessment is consistent with the *Guidelines for Landscape and Visual Impact Assessment*, prepared by the Landscape Institute and the Institute of Environmental Management and Assessment (2013).

The VIA needs to establish the existing nature of the landscape and visual environment. This includes the range of authorised uses which have modified the environment, such as roads, resource extraction, infrastructure etc, as well as the natural environment.

Importantly, the assessment seeks to assess only the proposed MOD 10 project activities, not legacy issues or the impact of historical practices. All existing infrastructure, including roads and pipelines, form part of the base case.

In the following sections we consider the visual effect of the proposed modification, before synthesising that information to assess the overall visual impact.

The stages of the assessment are:

- describe the existing environment surrounding the project area and establish a visual catchment;
- identify and evaluate the visual effect of the project;
- identify and evaluate the visual sensitivity within the existing environment;

- integrate the consideration of visual effect and visual sensitivity findings; and
- consider feasible mitigation measures.

When assessing the visual impacts of a proposed project, there are two high-level variables to be considered:

- the visual effect; and
- the sensitivity of the receptors to the visual effect.

Visual effect is concerned with the development or activities and the extent to which they will contrast to or integrate with the existing landscape. It considers the size or scale of the change, the duration of the change, and reversibility of the change. It also considers design elements such as form, shape, texture and line relative to the host landscape.

Visual sensitivity is concerned with the people or locations likely to have visibility of the development. It considers the nature of the receptors and considers factors such as the planar distance between the receptor and the proposed development, relative elevations, the relationship of the receptor to the development, and any intervening or mitigating factors such as vegetation.

When combined, those two variables determine the significance of the overall visual impact.

To retain a level of objectivity, the method includes a series of tables which allow the impact of the development to be assessed against key factors. These tables and rationale are presented below.

3.2.1 Site visit

A visit to the locality and key publicly accessible receptor points was undertaken on 27 December 2020. This provided an opportunity to prepare photographs and to determine local factors such as vegetation, infrastructure and existing development. The site visit included the town of Karuah and all local public roads.

3.3 Visual effect

Three factors are considered when evaluating the visual effect:

- contrast;
- integration; and
- the magnitude of the change.

Hence a development which occupies a significant portion of a primary view, but which has high integration and low contrast within the landscape, may nevertheless have a low visual effect.

On the other hand, a development occupying only a minor proportion of a primary view, but which exhibits high contrast and low integration, may have a higher visual effect.

Contrast and integration are the ‘visual properties’ of the proposed development. The effect of the two visual properties can, however, only be known once we establish how much of the landscape is occupied by the proposed development, the duration and reversibility of the change. The measurement of magnitude is concerned with the size and scale of the development relative to other landscape elements, and whether there will be a complete loss of a particular characteristic of the landscape or simply a minor change.

3.3.1 Contrast

Table 3.1 Contrast

Category	Meaning
High	The scale, form, line, colour or texture of the proposed development do not reflect, borrow from or complement the existing visual landscape
Moderate	The scale, form, line, colour or texture of the proposed development include some key elements which reflect, borrow from or complement the existing visual landscape
Low	The scale, form, line, colour or texture of the proposed development extensively reflect, borrow from or complement the existing visual landscape

A high contrast is less favourable than a low contrast.

3.3.2 Integration

Table 3.2 Integration

Category	Meaning
High	The existing visual landscape remains the dominant visual character because the design, siting, screening or filtering of the development makes it the recessive element
Moderate	The existing visual landscape remains the dominant visual character, but the design, siting, screening or filtering of the development only achieves partial integration.
Low	The existing visual landscape is dominated by the development.

A high level of integration is more favourable than a low level of integration.

Once the visual properties are understood, the next step is to consider the size and sale of the proposed development.

3.3.3 Magnitude

Table 3.3 Magnitude

Category	Meaning
High	A substantial change due to total loss of elements, features or characteristics of the host landscape; and represents a generally permanent and irreversible change. Size and scale are strongly inconsistent with other landscape elements.
Moderate	A discernible change due to partial loss of elements, features or characteristics of the host landscape; and represents a generally medium-term change (less than 10 years) and landscape recovery is expected. Size and scale are moderately inconsistent with other landscape elements.
Low	An insubstantial change due to alteration of elements, features or characteristics of the host landscape; and represents a generally medium-term change (less than 10 years) and landscape integrity is broadly retained. Size and scale are consistent with other landscape elements.

A low level of magnitude is more favourable than a high level of magnitude.

3.3.4 Overall effect

It is necessary to consider the two visual properties – contrast and integration – plus the magnitude of the landscape change, in order to rank the overall visual effect.

The table below provides a simple matrix to consider the interplay between those factors.

The grey boxes contain the visual effect classifications.

Table 3.4 Visual effect

Visual properties		Magnitude		
Contrast	**Integration**	**High**	**Moderate**	**Low**
High	Low	High Effect	High-Moderate Effect	Moderate Effect
High	Moderate	High Effect	Moderate Effect	Moderate-Low Effect
High	High	High Effect	Moderate Effect	Low Effect
Moderate	Low	High Effect	Moderate Effect	Moderate Effect
Moderate	Moderate	Moderate Effect	Moderate Effect	Moderate-Low Effect
Moderate	High	Moderate Effect	Moderate Effect	Low Effect
Low	Low	High Effect	Moderate Effect	Low Effect
Low	Moderate	High-Moderate Effect	Moderate Effect	Low Effect
Low	High	Moderate Effect	Moderate-Low Effect	Low Effect

Note that the visual effect is not the same as the visual Impact. To understand the impact, we not only need to understand the visual effects associated with the proposed development, but also the visual sensitivity of local receptors to a landscape change as described by the visual effects. In short, visual effects describe the characteristics of the source and visual sensitivity describes the characteristics of the receivers.

3.4 Visual sensitivity

The ranking of visual sensitivity depends on how critically the change to the landscape is likely to impact the people living at or visiting locations from which a primary view is available to the proposed development.

Not all places where a view is possible will have residents or visitors. Those locations that do have residents or visitors also are not equal in terms of the likely duration of the view (for example from a moving vehicle vs from a living room), the number of people experiencing the view, or the importance of the amenity or view integrity to the viewpoint. In this respect, the primary view from a residential dwelling or a tourist lookout will have a higher sensitivity that a remote agricultural or forestry location.

