

Section 7

Evaluation and Justification of the Project

Preamble

This section concludes the assessment of the proposed Karuah South Quarry. The Project is evaluated based on the residual risks posed and in consideration of ecologically sustainable development (ESD) principles.

A justification for the Project is provided based on the predicted residual impacts of the Project, and the likely economic and social benefits that would be generated. This section concludes with a review of how each of the Objects of the *Environmental Planning and Assessment Act 1979* are satisfied by the Project together with the consequences of the Project not proceeding.

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7.1 INTRODUCTION

In order to conclude the EIS, the Project is evaluated and justified through consideration of its potential impacts on the surrounding environment and potential benefits to the local and wider community.

The evaluation of the Project is undertaken by firstly assessing the identified environmental risks posed to the local environment by the proposed activities (**Table A5.4**) and then considering the implementation of the commitments for controls, safeguards or mitigation measures outlined in Section 5 and summarised in Section 6. The Project has also been evaluated against the principles of Ecologically Sustainable Development (ESD) in order to provide further guidance as to the acceptability of the Project.

Section 7.3, which presents the justification of the Project, revisits the predicted residual impacts on the biophysical environment, considers the economic and social benefits which would be provided and assesses the consequences of not proceeding with the Project.

7.2 EVALUATION OF THE PROJECT

7.2.1 Design of the Project

The Applicant commissioned R.W. Corkery and Co. Pty Limited and a team of specialist consultants to investigate and advise upon the most effective manner in which to develop a quarry on the southern side of Lot 11, DP 1024564 and to mitigate or manage the environmental and social factors that are relevant to the Project. An iterative approach has been adopted in designing and reviewing the Project to ensure these factors were taken into account in the design of the site layout and in planning operations and to ensure that any residual impacts are within government-specified criteria or goals, accepted industry standards and/or realistic community expectations. Modifications to the quarry design were undertaken to accommodate identified residual risks as the results of various specialist consultant assessments became available.

Key elements of the Project design that have been influenced by environmental or social factors include the following.

- In planning the location and development sequence of the extraction area, consideration was given to the visual amenity of the Site. Stage 2 extraction operations have been designed to progress from west to east so that the Operator can progressively revegetate the completed benches prior to these benches being exposed as the Stage 2 extraction activities advance eastwards.
- In planning the location of the product stockpiling area, consideration was given to avoiding existing drainage features in the southern section of the Site so as to maintain continuity of riparian vegetation in the Yalimbah Creek system.
- The importance of environmental flows to the Yalimbah Creek system has also been recognised and as a result all harvestable rights dams have been designed and positioned to collect runoff from disturbed catchments. This would preserve the hydrologic function in receiving waters by ensuring that, to the greatest extent possible, environmental flows would be retained.

- 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.
- The Project also includes the construction of a 4m high fence that has been included in the design of the Site principally for the purpose of noise attenuation and to limit potential dust generation from product stockpiling area for nearby residences and roads.

Where potential residual impacts were identified, management options were considered. Through the implementation of the proposed management and mitigation measures identified in Section 5 and summarized in the Summary of Environmental Management and Monitoring Measures in Section 6, the residual risk rating for the majority of potential environmental impacts has been reduced.

The definition of the extraction area enabled consideration of the likely demand for quarry products and physical capabilities to establish an achievable rate of extraction that would ensure operational impacts such as traffic and transportation levels, noise levels, particulate matter emissions and water management could be managed to remain within or improve upon government-specified criteria or goals, accepted industry standards and/or realistic community expectations.

The Project, as presented, would result in the development and operation of the Karuah South Quarry in an environmentally and socially responsible manner that also satisfies the cost efficiencies required by the Operator to ensure the operation remains viable.

7.2.2 Residual Environmental Risk and Impacts

Potential environmental risks and impacts of the proposed activities were identified during the design of the Project with mitigation measures developed to achieve an acceptable level of impact. **Appendix 4** provides a compilation of the environmental risks assessed for the issues raised in the SEARs and identified during community consultation.

