Deep Creek Quarry
Environmental Impact Statement

04 November 2021

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279 Deep Creek Road
Limeburners Creek NSW 2324

Kleinfelder Project Number: 20203112

Prepared for:

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This Environmental Impact Statement has been prepared to address State and Commonwealth requirements in relation to seeking Development Consent and Approval for the Deep Creek Quarry. The document may be referenced by any person, group or entity consistent with the applicable State and Commonwealth legislation. Outside of the assessment process, only Ironstone Developments Pty Ltd, its designated representatives and relevant statutory authorities may reference this document, it should not be otherwise referenced without permission.

DECLARATION

Project Details		
Project Number	SSD 11591659	
Project Name	Deep Creek Quarry	
Address of the land in respect of which the development application is made	279 Deep Creek Road Limeburners Creek NSW 2324 Lot 472 DP 1162208 & Lot 48 DP 753178, Lot 551 DP 1238818 & Lot 12 DP1277150	
Applicant Details		
Applicant Name	Ironstone Developments Pty Ltd	
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The undersigned declares that this EIS:

- has been prepared in accordance with Schedule 2 of the Environmental Planning and Assessment Regulation 2000
- this document contains a complete EIS
- contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates
- does not contain information that is false or misleading
- addresses the Planning Secretary's environmental assessment requirements (SEARs) for the project
- identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments
- has been prepared having regard to the Department's State Significant Development Guidelines - Preparing an Environmental Impact Statement
- contains a simple and easy to understand summary of the project as a whole, having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development
- contains a consolidated description of the project in a single chapter of the EIS
- contains an accurate summary of the findings of any community engagement
- contains an accurate summary of the detailed technical assessment of the impacts of the project as a whole.

Date	04 November 2021	04 November 2021
Signature	R. E. Townsend	

EXECUTIVE SUMMARY

INTRODUCTION

Ironstone Developments Pty Ltd (IDPL) propose to develop a hard rock quarry (the quarry) called Deep Creek Quarry (DCQ) located on the boundary of the localities of Limeburners Creek and Allworth, New South Wales. The project is located off The Bucketts Way in the Mid-Coast Local Government Area (LGA), on a partially previously disturbed site, historically used for agriculture and logging purposes. The Project is located approximately 10 km northeast of Clarence Town and 11 km northwest of Karuah. The Bucketts Way and Pacific Highway intersection is located a further 11.5 km south at Twelve Mile Creek.

Specifically, the proposed quarry is to be located at Lot 472 DP 1162208 & Lot 48 DP 753178, 279 Deep Creek Road, Limeburners Creek NSW 2324 (Subject Land). Access to the quarry will be via a dedicated quarry access road constructed within a portion of land to be subdivided from Lot 551 and Lot 12 DP1277150. See Figure 1 for the location of the Subject Land. The Subject Land is zoned as RU2 – Rural Landscape (RU2).

IDPL have a total land holding of 308 ha. The quarry is approximately 10% of the total landholding and has an area of 30 ha, with the extraction area being approximately 18 ha and supporting infrastructure, including the dedicated quarry access being approximately 12 ha.

The application seeks approval to produce up to 500,000 tonnes per annum (tpa) of hard rock quarry products for a period of up to 30 years, with the primary target being rhyolite that has the unique properties required to meet high specification road building standards throughout New South Wales. Targeting the rhyolite will also result in ancillary weathered rock products that are in high demand and suitable for the local construction industry.

The DCQ is expected to employ up to 10 full-time staff throughout operations, with further ongoing work for the local and regional construction industry and associated haulage contractors.

Pursuant to Schedule 1, Clause 7 of the *State Environmental Planning Policy (State and Regional Development) 2011*, development that extracts from a total resource of more than five million tonnes is classified as State Significant Development (SSD) and requires the preparation of an Environmental Impact Statement (EIS), prepared in accordance with the *Environmental Planning and Assessment Regulation 2000* (EP&A Regs). The DCQ, under current design plans, is expected to extract approximately 12 megatons (MTs) over the project lifetime and therefore constitutes SSD.

This EIS has been produced to satisfy the NSW Secretary's Environmental Assessment Requirements (SEARs), issued on 19 February 2021, and presented in Appendix A.

PROJECT OVERVIEW

The development is a hard rock quarry extracting up to 500,000 tonnes per annum over a period of up to 30 years. Approximately 12 Mt of rhyolite, arenite and weathered rock will be crushed, screened and sized into various products for road construction and landscaping purposes. A high proportion of product will be used to meet the Transport for NSW (TfNSW) specification for high grip product to improve road safety.

The quarry covers an area of 30 ha, with the extraction area of approximately 18 ha and approximately 12ha for infrastructure and ancillary facilities to support the operations. The project area and proposed layout is shown in Figure 3..

The infrastructure associate with the project will include a new sealed access road and intersection with The Bucketts Way, site office, workshop, weighbridge and stockpile area with associated water management infrastructure.

Progressive rehabilitation of the area will occur, returning disturbed land to the pasture and native vegetation that is currently present on site. On completion of extraction, benches will be revegetated with native trees consistent with surrounding vegetation with a free draining quarry floor consisting of open grassland and scattered woodland that may provide a dwelling site generally consistent with the existing approved subdivision of the property.

IMPACT ASSESSMENT

The project has undergone extensive environmental impact assessment from a range of technical specialist's informed by experts, consultants, government policy, and community feedback. Following is an executive summary of those impacts assessments.

Air Quality

An Air Quality Impact Assessment (AQIA) has been performed by Todoroski Air Sciences. The full AQIA is available in Appendix H.

The main sources of existing air pollutants in the area surrounding the project would include emissions from active extraction operations, agricultural activities and anthropogenic activities such as wood heaters and motor vehicle exhaust. Any bushfire activity in the area would also create air quality issues. Ambient air quality monitoring data from the quarry is not available. Therefore, the available data from the nearest air quality monitors operated by the NSW Department of Planning, Industry and Environment (DPIE) at Beresfield and Mayfield were used to characterise the background levels for the quarry.

The dispersion model (CALPUFF) was setup in accordance with the methods provided in the NSW EPA document Generic Guidance and Optimum Model Setting for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia' (TRC, 2011). The CALMET (meteorological model) domain was run on an initial domain of 30 x 30km grid with a 0.6km grid resolution and refined for a final domain of 10 x 10km with a 0.1km grid resolution.

The dispersion model predictions from CALPUFF presented include those for the operation of the development in isolation (incremental impact) and the operation of the development with consideration of other sources (total cumulative impact). The results show the predicted:

- Maximum 24-hour average $PM_{2.5}$ and PM_{10} concentrations
- Annual average $PM_{2.5}$, PM_{10} and TSP concentrations
- Annual average dust (insoluble solids) deposition rates.

It is important to note that when assessing impacts per the maximum 24-hour average levels, these predictions are based on the highest predicted 24-hour average concentrations. The cumulative (total) impact is defined as the modelling impact associated with the operation of the quarry combined with the estimated ambient background levels in Section 5.3.2. of the AQIA. The results show that minimal incremental effects would arise at the residential receptor locations due to the quarry. The predicted cumulative results indicate that all of the assessed receptors are predicted to experience levels below the relevant criteria for each of the assessed dust

metrics. The results for incremental 24-hour average $PM_{2.5}$ and PM_{10} concentrations indicate there are no predicted exceedances of the relevant criteria at the assessment locations for the assessed scenario.

Overall, the assessment demonstrates that even using conservative assumptions, the quarry can operate without causing any significant air quality impact at residential receptors in the surrounding environment.

Biodiversity

A Biodiversity Development Assessment Report (BDAR) for the proposed Deep Creek Quarry (DCQ) has been prepared by Kleinfelder Australia (Figure 9). This assessment was undertaken in accordance with the NSW Biodiversity Assessment Method (BAM) (DPIE, 2020) under the *Biodiversity Conservation Act 2016* (NSW) (BC Act). The BDAR assessed the biodiversity values of the Subject Land and the impacts of the proposed DCQ on biodiversity values in accordance with the BAM. The BDAR sets out the measures proposed to be undertaken to avoid and minimise impacts on biodiversity. The BDAR also details the number and class of biodiversity credits that are required to be retired to offset residual impacts.

The site contains four Plant Community Types (PCTs):

- PCT – 1590: Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest
- PCT – 1619: Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands
- PCT – 1567: Tallowwood - Brush Box - Sydney Blue Gum moist shrubby tall open forest on foothills of the lower North Coast
- PCT – 1556: Tallowwood - Smooth-barked Apple - Blackbutt grass tall open forest of the Central and lower North Coast
- Additionally, the site contains areas of non-native vegetation, including exotic grasslands, dams, and cleared land (existing roads/ tracks).

No threatened ecological communities were detected. The habitat for threatened flora species on the quarry site is of varying quality due to historical and current disturbances including vegetation clearing and cattle grazing. Higher quality habitat for threatened flora occurs within areas where intact native vegetation exists. Lower quality flora habitat occurs in areas of the site that have been cleared or managed. Disturbance in these areas has allowed the encroachment of weeds and exotic perennial grasses. In more open areas, these species tend to outcompete native plant species and reduce floristic diversity.

A desktop assessment (NSW BioNet search and likelihood of occurrence assessment) identified that 20 threatened flora species may occur on the quarry site. The field assessment identified a total of 235 flora species (211 native and 24 exotic) including two threatened species. The full list of flora species is provided in Appendix D of the BDAR (Appendix L).

The quarry site contains varying qualities of habitat for threatened fauna species as determined by historical disturbances, including vegetation clearing and cattle grazing. Higher quality fauna habitat occurs in less disturbed areas where denser native forest vegetation occurs or where multiple strata layers are present. These areas contain key habitat features for native fauna species, including food resources (i.e. seeds, nectar and pollen), potential breeding habitat (i.e. hollow-bearing trees), and habitat refugia (i.e. dense vegetation, leaf litter, logs and rocks).

Tree hollows were defined as small (<5 cm diameter), medium (5 – 20 cm diameter) and large (>20 cm diameter). A total of 360 habitat trees (comprised of 228 hollow-bearing trees and 132 dead stags) were identified during the surveys. Of these, 128 habitat trees occur within the impact area of the proposed quarry works.

An assessment of the extent of available Koala (*Phascolarctos cinereus*) habitat was determined in consideration of *The Review of Koala Tree Use Across New South Wales* (OEH 2018). In consideration of the large number of Koala use trees within the quarry site, all vegetation zones containing canopy vegetation are considered to represent Koala Habitat. To further assess the habitat value for the Koala, the habitat assessment criteria within the EPBC Act Referral Guidelines for the Vulnerable Koala (DotE 2014) was reviewed. An assessment using the

habitat assessment tool resulted in a habitat score of eight (8). This indicates that the quarry contains habitat that is critical to the survival of the Koala.

The quarry is located within Mid-Coast LGA, which is listed within Schedule 1 of the Koala SEPP 2020 and is zoned Rural Land. The Koala SEPP 2020 was therefore deemed applicable. As such, an assessment of Koala habitat suitability was conducted in accordance with the SEPP including the determination of Potential Koala Habitat (Step 1) or Core Koala Habitat (Step 2). The BDAR determined that the proposed quarry site contains both Potential Koala Habitat (areas of native vegetation where trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component) and Core Koala Habitat (an area of land with a resident population of koalas, evidenced by attributes such as breeding females, being females with young, and recent sightings of and historical records of a population) (Appendix L).

In accordance with the SEPP, a Koala Plan of Management (KPoM) has been prepared for the project and is available as Appendix 10 of the BDAR (Appendix L) .

Targeted surveys for threatened fauna were conducted in accordance with the appropriate guidelines. As a result of the targeted surveys, eleven mammal and four bird species were detected. Further details, including the assessment of the likelihood of occurrence of threatened and migratory species are detailed within the BDAR (Appendix L).

Potential impacts upon biodiversity from the development are described below. Management and mitigation measures to reduce or remove these are also provided. The Biodiversity Offset strategy, where required as a result of impacts, will consist of the following key elements:

- Creation of an onsite biodiversity stewardship site (within land owned or under agreement with IDPL) adjacent to the quarry and retirement of the required credits.
- Purchase any deficit in the required credits for retirement from existing biodiversity stewardship sites.
- Payment into the Biodiversity Conservation Trust Fund for any credit requirement that cannot be met through the above retirement of credits.

Significantly, preliminary vegetation and habitat mapping of the of IDPLs landholding was completed to estimate the available ecosystem and species credits that could contribute to the establishment of an onsite biodiversity stewardship site. The assessment determined the majority of credit requirements are likely to be met onsite.

Direct impacts to biodiversity relate to the removal of vegetation and associated fauna habitat during construction and operations, prior to the completion of rehabilitation as per the proposed strategy provided in Section 7.15.

The proposed development has the potential for various indirect biodiversity impacts such as impacts to habitat connectivity, fauna vehicle strikes, aquatic habitat degradation, increased noise, vibration and light spill, increased weed invasion and the spread of pest species.

No entities at risk of Serious and Irreversible Impacts were identified.

The EPBC Act requires that developments or undertakings that are likely to have a significant impact on Matters of National Environmental Significance (MNES) be referred for a determination as to whether they are a controlled action which requires approval under the EPBC Act (Section 1.5.1). A referral was submitted in November 2020. Of the nine MNES listed under the Act, those considered relevant to the development are potential impacts on listed threatened species or communities and potential impacts on migratory species listed under international agreements.

Assessments of significance in accordance with the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* have been undertaken for each relevant EPBC listed species (Appendix L). It was concluded that for the majority of the threatened species and migratory species identified or identified as having suitable habitat within the disturbance footprint, the proposed quarry is unlikely to have a significant impact.

A range of avoidance, mitigation and management measures would be implemented for biodiversity as outlined in Table 7-4. A site-specific Biodiversity Management Plan will be prepared prior to commencement of any clearing or construction works to ensure that impacts are managed and minimised.

Ecosystem and species credits would be required as part of the biodiversity offsets for the quarry, in accordance with Section 10.3 of the BAM (DPIE, 2020). A species credit is a class of biodiversity credit created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Biodiversity offset credits would be retired in accordance with BC Act and EPBC Act requirements.

Economics

The most relevant economy against which to examine the regional impacts associated with the proposed development is the regional economy comprised of the SA3s of Great Lakes (in which the development is located and lies within the Mid Coast LGA), Taree-Gloucester, Lower Hunter, Port Stephens, Maitland, Newcastle, Lake Macquarie – East, Lake Macquarie – West. This area is hereafter referred to as the market Catchment, or just the Catchment for the purposes of the economic impacts

Historically, the Catchment population has recorded moderate growth, averaging 1.0% per annum between 2001 and 2019, to reach a population of approximately 715,900 people by 2019. Average annual population growth between 2001 and 2019 was 0.2 percentage points lower than that of the State, with annual growth for the Catchment consistently trending below the State average over the seven years to 2019. Population projections suggest the Catchment's resident population is expected to continue to increase, though at a slower rate than historically, with the average annual rate of growth projected to reach 0.7% from 2019 to 2041. By 2041, the Catchment's population is projected to increase to approximately 833,200 people and is expected to represent 7.9% of the New South Wales population.

In 2018-19, the Catchment's economy recorded a Gross Regional Product (GRP) of approximately $51.03 billion in chain volume terms. Between 2006-07 and 2018-19, the economy recorded moderate growth of approximately 1.9% per annum on average, slightly lower than the 2.3% recorded for the State. In 2018-19, the largest employing industry in the Catchment was healthcare and social assistance, representing 17.1% of jobs, followed by retail trade (10.4%) and construction (10.1%).

The quarry will allow for additional economic activity in the region, stimulating increases in economic growth, employment and incomes, support for supply chain business and additional government revenues. Economic impacts of the quarry are anticipated to be overwhelmingly positive, with minimal adverse economic impacts identified. Key beneficial impacts arising from the quarry are outlined in Table E-1. Beneficial impacts are examined in consideration of what would otherwise occur if the development does not proceed.

Table E-1: Assessment of Beneficial Impacts of the Project

Impact	Description
Economic Growth	The quarry will contribute to economic growth through increased Gross Regional / State Product (GRP / GSP) during construction, operations, and decommissioning / rehabilitation phases, compared to what would occur without the quarry, flowing from both direct and flow-on impacts. The contribution to GSP will increase from approximately $3.7 million in 2021-22 (first year of construction) to approximately $8.5 million per annum between 2027-28 and 2040-41. The contribution to GSP is then estimated to rise to peak at $10.2 million per annum between 2043-44 and 2048-49 before the operations winds down and ceases by 2051-52. A contribution of approximately $7.6 million is estimated in 2051-52 as a result of final operations decommissioning and rehabilitation activities. In total, the region (within 100km of the site) is estimated to capture approximately 91.9% of the total contribution to GSP across the assessment period (from 2021-22 to 2051-52), with the rest of NSW accounting for approximately 8.1%.
Employment and Incomes	The quarry will support jobs and incomes during construction, operations, and decommissioning / rehabilitation phases, compared to what would occur without the quarry, flowing from both direct and flow-on impacts. Including direct and flow-on activity: • Approximately 20 FTE jobs are estimated to be supported in NSW in the first year of construction (2021-22), which decreases in line with construction activity to 2022-23 before operational activity commences in 2023-24 with 17 FTEs • FTE jobs supported in NSW are estimated to rise from 17 in 2023-24 to 31 FTE jobs by 2043-44 • Employment is then estimated to fall to 26 FTE jobs in 2051-52 as production winds up and ceases and decommissioning and rehabilitation activities occur. Approximately 87.8% of jobs supported in NSW will be within the region (within 100km of the site), with the remainder in the rest of NSW.

Impact	Description
Support for Upstream Supply Chain Businesses	The quarry will increase quarrying and processing activities in the Catchment and thereby support and create opportunities for suppliers in the Catchment and NSW, providing additional security and longevity of business incomes (and employment). The quarry will also create opportunities to secure new contracts and increase sales to supply and service the needs of the quarry through flow-on impacts in the supply chain, during all phases of the development. The construction phase is estimated to support business revenues for local businesses within the Catchment of approximately $5.8 million through direct construction activity. Flow-on supply chain impacts during construction are estimated to support an additional $3.3 million in business revenue in the Catchment. An additional $0.9 million in business revenues are estimated to be supported in the rest of NSW through direct and flow-on activity. During operations, the quarry is estimated to support approximately $15.7 million in business revenues per annum on average in the Catchment through direct and flow-on activity, with a further $1.3 million in revenues supported for businesses in the rest of NSW.
Support for Downstream Customers	DCQ is anticipated to become an important supplier of road base, crusher dust, aggregates, and rock domestically. The general resource market areas for the products of the quarry include Port Stephens, Newcastle, Maitland, Lake Macquarie, and Mid-Coast. Decorative and high Polishing Aggregate Friction Value (PAFV) products will travel further and have a wider market, including Sydney, Lithgow, Canberra, Port Macquarie, and Coffs Harbour. The quarry will provide a new and alternative supply source to the market which will service the strengthening demand for construction material together with several other planned new supplies coming online in the region. The quarry will thereby improve security of supply within the region (and areas adjacent to the region) to meet the significant number of planned infrastructure and other projects. To this end the quarry can be seen as important for the longer-term security of supply of domestic production, while also supporting transport and logistics business for the transport of products to customers.
Government Revenue	The quarry will provide a lift in Australian, State and Local government taxation revenues through a variety of taxes and duties. Overall, the quarry is estimated to deliver a total of: • $23.8 million in additional revenue to the Australian Government, through personal income tax, fringe benefits tax, company tax and GST, compared to what would occur without the quarry • $1.5 million in additional revenue to the NSW Government compared to what would occur without the project • $11.1 million in road levy revenue to Local Government compared to what would occur without the project. These additional revenues can be used by government to provide additional infrastructure and services to support business and households throughout Australia.

Heritage

Aboriginal Heritage

An Aboriginal Cultural Heritage Impact Assessment (ACHA) has been performed by Insite Heritage Pty Ltd (Insite Heritage). The full ACHA is available in Appendix I. The footprint of the DCQ was surveyed by Insite Heritage, accompanied by representatives of Karuah LALC and Nu-Run-Gee Pty Ltd, separating the DCQ footprint into three 'Survey Units'. Subsurface testing was undertaken by Insite Heritage, accompanied by representatives of Karuah LALC and Nu-Run-Gee Pty Ltd. Subsurface testing occurred in areas requiring excavation during construction and / or operation of the DCQ, in areas within close proximity to water and within close proximity to the proposed creek crossing (avoiding ploughed paddocks subject to past disturbance). In addition to the subsurface test pits, a survey transect was placed in the confluence of two tributaries in the eastern side of the stockpile area. The larger size of the artefacts located and the absence of debitage and small flakes suggests that the area was not a site of primary reduction or retouch / re-purposing of large flakes, tools or blanks. No cores were found by the test excavations. The absence of debitage indicates that any local stone sources were not used in tool making. The results of the sub-surface testing and field survey did not indicate a requirement for further archaeological work.

European Heritage

The quarry is a valley floor 150 to 250m wide, and side slopes on the western side of the valley to approximately 100m below the ridge crest. The valley and slopes are orientated to the north-west and drained by Deep Creek to the south-east. The Subject Land has been cleared of vegetation on the lower slopes and valley floor for grazing purposes. Based on the history of the surrounding locality, activities that may have been carried out in the vicinity include agriculture and farming, mining, timber cutting and milling along with the dwellings of those

involved in these activities. The historic record and previous heritage studies have not included any historic heritage items in or around the quarry.

No heritage items or structures or potential deposits were located during the field inspection. No evidence of any other activity other than historical grazing was found during the onsite inspection.

Based on the historic record of the study area and its immediate surrounds, along with a physical inspection, the study area has been assessed as being of no heritage significance. As such, there are no constraints relating to the area's heritage that would hinder the development of the proposed quarry.

Noise

A noise and vibration impact assessment has been conducted for the proposed construction and operation of a quarry producing hard rock products at a site located approximately 43km north of Newcastle and 11km northwest of Karuah, west of The Bucketts Way.

Documents referred to in conducting the assessment include:

- NSW Noise Policy for Industry (NPI), EPA (2017)
- NSW Road Noise Policy (RNP), OEH (2011)
- Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZEC)
- Voluntary Land Acquisition and Mitigation Policy (VLAMP), DPE (2014).

In order to quantify the existing acoustic environment at typical receivers surrounding the quarry, a Rion NL- 42 environmental noise logger was deployed from 20-27 November 2018 at a site located approximately 150 m from The Bucketts Way off Deep Creek Road, between R5 and R33 (refer to Figure 2). This location is closer to The Bucketts Way than many receivers, but further than others that front The Bucketts Way. Noise criteria (project noise trigger levels) were established with consideration of the logged noise levels and its location for all other receivers and these were adopted for this assessment.

Project noise trigger levels were based on the EPA default minimum background noise levels of 35 dB(A),L90 (day) and 30 dB(A),L90 (evening and night).

Based on the worst-case meteorological conditions presented in the air quality assessment for the quarry (Todoroski Air Sciences, 2021) the predicted operational noise exceedances were limited to:

- Receiver R25: 2dB exceedance under ESE winds during Stage 2 of the operations phase, and at, but not exceeding noise criteria during ESE winds in other Stage 1 and 3 (refer to Figures 5 through 8)
- Receiver R3 (associated property): 4-8 dB exceedance under WNW winds from Stage 2 onwards.
- Receiver R4a (associated property): 4 dB exceedance under WNW winds from Stage 3 onwards.

Receiver R3 and R4a are currently unhabituated with no approved dwelling. Ironstone Developments Pty has a negotiated agreement with these properties. There is no dwelling at R25.

The off-site traffic noise criterion of 55 dB(A),Leq(15hour) for arterial roads would be achieved for all receivers, considering the cumulative impacts from DCQ and other development in the vicinity. Between the private access road and the Pacific Highway (where the majority of trucks will travel), there are eight dwellings whose façade is less than 50m from the centre of the nearest travel lane on The Bucketts Way. The closest dwelling to The Bucketts Way between the Quarry and the Pacific Highway is 18m. The assessment has evaluated the noise impacts to the closest dwelling, with all other dwellings expected to experience noise levels similar to or lower than the assessed dwelling.

Point calculation modelling resulted in a road traffic noise level of 43 dB(A),Leq(1hour) based on a nominal speed of 90km/h. This is significantly below the adopted criterion of 55 dB(A),Leq(1hour).

The village of Limeburners Creek (i.e. off Old Coach Road) is south of the quarry, with the nearest dwelling over 90m from The Bucketts Way, and is therefore determined to be significantly below the adopted criteria.

Ground vibration and overpressure levels from blasting are predicted to be below the criteria for all receivers.

In summary, the assessment has found that the quarry would be able to operate in compliance with the appropriate criteria for operational and road traffic noise emissions and for potential blast overpressure and vibration impacts.

Rehabilitation

The objective of the rehabilitation will be to return the land to a stable, safe, non-polluting landform able to support self-sustaining native vegetation and agriculture in the form of pasture for grazing. Native revegetation will draw upon species that have been recorded on site, from two communities that, from vegetation mapping prior to quarry operation, were shown to occupy the area requiring rehabilitation.

The quarry floor and benches will have 100-200mm thick topsoil / friable growth media distributed across the service, utilising previously stripped topsoil and friable overburden. The need for additional roughening / fracturing of the quarry floor rock will be considered prior to placement of topsoil to assist in the retention of water, and thicker soil layers within the landscape. The toe of the highwall will include a wedge of soil to promote woody vegetation growth. Benches and patches across the quarry floor will be revegetated with native woodland vegetation generally consistent with adjacent vegetation communities. The remainder of the quarry floor will be vegetated with pasture species suitable for potential future agricultural grazing with paddock trees. Roads and infrastructure that supports future land use will be retained. The primary focus of the rehabilitation will be the creation of a safe, stable and non-polluting landform with a self-sustaining vegetation community.

Rehabilitation of the proposed development will initially be limited to areas of immediate disturbance such as road batters, access road construction and sediment dams. Progressive rehabilitation of the quarry benches will occur as they become available, with the majority of the rehabilitation taking place near the completion of resource extraction.

Topsoil that has been and stripped and stockpiled until required will be re-spread and seed suitable for the appropriate end land use – native revegetation or pasture – will be broadcast. Topsoil will be spread to a suitable depth to allow for root development and water accumulation, or the underlying area will be ripped to a sufficient depth to allow this to occur. Seed for revegetation will be purchased from commercial seed suppliers in the first instance, but supplementation of native species may be required by collection from onsite. Indicative topsoil volumes available from the extraction area have been calculated to be 17, 960 m^3. With revegetation to be conducted over an estimated 22.7 ha, it is estimated that 22, 700 m^3 of topsoil is required for rehabilitation. Available subsoil volumes, which may be used for revegetation are estimated to be 142, 190 m^3. This estimated resource allows for rehabilitation of the quarry surface, benches and main stockpile area to be conducted on deeper “soils”.

Where rehabilitated areas exceed 1 ha in size a 20m x 20m quadrat will be used to monitor the success of the rehabilitation. The methodology for monitoring is currently based on the Biodiversity Assessment Methodology. Where areas are linear or smaller patches, transects will be established to measure the progress of the rehabilitation. Monitoring is to be conducted and reported annually.

While there are five plant community types (PCTs) identified onsite, two have been determined to be target revegetation communities based on corresponding position in the original and final landscape. Species for revegetation have been drawn for these communities. Spotted Gum – Broad leaved Mahogany – Red Ironbark has been suggested for rehabilitating batters and benches where soils will be relatively shallow and well drained, while in gullies in poor drainage and deeper soils the Tallowwood – Brush Box – Sydney Blue Gum community forms the recommended species for the rehabilitation of this area. Grassland and pasture rehabilitation areas include the product stockpile area, areas surrounding the sediment dams below the product stockpile and the infrastructure area, the infrastructure surrounds itself, and water pipeline easement.

Social

Mara Consulting was engaged to conduct a social impact assessment (SIA). The SIA presents an assessment of potential social impacts associated with the proposed construction and operation of the Deep Creek Quarry project located near Limeburners Creek and Allworth, New South Wales (NSW).

The SIA includes the methods and results, the initiatives built into the project design to avoid and minimise social impacts, and the additional mitigation and management measures proposed to address any residual impacts not able to be avoided.

The Social Impact Assessment Guideline for State Significant Projects published by the NSW Department of Planning, Industry and Environment, July 2021, outlines the requirements for undertaking the SIA component of the EIS. This SIA has been undertaken in accordance with the new SIA Guideline.

This SIA concluded that the negative social impacts are primarily associated with the potential change to way of life and not knowing how the potential impacts will be experienced. The associated key impacts include:

- Positive economic outcomes, providing business and job opportunities for the community through construction and operation
- How the project communicates and engages with the community
- Noise, dust and blasting resulting from the operation and from the access road
- Change to the peaceful way of life in a rural residential area
- Changes to the amenity and environmental values.

Key mitigation measures to reduce the social impact of the project include; proactive and regular communication and engagement with the community and neighbours, developing an effective inquiries and complaints process which is promoted through communication channels, developing a construction management plan that includes notification prior to works starting, and proactively communicating blast times to impacted residents.

Suggested social management, mitigation and monitoring measures have been provided. Compliance monitoring may be required as part of the conditions of approval. Findings of monitoring will be presented at community meetings such as a consultative committee and is an opportunity to review and improve operations. An inquiries and complaints process will be developed to manage and respond to community feedback.

Following the review of social impacts identified during the SIA, it has been found that while the quarry presents a change to the community, social impacts can be managed. It is likely, if approved, the proponent may be required to submit a social impact management plan (SIMP) for approval as part of the conditions of consent.

Soils and Land Use

Land Resources

Reference to the Newcastle 1:100,000 Geology sheet shows that there are three geological units found within the proposed development footprint and new access road. These are the Ironstone Mountain (western upper slopes of the extraction area, Ten Mile (predominantly in the extraction area of the development) and The Branch formations (main stockpile, lower slopes of the extraction area and infrastructure area).

Soils

A total of 10 soil samples were taken from the proposed quarry site. The soil samples are relatively similar in characteristics in terms of topsoil/plant growth medium regardless of the geological derivation of the soils. The pH was very acidic (4.2 to 4.96 1:5 $CaCl_2$). The soils were generally of low fertility with nitrogen, phosphorous, major cations and minor nutrients all assessed as low to moderate. Electrical conductivity (EC) indicates that the soils were non-saline and hence non-dispersive, while aluminium toxicity, despite the low pH is unlikely to be a limitation for future rehabilitation activities. Topsoils may be a limited resource, but indicative soil depths show that there will be sufficient volumes of subsoils to support revegetation as per the proposed rehabilitation strategy.

Land Soil Capability (LSC) Mapping

Soil capability mapping (NSW DPIE, 2021) shows that the site has LSC that ranges from Class 4 – Moderate to Class 6 – Low Capability. Land that is defined as Class 4 - Moderate capability is generally only suitable for grazing but can be subject to pasture improvement and/or can be cultivated for pasture or crops. Class 4 land soils are restricted to the lower areas of the site, including the access road, infrastructure and main stockpile areas. Class 5 – Moderate to Low Capability land is defined as land that is not suitable for regular cultivation, only

suitable for grazing and requires pasture improvement and fertiliser application. It is restricted to the very lowest portions of the infrastructure and stockpile areas, and a small portion of the access road where it crosses Deep Creek itself. Class 6 – Low Capability land is defined as land that has very severe limitations for agriculture and is only suitable for light grazing with no cultivation. The majority of the extraction area, the entire pipeline easement and sections of the infrastructure and main stockpile area have areas of this land soil class.

Historical Land Use

Using the New South Wales Government's Historical Imagery Viewer provided historical aerial images of the Deep Creek area as far back as 1976, showing that the land use has not changed significantly over this time with grazing the main land use.

Agricultural Suitability and Strategic Agricultural Land

Two agricultural suitability classes have been mapped for the site. The first is 'Grazing' and consists of land that has been partially or totally cleared for this purpose, and takes in large sections of the access road, infrastructure area, lower portions of the extraction area and the main stockpile areas. The second is 'Tree and Shrub Cover' and covers a large section of the access road and the majority of the extraction area of the quarry. Biophysical Strategic Agricultural Land (BSAL) is defined as land with high quality soil and water resources that are capable of sustaining high levels of agricultural activity and is restricted to alluvial flats located to the north and east of the development along the Karuah River and tributaries. There is no BSAL within the development footprint.

Visual

This visual impact assessment (VIA) has been prepared to meet the SSD requirements by identifying and evaluating the visual impacts of the proposed quarry operations on the surrounding landscape.

The VIA describes the existing visual character and then applies a method to assess the visual sensitivity of the site and to assess the visual impact of the changes resulting from the planned development.

There is currently no universally agreed method of undertaking visual impact assessments in New South Wales and no reference is given in Mid-Coast Council's Development Control Plans. Therefore, the method used in this visual impact assessment is based on established practices and policies.

Mara has developed a system that enables consideration of the visual impact in rural environments. Documents used for broad guidance include the Roads and Maritime Services Environmental Impact Assessment Guidance Note (2013): Guidelines for landscape character and visual impact assessment.

- The study method for the VIA follows three key steps:
    - Existing visual environment
    - Review proposal and extents of the development
    - Landscape character - Types of landscape and how it is perceived
    - Visual catchment area defined through reviewing maps and satellite imagery to identify where the site is visible from
    - Site visit - undertake inspections from viewpoints, including photographs of the site from each location and verifying the visual catchment.
- Visual impact
    - Assessment of the visual impact by applying the visual sensitivity and visual effect criteria
    - Superimpose the visual model into the viewpoints (photo-montages)
    - Review against baseline information (impact of change from proposal).
- Acceptability of the visual impact
    - Assessment of the acceptability of the visual impact against relevant considerations
    - Drawing conclusion and recommendations.

A site visit was undertaken on 8 September 2020 by a registered landscape architect and environmental planner who has substantial experience analysing and mitigating visual impacts on the landscape. During the site visit, viewpoints were confirmed and an assessment was made of each potential public viewpoint against the extent of the project.

The viewpoints chosen were representative views from the surrounding area.

Of the 6 viewpoints assessed in this VIA:

- 0 received a visual impact rating of high
- 3 received a visual impact rating of moderate
- 3 received a visual impact rating of low.

Even though the ratings for viewpoints 1, 2 and 3 are moderate, the impact is from a roadway and will be greatest during construction. After the roadway is established and in use, the visual impact will begin to diminish as the road becomes a part of the landscape. Viewpoints 4, 5 and 6 had views toward the site, but trees, vegetation and topography obscure the proposed development from view. These illustrate that there are very few locations, if any, from which the quarry will be visible.

The visual impacts for this project are limited. The proposed quarry itself is not visible from any residences and is shielded by ridge lines and bushland that surround it.

Water

Surface Water

A Surface Water Impact Assessment (SWIA) has been performed for the proposed development. The consideration of the outcomes of the design of DCQ, along with a range of other key factors, minimise the potential for the proposed development to impact on surface water resources. These factors include:

- Management of water take and discharge of water within regimes established by NSW water and pollution control legislation
- Development of a suitable water management system (WMS) to meet legislative requirements and relevant guidelines (e.g. guidelines for treatment of runoff from disturbed areas)
- Maximised water recycling within the WMS to minimise the total volume of water harvested from, and discharged to, the environment.

Notwithstanding the measures to minimise impacts, the following aspects have the potential to impact on surface water resources:

- Landform changes as a result of the quarry operations
- Infrastructure, including creek crossings, associated with the access road.

The following surface water aspects were reviewed as part of the Surface Water Impact Assessment:

- Catchment area and flow changes
- Flooding, including flow rates, velocities and depths in Deep Creek
- Water quality.

DCQ is located within the catchment of Deep Creek, a tributary of the Karuah River (Figure 2-1). Within the vicinity of DCQ, Deep Creek is a third order watercourse, with a catchment area of about 1,500 ha (upstream of The Bucketts Way).

The upper catchment areas of Deep Creek are generally steep and forested lands with extensive rock outcropping. The channel sections of Deep Creek are moderately sinuous, with bed and bank materials ranging from large boulders and rock, to alluvial materials that include sections of currently active head-cuts. The Creek is separated from the upper slopes by colluvium deposits that are generally cleared with sporadic tree coverage. Deep Creek extends from its headwaters located about 2 km west of DCQ to its confluence with the Karuah River about 10 km east. Land use within and immediately surrounding DCQ is primarily agricultural. Further downstream (east of The Bucketts Way) is the Karuah National Park.

Detailed flood modelling was undertaken to estimate the existing flood conditions within Deep Creek, as well as estimate the potential changes to the flooding in response to the proposed DCQ development.

Long term surface water quality monitoring has been undertaken at four locations:

- North Location:
  - Located on a tributary of Deep Creek, separating the proposed quarry pit and stockpile areas.
  - Monthly field (pH and electrical conductivity (EC)) testing from July 2014 to October 2015 and January 2019 to March 2020; otherwise, sporadic
  - Quarterly (approximately) laboratory testing from August 2014 to January 2020.
- South Location:
  - Located on the main channel of Deep Creek, adjacent to the proposed infrastructure area
  - Monthly field (pH and EC) testing from July 2014 to October 2015; otherwise, quarterly (approximately)
  - Quarterly (approximately) laboratory testing from July 2014 to July 2017.

- Dam Location:
  - Located on an existing in-line dam, on an unnamed tributary to the south of the project
  - Monthly field (pH and EC) testing from July 2014 to October 2015; otherwise, quarterly (approximately)
  - Quarterly (approximately) laboratory testing from July 2014 to January 2018.
- The Bucketts Way Location:
  - Located on Deep Creek at the Bucketts Way bridge, about 1.5 km downstream of the site
  - Monthly field (pH and EC) testing from January 2019 to March 2020
  - Quarterly (approximately) laboratory testing from January 2019 to January 2020.

Water quality monitoring indicates occasional high background concentrations of fluoride, phosphorous and nitrogen, as well as very high levels of metals including aluminum, chromium, copper, iron, lead, and zinc. Concentrations of these metals is in part governed by the background pH level.

The monitoring results indicated that the pH of the local runoff is generally lower than the default ANZG / ANZECC trigger range (6.5 to 8.0). Similarly, the observed EC values for the four monitoring locations indicates that the local salinity levels are at the lower end of the default ANZECC trigger range for lowland rivers (125 to 2200 µS/cm), but generally consistent with the NSW Coastal Rivers (200 to 300 µS/cm). It is noted that EC levels at the South monitoring point are slightly higher than those at the North monitoring point, and EC levels at the Dam monitoring point have been steadily increasing since mid-2016, likely the result of low rainfall and evapo-concentration of salts within the dam.

Surface water will be managed on site by the Water Management System (WMS). The conceptual WMS for the DCQ includes:

- Dirty water management system, including:
  - Two sediment dams
  - An in-pit water storage dam.
- Catch drains to intercept sediment-laden runoff from disturbed areas, and direct it to one of the two sediment dams.
- Clean water management system, including:
  - Diversions and / or windrows to divert undisturbed up-slope catchment areas around the site
  - Culverts and bridges to provide access over existing watercourses.

Both the dirty and clean water management systems will need to be periodically modified in line with the progression of quarrying activities. The proposed evolution of the water management system at three stages of quarry at DCQ is presented in the SWIA in Appendix J. Wastewater (sewage) will be managed using a contained pump-out (or similar) system, which would require minimal site infrastructure.

The WMP allows for the ongoing assessment of risk as quarry operations progress, and the implementation of improvements and changes to the WMS where required. The proposed WMS would form the basis of a site Water Management Plan (WMP), that will outline how the WMS is to be operated to meet EPL conditions within the requirements of the *Protection of the Environment Operations Act 1997* (POEO Act), taking account of both

historical and current water qualities in the surrounding watercourses, and current and future downstream water users.

It is considered that, with the proposed WMS, the proposed quarry will have minimal impact on water quality in downstream watercourses.

A water balance model was developed and used to estimate the range of water transfers, storages, demands, and discharges are likely to occur during the operational life of the quarry. This allows for an estimate of water security and spill risk to be made, which will inform the identification of the licensing requirements.

During operations, the proposed DCQ is predicted to result in a small reduction in the catchment area of Deep Creek. The proposed final landform for the quarry pit includes a free-draining landform, meaning the final catchment areas are expected to be comparable to the existing conditions.

Prior to commencing operations, a site WMP will be prepared that will include details of erosion and sediment controls, surface water and groundwater monitoring programs, as well as a surface and groundwater response plan. The WMP will include specific monitoring requirements for:

- Erosion and sediment control measures
- Surface water and groundwater quality monitoring
- Stream health and channel stability monitoring.

At a minimum, the current water quality testing schedule is expected to be maintained, that is:

- Monthly field measurements of EC, pH, and TSS at the four monitoring locations
- Quarterly full laboratory suite (as per Table 2.1) at the four monitoring locations
- Event-based monitoring at the four monitoring locations, including field measurements (EC, pH, and TSS) and full laboratory suite.

DCQ will require an Environment Protection Licence (EPL) issued from the NSW Environmental Protection Agency (EPA). The EPL, to be issued under the POEO Act, will require two discharge locations: one for each of the two sediment dams.

Water Access Licences, in addition to the site harvestable right of about 33 ML, will be required to cover the water take from the dam to the south of the quarry. Water balance modelling indicates that by retaining and reusing surface water generated on site (primarily within the quarry footprint), external supply from the dam is expected to be small (up to 1 ML per year).

Groundwater

The groundwater impact assessment that has been performed provides an evaluation of the impact of the proposed quarry on the groundwater in the vicinity and other groundwater users in the area.

The quarry is to be developed within rhyolite subvolcanic rock emplaced within sandstone and siltstone sediments. The rhyolite has no primary porosity, with groundwater only present in discontinuous subvertical fractures. Sandstones and siltstones with some primary porosity, in addition to fracture porosity, overlie and underlie the rhyolite.