A primary view is defined as being an arc created by sight lines from a standing human radiating out vertically and horizontally at angles of 30 degrees around the centreline of the line of sight towards the proposed development. It is recognised that views do exist beyond the 30-degree arc, but this is, by convention, considered the most important part of a view.

Generally, the closer to the development, the more of the view that is occupied by the proposed development. In considering the scale of the proposed disturbance areas,

The table used to rank the relevant local sensitivities is provided below.

3.4.1 Visual sensitivity table for the proposed development

Table 3.5 Receptor types and relative visual sensitivity level

Land use	Less than 500 m from the development	Between 500 m and 1 km from the development	Between 1 km and 3 km m from the development	More than 3 km from the development
	Visual sensitivity level			
Land use	Less than 500 m from the development	Between 500 m and 1 km from the development	Between 1 km and 2 km from the development	More than 2 km from the development
Residential dwelling	High	High / Moderate	Moderate	Low
Community facility or commercial accommodation	High	High / Moderate	Moderate	Low
Designated lookout, picnic site or recreational destination	High	Moderate	Low	Low
Designated tourist road or scenic route	High	Moderate	Low	Low
Main (State) road or rail line	Moderate	Low	Low	Low
Minor road	Moderate	Low	Low	Low
Broadacre rural land	Low	Low	Low	Low
Forested land	Low	Low	Low	Low

3.5 Visual impact

Visual impact is an aggregation of the above factors.

The broad categorisation is the summary of overall visual effect and visual sensitivity.

Table 3.6 Visual impact

Visual effect	Visual sensitivity		
	High	**Moderate**	**Low**
High	High Visual Impact	High/Moderate Visual Impact	Moderate/Low Visual Impact
Moderate	High/Moderate Visual Impact	Moderate Visual Impact	Moderate/Low Visual Impact
Low	Moderate/Low Visual Impact	Moderate/Low Visual Impact	Low Visual Impact

If a receptor has no feasible line of sight or a line of sight which is sufficiently distant or obscured to be trivial or inconsequential, then the visual impact is said to be 'nil'.

Note that the receptor is assumed to be 1.6 m above natural ground level, which is roughly the average human height for eye level.

3.6 Area of theoretical visibility

The area of theoretical visibility represents the area within which the majority of potential views of the project may be located. It can also be considered the 'study area' for this VIA.

Consideration of the views within the area of theoretical visibility are the focus of the visual impact assessment. It is acknowledged that there may be other viewpoints, at some significant distance, outside the area of theoretical visibility but the likelihood of any material impact at those locations is negligible and are therefore not investigated as part of this assessment.

When dealing with unobstructed sight lines and adequate lighting, human-scale objects are resolvable as objects via unaided vision to a maximum distance of approximately 3 km. This is generally the conventional limit for 'distance' views. Some additional allowance has been made with respect to this project to ensure that rural residential dwellings to the east of the quarry are included for assessment. The area of theoretical visibility has therefore been set at a 4 km radius.

Three kilometres remains the extent of the area from which the effect of the development could conceivably be evident in any detail[1] but the proposed disturbance areas may be identifiable as a remote landscape feature at a distance of 4 km.

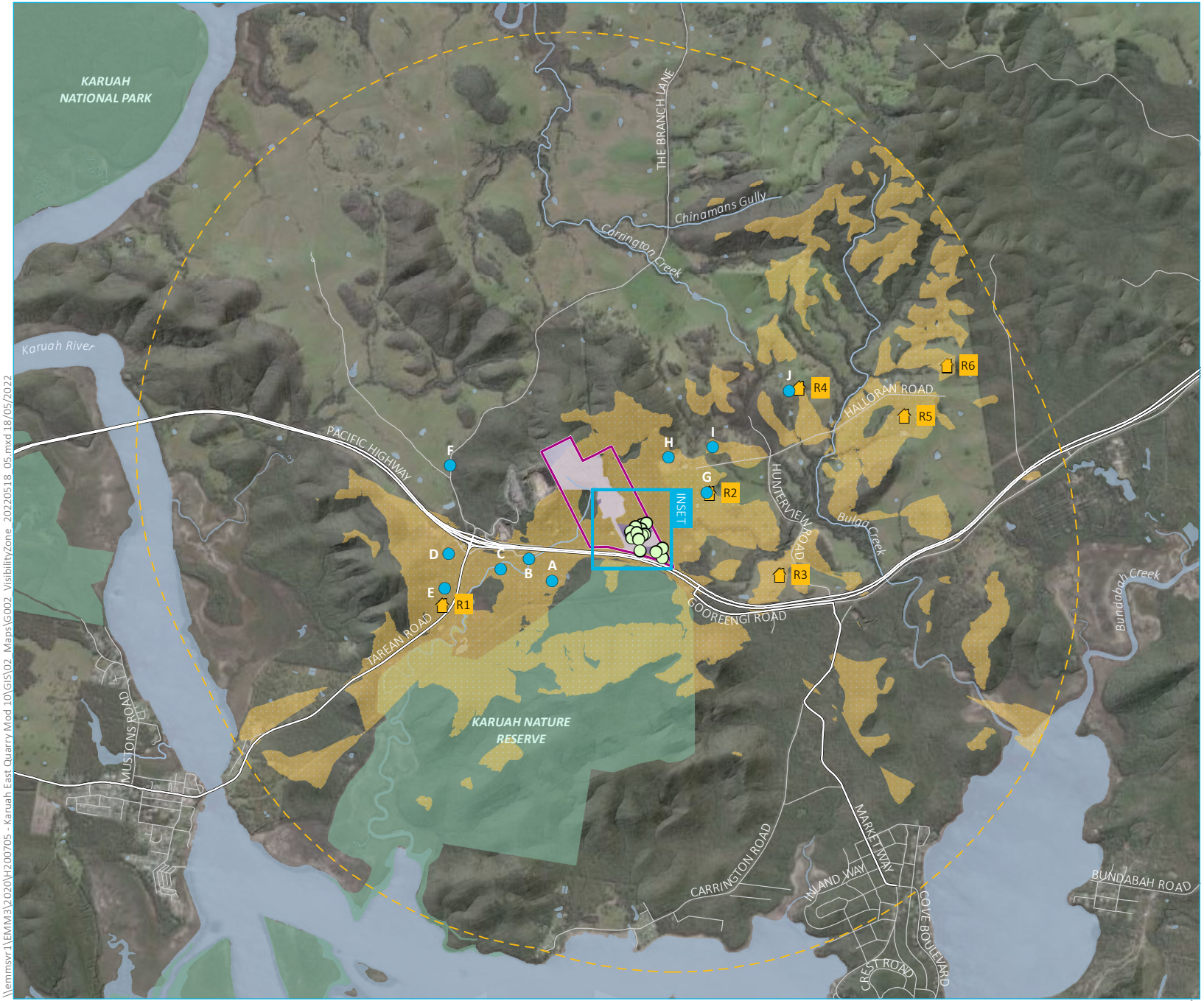
The area of theoretical visibility sets the overall envelope for visual impact consideration. Within the area of theoretical visibility, not all areas will have a line of sight to the proposed development due to the presence of intervening rises in topography such as ridges or hills.