The following provides a brief summary of key environmental risks (i.e. those given a “high” and “medium” risk rating following the adoption of relevant mitigation measures) and describes how these have been avoided or mitigated and how the residual impacts 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 adoption of both the design and operational mitigation measures would limit the colour contrast and duration of visual exposure and therefore the overall visual impacts of the Project. Importantly, the final rehabilitated landform would blend into the surrounding vegetated landscape without any substantive long-term impacts.

- Impacts associated with a loss of local amenity as the result of noise, visual or dust impacts that results in a changed experience for an 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 and 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 including a commitment 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 Operator and the regulator to ensure adverse social impacts are identified and addressed.

Medium Risks

- Dust from extraction and processing operations, stockpiles and exposed surfaces on the Site as well as that generated by vehicle movements potentially increasing deposited dust levels at local residences and water tanks and airborne fine dust creating the potential for adverse health impacts for local residents as well as inviting increased regulatory and community scrutiny.

The assessment of potential air quality impacts (Northstar, 2018) included dispersion modelling which predicted that during the assessed operational stages, the Project would comply with the air quality criteria for TSP, PM₁₀, PM_{2.5} and deposited dust at all residences, with the exception of a minor exceedance of maximum 24-hour average PM₁₀ at Residence 16.

The implementation of a real time air quality monitoring program would ensure that short-term elevations in incremental PM₁₀ concentrations do not result in exceedances of the criterion at any surrounding residence, including Residence 16.

- 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 (Northstar, 2018) indicates that emissions from the Project would represent a very small proportion of Australian greenhouse emissions.

- 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, 2018), 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.

- 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.

- 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 11.59ha of native vegetation, with a further 0.53ha of vegetation clearing impacting on areas identified as supporting exotic 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. These considerations have resulted in a reduction to the proposed area of disturbance of approximately 7.8ha.

- 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.

- 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 has 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. This aspect would remain a key topic of discussion in annual community meetings and subject to the satisfaction of social performance criteria.

- 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 (refer Section 5.10) 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 final floor in the extraction area and the establishment of a suitable substrate and a vegetative cover on the terminal Quarry bench to re-establish native vegetation in those areas. suitable for the proposed long-term land uses.

- 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.

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, are overall considered acceptable.

7.2.3 Ecologically Sustainable Development Principles

7.2.3.1 Introduction

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. 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. 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.

Each of the sustainable development principles has been considered throughout the design of the Project. The following subsections draw together 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.

7.2.3.2 The Precautionary Principle

In order to satisfy the principles of ESD, emphasis must be placed on anticipation and prevention of environmental damage, rather than reacting to it. During the planning phase for the Project, and throughout the preparation of the *Environmental Impact Statement*, 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. Throughout the design of the Project, particular attention was placed upon air quality issues and the development of controls, safeguards and/or mitigation measures to achieve an acceptable outcome for the local community.

The proposed environmental safeguards, controls and mitigation measures that would be implemented are summarised in Section 6.

Examples of matters relating to the precautionary principle that were considered during the various stages of the design of the Project are discussed as follows.

Site Selection

The applicant selected the location of the proposed extraction area as it would be a natural southward extension of the Karuah Quarry to the north, thereby confining the area of extraction a local quarry precinct based upon the high quality rock known to occur in the Karuah area.

Objectives of the Project

The Project has been designed with the principal objective to develop and operate the proposed Quarry in a safe and environmentally responsible manner, which meets the requirements of local and State government agencies, accepted industry standards and wherever possible,

reasonable community expectations. The Applicant recognises that only through comprehensive environmental assessment and an environmentally responsible approach to the design and operation of the Project can the risk of harm to the environment be minimised. Demonstration of this approach is provided both by the identification and prioritisation of issues (Section 3) for which a risk analysis formed an important component, and the implementation of proposed environmental safeguards, controls and mitigation measures (summarised in Section 6).

Design of Project Components

Several design aspects of the Project were modified during the planning stage in order to ensure the requirements of local and State government agencies and the surrounding community were met. These included the extraction sequence in Stage 2 of the Quarry's operation to limit visibility of extraction faces from the Pacific Highway. This modification would also assist in reducing dust lift-off.