The fractures in the sediments and rhyolite allow direct recharge from rainfall (estimated in the Water Sharing Plan to be 4% of rainfall) and flow of groundwater through the proposed quarry area. The rhyolite and underlying sediments are interpreted to be under semi-confined to confined conditions and are unlikely to have porosity of more than a few percent associated with fractures in the rhyolite and fractures and some pores in the sandstone.

The proposed quarry is estimated to have a low inflow of groundwater, due to the low permeability rhyolite rock type, which is the target material for quarrying. The sandstone and siltstone units overlying the rhyolite are generally above the water table, so are not all water-bearing.

Quarrying operations in similar volcanic units in the same Water Sharing Plan area are recorded to be essentially dry, suggesting the proposed quarry development will be similar. The predicted low inflow of groundwater into the

quarry will allow any groundwater (if it inflows) to accumulate in the base of the pit, where it will evaporate and be available for site activities, such as dust suppression.

Groundwater in the area of the proposed quarry has an Electrical Conductivity (EC) that is up to 10 times that in surface water ponds within the bed of Deep Creek, within several hundred metres of the proposed quarry. In the creek the EC is low and in the order of 250 uS/cm. However, the groundwater is moderate-quality water, acceptable for some agricultural uses but not for potable water.

Unless there is contamination of groundwater in the quarry during excavation it is unlikely there would be an impact on the groundwater quality in the area.

Groundwater records on the BoM Groundwater Explorer show that the nearest registered groundwater bore is 35 m deep and located 2 km east southeast and downgradient of the site, 200 m west of The Bucketts Way. This is listed as a stock bore. The next nearest registered bores are 4.3 and 6.2 km east and north northeast of the site, with depths of 66 and 53 m and used as a monitoring bore and a domestic bore respectively.

The principal uncertainty in the groundwater assessment is the potential heterogeneity in the fracturing of the rhyolite and surrounding sediments. Ongoing monitoring is recommended to better understand the response to rainfall of the groundwater level.

Groundwater inflows into the quarry during operations have been estimated for Stages 1 to 3 and are considered most likely to be in the range of 8 to 51 ML/year. Limited inflows are expected during Stage 1 (8-13 ML/year) and Stage 2 (22-32 ML/year), increasing to inflows in the order of 33-51 ML/year in Stage 3.

Appropriate storage and handling of hydrocarbons, any chemical products and site toilet and wastewater facilities will minimise the risk of groundwater and surface water contamination.

A Water Management Plan is required to cover the details of regular groundwater monitoring at site and the reporting of results and analysis of data. Interpretation and presentation of data will be required internally for the company and for reporting to government agencies.

Traffic and Transport

A Traffic Impact Assessment (TIA) has been performed by Intersect Traffic. The full TIA is available in Appendix K.

The primary haulage route proposed for the quarry is south via The Bucketts Way, Limeburners Creek to the Pacific Highway, Twelve Mile Creek then south to Newcastle via Raymond Terrace via the Pacific Highway. A small number of trips may head north from the site along The Bucketts Way or will head north along the Pacific Highway at Twelve Mile Creek.

The main traffic impacts of a quarry development lie in the areas of traffic efficiency, amenity, road safety, road pavements and alternate transport modes. Within these areas the main issues usually relate to the levels of service (LoS) experienced on the road network particularly at intersections, the impacts of road noise and dust, the geometric standards of the haulage routes, the construction standard of the haulage routes and the availability and accessibility to alternate transport modes.

A site inspection was held to inspect the haulage route and perform traffic counts. The road pavements on the existing haulage route from the quarry to the arterial road network are satisfactory. At the time of inspection, The Pacific Highway was in excellent condition and considered suitable for use by heavy vehicles associated with the quarry. At the time of inspection, The Bucketts Way was in good condition and considered suitable for use by heavy vehicles associated with the quarry.

Road capacity modelling has been performed on the haulage route and concluded that the existing road network has spare capacity to cater for traffic growth generated by additional development in the area. This modelling shows that this intersection currently operates with good levels of service for all movements for all AM and PM peak times modelled indicating little or no delay and / or queuing for motorists. Further with 10 years traffic growth at normal background growth levels i.e. 2% per annum, the intersection continues to operate satisfactorily. Future modelling shows that by 2052 which represents the possible quarry life end the intersection has reached capacity

in the PM peak periods and some form of intersection upgrade may be required even without the quarry traffic. However, this modelling is considered very inaccurate given the assumptions made in terms of background traffic growth and the time period involved for which network changes that affect the operation of the intersection may occur. Therefore, it is reasonable to conclude that the intersection has spare capacity to cater for additional traffic generated by development in the area through to and beyond 2031 however is likely to need either some form of upgrading or road network improvements to occur prior to the end of the quarry life (30 years). As this could happen without the quarry traffic this is considered a regional problem for which the road authority is responsible though the quarry may be responsible for fair and reasonable contribution to the future works. Therefore, a nexus would exist for some form of fair and reasonable contribution to this work from the quarry.

There is no public transport (bus) service to the area that is within convenient walking distance to the site. The only service that travels along The Bucketts Way is NSW Transports pre-booked coach. Routes C135 from Newcastle and C136 from Gloucester operate a 1 weekday after 6 pm service in either direction to and from Broadmeadow or Gloucester stopping at Raymond Terrace, Limeburners Creek, Allworth and Booral, Stroud Wards River, Craven and Stratford. Whilst there are formal stops at the above towns, arrangements can be made to alight or pickup at prearranged safe locations along the route. This would not be convenient for use by staff or visitors of the quarry given the proposed future operating hours of the quarry. As a rural area there are no constructed footpaths therefore facilities for pedestrians are non-existent. Pedestrians walking along the local road network would be required to use the unformed verges or utilise the road shoulder where necessary. Similarly, there are no designated on or off road cycle ways in the area therefore cyclists using the road network would either need to use the formed road shoulders or share the traffic lanes where necessary. In regard to the haulage of extracted material from the site there are currently no alternatives to the use of road haulage to and from the site.

In the operational phase the quarry is expected to quarry product 49 weeks of the year, 5.5 days per week. The quantity hauled, using 32 tonne truck and dog haulage vehicles, is estimated to be an average of 10,200 tonnes per week or 1,800 tonnes per day. The tonnage per day would vary greatly however a maximum of 4,000 tonnes could be supplied on any given day based on customers' needs. This maximum quantity would equate to a maximum peak of approximately 110 haulage vehicles leaving the quarry on a peak demand day and approximately 55 haulage vehicles on an average day. The highest peak hour traffic volume would be no greater than 25 laden haulage vehicles exiting in a peak hour based on loading / weighing dispatch times. It is important to realise this will not occur every day and every hour but would be a short term peak associated with a number of concurrent major orders.

It is anticipated that 10 staff would be employed for the operation of the quarry with approximately 6 inward deliveries / visitors per day in addition to the haulage truck trips.

Assumptions as to distribution patterns to and from the development have been made based upon anticipated demand as follows:

- Traffic at the quarry access will have origin / destinations 95% The Bucketts Way south and 5% The Bucketts Way north
- The Bucketts Way south traffic will have origin / destinations 80% west at the Pacific Highway and 20% east.
- In the 6-7 AM peak hour, truck traffic will be 50% inbound and 50% outbound, staff and visitors will be 100% inbound.
- In the 8-9 AM peak hour, truck traffic will be 50% inbound and 50% outbound, visitors will be 50% inbound and 50% outbound.
- In the 2-3 PM peak hour, truck traffic will be 50% inbound and 50% outbound, staff and visitors will be 100% outbound.

Construction traffic generated by the development will not be significant. A Construction Traffic Management Plan will be in place during construction of the new access road intersection with The Bucketts Way. The level of construction traffic is considered minor and as a short term impact would not adversely impact on the local road network. Safety issues would be managed by the Construction Traffic Management Plan for the construction tasks that would include traffic control plans where required.

During operations, as this proposal only results in an increase of up to 252 vtpd or 62 vtph during peak sales days on the road network it will not cause the two way mid-block technical capacity of the road network to be reached therefore satisfactory levels of LoS will still be experienced by motorists on the road network after the construction and operation of the quarry.

By 2052, The Pacific Highway mid-block capacity may be reached in the PM peak requiring the provision of additional travel lanes however this would be dependent on the accuracy of the background traffic growth assumption made in the assessment. Nonetheless, as this occurs with or without the contribution of traffic from the proposed Project, it is the responsibility of the road authority to undertake this work albeit a nexus would exist for a fair and reasonable contribution from the quarry to the works.

In regard to the Pacific Highway / The Bucketts Way intersection the impact of the additional traffic has been assessed using the Sidra Intersection models established for the intersection.

This modelling shows that this intersection will continue to operate satisfactorily post development during peak trading periods for the quarry through to at least 2030 with the average delay, levels of service and queue lengths for all movements remaining within the criteria determined by the TfNSW as representing satisfactory operation.

The peak hour traffic at the private access to the Deep Creek Quarry development will be a maximum of 472 vtph on The Bucketts Way in 2030 and approximately 62 vtph on the new access road which indicates uninterrupted flow conditions at the private access intersection as the peak traffic volumes fall well below the thresholds for uninterrupted flow conditions contained in Austroads *Guide to Traffic Management – Part 6 – Intersections, Interchanges & Crossings (2009)*. Therefore the proposed quarry access will not adversely impact on the local and state road network.

In terms of road safety the main issues that need to be considered are type of traffic, road geometry and intersection safety.

Greg Baird & Associates undertook a Road Safety Audit (RSA) of The Bucketts Way from the extents of the proposed quarry access road to the Pacific Highway including the Pacific Highway / The Bucketts Way intersection. This audit was undertaken on the basis of the road network condition and layout as at the date of the audit and did not include some improvements undertaken at the intersection post audit date. The full RSA is provided in Attachment E of the TIA (Appendix K), however, a summary of the findings is listed below.

- The existing right turn lane on the Pacific Highway at The Bucketts Way intersection was only 110 metres long but needs to be 155 metres for comfortable deceleration
- There is no acceleration lane for left turning vehicles out of The Bucketts Way onto the Pacific Highway
- There is no hold line for the southbound highway right turn lane into The Bucketts Way to provide guidance on where to stop. Line marking at the seagull island is faded
- On the day and night of the audit, the width marker (D4-3) signs on the Limeburner's Creek Bridge were observed to be rotated and not visible in the direction of travel. As well, no reflectors were observed delineating the older style bridge railing
- The available safe intersection sight distance (SISD) to and from the north of the proposed quarry access intersection on The Bucketts Way appears to be about 195 m, suitable for a travel speed of about 85 km/h. However, the proposed intersection layout includes a CHR(S) right turn lane for vehicles waiting to enter the quarry access road and a southbound acceleration lane for vehicles turning right to exit the quarry access. The right turn and acceleration lane remove potential conflict between southbound through traffic and traffic entering or leaving the proposed quarry access. Double barrier lines prohibit overtaking in the southbound approach to the proposed intersection. Sight distance to and from the south of the proposed quarry access is satisfactory
- The drawings (Appendix E of the TIA provided in Appendix K) show a 370 m long acceleration lane for vehicles exiting the quarry access intersection southbound (turning right), including merge taper. Assuming a 3.1 m wide acceleration lane and a 3% downgrade (as shown on the drawings), Austroads guidelines indicated that the proposed acceleration lane length will allow a heavy vehicle to accelerate to between 70 km/h and 75 km/h by the start of the taper. As sight distance to and from the merge is satisfactory, a merging speed of 70 km/h to 80 km/h is considered acceptable

- At the time of the audit parts of The Bucketts Way were not painted or delineated. Some edge lines on The Bucketts Way were also yet to be completed
- An existing two cell pipe culvert crosses under The Bucketts Way, in the area requiring widening for the acceleration lane. While not directly affected by construction, the existing western side headwall is within the clear zone and opposite the proposed merge. Once the final merge geometry and headwall locations are determined, both headwalls should be assessed to determine whether safety barrier protection is required.

It is expected that the issues raised with respect to the Pacific Highway / The Bucketts Way intersection would be resolved as part of the current TfNSW works on the intersection. The other matters will be addressed at detailed design stage of the quarry access intersection with The Bucketts Way.

The TIA for the project has found that regarding the road network, the project can be supported as it will not have an adverse impact on the local and state road network in the vicinity of the site and complies with all requirements of MidCoast Council, Austroads and NSW Roads and Maritime Services (RMS)/TfNSW. Nonetheless, a Traffic Management Plan would be developed prior to any activity commencing. Driver awareness would also be included in site inductions.

Hazards

Flood Management

The existing flood potential within the DCQ as shown by modelling, indicates that flooding is generally confined to the main channel of Deep Creek, with only a small out of bank floodplain about 100 m wide. The quarry, stockpile area, and infrastructure area are all located outside of the modelling 1% Annual Exceedance Probability (AEP) flood extent which represents the 1 in 100 year flood scenario. The proposed DCQ has the potential to influence flooding and watercourse stability in Deep Creek as a result of:

- Changes to local catchment areas associated with diversion drains and loss of catchment to the quarry pit
- Concentration of flows within bridges and culverts associated with the access road.

Updated flood modelling that includes the “maximum” quarry footprint and final landform was also assessed for impacts with the proposed DCQ crossing of Deep Creek is expected to locally increase flow velocities and depths for more frequent events. This is due to the concentration of flow required to drive the modelled flows through the proposed culvert. For larger events the proposed DCQ crossing of Deep Creek is expected to locally reduce flow velocities, with continued increases in depths. Additionally, climate change modelling indicates that differences in the maximum modelled flood extents for the 1% and 1-in-500-year AEP events largely occur downstream of the proposed cross point, within a section of the creek which broadens to include a small floodplain. Elsewhere, the well-defined channel geometry and limited overbank (floodplain) area associated with Deep Creek within the assessment area limits the modelled increase in flood extent.

EPA Searches

Searches were undertaken via the NSW EPA Protection of the Environment Operations (POEO) public register (under section 308 of POEO ACT) and the NSW EPA online record of contaminated sites. The results of the searches showed no registration, regulations by EPA impacting the land or other records of concern.

Acid Sulfate Soils

Review of the Great Lake Local Environmental Plan 2014 and the NSW Government ePlanning Portal has determined that the DCQ is not mapped with lands for potential occurrence of acid sulfate soils (ASS).

Coastal Management

Review determined that the proposed DCQ is not located in a coastal zone and is therefore not subject to the provisions of the State Environmental Planning Policy (Coastal Management) 2018, beyond potential impacts on downstream water quality. The SWIA provides a Water Management System (WMS) to provide a summary of actions to be undertaken during the construction and operation of the DCQ to prevent adverse impacts to downstream water quality and to in-stream flow dynamics.

Blasting

As currently proposed, each blast event at the DCQ will include a 9000kg blast producing approximately 11,600 m^3 / 30,600 tonnes of product. This quantity estimate would equate to approximately 16 blasts per year to produce a total 500,000 tonnes, it is possible that smaller blasts may be required depending on the conditions and target resource of the blast and therefore it is anticipated that up to 25 blasts per year could be performed. Blasting at the DCQ will be restricted to between the hours of 9am to 4pm Monday to Friday. Blasting will not occur on Saturdays, Sundays or on Public Holidays.

The proposed DCQ is not mapped to occur in an area at risk of mine subsidence, nor is the DCQ mapped in an area of landslide risk, hence blasting occurring at the DCQ is not expected to result in unacceptable risk to life and / or property. Blast vibration and overpressure levels will be significantly below the 5% exceedance criteria at assessed residential receivers. It is noted that maximum of 5% of blasts per year can exceed these criteria and still achieve compliance.

The proposed DCQ pit shell is located more than 1.5 km from The Bucketts Way. As such, it is not expected that the proposed DCQ will disrupt traffic flow along The Bucketts Way during blasting events. Portions of Deep Creek Road may require temporary closure using road barriers and blast guards during blasting events. The proposed DCQ property boundary will fenced to prevent accidental or intentional access by members of the public, providing an element of separation distance that will require ongoing management to prevent adverse accidental impacts. The closest dwelling is sufficient distance (>1km) and is therefore highly unlikely to be impacted by fly-rock fragments.

Road Safety

Construction of the proposed DCQ includes the construction of a new intersection between the proposed DCQ access road and The Bucketts Way. In addition, primary heavy vehicle access and egress will occur southbound along The Bucketts Way, which requires vehicles to merge onto the Pacific Highway. A Road Safety Audit (RSA) for the proposed DCQ intersection with The Bucketts Way and the intersection between The Bucketts Way and the Pacific Highway has been prepared. The results included four key points with a medium risk rating and four notes.

Bushfire

The proposed DCQ is located within a wide gully between two forested ridgelines, generally grading downslope towards Deep Creek and Deep Creek Road to the northeast. The proposed DCQ as occurs on lands mapped as ‘Vegetation Category 1’ and ‘Vegetation Buffer’. The proposed DCQ does not constitute residential infill development, residential subdivision development or special fire protection purpose (SFPP) development under PBP 2019. As such, the proposed DCQ will be assessed consistent with Chapter 8 – Other Development under PBP 2019. The Mid Coast LGA is located within the NSW RFS North Coast Fire Weather District and has a Forest Fire Danger Index (FFDI) of 80. The predominant vegetation types are Forest and Grassland, while topography within the locality intersects slopes of several different grades. Generally, compliance with the aim and objectives of PBP is satisfied by developments that can meet BAL 29 or lower by habitable buildings within the development footprint, while the workshop aims for BAL 40. Relevant APZs have been calculated and will be implemented. Additional concerns such as access and egress, power supply water supply and hazardous substances have been considered in the assessment.

State Environmental Planning Policy No 33

The screening assessment determined that operations at the DCQ are not considered potentially hazardous and therefore a preliminary hazard analysis (PHA), prepared in accordance with the Hazardous and Offensive Development Application Guidelines – Applying SEPP 33 (SEPP 33 Guideline) (NSW Department of Planning, 2011), is not required. The hazardous substances and dangerous goods required for the DCQ include hydrocarbons, such as fuels (diesel), oils and greases.

Site Safety

Construction and operation of the DCQ will present risks to workers and contractors and with the potential to result in injury or fatality if workers are ill informed of the hazards involved, or risks associated with plant and machinery are not managed. Following the implementation of workplace health and safety protocols, the potential for injuries or fatalities to workers, contractors or visitors to the DCQ will be minimised.

Public Safety

Risks such as increased traffic and unauthorised access or flyrock will be controlled through the implementation of controls listed in Section 16.8 (Table 16 10). The effectiveness of these controls will be continuously monitored and improved as required to minimise any potential adverse impacts of the DCQ upon members of the public.

Dam Safety

Assuming dams are designed by suitably qualified engineers, the risk of failure of dams constructed for the quarry is considered negligible. The largest of the dams is 15ML and is excavated into the floor of the quarry with only a minor above ground dam wall that will have limited potential for failure. The two sediment dams are designed with an above ground dam wall expected to be less than 5m high. These dams are expected to hold less than 10ML in combination and would be pumped down through a controlled discharge following storm events. However, in the event of total dam failure, the volume of water entering Deep Creek will be only constitute a small proportion of flows in Deep Creek. Considering flood modelling identified no significant impacts on downstream properties or dwellings, failure of these dams is unlikely to present any additional risk or hazard to persons downstream.

Waste

Waste streams will be generated through construction and operation of the project. The waste management practices associated with the Deep Creek project would be guided by the requirements Waste Avoidance and Resource Recovery Act 2001 (WARR Act) and the POEO Act. IDPL is aware of EPA's requirements with respect to notification and tracking of waste, and is aware of the relevant legislative requirements for disposal of the waste, including any relevant Resource Recovery Exemptions, as gazetted by EPA from time to time. Waste will be classified as per EPAs Waste Classification Guidelines and disposed of as per the requirements of the WARR Act, with management using the hierarchy of the WARR Act. Construction and operation of the quarry will require similar types of activities on site, being clearing of vegetation, haulage of rock and other ground materials and land forming. The quarry will generate only small quantities of the identified waste streams. While waste streams will be generated for the life of the project, they will remain given that no extractive material generates a waste stream and that all cleared vegetation is reused on site. Cumulative impacts with other activities in the area are not anticipated as they will be managed through the mitigation and management measures, notably as waste will be reused or recycled where possible, or disposed of in licensed manner, and therefore no long-term cumulative impact is expected.

CONCLUDING REMARKS

In addressing the requirements of the SEARs, the Deep Creek Quarry has been demonstrated to be consistent with the objectives of the EP&A Act and is therefore justified based on the findings identified by the environmental, social and economic investigations performed through the production of this EIS.

As a permissible activity under the current RU2 zoning, the quarry is strategically located behind natural ridgelines and positioned on a largely previously cleared area, while well situated to be able to utilise existing suitable road infrastructure efficiently to be able to service both local and regional demand. This strategic site positioning minimises social and environmental impacts, which are further reduced when the management and mitigation measures described throughout the EIS are implemented.

The EIS has demonstrated the quarry will not result in any significant impacts during construction or operations, and no significant residual impacts following completion and rehabilitation. Any potential impacts identified as part of the EIS have been demonstrated to be able to be managed, mitigated or offset to ensure that the project can operate without significant impacts to the receiving environment and deliver Ecologically Sustainable Development.

The quarry has been demonstrated to meet the objectives of Ecologically Sustainable Development and the other objects under Section 1.3 of the EP&A Act, and as defined by Section 6(2) of the POEA Act. As the demonstrated Ecologically Sustainable Development is coupled with the 'overwhelmingly positive' economic benefits and limited social impacts identified, the project is justified.

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INTRODUCTION

Deep Creek
QUARRY

1 INTRODUCTION

1.1 PROJECT OVERVIEW

The proponent for the proposed development is Ironstone Developments Pty Ltd (IDPL), a locally owned company with considerable experience in quarrying operations.

Ironstone Developments Pty Ltd (IDPL) propose to develop a hard rock quarry called Deep Creek Quarry (DCQ) located on the boundary of the localities of Limeburners Creek and Allworth, New South Wales. The quarry will located to the west of the The Bucketts Way in the Mid-Coast local Government Area, on a site historically used for agriculture and logging purposes.

Specifically, the proposed quarry is to be located at Lot 472 DP 1162208 & Lot 48 DP 753178, 279 Deep Creek Road, Limeburners Creek NSW 2324. Access to the quarry will be via a dedicated quarry access road constructed within a portion of land to be subdivided from Lot 551 DP 1238818 and Lot 12 DP 1277150. The subject land or subject site includes these four lots. Throughout this environmental impact statement (EIS) the extraction area or area of quarrying activity will include Lots 472 and Lot 48 while Lot 551 and Lot 12 will only have an access road linking the extraction area to The Bucketts Way.

IDPL have a total land holding of 308 ha. The quarry is approximately 10% of the total landholding and has an area of 30 ha, with the extraction area being approximately 18 ha and supporting infrastructure, including the dedicated quarry access being approximately 12 ha.

The application seeks approval to produce up to 500,000 tonnes per annum of hard rock quarry products for up to 30 years, with the primary target being rhyolite that has the unique properties required to meet high specification road building standards. Targeting the rhyolite will also result in ancillary weathered rock products suitable for the local construction industry.

The DCQ is expected to employ up to 10 full-time staff, with further ongoing work for the local and regional construction industry and associated haulage contractors.

Pursuant to Schedule 1, Clause 7 of the *State Environmental Planning Policy (State and Regional Development) 2011*, development that extracts from a total resource of more than five million tonnes is classified as State Significant Development (SSD) and requires the preparation of an EIS, prepared in accordance with the *Environmental Planning and Assessment Regulation 2000* (EP&A Regs). The DCQ, under current design plans, is expected to extract approximately 12 megatons (MTs) over the project lifetime and therefore constitutes SSD.

1.2 PROJECT SUMMARY

IDPL seeks approval under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* for the construction and operation of the DCQ. The extraction footprint of the quarry has been determined following resource mapping undertaken by VGT Pty Ltd between 2013 and 2020 and consideration of environmental issues specifically ecological constraints from site surveys undertaken between 2016 and 2020.

While the total hard rock resource within the IDPLs landholding is considerably larger than that proposed, in order to focus the quarry on the highest value rhyolite product, a resource of approximately 12 million tonnes (12 megatons) is proposed to be extracted.

The primary target material for the quarry will be a high quality rhyolite resource aimed at satisfying RMS/ TfNSW demand for high friction road aggregates. While the project targets durable high friction rhyolite, the wider resource also comprises moderately durable trachyte, durable arenite and quartz trachyte, with a secondary resource containing a decorative dimension stone.

The key details of the development are shown within Table 1-1 below. An overview of the proposed Quarry layout is shown in Figure 1.

Table 1-1: Key Aspects of the Proposed Deep Creek Quarry Project

Aspect	Key Aspects of the Project
Key elements	Hard rock quarry extracting up to 500,000 tonnes per annum over a period of up to 30 years including a sealed access road, site office, workshop, weighbridge and stockpile area with associated water management infrastructure. Progressive rehabilitation of quarried land returning to pasture and native vegetation.
Location	279 Deep Creek Road, Limeburners Creek, NSW 2324, within the Mid-Coast local government area.
Property Titles	Lots 472 DP1162208, 48 DP753178, 551 DP1238818, Lot 12 DP 1277150, Deep Creek Road, Limeburners Creek, NSW 2324.
Land Owner	Ironstone Developments Pty Ltd (access road corridor under option to Ironstone Developments from a local private landholder).
Proponent	Ironstone Developments Pty Ltd.
Employment	Up to 10 full-time staff, with further support for the local and regional construction industry and associated haulage contractors.
Area	The area subject to this development will be approximately 30 hectares, comprising: • 18 ha of quarry extraction area. • 12 ha in supporting infrastructure and internal access roads. From a proponent land holding of approximately 308 hectares.
Elevations	Approximate elevations relevant to the development are: • Quarry located between 37 m to 115 m Australian Height Datum (AHD) • Workshop, office and stockpiles located between 31 to 49 m AHD • Access road located between 22 to 59 m AHD. The Quarry pit is sheltered to the west by a ridge 125 m to 145 m AHD high and is above the nearby Deep Creek which has an elevation of 28 m AHD.
Project Life	Up to 30 years.
Extraction Rate	Maximum of 500,000 tonnes per annum, and maximum daily rate of 4,000 tonnes.
Resource and products	Approximately 12 MT of rhyolite, arenite and weathered rock, crushed, screened and sized for various products including road construction and landscaping purposes. High proportion of product to meet TfNSW specification for high grip to improve road safety.
Operating Hours	Construction of access, bunds, workshop and office: • 7:00 am to 5:00 pm Monday to Friday • 8:00 am to 1:00 pm Saturday • No works on Sunday or public holidays. Quarrying Operations: • 7:00 am to 5:00 pm Monday to Friday • 8:00 am to 1:00 pm Saturday • No quarrying on Sunday or a Public Holiday. Loading and dispatch of trucks: • 6:00 am to 6:00 pm Monday to Friday • 6:00 am to 1:00 pm Saturday • No haulage on Sunday or a Public Holiday.

Aspect	Key Aspects of the Project
Transport Rate	• Maximum of 25 laden trucks per hour at peak rates • Maximum daily extraction rate of 4,000 tonnes per day • On average, this equates to 55 laden trucks per day in order to meet peak production • Up to 10 vehicles of employees would be expected to arrive and depart within 1 hour of opening and closing.
Extraction	• Maximum extraction rate of 500,000 tonnes per annum • Weathered rock stripped by bulldozer or excavator • Blasting of hard rock • Excavator and articulated trucks to feed mobile crusher and screen on pit floor • Excavator or front-end loader and articulated trucks, to distribute materials between processing and stockpile areas • Front-end loader to load road registered haulage trucks for saleable products.
Support facilities and utilities	• Site office, weighbridge, workshop, stores, car parking • New intersection on The Bucketts Way with private sealed access road • Power supply from diesel generators or solar • Telecommunications line run adjacent to the access road • Water supply sourced from rainwater, onsite dams, surface water runoff, groundwater seepage and imported potable water as needed.
Rehabilitation	• On completion of extraction, benches will be revegetated with native trees consistent with surrounding vegetation with a free draining quarry floor consisting of open grassland and scattered woodland that may provide a dwelling site generally consistent with the existing approved subdivision of the property.

1.3 THE APPLICANT

Ironstone Developments Pty Ltd (IDPL) is the applicant for the DCQ project. Ironstone Developments is a local family owned company with considerable experience in quarrying operations in the Hunter region.

1.4 DOCUMENT PURPOSE

Pursuant to Schedule 1, Clause 7 of the *State Environmental Planning Policy (State and Regional Development) 2011*, development that extracts from a total resource of more than five million tonnes is classified as State Significant Development (SSD) and requires the preparation of an EIS, prepared in accordance with the *Environmental Planning and Assessment Regulation 2000* (EP&A Regs). The DCQ, under current design plans, is expected to extract approximately 12 million tonnes over the project lifetime and therefore constitutes SSD. This document is submitted to meet the EIS requirement.

1.4.1 Secretary's Environmental Assessment Requirements

This EIS presents the environmental impacts of the proposed DCQ and assesses them in accordance with the requirements of the Secretary's Environmental Assessment Requirements (SEARs). The SEARs were issued on 19th February 2021. The SEARs and location in the EIS where they are addressed within the EIS is presented in Appendix A.

1.5 NEED, JUSTIFICATION, AND ALTERNATIVES

1.5.1 Project Objectives

The objectives of the DCQ project are:

- Provide high quality rhyolite resource to meet demand throughout the Hunter region and across NSW due to it's strategic logistical location:
    - The unique properties of the Rhyolite provide high friction and will contribute to increased road safety
    - The light colour aggregates used on a road surface can reduce street lighting demand and assist with cooler temperatures for the road surface and adjacent area
    - The project allows for responsible and sustainable use of a regionally significant resource
- Provide employment for approximately ten full time employees
- Provide economic benefit to the State and local community through employment and the purchase of local goods and services
- To meet the above objectives through extracting the resource via best practice environmental and social approaches as described in this EIS.

1.5.2 Need and Justification

A Market Justification Report has been produced and is available in full in Appendix M. What follows is a summary of the unique qualities and demand for the target resource of the DCQ project. Appendix M contains photographic examples of the rhyolite material from the DCQ.

Resource Quality

The primary target material for the quarry will be a high quality rhyolite resource aimed primarily at satisfying TfNSW demand for high friction road aggregates. This material improves grip and is often used in areas where the additional grip allows for increased road safety.

The Deep Creek Quarry resource material being targeted is competent enough for use in the full range of engineering applications such as concrete and asphalt aggregates, manufactured sand, rail ballast, gabion and mattress rock for stabilisation of ground on projects, armour rock for riverbank and sea wall protection, specified road base, select fill, general fill, drainage aggregates, non-spec road base, crusher dust and rock for decorative landscape applications. Road base and crusher dust can also be used for rammed earth houses.

Polishing Aggregate Friction Value

An important property of rhyolite is the Polishing Aggregate Friction Value (PAFV). The PAFV refers to a test result for aggregates obtained through skid resistance testing in a laboratory. Within a technical commentary for the supply of pavement materials the South Australian Department of Planning, Transport and Infrastructure (DPTI) provides an explanation of how high grip aggregates are important:

"Micro texture is a measure of the surface roughness of an aggregate particle and is significant in determining the frictional characteristics of an asphalt wearing course in which the aggregate particles lie flat to the surface. As a result, aggregates with a higher PAFV than for spray sealing are required for asphalt. Asphalts also tend to be used in urban or rural areas where traffic loadings are high and so are subject to the polishing action of traffic during their service life. While dense graded asphalts also have a mastic of sand and bitumen that contributes to surface microtexture, open graded and stone mastic asphalts are more heavily reliant on the microtexture of the coarse aggregate for surface friction and so a higher PAFV is specified. Sites requiring a higher level of skid resistance, such as heavily trafficked sharp curves, or high stress braking areas may also warrant a higher level of polishing resistance. The specified values for PAFV for asphalt aggregates are intended to reflect the diversity of road geometry, traffic loading, asphalt mix types and performance, and available aggregate sources to ensure that aggregates selected for specific sites are fit for their intended purpose." (DPTI 2017).

TfNSW have specified high PAFV aggregates for use in intersections and roundabouts for over a decade. A PAFV of 48 is typically specified for general road construction, while a high grip material requires a PAFV of 58 to 65.

Queensland Transport and Main Roads (TMR) changed specification for PAFV following a fatal road accident in 2007, where the PAFV was raised from 45 to 48 for road surfacing (TMR 2007). While some changes to improve PAFV of a road surface can be made, the inherent properties of the rock can't be altered. Following this change in PAFV, several quarries were then unable to supply materials consistent with the specification (Geological Survey of Victoria, 2020). These changes show the increased focus on improving road safety, and where the DCQ resource can contribute to these improvements due to its high grip PAFV rating.

The PAFV test results, presented in the VGT Geological Report (Appendix O) for the Deep Creek Quarry rock cores range from 57 to 65, meeting the requirements of high grip material. This high grip quality is an important value of the proposed quarry that has the potential to substantially increase road safety.

Resource Location, Supply and Demand

The resource will be appropriate for a wide range of civil and construction projects, with a significant relevance to meeting the anticipated increased demand for high quality road aggregate from government stimulated infrastructure projects in the near future. Demand will be driven by both State and Federal spending on infrastructure projects and private investment. Both of these markets are expected to expand due to post COVID stimulus and as such demand is expected to increase.

In particular, high grip aggregates such as the target resource have limited availability in the current market. The proposed development would provide quarry resources to both supplement existing supply and help meet the medium to long term increasing demand for such quarry materials in the local and broader regions. The materials produced by the quarry are expected to meet market demand between Coffs Harbour and Canberra, while more consistent supplies may lead to improved confidence in the market, the ability to meet material specifications and less variability in pricing.

The site is in close proximity to key local markets (Hunter, Central Coast and Sydney) and existing road infrastructure, notably the Pacific Highway. Being located approximately 50 km north of Newcastle, and in close proximity to major road networks, the site is strategically located to efficiently supply quarry products for road infrastructure both locally and regionally throughout NSW while utilising the established distribution network nearby.

The material produced by DCQ is expected to be well suited to the local construction industry within the Mid-Coast, Dungog, Maitland, Port Stephens, Newcastle and Lake Macquarie local government areas, however the decorative and high PAFV products will have a wider market including:

- 196 kms to Sydney
- 297 kms to Lithgow
- 472 kms to Canberra
- 213 kms to Port Macquarie
- 340 kms to Coffs Harbour.

On a broader scale, demand for quarry products such as the target resource are increasing throughout NSW. The economic study performed for the project (Appendix N) estimates The Greater Sydney Region requires around 600,000 tonnes per week of quarry products (or 31.2 million tonnes per annum) and quarry products are currently flowing into the area from feeder regions (such as the location of the proposed quarry). As the population of the surrounding regions continues to grow, the accessibility and availability of construction materials has become critical for providing housing, buildings, roads, and other infrastructure pertinent to supporting the population and growth. As such, demand within the Hunter Region, Sydney and North Coast, and across NSW is anticipated to record strong growth over the next five years, with the national construction sector anticipated to experience forecast annual growth of 2.4% per annum on average (National Industry Insights, 2020). Further to this, a number of major projects within the local area, including the $400 million Newcastle Power Station project (in construction), the Jesmond to Rankin Park Bypass (2022), M1 to Heatherbrae Fly Over Bypass (2024), Lower Hunter Freight Line and the Newcastle Gas Terminal (EIS in preparation), will require quarry products such as those to be produced by the DCQ Project.

The DCQ Project will provide a new and alternative low impact and sustainable supply source to the market which will service the strengthening demand for construction material within NSW. The DCQ Project will thereby improve the security of supply within NSW and to meet the significant number of planned infrastructure and other projects.

Resource Environmental Benefits

Rhyolite has a lighter colour than other products used in similar circumstances resulting in lower solar heat absorption and greater heat reflectivity. This can reduce surface temperatures of roads, resulting in both reduced ambient temperatures in close proximity and less contribution to increased temperatures in urban environments, along with reduced temperatures of runoff from rainfall. This can in turn provide benefit to receiving environments that may see reduced impacts from temperature increases that they may receive from other products used in the same circumstance.

The light coloured nature of the aggregate available on site also has specific benefits when used in an urban environment with the lighter coloured aggregate potentially reducing street lighting demand for roads whilst maintaining the same illumination for safety, resulting in reduced power consumption and a net benefit to greenhouse gas emissions.

Extraction Area Location

The pit location has previously been partially cleared for logging and replaced with exotic pasture for agricultural purposes, while the shallow depth of the target resource in this area reduces the amount of overburden removal. While alternate areas of resource are present within the wider land owned by the proponent, the adopted resource area has been selected as it is considered to have the highest value and can be extracted with the lowest possible environmental impacts in relation to other considered project alternatives (see Section 1.5.3 for alternatives considered).

The proponent has therefore opted to target a smaller area of the available high Polishing Aggregate Friction Value (PAFV) rhyolite resource that is in short supply but high demand across NSW by TfNSW due to the increased grip properties and therefore the safety it provides in road infrastructure. The project design to date, has included a range of changes to the design (as per 1.5.3) to provide a final project design that results in the least environmental impacts while maintaining a viable extractive project.

1.5.3 Project Alternatives

Given the unique beneficial properties of the target resource and its location, there are no feasible alternatives available to the proponent for the development of the proposed project. Design mitigations as detailed below have been applied to target a specific portion of the resource to result in minimised impacts to the receiving environment and the local community when compared to the alternative of targeting the entire resource available.

Project Alternative Design Considerations

The project design has changed as investigations have occurred on site with the aim to mitigate potential impacts of the DCQ upon nearby receivers and the surrounding environment. These changes have included:

- Access via Forest Glen Road was reviewed as a possible quarry access road as it provides legal access. This was not adopted due to the potential impact to residents with traffic going past numerous properties, the steep hills would also generate more truck noise going up and down the hill
- Access via Deep Creek Road from The Bucketts Way was reviewed as another possible quarry access road. This was not adopted due to the close proximity of an existing dwelling adjacent to the road and to other residents on Forest Glen Road
- Access via a new road and intersection formed in agreement with local land owners provided a straighter road along the northern boundary of the Subject Land that was spatially more remote from dwellings than Deep Creek Road. The intersection with The Bucketts Way allowed for a full length acceleration lane
- The new access road location moved the alignment further away from the nearest dwelling, increasing the distance to the nearest residential receptor from 131 m to 297 m. Further information regarding the final access and intersection design is available in Appendix K, with civil design drawings provided in Appendix B.

- Adjustment to new access road profile. To improve efficiencies of the new access road the road includes cuttings on the crests that provide a more gentle and efficient road profile whilst also shielding noise emissions
- Access road horizontal alignment. The access road has been designed with regard to the location of large and hollow bearing trees, selecting an alignment that minimised impacts on ecology
- Quarry footprint. The quarry started as a larger pit design, extending to the west and south. To minimise noise emissions the quarry was adjusted to retain the dominant ridge line to the west and retain the ridge line to the south
- The quarry extraction plan. Initial plans aimed to work the quarry in a general east to west direction, this potentially resulted in greater noise emissions to the south and east of the quarry. The extraction plan has been developed to retain an east-west trending barrier to properties south of the quarry. Activity on the top of the hill will only be required when initially clearing and drilling /starting a new bench profile
- Processing location. The primary processing of material following the development of benches would result in one of the highest noise emissions to occur at higher elevations. Thus the main processing is proposed to occur on the floor of the quarry, starting on the northern side of the east-west barrier.

1.5.4 Consequence of Not Carrying Out the Project (i.e. Do Nothing)

The target resource will be used both within the local area and throughout NSW. The extraction of the available rhyolite will help to meet the volumes required across this area for a resource that is in high demand due to its unique properties with regard to improved road safety. Due to the high PAFV qualities of the rhyolite resource and the projection that demand will continue to increase with additional government spending on infrastructure throughout the region, the provision of the resource from DCQ will contribute to a supply that meets projected demand.

The DCQ is ideally positioned to minimise environmental impact by being situated in proximity to the Pacific Highway, and upon land that has seen a significant proportion of the footprint previously disturbed for agricultural activities, and land that is predominantly shielded from impacts due to the presence of natural ridgelines. Should the project not be approved, a supply for the projected demand will be required from elsewhere and may result in resources being identified and extracted from sites with greater impacts to the receiving environment. Should alternate projects be required that are not in such close proximity to state-wide infrastructure (Pacific Highway), the cost of transporting the product, and therefore the product itself may increase resulting in increased costs of infrastructure projects requiring the unique properties of a rhyolite resource.

Given the particularly high PAFV grade of the resource targeted by DCQ, it is also likely that alternate resource sourced elsewhere may not provide for the same level of grip once used in road surfacing, and as such may impact the overall benefit to road safety within the catchment and across NSW.

The project has been modelled to have a positive economic benefit to the broader Hunter Region and beyond. More specifically it is forecast the quarry will have a positive economic impact on the surrounding area through construction, where approximately $5.8 million will be injected into the catchment, and during operations where the project is estimated to generate $7.6 million per year, creating 10 full-time equivalent jobs through the expected life of the quarry of up to 30 years. Without the project, this economic injection and employment would be displaced from the catchment, and with other development opportunities limited within the catchment.

In summary, the consequence of not carrying out the project may be a reduced supply of high PAFV material in the region and NSW. With demand projected to increase, this may result in a supply being sourced from elsewhere which may not be from a site with such limited environmental impacts, or one with similar economic benefit. A lower quality product with reduced PAFV value may also see a net reduction in road safety in infrastructure projects where it would otherwise have been used. A darker alternative aggregate supply will not provide the DCQ resource light colour road surface benefits of reduced street lighting and cooler pavements.