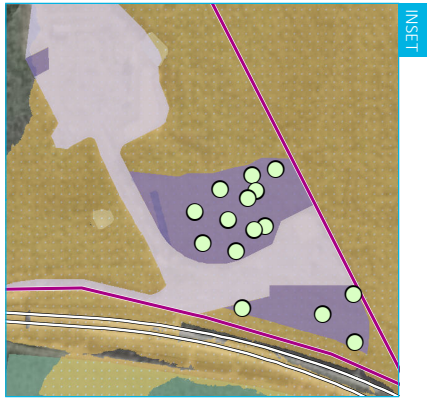
The area of theoretical visibility is shown in Figure 3.1.

[1] Tomko, M, Trautwein, F & Perves, R S (2009) Identification of practically visible spatial objects in natural environments, DOI: 10.1007/978-3-642-00318-9_1 · Source: DBLP

The area of theoretical visibility is based on the elevation of the proposed development components – principally the cleared area and stockpiled material – and the extent to which topography, such as ridges and hills, limit the locations from which a line of sight to those development features might be possible. For the purposes of the VIA, the maximum height of material stockpiles is assumed to be 5 m above ground level. Generally, the operation of the site will mean that stockpiles will be in various stages of amassing or diminishing, and hence a 5 m height for all stockpiles represents a worst-case scenario.

The area of theoretical visibility does not take into account any vegetation or structures such as sheds or water tanks which might also prevent or limit a line of sight. Those additional factors are considered only after topography has been considered as a feature which will obscure a line of sight.





KEY

- Site boundary
- Site boundary - 4 km buffer
- Viewshed assessment location
- Area of theoretical visibility
- Approved disturbance area
- Proposed MOD 10 disturbance area
- Residential receptor
- Residential receptor precinct
- Major road
- Minor road
- Named watercourse
- Waterbody
- NPWS reserve

Area of theoretical visibility

Karuah East Quarry Modification 10
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Figure 3.1

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Source: EMM (2022); ESRI (2022); DFSI (2017); ICSM (2012)

0 1 2 km
GDA 1994 MGA Zone 56

N

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4 Site context and existing environment

4.1 Introduction

The 'state of play' in terms of the landscape and visual context needs to be described prior to considering the visual effect and impacts of the proposed development on that current setting.

This section considers the socio-economic context for Karuah, the strategic intent expressed through land-use zones and strategic planning documents, and the environmental features which characterise the locality.

4.2 Socio-economic character

4.2.1 Census data

The site is within the MidCoast Council local government area (LGA).

The Australian Bureau of Statistics (ABS) provides data on a range of demographic variables for the district of Karuah[2]. Some key indicators are noted below.

The median age of people in Karuah (at 2016) was 50 years.

Aboriginal and Torres Strait Islander people make up 14.6% of the population.

The main sources of employment were supermarket and groceries; social assistance services; accommodation and road freight services.

The most common occupations in Karuah included technicians and trades workers 20.2%, labourers 14.3%, machinery operators and drivers 13.8%, clerical and administrative workers 12.2%, and managers 9.9%.

The unemployment rate in 2016 was 10.1%.

The average household size is 2.3 persons. The majority of households are families (66%). Single person and group households account for 34% of the residences.

Dwelling types are predominantly separate houses (79%).

4.2.2 Community Strategic Plan

The *MidCoast Community Strategic Plan 2030* is the principal means of articulating the vision and values of the community.

The values and vision of the LGA are:

- a unique, diverse and culturally rich communities;
- a connected community;
- the environment;
- a thriving and growing economy; and

[2] Australian Bureau of Statistics Regional Summary for Karuah 2016

- strong leadership and shared vision.

4.3 Land use

MidCoast Council was formed through the 2016 merger of the former Great Lakes Council, Greater Taree Council and Gloucester Shire Council.

The relevant local environmental plan (LEP) for the site is the *Great Lakes Local Environmental Plan2014*.

The land use zoning for the study area under the Great Lakes LEP is predominantly RU2 Rural Landscape (the quarry sits entirely within this land use zone) with a land use zone of SP2 Infrastructure (Classified Road) along the Pacific Highway (A1) alignment, and land zoned E1 (now C2) National Parks and Nature Reserves applies to the Karuah Nature Reserve to the south (refer to Figure 4.1).

This is reflected in the characteristic mix of cleared or partially cleared land for the purpose of agriculture, interspersed with vegetated and less modified landscapes in the protected areas and the steeper ridges which are less suited to agriculture.

The Great Lakes LEP provides that extractive industries are permitted with development consent in land zoned RU2.