Integration of Safeguards and Procedures

The framework for ongoing environmental management, operational performance and rehabilitation of the Site would be provided through the development consent and licences for the Project. Additionally, the following actions would be undertaken throughout the life of the Project.

- The Site would be managed in accordance with the commitments listed in Section 6.
- A range of on-site specific environmental procedures would be adopted to achieve consistency with specified outcomes and to avoid serious environmental damage.
- All on-site procedures would be regularly reviewed, particularly in light of monitoring results and any feedback received.
- The Operator would monitor PM₁₀ particulate matter in real time in order to ensure the continued compliance of the operation with goals outlined in this document.
- A Water Management Plan would be implemented to minimise any impact on any local water resources from runoff generated on catchments disturbed by Site activities.
- Topsoil and subsoil would be stripped and placed either on the outer face of the Quarry infrastructure area or stockpiled for use in revegetation of the reshaped final landform on the floor of the former extraction area.
- The operation would be subject to the annual reporting requirements of DPE and the EPA as well as regular environmental management auditing. All documents and reporting would be publicly available from the Operator's website.

Rehabilitation and Subsequent Land Use

Long term adverse impacts on the local environment would be avoided through the design to progressively rehabilitate disturbed areas at the Site particularly the terminal benches around the margin of the extraction area. The areas rehabilitated with native vegetation, namely on the

outer face of the Quarry infrastructure area and on the terminal benches, would supplement the existing biodiversity offset areas to the east and west of the Site. The final landform would provide a number of beneficial attributes for the possible future land uses. These include:

- A large area of comparatively flat land on the floor of the extraction area for a range of uses;
- a site easily accessible to the Pacific Highway.

Conclusion

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.

7.2.3.3 Social Equity

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.

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.

Both elements of social equity are addressed through the design of the Project itself, the implementation of operational safeguards to mitigate any short-term or long-term environmental impacts. Examples of matters relating to social equity that are relevant to the various stages of the Project are as follows.

Identification of Project Objectives

The principal objectives for the Project centre upon:

- securing access to a quality hard rock resource that would ensure the continued provision of a range of high quality construction materials to the Hunter and Greater Sydney regions;
- maintaining the level of production from the Project up to a maximum 300 000tpa in Stage 1 and 600 000tpa in Stage 2 to meet the supply demands;
- progressively rehabilitating completed benches to provide for future nature conservation at the completion of operations;
- increasing local employment levels; and
- maximising the recovery of the natural resource.

Site Selection

The selection of the site for the Project, i.e. adjacent to two approved quarries reflects a concern for social equity in that it provides for the production of sought-after construction materials whilst impacting on as few people as possible, particularly given the Site's closer proximity to the Pacific Highway. The fresh and weathered hard rock resource has been defined within the proposed extraction area would be capable of yielding approximately 11 million tonnes of high quality hard rock products.

Design of Project Components

The Project has been designed to maintain inter-generational equity, i.e. in recognition that the removal of the hard rock resource is a short term land use, but would create a landform suited to use by a subsequent enterprise that would also provide ongoing economic and social benefits.

The establishment of a third quarry in close proximity to two existing quarries, whilst concentrating activities in a localised area, would assist to expand the economic benefits to the Karuah and district community.

The Project has also been designed with the objective to ensure the continued use of surrounding land throughout and beyond the life of the Project.

Integration of Mitigation Measures and Procedures

The Operator would consult with the local community and maintain a pro-active approach to issues of interest to the residents. This dialogue would also include a system to record, manage and respond to any issues raised and/or complaints relating to the operation. The Operator would be consulted to adaptive management to ensure matters raised by the local community are addressed pro-actively.

Conclusion

The principle of social equity has been addressed throughout the Site selection and design of the Project. The Karuah South Quarry 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 Operator would adopt a pro-active approach in identifying and addressing any issues identified by the local community.

7.2.3.4 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. Details of how the Project has been designed to achieve compliance with these principles are set out below.