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SITE ANALYSIS

Deep Creek QUARRY

2 SITE ANALYSIS

2.1 LOCATION

Deep Creek Quarry (DCQ) is located approximately 10 km northeast of Clarence Town and 11 km northwest of Karuah, within the Local Government Area (LGA) of Mid-Coast in NSW. The Subject Landis located off The Bucketts Way, with The Bucketts Way and Pacific Highway intersection located a further 11.5 km south at Twelve Mile Creek.

Specifically, the proposed DCQ is to be located at Lot 472 DP1162208 and Lot 48 DP753178 with a new private access road on Lot 551 DP1238818 and Lot 12 DP1277150, crossing Deep Creek Road and joining to The Bucketts Way Road reserve at Limeburners Creek, Parish of Karuah, County of Gloucester, 279 Deep Creek Road, NSW 2324.

See Figure 1 for the location of the Subject Land.

It should be noted that a minor subdivision has taken place in the area of quarry and as such Lot 552 DP 1238818 is now recognised as Lot 12 DP1277150. Any reports associated with this EIS that list Lot 552 DP 1238818 have identified the impacts on what is now Lot 12 DP1277150. The change in lot number does not impact on any of the assessments as the subdivision was a minor boundary adjustment.

2.2 LAND OWNERSHIP

The DCQ project Subject Land is owned by the proponent, Ironstone Developments Pty Ltd. The property titles owned by the proponent are Lot 472 DP1162208, and Lot 48 DP753178. The proposed access road corridor is located on Lot 551 DP1238818, and Lot 12 DP127715, and this land is under option to IDPL from local private landholders.

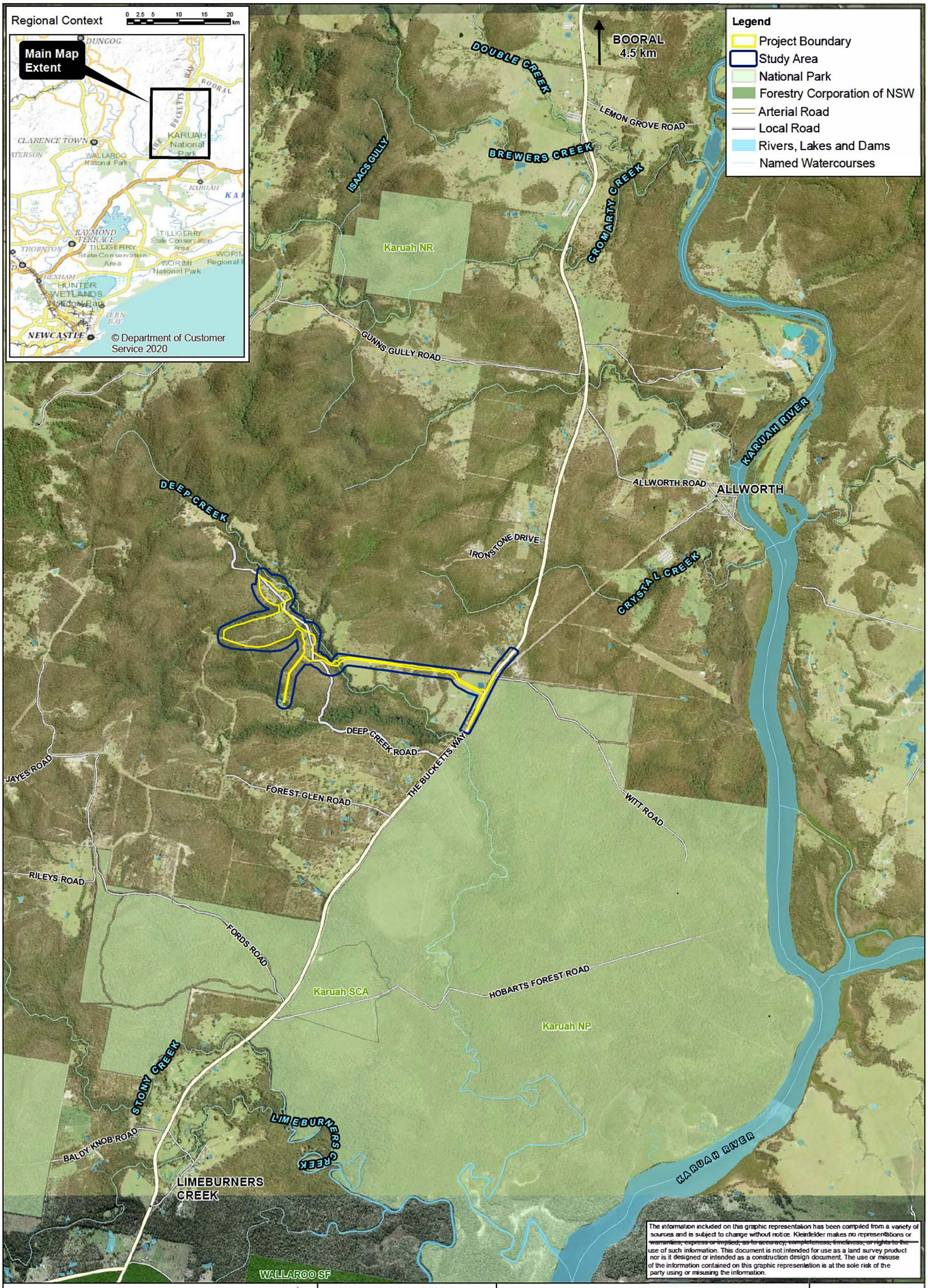
2.3 LAND USE AND ZONING

The Subject Land is located within a rural environment, comprising a combination of forested hills and ridgelines intersected by vegetated drainage lines. Large parcels of vegetation remain within the valley floodplain, with some clearing of vegetation for residential, commercial, utility and infrastructure use. The Subject Land is located within the Mid-Coast LGA and is zoned as RU2 – Rural Landscape (RU2).

Anthropological land use within 1 km of the Subject Land comprises the following:

- Large lot private properties and associated dwellings
- Private businesses
- Farming (primarily beef cattle grazing)
- Utility easements (e.g. powerline)
- Maintained private accessways, fire trails, public roads and trails.

The Karuah State Conservation Area and Karuah National Park is located approximately 2.1 km south east of the proposal. The private access road and The Bucketts Way intersection is located immediately to the west of the National Park. The Subject Land is not located within an area that has been mapped as Biophysical Strategic Agricultural Lands or Critical Industry Cluster Land (Equine or Viticulture).



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2.4 Site Access and Traffic

Access to the Subject Land will be via The Bucketts Way. The Bucketts Way is a two lane, 8 m wide sealed bitumen road, which services traffic between the Twelve Mile Creek intersection of the Pacific Highway and towns such as Booral, Stroud and Stratford, located north of the Subject Land.

Direct access to the Subject Land from The Bucketts Way will be via a new sealed private access road from The Bucketts Way intersecting with Deep Creek Road within the quarry property.

2.5 Biophysical Factors

2.5.1 Climate

The Subject Land is located within the extent of the former Great Lakes LGA, which now forms part of the Mid-Coast LGA. The climate in the locality is characterised by warm summers and mild winters. Rain peaks during summer and autumn, decreasing in intensity later in the year. Summer temperatures often exceed 25°C from November to March. Winter temperatures can drop down below 10°C. The average annual rainfall for area surrounding the Subject Land is around 1124.9 mm.

The Williamtown RAAF Bureau of Meteorology (BoM) weather station (Site number: 061078), located approximately 26 km south of the Subject Land, provides long-term climate statistics for the locality. Climate statistics recorded at the Williamtown RAAF Weather Station are recorded in Table 2-1.

Table 2-1: Climate Averages for Locality (Williamtown RAAF Weather Station 1942 to 2020)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Temperature ^{0} C													
Mean max	28.3	27.7	26.4	23.8	20.4	17.7	17.2	18.8	21.5	23.8	25.6	27.4	23.2
Mean min	18.2	18.1	16.4	13.2	10.1	8.0	6.4	6.9	9.1	12.0	14.4	16.6	12.4
Rainfall (mm)													
Monthly mean	98.3	117.8	120.7	109.8	108.6	124.6	72.6	72.8	60.1	73.5	81.9	77.5	1118.0
Rain days ≥1mm	7.1	7.3	8.2	7.5	7.6	8.4	6.4	6.1	5.6	7.3	7.2	7.0	85.7
9 am Conditions													
Rel humidity %	72	76	77	76	79	80	77	71	66	64	66	68	73
Wind speed kph	11.9	10.6	10.2	11.4	13.7	15.9	16.4	16.8	15.3	14.4	14.4	12.9	13.7

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Dominant vectors >20% of time	Variable	Variable	Variable	W, NW	W, NW	W, NW	W, NW	W, NW	W, NW	NW	Variable	Variable	W, NW
3 pm Conditions													
Rel humidity %	59	62	61	59	60	60	55	50	50	54	55	56	57
Wind speed kph	21.9	20.6	18.9	17.2	15.8	17.5	18.7	20.9	22.0	22.5	23.5	23.5	20.2
Dominant vectors >20% of time	E, SE	E, SE	E, SE	SE	Variable	W	W, NW	W, NW	SE	SE	E, SE	E, SE	SE

Source: Bureau of Meteorology 2020

2.5.2 Topography

The Subject Land generally comprises of forested hills and slopes, intersected by the floodplain of Deep Creek within the north-eastern portion of the property. Elevations within the Subject Land range from 30 m Australian Height Datum (AHD) to 130 m AHD (measured using 10 m contours).

The proposed footprint of the Quarry extraction area is located between two ridgelines, generally grading downslope towards Deep Creek Road and Deep Creek to the northeast.

The location of the proposed Quarry extraction area and associated infrastructure within the Subject Land is shown in Figure 1.

2.5.3 Geology and Soils

Geologic mapping was performed by VGT Pty Ltd between 2013 and 2018. The mapping indicates that the site consists of the Paterson Volcanics. This Formation is part of the New England Orogen Province that was formed by a volcanic activity in the Serpukhovian (lower Carboniferous) age some 323-330 million years ago. The Formation is described as Grey-green rhyodacitic ignimbrite and is up to 150 m thick.

The following description provides a general summary of the subsurface conditions encountered during the VGT Resource Evaluation Investigation (Appendix O).

Four boreholes (designated as DDH7, DDH17, DDH18 and DDH19) have been installed within the proposed Quarry Area. Those boreholes were logged by VGT and core samples taken have been inspected by the author. The ground conditions encountered in the boreholes are summarised in Table 2-2 below. The approximate depth ranges of the units are shown as meters below ground level (bgl).

Table 2-2: Summary of Encountered Stratum

Stratum	DDH7 (m bgl)	DDH17 (m bgl)	DDH18 (m bgl)	DDH19 (m bgl)
Soil Overburden	0 – 1.35	0 – 1.0	0 – 2.5	0 – 0.5
Weathered Sandstone/Siltstone/ Claystone	1.35 – 6.8	–	2.5 – 5.6	0.5 – 5.0
Fresh Sandstone/Siltstone	–	–	5.6 – 14.2	5.0 – 14.6
Rhyolite	6.8 – 68.4	1.0 – 39.6	14.2 – 55.6	14.6 – 61.6
Fresh Sandstone/Siltstone/ Claystone	68.4 – 72.0	–	–	–

The quarrying resource comprises a mixture of durable rhyolite, moderately durable trachyte, durable volcanic arenite and quartz trachyte, with a secondary resource containing a decorative dimension stone. The primary target material for the quarry will be a high-quality rhyolite resource aimed at satisfying TfNSW demand for high friction road aggregates.

Soil landscapes, and their corresponding characteristics, for the Subject Land have been determined via review of the *Soil Landscapes of the Newcastle 1:100 000 Sheet* report and corresponding mapping layer (Mathei 1995).

- The Subject Land contains the following soil landscapes:
    - Ironstone Mountain (im and ima) colluvial soil landscape
    - Ten Mile Road (tm) erosional soil landscape
    - The Branch residual soil landscape.

The Ironstone Mountain soil landscape is located on steep slopes (generally >30%) containing well drained gravelly Bleached Loams / Lithosols, well drained stony Yellow Earths and some moderately deep, well drained Yellow Podzolic soils on slopes and occasional crests. A variant of the Ironstone Mountain soil landscape occurs on rolling crest ridges and slopes between 5-15% (Mathei 1995).

The Ironstone Mountain soil landscape possesses the following qualities and limitations:

- Foundation hazard
- Generally located on steep slopes
- Mass movement hazard
- Very high water erosion hazard
- Localised rocky outcrops
- Shallow
- Stony soils of low fertility.

The Ten Mile Road soil landscape is found on undulating low hills of Carboniferous sediments and acid volcanics within Clarencetown Hills and Medowie Lowlands regions. The Ten Mile Road soil landscape contains moderately deep to deep well to imperfectly drained brown Soloths, Yellow Soloths, and shallow, well drained Bleached Loams / Lithosols (Mathei 1995).

The Ten Mile Road soil landscape possesses the following characteristics:

- High water erosion hazard
- Localised shallow soils
- High run-on and seasonal waterlogging
- Strongly to extremely acid soils of low fertility.

The Branch soil landscape is found on broad plains on deep Pleistocene clay deposits in the Medowie Lowlands. The Branch soil landscape contains deep, poorly drained Soloths. The Branch soil landscape possesses the following characteristics:

- Seasonal waterlogging
- Foundation hazard
- Highly erodible
- Strongly acid soils with extremely low wet strength
- Low fertility
- Low permeability.

The Subject Land is not within a mapped area with the potential to contain Acid Sulphate Soils (ASS) under the Great Lakes LEP, nor is it mapped within the extent of potential ASS under the NSW OEH *Acid Sulfate Soils Risk* mapping layer within the NSW Government's Sharing and Enabling Environmental Data (SEED) mapping system (Office of Environment and Heritage 1998; State of NSW and Office of Environment and Heritage 2018).

2.5.4 Biodiversity

Detailed vegetation mapping of the Subject Land has been performed by ecologists since 2016. The extent of vegetation mapped is illustrated on Figure 10. The area specifically surveyed encompasses the entirety of the impact area, a buffer around the impact area as well The Bucketts Way where a new intersection is proposed.,

The following Plant Community Types (PCTs) were identified within the Subject Land (Table 2-3).

Table 2-3: PCTs identified within the Subject Land

Plant Community Type (PCT)	PCT ID	Potential Equivalent EEC
HU770: Tallowwood - Smooth-barked Apple - Blackbutt grass tall open forest of the Central and lower North Coast	1556	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Partial) (NSW)
HU781: Tallowwood - Brush Box - Sydney Blue Gum moist shrubby tall open forest on foothills of the lower North Coast	1567	Nil
HU804: Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	1590	Lower Hunter Spotted Gum-Ironbark Forest in the Sydney Basin Bioregion (Part) (NSW)
HU833: Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	1619	Nil

The following threatened flora species were identified within the Subject Land:

- *Tetratheca juncea* - Black-eyed Susan – listed as Vulnerable in NSW under the *Biodiversity Conservation Act 2016* (BC Act) and Vulnerable is Australia under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- Callistemon linearifolius - Netted Bottle Brush – listed as Vulnerable in NSW under the *Biodiversity Conservation Act 2016*.

Fauna surveys conducted identified a total of 79 fauna species, comprised one fish, one crustacean, six amphibians, two reptiles, 32 mammals and 37 birds. Of these, one pest animal, the Red Fox (Vulpes vulpes) was identified.

Fifteen of the species recorded are listed as Vulnerable under the NSW BC Act; Glossy Black-Cockatoo (*Calyptorhynchus lathami*), Little Lorikeet (*Glossopsitta pusilla*), Masked Owl (*Tyto novaehollandiae*), Sooty Owl (*Tyto tenebricosa*), Large-eared Pied bat, Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Eastern Coastal Freetail Bat (*Micronomus norfolkensis*), Little Bent-winged Bat (*Miniopterus australis*), Southern Myotis (*Myotis macropus*), Koala, Golden-tipped bat (*Phoniscus papuensis*), Grey-headed Flying fox, Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), and Eastern Cave Bat (*Vespadelus troughtonii*).

Four of the recorded fauna species are listed as Vulnerable under the EPBC Act; being the Koala, New Holland Mouse, Grey-headed Flying-fox and Large-eared Pied Bat.

One migratory species listed under the EPBC Act was identified during survey, Rufous Fantail.

2.5.5 Surface Water

Surface water drainage within the Subject Land is characterised by several 1st order ephemeral drainage lines forming within gullies. These drainage lines converge at lower elevations prior to flowing into Deep Creek and an unnamed 5th order ephemeral stream.

The proposed Quarry will, within its current footprint:

- Be located between two 1st order ephemeral streams, with limited disturbance to the main gully lines
- Intersect one 1st order, three 2nd order and a 5th order stream for the construction of access roads. Construction of the main access road will occur within the riparian buffer of Deep Creek, a 4th order stream
- Intersect one 1st order stream for the construction of the product stockpile area. Construction works will also occur within the riparian buffer of a 1st order ephemeral creek and Deep Creek
- Draw water from inline dams in 2nd and 3rd order ephemeral streams.

A surface water impact assessment (SWIA) of the proposed DCQ has been performed and the impacts are presented in Appendix J.

2.5.6 Ground Water

The quarry is to be developed on a rhyolite subvolcanic rock that was emplaced within sandstone and siltstone sediments. The rhyolite has no primary porosity, with groundwater only present in discontinuous fractures. Sandstones and siltstones with some primary porosity, in addition to fracture porosity, overlie and underlie the rhyolite.

The fractures in the sediments and rhyolite allow direct recharge from rainfall (estimated in the Water Sharing Plan to be 4% of rainfall) and flow of groundwater through the proposed quarry area. The rhyolite and underlying sediments are interpreted to be under semi-confined to confined conditions and are unlikely to have porosity of more than a few percent associated with fractures in the rhyolite and fractures and some pores in the sandstone.

The proposed quarry is estimated to have a low inflow of groundwater, due to the low permeability rhyolite rock type, which is the target material for quarrying. The sandstone and siltstone units overlying the rhyolite are generally above the water table, so are not all water-bearing, with the water table in the area varying from 30 to < 10 m below surface, from upslope to downslope locations.

A groundwater impact assessment of the proposed DCQ has been performed and the impacts are presented in Appendix P.

2.5.7 Acoustic

The existing acoustic environment within and surrounding the Subject Land is representative of a typical rural setting and characterised by anthropological noise coming from agricultural activities and the nearby road network, predominantly The Bucketts Way.

Topographic ridgelines surrounding the Subject Land provide natural noise attenuation shields with regard to the acoustic environment, and limit the overall area of the acoustic environment concerned. The location of nearby acoustic receptors in relation to the subject land are demonstrated in Figure 2.

A noise and vibration impact assessment of the proposed DCQ has been prepared with the impacts presented in Section 7.2 and Appendix Q.

2.5.8 Air Quality

The main sources of air pollutants in the area surrounding the quarry site would include emissions from existing active extraction operations, agricultural activities and anthropogenic activities such as wood heaters and motor vehicle exhaust.

Ambient air quality monitoring data from the quarry site are not available. Therefore, the available data from the nearest air quality monitors operated by the NSW Department of Planning, Industry and Environment (DPIE) at Beresfield and Mayfield were used to characterise the background levels for the proposal.

Of the ambient air quality monitors reviewed, the Beresfield monitoring site is the monitor located closest. The Beresfield site is located in an urban residential development and near a motorway, railway line and other industrial sources which would contribute to the measured level at this monitor.

In the absence of available data, estimates of the annual average background TSP and deposited dust concentrations can be determined from a relationship between PM_{10}, TSP and deposited dust concentrations and the measured PM_{10} levels.

This relationship assumes that an annual average PM_{10} concentration of 25µg/m^3 corresponds to a TSP concentration of 90µg/m^3 and a dust deposition value of 4g/m^2/month. This assumption is based on the NSW EPA air quality impact criteria.

Applying this relationship with the measured annual average PM_{10} concentration of 18.8µg/m^3 indicates an approximate annual average TSP concentration and deposition value of 67.5µg/m^3 and 3.0g/m^2/month, respectively.

An air quality impact assessment has been performed for the proposal and is available in Section 7.3 and Appendix H.

2.6 CULTURAL FACTORS

2.6.1 Aboriginal History

The Subject Land is located within the Karuah Local Aboriginal Land Council area. The Subject Land has been partially cleared for grazing. The study area comprises a narrow valley with the quarry and associated infrastructure to be located on the western side of Deep Creek. An access road is proposed to connect the quarry with The Bucketts Way to the east. The access road includes a crossing of Deep Creek and an un-named tributary.

The study area has not been the subject of previous cultural heritage assessment and there are no NSW Government Aboriginal Heritage Information System (AHIMS) sites within the study area.

A search of the NSW Government AHIMS system was conducted on 9 July 2020 for Lot 472 DP 1162208, Lot 48 DP 753178, Lot 551 DP 1238818 and the former Lot 552 DP 1238818 (now Lot 12 DP1277150) using a 200 m buffer. No Aboriginal sites or places are recorded in or near any of the aforementioned allotments.

An assessment of the proposed DCQ against the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales 2010 (Due Diligence Guideline) has been conducted (see

Table **2-4**). The assessment found that the proposed DCQ is located within 200 m of waters (intersects Deep Creek and several ephemeral drainage lines), with the proposed pit to intersect forested ridgelines. There are no caves or rock overhangs present and the historical logging activity has reduced the potential for modified trees to be present. The due diligence assessment found that further assessment by a specialist was required. As such, an Aboriginal Cultural Heritage Assessment Report was subsequently prepared to assess the impacts of the DCQ and the findings are presented in Appendix I.

Table 2-4: Assessment of the Proposed Quarry Against the Due Diligence Guideline

Step	Response
1) Will the activity disturb the ground surface or any culturally modified trees?	The proposed Quarry will disturb the ground surface. No known culturally modified trees are located within the Subject Land, however this does not preclude the existence of unknown modified trees.
2) Are there any:	
a) Relevant confirmed site records or other associated landscape feature information of AHIMS?	No sites recorded on the AHIMS database.
b) Any other sources of information of the which the person is aware?	No sites identified utilising the NSW Heritage Register or Great Lakes LEP.
c) Landscape features that are likely to indicate presence of Aboriginal objects?	The proposed quarry partially located on disturbed land but contains the following sensitive landscape features: • Is located within 200 m of waters • Parts of the proposed quarry have the capacity to impact upon ridgelines within the Subject Land. The proposed Quarry will not be located within 20 m of a cave, rock shelter or cave mouth.
3) Can you avoid harm to the object or disturbance of the landscape feature?	Given the topography of the Subject Land, the nature of the resource and quarrying activity, it is considered that complete avoidance of landscapes is not feasible.

2.6.2 European Heritage

A search of the Heritage NSW database and review of the Great Lakes LEP did not find any European Heritage sites within 1 km of the Subject Land (NSW Office of Environment and Heritage 2018).

The World Heritage List, Commonwealth Heritage List and National Heritage List have been reviewed. There are no historic, cultural or natural resource heritage values on these lists either on the Subject Land nor have the potential to be impacted by the proposed Quarry (Department of Environment and Energy 2018; Department of Environment and Energy 2018; United Nations Educational, Scientific and Cultural Organization 2018).

In order to establish whether any heritage items have been previously recorded within the study area, searches were undertaken of statutory and non-statutory heritage registers and schedules including the State Heritage Inventory, *Environment Protection and Biodiversity Conservation Act 1999* (National Heritage List, Commonwealth Heritage List), Australian Heritage Database (Department of the Environment), Great Lakes Local Environmental Plan 2014 (LEP) and the non-statutory Register of the National Estate and Register of the National Trust of Australia (NSW).

These searches did not result in finding any heritage items within or in the immediate vicinity of the Subject Land. The closest recorded items are listed on the Great Lakes Local Environmental Plan 2014 and include dwellings, bridges, community facilities, mills and wharves. None of these recorded items are within ten kilometres of the study area. Booral is located approximately ten kilometres north-east of the study area and thirteen items are listed on the LEP (including Gundayne House which is listed on the State Heritage Register). Carrington is located approximately sixteen kilometres south-east of the study area and has six items listed on the LEP (including Tahlee Estate which is listed on the State Heritage Register). Karuah is located thirteen kilometres south of the study area and has three items listed on the Port Stephens LEP.

Given the distance to any known historic heritage sites, no impacts are expected. Nonetheless, a historic heritage impact assessment has been prepared for the DCQ and is presented in Appendix R.

2.7 SOCIO-ECONOMIC FACTORS

2.7.1 *Community Profile*

Social Profile

The local area is defined as the area covered by the Limeburners Creek SSC and Allworth SSC. The wider regional area includes the localities of Bulahdelah, Stroud, Port Stephens and Dungog. These areas are listed in Table 2-5.

Table 2-5: Localities related to the Proposed Development

Study Area	Geographic area	ABS data category	Referred to as
Local study area	Limeburners Creek Allworth	SSC SSC	Local area
Regional study area	Bulahdelah – Stroud Port Stephens Dungog	SA2 SA3 SA2	Regional area
State of New South Wales	NSW State	NSW STE	NSW

According to the 2016 Census of Population and Housing, the local area had a total population of 502 people (ABS 2016). These residents are considered the immediate neighbours and are most likely to be directly impacted by the proposed works.

The 'regional area' had a 2016 population of 85,079. Analysis of ABS data shows that the population of the 'regional area' has been increasing at a lower rate than NSW from 2006-2016. The 'local area' population has grown at a higher rate than the 'regional area', and more in line with NSW.

A Social Impact Assessment (SIA) has been performed for the proposal and is presented in Appendix S. The SIA provides a full description of the community profile and social baseline within the local and regional areas.

Economic Profile

The market identified by DCQ for its products were subject to a Local Effects Analysis (LEA) (Appendix N). This market place is defined as the aggregation of the following Statistical Analysis areas (SA3s):

- Great Lakes
- Taree-Gloucester
- Lower Hunter
- Port Stephens
- Maitland
- Newcastle
- Lake Macquarie – East
- Lake Macquarie – West.

This 'Catchment' was chosen as it encompasses the main market as well as the key source markets for goods/ labour for DCQ and is also represented by a 100-kilometre radius.

The LEA has shown the following:

- The 'Catchment' has recorded consistently lower population growth than the State over the seven years to 2019. Population growth in the 'catchment' is anticipated to remain lower than the State to 2041.
- The 'Catchment's' economy has recorded consistent annual growth
- Quarry activity will be supported by the significant developments in the Hunter region and in the broader 'Catchment' over the coming years
- Population serving sectors were the top employers in 2018-19
- Unemployment in the 'catchment' has recovered from peak levels in 2015
- The 'Catchment' is both highly self-sufficient and self-contained
- Demand for rental stock has remained steady in the 'Catchment', whilst more subdued demand is evident in the housing market
- Vacancy rates are higher the 'Catchment' than New South Wales on average.

An economic impact assessment has been performed for the DCQ and is presented in Appendix N.

2.8 Existing and Surrounding Land Use

The Subject Land is located in a rural environment (zoned RU2 – Rural Landscape under the Great Lakes LEP), along a major arterial road (The Bucketts Way) servicing traffic between townships to the north and the Pacific Highway to the south. Existing significant noise sources in the locality are restricted to vehicle movement along The Bucketts Way and existing agricultural activities.

Along with existing cleared paddocks for agricultural use natural aesthetic qualities of the landscape are present, with the local landscape surrounding the Subject Land dominated by forested ridgelines. The forested ridgelines offer natural screening to some environmental impacts (visual and noise) from the operations of the proposed quarry.

The area surrounding DCQ is characterised by partially cleared valley floors and lower slopes used for agricultural grazing and private dwellings. The ridgelines are all vegetated. The proposed quarry site is not visible from any dwellings in the area. Visibility of the quarry from The Bucketts Way is not possible due to the hill in between and therefore only the front part of the internal access road and the new intersection at The Bucketts Way will be visible by the public.

2.8.1 Surrounding Residential Properties and Land Uses

Anthropological land use within 1 km of the Subject Land comprises the following:

- Large lot private properties and associated dwellings
- Private businesses

- Farming (primarily beef cattle grazing)
- Utility easements (e.g. powerline)
- Maintained private accessways, fire trails, public roads and trails.

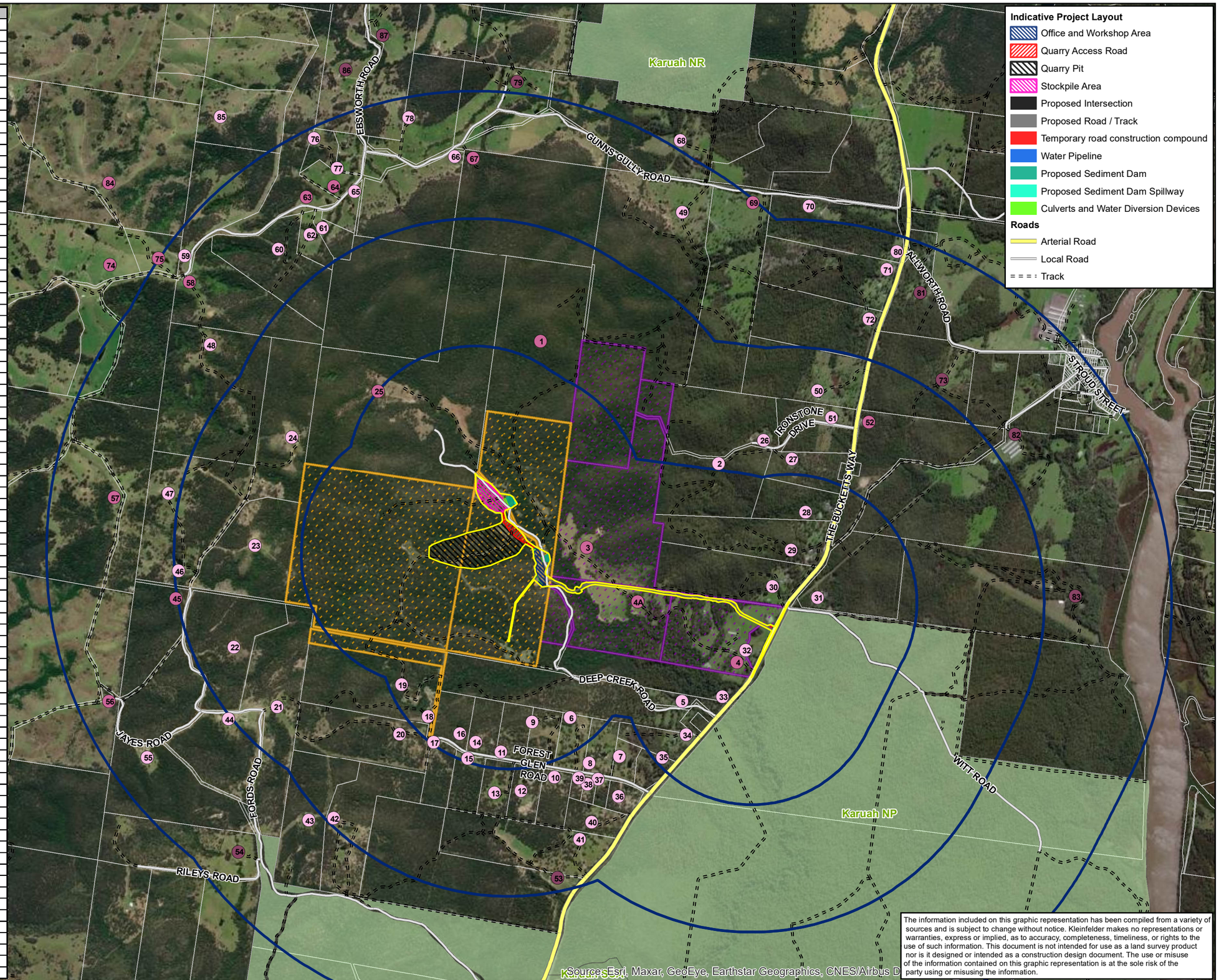
The Karuah State Conservation Area and Karuah National Park are located approximately 2.1 km south east of the proposed quarry pit. The private access road and The Bucketts Way intersection is located immediately to the west of the far northern extent of the National Park.

The Subject Land is located 297 m from the nearest residential receptor (R30, See Figure 2). This is a dwelling located north of the proposed access road. The proposed access road has been designed to maximise the distance to this dwelling.

The nearest dwelling, (R3) to the proposed extraction area is located 458 m east of the pit. IDPL have an agreement with this landholder with an option to purchase should project approval be granted, thus removing any impacts to the receptor. The nearest privately owned residential receptor is 1020 m (R19) to the south of the extraction area. Noise, vibration and air quality impacts have been found to be within regulatory acceptable limits.

There are a total of 87 residential receptors (known or potential dwellings) within 3 km of the Subject Land (including the proposed access road and quarry infrastructure). Receptors are spread throughout all directions surrounding the Subject Land, with the largest density of dwellings along Forest Gen Road to the south of the proposed project which provides access to 20 dwellings. Twenty two (22) dwellings are within 1 km of the Subject Land (including site infrastructure and the access road). The residential receptors are displayed in Figure 2.

Receptor ID	Address
1	NO ADDRESS
2	81 IRONSTONE DR, ALLWORTH
3	DEEP CREEK RD, LIMEBURNERS CREEK
4	1277 THE BUCKETTS WAY, LIMEBURNERS CREEK 2324
5	32 DEEP CREEK RD, LIMEBURNERS CREEK
6	62 FOREST RD. LIMEBURNERS CREEK
7	33 FOREST GLEN RD, LIMEBURNERS CREEK 2324
8	52 FOREST GLEN RD, LIMEBURNERS CREEK
9	82 FOREST RD, LIMEBURNERS CREEK
10	75 FOREST GLEN RD, LIMEBURNERS CREEK 2324
11	124 FOREST ROAD, LIMBEUNRERS CREEK
12	89 FOREST GLEN RD, LIMEBURNERS CREEK 2324
13	111 FOREST GLEN RD, LIMEBURNERS CREEK 2324
14	148 FOREST RD, LIMEBURNERS CREEK
15	151 FOREST GLEN RD, LIMEBURNERS CREEK 2324
16	160 FOREST GLEN RD, LIMEBURNERS CREEK
17	173 FOREST GLEN RD, LIMEBURNERS CREEK
18/19	180 FOREST GLEN RD, LIMEBURNERS CREEK 2324
20	181 FOREST GLEN RD, LIMEBURNERS CREEK
21	385 FORDS RD, LIMEBURNERS CREEK
22	464 FORDS RD, LIMEBURNERS CREEK
23	586 FORDS RD, LIMEBURNERS CREEK 2324
24	663 FORDS RD, LIMEBURNERS CREEK 2324
25	335 DEEP CREEK RD, LIMEBURNERS CREEK
26	80 IRONSTONE DR, ALLWORTH
27	73 IRONSTONE DR, ALLWORTH 2425
28	NO ADDRESS
29	1341 THE BUCKETTS WAY, ALLWORTH 2425
30	1281 THE BUCKETTS WAY, ALLWORTH 2425
31	1284 THE BUCKETTS WAY, ALLWORTH 2425
32	1225 THE BUCKETTS WAY, LIMEBURNERS CREEK 2324
33	1195 THE BUCKETTS WAY, LIMEBURNERS CREEK 2324
34	1157 THE BUCKETTS WAY, LIMEBURNERS CREEK
35	33 FOREST GLEN RD, LIMEBURNERS CREEK 2324
36	NO ADDRESS
37	39 FOREST GLEN RD, LIMEBURNERS CREEK 2324
38	51 FOREST GLEN RD, LIMEBURNERS CREEK 2324
39	59 FOREST GLEN RD, LIMEBURNERS CREEK 232
40	1075 THE BUCKETTS WAY, LIMEBURNERS CREEK 2324
41	1017 THE BUCKETTS WAY, LIMEBURNERS CREEK 2324
42	190 FORDS RD, LIMEBURNERS CREEK 2324
43	196 FORDS RD, LIMEBURNERS CREEK
44	401 FORD RD, LIMEBURNERS CREEK
45	384 FORDS RD, LIMEBURNERS CREEK
46/47	"OCEAN & EARTH FARMSTAY" 560 FORDS RD, LIMEBURNERS CREEK 2324
48	660 FORDS RD, LIMEBURNERS CREEK
49	171 GUNNS GULLY RD, ALLWORTH
50	1479 THE BUCKETTS WAY, ALLWORTH 2425
51	18 IRONSTONE DR, ALLWORTH 2425
52	1378 THE BUCKETTS WAY, ALLWORTH 2425
53	"FOREST GLEN FARM" 1013 THE BUCKETTS WAY, LIMEBURNERS CREEK 2324
54	265 FORDS RD, LIMEBURNERS CREEK 2324
55	53 JAYES RD, LIMEBURNERS CREEK 2324
56	450 JAYES RD, GLEN MARTIN
57	452 GLEN MARTIN RD, GLEN MARTIN
58	10 EBSWORTH RD, LIMEBURNERS CREEK
59	1428 EBSWORTH RD, BOORAL 2425
60	1361 EBSWORTH RD, BOORAL
61	1211 EBSWORTH RD, BOORAL
62	1217 EBSWORTH RD, BOORAL
63	1338 EBSWORTH RD, BOORAL
64	1166 EBSWORTH RD, BOORAL
65	1169 EBSWORTH RD, BOORAL
66	403 GUNNS GULLY RD, BOORAL
67	401 GUNNS GULLY RD, BOORAL
68	180 GUNNS GULLY RD, BOORAL 2425
69	125 GUNNS GULLY RD, ALLWORTH
70/80	1575 THE BUCKETTS WAY, ALLWORTH 2425
71	1569 THE BUCKETTS WAY, ALLWORTH 2425
72	1511 THE BUCKETTS WAY, ALLWORTH 2425
73	100 ALLWORTH RD, ALLWORTH 2425
74	1420 GLEN MARTIN RD, GLEN MARTIN 2321
75	1448 EBSWORTH RD, GLEN MARTIN 2321
76	52 JINDALEE RD, PORT MACQUARIE
77	1160 EBSWORTH RD, BOORAL
78	448 GUNNS GULLY RD, BOORAL
79	350 GUNNS GULLY RD, BOORAL
81	38 ALLWORTH RD, ALLWORTH 2425
82	72 LARPENT ST, ALLWORTH 2425
83	1282 THE BUCKETTS WAY, ALLWORTH 2425
84	500 GLEN MARTIN RD, GLEN MARTIN
85	1398A EBSWORTH RD, BOORAL 2425
86	1092 EBSWORTH RD, BOORAL
87	1031 EBSWORTH RD, BOORAL



Legend

- Buffers (1, 2, 3 km)
- Project Boundary
- Lot Boundaries
- National Park
- Ironstone Development Pty Ltd Owned
- Agreement with Ironstone Development Pty Ltd

Receptor Locations

- Existing Receptor
- Potential Future Receptor
- Existing Receptor (outside domain)

0 0.25 0.5 1 1.5 2 km

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N

PROJECT REFERENCE:	20203112
DATE DRAWN:	2021/10/21 14:03 Version 1
DRAWN BY:	GJoyce
DATA SOURCE:	NSW DFSI - 2021 NSW DPIE - 2020

Residential Receptors Surrounding the Subject Land

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek, NSW

FIGURE: **2**

L:\GIS FOLDER\00 CLIENT FILES\124371_IronstoneDev_Woodbury\20203112_DeepCreekQuarry_EIS\Mapping\20203112_EIS_Fig02_NoiseModelDomainV6_Buffers.mxd

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PROPOSED PROJECT

Deep Creek
QUARRY

3 PROPOSED PROJECT

3.1 THE SITE

The Subject Land is a greenfield site that will require the installation of new fixed infrastructure to service the quarry. While a significant proportion of the Subject Land has been previously cleared due to previous logging and agricultural land use, some clearing will need to be performed to allow for construction of the site infrastructure.

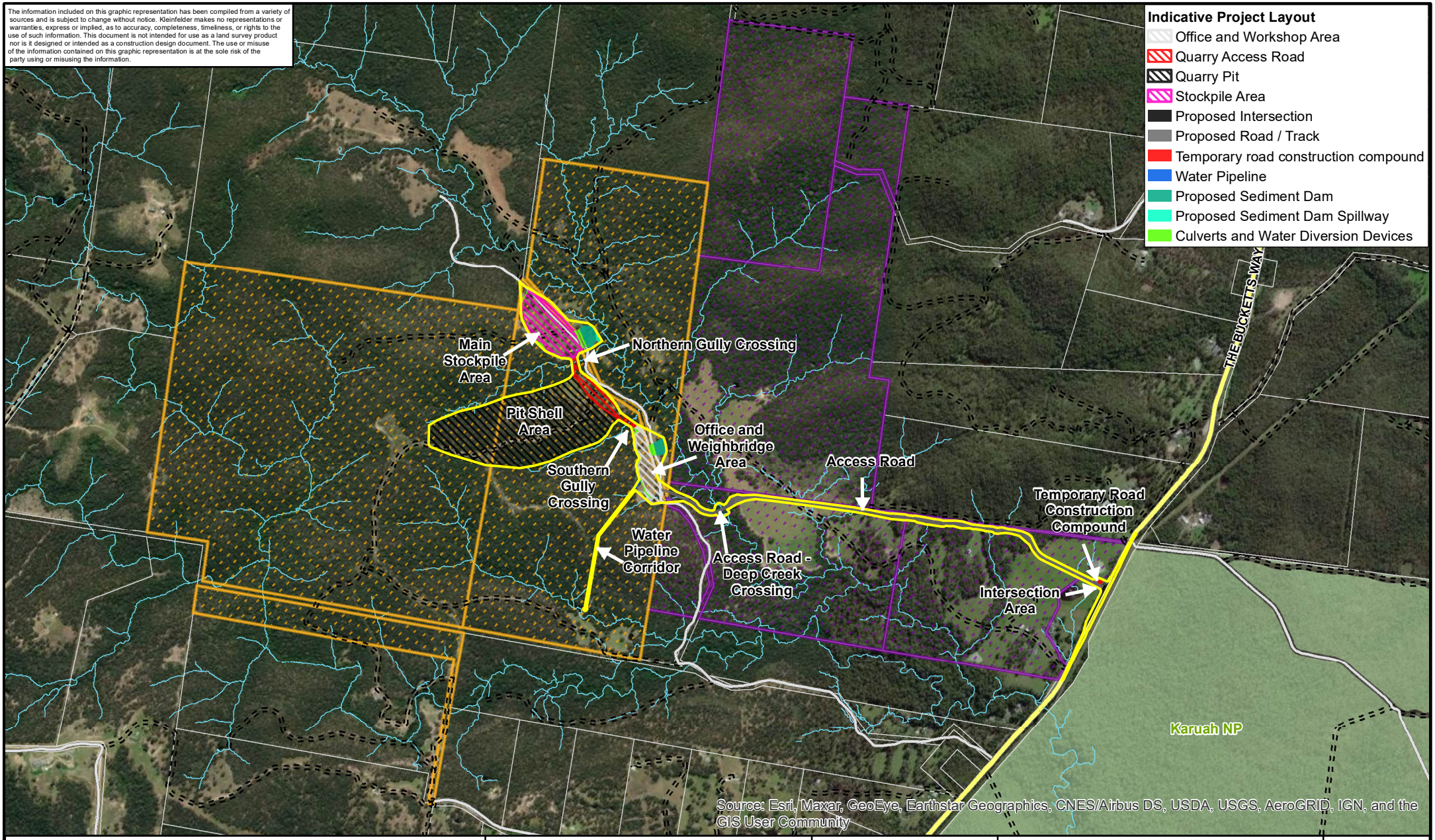
See Figure 1 for the location of the Subject Land and Figure 3 for the proposed infrastructure layout. The site establishment process is described further in Section 3.2.1.