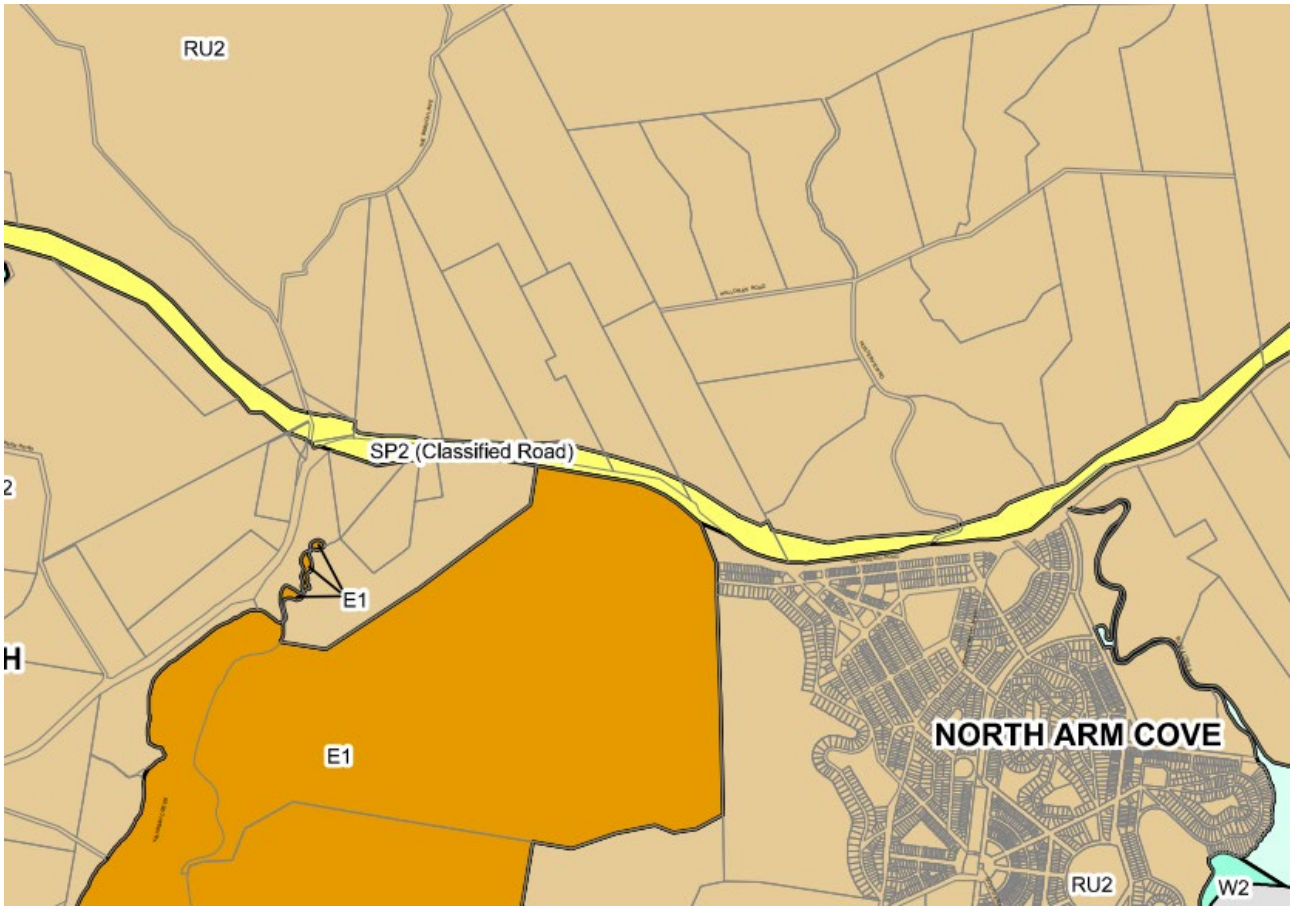

Figure 4.1 Local land use zoning

Figure 4.1Source: Great Lakes LEP – Land Zoning Map Sheet LZN_006 (detail)

4.4 Landscape character

There is a patchwork of varying agricultural uses which include cropping and grazing, with generally large lot landholdings.

The local landscape has been partly cleared, particularly in areas offering flatter terrain, and tree-lined verges are generally retained along creeks and gullies, or ridge lines.

There are smaller constructed elements throughout the landscape, such as fence lines, farm sheds and farm dams. Houses are highly dispersed. Local roads are predominantly unsealed.

The landscape presents as modified from its natural form, but with a backdrop of hilltops and ridges with a heavily vegetated cover, plus surface water features such as the Karuah River to the west, and lesser streams such as Yalimbah Creek, Carrington Creek, Mosquito Creek and Bulga Creek locally.

4.4.1 Landscape character units

There are two main landscape character units (VCUs):

- Visual Character Unit 1: Cleared and modified landscape, generally in flatter terrain; and
- Visual Character Unit 2: Heavily vegetated landscapes, predominantly at elevated rises and ridges.

i VCU 1 – Cleared and modified landscapes

The cleared and modified landscapes are generally associated with land used for primary production. Within these landscapes there are also pockets of vegetated landscape, but these are typically along creeks or drainage lines where vegetation has been preserved to protect riparian systems. The VCU 1 patchwork of cleared fields is also characterised by the presence of dispersed agricultural infrastructure such as farm dams, fences, power lines and sheds.

Refer to Figure 4.2 for an example of a VCU 1 landscape type which is dominated by a cleared and modified landscape character.