Identification of Project Objectives

The Operator would be committed to undertake all activities in an environmentally responsible manner and ensure that the changes to natural components of the environment do not significantly adversely affect biological diversity or ecological integrity. As such, the Project has been designed to:

- retain native vegetation adjacent to Blue Rock Close and the northern side of Karuah Quarry within Lot 11;
- minimise the potential impacts on threatened flora and fauna (and native vegetation and fauna habitats generally) and where residual impacts remain, account for those impacts through the development and implementation of the biodiversity offset strategy;
- mitigate impacts upon potential habitat for local fauna through the progressive rehabilitation of the terminal benches; and
- provide for nature conservation through the establishment of native vegetation on the terminal extraction benches and the retention of remnant native vegetation on the northern and southern sides of Lot 11.

Design of Project Components

The Applicant, on advice from the specialist consultancies commissioned to assist with the design and to assess the impact of the Project, has provided for the conservation of biological diversity and ecological integrity through the following design elements.

- Stage 2 extraction operations have been designed to progress from west to east so that the Operator can progressively revegetate the completed benches prior to these benches being exposed as the Stage 2 extraction activities advance eastwards. This approach would assist in progressively re-introducing a range of native vegetation back into the area disturbed by Quarrying.
- Water management structures have been designed to exceed current design criteria and would be operated in a manner to ensure that only water meeting specified water quality criteria leaves the Site and enters Yalimbah Creek and eventually the Karuah River estuary.
- All overburden and soil would be managed within the extraction area footprints, thus requiring no additional disturbance on the Site.
- The residual impacts to native vegetation and fauna habitat would be accounted for by contributions to the Biodiversity Conservation Fund.

Integration of Safeguards and Procedures

Management and preservation of biodiversity values within the Site would be guided by a Landscape and Rehabilitation Management Plan that would be provided to DPE for approval prior to the commencement of operations. The Plan would include protocols for the following activities.

- Soil stripping and stockpiling.
- Vegetation clearing protocols.

- Clearing, handling and placement of hollow-bearing trees.
- Weed management.
- Bush fire management.
- Threatened species management.
- Management of the Biodiversity Offset Area(s), once secured.
- Progressive and final rehabilitation of the Site

Residual impacts to native vegetation would be offset through contributions to the Biodiversity Conservation Fund.

Progressive rehabilitation of the Site would include the establishment of native vegetation on the terminal extraction benches.

Conclusion

The Project addresses 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. Weed eradication and feral animal control programs would be implemented as appropriate and would further assist in addressing the principle of sustainable development.

7.2.3.5 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. A reflection of these issues on the Project is set out below.

Identification of Project Objectives

The Applicant's principal objective is to operate the Project in a profitable, safe and environmentally responsible manner, which would enable the full implementation of all required mitigation measures, including community contributions to achieve the predicted level of environmental impact.

Design of Project Components and Integration of Safeguards and Procedures

The extent of research, planning and design of mitigation measures to prevent irreversible damage to environmental resources, other than the material to be extracted, is evidence of the value placed on these resources.

Rehabilitation and Subsequent Land Use

The design of the final landform to provide a useful legacy for future enterprises together with the establishment of native vegetation on the terminal benches illustrates the value placed by the Applicant on both the commercial and ecological elements of the Site.

Conclusion

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 Operator 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.

7.2.3.6 Conclusion

The approach taken in planning the Project has been multi-disciplinary, involved consultation with potentially affected local residents and various government agencies and emphasis on the application of a range of mitigation to minimise potential environmental, economic and social impacts. The design of the Project has addressed each of the sustainable development principles, and on balance, it is concluded that the proposed Karuah South Quarry is consistent with the principles of ecological sustainable development.

7.3 Justification of the Project

7.3.1 Introduction

In assessing whether the development and operation of the Project is justified, consideration has been given both to biophysical and economic and social factors including the predicted residual impacts on the local and wider environment and the potential benefits of the Project. When considering the predicted residual impacts, a review of the proposed mitigation measures was also undertaken to determine the emphasis placed on impact minimisation and the incorporation of the principles of ESD. This section also considers the consequences of the Project not proceeding.