3.2 PROJECT DESCRIPTION

IDPL seeks approval under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* for the construction and operation of the DCQ. The extraction footprint of the quarry has been determined following resource mapping undertaken by VGT Pty Ltd between 2013 and 2018 and consideration of environmental constraints particularly ecological constraints from site surveys undertaken by Kleinfelder Australia Pty Ltd (Kleinfelder) starting in 2016.

While the total hard rock resource within the proponent's landholding is considerably larger than the amount targeted, in order to focus the quarry on the highest value rhyolite product and mitigate potential impacts, a resource of approximately 12 million tonnes (MTs) is proposed to be extracted.

The primary target material for the quarry will be a high quality rhyolite resource aimed at satisfying TfNSW demand for high friction road aggregates. While the project targets durable high friction rhyolite, the wider resource also comprises moderately durable trachyte, durable arenite and quartz trachyte, with a secondary resource containing a decorative dimension stone.



Legend

- Project Boundary
- Lot Boundaries
- Ironstone Development Pty Ltd Owned
- Agreement with Ironstone Development Pty Ltd
- DEM Derived Creek Lines
- National Park
- Arterial Road
- Local Road
- Track

km 0 0.1 0.2 0.4 0.6 0.8 1

N

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PROJECT REFERENCE:	20203112
DATE DRAWN:	2021/10/21 13:56 Version 1
DRAWN BY:	GJoyce
DATA SOURCE:	NSW DFSI - 2018 NSW DPIE - 2020 Wedgetail – 2021

Layout of the Proposed Development

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek, NSW

FIGURE: **3**

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3.2.1 Site Establishment and Access Roads

Detailed civil design drawings for site, including the new access road and intersection, are provided in Appendix B. These provide a detailed visual reference to the text that follows.

Site Access

Access to the quarry will be via a new dedicated quarry access road constructed within a portion of land to be subdivided from Lot 551 and Lot 12 DP1277150. While legal access to the property is currently possible via Deep Creek Road and Forest Glen Road, to minimise impacts on dwellings and the environment a new shorter and more direct access road has been designed. The new road will connect to a new intersection onto The Bucketts Way north of Deep Creek Road and south of Witt Road (See Figure 3). Other alignments were considered but the selected option moved the alignment into a previously partially cleared area for grazing, and further away from the nearest dwelling, increasing the distance from the road to the nearest residential receptor from 131 m to 297 m and reduced environmental impacts. The access road will be a sealed (e.g. two coat bitumen) two lane road to be suitable for the longevity of service required.

The new intersection to The Bucketts Way will be constructed as per Austroads Guide to Road Design and will consist of a T-intersection which will operate as a rural give way controlled Channelised right turn (CHR) / Auxiliary left turn (AUL) T-intersection. It will provide an acceleration lane 370 m long for vehicles exiting the quarry in a southbound direction, and a right turn lane for vehicles entering the quarry from a northbound direction. An overview of the design for the intersection is provided in Figure 4. The right turn and acceleration lane remove potential conflict between southbound through traffic and traffic entering or leaving the proposed quarry access. Double barrier lines will prohibit overtaking in the southbound approach to the proposed intersection. A Road Safety Audit (available in the TIA, Appendix K) has determined sight distance to and from the south of the proposed quarry access is satisfactory.

New Access Road and Intersection Construction Activities

It is a priority to establish the access road site compound to off load heavy machinery for work on the access road and within the quarry site. The following is anticipated to occur:

- The access road corridor will need to be surveyed and fenced
- An initial track will be established through the access road alignment for the movement of heavy machinery such as Dozer's, Excavator's, Dumper's and Front End Loader's onto site then work will continue on the access road and within the quarry site.

Site Establishment and Construction Activities

Prior to commencement of extraction, construction activities are required to provide the necessary site infrastructure to allow for a safe and efficient quarrying project. Once constructed, all traffic will use the newly constructed access road, however until the access road construction is completed (approximately 12 weeks) other access routes may need to be used. Given the limitations of the existing access, the intent will be to access the site as follows during construction:

- Access to the new access road and intersection construction compound will be off The Bucketts Way, with a Traffic Management Plan to be developed.
- Given the need to construct the Deep Creek crossing on the new access road, access to the quarry side of Deep Creek during construction may be required and may require floating of approximately five pieces of heavy machinery via Forest Glen Road. Machinery will be unloaded near the end of Forest Glen Road and driven across the IDPL owned property. Forest Glen Road has creek crossings suitable for heavy vehicles, Deep Creek Road is not suited to heavy vehicles.

Importantly, Forest Glen Road and Deep Creek Road will not be used for:

- Haulage of gravel products from the quarry or importing gravels, other than those used in maintaining Deep Creek Road to its existing condition
- Day to day access for staff, or other vehicles once the access road and intersection construction has been completed..

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NORTHROP

Metres
0 5 10 20 30 40 50

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DRAWN BY: GJoyce

DATA SOURCE:
Northrop - 2021
NSW DFSI - 2021

Layout of the Proposed New Intersection with The Bucketts Way

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek, NSW

FIGURE:
4

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Deep Creek Road

The following is anticipated to occur:

- Machine operators (approximately 5) working on the quarry site will use this road daily to enter and exit site
- A rigid (6 wheeler) water truck will travel to and from the quarry site for dust suppression as required
- A rigid fuel truck will enter and exit the site daily (normally once per day) to fuel the onsite machinery
- Other heavy machinery support vehicles such as a mechanic or tyre repair / replacement vehicle will use this road as required
- Regulator officers, consultants, construction workers and supervisors will enter and exit as required
- Once the new quarry access road is operational it will be used as site access for the above items
- Road Gravel if required will be delivered by rigid (6 wheeler) vehicles for normal road maintenance to ensure safety for all road users, material would be placed by a positrak, and potentially a grader and roller
- DCQ project site specific inductions will be given to workers and delivery / service vehicle drivers using this road and will cover a required maximum speed of 40 kms per hour and communication for trucks via a UHF Radio
- Appropriate temporary road signage will be in place such as speed limits, two way traffic and UHF channel number
- Due to the small timber bridge on Deep Creek Road this access will not be used for movements of heavy machinery
- This road will not be used for trucks hauling products out of the operational quarry
- This access road will continue to be an access road for properties off Deep Creek Road and for emergency access if required for the likes of the Rural Fire Service.

Forest Glen Road

There is a possibility that some heavy machinery may need to be delivered by float (with a vehicle escort if required) to or be collected from the quarry site during the construction phase (if the new access road is not operational due to construction work progress and /or the main creek crossing culvert installation).

This road will not be used for trucks hauling products out of the operational quarry.

This road is a legal access and will continue to provide an alternative property access and emergency access if required for the likes of the Rural Fire Service.

3.2.2 Plant and Equipment

The following plant is anticipated to be used at DCQ during operations:

- Two 972 Loaders
- Two 40-ton Dumpers
- One 33-ton excavator.

The following equipment will be required for production:

- Mobile crusher's and screens
- Conveyor and loading infrastructure.

To support operations the following fixed infrastructure will be required:

- Workshop
- Sheds
- Offices
- Weighbridge
- Fencing
- Tarping Area
- Wash and Trimming Bays.

This fixed infrastructure will be within the infrastructure area displayed on Figure 3.

Mobile infrastructure may include:

- Solar and Diesel Generators (no connection to grid)
- Water pumps, tanks and pipes
- Waste and Sewage (pump out toilets, no mains sewage connection)
- Communications (phone line).

3.2.3 Employment

The construction phase is estimated to support 18 Full Time Equivalent (FTE) jobs for residents in the local catchment/region, eight of which will be supported directly with a further 10 FTE jobs supported through flow-on activity. This is estimated to support a total of $1.9 million in wages and salaries.

During operations, up to 10 full time staff will be employed at the quarry. The quarry is estimated to support an average of 24 FTE jobs annually in the local catchment/region, 10 of which will be supported directly by the quarrying and processing activities (i.e. on site through IDPL) and 14 through flow-on activity. This is estimated to support a total of $2.0 million in wages and salaries.

An economic assessment has been completed and is presented in Appendix N. The assessment provides further detail on employment and the associated economic impacts of the quarry.

3.2.4 Hours of Operation

Construction of intersection, access and workshop and office:

- 7:00am to 5:00pm Monday to Friday, 8:00am to 1:00pm Saturday
- No works on Sunday or public holidays.

Quarrying Operations (crushing and processing):

- 7:00am to 5:00pm Monday to Friday, 8:00am to 1:00pm on Saturday
- No quarrying on Sunday or a Public Holiday.

Loading and dispatch of product trucks:

- 6:00am to 6:00pm Monday to Friday, 6:00am to 1:00pm Saturday
- No works on Sunday or public holidays.

Maintenance:

- May be conducted at any time, provided that these activities are not audible at any privately-owned residence if outside of the operational hours.

3.2.5 Transport

The project will generate an average of 55 laden trucks per day in order to meet peak production rates, with a maximum of 25 laden trucks per hour in peak periods. Up to ten vehicles of employees would be expected to arrive and depart within 1 hour of opening and closing.

The project is seeking to extract up to 500,000 tpa and is expected to operate 5.5 days per week. Therefore, the average quantity hauled, using 32 ton truck and dog haulage vehicles, is estimated to be an average of 10,200 tonnes per week or 1,800 tons per day. The tonnage per day would vary greatly however a maximum of 4,000 tons could be supplied on any given day based on demand. This maximum quantity would equate to a maximum peak of approximately 110 haulage vehicles leaving the quarry on a peak demand day and approximately 55 haulage vehicles on an average day. The highest peak hour traffic volume would be no greater than 25 laden haulage vehicles exiting in a peak hour based on loading / weighing dispatch times. It is important to note this will not occur every day and every hour but would be a short-term peak associated with a number of concurrent major orders. The project will be required to operate within extraction limits of 500,000 tpa.

A Traffic Impact Assessment has been performed and is presented in Appendix K.

3.2.6 Extraction and Processing Method

Drilling and Blasting

A traditional Drilling and Blasting technique, similar to techniques used widely and successfully at other hard rock quarries, will be used to facilitate extraction. This technique is used commonly in the industry to remove rock from the resource to allow for processing.

A typical 9000kg blast will enable processing of up to 30,600 tonnes of material. Blast parameters will be adjusted to suit conditions for each individual blast. Up to 25 blasts per year will therefore be required to meet the peak production rate of 500,000 tpa, which equates to an average peak interval of 1 blast every 3.25 weeks assuming a consistent extraction rate. Actual frequency will be campaign led and time between blasts may be longer prior to reaching maximum extraction rate.

Professional Drill and Blast contractors will design a blast suitable for the rock characteristics, rock density, bench height and size of the blast (tonnes to be blasted), the holes (drilling pattern and spacing) are marked out on the drilling area (quarry bench) and drilling can commence.

Appropriate notifications of the intended blast are made prior to the day of the blast, once all of the holes are drilled, they will be loaded with explosives, at the appropriate time quarry personnel, drivers of road haulage trucks and quarry machine operators as well as machinery will move to a nominated area a safe distance from the intended blast. Communications are maintained by UHF radio, Blast Guards (nominated quarry personnel) block off access roads to ensure no one ventures into the exclusion area. Once the blast has been done the drilling contractor will inspect the blasted material (shot) and once deemed safe will announce that it is safe to re-enter the quarry. The blast is monitored with vibration equipment.

Blasting will occur within the operational hours described above, and will not be performed on weekends or Public Holidays, nor when adverse weather conditions are prevailing.

A Noise and Vibration Impact Assessment has been performed and is presented in Section 7.2 and Appendix Q.

Processing

Following blasting, the extracted resource material will require processing, which will be performed on the pit floor. Some material will be stockpiled adjacent to the pit floor for sale and the premium products will be relocated to the main stockpile area in the north of the quarry site as required.

Machinery will be used to crush the blasted material which is referred to as the shot or raw feed. An excavator loads (feeds) a mobile crusher hopper/feed bin directly at the shot or if the crusher is located further away it loads dumpers to haul the material to the crusher, large rocks will block the crusher so they are put aside for sale as large rock and can be broken down by machinery to smaller sizes later as required. Large rock is stockpiled for sale in the adjacent pit floor area. Quarries will often haul material from multiple benches (shots) to ensure product consistency is achieved.

From the Hopper/feed bin raw feed passes over a feeder which regulates the speed (the optimal amount of material to efficiently process) while also extracting the initial fine material from the blasted rock which is sold as road base, the remaining coarse rock passes through a Jaw crusher which reduces the size so it can pass through a Cone crusher which reduces its size further until the desired sizes are obtained. If required a shaping crusher is included in the circuit to produce a better shaped aggregate.

Once the material passes through the crushers it travels by conveyor belt to the various screens that shake and size the material for end use such as 20 mm, 14 mm, 10 mm, 7 mm aggregates and Crusher Dust.

The various sizes of material (final products) exit the screens onto conveyors and are discharged onto the ground. If a Gabion rock product 75 mm to 150 mm or 150 mm to 250 mm is required, it is screened off early in the process.

A front end loader moves the material from the small stockpiles under the conveyors either to an adjacent stockpile within the extraction area, loads it onto a dumper to haul the material to the Main Stockpile area for loading onto road trucks as required or loads it directly onto road trucks for weighing and dispatch.

A water truck is to be used on internal quarry haul roads for dust suppression and water sprays are used on conveyors and at material discharge points for dust suppression as required.

3.2.7 Staging Overview

The DCQ will be excavated from North to South across the extraction area as per the staging depicted in Figure 5 to Figure 9 over a period of up to 30 years, with demand for resource dictating the extraction rate of up to 500,000 tpa. The production schedule is described further in Section 3.3.

Extraction will commence following the initial construction phase of the project. The bulk of the extraction works will occur in stages 1 – 3. This will follow a logical and efficient progression of quarrying with consideration for stability and safety (benching, see Section 3.2.10), while allowing opportunity for progressive rehabilitation. Figure 5 to Figure 9 illustrate the extent of this process for each stage. Stage 4 represents the final stage of extraction and processing the material, see Figure 8.

Construction

The Construction phase will occur at the beginning of the project in Year 1 with works expected to take approximately 12 weeks. The precise duration will be dependent upon prevailing conditions to ensure safe operations and to maintain compliance with any conditions of consent. The construction phase will include the internal road works and intersection, construction of the offices, workshop, stockpile areas and infrastructure to support the commencement of extraction. This will provide the infrastructure needed to begin the aggregate extraction. In total up to 12.8 ha of the project area would be disturbed during construction.

Following the construction period in Year 1, staging will be as follows:

Stage 1 (Years 1-5)

Stage 1 would see approximately 6.7 ha of the total extraction area undergoing extraction or processing and stockpiling. Stage 1 is unlikely to present any opportunity for progressive rehabilitation due to ongoing disturbance within the stage 1 footprint. In total up to 17 ha would be disturbed by the end of Stage 1.

Stage 2 (Years 5 to 11)

Stage 2 would see approximately 14.4ha of the total extraction area undergoing extraction and processing stockpiling. Due to the ongoing expansion of the extraction area the requirement to ramp up processing in line with the forecast production schedule (Section 3.3) Stage 2 does not offer any significant opportunity for progressive rehabilitation due to ongoing disturbance within the Stage 2 footprint. In total up to 24.8 ha of the project area would be disturbed or modified up to the end of Stage 2 (including stockpiles and site infrastructure).

Stage 3 (Years 11 to 21)

Stage 3 will see approximately 17.7 ha of the total extraction area having undergone extraction and processing or stockpiling. As the extraction campaign progresses, progressive rehabilitation will be performed as per the progression depicted in Check Stage 3 of the project sees the completion of extraction in the west of the pit area, and will present opportunity for progressive rehabilitation to occur over an area covering approximately 7.2 ha of the 17.7 ha disturbed to date within the extraction area. In total up to 28.1 ha of the project area would be disturbed up to the end of Stage 3 (including stockpiles and site infrastructure).

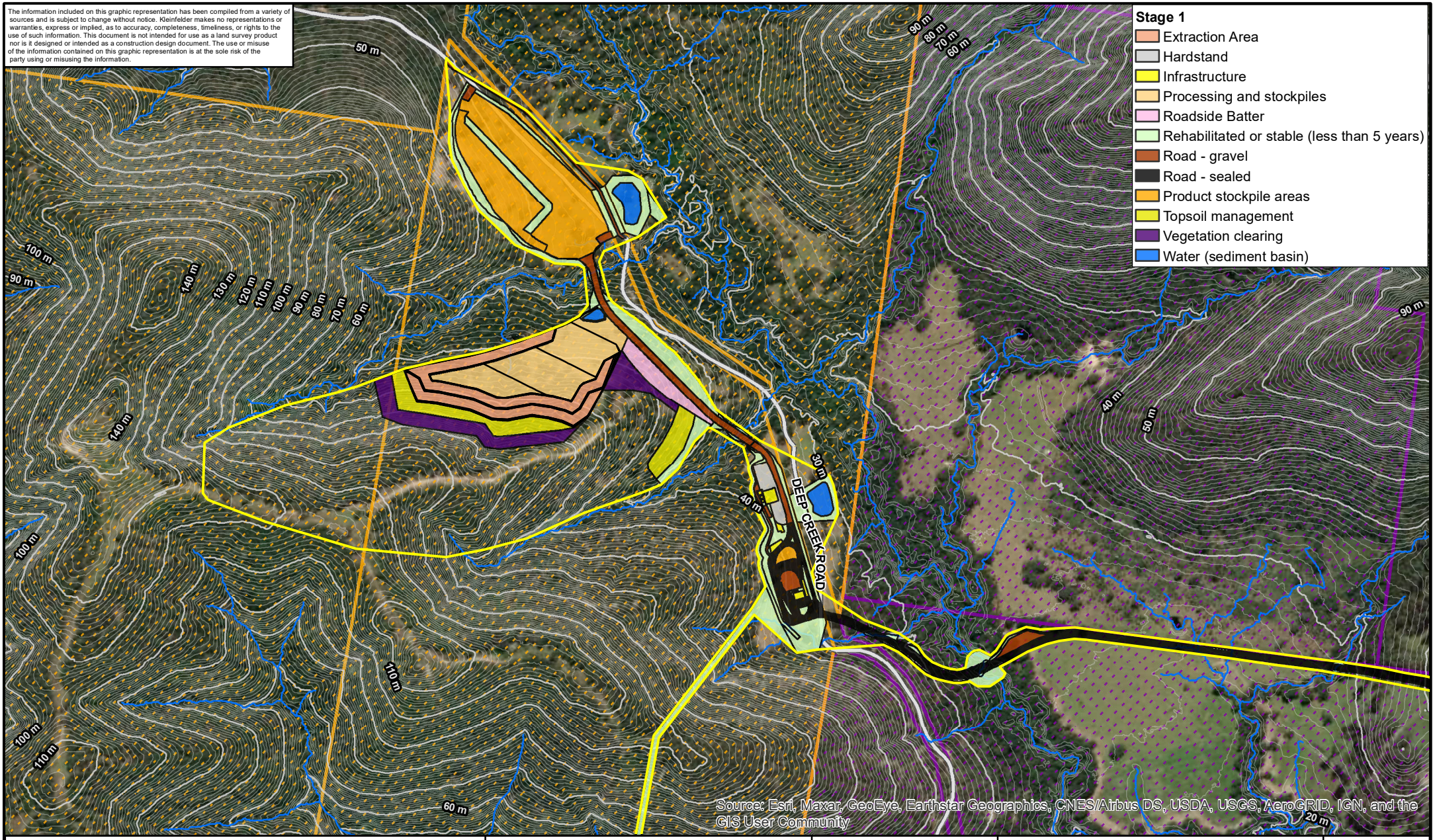
Stage 4 (Years 21 to 30)

Stage 4 represents the final stage of extraction and significant rehabilitation being performed across the majority of the extraction area, prior to achieving final landform after the cessation of extraction. The Stage 4 extraction area will present opportunity for significant progressive rehabilitation to occur over an area covering approximately 6.4 ha within the extraction area, which along with the with 7 ha already commenced rehabilitation in Stage 3,

sees 13 ha of the total 18 ha extraction area forecast to be rehabilitated by completion of Stage 4. In total up to 28.6 ha of the project area would be disturbed up to the end of Stage 4 (including stockpiles and site infrastructure).

Final Landform

Following completion of the extraction campaign and the progressive rehabilitation of up to 13 ha of the extraction area in Stage 4, the remaining area will be rehabilitated to the final landform. The objective of the final landform is to return the land to it's current attributes which is to a stable, safe, non-polluting landform able to support self-sustaining native vegetation and agriculture in the form of pasture for grazing. A Rehabilitation Strategy has been developed for the quarry and is presented in Appendix T.



Legend

- Project Boundary
- Ironstone Development Pty Ltd Owned
- Agreement with Ironstone Development Pty Ltd
- Local Road
- DEM Derived Creek Lines
- 1m Contours
- 10m Contours

Metres
0 25 50 100 150 200 250

N

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NSW DFSI - 2018
NSW DPIE - 2020
Wedgetail – 2021
Engeny – 2021

Stage 1 of Development

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek, NSW

FIGURE:
5

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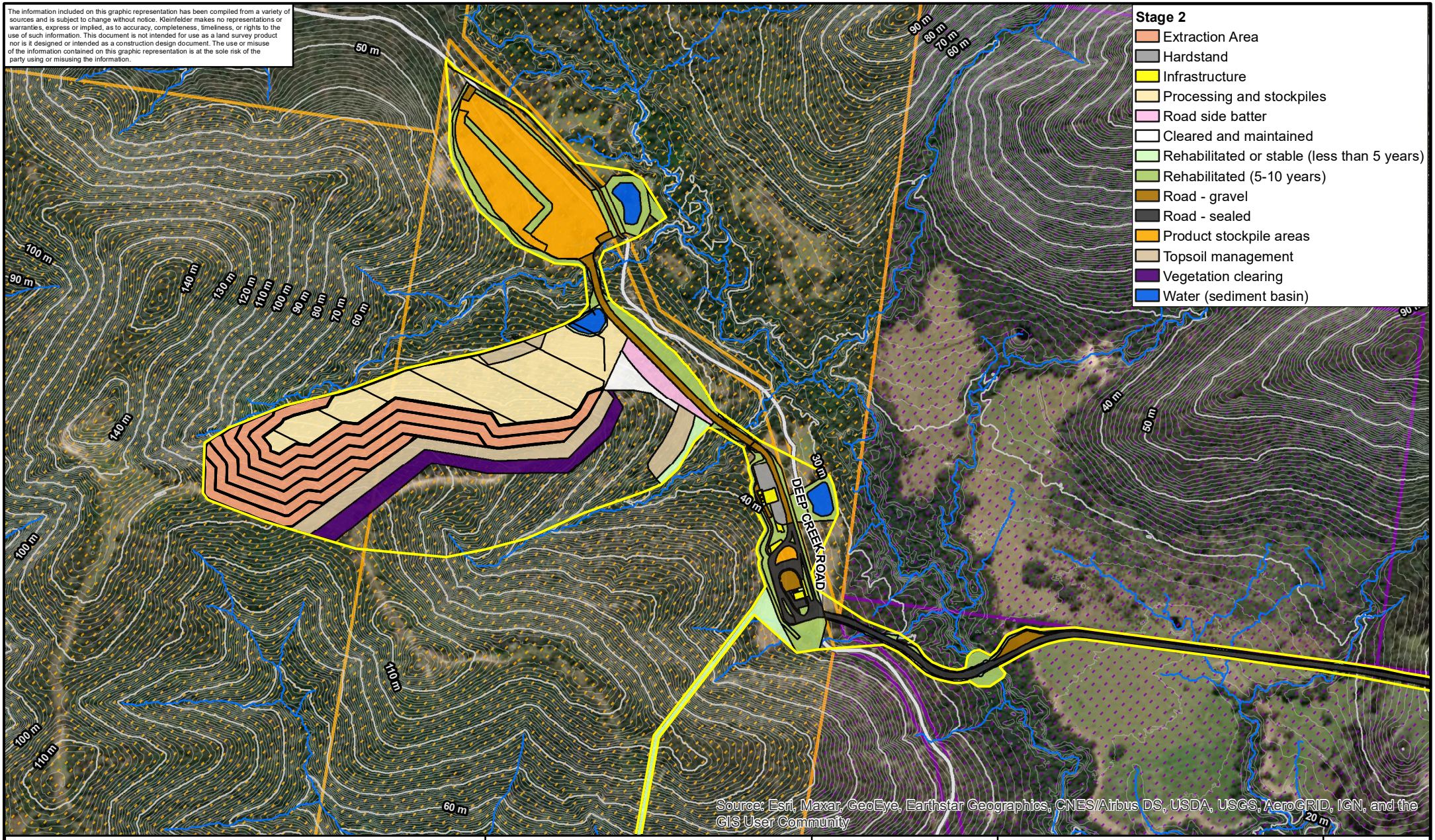

Legend

- Project Boundary
- Ironstone Development Pty Ltd Owned
- Agreement with Ironstone Development Pty Ltd
- Local Road
- DEM Derived Creek Lines
- 1m Contours
- 10m Contours

Metres
0 25 50 100 150 200 250

N

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Stage 2 of Development

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek, NSW

FIGURE:

6

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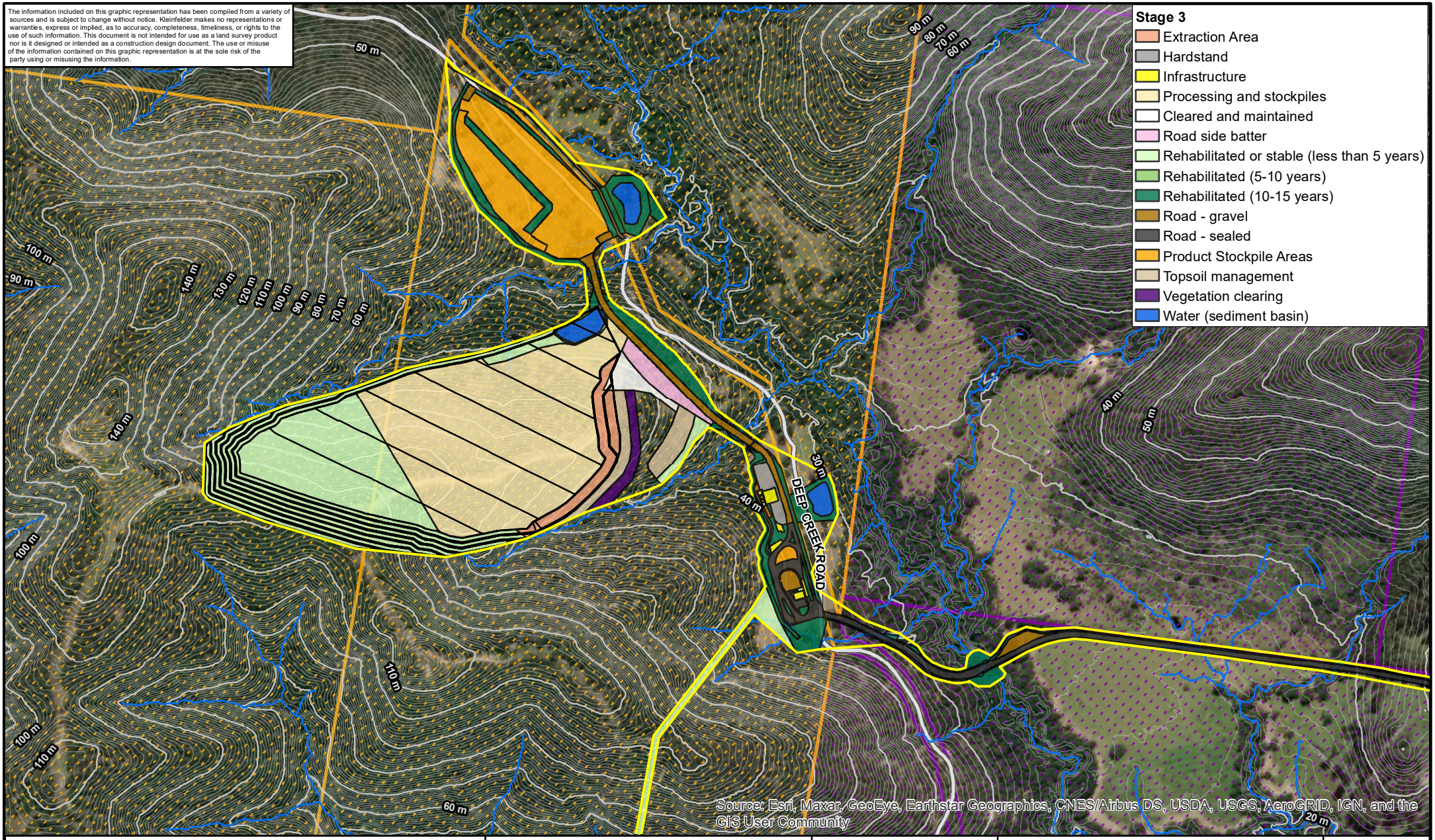

Legend

- Project Boundary
- Ironstone Development Pty Ltd Owned
- Agreement with Ironstone Development Pty Ltd
- Local Road
- DEM Derived Creek Lines
- 1m Contours
- 10m Contours

Metres
0 25 50 100 150 200 250

N

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Stage 3 of Development

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek, NSW

FIGURE:
7

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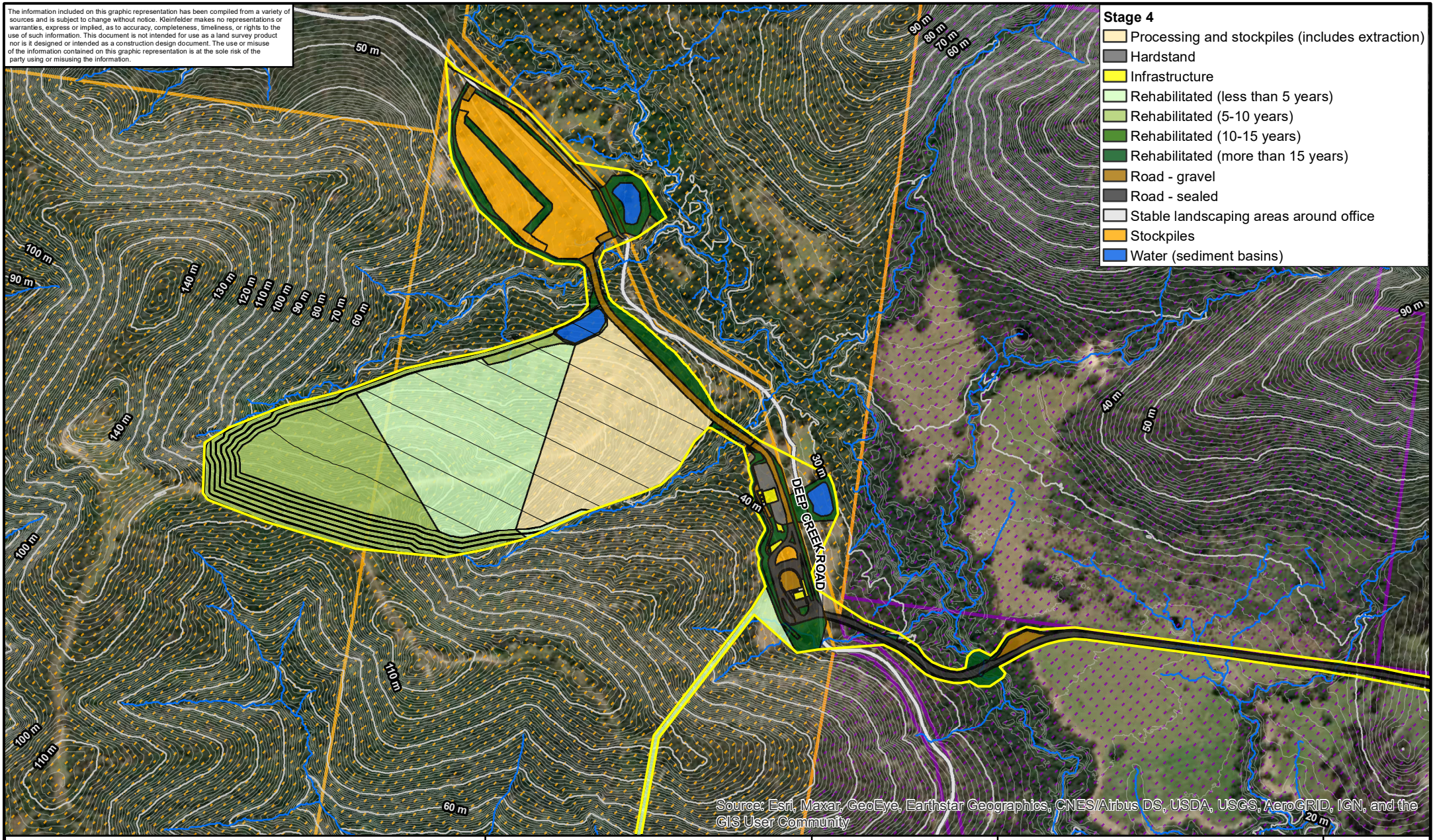

Legend

- Project Boundary
- Ironstone Development Pty Ltd Owned
- Agreement with Ironstone Development Pty Ltd
- Local Road
- DEM Derived Creek Lines
- 1m Contours
- 10m Contours

Metres
0 25 50 100 150 200 250

N

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Stage 4 of Development

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek, NSW

FIGURE:
8

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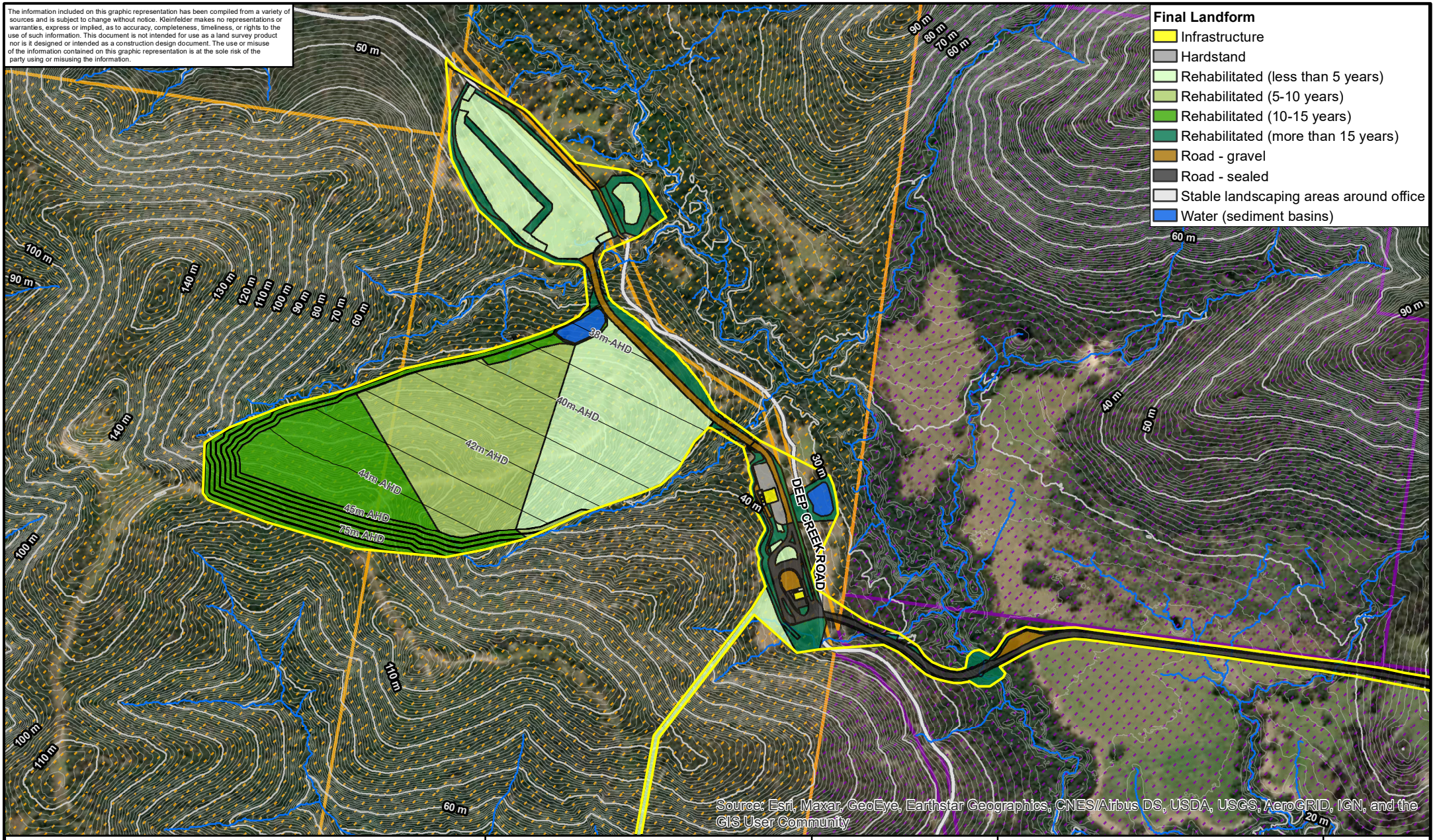

Legend

- Project Boundary
- Ironstone Development Pty Ltd Owned
- Agreement with Ironstone Development Pty Ltd
- Local Road
- DEM Derived Creek Lines
- 1m Contours
- 10m Contours

Metres
0 25 50 100 150 200 250

N

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Final Landform

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek, NSW

FIGURE:
9

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3.2.8 Stockpiling

Product

The main product stockpile area will be developed to the north of the extraction area and will cover an area of approximately 4.4 ha. It will be cleared during the construction phase and stockpiling of extracted product will commence in Stage 1 of the project.

Stockpiling of product will also occur on the pit floor within the extraction area. This will be large rock, gabion rock and to manage product prior to crushing, sorting and transport to the main stockpile area.

Topsoil

Topsoil will also be stockpiled to be used in the progressive rehabilitation throughout the campaign. This may be stockpiled within the extraction area prior to respread during progressive rehabilitation or within the main stockpile area. It may also be managed in the designated topsoil management areas depicted in the stage plan figures provide in Figure 5 to Figure 8. Topsoil will be managed in a way to ensure it's viability for use in rehabilitation.

3.2.9 Dust Suppression

Dust suppression will be performed as required with a water cart on site at all times to be used in times of high wind or when elevated dust is identified. During processing, water sprays are used for dust suppression at material discharge points as required. Water will be supplied through the on site water management system, described in Appendix J.

3.2.10 Stabilisation Measures

As extraction progresses within the designated extraction area, benches will be developed to ensure that the material is extracted in a safe and stable manner. Once disturbance is no longer required on a benched area, progressive rehabilitation will be performed to further stabilise the area.

3.2.11 Rehabilitation

The objective of the rehabilitation will be to return the land to a stable, safe, non-polluting landform able to support self-sustaining native vegetation and agriculture in the form of pasture for grazing. Native revegetation will draw upon species that have been recorded on site, from the communities consistent with the specific area to be rehabilitated. Rehabilitation will be ongoing and progressive alongside the extraction campaign.

The rehabilitation will use topsoil that has been stripped from site and stockpiled until required followed by seeding with the appropriate vegetation community – woodland or native grassland or exotic pasture. Generally, the process of revegetation is as follows:

- Immediately prior to topsoil spreading, the area will either:
    - be ripped to provide a friable subsoil layer to allow for water and root penetration
    - or sufficient growth media in the form of subsoil or topsoil will be applied to allow for water accumulation and root development.
- Topsoil will be re-spread by machine over the areas to a depth of between 100 mm and 200 mm areas such as the quarry benches would benefit from application of larger quantities for deeper soil.
- Once topsoil has been respread, seed is broadcast using the equipment/machinery adequate for the area, i.e. batters and the quarry floor (once extraction has ceased) may be able to be seeded using tractor mounted equipment, or where areas are small or difficult to access, seed will require manual seeding either by hand or by "belly-seeders" Seed for the revegetation will be purchased from commercial seed suppliers where available, but for greater diversity many species will be required to be collected from site prior to clearing
- Seeding is the preferred method of revegetation establishment, but tubestock supplied by a recognised native plant nursery can be used if conditions are appropriate (e.g. revegetation of creek lines, visual amenity screens and shade tree patches on the quarry floor).
- The quarry floor is anticipated to consist of hard rock with a shallow topsoil layer. The hard rock floor should be prepared where possible to provide a friable subsoil layer which will be suitable for the establishment of

grassland and pasture. Where shade trees are to be established in patches, the subsoil will require extra work to allow for the establishment of deeper root systems for stability. This will be considered when planning the parameters of the blasting program to allow for deeper subsoil in certain areas of the pit floor in anticipation of rehabilitation (see Appendix T).