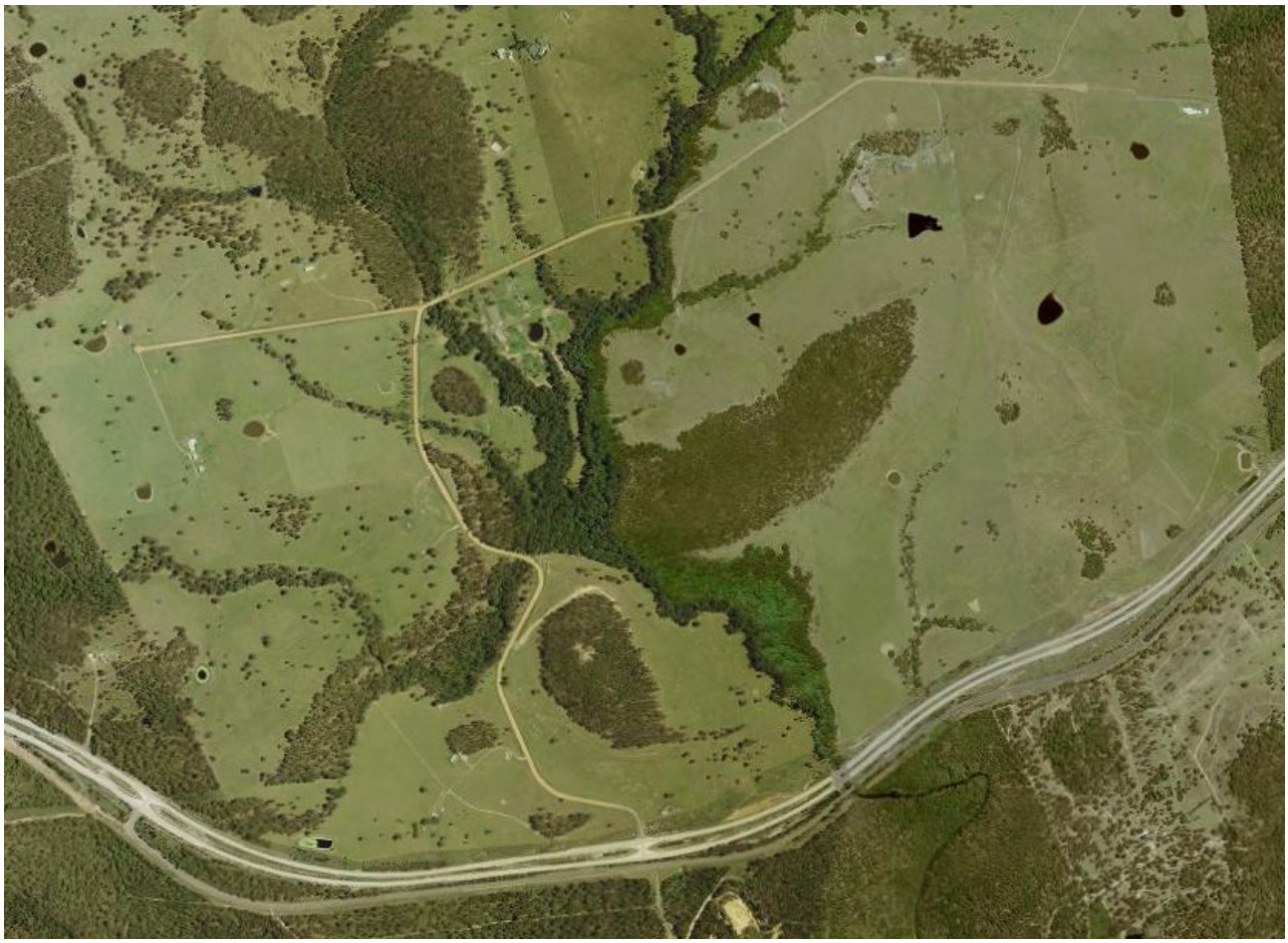

Figure 4.2 Example of clear agricultural land (VCU 1)

Source: Six Maps

ii VCU 2 – Vegetated rises and ridges

The vegetated rises and ridges comprise a significant portion of the local landscape character due partly to the large tracts of land set aside as nature reserves, national parks or State forest. Nerong State Forest, Karuah National Park and Karuah Nature Reserve are the largest landholdings in the VCU 2 landscapes.

The North Arm Cove subdivision is also considered part of VCU 2 because although originally conceived as a suburban precinct, the 1918 subdivision is now zoned non-urban and remains relatively un-cleared.

Refer to Figure 4.3 for an example of the landscape type which is dominated by vegetated peaks and ridges.

Figure 4.3 Example of vegetated land (VCU 2)

Source: Six Maps

4.5 Landform and topographic features

The topography is characterised by undulating lowlands and low to steep hills formed on generally north-west trending folds.

The significant topographic features for this locality are:

- Karuah River and its tributaries such as Yalimbah Creek, The Branch River and North Arm Cove;
- extensive coastal wetlands generally adjacent to the Karuah River;
- the town of Karuah;
- Karuah Hill (246 m ASL) within Karuah Nature Reserve; and
- lesser peaks to approximately 150 m ASL generally west of the site.

4.6 Towns and regional centres

The nearest urban settlement is the town of Karuah, approximately 4.5 km to the south-west of the site. Karuah has a population of 1,411.

The regional centre of Raymond Terrace, with a population of approximately 13,300, is approximately 27 km south-west of the site.

4.7 Rural residences

There are nine private rural residences identified within the four-kilometre radius which have some prospect of a line of sight to the proposed development areas (refer to Figure 3.1). Individual residences are identified with a blue dot. The precincts within which one or more receptors are located are shown as R1 to R6 in yellow squares. For example, R1 identifies residences south of the Pacific Motorway which are within the Area of Theoretical Visibility; R2 identifies residences in Halloran Road east; R3 is Hunterview Road.

Note that these residences are in the Area of Theoretical Visibility, and this simply means that the topography allows a theoretical like of sight to the proposed development, but that theoretical line of sight is often not an 'actual' line of sight due to the intervention of mature vegetation or surface structures.

Site observances from public roads suggest that most rural residences within the Area of Theoretical Visibility have the benefit of established trees in property landscaping or local forested areas as features which will screen or obscure potential view lines. Access to residences was not sought.

4.8 Protected areas

Local areas of vegetated land, and potentially including visitor destinations, include protected areas such as national parks and nature reserves.

4.8.1 Karuah Nature Reserve

Karuah Nature Reserve covers an area of 824 ha and is situated immediately south of the Pacific Highway (A1) near the site.

The most significant feature of Karuah Nature Reserve is the peak if Karuah Hill (246 m ASL) which serves as a backdrop to the town of Karuah. This conical hill is similar to those near Shoal Bay to the east.

Nature reserves differ from national parks in that they do not have the provision of recreation as a management principle.

4.8.2 Karuah National Park

Karuah National Park is situated west of the Karuah River and comprises 3,534 ha of land.

4.9 State forests

4.9.1 Wallaroo State Forest

Wallaroo State Forest is adjacent to and south-west of Karuah National Park and comprises approximately 6,200 ha.

4.10 Travelling Stock Reserves

There are no travelling stock reserves (TSRs) in the vicinity of the site. The nearest TSRs are in East Seaham, approximately 25 km to the west of the site.

4.11 Tourist sites and lookouts

4.11.1 Great Aussie Bush Camp

The Great Aussie Bush Camp is approximately 6.5 km to the east of the site.

4.11.2 Karuah Jetty Holiday Park

The Karuah Jetty Holiday Park (Big 4) is situated to the south of the Karuah town area and approximately 5 km south-west from the site.

4.11.3 Karuah Caravan Park and motels

The Karuah Caravan Park and a number of tourist motels are within the main urban area of Karuah, approximately 4.5 km from the site.

4.12 Roads and transport

4.12.1 Pacific Highway

The Pacific Highway is a dual carriageway and is situated at the southern perimeter of the study area (located south of KEQ and Blue Rock Close which provides access to KEQ) and is the only classified road in the vicinity.

4.12.2 Minor roads

There are several lesser local roads including:

- The Branch Lane;
- Blue Rock Close;
- Andersite Road;
- Tarean Road;
- Hunterview Road;
- Halloran Road;
- Gooreengi Road;
- Mill Hill Close;
- Myers Trail;
- Alice Street, Karuah; and

- Bundabah Street, Karuah.