7.3.2 Biophysical Considerations

Air Quality

A detailed dispersion modelling exercise has been performed to characterise the predicted impacts from the Project and all other surrounding quarrying operations (Karuah, Karuah East and the proposed Karuah Red Quarry) at a number of surrounding privately- and site-owned receptors.

The dispersion modelling indicates that the Project can operate across all stages of the Project with no exceedances of adopted air quality criteria, save for one minor exceedance of the maximum 24-hour average PM₁₀ concentration. This minor exceedance (50.4 µg·m⁻³ compared to the criterion of 50 µg·m⁻³), with the contribution from the Project being minor on this day.

In addition, annual average PM_{2.5} modelling results have also been compared to the criterion for respirable crystalline silica, with impacts in all stages of the development predicted to be minimal.

To ensure that impacts from the Project do not result in exceedances of the air quality criteria at surrounding residential locations, a real-time air quality monitoring program is proposed to be supported by a detailed Air Quality Management Plan.

Noise and Vibration

Aspects relevant to Project-related noise and vibration contributions to the current environment would include the following.

- The construction and operational noise levels of the Project are not predicted to exceed the relevant criteria at any residence.
- The maximum noise levels proposed for the period between 5:00am and 7:00am are not predicted to exceed the sleep disturbance criteria at any residence.
- The maximum heavy vehicle movements associated with the Project are not predicted to exceed the road traffic noise criteria at the most affected residence (R16).
- The predicted blast overpressure and ground vibration levels at the nearest residences in each direction from the Site are below the assessment criteria presented in ANZECC (1990).
- The blast design would be optimised and operational practices implemented to ensure that all fly rock is confined to the blast envelope and not impact upon any surrounding residence or traffic travelling on the Pacific Highway.

Visibility

The proposed Quarry has been designed with recognition of the potential for the components of the Quarry that could be visible from sections of the Pacific Highway both east and west of the Site and from two properties adjacent to the Pacific Highway south of the Site.

The Quarry infrastructure area would be constructed at an elevation that would substantially minimise the opportunity for motorists travelling southwards on the Pacific Highway to view any activities including processing and product stockpiling on this area. The Quarry infrastructure area would not be visible from the Pacific Highway west of the Site.

The sequence of extraction within the extraction area has been designed to maximise the opportunity for terminal benches to be vegetated to limit visibility of the extraction faces as the extraction area advances in an easterly direction and exposes the completed terminal Quarry benches.

It is possible that some of the construction activities would be visible through the base of trees present on Property 22 to the south of the Pacific Highway. The revegetation of the southern slope of the Quarry infrastructure area will progressively reduce any visual impact of this activity.

Traffic

At maximum production, the Project would generate up to 240 truck movements (120 loads) and 60 light vehicle movements (30 return trips) per day.

Through assessment of current and future traffic levels, and modelling of road use and intersection performance, it has been determined the additional traffic generated by the Project would not adversely impact the road level of service or intersection performance. The increases in total traffic and heavy vehicles using the Pacific Highway would be comparatively small and account for approximately 1% of total traffic and up to 9% of heavy vehicle traffic in the vicinity of the Site.

The proposed operational safeguards that would be implemented by the Applicant would ensure that the existing high safety standards on the Pacific Highway adjacent to the Site would be maintained. The Project's impacts on both local and State road networks would be minor and are not expected to result in the deterioration of future road safety levels.

Terrestrial Ecology

A Biodiversity Development Assessment Report (BDAR) was undertaken for the Project with field surveys conducted between February and October 2018. Field surveys identified one endangered ecological community and five threatened fauna species within or immediately surrounding the Site.

Direct impacts to native vegetation are anticipated through the clearing of approximately 11.59ha of native vegetation. Indirect impacts associated with the Project may include impacts such as noise and erosion associated with the construction and operational stages of the Project. No prescribed biodiversity impacts are anticipated from the Project.

It has been concluded that the ecological impacts of the Project have been mitigated to the greatest extent practicable. Residual ecological impacts would be offset in accordance with the BAM to achieve a 'no net loss standard' to biodiversity values.