A Rehabilitation Strategy has been prepared and is available in Appendix T which provides full detail of the proposed process to return the area to a safe, sustainable and non-polluting landform.

3.2.12 Biodiversity Offsets Staging

Staging of biodiversity offset requirements is proposed to ensure the significant financial investment required to meet credit obligations can be undertaken in a manner that better distributes the capital investment and enables the biodiversity stewardship site to be suitably established. It is proposed to stage the biodiversity credit requirement obligations as follows:

- Lodgement of the Biodiversity Stewardship Assessment Report for the onsite offset area within two years of commencing construction (allows for seasonality surveys of credit species).
- Retirement of 60% of credit requirements (i.e. payment of 60% the total fund deposit) within 12 months of the acceptance by the BCT of the proposed offset area as a Stewardship site.
    - Equating to 323 ecosystem credits and 1093 species credits
    - No more than 18 hectares (i.e. 60% of total disturbance area) is will be disturbed until this requirement is met. Noting, Stage 1 (anticipated to be completed by Year 4 – see Table 3-1) is expected to impact approximately 17 hectares.
- Retirement of the remaining 40% of the credit requirements (i.e. payment of applicable total fund deposit) within 5 years of commencing construction.
    - Equating to 216 ecosystem credits and 728 species credits

Further information regarding these credit requirements is available in Section 7.1.14.

3.3 PRODUCTION SCHEDULE

Approval is being sought for an extraction rate of up to 500,000 tpa. While specific extraction rates are to be defined by demand, the market is anticipated to be strong. As such production is forecast to ramp up from approximately 80,000 tpa of material in year one to 400,000 tpa by year 6 and reach a maximum rate of 500,000 tpa around year 20 with maximum rates sustained between years 22 to 27. The average annual production rate of the life of the project is expected to be 394,400 tpa. The maximum daily rate of production at any point is 4,000 tonnes. While it will be demand led, a breakdown of the forecast production schedule is provided in Table 3-1.

Table 3-1: Forecast Production Schedule

Year	Anticipated Extraction Rate	Cumulative Tonnes Extracted	Stage
0 – Construction	Nil	0	Construction
1	80,000	80,000.00	Stage 1
2	150,000	230,000.00	
3	200,000	430,000.00	
4	300,000	730,000.00	
5	350,000	1,080,000.00	Stage 1/2
6	400,000	1,480,000.00	Stage 2
7	400,000	1,880,000.00	
8	400,000	2,280,000.00	
9	400,000	2,680,000.00	
10	400,000	3,080,000.00	
11	400,000	3,480,000.00	Stage 2/3
12	400,000	3,880,000.00	Stage 3
13	400,000	4,280,000.00	
14	400,000	4,680,000.00	
15	400,000	5,080,000.00	
16	400,000	5,480,000.00	
17	400,000	5,880,000.00	
18	400,000	6,280,000.00	
19	400,000	6,680,000.00	
20	450,000	7,130,000.00	
21	450,000	7,580,000.00	Stage 3/4
22	500,000	8,080,000.00	Stage 4
23	500,000	8,580,000.00	
24	500,000	9,080,000.00	
25	500,000	9,580,000.00	
26	500,000	10,080,000.00	
27	500,000	10,580,000.00	
28	450,000	11,030,000.00	
29	450,000	11,480,000.00	
30	352,000	11,832,000.00	
Total	**11,832,000**		

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STAKEHOLDER ENGAGEMENT

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4 STAKEHOLDER ENGAGEMENT

Stakeholder engagement has been an integral part of the project planning. One of the major purposes of stakeholder engagement has been to gather an understanding of the local community and other stakeholders thoughts and feedback on the proposed project, and considering this in the project design

Specific consultation and stakeholder engagement is required by the SEARs. A consultation report, which also presents the project consultation plan and implementation, has been prepared by consultation specialists which describes the stakeholder engagement performed for the project and is presented in Appendix U.

The feedback collected via the consultation also helped to inform the Social Impact Assessment (SIA) which is provided in Appendix S. The purpose of the SIA is to investigate the potential for social impacts to allow for appropriate management and mitigation should they be identified.

What follows in this section of the EIS is a summary of the consultation strategy and stakeholder engagement activities performed. The impacts identified are presented and assessed in the SIA, provided in Appendix S.

4.1 STAKEHOLDER ENGAGEMENT STRATEGY

The consultation process was designed to give the community and stakeholders information about the project as well as the opportunity to provide feedback prior to the submission of the State Significant Development application that will be provided to the NSW Department of Planning, Industry and Environment.

Consultation commenced in the early stages of project planning to refine the project design and adequately inform the scoping report submitted to accompany the SEARs request. Early-stage consultation involved IDPL liaising with stakeholders including Mid-Coast Council and nearby landholders. An initial Development Assessment Panel (DAP) meeting commenced the consultation process and was held with the then Great Lakes (now Mid-Coast) Council on 18 February 2014.

Community and stakeholder feedback was invited on the proposed development by consultation specialists between September 2020 and August 2021. The approach to consultation for this stage of the project was developed in mid-2020, when COVID-19 measures and health orders were in place. As a result, all feasible channels were used to reach as many people as possible to inform them of the project, explain how they could participate and how feedback would be included in the project.

Following issue of the SEARs, the consultation plan was refined to meet the requirements of the SEARs. Key stakeholders were identified and included individuals, special interest groups (e.g. ICAG, oyster farmers, business groups), local governments (MidCoast and Port Stephens), and those with an interest in or likely to be affected by the project.

Table 4-1 shows the timetable of the consultation that has occurred, while Table 4.2 presents the objectives of the consultation plan and how each objective was met, with Table 4-3 presenting the tools used to meet them.

Table 4-1: Consultation Timetable

Timeline	Stage	Consultation tools and activities
2017 - 2020	Early engagement by proponent to inform project design and Scoping Report	• Proponent liaised with stakeholders • Proponent delivered preliminary scope of potential issues • Meetings with agencies, Mid-Coast Council, landowners • Investigated alternative access road and secured arrangement

Up to November 2020	Finalisation of Scoping Report and Lodgement of SEARs request	• Consultation with:
		  ○ Department of Planning Industry and Environment
		  ○ Mid-Coast Council
		  ○ Port Stephens Council
		  ○ Transport for NSW
		  ○ Resources Regulator
		  ○ Landowners located along the proposed new access corridor
		  ○ Landowners of the dwelling immediately north of the proposed access road
		  ○ Property owners immediately east and north of the quarry pit
		• A copy of the first DCQ newsletter distributed to local properties
		• Launch consultation platform (website)
		• Created dedicated project contact channels

November 2020 to February 2021	Awaiting SEARs	• Maintaining website • Responding to stakeholder inquiries (phone / email)

19 February 2021 to August 2021	Issuing of Secretary's environmental assessment requirements	• Received SEARs 19th February 2021 including agency feedback from:
		  ○ Mid-Coast Council;
		  ○ Biodiversity, Conservation and Science Directorate (BCS) within the
		  ○ Department of Planning, Industry and Environment (DPIE);
		  ○ Heritage NSW;
		  ○ Environment Protection Authority;
		  ○ Regional NSW – Mining Exploration and Geoscience;
		  ○ DPIE Water Group and the Natural Resources Access Regulator (NRAR);
		  ○ NSW Rural Fire Service; and
		  ○ Transport for NSW (formerly Roads and Maritime Services).
		• Updated project information materials
		• Sent notification letter and information packs to stakeholders
		• Prepared Community and Engagement Plan
		• Survey live May to August 2021
		• Respond to stakeholder inquiries (phone / email)
		• Letterbox drop to approx. 84 stakeholders (as per receiver map)
		• Letter and flyer sent advising of community consultation for development of EIS. Included information about the survey, website details, contacts and updated project factsheet approximately 84 stakeholders (as per receiver map)
		• Email invitation to registered stakeholder for community information session
		• Phone interviews with key stakeholders and agencies
		• Two online community information sessions 10am – 11am and 6pm-7pm. Included video presentation, FAQs and facilitated Q&A session.
		• Video presentation of project showed at information session and downloadable list of questions raised at information session available on website.

Table 4-2: Consultation Plan Objectives

Consultation Objective	How objective met
Make the community and stakeholders aware of the project	Preparation of project information including developing a project specific website, images and maps, fact sheets, emails, letterbox drop, letters, emails, phone calls, social media promotion.
Distribute information to stakeholders, residents, and local businesses	Distribution project information via one-on-one meetings, letterbox drops and mail outs, online consultation platform web pages, phone calls, online community consultation sessions, in-depth interviews, emails.
Identify and define potential issues and opportunities arising from the proposed development	Used feedback provided through the various feedback channels to identify and define potential issues and update project information, fact sheets, and FAQs.
Provide an opportunity for the community and stakeholders to provide feedback	Gathered feedback via one-on-one meetings with directly impacted and interested stakeholders, project-based contact channels including email address and mailbox, printed and online surveys, online consultation platform, phone interviews and online community consultation sessions.
Recommend mitigation, management measures regarding the potential impacts of the quarry, through construction and operation	Developed mitigation and management plans and altered construction and access road designs as a direct outcome of one-on-one meetings with directly impacted stakeholders.

Table 4-3: Consultation Plan Tools

Tools	Description	Stakeholder groups
Online community information session	Provided an opportunity for online (face-to-face) engagement between interested and impacted stakeholders and the Deep Creek Quarry project team. To open discussion on construction and operation and possible social and environmental impact of the proposed quarry and gather feedback and input from the community.	Directly impacted stakeholders Interested stakeholders
Online consultation platform (Social Pinpoint)	Provided project information to community and stakeholders and gather feedback on issues, and opportunities regarding the project.	Directly impacted stakeholders Interested stakeholders Neighbouring businesses
Online surveys	Easy to access community survey gathered feedback from on the proposed Deep Creek Quarry Project and ensured that stakeholder group's interests and concerns about the proposal were understood.	Directly impacted stakeholders Interested stakeholders
Contact mechanisms	A variety of contact mechanisms were established including project email, dedicated post box and consultation platform. Contact details have been included on all project-related communication materials.	Directly impacted stakeholders Interested stakeholders Neighbouring businesses Government agencies
Communications (emails, factsheets, frequently asked questions)	Distribution of project information to community and stakeholders via letterbox drops, mail outs, web pages, and social media platforms.	Directly impacted stakeholders Interested stakeholders Neighbouring businesses Government agencies
Phone interviews	In-depth, one-on-one interviews provided an opportunity for stakeholders to deliver feedback about the project and raise any issues or concerns.	Directly impacted stakeholders

Tools	Description	Stakeholder groups
Briefings	Briefings/forums with key agency and government stakeholders to seek feedback on a specific issue or range of issues. Both online and in-person	Mid-Coast Council Port Stephens Council Government agencies
One-on-one meetings	Meetings with stakeholders to discuss concerns and opportunities.	Impacted stakeholders Community

4.2 COMMUNITY CONSULTATION

The full Consultation Report is available in Appendix U. A summary of the community consultation that was performed includes:

- A project website using Social Pinpoint as the platform for sharing information. Since the site went live 07 September 2021, there have been more than 2988 visitors to the site (as of 24 September 2021) and 435 unique visitors with 149 document downloads
- Project flyers and factsheets letterbox dropped to around 84 residents (see Figure 2) and businesses (twice)
- Social media via Mara Consulting's Facebook page and LinkedIn page
- Online project survey – Have your say on the Deep Creek Quarry project. This was promoted on the consultation platform website developed for the project, Mara Consulting website. The survey opened on 10 May 2021 and was initially scheduled to close on 30 May 2021. After stakeholder feedback, the online survey remained open until 4 August 2021
- Twenty (20) printed project surveys sent to stakeholders with return to sender envelopes
- Express post letter and factsheet inviting stakeholders to provide feedback and take the survey, sent to around 84 residents and businesses
- Phone in-depth interviews with affected, interested and agency stakeholders
- The proponent engaged in 33 one-on-one liaisons, and just under 100 phone, email, and text contacts with directly impacted and interested stakeholders to discuss noise, traffic and transport, environmental impacts, visual impacts, and air quality
- Online community information sessions were held on 4 August 2021: In total, 12 participants attended the hour-long sessions that included an overview of the project, a video presentation and a facilitated Q&A session. The video presentation and summary of Q&A were both available on the website for those who could not attend the presentation.

A summary of the level of community participation between September 2020 and August 2021 is provided in Table 4-4. Further detail of the delivery of each of these activities is provide in the Consultation Report (Appendix U).

Table 4-4: Community Participation Statistics

Activity	Number of contacts
Website visitors	2842
Document downloads (factsheets, FAQs)	136
Emails (in and out)	123
Online survey	21
Online community information session	2
Video presentation	18 views
Letterbox drop (properties) within 2 km of quarry	164
Letters mailed (Express post)	84
Phone calls	66
Meetings	33
In-depth interviews	12

A summary of the feedback received from the community while performing the activities presented in Table 4-3, along with the response from IDPL is provided in Table 4-5. Based on feedback provided by the community, there have been amendments to the project design and mitigation measures applied to the project.

Table 4-5: Summary of Community Consultation Comments and Responses

Community feedback and issues raised	Proponent response provided	Where Addressed in EIS
Who is Ironstone Developments?	Ironstone Developments Pty Ltd is a locally owned family company, whose owners have a long history in quarrying and civil construction works in the Hunter region (through Woodbury Civil Pty Limited).	Section 1.1
Do the quarry developers have enough financial backing?	There are several measures to make sure the quarry has adequate financial backing to develop the project effectively and is generally included in the conditions of an approval. The quarry must operate to the conditions of approval, if it cannot meet the conditions of approval, regulatory authorities can close the quarry down. Prior to commencing the project, a rehabilitation bond will be submitted to the State government. The bond is calculated by an approved quantity surveyor and normally covers the costs needed to rehabilitate the first three years of the quarry disturbance. This is then reviewed and updated as the quarry continues. If rehabilitation was not performed as agreed under the conditions of approval, the bond would allow rehabilitation to be performed and costs to be covered.	Section 7.13 Appendix W
Where is the access road to the quarry?	Stakeholders highlighted concerns about using Forest Glen Road and Deep Creek Road as the haul road. Based on this feedback, the project team investigated alternatives and secured an agreement to create a new private access road, directly from The Bucketts Way to the quarry. The access road will be approximately 1.6km north of the Forest Glen Road intersection. It will be a two-lane sealed access road, with a new intersection to be constructed on The Bucketts Way which will include acceleration and deceleration lanes.	Section 3.2.1
What impacts will there be on The Bucketts Way?	A Traffic Impact Assessment has been completed to review the potential impacts of the quarry operation on The Bucketts Way. This assessment used vehicle traffic data from 21 February 2019. An accredited road safety auditor has completed a road safety audit of the existing conditions of the Limeburners Creek Bridge, The Bucketts Way, the Pacific Highway intersection, and consideration of the proposed new intersection onto The Bucketts Way. The TIA concludes that the proposed development will not have an adverse impact on the local and state road network in the vicinity of the site and that the network is suitably safe for use by quarry traffic, meeting all the minimum requirements of MidCoast Council, Austroads and NSW Roads and Maritime Services (RMS)/TfNSW.	Section 7.8 Appendix K

Community feedback and issues raised	Proponent response provided	Where Addressed in EIS
Can the Limeburners Creek Bridge cater to the extra number of trucks needed to service the quarry?	Yes. A Road Safety Auditor has reviewed the bridge and determined that it does meet the standard requirements, though noted minor maintenance of existing bridge delineation was required. The results of this audit have been supplied to Mid Coast Council.	Section 7.8 Appendix K
What is the timeline for construction on the haul road and the associated road works of The Bucketts Way?	It is expected that progressive construction of the road and intersection will take approximately 12 weeks, pending weather.	Section 3.2.1
When was the survey done on The Bucketts Way?	Traffic counts on The Bucketts Way were completed on 21 February 2019.	Section 7.8 Appendix K
What are the expected truck movements per day?	At peak operation there will be an average of 55 laden trucks per day leaving the site. There will be a further 10 light vehicles and 6 other vehicles for deliveries, visitors, and services that access and leave the site each day.	Section 3.2.5
How will the project manage truck movements and speed?	All drivers will go through a driver safety induction and Driver Code of Conduct that encourages safe driving practices. All drivers will be required to undertake the induction before coming onsite or on their first site arrival. This will specify the expected safe driving behaviours both within the site and when on public roads. The induction and code of conduct will include, but will not be limited to: • Speed management • Avoiding excessive throttle use • Avoiding the use of exhaust brakes near dwellings • Quarry opening times • Being aware that animals may occasionally be crossing the road. If a driver does not adhere to the Code of Conduct, they will be suspended from undertaking further haulage from the quarry.	Section 7.8.4
What would be the landscaping arrangements along the haul road?	A mix of native trees and shrubs will be positioned along portions of the haul road to improve visual screening from adjoining property. In some locations, where feasible, the vegetation will be planted into an earthen bund intended to reduce noise and increase the visual screening effect.	Section 3.2.1 Section 7.12.6

Community feedback and issues raised	Proponent response provided	Where Addressed in EIS
How would complaints be managed through the operation of the quarry?	As part of ongoing community liaison, the quarry will be required to have a complaints management system. This will include a phone number for community inquiries and complaints. All complaints will be required to be recorded on the quarry's website and reported to DPIE within each annual review. If the quarry is approved, it is expected that a Community Liaison Group will be formed. This group would meet on a regular basis to keep the communication open between the quarry and the community and ensure that the quarry is operating in line with its commitments.	Section 7.14.6
Will there be any compensation?	Any conversations about compensation will be held directly with those stakeholders. This project will be subject to the requirements of the Voluntary Land Acquisition Policy. This includes compensation through to voluntary property acquisition where criteria are exceeded.	Section 7.14 Table 4-5
How would dust be managed?	If the project is approved, an Air Quality Management Plan will be put in place to help meet the strict environmental conditions that are likely to be placed on the operation. Minimising dust has been a priority through the design of the quarry. This includes positioning the quarry below the ridgeline, sealing the main access road, and crushing to take place on the quarry floor. The air quality management plan is likely to include: • Setting limits to the speed of vehicles travelling on access roads • Dampening internal unsealed roads with water carts and using water sprays on the crushing plant during production • Keeping quarry stockpiles as low as possible • Avoiding high dust generating activities such as crushing, blasting, or even driving on unsealed roads during dry weather with high winds • When working in exposed areas, dust suppression • Measures and monitoring will be in place to ensure that dust emissions are maintained within acceptable specified levels • A program to monitor the dust levels surrounding the quarry operations to ensure emissions meet regulatory requirements.	Section 7.3.7

Community feedback and issues raised	Proponent response provided	Where Addressed in EIS
How will the silica dust be managed during the quarry's construction and operation?	The quarry manager will be responsible for ensuring that the silica dust levels are in line with the WHS regulations. The mandatory limit for silica dust exposure in Australia is 0.05mg/m^3 averaged over an eight-hour day (except in Tasmania where it is 0.1mg/m^3). Under WHS regulations, employers must provide health monitoring for workers if they carry out ongoing work using, handling, generating, and storing crystalline silica. The quarry will also have a duty to ensure the workplace exposure standard for crystalline silica is not exceeded and to provide health monitoring and air monitoring to workers.	Section 7.3.7
What's the economic benefit for the Lower Hunter?	For a small operation, the quarry will have a positive economic impact on the surrounding area. Through construction, approximately $5.8 million will be injected into the community. During operations, the project is estimated to generate $7.6 million per year, creating 10 full-time equivalent jobs through the expected life of the quarry of up to 30 years. As the project is in the early stages of seeking approval, there are no plans to fill these positions currently. Employment will be based on experience and the ability to fill the role.	Section 7.13.3
What area was included in the economic assessment?	The study area used in the economic assessment is defined as the aggregation of the Statistical Analysis areas of Great Lakes (the project is located within the Mid Coast Local Government Area (LGA), Taree-Gloucester, Lower Hunter, Port Stephens, Maitland, Newcastle, Lake Macquarie – East, Lake Macquarie –West. This catchment was chosen as it encompasses the project location as well as the key source markets for goods and labour that are represented by a 100-kilometre radius.	Section 7.13.1
What are the environmental impacts?	The environmental studies show that the project can operate within the expected guidelines and health and amenity criteria for surrounding dwellings. As part of the Environmental Impact Statement, extensive surveys have been done to identify the different animals and plants found on the site and understand the potential impacts on them by the proposed quarry. No serious and irreversible impacts, as defined within the legislation, have been identified within the development site. The full studies for each of those listed in the presentation will be available on the DPIE website once it is lodged.	Section 7

Community feedback and issues raised	Proponent response provided	Where Addressed in EIS
Will there be an impact on koala habitat?	Extensive surveys have been done to identify the different animals and plants found on the site and understand the potential impacts on them by the proposed quarry. This includes koalas. The assessment determined that the quarry would impact on 29.02 hectares of koala habitat (within the 308 ha property). There will be specific management measures during construction and operations in addition to the retirement of 736 Koala species credits to offset quarry impacts. Measures are likely to include preclearing surveys, supervised clearing, vehicle speed management and inductions for all staff, truck drivers and contractors. Offsets will include both long term protection of adjacent quarry-owned land and purchase of offset credits from the local area. The assessment concluded that the impacts are manageable and will not result in serious or irreversible impacts on Koalas.	Section 7.1.8
Will there be any visual impacts?	The visual impact assessment shows the quarry would not be visible from any resident and will be completely shielded by existing vegetation or ridgelines. There are some impacts from the new access road intersection to The Bucketts Way.	Section 7.12
Are there any plans for further expansions to the quarry for the future?	There are no current plans to expand the footprint of the proposed Deep Creek Quarry.	As per response provided in this line item.
Who monitors the tonnage of product extracted over quarry life?	The NSW EPA and the NSW DPIE monitor the extraction levels from the quarry. As the proposal is seeking to extract 500,000 tonnes of hard rock products per annum, the operators need to apply for an Environmental Protection Licence (EPL) issued by the NSW EPA. An annual extraction limit will likely be a condition of any approval issued by DPIE. Annual reports regarding the quarries production are provided to DPIE and the EPA and are available on the website for public access. Breaches of EPL licence conditions or the conditions of consent are subject to regulatory disciplinary actions. Disciplinary actions can vary from improvement programs, fines, and enforceable undertakings, through to suspension of the EPL and right to operate the quarry.	As per response provided in this line item. Section 8

4.3 NSW Government Agency Consultation

Table 4-6 demonstrates the Government Agencies that were required to be consulted via DPIE as part of the SEARs request and issue process. Agencies that provided feedback via the SEARs process are highlighted in Table 4-6, with their feedback provided in Appendix F. Agencies required to be consulted with, but who did not provide feedback through the SEARs request process were consulted with separately.

Table 4-6: Government Agency SEARs Consultation

Government Agency	Feedback Received
DPIE	See
Mid-Coast Council	Feedback received though SEARs Attachment 2, available in Appendix F.
Biodiversity, Conservation and Science Directorate (BCS)	Feedback received though SEARs Attachment 2, available in Appendix F.
Heritage NSW	Feedback received though SEARs Attachment 2, available in Appendix F.
Environment Protection Authority	Feedback received though SEARs Attachment 2, available in Appendix F.
Regional NSW – Mining Exploration and Geoscience (MEG)	Feedback received though SEARs Attachment 2, available in Appendix F. Further consultation occurred following issue of the SEARs to discuss MEGs requirements regarding economic assessment of the resource. MEG informed they would wait for submission of the EIS.
Regional NSW - Resources Regulator	Consulted via email on 28 September 2021 however no response was received at the time of submission. Regional NSW have been consulted via MEG (as above). It is considered that the submission of the EIS will provide for appropriate consultation with the Resources Regulator division within Regional NSW.
DPIE – Crown Lands Group	Consulted via email at project inception and most recently on 28 September 2021. Response received on 18 October 2021: Crown Lands noted that there has been some minor modifications to the proposal (such as access) from that originally submitted to the department at project inception, and while the plan now indicates access (via the new dedicated access road) is further north of the original proposal to use Deep Creek Road from the Buckett's Way, note that lot 1 DP 1264650 is no longer Crown land. Crown Lands also suggested discussions be held which include Mid Coast council should any activity be proposed to occur on Crown road reserves.
DPIE Water Group and the Natural Resources Access Regulator (NRAR)	Feedback received though SEARs attachment 2, available in Appendix F.

Government Agency	Feedback Received
Department of Primary Industries (including NSW Forestry, Agriculture and Fisheries)	Consulted via email on 28 September 2021, response received 30 September 2021. DPI noted the project included installation of culverts and stated that it should comply with the Departments policy and Guidelines for waterway crossings.
NSW Local Land Services	Consulted via email on 28 September 2021 however no response was received at the time of submission. No significant impacts have been identified that are considered to require consideration by Stakeholder.
NSW Health	Consulted via email on 28 September 2021 however no response was received at the time of submission. No significant impacts have been identified that are considered to require consideration by Stakeholder.
Water NSW	Response received 14 October 2021. Response noted WaterNSW did not provide comment on the SEARs and has no particular comment to make, as the site is not located near any WaterNSW lands, assets or infrastructure. WaterNSW further noted they suspect that comments should rather come from NRAR and DPI Water if required, and stated as such they have no further comment to make on this project.
Hunter Water	The Hunter Water Act is administered within the jurisdiction of DPIE so it is considered that Hunter Water are consulted through the SEARs process. In Addition, Hunter Water were consulted prior to the SEARs request via email on 17 February 2020 however no response was received at the time of submission.
Dams Safety NSW	Dam Safety NSW were consulted via email on 3 September 2021 however no response was received at the time of submission. No significant impacts have been identified that require the consideration of Dams Safety NSW.
NSW Rural Fire Service	Feedback received though SEARs Attachment 2, available in Appendix F.
Transport for NSW (formerly Roads and Maritime Services).	Feedback received though SEARs Attachment 2, available in Appendix F.

4.4 COMMONWEALTH CONSULTATION

Commonwealth consultation occurred through referral of the proposed quarry to the Department of Agriculture, Water and Environment (DAWE). In providing a response to the referral DAWE confirmed on 7 December 2020 that the proposed action is a controlled action that requires assessment and approval under the EPBC Act before

it can proceed. DAWE also confirmed that the quarry will be assessed under the assessment bilateral agreement with New South Wales (see Section 6.2.2.).

In responding to the referral, DAWE provided the requirements presented in Table 4-7 and Appendix G.

Table 4-7: Commonwealth Referral Requirements

Commonwealth Agency	Feedback Received	Where Addressed
Department of Agriculture, Water and Environment	The information that I have considered indicates that the proposed action is likely to have a significant impact on the following matters protected by the EPBC Act: • Listed threatened species and communities.	Appendix L
	Based on the information available in the referral, the proposed action is likely to have a significant impact on the following matters of national environmental significance, but not limited to: • Black-eyed Susan (*Tetratheca juncea*) listed as Vulnerable under the EPBC Act. The proposed action involves clearing individuals of an important population of the species. Further information is required during the assessment stage to determine the exact number of the individuals that will be directly and indirectly impacted. • Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (*Phascolarctos cinereus*) listed as Vulnerable under the EPBC Act. The proposed action involves clearing habitat critical to survival of the species. Further information is required during the assessment stage to determine the extent of the habitat that will be directly and indirectly impacted. • Grey-headed Flying-fox (*Pteropus poliocephalus*) listed as Vulnerable under the EPBC Act. The proposed action involves clearing habitat critical to survival of the species. Further information is required during the assessment stage to determine the extent of the habitat that will be directly and indirectly impacted.	Appendix L
	The proposed action also has the potential to have a significant impact on the following listed threatened species and further detailed assessment of potential impacts is required: • Large-eared Pied Bat (*Chalinolobus dwyeri*) listed as Vulnerable under the EPBC Act. • New Holland Mouse (*Pseudomys novaehollandiae*) listed as Vulnerable under the EPBC Act.	Appendix L
	In addition, without further detailed assessment of potential impacts, the Department considers that there is a real chance or possibility that the proposed action will significantly impact on the following: • Green and Golden Bell Frog (*Litoria aurea*) listed as Vulnerable under the EPBC Act. • Swift Parrot (*Lathamus discolour*) listed as Critically Endangered under the EPBC Act. • Regent Honeyeater (*Anthochaera phrygia*) listed as Critically Endangered under the EPBC Act.	Appendix L

Commonwealth Agency	Feedback Received	Where Addressed
	Please note that this may not be a complete list and additional impacts may be identified during preparation of the environmental impact statement. In this regard, the Department considers it the responsibility of the proponent to undertake an analysis of the significance of the relevant impacts and ensure that all protected matters that are likely to be significantly impacted are assessed for the Commonwealth Minister's consideration.	Appendix L

4.5 Aboriginal Consultation

Consultation with Registered Aboriginal Parties was performed by Insite Heritage Pty Ltd in compliance with the NPW Act. This was performed as part of the Aboriginal Cultural Heritage Assessment Report (ACHAR) that has been produced and is available in Appendix I.

4.5.1 Aboriginal Consultation Strategy

Consultation for the project was carried out over five stages as presented in Table 4-8. The consultation was used to produce the Aboriginal Cultural Heritage Assessment Report (ACHAR) that is provided in Appendix I. A full consultation log of the actions taken is provided in the ACHAR (Appendix I).

Table 4-8: Aboriginal Consultation Activities

Stage	Consultation Activity Performed
Stage 1	Requests for the identification of potential interested Aboriginal persons or groups relevant to the project location. Sent to Heritage NSW, Local Land Services, Council, Karuah Local Aboriginal Land Council, Native Title services, Office of the Register Aboriginal Owners (Appendix A of ACHAR). Advertisement in the Newcastle Herald on the 14th August 2020 inviting registrations of interest– closed the 29th August 2020 (Appendix B of ACHAR).
Stage 2	Project information and invitation to register sent to all parties identified in Stage 1. Compile registrations – 14 day registration period (Appendix C of ACHAR). Notify Heritage NSW and Karuah LALC with a list of registrants (Appendix D of ACHAR). Registrations closed 22nd September 2020.
Stage 3	Preparation of draft assessment methodology. Sent a copy of the draft methodology to all registrants. Responses closed on the 30h October 2020 (Appendix E of ACHAR).
Stage 4	Field assessment over 2.5 days 9th to 11th of November and findings incorporated into ACHAR.
Stage 5	The draft ACHAR was provided to all RAPs for a 28 day review period prior to finalisation. An opportunity to visit the study was offered during the ACHAR review period.

4.6 Ongoing Stakeholder Engagement

The consultation report in Appendix U demonstrates how the consultation requirements of the SEARs have been met within the EIS. The report demonstrates how stakeholders have been engaged and how feedback has informed the designs and technical studies undertaken for the project to support the submitted application.

Once the EIS is submitted to DPIE, it will be placed upon exhibition for 28 days. During the exhibition phase, feedback on the project is encouraged from stakeholders. DPIE is responsible for notifying surrounding neighbours and will advertise the exhibition period. Community members will have the ability to make a formal

submission on the proposal to DPIE and will be considered as part of the EIS determination. Responses to submissions will then be compiled in a submission report following closure of the exhibition period, and provision of the feedback received by DPIE to IDPL. The submissions report will help the community, councils and government agencies understand how the issues they raised have been addressed by IDPL. And allow the regulator to further evaluate the merits of the project prior to deciding whether to grant approval for the project.

Beyond the response to submissions, IDPL will continue to provide information to the community and stakeholders about ongoing activities including project updates at key stages. Should the project be successful in gaining approval, consultation will be ongoing throughout the construction and operation of the quarry as required by the conditions of consent and DPIEs *Undertaking Engagement Guidelines for State Significant Projects*.

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LEGISLATIVE FRAMEWORK

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5 LEGISLATIVE FRAMEWORK

5.1 ASSESSMENT REQUIREMENTS

This section outlines the strategic planning polices and statutory provisions that apply to the Subject Land. A number of other environmental planning instruments have also been reviewed to ascertain whether they apply to the proposed development.

The SEARs specifically required the following in relation to legislative framework considerations:

Table 5-1: Legislative Framework SEARs Requirements

SEARs Requirement	Where Adressed
• The Environmental Impact Statement (EIS) for the development must comply with the requirements in Clauses 6 and 7 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000	Section 5.3.1
• Consideration of the development against all relevant environmental planning instruments (including Part 3 of the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007);	Section 5.4
• A list of any approvals that must be obtained before the development may commence	Table 5-3

5.2 COMMONWEALTH LEGISLATION

5.2.1 Environmental Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), assessment and approval is required for actions that are likely to have a significant impact on Matters of National Environmental Significance (MNES). An action includes a project, development, undertaking, activity, or series of activities. When a person proposes to take an action they believe may need approval under the EPBC Act, they must refer the proposal to the Australian Government Minister for the Department of Environment (DoE). The EPBC Act identifies nine matters of national environmental significance (MNES):

1. World heritage properties
2. National heritage places
3. Wetlands of international importance (RAMSAR)
4. Nationally listed threatened species and communities
5. Migratory species listed under international agreements
6. Nuclear actions
7. Commonwealth marine areas
8. Great Barrier Reef Marine Park
9. A water resource, in relation to coal seam gas development and large coal mining development.

The objectives of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) are to:

(a) to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance; and

(b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources; and

(c) to promote the conservation of biodiversity; and

(ca) to provide for the protection and conservation of heritage; and

(d) to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples; and

(e) to assist in the co-operative implementation of Australia's international environmental responsibilities; and

(f) to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and

(g) to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.

Consultation with DAWE via an EPBC Referral (see Section 4.4) has identified that there may be impacts to listed threatened and migratory species as displayed in Table 5-2.

Table 5-2: Impacts on MNES by the DCQ Project

EPBC MNES Matter	Project Impact	Where Addressed
World heritage properties	No	N/A
National heritage places.	No	N/A
Wetlands of international importance (RAMSAR).	No	N/A
Nationally listed threatened species and communities	Yes	Appendix L
Migratory species listed under international agreements	Potential	Appendix L
Nuclear actions	No	N/A
Commonwealth marine areas.	No	N/A
Great Barrier Reef Marine Park	No	N/A
A water resource, in relation to coal seam gas development and large coal mining development	No	N/A

The Biodiversity Development Assessment Report (BDAR) prepared by Kleinfelder contains an assessment of the potential impacts for listed threatened and migratory species in the EPBC Act (Appendix L)

Appendix L details the assessment under the EPBC Act undertaken and the NSW Framework for Biodiversity Assessment has been applied in accordance with the Assessment Bilateral Agreement between the Commonwealth of Australia and the State of NSW.

5.2.2 Native Title Act 1993

The *Native Title Act 1993* (NT Act) tries to balance Indigenous and non-Indigenous peoples' rights to land. The Act has a number of functions. It creates processes through which native title can be recognised and protected. Native Title recognises a set of rights and interests over land or waters where Aboriginal and Torres Strait Islander groups have practiced and continue to practice, traditional laws and customs prior to British occupation. Native title recognises an Aboriginal or Torres Strait Islander people's traditional law and custom. For the courts to recognise native title, there are two key legal questions that must be answered:

- Under the traditional laws and customs of the group of Indigenous people claiming native title, are their rights and interests to the claim area based on their traditional connection to the area?
- If a connection under traditional law and custom is found, the courts ask the next question: Has this connection been either entirely or partially 'extinguished' (lost) by specific government actions? For example, selling that area of claimed land.

The term 'extinguishment' means that all or some native title rights are lost forever in Australian law. Once native title has been extinguished, it cannot be revived except in very limited circumstances. The extinguishment of native title can be:

- Total extinguishment which takes away all native title rights
- Partial extinguishment which takes away only some native title rights.

Partial extinguishment shows the difference between two categories of native title rights:

- 'Exclusive' allows native title holders to control access to land
- 'Non-exclusive' native title does not allow native title holders to control access to land.

A review of applications and determinations recorded by the National Native Title Tribunal (NNTT) utilizing the SEED portal identified no active or determined title claims covering the area of the proposed activity.

5.3 NSW LEGISLATION

5.3.1 Environmental Planning and Assessment Act 1979

Pursuant to Schedule 1, Clause 7 of the *State Environmental Planning Policy (State and Regional Development) 2011*, development that extracts from a total resource of more than five million tonnes is classified as State Significant Development (SSD). The DCQ, under current design plans, is expected to extract up to 12 MT over the project lifetime and therefore constitutes SSD.

SSD are assessed pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), whereby an EIS is prepared in accordance with Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.

Under Schedule 2, Part 3 of the EP&A Regs, an EIS must be prepared in accordance with environmental assessment requirements sort by written application from the Planning Secretary (commonly referred to as Secretary's Environmental Assessment Requirements (SEARs). The application must include particulars of the location, nature and scale of the development or activity and as required by the Secretary. This document intends to provide those particulars.

The consent authority for the proposed development will be the NSW Minister of Planning (or as otherwise delegated by the Minister).

Pursuant to section 4.41 of the EP&A Act, the following approvals are not required for SSD:

- A permit under section 201, 205 or 219 of the *Fisheries Management Act 1994*
- An approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977*
- An Aboriginal heritage impact permit (AHIP) under section 90 of the *National Parks and Wildlife Act 1974*
- A Bush Fire Safety Authority under section 100B of the *Rural Fires Act 1997*
- A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000*.

The following authorisations, as listed under section 4.42, cannot be refused for carrying out SSD that is authorised by development consent under Division 4.7:

- An aquaculture permit under section 144 of the *Fisheries Management Act 1994*
- An approval under section 15 of the *Mine Subsidence Compensation Act 1961* (repealed legislation)
- A mining lease under the *Mining Act 1992* (unless the person is deemed unfit for a license under section 380A of that Act)
- An environment protection licence under Chapter 3 of *the Protection of the Environment Operations Act 1997* (for any of the purposes referred to in section 43 of that Act)
- A consent under section 138 of the *Roads Act 1993*
- A licence under the *Pipelines Act 1967*.

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and its associated Environmental Planning and Assessment Regulations 2000 provides the basis for development in NSW.

The objectives of the EP&A Act are:

"(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,

(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,

(c) to promote the orderly and economic use and development of land,

(d) to promote the delivery and maintenance of affordable housing,

(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,

(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),

(g) to promote good design and amenity of the built environment,

(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,

(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,

(j) to provide increased opportunity for community participation in environmental planning and assessment."

A development application, and this EIS will be assessed against the matters for consideration provided in Section 4.15 of the EP&A Act. These provisions state that, in determining a development application, a consent authority must consider the following matters:

a) the provisions of:

   i) any environmental planning instrument, and

   ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and

   iii) any development control plan, and

   iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and

   iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph)

   that apply to the land to which the development application relates.

b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,

c) the suitability of the site for the development,

d) any submissions made in accordance with this Act or the regulations,

e) the public interest.

Part 4 of the EP&A Act identifies the approval pathways for most development in NSW. In general, Part 4 development can be determined at the local level (Council), regional level (regional planning panel) or by the State Government (State Significant Development). Within this, development approvals may require referral to another state government agency (integrated development) or more potentially hazardous development may be considered 'designated development' which requires a more thorough environment impact assessment.

Section 4.46 of the EP&A Act identifies that a proposed development is considered integrated development if approval/concurrence from another State agency is required. A development is integrated if any of the following is triggered (Table 5-3):

Table 5-3: Provisions for Integrated Development

Act	Provision	Approval	Comments on the Proposed Development / Where addressed in EIS
Coal Mine Subsidence Compensation Act 2017	s 22	approval to alter or erect improvements, or to subdivide land, within a mine subsidence district	The site is not in a mine subsidence district
Fisheries Management Act 1994	s 144	aquaculture permit	No permits required for proposed construction or operation at this stage.
	s 201	permit to carry out dredging or reclamation work	
	s 205	permit to cut, remove, damage or destroy marine vegetation on public water land or an aquaculture lease, or on the foreshore of any such land or lease	
	s 219	permit to— (a) set a net, netting or other material, or (b) construct or alter a dam, floodgate, causeway or weir, or (c) otherwise create an obstruction, across or within a bay, inlet, river or creek, or across or around a flat	
Heritage Act 1977	s 58	approval in respect of the doing or carrying out of an act, matter or thing referred to in s 57(1)	There are no heritage listed items on the subject site (refer to Section 7.6)
Mining Act 1992	ss 63, 64	grant of mining lease	A mining lease is not required
National Parks and Wildlife Act 1974	s 90	grant of Aboriginal heritage impact permit	An AHIP is not required under SSD.
Petroleum (Onshore) Act 1991	s 16	grant of production lease	No production lease is required
Protection of the Environment Operations Act 1997	ss 43(a), 47 and 55	Environment protection licence to authorise carrying out of scheduled development work at any premises.	An environmental protection licence will be required (refer to Section 5.3.11).
	ss 43(b), 48 and 55	Environment protection licence to authorise carrying out of scheduled activities at any premises (excluding any activity described as a “waste activity” but including any activity described as a “waste facility”).	
	ss 43(d), 55 and 122	Environment protection licences to control carrying out of non-scheduled activities for the purposes of regulating water pollution resulting from the activity.	