4.13 Local community facilities

4.13.1 North Arm Community Hall

The North Arm Community Hall, located at The Ridgeway, North Arm Cove, is approximately 5 km to the south-east of the site.

4.13.2 Karuah town facilities

There are several community facilities in and around the town of Karuah, including the Karuah Boat Ramp, Karuah Motor Yacht Club, Karuah and District RSL Club and Karuah Community Hall. These are all generally within the urban area of Karuah, approximately 4.5 km from the site.

4.13.3 Karuah Public School

Karuah Public School is on Bundabah Street, Karuah, and services Kindergarten to Year 6 and typically has an enrolment of approximately 130 students. The school is approximately 4.4 km from the site.

5 Visual effect

The visual effect of the proposed development is discussed below.

There are three elements which combine to create the magnitude of the effect – being contrast, integration and magnitude

5.1 Contrast

In considering the contrast attributable to the proposed cleared areas and the stockpiling of extracted material, there is some consideration that the materials, and indeed clearing, are identifiable elsewhere in the local landscape setting. The dominant landscape is, however, is VCU2 – heavily vegetated terrain. There is also the feature of an established quarry at this site which does, to some extent, also inform the extent to which a contrast is created.

There are no substantial buildings proposed and the contrast is therefore attributable to the loss of vegetation and the presence of stockpiled material and minor structures. The colour, texture and naturalness are altered but not replaced by significant build form. Nevertheless, there is little which can be said to complement or borrow from the main existing visual landscape.

The contrast therefore is considered high.

5.2 Integration

The existing dominant landscape of VCU2 lands remains the key character of the area. The scale of the proposed development does not materially diminish the overall visual character.

The design and siting of the proposed development areas considers the ability of remnant vegetation to screen or filter the development, and the project achieves partial integration.

The integration is therefore considered to be moderate.

5.3 Magnitude

The magnitude of the development is determined by the extent to which the size and scale result in the loss of landscape elements, features or characteristics.

As noted above, the site is within a landscape characterised as VCU2 but there are established operational areas of a quarry already in existence within the VCU and the addition of further cleared areas does not intrude on an otherwise unblemished landscape. The nearby presence of a major State road and the associated infrastructure also forms a distinct element in the landscape.

Visually, the host landscape will not be subject to a major change due to the proposed development. The size and scale of the development are consistent with other elements. The duration will be greater than 10 years, but integrity can be restored in the longer term through site rehabilitation.

The magnitude is therefore considered to be low.

5.4 Overall visual effect

On this basis, the overall visual effect is low-moderate.

6 Sensitivity ranking of receptors

Sensitivity is considered first and then impact.

Sensitivity is based on the type of viewer and viewpoint (ie residences, lookouts, community facilities, roads), and the distance from the proposed development. It considers only the elevation of land.

Sensitivity does not consider the influence of surface features or mitigating elements such as trees or other structures. It is simply a means of ranking the potential sensitivity of the receiver if a view is available.

Table 6.1 Sensitivity ranking of receptors

Receptor location	Distance	Sensitivity ranking
Rural residences – The Branch Lane	1.6 km	Moderate
Rural residences – Hunterview Road	650 m to 1.1 km	High/Moderate
Rural residences – Halloran Road	570 m to 3.5 km	High/Moderate to Low
Rural residences – Tarean Road	1.7 km to 3.6 km	Moderate
Rural residences – Mill Hill Close	800 m to 1.1 km	High/Moderate
Urban residences – Alice Street, Karuah	4.0 km to 5.5 km	Low
Urban residences – Riverside Drive, Mustons Road, Ridgeway Close, Manton Close, Buudhang Close and Boronia Road, Karuah	4.9 km	Low
Memorial Park, Karuah	4.8 km	Low
Boat Ramp, Karuah	4.8 km	Low
Pacific Highway	50 m +	Moderate to Low
The Branch Lane	1.3 km +	Low
Hunterview Road	1.2 km +	Low
Halloran Road	700 m +	Low
Gooreengi Road	450 m +	Moderate to Low
Myers Trail	110 m +	Moderate to Low
Mill Hill Close	800 m +	Low
Tarean Road	1.6 km +	Low
Karuah Nature Reserve	300 m +	Low
Karuah National Park	6 km +	Low

7 Visual impact

The visual impact is assessed here under various categories of receptor locations, such as urban residences, rural residences, roads and community facilities.

7.1 Residential dwellings

The residential dwellings can be classified as either urban or rural.

7.1.1 Urban

The urban development of Karuah includes dwellings on the eastern and western side of the Karuah River.

To the east, the main cluster of dwellings with a potential view line to the proposed development is Alice Street, but this is limited to dwellings at the northern end of the street.

The sensitivity ranking, based on distance (4.0 km or more) from the proposed development, is low.

None of the dwellings in this location will achieve a clear view line to the development due to intervening vegetation and structures. Refer to Photograph 7.1 and Photograph 7.2. The visual impact is therefore nil.

Photograph 7.1 Alice Street, Karuah, looking east

Image: A. Young (EMM)

Photograph 7.2 Alice Street, Karuah, looking east

Image: A. Young (EMM)

There are also houses in Memorial Drive and Bundabah Street, Karuah, which have a potential view line to the proposed development. The line of sight is generally not obstructed across the Karuah River, and the distance of 4.5 km means that the precinct is outside the range applied for the area of theoretical visibility.

Houses along Riverside Drive, Mustons Road, Ridgeway Close, Manton Close, Buudhang Close and Boronia Road (to the north of the Karuah town centre) generally have any viewline towards the proposed development filtered by mature foreshore vegetation. Those few premises which have an unobstructed view across the river, being generally the houses in Manton Close, Ridgeway Close and Buudhang Close, at a little over 4 km from the site, will be unlikely to perceive any visual effect, noting that there is a significant ridge north of Tarean Road which will prevent any view line at this location. Refer to Photograph 7.3.

The impact on houses in these locations is considered nil or low.

Photograph 7.3 Residence, Manton Close / Mustons Road

Image: A. Young (EMM)

7.1.2 Rural

i Rural residential receptor precincts

There are a number of individual rural residences scattered across the study area.

The residential receptor precincts are identified in Figure 3.1. Note that these receptor precincts usually identify locations where number of local rural residences are situated (not individual residences). The discussion below, based on a site visit, considers the likely a viewsheds at the rural residences and any mitigating factors such as intervening vegetation.

ii Assessments based on site visit

There are several residential dwellings within the area of theoretical visibility, generally in the Hunterview Road and Halloran Road vicinity, to the east of the quarry and proposed development.