Surface Water

It has been assessed that the Project could be undertaken without any significant adverse impact on surface water resources. Assuming the implementation of the proposed site water management infrastructure, operational safeguards and controls, the Project would:

- not be subjected to, or cause adverse effects from, flooding;
- minimise any reduction in environmental flows to Yalimbah Creek;
- ensure that clean water runoff is diverted away from areas of disturbance;
- ensure that sediment-laden runoff is captured, recycled and re-used for quarry-related activities to avoid discharge to Yalimbah Creek; and
- ensure the capture, recycling and re-use of sediment-laden runoff is restricted to the maximum harvestable rights of the Site.

Groundwater

The Site and therefore the extraction area are situated within the relatively thick rhyodacite aquifer belonging to the Nerong Volcanics which overlies the sequence of interbedded Carboniferous sedimentary rocks of the Karuah Formation. The rhyodacite aquifer system is considered to be 'less productive' with groundwater occurrence associated with discrete discontinuous sub-vertical fractures that dissect the rock mass and provide preferential, but discontinuous, groundwater pathways for percolated rainfall (Cook, 2018).

The potential local and regional impacts of the Project on the groundwater environment, local groundwater users, local surface water systems and GDEs have been assessed under the NSW Aquifer Interference Policy with the results as follows:

- local and regional groundwater system: Cook (2018) concluded that minor amounts of groundwater may flow into the proposed extraction area, however any impact to the local and regional groundwater system would be limited.
- local groundwater users: one registered bore (GW201611) was identified 3km northwest of the Site, as this bore is considered to be up gradient of the Site. Cook (2018) concluded that the Project will not adversely impact any neighbouring registered bores.
- local creek flow: Cook (2018) concluded that groundwater flow predominantly occurs within fractures and shear zones. These fracture systems are discontinuous and considered to be disconnected from watercourses.
- groundwater chemistry: Cook (2018) concluded that the chemistry of any residual water retained in the final void would be dominated by rainwater.
- groundwater dependent ecosystems (GDEs): No Groundwater Dependent Ecosystems or Groundwater Sensitive Ecosystems have been identified on the Site (Ecoplanning, 2019) or within close proximity.

Aboriginal Cultural and Historic Heritage

An Aboriginal Cultural Heritage Assessment undertaken by Biosis (2018a) identified no sites of Aboriginal cultural heritage significance within the Site.

The preparation of an Aboriginal Cultural Heritage Management Plan would ensure that any unknown Aboriginal cultural heritage sites and values would be protected in accordance with the requirements of OEH.

An investigation was also conducted to identify any structures, places or relics of non-Indigenous significance in the vicinity of the Site (Biosis, 2018b). No items were identified within or surrounding the Site. It is not anticipated that there would be any impacts to historic heritage as a result of the Project.

Soils

Based on *The Land and Soil Capability Assessment Scheme – Second approximation* (OEH, 2012), the soils of the Site may be classified as follows.

- Class 7 – Very low capability land.
- Class 6 – Low capability land.
- Class 5 – Moderate-low capability land.

It is therefore concluded that the Project would not impact adversely on the agricultural potential of the land given the existing land uses both within and immediately surrounding the Site and the prevalence of moderate-low to very low capability soils.

7.3.3 Economic and Social Considerations

7.3.3.1 Economic Considerations

The Project provides for the removal, processing and despatch of aggregates, pavement products and manufactured sand recognised 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;
- avoid, minimise and/or mitigate environmental and social impacts to the greatest extent practicable which in turn relates to the economic costs of the Project.

7.3.3.2 Social Considerations

Consultation with the local community has identified that existing social impacts are being experienced by the community, which influence the potential for and expectation of cumulative social impacts under the Project.

The potential amenity impacts of the Project have been the subject of comprehensive technical review that predicts that all operations (including the Project) would operate within acceptable criteria established in NSW guidelines and legislation. Residual social impacts are predicted to occur as a result of changes to local amenity which may influence the existing way of life for some stakeholders. In addition, the community values local environmental features of the area and impacts to these natural resources has social consequences. Community fears about the operations are likely to remain in the short term.