Act	Provision	Approval	Comments on the Proposed Development / Where addressed in EIS
Roads Act 1993	s 138	consent to— (a) erect a structure or carry out a work in, on or over a public road, or (b) dig up or disturb the surface of a public road, or (c) remove or interfere with a structure, work or tree on a public road, or (d) pump water into a public road from any land adjoining the road, or (e) connect a road (whether public or private) to a classified road	An approval under Section 138 of the Roads Act will be required (refer to Section 5.3.12)
Rural Fires Act 1997	s 100B	Authorisation under section 100B in respect of bush fire safety of subdivision of land that could lawfully be used for residential or rural residential purposes or development of land for special fire protection purposes	The proposed development is not a subdivision, a development for a residential purpose or for a special fire protection purpose
Water Management Act 2000	ss 89, 90, 91	Water use approval, water management work approval or activity approval under Part 3 of Chapter 3	Water Access Licences are discussed in Section 7.4

Notes:

- Development is not integrated development in respect of an Aboriginal heritage impact permit required under Part 6 of the National Parks and Wildlife Act 1974 unless—
  (a) an Aboriginal object referred to in that Part is known, immediately before the development application is made, to exist on the land to which the development application applies, or
  (b) the land to which the development application applies is an Aboriginal place within the meaning of that Act immediately before the development application is made.
- Development is not integrated development in respect of the consent required under section 138 of the Roads Act 1993 if, in order for the development to be carried out, it requires the development consent of a council and the approval of the same council.
- Development is not integrated development in respect of the approval required under section 57 of the Heritage Act 1977 if the approval that is required is the approval of a council.

Based on known information the proposed works would be considered to be integrated development as a referral under more than one State Agency as per the Table . Nonetheless, as the proposed quarry is considered State Significant Development, under Section 4.41 of the EP&A Act a number of authorisations do not apply if development consent is granted. Section 4.41 identifies:

> (1) The following authorisations are not required for State significant development that is authorised by a development consent granted after the commencement of this Division (and accordingly the provisions of any Act that prohibit an activity without such an authority do not apply)—
>
> (a) (Repealed)
>
> (b) a permit under section 201, 205 or 219 of the Fisheries Management Act 1994,
>
> (c) an approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977,
>
> (d) an Aboriginal heritage impact permit under section 90 of the National Parks and Wildlife Act 1974,
>
> (e) (Repealed)
>
> (f) a bush fire safety authority under section 100B of the Rural Fires Act 1997,
>
> (g) a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the Water Management Act 2000.

(2) Division 8 of Part 6 of the Heritage Act 1977 does not apply to prevent or interfere with the carrying out of State significant development that is authorised by a development consent granted after the commencement of this Division.

(3) A reference in this section to State significant development that is authorised by a development consent granted after the commencement of this Division includes a reference to any investigative or other activities that are required to be carried out for the purpose of complying with any environmental assessment requirements under this Part in connection with a development application for any such development.

In relation to Section 4.38(2) of the EP&A Act the proposed development is permissible with consent under the Great Lakes Local Environmental Plan 2014.

5.3.2 Environmental Planning and Assessment Regulation 2000

The criteria for a proposed development to be considered 'designated development' is identified in Schedule 3 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regs). Schedule 3 of the EP&A Regs was reviewed to assess whether the proposed remediation works are considered designated development. It is noted that any proposal that is State Significant Development (SSD) is not considered designated (re Section 4.10 of the EP&A Act).

Section 4.12 of the EP&A Act identifies that if a proposed development is designated development or SSD the development application must be accompanied by an environmental impact statement (EIS).

Part 3 of Schedule 2 to the Environmental Planning and Assessment Regulation 2000 (Regulation) sets out the content requirements for an EIS, which require the EIS to include:

a) a summary of the environmental impact statement (Section 1),

b) a statement of the objectives of the development, activity or infrastructure (Section 1),

c) an analysis of any feasible alternatives to the carrying out of the development, activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure (Section 1.5.3),

d) an analysis of the development, activity or infrastructure, including:

   i) a full description of the development, activity or infrastructure (Section 3.2), and

   ii) a general description of the environment likely to be affected by the development, activity or infrastructure, together with a detailed description of those aspects of the environment that are likely to be significantly affected (Section 7), and

   iii) the likely impact on the environment of the development, activity or infrastructure (Section 7), and

   iv) a full description of the measures proposed to mitigate any adverse effects of the development, activity or infrastructure on the environment (Section 8), and

   v) a list of any approvals that must be obtained under any other Act or law before the development, activity or infrastructure may lawfully be carried out (Section 5),

e) a compilation (in a single section of the environmental impact statement) of the measures referred to in item (d) (iv) (Section 8),

f) the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development set out in subclause (4) (Section 8).

5.3.3 Biodiversity Conservation Act 2016

The purpose of the Biodiversity Conservation Act 2016 (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development.

Pursuant to section 7.9 of the *Biodiversity Conservation Act 2016* (BC Act), SSD applications require the application of the Biodiversity Assessment Method (BAM), established under section 6.7, which is utilised to prepare a Biodiversity Development Assessment Report (BDAR), unless advised otherwise by the Chief Executive of the Biodiversity Conservation Division (BCD) and the Secretary of the Department of Planning, Industry and Environment (DPIE).

SSD projects automatically trigger the Biodiversity Offsets Scheme (BOS), unless advised otherwise by the Chief Executive of the BCD and the Secretary of DPIE.

The Secretary of the DPIE may advise further biodiversity assessment is required beyond the scope of the BAM as part of the SEARs. It should be noted that this did not occur in the SEARs received for the project.

SSD are assessed under section 7.14 of the BC, requiring the retirement of biodiversity credits to offset impacts to flora and fauna following implementation of mitigation measures with the aim to reduce the potential impact of the SSD. The retirement of biodiversity credits is to occur prior to the relevant stage of development to which the credits offset.

5.3.4 Local Land Services Act 2013

The objectives of the Local land Services Act 2013 (LLS Act) are:

(a) to establish a statutory corporation (to be known as Local Land Services) with responsibility for management and delivery of local land services in the social, economic and environmental interests of the State in accordance with any State priorities for local land services,
(b) to establish a governance framework to provide for the proper and efficient management and delivery of local land services,
(c) to establish local boards for the purpose of devolving management and planning functions to regional levels to facilitate targeted local delivery of programs and services to meet community, client and customer needs,
(d) to require decisions taken at a regional level to take account of State priorities for local land services,
(e) to ensure the proper management of natural resources in the social, economic and environmental interests of the State, consistently with the principles of ecologically sustainable development (described in section 6 (2) of the Protection of the Environment Administration Act 1991),
(f) to apply sound scientific knowledge to achieve a fully functioning and productive landscape,
(g) to encourage collaboration and shared responsibility by involving communities, industries and non-government organisations in making the best use of local knowledge and expertise in relation to the provision of local land services,
(h) to establish mechanisms for the charging of rates, levies and contributions on landholders and fees for services,
(i) to provide a framework for financial assistance and incentives to landholders, including, but not limited to, incentives that promote land and biodiversity conservation.

The LLS Act applies to rural areas of the State (outside of areas to which SEPP – Vegetation in Non-Rural Areas applies). The main aim of the Act is to regulate the clearing of native vegetation. Part of the subject site is identified as Category 2 regulated land for which approval would be required by Local Land Services. However, it is identified in Section 60(O) of the LLS Act that an approval under Part 4 of the EP&A Act (e.g. an approval of this SSD application) that such an approval allows clearing of native vegetation without the need for a separate approval under the LLS Act.

Under Section 60: O(ai) of the *Local Land Services Act 2013* (LLS) Act the clearing of native vegetation in a regulated rural area is permitted following approval by a determining authority for a development consent under Part 4 of the EP&A Act. The proposed SSD will be assessed utilising the BAM and subject to approval under the BC Act and Part 4 of the EP&A Act.

5.3.5 Coastal Management Act 2016

The subject site is not located within a coastal zone under the Coastal Management Act 2016. The proposed activity is therefore not subject to subsequent provisions under the State Environmental Planning Policy (Coastal Management) 2018.

5.3.6 Contaminated Land Management Act 1997

The *Contaminated Land Management Act 1997* (CLM Act) outlines the process for investigating and where appropriate remediating land that has been significantly contaminated as well as outlining the roles of the EPA and site auditors in supervision and quality assurance. Section 60 of the CLM Act imposes a duty on landowners to notify DPIE, and potentially investigate and remediate land if contamination is above EPA guideline levels.

A contaminated land search and a search of the POEO public register was conducted as part of this EIS which indicated no contamination or notices on the subject site. As such, the subject site has not been declared as significantly contaminated under the CLM Act.

However, should contaminants be unearthed on the site during construction works, an assessment would be carried out to determine if notification of the contamination under Section 60 of the CLM Act to the NSW EPA is required. All remediation, if required, would be carried out in accordance with the CLM Act.

5.3.7 Heritage Act 1977

The Heritage Act 1977 provides for the understanding, conservation, protection of matters of New South Wales heritage and the constitution of the Heritage Council of New South Wales. The objectives of the *Heritage Act 1977* include:

(a) to promote an understanding of the State's heritage,

(b) to encourage the conservation of the State's heritage,

(c) to provide for the identification and registration of items of State heritage significance,

(d) to provide for the interim protection of items of State heritage significance,

(e) to encourage the adaptive reuse of items of State heritage significance,

(f) to constitute the Heritage Council of New South Wales and confer on it functions relating to the State's heritage,

(g) to assist owners with the conservation of items of State heritage significance.

Under the Act, the NSW Government is obligated to compile a register of heritage assets, both publicly and privately owned, and look after the assets on behalf of the community. The register consists of buildings, as well as natural, movable, archaeological, landscapes and Aboriginal heritage. To be listed, the item must be significant to the whole of NSW.

An excavation permit is required to disturb or excavate any land where it is known or there is reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed. A permit is also required to disturb or excavate any land on which the person has discovered or exposed a relic.

Pursuant to section 4.41 of the EP&A Act (Section 5.3.1), an approval under Part 4, or an excavation permit under section 139 of the Heritage Act 1977 is not required for SSD as part of the application process.

As detailed in Section 7.6 and Section 7.7, there are no items of State or Local heritage significance located within the subject site. Approval under section 57 (for work to a place, building, work, relic, moveable object, precinct, or land listed on the State Heritage Register), or an excavation permit under Section 139 (to disturb or excavate any land containing or likely to contain a relic) of the Heritage Act 1977 would not be required, even though approval would not be required by virtue of Section 4.4.1 of the EP&A Act for a SSD.

5.3.8 Hunter Water Act 1991

The Hunter Water Act 1991 (HW Act) provides the framework for the protection and management of drinking water within the Hunter Water catchment. The Hunter Water catchment lies within the Port Stephens LGA. Section 7.4 demonstrates that no impacts are expected to occur downstream of the project (which lies entirely within the Mid-Coast LGA), and as such consideration of the HW Act is not required.

5.3.9 Biosecurity Act 2015 (NSW)

The primary object of the Biosecurity Act 2015 is to "provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers."

Under the Biosecurity Act 2015, all plants in NSW are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plants, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

If the proposed activity propagates the spread of weeds within the subject land Ironstone Developments will have a General Biosecurity Duty to remove the weed species and once the areas of quarry material extraction are complete remediate the site.

Weed species recorded within the study area that are regulated by the Biosecurity Act 2015 are discussed in the flora and fauna assessment in Section 7. The civil contractor will need to put in place measures in the construction environmental management plan (CEMP) to control terrestrial and aquatic weeds within the disturbance area as much as practical and limit their spread.

5.3.10 National Parks and Wildlife Act 1979

The *National Parks and Wildlife Act 1974* (NPW Act) intends to conserve nature, objects, places or features (including biological diversity) of cultural value within the landscape. The NPWS Act also aims to foster public appreciation, understanding and enjoyment of nature and cultural heritage, and also provides for the preservation and management of national parks, historic sites and other areas identified under the Act.

The NPW Act aims for the conservation of nature and culturally significant objects, places or features within the landscape. Specifically, the objects of this Act include:

(a) the conservation of nature, including, but not limited to, the conservation of –

  (i) habitat, ecosystems and ecosystem processes, and

  (ii) biological diversity at the community, species and genetic levels, and

  (iii) landforms of significance, including geological features and processes, and

  (iv) landscapes and natural features of significance including wilderness and wild rivers,

(b) the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including, but not limited to –

  (i) places, objects and features of significance to Aboriginal people, and

  (ii) places of social value to the people of New South Wales, and

  (iii) places of historic, architectural or scientific significance,

(c) fostering public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation,

(d) providing for the management of land reserved under this Act in accordance with the management principles applicable for each type of reservation.

A search of the Aboriginal Heritage Information Management System (AHIMS) database for Lot 48 DP 753178 and Lot 472 DP 1162208 using a 200 m buffer found no identified Aboriginal sites or places within the Subject Land (NSW Office of Environment and Heritage 2018). Section 7.6 presents the findings of the Aboriginal Heritage Impact Assessment, which is provided in full in Appendix I.

As stated in Section 7.6 an AHIP for disturbing an Aboriginal item or place is not required if the proposed DCQ is permitted as SSD under the EP&A Act. The EIS is to contain sufficient information towards the permissibility of the proposed SSD with regards to Aboriginal Heritage as part of the application process which is provide in Section 7.6 and Appendix I.

5.3.11 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO) Act provides for the protection, restoration and enhancement of the environment in NSW, having regard to the need to maintain ecologically sustainable development' and 'reduce risks to human health and prevent the degradation of the environment'.

Section 43 of the POEO Act identifies that Environmental Protection Licences (EPL) may be issued for a range of purposes. The proposed development constitutes a scheduled activity under the POEO Act as a "land-based extractive activity" that "involves the extraction, processing or storage of more than 30,000 tonnes per year of extractive materials." As such an EPL will be sought for the proposed activity.

The Quarry will require an EPL for the "crushing, grinding or separating" of "more than 150 tonnes of materials per day or 30,000 tonnes of materials per year."

On determination of the project application, an application for an EPL will be lodged with the NSW Environment Protection Authority (EPA). As the proposal is subject to an environmental assessment under the EP&A Act, the EPA will not be required to invite or consider public submissions prior to the licence being approved. If the proposed Deep Creek Quarry is permitted as SSD under the EP&A Act, an EPL for related scheduled activities cannot be refused, with the prescribed EPL conditions consistent to those set out under the SDD approval documentation.

5.3.12 Roads Act 1993

The objects of this Act are:

(a) to set out the rights of members of the public to pass along public roads, and

(b) to set out the rights of persons who own land adjoining a public road to have access to the public road, and

(c) to establish the procedures for the opening and closing of a public road, and

(d) to provide for the classification of roads, and

(e) to provide for the declaration of RMS and other public authorities as roads authorities for both classified and unclassified roads, and

(f) to confer certain functions (in particular, the function of carrying out road work) on RMS / TfNSW and on other roads authorities, and

(g) to provide for the distribution of the functions conferred by this Act between RMS/ TfNSW and other roads authorities, and

(h) to regulate the carrying out of various activities on public roads.

Section 138 provides a list of works that require separate approval under the Act. This includes 'carry out a work in, on or over a public road''. Any road works will therefore require separate approval from the relevant road authority.

The proposed SSD includes, in its current design, the provisions for a private access road to join The Bucketts Way with an appropriate approved intersection (Section 7.8).

The roadworks described above will require a Section 138 Approval from Mid-Coast Council. However, it should be noted that this approval must be consistent with the specifications of the approval (if granted) for the SSD pursuant to section 4.42 of the EP&A Act.

5.3.13 Waste Avoidance and Resource Recovery Act 2001

The purpose of the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) is to develop and support the implementation of regional and local programs to meet the outcomes of a State-wide strategy for waste avoidance and resource recovery. It also aims to 'minimise the consumption of natural resources and final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste'.

Waste generation and disposal reporting would be carried out during the construction and operation of the proposed development. Procedures would be implemented during construction to meet the objectives of the WARR Act.

5.3.14 Water Management Act 2000

The objects of *Water Management Act 2000* (WM Act) are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations and, including to protect, enhance and restore water sources, and their water quality, and to encourage best practice in the management and use of water.

The WM Act and the associated Water Management Regulations (General) 2018 (WM Regs), provide framework for the "*sustainable and integrated management of the water sources of the State for the benefit of both present and future generations*".

Of relevance to the proposed quarry the WM Act provides framework for:

- **Harvestable rights**. Harvestable rights allow owners of a property to, without the need for any access licence, water supply work approval or water use approval, to construct and use one or more water supply works for the purpose of capturing and storing water and use of that water on that property. The harvestable right for the area permits the capture of up to 10% of average annual regional rainfall run-off. Dams constructed for this purpose may be constructed on any gully but only on a first or second order stream. Dams currently proposed as part of the Project are within first order streams. One existing dam is located on the property in a second order stream.
- **Access Licences**. Where the EIS determines the annual water take is in excess of the harvestable right or will intercept more than 3ML per annum of groundwater, a water access licence (WAL) will be required consistent with the water sharing plan.
- The Subject Land is located within lands covered under the following water sharing plans:
    - The *Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009*
    - The *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*
        - Schedule 4, Clause 7 provides a 3 ML per annum exemption for aquifer interference activities for approved quarrying activities. Current understandings of ground water suggest the quarry floor is located above the groundwater table and it is unlikely to result in extraction or interference with groundwater. This will be further assessed through a groundwater study as part of the EIS
- Section 89, Water use approvals. Required if additional water is needed beyond the harvestable right allocation or aquifer interference exemption
- Section 90, Water management work approvals, required if a water supply bore is drilled or dam is constructed outside of the harvestable rights framework
- Section 91, Activity approvals are applicable to controlled activities and aquifer interference activities, where:
    - Controlled Activities are works within 40 m of a water course, with the exception of fencing, crossings or tracks in a rural zone, activities associated with harvestable rights or a lawfully constructed car park or hard stand. No works associated with the project are considered to require a Controlled Activity Approval
    - Aquifer interference activities are the penetration, interference, take or obstruction of an aquifer or the water within in it. Based on the current understanding, groundwater is located below the floor level of the quarry. The quarry will therefore not require an aquifer interference approval.

Deep Creek is further mapped within the extents of the *Water Sharing Plan for the North Coast Coastal Sands Groundwater Sources 2016*. The extent of Deep Creek mapped within this plan is located approximately 5 km southeast of the Subject Land.

5.3.15 Water Act 1912 (NSW)

The *Water Act 1912* sets out the provisions of water rights, water and drainage and the use of water from artesian sources in New South Wales. The *Water Act 1912* manages water sources not accounted for under the *Water Management Act 2000*.

The *Water Act 1912* remains applicable to:

- taking water from a water source outside water sharing plan areas

- construction and use of water supply works outside water sharing plan areas
- drainage works in all areas of NSW
- aquifer interference activities in all areas of NSW.

The Subject Land is located in lands managed under the Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009 and the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016, administered under the Water Management Act 2000, and is therefore does not require a license under the Water Act 1912.

5.3.16 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) provides for the protection of fishery resources for the state and the benefit of present and future generations. Works may require notification under the FM Act if any protected fish species, fish habitats or marine vegetation are to be affected or disturbed.

Under Section 201 of the FM Act a person must not carry out dredging work or reclamation work in fish habitat except under the authority of a permit issued by the Minister. For the purposes of the FM Act, dredging work includes excavating water land (defined as land submerged by water under the FM Act) or any work that involves moving material on water land or removing material from water land including the removal of snags.

Although, Deep Creek is identified as a Key Fish Habitat by the NSW Department of Primary Industries (DPI) under Section 4.4.1 of the EP&A Act an approval under Section 201 is not required for an SSD project. Nonetheless, the potential aquatic ecological impacts have been assessed and are discussed in Section 7, which demonstrate the project will have no significant impacts on fish habitat.

5.3.17 Rural Fires Act 1997

Section 100B of the Rural Fires Act 1997 relates to development within bushfire prone land. The provisions state that a bush fire safety authority is required for:

(a) a subdivision of bush fire prone land that could lawfully be used for residential or rural residential purposes, or

(b) development of bush fire prone land for a special fire protection purpose.

This requirement does not apply to State Significant Development (Section 4.41 of the EP&A Act) and the development does not involve subdivision of residential land or any special fire protection purposes.

Bushfire risks and hazards have been addressed in Section 7 of this EIS.

5.4 Environmental Planning Instruments

5.4.1 State Environmental Planning Policies

Great Lakes Local Environmental Plan 2014

The Subject Land is located within the Mid-Coast LGA, formed via the amalgamation of the Great Lakes, Greater Taree and Gloucester Shire Councils on 12 May 2016 (Mid-Coast Council, 2018).

Upon review of the NSW Legislation website, the Subject Land is still managed under the *Great Lakes Local Environmental Plan 2014* (Great Lakes LEP). Under the Great Lakes LEP, the Subject Land is zoned as RU2 – Rural Landscape (RU2).

The objectives of the RU2 zone are as follows:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base
- To maintain the rural landscape character of the land
- To provide for a range of compatible land uses, including extensive agriculture
- To provide for rural tourism in association with the primary industry capability of the land which is based on the rural attributes of the land

- To secure a future for agriculture in the area by minimising the fragmentation of rural land and loss of potential agricultural productivity.

Under the Great Lakes LEP, *Extractive Industries* are permitted with consent within the RU2 zone. As such, the proposed development can comply with prescribed land zoning following approval by the NSW Minister of Planning under the EP&A Act.

Several portions of the proposed SSD will intersect the mapped *Flood Planning Area* under the Great Lakes LEP. The proposed SSD therefore requires assessment against Clause 5.21 of the Great Lakes LEP during the preparation of the EIS (see Section 7.4).

Other sections in the LEP that were considered during the preparation of this EIS includes:

- Clause 5.10 – Heritage Conservation (Section 7.6 and 7.7)
- Clause 7.2 – Earthworks (Throughout)
- Clause 7.5 – Stormwater Management (Section 7.4)
- Clause 7.7 – Riparian Land and Watercourses (Section 7)
- Clause 7.21 – Essential Services (Section 3 and 7.11).

5.4.2 State Environmental Planning Policy (State and Regional Development) 2011

The proposed Quarry is assessed as SSD pursuant to Schedule 1, Clause 7 of the *State Environmental Planning Policy (State and Regional Development) 2011* as an extractive industry that will extract more than five million tonnes from a total resource over the lifetime of the project.

Clause 11 of the *State Environmental Planning Policy (State and Regional Development) 2011* states the following:

> "**11 Exclusion of application of development control plans**
>
> Development control plans (whether made before or after the commencement of this Policy) do not apply to:
>
> a) State significant development, or
>
> b) development for which a relevant council is the consent authority under section 4.37 of the Act."

As such, the provisions of the *Great Lakes Development Control Plan (DCP)* do not apply to the proposed SSD. Notwithstanding the project design will have regard to the provisions of the DCP in the design where relevant.

5.4.3 State Environmental Planning Policy (Mining Petroleum Production and Extractive Industries) 2007

The *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP)* provides framework to facilitate the orderly and economic use and development of land for the purpose of promoting the extraction of natural resources for the social and economic welfare of the state.

Clause 7(3) of the Mining SEPP states:

> "**Extractive industry**
>
> Development for any of the following purposes may be carried out with development consent:
>
> a) extractive industry on land on which development for the purposes of agriculture or industry may be carried out (with or without development consent),
>
> b) extractive industry in any part of a waterway, an estuary in the coastal zone or coastal waters of the State that is not in an environmental conservation zone."

The Subject Land is zoned RU2 – Rural Landscape under the *Great Lakes Local Environmental Plan 2014.* Both agriculture and industries are listed as permitted with consent within the RU2 zone. It should also be noted that

extensive agriculture is permitted without consent within the RU2 zone under the *Great Lakes Local Environmental Plan* 2014.

Relevant to the proposed quarry, the Mining & Extractive SEPP includes the following clauses of relevance:

- Clause 7: Enables quarries to be permissible with consent on any land to which agriculture or industry may be carried out.The quarry is therefore permissible with consent.
- Clause 12: Requirement for the Consent Authority to consider the compatibility of the quarry with surrounding land use. EIS must assess the potential for impacts of adjoining land uses.
- Clause 14: Requirement for the consent authority to consider the potential impacts on water, threatened species and biodiversity and greenhouse gas emissions. The EIS must include assessment on biodiversity and consideration of greenhouse gas emissions.
- Clause 15: Requirement for the consent authority to consider matters relating to efficiency and minimising waste. The EIS will include consideration of efficiencies and waste.
- Clause 16: Requirement for the consent authority consider measures relating to transport of materials on public roads, including the provision of the development application to the roads authority (Council and/or TfNSW). The EIS will include an assessment of traffic impacts that will assist in any referral of the application to TfNSW.
- Clause 17: Requirement for the consent authority to consider conditions relating to rehabilitation of the quarry. The EIS will include documentation relating to the final landform and rehabilitation of the quarry.

5.4.4 State Environmental Planning Policy No 55—Remediation of Land

Under Clause 7 of the *State Environmental Planning Policy No 55—Remediation of Land* (SEPP 55) a consent authority must account for potential contamination on land prior to issuing development consent. As such, in accordance with SEPP 55, the Subject Land will be assessed for potential contamination as part of the EIS.

5.4.5 State Environmental Planning Policy (Koala Habitat Protection) 2020

State Environmental Planning Policy (Koala Habitat Protection) 2020 (Koala SEPP) aims to encourage the conservation and management of areas of natural vegetation that provide habitat for Koalas to support a permanent free-living population over their present range and reverse the current trend of Koala population decline.

The Koala SEPP 2020:

- Provides a framework for councils to prepare a strategic koala plan of management that would apply to the whole or part of a local government area
- Applies to development applications on land over one hectare in a relevant LGA
- Requires development applications to be consistent with a council strategic koala plan of management that applies to the land, or, if there is no strategic plan, sets out a two-step process to determine if the land is core koala habitat and if it is, produce an Individual Koala Plan of Management before council can grant consent to a development application
- Exempts clearing of vegetation from the application of the SEPP if the purpose of the clearing is to maintain an Asset Protection Zone as part of rebuilding a dwelling destroyed or damaged by bushfire and allows the dwelling to be sited anywhere on the lot
- Saves all Koala Plans of Management approved under SEPP 44 and 2019 Koala SEPP.

Core Koala habitat is defined in the updated SEPP and the list of tree species listed under the SEPP has been expanded from 10 to up to 65, across nine distinct regions of NSW.

Kleinfelder have conducted detailed vegetation mapping of the subject land since 2016. An assessment of the potential impact of the proposed construction and operation of the quarry upon koalas and koala habitat has been undertaken as part of the EIS (Section 7), and in line with the Koala Habitat Protection SEPP (2020). A Koala Plan of Management is available as Appendix 10 of the BDAR (Appendix L).

5.5 OTHER PLANS AND POLICIES

5.5.1 Great Lakes Local Environmental Plan

The Subject Land is in the Mid Coast Council local government area. The Mid Coast Council was created in 2016 through the merger of Great lakes, Greater Taree and Gloucester Council. As such, the subject site still falls within the provisions of the Great Lakes Local Environmental Plan (LEP) 2014.

The subject site is zoned RU2 Rural Landscape under the Great Lakes LEP 2014. The proposed development can be defined as 'Extractive Industries' under the provisions of the LEP. Extractive Industries is defined as the winning or removal of extractive materials (otherwise than from a mine) by methods such as excavating, dredging, tunnelling or quarrying, including the storing, stockpiling or processing of extractive materials by methods such as recycling, washing, crushing, sawing or separating, but does not include turf farming. Within the RU2 zone, extractive industries are permissible with consent.

The objectives of the RU2 zone are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base
- To maintain the rural landscape character of the land
- To provide for a range of compatible land uses, including extensive agriculture
- To provide for rural tourism in association with the primary industry capability of the land which is based on the rural attributes of the land
- To secure a future for agriculture in the area by minimising the fragmentation of rural land and loss of potential agricultural productivity.

Other sections in the LEP that were considered during the preparation of this EIS includes:

- Clause 5.10 – Heritage Conservation
- Clause 7.2 – Earthworks
- Clause 5.21 – Flood Planning
- Clause 7.5 – Stormwater Management
- Clause 7.7 – Riparian Land and Watercourses
- Clause 7.21 – Essential Services.

5.5.2 Great Lakes Development Control Plan

As detailed in Section 5.4.2 the Great Lakes Development Control Plan (DCP) does not apply to State significant development under clause 11 of the State Environmental Planning Policy (State and Regional Development) 2011.

5.6 STRATEGIC PLANNING POLICIES

5.6.1 Hunter Regional Plan 2036

The Hunter Regional Plan 2036 (HRP) provides an overarching framework to guide detailed land use plans, development proposals and infrastructure funding decisions. It presents that the Hunter is the largest regional economy in Australia, drives 28 % of regional NSW's total economic output, and is the largest regional contributor to the States Gross Domestic Product (GDP). The HRP further presents that the region has an estimated 322,000 jobs and this is projected to increase to 384,000 by 2036. There is potential to achieve higher jobs growth by planning for more diversified use of land.

The HRP states that 'Infrastructure investment is the linchpin of economic development across the Hunter. It supports freight, health and education services, agribusiness and tourism, as well as building resilience to global economic cycles and climate change'.

Direction 6 of the HRP aims to grow the economy of the Mid Coast and Port Stephens areas. It notes that the completion of the Pacific Highway upgrade has cut travel times, and that these travel times offer opportunities for industries to expand and supply products to Greater Newcastle and Sydney. This will act as a catalyst for

employment growth. Attracting new industries and growing existing industries that can leverage on the accessibility provided by the Pacific Highway to support economic growth.

Direction 6.4 of the HRP aims to specifically 'Promote growth of industries that can leverage accessibility provided by the Pacific Highway' within that area. The Project is located strategically to be able to leverage this accessibility.

The HRP discusses the importance of the development of road and transport networks throughout the Hunter to support the above, which the DCQ is strategically situated to provide a construction resource to efficiently, and with a high quality product that both contributes to road safety and the use of which provides environmental benefits .

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ENVIRONMENTAL ASSESSMENT FRAMEWORK

Deep Creek
QUARRY

6 ENVIRONMENTAL ASSESSMENT FRAMEWORK

6.1 SCOPING REPORT / PRELIMINARY ENVIRONMENTAL RISK ANALYSIS

A Scoping Report was provided to DPIE to support the Secretarys Environmental Assessment Requirements (SEARs) request on 27 November 2020. The Scoping Report was informed by both site and desktop investigations which collated baseline environmental data monitoring and initial risk and impact assessments, along with preliminary stakeholder consultation.

These desktop and site investigations identified the need for any further studies, to be performed by technical specialists, and incorporated into this EIS. These studies are provided in the appendices.

6.1.1 Commonwealth Referral

In producing the Scoping Report it was identified that the action should be referred to DAWE under the EPBC Act. DAWE determined that the proposed activity was a controlled action and would require assessment via EIS under the bilateral agreement with NSW under the EP&A Act.

6.2 STRUCTURE OF ENVIRONMENTAL ASSESSMENT

The SEARs were received on 19 February 2021 and stated that a Development Application (DA) and EIS were required to be submitted within 2 years of issue.

6.2.1 Secretary's Environmental Assessment Requirements (SEARs)

The Planning Secretary's Environmental Assessment Requirements (SEARs) set the requirements for the preparation of an Environmental Impact Statement (EIS) for the Project. The requirements were prepared in consultation with relevant public authorities based on the information provided up to and including the Scoping Report. NSW Government agency comments were provided as Attachment 2 of the SEARs (Appendix F). The SEARs informed that there must be regard to these comments in the preparation of the EIS.

6.2.2 Commonwealth Bilateral Agreement

The SEARs also confirmed that on 7 December 2020, a delegate for the Minister of Agriculture, Water and the Environment determined the development to be a controlled action under Section 75 of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). On that date, the Commonwealth Department of Agriculture, Water and the Environment (DAWE) also determined that the Project will be assessed under the Amended Bilateral Agreement between the NSW and the Commonwealth Governments.

DAWE provided specific feedback regarding Matters of National Environmental Significance (MNES) which has been addressed in both the Biodiversity Assessment Report (BDAR) available in Appendix L.

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IMPACT ASSESSMENT

Deep Creek
QUARRY

7 IMPACT ASSESSMENT

7.1 BIODIVERSITY

A Biodiversity Development Assessment Report (BDAR) for the proposed Deep Creek Quarry (DCQ) has been prepared by Kleinfelder Australia (Appendix L). This assessment was undertaken in accordance with the NSW Biodiversity Assessment Method (BAM) (DPIE, 2020) under the *Biodiversity Conservation Act 2016* (NSW) (BC Act). The BDAR assessed the biodiversity values of the Subject Land and the impacts of the proposed DCQ on biodiversity values in accordance with the BAM. The BDAR sets out the measures proposed to be undertaken to avoid and minimise impacts on biodiversity. The BDAR also details the number and class of biodiversity credits that are required to be retired to offset residual impacts. This chapter summarises the findings of the BDAR.

The following terms are used in this section to describe particular geographical areas:

- Development Site: The area to be directly impacted by the quarry, and corresponds to the project site (30 ha) shown in Figure 3
- Study Area: The area comprising the development plus a buffer area ranging from 25 to 50 m wide to account for possible indirect impacts (44.21 ha)
- Locality: land within a 10 km radius of the Study Area.

7.1.1 Assessment Requirements

The SEARs required assessment of Biodiversity as presented in Table 7-1.

Table 7-1: Biodiversity SEARs Requirements

SEARs Requirement	Where Addressed
• Biodiversity – including: ○ accurate predictions of any vegetation clearing on site;	Appendix L
○ a detailed assessment of the likely biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems, undertaken in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report;	Appendix L
○ a detailed consideration of the potential for off-site and in-direct impacts on local biodiversity and surrounding ecological corridors or habitat; and	Appendix L
○ a strategy to offset any residual impacts of the development in accordance with the Biodiversity Offsets Scheme;	Appendix L

7.1.2 Landscape Context

The Study Area consists of vegetated spurs and drainage gullies, with a mosaic of remnant vegetation and previously cleared land for pasture and historical timber harvesting activities. The proposed Development Site is located on mid to upper slopes of a vegetated spur, with the areas set aside for ancillary infrastructure on the lower and more cleared slopes west of Deep Creek. The proposed site access road crosses Deep Creek and is located upon a combination of disturbed native vegetation and cleared agricultural pastures. The cleared agricultural pastures are currently used for cattle grazing. Surrounding lands contain rural properties of approximately 40-200 ha, with smaller 2-10 ha lots further south off Forest Glen Road.

7.1.3 Vegetation Communities

The site contains four Plant Community Types (PCTs) as defined by the BioNet Classification database:

- PCT – 1590: Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest
- PCT – 1619: Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands
- PCT – 1567: Tallowwood - Brush Box - Sydney Blue Gum moist shrubby tall open forest on foothills of the lower North Coast
- PCT – 1556: Tallowwood - Smooth-barked Apple - Blackbutt grass tall open forest of the Central and lower North Coast.

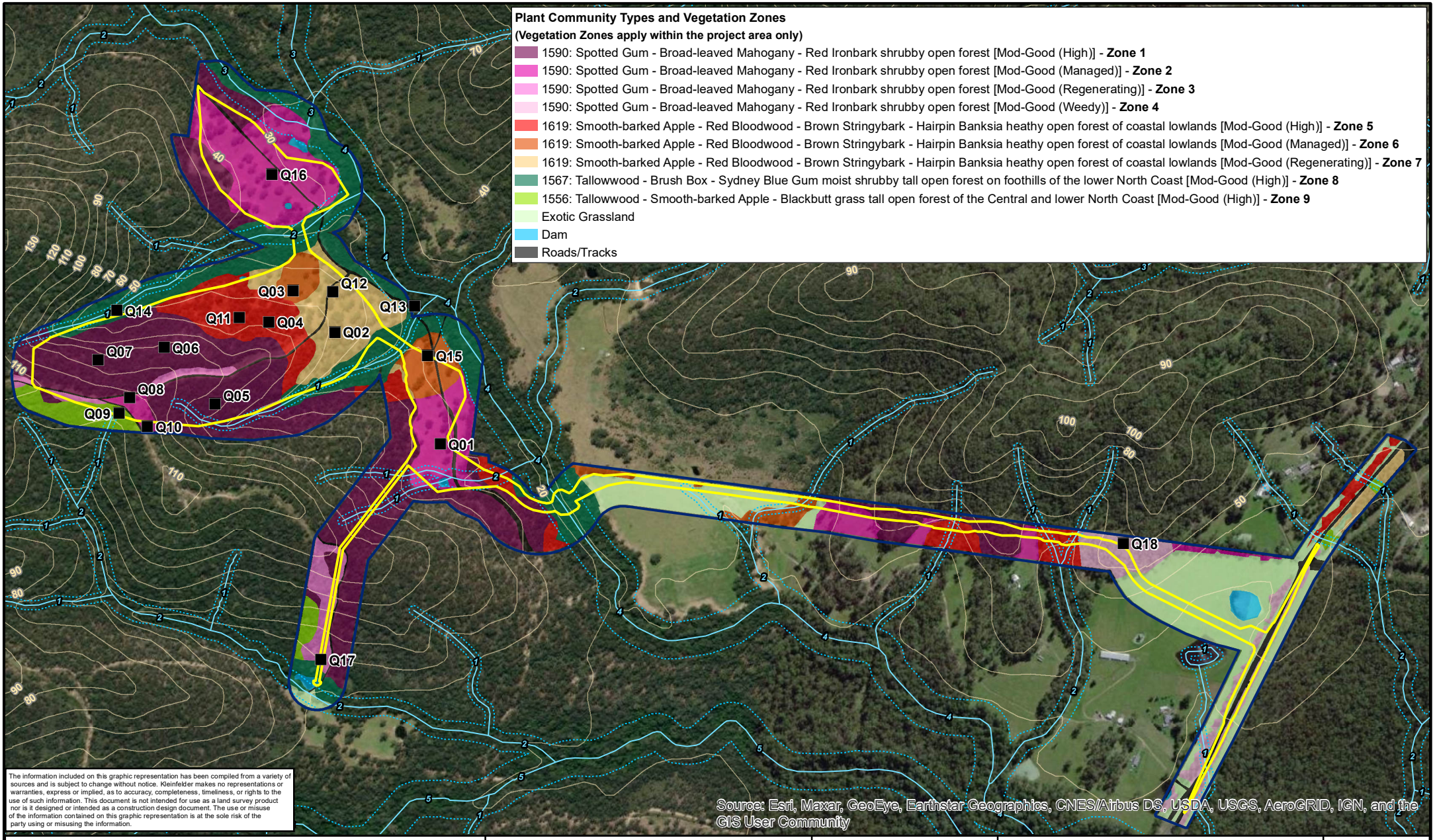
Additionally, the Development Site contains areas of non-native vegetation, including exotic grasslands, dams, and cleared land (existing roads/ tracks).

The PCTs identified within the Development Site were further spilt into vegetation zones, each based on the level of disturbance, condition and variation in management (refer to Section 3.2.2 of the BDAR, Appendix L). Summaries of the PCTs and relevant zones are provided in Table 7-2 and shown in Figure 10.

Table 7-2: Plant Community Types and other areas within the Development Site

Zone	PCT	Condition Class	Vegetation Formation	Vegetation Class	Area (ha)
1	1590: Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Mod-Good	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Hunter – Macleay Dry Sclerophyll Forests	10.64
2	1590: Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (Regenerating)	Managed	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Hunter – Macleay Dry Sclerophyll Forests	6.70
3	1590: Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (Managed)	Regenerating	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Hunter – Macleay Dry Sclerophyll Forests	0.62
4	1590: Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (Weedy)	Weedy	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Hunter – Macleay Dry Sclerophyll Forests	0.72
				Sub-total of PCT 1590	***18.68***
5	1619: Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands (High)	Mod-Good	Dry Sclerophyll Forests (Shrubby sub-formation)	Sydney Coastal Dry Sclerophyll Forests	3.87
6	1619: Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands (Regenerating)	Managed	Dry Sclerophyll Forests (Shrubby sub-formation)	Sydney Coastal Dry Sclerophyll Forests	1.76
7	1619: Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands (Managed)	Regenerating	Dry Sclerophyll Forests (Shrubby sub-formation)	Sydney Coastal Dry Sclerophyll Forests	2.97
				Sub-total of PCT 1619	***8.60***
8	1567: Tallowwood - Brush Box - Sydney Blue Gum moist shrubby tall open forest on foothills of the lower North Coast.	Mod-Good	Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	1.57
				Sub-total of PCT 1567	1.57
9	1556: Tallowwood - Smooth-barked Apple - Blackbutt grass tall open forest of the Central and lower North Coast	Mod-Good	Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	0.17
				Sub-total of PCT 1556	0.17

Zone	PCT	Condition Class	Vegetation Formation	Vegetation Class	Area (ha)
				Sub-total of native vegetation	**29.02**
-	Non-Native: Exotic Grasslands	-	-	-	1.60
-	Dams (no Wetland Vegetation)	-	-	-	0.08
-	Excluded (Tracks and Cleared Areas)	-	-	-	1.11
				Total Area	**31.82**



Legend

- Project Boundary
- Study Area
- Plot Transects
- Watercourse
- Riparian Buffers
- Contours (10m)

Metres
0 50 100 200 300 400 500
N

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DATE DRAWN: 2021/10/26 16:28 Version 1
DRAWN BY: GJoyce
DATA SOURCE:
NSW DFSI - 2019
NSW OEH - 2020

Plant Community Types

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek NSW 2324

FIGURE:
10

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7.1.4 Threatened Ecological Communities

No threatened ecological communities were detected within the Development Site.

7.1.5 Flora Habitat

The habitat for threatened flora species within the Study Area is of varying quality due to historical and current disturbances including vegetation clearing and cattle grazing. Higher quality habitat for threatened flora occurs within areas where intact native vegetation exists (i.e. Vegetation Zones 1, 5, 8 and 9 on Figure 10). These areas contain multiple vegetation strata (i.e. canopy, midstorey, shrub and groundcover layers) and have a moderate to high floristic diversity.