Rural residences are also located along the Tarean Road, Mill Hill Close and The Branch Lane.

Generally, the rural residences in the Hunterview and Halloran Road area where a line of sight is a theoretical possibility are usually surrounded by remnant trees or landscape tree plantings (refer to Photograph 7.4 to Photograph 7.7), or are oriented away from the viewshed towards the proposed development (refer to Photograph 7.8).

It is noted that Lot 5 DP 838128 and Lot 14 DP 1024564 are biodiversity offset areas that are heavily vegetated and will not be affected by the MOD 10 proposal.

The presence of mature landscaping trees or remnant bushland will effectively obscure views towards the proposed development from rural residences. For these rural residences to the east of the site, the visual impact will range from nil to low (where distance is greatest and/or vegetation screens the line of sight). Note that access to the Halloran Road and Hunterview Road premises did not form part of the assessment and observations from nearby public roads suggested that most residences have perimeter landscaping or remnant bushland within their potential line of sight which would effectively mitigate the impact.

There is one rural residence proximate to the proposed development to the west of the existing quarry on The Branch Lane. This rural residence (refer to Photograph 7.9) has any potential view line to the development obscured by the mature vegetation on the north-eastern (quarry) side of The Branch Lane and the hills west of the exiting quarry.

The rural dwellings along Tarean Road and Mill Hill Close or Myers Trail are nestled in generally wooded settings and any potential view line to the proposed development is obscured by trees.

The impact on rural residences to the east of the proposed development (Hunterview Road and Halloran Road) is considered to be low, and in some cases nil. Rural residences south of the Pacific Highway also have a visual impact which is low or nil. In both cases, it is the intervening vegetation which effectively mitigates any visual impact. Intervening vegetation includes a buffer area of approximately 30 m wide along the project boundary, which is proposed to be retained under MOD 10, and that buffer area comprises existing mature vegetation.

Photograph 7.4 Residence, Halloran Road, Western Section

Image: A. Young (EMM)

Photograph 7.5 Residence, Halloran Road, Western Section

Image: A. Young (EMM)

Photograph 7.6 Residence, Halloran Road, Western Section

Image: A. Young (EMM)

Photograph 7.7 Residence, Halloran Road, Eastern Section

Image: A. Young (EMM)

Photograph 7.8 Residence, Halloran Road, Eastern Section

Image: A. Young (EMM)

Photograph 7.9 Residence, The Branch Lane

Image: A. Young (EMM)

Photograph 7.10 Residence, Tarean Road

Image: A. Young (EMM)

7.1.3 Community facilities and commercial accommodation

The nearest community facilities and most commercial accommodation are in Karuah and North Arm Cove. The Great Aussie Bush Camp is 7 km away and well outside the area of theoretical visibility. None of these facilities are within the area of theoretical visibility and therefore no visual impact is registered.

7.1.4 Designated lookout, picnic site or recreational destination

i Karuah Nature Reserve and National Park

Several high points within Karuah Nature Reserve and (potentially) Karuah National Park have a theoretical line of sight to the proposed development areas but there are no destination points, such as lookouts or camping sites, at these high points. The peaks are also heavily vegetated, meaning that the line of sight, if any, at those locations is significantly filtered.

Nature Reserves are focussed on habitat conservation and are not created for public recreation or hiking, and therefore generally do not encourage visitation by providing lookouts or other facilities. National Parks have a broader purpose and do include public facilities generally.

Karuah Nature Reserve therefore has, based on distance, capacity to receive some visual effect from the proposed development however the low number of visitors to the park and the limited opportunities to achieve a line of sight to the proposed disturbance areas means that the impact is low.

The Karuah Nature Reserve is proximate to the proposed development, but visual impact remains low due to the presence of mature forest. The Karuah National Park is approximately 6 km north-west of the proposed development and the visual impact, if any, at that distance is ranked as nil.

ii Karuah Boat Ramp

Karuah Boat Ramp is 4.8 km south-east of the proposed development and the visual effect, if any, of the proposed development at this distance is nil or low. The line of sight towards the proposed development is unimpeded across the Karuah River but the intervening rise in elevation and bushland along the Tarean Road alignment will obscure the view to the proposed disturbance areas.

Photograph 7.11 Karuah Boat Ramp, looking north-east

Image: A. Young (EMM)

iii Memorial Park, Karuah

Memorial Park, Karuah, has a more obscured line of sight towards the site. There is topography and vegetation generally obscuring the view line and the distance is approximately 4.8 km.

Photograph 7.12 Memorial Park, Karuah, looking north-east

Image: A. Young (EMM)

7.1.5 Designated tourist road or scenic route

There are no designated tourist roads or scenic routes within the area of theoretical visibility and therefore no visual impact is registered.

7.1.6 Main road or rail line

i Pacific Highway

The Pacific Highway (A1) carries approximately 45,000 vehicle per day however the road in this location is a dual carriageway with a 110 km/hr speed limit and landscaped verges with mature plantings. There is also landscaping in many sections of the median strip. Refer to Photograph 7.13 and 7.14. The duration of any possible line of sight is therefore extremely brief.

The highway is close to the proposed disturbance area (approximately 50 m) but there is a vegetated highway verge and also a proposed ribbon of retained vegetation (approximately 30m wide) along the southern extent of the site which will filter or obscure the line of sight for passing traffic.

There is only limited and filtered opportunity to form a view line to the proposed development areas, the potential opportunity for establishing a view line is when approaching from the north.

Photograph 7.13 Pacific Highway, Southbound

Image: A. Young (EMM)

Photograph 7.14 Pacific Highway, Northbound

Image: Google Street View

7.1.7 Minor roads

i Blue Rock Close and Andesite Road

Blue Rock Close and Andesite Road are predominantly service roads for the quarry facilities.

There is likely to be very little traffic using these roads other than vehicle movements associated with quarry operations.

ii Tarean Road

Tarean Road connects with the highway near The Branch Lane and Andersite Road and is the main approach to Karuah town from the north when diverting from the Pacific Highway.

There is negligible opportunity to form a view line to the proposed development from Tarean Road due to the mature vegetation on both sides of the road. The visual impact is nil.

Photograph 7.15 Tarean Road, looking north-east

Image: A. Young (EMM)

iii The Branch Lane

The Branch Lane runs generally north-south along the western side of the quarry area and joins the Pacific Highway at the Tarean Road junction.