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

Assuming that the mitigation commitments for the Project are successful in alleviating community concerns, 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 outcome would benefit the social outcomes of both the existing operations and the Project.

7.3.4 Objects of the Environmental Planning & Assessment Act 1979

The SEARs for the Project require the EIS to provide the reasons why the Project should be approved having regard to the Objects of the Act. **Table 7.1** identifies the objects of the EP&A Act and confirms that each would be satisfied by the Project and this EIS.

Table 7.1
Objects of the EP&A Act

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Object	EIS Coverage
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>Section 5.10 confirms that the Site has limitations for agricultural land uses and confirms that the Project would have negligible impact on agricultural resources and production. The Site does not contain forestry or mineral resources and therefore no specific management measures for these have been developed.</p> <p>Sections 5.6 and 5.7 confirm that water resources would be suitably managed within the Site. Minimal impacts to the surrounding groundwater and surface water environments would be expected with the implementation of best practice management.</p> <p>Section 5.5 confirms that native vegetation clearance has been avoided and minimised where practical. Residual impacts would be offset through payment into the Biodiversity Conservation Fund.</p> <p>Sections 5.12 and 5.13 considers the economic and social costs and benefits associated with the Project and demonstrates that given the implementation of proposed design and operational mitigation measures and operational 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 7.2.2 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,	<p>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.</p> <p>Section 5.12 and 5.13 confirms that the Project would provide a net benefit to the local and regional economy the final landform would be suitable for a range of subsequent uses.</p>
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,	Section 5.5 demonstrates the significant effort to be taken to minimise the impacts of the Project on local and regional biodiversity. Residual ecological impacts would be offset through contributions into the Biodiversity Conservation Fund.

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

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Object	EIS Coverage
f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	Sections 5.8 and 5.9 outlines the results of the survey with respect to Aboriginal cultural and/or historic heritage. No sites 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,	The Project has been designed to incorporate a range of components, either excavated or constructed, that would achieve a good design and minimise impacts to amenity. Section 5.3 describes potential impacts to amenity and identifies the environmental controls and management measures that would be implemented throughout the life of the Project.
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,	Section 3.3 reviews the relevant federal, State, regional and local environmental planning regulations, plans and strategies.
j) to provide increased opportunity for community participation in environmental planning and assessment.	It has been demonstrated through the consultation strategy adopted for the Project (see Section 3.2) a transparent approach to information distribution and consideration of community concerns. It is proposed and to adopt a proactive approach with the local community throughout the life of the Project to ensure the current level of concern caused by existing quarries is progressively removed.

7.3.5 Consequences of not Proceeding with the Project

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.
- ii) It is envisaged that the Operator of the Quarry would be a contractor or resource company that would prioritise use of the products produced for their own projects. As the opportunity for the Operator to operate their own quarry would be foregone.
- iii) 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 limit the extent of their development.

- iv) 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.
- v) Payments for elevated rates (to MidCoast Council), State and federal taxes and affected landowners within the Site would be foregone.
- vi) The existing environmental and amenity issues experienced by the local community from the Karuah Quarry and Karuah East Quarry 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.
- vii) The various adverse impacts attributed to the Project that are identified throughout Section 5 of this document 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.

7.4 CONCLUSION

The Project has been designed to address the issues raised by the community and all levels of government, as well as the principles of ecologically sustainable development. The Project provides for the extraction of the identified hard rock resource and general operation of the Quarry in an environmentally responsible manner. The Project incorporates a range of design and operational mitigation measures to ensure all relevant statutory goals and criteria, environmental objectives and reasonable community expectations are satisfied. Importantly, the environmental aspects of the Project have been assessed cumulatively with those of the adjoining quarries with the collective impacts assessed to be acceptable.

This document and the range of specialist consultant studies undertaken have identified that the Project should proceed because it would:

- contribute towards satisfying the demand for hard rock products required for the construction industry materials, particularly within the Greater Sydney metropolitan and Hunter regions;
- have a minimal and manageable impact on the biophysical environment;
- satisfy sustainable development principles; and
- result in a net benefit for the local community, the Local Government Agencies of MidCoast and Port Stephens and the State of NSW.

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