Lower quality flora habitat occurs in areas of the Study Area that have been cleared or managed (i.e. Vegetation Zones 2, 3, 4, 6, and 7 on Figure 10). Disturbance in these areas has allowed the encroachment of weeds and exotic perennial grasses. In more open areas, these species tend to outcompete native plant species and reduce floristic diversity. The management of vegetation to establish tracks and open areas within the Study Area has also facilitated edge effects and the encroachment of weeds such as Lantana camara (Lantana) in better quality flora habitat.

7.1.6 Threatened Flora

The desktop assessment (NSW BioNet search and likelihood of occurrence assessment) identified that 20 threatened flora species may occur in the Study Area. The field assessment identified a total of 235 flora species (211 native and 24 exotic) including two threatened species. The full list of flora species is provided in Appendix D of the BDAR (Appendix L). The threatened flora species identified in the Development Site include:

- *Callistemon linearifolius* (Netted Bottlebrush)
- *Tetratheca juncea* (Black-eyed Susan).

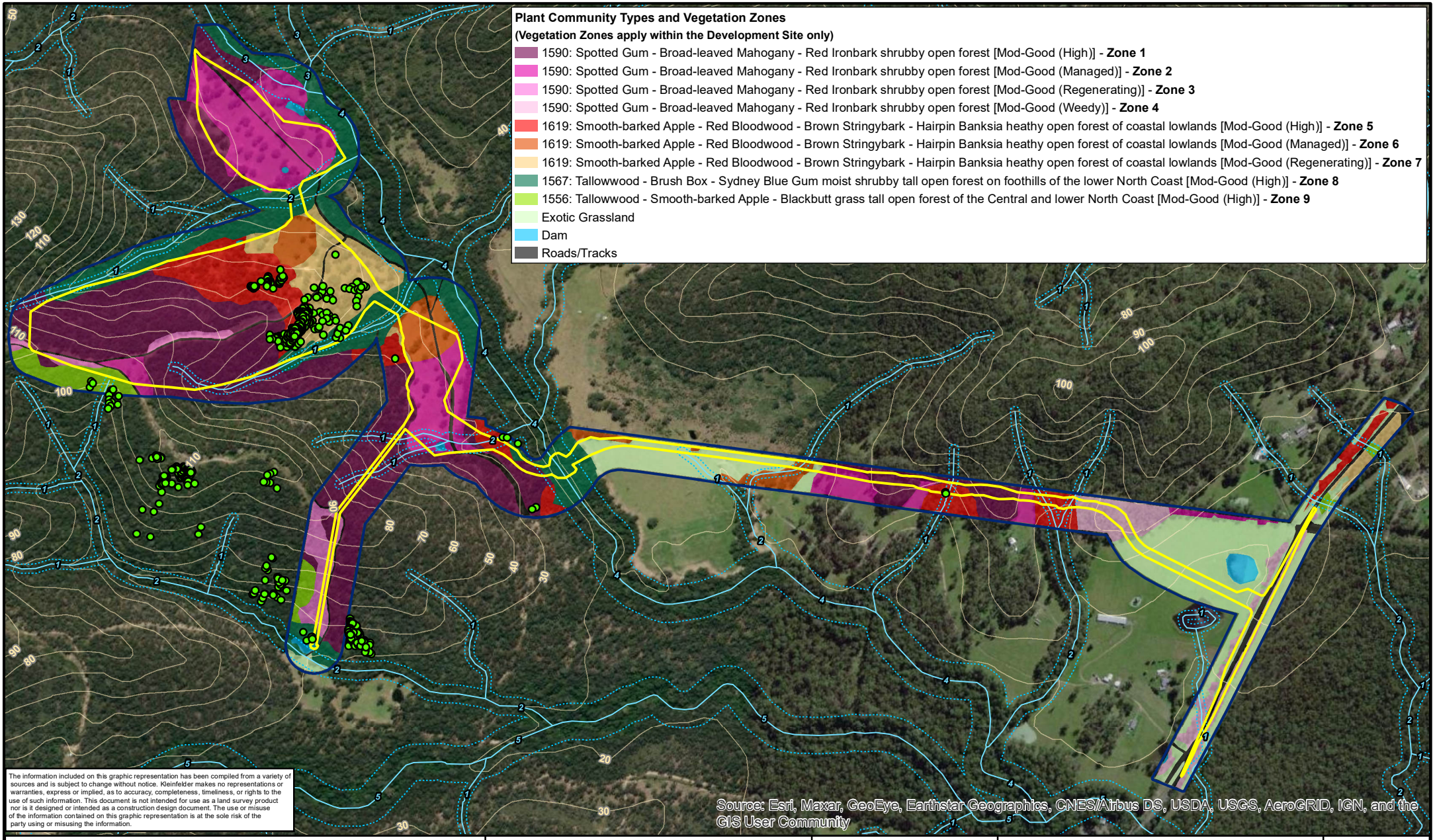
A total of 573 individuals of *Callistemon linearifolius* were detected within the Study Area during the assessment. A total of 60 individuals were recorded within the Development Site. In accordance with the BAM, the unit of measurement for the species polygon for *Callistemon linearifolius* is “count” of individuals. The total number of individuals within the Development Site within each vegetation zone is as follows:

- 3 individuals within Vegetation Zone 1 (PCT 1590_Mod-Good)
- 15 individuals within Vegetation Zone 2 (PCT 1590_Managed)
- 9 individuals within Vegetation Zone 5 (PCT 1619_Mod-Good)
- 33 individuals within Vegetation Zone 8 (PCT 1567_Mod-Good).

A total of 1,462 *Tetratheca juncea* individuals were identified during surveys, forming two separate subpopulations. The larger subpopulation is comprised of 1,460 individuals, of which 586 individuals are within the Development Site, 18 individuals are within the Study Area (outside of the Development Site) and 856 individuals are within the remaining landholdings (that have been surveyed) and will not be impacted. The second smaller subpopulation of 2 individuals was identified on the access road and will be impacted. In accordance with the BAM, the unit of measurement for the species polygon for *Tetratheca juncea* is “area” of habitat, which is defined by the extent of the Vegetation Zone in which the species is detected. The total area of the species polygon for *Tetratheca juncea* within the Development Site was determined to be 19.05 ha as shown in Figure 10, including:

- 10.64 ha (containing 26 individual plants) within Vegetation Zone 1 (PCT 1590_Mod-Good)
- 3.87 ha (containing 453 individual plants) within Vegetation Zone 5 (PCT 1619 – Mod-Good)
- 2.97 ha (containing 95 individual plants) within Vegetation Zone 7 (PCT 1619 – Regenerating)
- 1.57 ha (containing 12 individual plants) within Vegetation Zone 8 (PCT 1567_Mod-Good).

All other vegetation zones were considered to be too degraded or unsuitable habitat (PCT 1556 and PCT 1567) for *Tetratheca juncea*.



Legend

- Project Boundary
- Study Area
- *Tetratheca juncea* Presence
- Watercourse
- Riparian Buffers
- Contours (10m)

Metres
0 50 100 200 300 400 500
N

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DRAWN BY: GJoyce
DATA SOURCE:
NSW DFSI - 2019
NSW OEH - 2020

Tetratheca juncea (Black-eyed Susan) Presence

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek NSW 2324

FIGURE:
11

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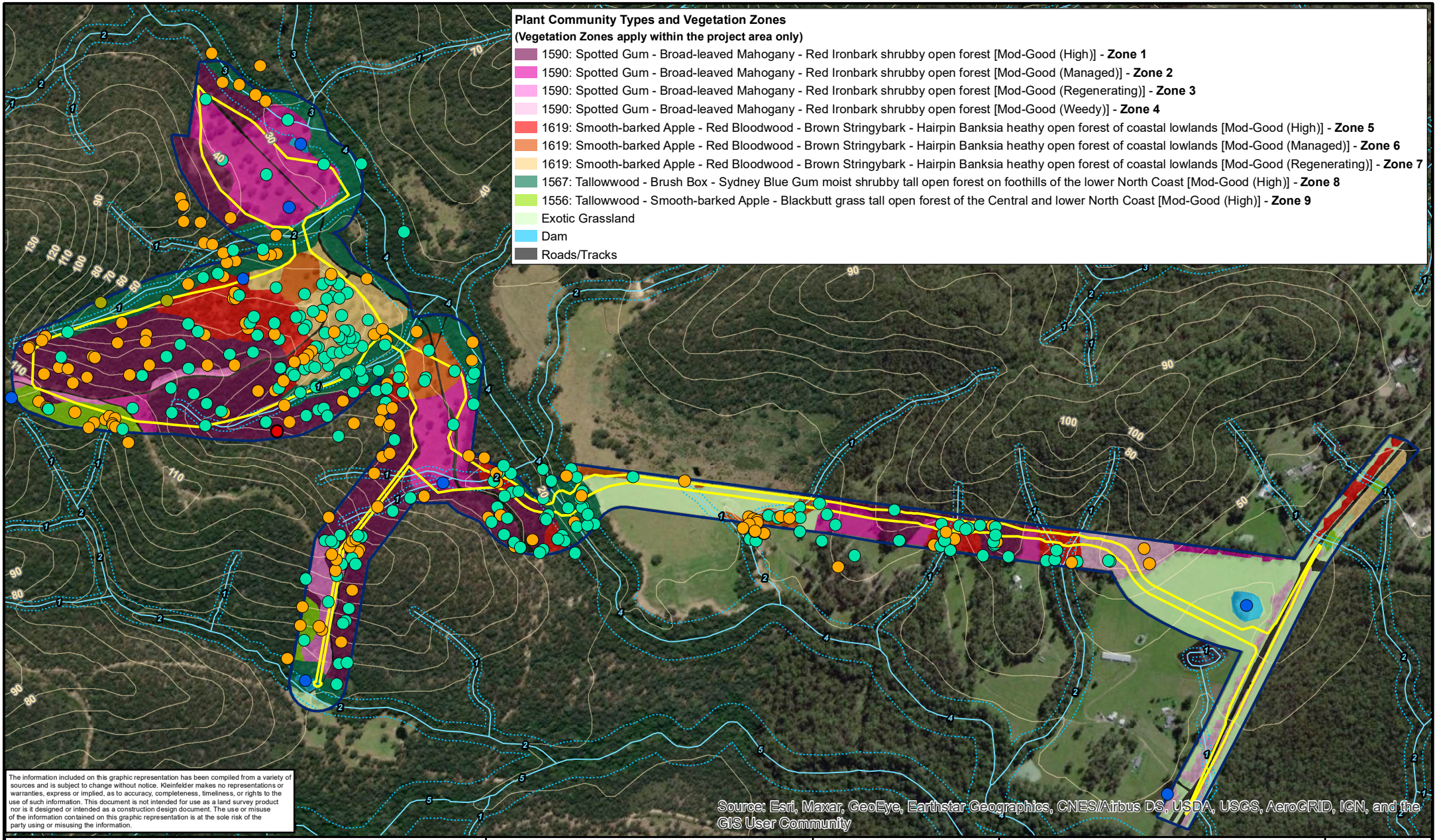
7.1.7 Fauna Habitat

The Study Area contains varying qualities of habitat for threatened fauna species as determined by historical disturbances, including vegetation clearing and cattle grazing. Higher quality fauna habitat occurs in less disturbed areas where denser native forest vegetation occurs or where multiple strata layers are present. These areas contain key habitat features for native fauna species, including food resources (i.e. seeds, nectar and pollen), potential breeding habitat (i.e. hollow-bearing trees), and habitat refugia (i.e. dense vegetation, leaf litter, logs and rocks).

Tree hollows were defined as small (<5 cm diameter), medium (5 – 20 cm diameter) and large (>20 cm diameter). A total of 360 habitat trees (comprised of 228 hollow-bearing trees and 132 dead stags) were identified during the surveys within the Study Area (Figure 12). Of these, 128 habitat trees occur within the Development Site, including:

- 90 hollow-bearing trees containing:
    - 99 small hollows
    - 62 medium hollows
    - 29 large hollows.
- 38 dead stags containing:
    - 45 small hollows
    - 37 medium hollows
    - 22 large hollows.



Legend

- Project Boundary
- Study Area
- Watercourse
- Riparian Buffers
- Contours (10m)

Habitat Feature

- Dead Stag
- Hollow-bearing Tree
- Nest
- Water feature
- Rock Den

Metres
0 50 100 200 300 400 500
N

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DATE DRAWN: 2021/10/21 15:02 Version 1
DRAWN BY: GJoyce
DATA SOURCE:
NSW DFSI - 2019
NSW OEH - 2020

Habitat Features

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek NSW 2324

FIGURE:
12

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7.1.8 Koala Habitat

An assessment of the extent of available Koala (*Phascolarctos cinereus*) habitat within the Development Site was determined in consideration of *The Review of Koala Tree Use Across New South Wales* (OEH 2018). A summary of this assessment is as follows:

- PCT 1590 – The dominant tree species in this PCT are *Eucalyptus siderophloia* (Grey Ironbark), *Corymbia maculata* (Spotted Gum), *Eucalyptus microcorys* (Tallowwood) and *Eucalyptus acmenoides* (White Mahogany). Other species that occur to a lesser extent include *Eucalyptus canaliculata* (Grey Gum) and *Syncarpia glomulifera* (Turpentine):
    - *Eucalyptus microcorys* is a "regional high use" tree species for the Koala
    - *Eucalyptus siderophloia*, *Eucalyptus acmenoides* and *Syncarpia glomulifera* are "significant use" tree species for the Koala
    - *Corymbia maculata* and *Eucalyptus canaliculata* are "irregular use" tree species for the Koala.

- PCT 1619 – The dominant canopy species in this PCT are *Angophora costata* (Smooth-bark Apple) and *Corymbia gummifera* (Red Bloodwood*). Eucalyptus capitellata* (Brown Stringybark) is co-dominant in some areas. Sub-dominant species include *Eucalyptus resinifera* subsp. *resinifera* (Red Mahogany), *Eucalyptus eugenioides* (Thin-leaved Stringybark), *Eucalyptus umbra* (Broad-leaved White Mahogany) and *Syncarpia glomulifera* (Turpentine):
    - *Angophora costata* and *Eucalyptus resinifera* are "local high use" tree species for the Koala
    - *Eucalyptus eugenioides* and *Syncarpia glomulifera* are "significant use" tree species for the Koala
    - *Corymbia gummifera* and *Eucalyptus capitellata* are "irregular use" tree species for the Koala
    - *Eucalyptus umbra* is a "low use" species for the Koala.

- PCT 1567 - The dominant canopy species in this PCT are *Eucalyptus microcorys* (Tallowwood) and *Syncarpia glomulifera* (Turpentine). *Eucalyptus saligna* (Sydney Blue Gum) occurs in wetter areas (gullies) along with *Lophostemon confertus* (Brush Box):
    - *Eucalyptus microcorys* is a "regional high use" tree species for the Koala
    - *Syncarpia glomulifera* and *Eucalyptus saligna* are "significant use" tree species for the Koala
    - *Lophostemon confertus* is an "irregular use" tree species for the Koala.

- PCT 1556 - The dominant canopy species in this PCT are *Syncarpia glomulifera* (Turpentine), *Eucalyptus microcorys* (Tallowwood) and *Eucalyptus umbra* (Broad-leaved Mahogany). Other species that occur to a lesser extent include *Corymbia maculata* (Spotted Gum) and *Angophora costata* (Smooth-barked Apple):
    - *Eucalyptus microcorys* is a "regional high use" tree species for the Koala
    - *Angophora costata* is a "local high use" tree species for the Koala
    - *Syncarpia glomulifera* is a "significant use" tree species for the Koala
    - *Corymbia maculata* is an "irregular use" tree species for the Koala
    - *E. umbra* is a "low use" species for the Koala.

In consideration of the large number of Koala use trees within the Development Site, all vegetation zones containing canopy vegetation are considered to represent Koala Habitat. To further assess the habitat value of the Development Site for the Koala, the habitat assessment criteria within the EPBC Act Referral Guidelines for the Vulnerable Koala (DotE 2014) was reviewed. An assessment using the habitat assessment tool resulted in a habitat score of eight (8). This indicates that the Development Site contains habitat that is critical to the survival of the Koala (Appendix L).

The Study Area is located within Mid-Coast LGA, which is listed within Schedule 1 of the Koala SEPP 2020 and is zoned Rural Land. The Koala SEPP 2020 was therefore deemed applicable for the Development Site. As such, an assessment of Koala habitat suitability was conducted in accordance with the SEPP including the determination of Potential Koala Habitat (Step 1) or Core Koala Habitat (Step 2). The BDAR determined that the proposed quarry contains both Potential Koala Habitat (areas of native vegetation where trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component) and Core Koala Habitat (an area of land with a resident population of koalas, evidenced by attributes

such as breeding females, being females with young, and recent sightings of and historical records of a population) (Appendix L).

In accordance with the SEPP, a Koala Plan of Management (KPoM) has been prepared for the proposed development and is available as Appendix 10 of the BDAR (Appendix L).

7.1.9 Threatened Fauna

Targeted surveys for threatened fauna were conducted in accordance with the appropriate guidelines. As a result of the targeted surveys, eleven mammal and four bird species were detected within the Study Area consisting of:

- Glossy Black-Cockatoo (*Calyptorhynchus lathami*)
- Little Lorikeet (*Glossopsitta pusilla*)
- Masked Owl (*Tyto novaehollandiae*)
- Sooty Owl (*Tyto tenebricosa*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*)
- Little Bent-winged bat (*Miniopterus australis*)
- Southern Myotis (*Myotis macropus*)
- Golden Tipped Bat (*Phoniscus papuensis*)
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Eastern Cave Bat (*Vespadelus troughtoni*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- New Holland Mouse (*Pseudomys novaehollandiae*)
- Koala (*Phascolarctos cinereus*).

All of the above species are listed as threatened species within the BC Act with the exception of the New Holland Mouse, which is listed as vulnerable under the EPBC Act. Further details, including the assessment of the likelihood of occurrence of threatened and migratory species are detailed within the BDAR (Appendix L). Species polygons were generated for the Koala and Southern Myotis, in accordance with the BAM and the Threatened Biodiversity Data Collection (TBDC), Most threatened fauna species detected were either Ecosystem Credit species only or were Species Credit species where breeding habitat was absent from the Development Site (no species polygon generated).

Koala (Phascolarctos cinereus)

The Koala was recorded in four areas within the Study Area from six detections through Koala SAT assessment or remote camera surveys. The four areas included:

1) Mid-way along the access road (SAT and camera)

2) Near Deep Creek crossing (SAT and camera)

3) In a gully near the southern side of the quarry pit (SAT)

4) Within the riparian corridor below the main stockpile area (SAT). All tended to be within the lower slopes and gullies, with two records in the Development Site, Koala habitat was defined as each vegetation zone where Koala Feed Tree Species were present and dominant.

The total area of the species polygon for the Koala is 29.02 ha, including:

- 10.64 ha within Vegetation Zone 1 (PCT 1590_Mod-Good)
- 6.70 ha within Vegetation Zone 2 (PCT 1590_Managed)
- 0.62 ha within Vegetation Zone 3 (PCT 1590_Regenerating)
- 0.72 ha within Vegetation Zone 4 (PCT 1590_Weedy)
- 3.87 ha within Vegetation Zone 5 (PCT 1619_Mod-Good)
- 1.76 ha within Vegetation Zone 6 (PCT 1619_Managed)

- 2.97 ha within Vegetation Zone 7 (PCT 1619_Regenerating)
- 1.57 ha within Vegetation Zone 8 (PCT 1567_Mod-Good)
- 0.17 ha within Vegetation Zone 9 (PCT 1556_Mod-Good).

Southern Myotis (*Myotis macropus)*

Southern Myotis was identified via Anabat recordings. Habitat for the species has been assessed as all PCTs which the species is associated with under the Threatened Biodiversity Data Collection that occur within 200 m of the foraging habitat – waterbodies greater than 3 m wide (both within the Study Area and within 200 m of the Development Site). The total area of the species polygon for the Southern Myotis is 17.65 ha, including:

- 2.82 ha within Vegetation Zone 1 (PCT 1590_Mod-Good)
- 6.05 ha within Vegetation Zone 2 (PCT 1590_Managed)
- 0.17 ha within Vegetation Zone 3 (PCT 1590_Regenerating)
- 0.39 ha within Vegetation Zone 4 (PCT 1590_Weedy)
- 3.18 ha within Vegetation Zone 5 (PCT 1619_Mod-Good)
- 2.42 ha within Vegetation Zone 6 (PCT 1619_Managed)
- 1.66 ha within Vegetation Zone 7 (PCT 1619_Regenerating)
- 0.96 ha within Vegetation Zone 8 (PCT 1567_Mod-Good).

7.1.10 Aquatic Habitat

Eight man-made dams occur within the Study Area. These areas are likely to provide a source of water for local fauna species. Dams with emergent or aquatic vegetation may also provide breeding habitat for amphibian species. These areas may also provide foraging habitat for bird species such as waders and bats that predate on aquatic prey. Number of first and second order streams intersect the proposed Development Site, but all are ephemeral in nature, flowing only are heavy rainfall and lack riparian vegetation.

The vegetated riparian corridor of Deep Creek is located within portions of the Study Area and more broadly fringes the eastern side of the Study Area (excepting the access road). Deep Creek is largely ephemeral in nature and is typically incised meandering though the vegetated riparian corridor. It contains frequent deeper pools of water that remain between rain events with varying degrees of permanence.

Aquatic habitats are unlikely to be suitable for any threatened species which are known from the locality.

7.1.11 Groundwater Dependent Ecosystems

Ecological surveys identified one non-obligate (partially dependent) Groundwater Dependent Ecosystem (GDE) (Tallowood Brush Box Sydney Bluegum) was identified within the development site. Weeping Lilly Pilly / Water Gum riparian warm temperate rain forest has also been identified as being present along Deep Creek, however this GDE is not within the development site.

Groundwater investigations have shown that the rocks to be quarried have low hydraulic conductivity and groundwater storage. Evaluation of surface water and groundwater shows that the water quality is distinct and groundwater contribution to Deep Creek is likely to consist of limited shallow interflow discharge to the creek and limited discharge of deeper groundwater in bedrock fractures. While Deep Creek potentially receives some shallow groundwater discharge, water quality information from pools along Deep Creek show these are substantially fresher water than the groundwater upgradient in the project area, which suggests at most a minor contribution to the Deep Creek alluvium from the bedrock groundwater.

As such, no impacts are identified to the non-obligate GDE identified. Further discussion of groundwater dependent ecosystems is available in the Biodiversity Assessment report (BDAR), available in Appendix L.

7.1.12 Assessment of impacts

The proposed development has been designed in consideration of the principals of avoid and minimise. A range of alternatives, including the do-nothing option, were considered prior to the current design. Direct impacts,

indirect impacts and impacts on prescribed matters have been avoided and minimised where possible in the final design.

Potential impacts upon biodiversity from the activity are described below along with management and mitigation measures.

Direct Impacts

Direct impacts to biodiversity relate to the removal of vegetation and associated fauna habitat during construction and operations, prior to the completion of rehabilitation as per the proposed Rehabilitation Strategy.

Direct impacts of the proposed development will primarily occur during the construction phase and clearing works and then increase progressively during operations until the maximum extent is cleared. Construction would require complete removal of all native vegetation (totalling 29.02 ha of native vegetation). A total of 128 hollow-bearing trees will be removed and three dams will be impacted. The development will also include impacts to a number of second and first order streams. The proposed development also intersects Deep Creek (fourth order stream), however, impacts are largely avoiding or mitigated through controls.

Indirect Impacts

The proposed development has the potential for various indirect biodiversity impacts such as impacts to habitat connectivity, fauna vehicle strikes, aquatic habitat degradation, increased noise, vibration and light spill, increased weed invasion and the spread of pest species. These potential impacts are discussed below.

Habitat Connectivity

Vegetation removal will be limited to areas that have already been subject to vegetation clearing or areas of forest vegetation on the edge of larger patches of vegetation, which are continuous within the locality. While areas of native vegetation would be removed, movement corridors within the local area would be maintained, or interrupted by only narrow cleared corridors associated with the quarry access road. As such, impacts to these areas of vegetation are unlikely to impact on the movement of fauna in the local area.

Vehicle Strikes and Injury

Vehicle and machinery movements are necessary during the construction and operational phases. The quarry itself has relatively short travel distances and will operate within a broader cleared area. The access road is approximately 1.6km and runs near perpendicular to the general north-west to south-east vegetated corridors. The construction and operational times are limited to generally daylight hours that will limit the potential for vehicle strikes. As such impacts from vehicle strikes is not anticipated to be a significant impact. Measures to minimise any potential impacts would be through the implementation of reduced vehicle speeds within construction zones and operationally for all traffic. Speed limits are to be enforced at a maximum of 40 km an hour.

Weed Invasion, Pest Species and Pathogens

Proliferation of weed and pest species has the potential to occur during construction and operation due to vegetation removal, vehicle movements and increased edge effects. Weed and pest species have the potential to impact on terrestrial biodiversity as native species can become displaced through predation and competition. Pest species (i.e. dogs, rabbits, cats) can also damage native vegetation by grazing and trampling.

A total of eight High Threat Exotic (HTE) species were identified in the Study Area including:

- Senecio madagascariensis (Fireweed)
- Cyperus eragrostis (Nutsedge)
- Cinnamomum camphora (Camphor Laurel)
- Andropogon virginicus (Whisky Grass)
- Axonopus fissifolius (Narrow-leafed Carpet Grass)
- Paspalum dilatatum (Paspalum)
- Pennisetum clandestinum (Kikuyu Grass)
- Stenotaphrum secundatum (Buffalo Grass).

Two priority weed species within the Hunter Local Land Services Region were also identified in the Study Area: *Senecio madagascariensis* (Fireweed) and *Lantana camara* (Lantana). These species, along with other exotic species identified within the Study Area, have the potential to disperse into areas of remnant vegetation where exotic species are currently limited or occur in low densities. This risk is considered to be manageable provided the suggested mitigation measures are implemented within the site during and post development.

The plant pathogen *Phytophthora cinnamomi* is declared a key threatening process in NSW. *Tetratheca juncea*, a threatened species identified within the Study Area, is a species that may be adversely affected by direct infestation or habitat degradation by *Phytophthora cinnamomi* (TSSC, 2005). The proposed action is unlikely to include activities that are likely to introduce any disease, including *Phytophthora cinnamomi*.

Noise, Vibration, Dust and Light Spill

Increased human activity (from workers and traffic levels) directly adjacent to sensitive habitat areas may cause disturbance to flora and fauna species in adjoining habitat.

Water Quality

The Development Site has been positioned to minimise direct impacts on drainage channels such as Deep Creek to the north, however, there is some potential for indirect impacts to water quality downstream through sedimentation and changes in water quality. Implementation of appropriate erosion and sedimentation control measures and discharge licence requirements as part of the project will be required to minimise the potential and extent of these impacts.

In the absence of the implementation of suitable controls potential unmitigated impacts to surface water during construction, and operations to a lesser extent, have been assessed as a result of removal of vegetation, stripping of topsoil, excavation, stockpiling, concreting, instream works, transportation of cut and fill and accidental spills and leaks.

- The subsequent impact to water quality could be increased turbidity, suspended solids, nutrients and contaminants from mobilisation of soils, which in turn could lead to increased weed growth and algal blooms and smothering of aquatic organisms. Oily films, increased alkalinity and pH, and elevated concentrations of toxicants from concreting works and accidental leaks and spills could result in reduced health of aquatic organisms.
- Operational water discharges to Deep Creek will be required to meet quality criteria, failure to adhere to these criteria could result in similar impacts to those noted above.
- Waterways at greatest risk are those directly impacted (instream works) or located in close proximity to construction works such as Deep Creek.

The project will be required to operate in accordance with a Soil and Water Management Plan and Environmental Protection Licence that will guide and regulate the quarry and the potential impacts on water. With implementation of this management plan and the conditions of the EPL, impacts on surface water quality will be minimal.

Serious and Irreversible Impacts

No entities at risk of Serious and Irreversible Impacts (SAIIs) were identified within the Development Site.

Impacts to Matters of National Environmental Significance

The EPBC Act requires that developments or undertakings that are likely to have a significant impact on MNES be referred for a determination as to whether they are a controlled action which requires approval under the EPBC Act. Of the nine MNES listed under the Act, those considered relevant to the Study Area are potential impacts on listed threatened species or communities and potential impacts on migratory species listed under international agreements.

A delegate of the Commonwealth Minister for the Environment determined that the project is a controlled action under the EPBC Act. The EPBC Act controlling provisions for the proposed action are listed threatened species and communities. The project will be assessed under the Bilateral Agreement (Amending Agreement No.1, 2020) between the Commonwealth and NSW Governments. The BDAR has prepared in accordance with the assessment requirements provided by DAWE.

Assessments of significance in accordance with the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* have been undertaken for each relevant EPBC listed species (Appendix L). These findings are summarised in Table 7-3.

Table 7-3: Summary of Assessment of Significance for MNES

Species	Listing Status	Likelihood of Occurrence	Impacts to Habitat	Assessment of Significance
Black-eyed Susan (*Tetratheca juncea*)	Vulnerable	Known	Up to 19.05 ha	The proposed Action is considered unlikely to have a significant impact on this species given that 59.9% of *T. juncea* individuals would be retained within the Study Area and that no habitat critical to this species has been identified by the Commonwealth (DAWE, 2020).
Koala (*Phascolarctos cinereus*)	Vulnerable	Known	Up to 29.02 ha	The proposed Action is considered unlikely to have a significant impact on this species given that the Koala population identified within the Study Area is not listed as an important population and that a larger area of suitable habitat will be retained.
Grey-headed Flying-fox (*Pteropus poliocephalus*)	Vulnerable	Known	Up to 29.02 ha	The proposed Action is considered unlikely to have a significant impact on this species given that the Grey-headed Flying-fox population identified within the Study Area is not listed as an important population and that a larger area of suitable habitat will be retained. No breeding habitat will be impacted.
Large-eared Pied Bat (*Chalinolobus dwyeri*)	Vulnerable	Low	Up to 29.02 ha	The proposed Action is considered unlikely to have a significant impact on this species given that the Large-eared Pied Bat population identified within the Study Area is not listed as an important population and that a larger area of suitable habitat will be retained. No breeding habitat will be impacted.
New Holland Mouse (*Pseudomys novaehollandiae*)	Vulnerable	Known	Up to 17.45 ha	The proposed Action is considered unlikely to have a significant impact on this species given that the New Holland Mouse population identified within the Study Area is not listed as an important population and that a larger area of suitable habitat will be retained.
Green and Golden Bell Frog (*Litoria aurea*)	Vulnerable	Low	Up to 17.65 ha	Surveys conducted within the Study Area for the proposed Action did not identify the species. As such, no location population of the species was detected, and the proposed Action is unlikely to have a significant impact on the species.

Species	Listing Status	Likelihood of Occurrence	Impacts to Habitat	Assessment of Significance
Swift Parrot (*Lathamus discolor*)	Critically Endangered	Low	Up to 29.02 ha	The Action is unlikely to result in a significant impact to this species. No breeding habitat will be impacted.
Regent Honeyeater (*Anthochaera phrygia*)	Critically Endangered	Low	Up to 29.02 ha	The Action is unlikely to result in a significant impact to this species. No breeding habitat will be impacted.
Fork- tailed Swift (*Apus pacificus*)	Migratory	Low	Up to 29.02 ha	The Action is unlikely to result in a significant impact to this species. No breeding habitat will be impacted.
White-throated Needletail (*Hirundapus caudacutus*)	Migratory	Low	Up to 29.02 ha	The Action is unlikely to result in a significant impact to this species. No breeding habitat will be impacted.
Satin Flycatcher (*Myiagra cyanoleuca*)	Migratory	Low	Up to 1.74 ha	The Action is unlikely to result in a significant impact to this species.
Black-faced Monarch (*Monarcha melanopsis*)	Migratory	Low	Up to 1.74 ha	The Action is unlikely to result in a significant impact to this species.
Spectacled Monarch (*Monarcha trivirgatus*)	Migratory	Low	Up to 1.74 ha	The Action is unlikely to result in a significant impact to this species.
Rufous Fantail (*Rhipidura rufifrons*)	Migratory	Low-moderate	Up to 1.74 ha	The Action is unlikely to result in a significant impact to this species.

It was concluded that for the majority of the threatened species and migratory species identified within the Development Site or identified as having suitable habitat within the disturbance footprint, the quarry is unlikely to have a significant impact.

7.1.13 Mitigation and Management

A range of avoidance, mitigation and management measures would be implemented for biodiversity as outlined in Table 7-4. A site-specific Biodiversity Management Plan will be prepared prior to commencement of any clearing or construction works to ensure that impacts are managed and minimised.A major part of the management and mitigation regarding biodiversity I the Biodiversity Offset Strategy as described in Section 7.1.14.

Table 7-4: Summary of Biodiversity Mitigation and Management Measures

Impact	Action and Outcome	Responsibility	Timing
Direct impact / prescribed impact			
Clearing of native vegetation	• Avoid and minimise clearing impacts to native vegetation where practicable. • Clearly delineate the boundaries of the Development Site to ensure no accidental incursions within retained vegetation. • Ensure vehicle and equipment parking areas and stockpile areas are identified and sited to avoid areas containing ecological value wherever practicable. • Appropriate signage such as 'No Go Zone' or 'Environmental Protection Area' should be installed. • Identify and communicate the location of any 'No Go Zones' in site inductions. • Further mitigation measures to reduce the potential for impacts to Koalas are presented in the KPoM (Appendix 10 of Appendix L).	Construction / Quarry Manager	Prior to and during vegetation clearing.

Removal of hollow-bearing trees / habitat trees, resulting in fauna injury and mortality.	• Limit removal of trees to that required within the Development Site.
	• Hollows removed will be replaced with nestboxes in retained vegetation within the IDPL landholding at a ratio of 1:1.
	• A pre-clearing protocol will be implemented during clearing works, as follows:
	  ○ Pre-clearance surveys will be undertaken to determine if any inhabiting fauna are present.
	  ○ A suitably qualified and trained fauna handler will be present during hollow-bearing tree clearing to rescue and relocate displaced fauna.
		Construction / Quarry Manager, and suitably qualified/trained fauna handler.	Prior to and during tree clearing.

Impacts to surface and groundwater quality and quantity due to sediment run-off and/or contaminant runoff into adjacent watercourses	• Source controls such as sediment fences, mulching and jute matting will be utilised where appropriate.
	• Site-based vehicles will carry spill kits.
	• A Soil and Water Management Plan will be required prior to disturbance activities that includes:
	  ○ An Erosion and Sediment Control Plan for each stage of development.
	  ○ A Groundwater Management Plan.
	  ○ A Surface Water Management Plan.
	• Limit the use of pesticides in the Development Site where possible to avoid the risk of contamination of nearby watercourses/wetland areas.
		Construction / Quarry Manager	During vegetation clearing, construction and operation.

Vehicle collision with fauna	• Speed limits within the Development Site will be limited to 40 km/hr. • This speed limit should be communicated in site inductions and through onsite signage. • Staff and contractor awareness of increased animal activity during dawn and dusk should be communicated in site inductions and through appropriate onsite signage. • Mitigation measures to reduce the potential for vehicle strikes to Koalas are presented in the KPoM (Appendix 10 of Appendix L).	Construction / Quarry Manager	During construction and operation

Impact	Action and Outcome	Responsibility	Timing
Indirect Impact			
Transfer of weeds and pathogens to and from site.	Fungal pathogens, including *Phytophora cinnamomi* and Myrtle Rust (*Puccinia psidii*), and invasive weeds can have devastating impacts on native plant communities and inhabiting fauna if not managed. Key measures are recommended to include: • Earth moving equipment and off road vehicles will be required to enter the site clean, free of loose dirt and vegetation matter. • Weed infestations within the construction footprint are to be identified and mapped prior to construction. • Ensure soil and seed material is not transferred between weedy and weed free areas onsite. • A Plan of Management for the control of noxious weeds is to be included in the Biodiversity Management Plan. This is to include weed control works to be conducted throughout the construction phase of the Project, and follow-up weed control within the Development Site post construction.	Construction / Quarry Manager	During vegetation clearing and construction.

Noise, vibration, waste and air pollution impacts to adjacent sensitive habitat areas.	Increased human activity (from workers and traffic levels) directly adjacent to sensitive habitat areas may cause disturbance to flora and fauna species in adjoining habitat. Impacts from operational activities, such as disturbance to an animal's normal behaviour patterns due to noise, vibration, and dust may cause areas of previously suitable habitat to become sub-optimal and may cause fauna species to vacate areas of previously suitable habitat. Management Plans for the Quarry will consider measures to mitigate impacts on flora and fauna from noise, vibration, waste, and air pollution such as:
	• Traffic Management Plan that will include measures to improve driver behaviour, that will be communicated through inductions and a Drivers Code of Conduct applicable to all haulage contractors. Key measures to be included are:
	  ○ Speed limits within the Development Site will be limited to 40 km/hr.
	  ○ Speed limit signage.
	  ○ Staff and contractor awareness of increased animal activity during dawn and dusk should be communicated in site inductions and through appropriate onsite signage.
	• Enforce 'carry-in, carry-out' policy regarding rubbish and waste materials generated on site to avoid waste materials entering adjacent vegetation.
	• Restriction of public access and associated impacts from domestic pets, waste dumping and damage to adjoining vegetation must be enforced pre, during and post construction.
	• Fence sensitive areas to delineate 'no go' zones.
	• Noise and vibration minimization practices should be included in the Noise and Vibration Management Plan for the quarry.
	• Dust control measures will be implemented through the Quarry's Air Quality Management Plan, this should include covering loads where required; amending operations under excessive wind conditions including ceasing operations if required; use of water carts and static sprays as required to control dust; rehabilitation or stabilisation of exposed surfaces; and, other dust minimisation measures as become evident during works.
		Construction / Quarry Manager	During construction and operation.

Impact	Action and Outcome	Responsibility	Timing
'On site' offset areas	• Weed control programs to maintain or reduce the existing weeds within the onsite offset area. • Repair and erection of fencing as needed to ensure the exclusion of livestock from the offset area.	Quarry Manager	Upon commencement of construction until the credits are suitably retired or are otherwise managed under a Biodiversity Stewardship Site Agreement
Biodiversity Offset Strategy	• Satisfaction of the Biodiversity Offset Strategy detailed within Section 7.1.14.	Quarry Manager	As stated in Section 7.1.14.

7.1.14 Biodiversity Offset Strategy

The Biodiversity Offset Strategy will consist of the following key elements:

- Creation of an onsite biodiversity stewardship site (within land owned or under agreement with IDPL) adjacent to the quarry and retirement of the required credits.
- Purchase any deficit in the required credits for retirement from existing biodiversity stewardship sites.
- Payment into the Biodiversity Conservation Trust Fund for any credit requirement that cannot be met through the above retirement of credits.

The retirement of ecosystem and species credits will be in accordance with Section 10.3 of the BAM (DPIE, 2020) will form the core component of the proposed biodiversity offsets strategy for the quarry. Biodiversity offset credits would be retired in accordance with BC Act and EPBC Act requirements (the proposed action will be assessed in accordance with the bilateral assessment agreement Amending Agreement No. 1).

Credit Requirement

A summary of the impacts on native vegetation and the required ecosystem credits to offset the impacts is provided in Table 7-5.

A species credit is a class of biodiversity credit created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates (i.e. one that is not already addressed through ecosystem credits).

A summary of the impacts on threatened species and the required species credits to offset impacts is provided in Table 7-6.

Table 7-5: Summary of Ecosystem Credit Biodiversity Offset Requirements

Plant Community Type Impacted	Ecosystem Credits required to offset impact	Estimated Onsite Offset Credits Available	Comment
PCT 1590 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	325	1461	Requirement likely met in onsite offset
PCT 1619 Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	165	35	Alternate credit source required or payment into the BCT Fund.
PCT 1567 Tallowwood - Brush Box - Sydney Blue Gum moist shrubby tall open forest on foothills of the lower North Coast	44	58	Requirement likely met in onsite offset

Plant Community Type Impacted	Ecosystem Credits required to offset impact	Estimated Onsite Offset Credits Available	Comment
PCT 1556 Tallowwood - Smooth-barked Apple - Blackbutt grass tall open forest of the Central and lower North Coast.	5	30	Requirement likely met in onsite offset
Total	**539**	**1584**	

Table 7-6: Summary of Species Credit Requirements

Species Impacted	Species Credits required to offset impact	Estimated Onsite Offset Credits Available	Comment
Callistemon linearifolius	**92**	**Credits likely to be available on site**	Requirement likely met on site, requires further survey effort to define on site credits available
Tetratheca juncea	**577**	**Credits likely to be available on site**	Requirement likely met on site, requires further survey effort to define on site credits available
Koala	**736**	**1847**	Requirement likely met on site, requires further survey effort to define on site credits available
Southern Myotis	**416**	**441**	Requirement likely met on site, requires further survey effort to define on site credits available
Total	**1821**	**2288**	

Source and Location of Offset Credits

An assessment of IDPL land holdings and land holdings subject to an agreement with IDPL was undertaken to determine the lands available and suitable for long term biodiversity offset. This considered potential future post quarrying land use, including several possible housing sites (i.e. generally consistent with the approved eight lot subdivision), asset protection zones, access and retention of cleared areas for agricultural use. An estimated 286 hectares was considered suitable for future long term biodiversity offset, i.e. “onsite offsets”.

Preliminary vegetation and habitat mapping of this 286 ha was completed to estimate the available ecosystem and species credits that could be created through the establishment of an onsite biodiversity stewardship site. The assessment determined the majority of credit requirements are likely to be met onsite, as displayed in Table 7-5 and Table 7-6.