The road is predominantly unsealed and carries local traffic, connecting to Booral Road approximately 16 km to the north.

The area to the east (quarry side) of The Branch Lane is heavily vegetated and no view to the proposed development is available. Refer to Photograph 7.16 and Photograph 7.17. The visual impact is nil.

Photograph 7.16 The Branch Lane, looking north

Image: A. Young (EMM)

Photograph 7.17 The Branch Lane, looking south

Image: A. Young (EMM)

iv Gooreengi Road

Gooreengi Road, which previously formed part of the old Pacific Highway, runs parallel with the Pacific Highway, at its closest point, approximately 450 km south-east of the quarry and provides access to North Arm Cove and Tahlee. There is no view available from this road due to the mature vegetation along the sides of the road. The visual impact is nil.

Photograph 7.18 Gooreengi Road, looking west

Image: A. Young (EMM)

v Myers Trail

Myers Trail forms part of the old Pacific Highway and runs parallel to the current Pacific Highway. At its closest point, it is approximately 110 m south of the proposed development. It carries negligible traffic and connects to other management trails within the Karuah Nature Reserve. Refer to Photograph 7.19.

Views from the road are obscured by the mature vegetation along the northern side of the road. It is possible to achieve a line of site towards the quarry by walking to the roadside safety fence near the Pacific Highway but this is available only at two locations and is unlikely to ever be accessed. The image is included as a surrogate for the potential glimpse of the quarry which may be available momentarily to passengers in vehicles travelling south bound on the Pacific Highway. Refer to Photograph 7.20.

The visual impact is low.

Photograph 7.19 Myers Trail, looking west

Image: A. Young (EMM)

Photograph 7.20 Myers Trail (safety fence), looking north-west

Image: A. Young (EMM)

vi Mill Hill Close

Mill Hill Close is part of the old Pacific Highway and is separated from the current Pacific Highway by an elevated earth embankment (not factored into the area of theoretical visibility) and mature vegetation. It is directly opposite the proposed development – separated by the Pacific Highway. Mill Hill Close carries negligible traffic. An extremely limited view line will be available from this road. The visual impact is low.

Photograph 7.21 Mill Hill Close, looking east

Image: A. Young (EMM)

vii Hunterview Road

Hunterview Road connects to the Pacific Highway at the North Arm Cove intersection, approximately 1.2 km (at the closest point) to the east of the quarry.

Hunterview Road services local rural residences and farms in the Bulga Creek area. It connects to Halloran Road.

The road is at a generally lower elevation relative to surrounding land and has sections of heavily vegetated land on either side. There is no view available to the proposed development from the road. Refer to Photograph 7.22 to Photograph 7.25.

The visual impact on selected sections of the formed roadway of Hunterview Road is low. For most of the road, the visual impact is nil.

Photograph 7.22 Hunterview Road, looking south

Image: A. Young (EMM)

Photograph 7.23 Hunterview Road, looking north-west

Image: A. Young (EMM)

Photograph 7.24 Hunterview Road, looking south-west

Image: A. Young (EMM)

Photograph 7.25 Hunterview Road, looking west

Image: A. Young (EMM)

viii Halloran Road

Halloran Road runs generally east west from a junction with Hunterview Road. It services several rural residences and farms. At its closest point (western end) the road is approximately 650 m from the proposed development. Halloran Road continues further east to a point approximately 3.5 km from the proposed development.

The road transects a series of ridges and from the higher points there is a view line available to the existing quarry and the proposed development. Photograph 7.26 to Photograph 7.28 illustrate the distant visibility of the existing quarry.

No line of sight is available at lower section of the road or where heavily vegetated land obstructs view lines (refer to Photograph 7.29). The visual impact is ranked as low.

Photograph 7.26 Halloran Road (western section), looking west – distant visibility

Image: A. Young (EMM)

Photograph 7.27 Halloran Road (eastern section), looking west - distant visibility

Image: A. Young (EMM)

Photograph 7.28 Halloran Road (eastern section), looking west - distant visibility

Image: A. Young (EMM)

Photograph 7.29 Halloran Road (east section), looking west – no visibility

Image: A. Young (EMM)

8 Management and mitigation

8.1 Avoidance through design

The land generally east of The Branch Lane and comprising the site is dominated by Visual Character Unit 2 and is heavily vegetated.

Provided that any new disturbance area is set behind a buffer of retained mature vegetation, the effect can be mitigated by the retention of the vegetation. This will be achieved in this instance noting that MOD 10 has been specifically designed to retain an approximate 30 m vegetation buffer along the southern extent of Lot 13 DP 1024564. Furthermore, the MOD 10 areas are bounded by established biodiversity offset vegetation to the west (on Lot 12 DP 1024564) and east (Lot 14 DP 1024564).

The effectiveness of vegetation retention as a visual impact mitigation measure will depend on the relative elevation of the disturbed area and the elevation of the viewer.

8.2 Management of residual impacts

Due to limitations on access, it is not possible to conclusively rank the visual impact for rural residences to the east of the site – notably dwellings at Hunterview Road and the western extent of Halloran Road. It is anticipated however that the impact for those dwellings will be nil to low.

It is also recommended that in the event that any temporary plant or structures are installed in the proposed disturbance areas that the finishes on those structures/plant be non-reflective wherever possible.

9 Conclusion

From a visual perspective, the site has a significant benefit in terms of the surrounding topography and vegetation.

The site is nestled within a heavily vegetated area and most receptor points are also shielded by landscape plantings or mature forests.

Some of the rural residences to the east of the proposed development may register a low visual impact and in some cases nil, depending on the degree to which views from the premises are obscured or filtered by vegetation.

Urban residences in Karuah are a generally 4 km or more from the proposed development, and usually shielded by topography or vegetation such that the impacts are negligible or nil.

Glimpses of the proposed development may be afforded from southbound vehicles on the Pacific Highway, but these views are filtered by road verge vegetation and median strip vegetation and will be fleeting.

Minor roads, notably Hunterview Road and Halloran Road, undulate across some ridges and there will be occasional lines of sight to the development from high points. However, these are very low volume roads, and this impact is considered low.

There are no public access receptor points, such as lookouts or tourist destinations, which will be impacted visually.

The use of vegetation buffers is the strongest mitigation measure to reduce visual impact, and there should also be an avoidance of reflective finishes for any temporary installations or plant that may be positioned within the proposed disturbance areas from time to time.