This allows IDPL to meet a significant majority of the offset requirements through onsite offsetting (via establishment of a Biodiversity Stewardship Site agreement), with the remainder to be met through the purchase of credits from the credit register, or payment into the Biodiversity Conservation Trust (BCT) fund.

At the request of Regional NSW – Mining, Exploration and Geoscience (MEG) (Appendix F), consideration has been given to potential resource sterilisation in relation to any proposed biodiversity offsets areas. A review of ‘Minview’ was performed and no existing mining or exploration titles or pending applications are present within the IDPL landholding containing potential onsite offsets. The nearest mining lease (ML5938) is over 14 km south of the Project area at Swan Bay, and the nearest exploration licence (ELA269) is 27 km East of the Project area in Tea Gardens. Given these significant distances to the nearest resources identified by existing mining and exploration titles, no potential sterilisation has been identified.

As demonstrated by Figure 16, Strategic Agricultural land is over 2 km from the proposed project site and is therefore outside of the proposed offset areas.

Staging and Timing of Credit Retirement

Staging of biodiversity offset requirements is proposed to ensure the significant financial investment required to meet credit obligations can be undertaken in a manner that better distributes the capital investment and enables the biodiversity stewardship site to be suitably established. It is proposed to stage the biodiversity credit requirement obligations as follows:

- Lodgement of the Biodiversity Stewardship Assessment Report for the onsite offset area within two years of commencing construction (allows for seasonality surveys of credit species).
- Retirement of 60% of credit requirements (i.e. payment of 60% the total fund deposit) within 12 months of the acceptance by the BCT of the proposed offset area as a Stewardship site.
    - Equating to 323 ecosystem credits and 1093 species credits
    - No more than 18 hectares (i.e. 60% of total disturbance area) will be disturbed until this requirement is met. Noting, Stage 1 (anticipated to be completed by Year 4 – see Table 3-1) is expected to impact approximately 17 hectares.
- Retirement of the remaining 40% of the credit requirements (i.e. payment of applicable total fund deposit) within 5 years of commencing construction.
    - Equating to 216 ecosystem credits and 728 species credits

Given the majority of credit requirements will be satisfied within the onsite offset area, the availability and security of the credits is substantially met. To ensure the suitability and integrity of the onsite biodiversity areas prior to the establishment of the Stewardship Site, management controls will be implemented until the credits are suitably retired or are otherwise managed under a Biodiversity Stewardship Site Agreement. The proposed controls will be addressed through the implementation of the Biodiversity Management Plan and will include:

- Weed control programs to maintain or reduce the existing weeds within the onsite offset area.
- Repair and erection of fencing as needed to ensure the exclusion of livestock from the offset area.

7.2 NOISE & BLASTING

A Noise and Vibration Impact assessment (NIA) has been performed by Spectrum Acoustics. The full NIA is available in Appendix Q. This chapter provides a summary of the NIA.

The NIA report provides:

- An overview of the acoustic environment around the quarry, based upon recent and historical background noise measurements
- An outline of the acoustic criteria relevant to the quarry
- An assessment of the predicted noise levels associated with the quarry and as to the adverse impacts on the existing acoustic environment in vicinity of the proposed operations including traffic noise
- An outline of the required noise mitigation measures and monitoring.

The noise and vibration impact assessment has been prepared in accordance with the NSW Noise Policy for Industry (EPA, 2017), Road Noise Policy (OEH, 2011) and the Secretary's Environmental Assessment Requirements (SEARs).

7.2.1 Investigation

This noise and vibration impact assessment has been prepared in accordance with the NSW Noise Policy for Industry (EPA, 2017), Road Noise Policy (OEH, 2011) and the Secretary's Environmental Assessment Requirements (SEARs), issued on 19 February 2021 by the NSW Department of Planning, Industry and Environment (DPIE). Appendix 1 of the NIA (Appendix Q) records the coverage of the requirements within this report. Privately-owned residential properties within approximately 3 km of the proposed development were considered in this assessment.

Additional residences located at greater distances from the proposed extraction area are also included in the noise modelling domain.

The existing meteorological and acoustical environments of the quarry and its surrounds have been studied to determine prevailing conditions and to allow noise goals to be set. The meteorological data analyses conducted by Todoroski Air Sciences (TAS 2021) was used to determine relevant meteorological conditions for this noise impact assessment. Data was analysed for the Beresfield (NSW OEH), Williamtown RAAF and Paterson (Tocal) meteorological stations, as well as computer modelling using the CALMET software.

The worst case of these, the CALMET predictions, found that winds up to 3m/s occurred for more than 30% of the time from the NNE, WNW and ESE during various seasons when assessed with the EPA's Noise Enhancement Wind Analysis (NEWA) methodology. Pasquill stability class F was found to occur for more than 30% of the time. Since there are no proposed major noise-generating activities during night time hours, i.e. extraction and blasting, inversions will not be considered. Worst case noise impacts at all assessed receivers are covered by the three assessed wind directions.

The following points are the most significant with respect to noise propagation and were adopted as parameters for noise modelling.

- Extremes of relative humidity (RH) are rarely experienced during daytime hours. A value of 70% RH was adopted
- Neutral atmospheric conditions (20°C, no wind)
- Winds, 3 m/s from the NNE, WNW and ESE.

Noise impacts have been determined based upon the existing acoustic environment and associated trigger levels. Trigger levels have been determined by monitoring existing noise at the most noise impacted receiver (R33). This provides a conservative baseline to understand the potential impacts of noise to receptors within the wider receiving environment as receivers further from The Bucketts Way than R33 would experience lower impacts to background noise levels as a result of the proposed activity. As the location closest to The Bucketts Way, R33 (refer to Figure 2 for location) will receive the most cumulative impacts from changes to the existing acoustic environment from cumulative road noise as a result of trucks transiting to and from the quarry.

In order to quantify the existing acoustic environment at the potentially most impacted receiver (R33), a Rion NL-42 environmental noise logger was deployed from 20-27 November 2018 at location R33 (convergence of Deep Creek and The Bucketts Way south of proposed entrance to quarry) (refer to Figure 2). This location is the closest receiver to The Bucketts Way and Quarry entrance (i.e. worst case scenario). The noise monitoring was conducted to establish noise impact criteria specific to receiver R33. Noise criteria (project noise trigger levels) were established from this for all other receivers and these were adopted for this assessment.

Traffic Noise

In NSW, noise from vehicle movements associated with an industrial source is assessed in terms of the Noise Policy for Industry (NPI) if the vehicles are not on a public road. If the vehicles are on a public road, the NSW Road Noise Policy (RNP) applies. Noise from the proposed development must, therefore, be assessed against the project noise trigger levels of the NPI and also the criteria in the RNP.

The RNP recommends various criteria based on the functional categories of roads applied by the Transport for NSW (TfNSW). The TfNSW differentiates roads based on a number of factors including traffic volume, heavy vehicle use, or through local traffic, vehicle speeds and applicable traffic management options. Vehicles accessing the quarry will do so via The Bucketts Way which falls under the TfNSW definition of an arterial road.

Table 7-7 shows the noise criteria relevant to arterial roads extracted from Table 3 of the RNP. For the assessment of traffic noise, the daytime period is from 7:00am to 10:00pm, whilst night is from 10:00pm to 7:00am.

Table 7-7: Road Traffic Noise Criteria

Situation	Recommended Criteria	
	Day (7:00am to 10:00pm)	Night (10:00pm to 7:00am)
Existing residences affected by additional traffic on existing freeway/ arterial/sub-arterial roads generated by land use developments	Leq (15-hour) 60	Leq (9-hour) 55

Project Noise Trigger Levels

Project-generated noise within the quarry is required to be assessed against the provisions of the NPI. In relation to the residences surrounding the quarry, the NPI specifies two noise criteria: intrusiveness and amenity criteria.

The Intrusiveness Criterion limits Equivalent Continuous Noise Level (Leq) from the industrial source to a value of 'background plus 5dB'. That is, the Rating Background Level (RBL) for the time period, plus 5 dB(A). The RBL (LA90) is defined as the overall single figure background level representing each assessment period.

The Amenity Criterion aims to protect against excessive noise levels where an area is becoming increasingly developed. Amenity criteria are dependent upon the nature of the receiver area and the existing level of industrial noise. There is no significant existing industrial noise in the vicinity of the quarry site and the residential area that is potentially affected by noise emissions from the quarry is best described acoustically as an area dominated by environmental noise with some road traffic noise.

Time periods for assessment as defined in the NPI are:

- Daytime – 7:00am (8:00am on Sundays) to 6:00pm
- Evening – 6:00pm to 10:00pm
- Night – 10:00pm to 7:00am (8:00am on Sundays).

The area surrounding the site is not impacted by significant traffic or industrial noise levels and the intrusiveness criteria become the most stringent.

The measured noise levels at R33 were impacted by road traffic noise, due to the minimal distance between it and The Bucketts Way. Due to this, a conservative noise level reduction will be adopted to meet the default minimum daytime background noise level of 35 dB(A).L90, as per the NPI. The adopted project noise trigger level (PNTL) for all receivers is shown in Table 7-8.

Table 7-8: Adopted Noise Trigger Levels

Location	Rating Background Level (RBL)* L_{A90}	Trigger levels/PNTLs $L_{Aeq(15minute)}$
All Receivers	35	40

* NPI default minimum daytime RBL.

Maximum Noise Levels

The potential for sleep disturbance from maximum noise level events from the quarry is likely to occur during the 'night-time' period 6 am – 7 am when the quarry is anticipated to be open. Product dispatch during this period would involve loading of empty trucks and movement of the trucks to and from The Bucketts Way.

Where the subject development/premises night-time noise levels at a residential location exceed:

- LAeq,15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater,and/or
- LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

Other factors that may be important in assessing the extent of impacts on sleep include:

- How often high noise events will occur
- The distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development
- Whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods)
- Current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

Maximum noise level event assessments should be based on the LAFmax descriptor on an event basis under 'fast' time response. The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels of which 52 dB(A),Lmax will be the adopted criterion applicable to night-time noise emissions from loading of product haulage trucks between 6am and 7am.

Blasting

Blasting will occur up to 25 times per year on average based upon 20,000 to 30,000 tonne blasts at peak production of 500,000 tpa.

Noise and vibration levels from blasting are assessable against criteria proposed by the Australian and New Zealand Environment and Conservation Council (ANZECC) in their publication "*Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration – September 1990*". These criteria are summarised as follows:

- The recommended maximum overpressure level for blasting is 115 dB
- The level of 115 dB may be exceeded for up to 5% of the total number of blasts over a 12-month period, but should not exceed 120 dB at any time
- The recommended maximum vibration velocity for blasting is 5 mm/s Peak Vector Sum (PVS)
- The PVS level of 5 mm/s may be exceeded for up to 5% of the total number of blasts over a 12-month period, but should not exceed 10 mm/s at any time
- Blasting should generally only be permitted during the hours of 9 am to 5 pm Monday to Saturday, and should not take place on Sundays and Public Holidays
- Blasting should generally take place no more than once per day.

Building damage assessment criteria are nominated in AS 2187.2-1993 “Explosives – Storage, Transport and Use. Part 2: Use of Explosives” and summarised in Table 7-9.

Table 7-9: Building Damage Vibration Criteria

Building Type	Vibration Level (mm/s)	AIRBLAST LEVEL (dB re 20 μPa)
Sensitive (and Heritage)	5	133
Residential	10	133
Commercial/Industrial	25	133

The annoyance (ANZECC) criteria are more stringent than the building damage criteria and are therefore taken as the governing criteria in the impact assessment.

7.2.2 Results

Construction and Operational Noise

Noise levels from construction and operational phases of the project, including associated on site traffic movements were modelled. Noise levels were modelled using Renzo Tonin Associates (RTA) *Environmental Noise Model* v3.06 (ENM) software. Point-to-point calculations were performed for all receivers within 3 km of the quarry footprint and the results for each are available in Section 5 the NIA.

The predicted noise levels were compared to the noise criteria in the NPI and RNP. The results in the NIA (Appendix Q) predict noise levels below the project noise trigger level at all assessed receivers with the exceptions presented in Table 7-10.

Table 7-10: EPA NPI Criteria Exceedences

Receiver	Receiver Type	Exceedance
R3	IDPL associated property	4-8 dB exceedance under WNW winds from Stage 2 onwards.
R4a	IDPL associated property	4 dB exceedance under WNW winds from Stage 3 onwards.
R25	No residential dwelling	2dB exceedance under ESE winds during Stage 2, and at, but not exceeding noise criteria during ESE winds in other Stage 1 and 3.

Receiver 3 (R3), and R4a have agreements in place with Ironstone Developments Pty Ltd accounting for potential noise impacts due to quarrying activity. There is no residential dwelling on Receiver 25 (R25). Receiver locations are presented in Figure 2.

The DPIE’s *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extraction Industry Development* (VLAMP) lists five different levels of noise impact and recommended actions. These impact levels and actions are shown in Table 12 of the NIA. The results demonstrate that no acquisitions under VLAMP are required based upon the findings of the NIA. See Appendix Q for further information.

It should be noted that the predicted worst case noise level of 47 dB(A),Leq(15min) at R3 was based on all noise sources operating simultaneously. This worst case is well below the 52 dB(A),Lmax default minimum sleep disturbance noise screening level and therefore no further quantitative assessment is advised by the NIA or considered required.

Off-Site Road Traffic

The bulk of the products would be despatched from the quarry using truck and dog trailers of various configurations, i.e. with a capacity of between 32.5t and 37.5t, smaller quantities of products would be despatched by semi-trailers (27.5t to 30t capacity) or rigid trucks (12.5t to 18t capacity).

While traffic levels will vary substantially on a daily basis throughout the life of the quarry, for the purposes of the NIA, the average of 55 loads per day with a maximum of 25 laden trucks per hour at maximum rate, i.e. with annual production typically around 500,000 tpa or less. A worst case of 8.25 loads per 15 minute period was considered in the assessment of potential noise impacts.

All laden trucks departing the quarry would travel eastwards on the new private access road from the new intersection with The Bucketts way. The access road will be a two-way, two-lane, sealed private road that runs east-west perpendicular to, and on the western side of, The Bucketts Way. Unladen trucks travelling to the quarry from The Bucketts Way would approach either northbound or southbound prior to entering Deep Creek Road.

Based on the maximum annual product despatch rate of 500,000 tonnes, the quarry would generate up to 55 movements per day, with 25 movements per hour maximum, half as arriving empty trucks and half as departing full trucks.

The potentially most impacted receiver regarding traffic noise is R33 at 51m west of The Bucketts Way. Point calculation modelling resulted in a road traffic noise level of 39 dB(A),Leq(1hour) based on a nominal speed of 90km/h. This is significantly below the criterion of 55 dB(A),Leq(9hour), and as such impacts are not expected.

Cumulative Impacts (Noise)

There is the possibility of additional road traffic generation by the proposed Hillview Quarry, located to the north of DCQ off Maytom's Lane at Allworth. The maximum production rate being applied for at that quarry is 1.5 million tpa. Being triple the production rate of DCQ, the maximum morning heavy vehicle numbers would be 5 dB greater than for DCQ, or 44 dB(A), Leq(1hour). The cumulative level of 46 dB(A) at R33 is 9 dB below the adopted criterion of 55 dB(A) and therefore the potential cumulative noise impact is considered acceptable, even at the maximum approval rate sought by the proposed Hillview application.

Blasting and Vibration

Predicted blast overpressure and ground vibration levels at the nearest residential receivers in each direction from the Site are shown in Table 7-11. Calculations are based on charge weights (Maximum Instantaneous Charge weight, (MIC) of a nominal 60kg and a likely maximum value of 80kg.

Table 7-11: Predicted Blast Impacts

Receiver	Distance (m)[a]	Criterion		MIC = 60 kg		MIC = 80 kg	
		PPV[b]	OP[c]	PPV	OP	PPV	OP
R19 (south)	740	5	115	0.3	105	0.4	106
R22 (west)	1140	5	115	0.2	101	0.2	102
R24 (north)	1020	5	115	0.2	103	0.3	104
R3 (east)	285	5	115	1.4	115	1.8	117

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

The results in Table 7-11 confirm that blast vibration and overpressure levels will be below the 5% exceedance criteria at the assessed residential receivers, except R3 where a 2dB exceedance of the 5% exceedance overpressure criterion may occur when blasting is at its closest point to this receiver. A maximum of 5% of blasts per year can exceed these criteria as discussed in Section 3.7.1 of the NIA. Receiver R3 has no dwelling and there is an agreement in place with IDPL should the project be approved.

7.2.3 Impact Assessment

The assessment has found that the quarry would be able to operate in compliance with the appropriate criteria for construction and operational noise emissions, road traffic noise emissions and for potential blast overpressure and vibration impacts.

Direct Impacts

The predicted worst case noise level of 47 dB(A),Leq(15min) at R3 was based on all sources operating simultaneously. This is well below the 52 dB(A),Lmax default minimum sleep disturbance noise screening level and no further quantitative assessment is therefore required.

Blast vibration and overpressure levels will be significantly below the 5% exceedance criteria at the assessed residential receivers. A maximum of 5% of blasts per year can exceed these criteria as discussed in Section 3.7.1 of the NIA (Appendix Q).

Residual Impacts

Additional traffic noise generated by the quarry at residential receivers adjacent to The Bucketts Way will be of a discrete rather than constant nature. Agreements are in place to remove the impacts of potential operational exceedances at impacted receivers. The residual noise impact is the exceedance of criteria at a receiver after all feasible and reasonable mitigation and management measures have been considered. No residual impacts are therefore predicted at any privately-owned receivers.

Cumulative Impacts

Cumulative impacts are associated with off site traffic noise generation and have been factored into the modelling performed (i.e. background noise levels such as traffic). given that a conservative approach was taken with this, no significant cumulative impacts are expected as a result of the project regarding noise. Notably, regarding worst case traffic noise, the cumulative level of 46 dB(A) at R33 is 9 dB below the adopted criterion of 55 dB(A). This means the off-site traffic noise criterion of 55 dB(A),Leq(15hour) for arterial roads would be achieved for all receivers when considering the cumulative impacts from DCQ and a potential future quarry (Hillview).

7.2.4 Mitigation and Management Measures

The results of the NIA have found that there will be no exceedances of noise criteria at any receivers, other than those with an agreement with IDPL. As such there are no noise related impacts arising form the project. It should also be noted that the project is strategically located to have topographic ridgelines provide natural noise attenuation to the majority of nearby receivers. The hours of operation described in Section 3.2.4 will be strictly adhered to, and sleep will not be impacted as evidenced by the impact assessment results provided.

Residual impacts are not expected, nonetheless a Noise Management Plan (NMP) will be developed for the quarry prior to the commencement of construction, and at a minimum the NMP would include:

- A noise monitoring program, including:
    - Noise monitoring on commencement of construction and on a quarterly basis for at least the first year of operation to determine compliance with the noise criteria and to inform any further noise mitigation works, should the need arise. Monitoring locations would include R6 and/or R19 and R25 (see Figure 2).
- Management controls to minimise noise impacts, including:
    - Relevant best practice noise management practices.
    - Ensuring plant and equipment used onsite are generally consistent with the sound power levels used in this noise modelling assessment.
    - The location of plant and equipment relative to bunding and screens is generally consistent with this noise modelling assessment.
- Response protocols in the event of a monitored exceedance or noise complaint.

A Blast Management Plan should be developed prior to undertaking blasting onsite, the Blast Management Plan should include vibration monitoring protocols for each blast and response protocols in the event of any exceedance of blast vibration criteria.

7.3 AIR QUALITY

7.3.1 Introduction

An Air Quality Impact Assessment (AQIA) has been performed by Todoroski Air Sciences. The full AQIA is available in Appendix H. This chapter provides a summary of the AQIA.

7.3.2 NSW Voluntary Land Acquisition and Mitigation Policy

Part of the NSW Voluntary Land Acquisition and Mitigation Policy (VLAMP) dated September 2018 describes the NSW Government's policy for voluntary mitigation and land acquisition to address particulate matter impacts from state significant mining, petroleum and extractive industry developments.

Voluntary mitigation rights apply per the VLAMP where, even with best practice management, the development contributes to exceedances of the criteria in at any residence on privately owned land or workplace on privately owned land. The AQIA assesses the impacts of the proposed development against these criteria. The criteria are presented in Table 7-12.

Table 7-12: VLAMP Particulate Matter Criteria

Pollutant	Averaging period	Mitigation criterion		Impact type
$PM_{2.5}$	Annual	8µg/m³*		Human health
$PM_{2.5}$	24 hour	25µg/m³**		Human health
PM_{10}	Annual	30µg/m³*		Human health
PM_{10}	24 hour	50µg/m³**		Human health
TSP	Annual	90µg/m³*		Amenity
Deposited dust	Annual	2 g/m²/month**	4 g/m²/month*	Amenity

*Cumulative impact (i.e. increase in concentration due to the development plus background concentrations due to all other sources).

**Incremental impact (i.e. increase in concentrations due to the development alone), with zero allowable exceedances of the criteria over the life of the development.

7.3.3 Investigation

This Air Quality Impact Assessment is provided in full in Appendix H and has been prepared in accordance with the NSW EPA document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2017).

Air Quality Criteria

Particulate matter (dust), odour emissions and nitrogen oxide have been considered when investigating potential air quality impacts from the proposed development.

The significant dust generating activities associated with proposed operation of the quarry are identified as drilling and blasting, loading/unloading of material, vehicles travelling on-site and off-site, crushing and screening processes, and windblown dust from exposed areas and stockpiles. The on-site and off-site vehicle and plant equipment also have the potential to generate particulate emissions from the diesel exhaust.

Particulate Matter

Particulate matter consists of dust particles of varying size and composition. Air quality goals refer to measures of the total mass of all particles suspended in air defined as the Total Suspended Particulate matter (TSP). The upper size range for TSP is nominally taken to be 30 micrometres (µm) as in practice particles larger than 30 to 50µm will settle out of the atmosphere too quickly to be regarded as air pollutants.

Two sub-classes of TSP are also included in the air quality goals, namely PM_{10}, particulate matter with equivalent aerodynamic diameters of 10µm or less, and $PM_{2.5}$, particulate matter with equivalent aerodynamic diameters of 2.5µm or less.

Particulate matter, typically in the upper size range, that settles from the atmosphere and deposits on surfaces is characterised as deposited dust. The deposition of dust on surfaces may be considered a nuisance and can adversely affect the amenity of an area by soiling property in the vicinity.

Odour

While odour emissions have some potential to arise from the diesel exhaust emissions of on-site plant equipment as well as vehicles travelling on and off site, they are considered to be too low to generate any significant impacts and have not been assessed further.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) is reddish-brown in colour (at high concentrations) with a characteristic odour and can irritate the lungs and lower resistance to respiratory infections such as influenza. NO_2 belongs to a family of reactive gases called nitrogen oxides (NOX). These gases form when fuel is burnt at high temperatures, mainly from motor vehicles, power generators and industrial boilers (US EPA, 2011).

For the proposed development, NO_2 from diesel powered equipment has been considered in this assessment. NO_2 may also be emitted from blasting activity (i.e. blast fumes) under certain conditions, however due to the low frequency of up to 25 blasts per year, relatively small scale nature of the blasts and material to be blasted the activity is considered to have a low potential of NO_2 generation. Blast fume emissions from hard-rock quarries can be easily managed (through a Blast Management Plan) so as to not cause any air impacts and thus have not been considered further in the AQIA.

Local Air Quality Monitoring and Background Dust Levels

The main sources of air pollutants in the area surrounding the quarry include emissions from active extraction operations, agricultural activities and anthropogenic activities such as wood heaters and motor vehicle exhaust. Ambient air quality monitoring data from the quarry are not available. Therefore, the available data from the nearest air quality monitors operated by the NSW Department of Planning, Industry and Environment (DPIE) at Beresfield and Mayfield were used to characterise the background levels.

Estimated Background Levels

There is no readily available site specific monitoring data, and therefore to assess the potential impacts associated with the proposed quarry against the relevant dust criteria, consideration of background dust levels needs to be applied. The background dust levels should be representative of the area surrounding the quarry site. In the absence of available data, estimates of the annual average background TSP and deposited dust concentrations can be determined from a relationship between PM_{10}, TSP and deposited dust concentrations and the measured PM_{10} levels.

The main sources of air pollutants in the area surrounding the quarry would primarily include emissions from anthropogenic activities such as wood heaters and motor vehicle exhaust.

Ambient air quality monitoring data from the quarry site are not available. Therefore, the available data from the nearest air quality monitors operated by the NSW Department of Planning, Industry and Environment (DPIE) at Beresfield and Mayfield were used to characterise the background levels.

It is to be noted that the Beresfield and Mayfield monitoring stations are located in generally more urban environments with potentially higher ambient air emissions sources originating from industrial and commercial operations as well as traffic emissions. The monitoring data are therefore expected to provide a conservative estimate of the underlying background levels. A summary of the background levels used for the project are provided in Table 7-13.

Table 7-13: Summary of Background Air Quality Levels

Pollutant	Averaging period	Background level	Units
TSP	Annual	67.5	µg/m³
PM_{10}	24-hour	Daily varying	µg/m³
	Annual	18.8	µg/m³
$PM_{2.5}$	24-hour	Daily varying	µg/m³
	Annual	7.3	µg/m³
Deposited dust	Annual	3.0	g/m²/month
NO_2	1-hour	100.5	µg/m³
	Annual	39.1	µg/m³

Dispersion Modelling Approach

The dispersion model was setup in general accord with the methods provided in the NSW EPA document *Generic Guidance and Optimum Model Setting for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia'* (TRC, 2011). The centre of analysis for the air pollution model (TAPM) utilized was 32deg 30min south and 151deg 54.5min east. The simulation involved an outer grid of 30km, with three nested grids of 10km, 3km and 1km with 35 vertical grid levels. The CALMET domain was run on an initial domain of 30 x 30km grid with a 0.6km grid resolution and refined for a final domain of 10 x 10km with a 0.1km grid resolution.

7.3.4 Results

The particulate matter dispersion model predictions presented include those for the operation of the quarry in isolation (incremental impact) and the operation of the quarry with consideration of other sources (total cumulative impact). The results show the predicted:

- Maximum 24-hour average $PM_{2.5}$ and PM_{10} concentrations
- Annual average $PM_{2.5}$, PM_{10} and TSP concentrations
- Annual average dust (insoluble solids) deposition rates.

The criteria required to be met by these results are as provided in Table 7-14.

Table 7-14: NSW EPA Air Quality Impact Assessment Criteria

Pollutant	Averaging Period	Impact	Criterion
TSP	Annual	Total	90µg/m^3
PM_{10}	Annual	Total	25µg/m^3
	24 hour	Total	50µg/m^3
$PM_{2.5}$	Annual	Total	8µg/m^3
	24 hour	Total	25µg/m^3
Deposited dust	Annual	Incremental	2 g/m^2/month
		Total	4 g/m^2/month
NO_2	1 hour	Total	246µg/m^3
	Annual	Total	62µg/m^3

Source: NSW EPA, 2017
µg/m^3 = micrograms per cubic metre
g/m^2/month = grams per square metre per month

The air quality goals for total impact relate to the total pollutant burden in the air and not just the contribution from the quarry (i.e. the cumulative impact). Consideration of background pollutant levels needs to be made when using these goals to assess potential impacts.

It is important to note that when assessing impacts per the maximum 24-hour average levels, these predictions are based on the highest predicted 24-hour average concentrations which were modelled at each point within the modelling domain for the worst day (i.e. a 24-hour period) during the one year long modelling period.

The cumulative (total) impact is defined as the modelling impact associated with the operation of the quarry combined with the estimated ambient background levels in the AQIA. Table 7.15 presents the predicted incremental and cumulative particulate dispersion modelling results at selected key receptors, and Appendix H shows the complete results at all of the assessed receptor locations.

Table 7-15: Dust Dispersion Modelling Results at Key Receptors

Receptor ID	$PM_{2.5}$ (µg/m^3)		PM_{10} (µg/m^3)		TSP (µg/m^3)	DD (g/m^2/mth)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	TSP (µg/m^3)	DD* (g/m^2/mth)
	Incremental						Cumulative			
	24-hr ave.	Ann. ave.	24-hr ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.
	Air quality impact criteria									
		-	-	-	-	2	8	25	90	4
R1	0.8	<0.1	4.4	0.2	0.4	<0.1	7.3	19.0	67.9	3.0
R3	3.3	0.4	21.0	2.3	5.9	0.1	7.7	21.1	73.4	3.1

Receptor ID	$PM_{2.5}$ (µg/m³)		PM_{10} (µg/m³)		TSP (µg/m³)	DD (g/m²/mth)	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)	TSP (µg/m³)	DD* (g/m²/mth)
	Incremental						Cumulative			
	24-hr ave.	Ann. ave.	24-hr ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.
	Air quality impact criteria									
		-	-	-	-	2	8	25	90	4
R9	0.6	<0.1	3.9	0.2	0.4	<0.1	7.3	19.0	67.9	3.0
R19	0.7	<0.1	4.6	0.2	0.5	<0.1	7.3	19.0	68.0	3.0
R21	0.4	<0.1	2.6	0.1	0.3	<0.1	7.3	18.9	67.8	3.0
R22	0.4	<0.1	2.3	0.1	0.3	<0.1	7.3	18.9	67.8	3.0
R23	0.6	<0.1	3.5	0.2	0.3	<0.1	7.3	19.0	67.8	3.0
R24	0.8	<0.1	4.6	0.2	0.4	<0.1	7.3	19.0	67.9	3.0
R25	1.3	<0.1	7.5	0.2	0.5	<0.1	7.3	19.0	68.0	3.0
R30	0.8	<0.1	5.4	0.4	0.8	<0.1	7.4	19.2	68.3	3.0
R33	0.9	<0.1	4.7	0.2	0.4	<0.1	7.3	19.0	67.9	3.0
R4A	1.9	0.2	11.2	1.0	2.7	<0.1	7.5	19.8	70.2	3.1

Note: See Figure 2 for receptor locations.

7.3.5 Impact Assessment

Project Operations

Air dispersion modelling was used to predict the potential for off-site dust (particulate matter) and vehicle emission impacts in the surrounding area due to the operation of the quarry. The estimated emissions applied in the modelling are likely to be conservative and would overestimate the actual impacts.

It is predicted that all the assessed air pollutants generated by the operation of the quarry would comply with the applicable assessment criteria at the assessed receptors and therefore would not lead to any unacceptable level of environmental harm or impact in the surrounding area. This includes both on site emissions and from road traffic emissions from The Buckets Way.

Nevertheless, the site would apply appropriate air pollution management measures (see Section 7.3.7) to ensure it minimises the potential occurrence of excessive air pollutant emissions from the site.

The results of the AQIA indicate the highest maximum predicted level at the assessed privately-owned receptors would be below the applicable VLAMP mitigation and acquisition criteria.

Overall, the assessment demonstrates the quarry can operate without causing any significant air quality impact at residential receptors in the surrounding environment.

Road Traffic Emissions

A specific assessment of road-going vehicle emissions has been conducted. Table 7-16 provides a summary of the predicted incremental and cumulative PM_{10}, $PM_{2.5}$ and NO_2 pollutant impacts at receptor R30 (refer to Figure 2) due to traffic emissions from road trucks travelling on the Quarry Access Road and also all other vehicles travelling along The Bucketts Way (including any additional new trucks and vehicles associated with the quarry). R30 is selected as it is the receptor with the greatest potential to be impacted by emissions (i.e. worst case).

The results in Table 7-16indicate the predicted levels are negligible. The results most closely associated with harm, $PM_{2.5}$, are too low to be measurable, and would not result in any discernible effect on health. The data show that emissions would not exceed any relevant criteria at the assessed receptor locations.

Table 7-16: Predicted Incremental and Cumulative Impacts of Road Traffic Emissions

Pollutant	Averaging period	Maximum incremental impact from vehicles on Quarry Access Road	Maximum incremental impact from vehicles travelling on The Bucketts Way (µg/m³)	Background (µg/m³)	Cumulative impact (µg/m³)	NSW EPA criterion (µg/m³)
PM_{10}	24-hour	0.005	0.07	-	-	**50**
	Annual	0.0008	0.022	18.8	18.8	**25**
$PM_{2.5}$	24-hour	0.005	0.06	-	-	**25**
	Annual	0.0007	0.020	7.3	7.3	**8**
NO_2	1-hour	0.15	1.02	100.5	101.7	**246**
	Annual	0.004	0.090	39.1	39.2	**62**

For NO_2 concentrations, the results indicate the maximum contribution from the quarry at the receptor locations would be below the relevant criteria for NO_2.

Road traffic prediction results indicate that the quarry does not increase the number of days above the 24-hour average criterion at the assessed receptor for $PM_{2.5}$ and PM_{10}. Based on this result it can be inferred that the Project does not increase the number of days above the 24-hour average $PM_{2.5}$ and PM_{10} criterion at any of the receptor locations surrounding the Project.

7.3.6 Cumulative Impacts

The predicted cumulative results indicate that all of the assessed receptors are predicted to experience levels below the relevant criteria for each of the assessed dust metrics. The results for incremental 24-hour average $PM_{2.5}$ and PM_{10} concentrations indicate there are no predicted exceedances of the relevant criteria at the assessment locations for the assessed scenario.

Particulate Matter

The AQIA (Appendix H) provides a summary of the findings from the assessments for the selected receptors for both $PM_{2.5}$ and PM_{10}. The results indicate that the quarry does not increase the number of days above the 24-hour average criterion at the assessed receptors for $PM_{2.5}$ and PM_{10}. Based on this result it can be inferred that the quarry does not increase the number of days above the 24-hour average $PM_{2.5}$ and PM_{10} criterion at any of the receptor locations surrounding the quarry and there are therefore no significant cumulative impacts regarding particulate matter.

The predicted incremental results show that minimal incremental effects would arise at the residential receptor locations due to the proposed development. Detailed tables of the contemporaneous assessment results are provided in the AQIA.

Nitrogen Oxide Concentrations

The AQIA presents the predicted maximum impact from onsite vehicle and plant exhaust emissions for NO_2 at each of the assessed receptor locations. Isopleth diagrams of the predicted impact for maximum 1-hour average and annual average NO_2 concentrations are presented in the AQIA (Appendix H).

The cumulative (total) impact is defined as the modelling impact associated with the operation of the quarry combined with the estimated ambient background levels.

The results indicate the contribution from the quarry at all the receptor locations would be well below the relevant criteria for NO_2.

7.3.7 Mitigation and Management Measures

While the proposed quarry has the potential to generate particulate matter emissions, the modelling predictions from the AQIA for the quarry do not indicate any exceedance of the relevant pollutant impact assessment criteria at any of the residential receptors. Given this outcome, the AQIA did not identify any specific ambient air quality monitoring recommendations for proposed development at the residential receptors.

If approved, the quarry would develop an Environmental Management Plan (EMP). The EMP would include a dust management plan which outlines the measures to manage dust emissions at the site and include aspects such as key performance indicators, response mechanisms, and complaints management.

Suggested practicable dust mitigation measures, commensurate to the AQIA results for the quarry, are listed in Table 7-17.

Table 7-17: Dust Management and Mitigation Measures

Source	Mitigation Measure
General	• Activities to be assessed during adverse weather conditions and modified as required (e.g. cease activity where reasonable levels of dust cannot be maintained using the available means)
	• Weather forecast to be checked prior to undertaking material handling or processing
	• Engines of on-site vehicles and plant to be switched off when not in use
	• Vehicles and plant are to be fitted with pollution reduction devices where practicable
	• Vehicles are to be maintained and serviced according to manufacturer's specifications
	• Visual monitoring of activities is to be undertaken to identify dust generation
Exposed areas/stockpiles	• The extent of exposed surfaces and stockpiles is to be kept to a minimum
	• Exposed areas and stockpiles are either to be covered or are to be dampened with water as far as is practicable if dust emissions are visible, or there is potential for dust emissions outside operating hours
	• Minimise dust generation by undertaking rehabilitation earthworks when topsoil and subsoil stockpiles are moist and/or wind speed is below 10 m/s
Material handling	• Reduce drop heights from loading and handling equipment where practical
	• Dampen material when excessively dusty during handling
	• Dust suppression on crushing and screening; water sprays as required to control fugitive dust emissions
Hauling activities	• Haul roads should be watered using water carts such that the road surface has sufficient moisture to minimise on-road dust generation but not so much as to cause mud/dirt track out to occur
	• Regularly inspect haul roads and maintain surfaces to remove potholes or depressions
	• Driveways and hardstand areas to be swept/cleaned regularly as required etc
	• Vehicle traffic is to be restricted to designated routes
	• Speed limits are to be enforced
	• Vehicle loads are to be covered when travelling off-site

7.4 SURFACE WATER

7.4.1 Introduction

A Surface Water Impact Assessment (SWIA) has been undertaken by Engeny Water Management. The full SWIA is available in Appendix J. This chapter provides a summary of the SWIA, including an assessment of flooding, a site water balance and a Water Management Plan (WMP).

The quarry will exist within a regulated system that has been designed to provide for the sustainable management of the State's water resources. This includes licensing of allowable water take with consideration of environmental flow requirements of watercourses and the needs of other water users; control of water pollution; and guidelines that govern the appropriate design of water management systems to provide for appropriate water quality in accordance with Environment Protection Licence (EPL) requirements.

Within the existing environment, surface water drainage on the Subject Land is characterised by several 1st order ephemeral drainage lines forming within gullies. These drainage lines converge at lower elevations prior to flowing into Deep Creek and an unnamed 5th order ephemeral stream. Within the vicinity of the Subject Land, Deep Creek is a 3rd order watercourse with a catchment area of approximately 1,500 ha. The Karuah River receives water from Deep Creek downstream.

Detailed flood modelling was undertaken to estimate the existing flood conditions within Deep Creek, as well as estimate the potential changes to the flooding in response to the proposed DCQ development. The modelling indicates that flooding is generally confined to the main channel of Deep Creek, with only a small out of bank floodplain about 100 m wide (See Appendix J, Figure 2-2). The quarry, stockpile area, and infrastructure area are all located outside of the modelling 1% Annual Exceedance Probability (AEP) flood extent.

The proposed quarry will, within its current footprint:

- Be located between two 1st order ephemeral streams, with limited disturbance to the main gully lines
- Intersect one 1st order, three 2nd order and a 5th order stream for the construction of access roads
- Construction of the main access road will occur within the riparian buffer of Deep Creek, a 4th order stream
- Intersect one 1st order stream for the construction of the product stockpile area. Construction works will also occur within the riparian buffer of a 1st order ephemeral creek and Deep Creek
- Draw water from inline dams in 2nd and 3rd order ephemeral streams.

7.4.2 Surface Water Quality Baseline Assessment

Surface water quality testing has been undertaken at four locations strategically located around the Subject Land since 2014, including at the Deep Creek bridge on The Bucketts Way just south of the proposed new intersection. These locations were selected to provide baseline surface water quality data across the Subject Land and are described in the SWIA (Appendix J).

In summary, water quality monitoring indicates occasional high background concentrations of fluoride, phosphorous and nitrogen, as well as very high levels of metals including aluminum, chromium, copper, iron, lead, and zinc (Table 7-18). Concentrations of these metals is in part governed by the background pH level. A comparison of the observed water quality baseline parameters with ANZECC Default Trigger values is presented in Table 7-18.

The monitoring results indicated that the pH of the local runoff is generally lower than the default ANZG / ANZECC trigger range (6.5 to 8.0). Similarly, the observed EC values for the four monitoring locations indicates that the local salinity levels are at the lower end of the default ANZECC trigger range for lowland rivers (125 to 2200 µS/cm), but generally consistent with the NSW Coastal Rivers (200 to 300 µS/cm).

Table 7-18: Summary of Water Quality Baseline Data

Analytes	Units	LOR	ANZECC Default Trigger	Dam		North		South	
				#	Range	#	Range	#	Range
Anions and Cations (Laboratory)									
Sodium	mg/L	1.0	-	10	19 to 37	12	10 to 38	9	18 to 43
Calcium	mg/L	1.0	-	10	2 to 4	12	3 to 9	9	4 to 10
Magnesium	mg/L	1.0	15 [A]	10	3 to 6	12	2 to 6	9	4 to 7
Potassium	mg/L	1.0	-	10	2 to 6	12	2 to 9	9	2 to 3
Total sulphur	mg/L	1.0	-	9	1 to 3	12	1 to 8	8	0 to 6
Sulphate	mg/L	1.0	-	10	1 to 7	10	< LOR to 22	8	< LOR to 18
Chloride	mg/L	1.0	-	10	31 to 57	12	11 to 59	9	20 to 66
Fluoride	mg/L	0.1	0.02 [A]	3	< LOR to 0.1	8	< LOR to 0.1	3	< LOR to 0.1
Total phosphorus	mg/L	0.01	0.025 [B]	3	0.02 to 0.03	5	0.02 to 0.11	4	0.01 to 0.03
Nitrite and nitrate	mg/L	0.01	-	1	0.01	2	0.01 to 0.17	2	0.01
Total nitrogen	mg/L	0.1	0.350 [B]	3	0.5 to 0.8	5	0.5 to 2.4	4	0.5 to 0.6
Total Kjeldahl nitrogen	mg/L	0.1	-	3	0.5 to 0.8	5	0.5 to 2.2	4	0.5 to 0.6
Total cations	meq/L	0.01	-	10	1.25 to 2.37	12	1.06 to 2.44	9	1.41 to 2.85
Total anions	meq/L	0.01	-	10	1.21 to 1.97	12	0.77 to 2.07	9	1.21 to 2.65
Alkalinity (Laboratory)									
Bicarbonate	mg/L $CaCO_3$	1.0	-	10	9 to 24	12	8 to 47	9	13 to 42
Carbonate	mg/L $CaCO_3$	1.0	-	2	< LOR to 1	7	< LOR to 1	3	< LOR to 1
Hydroxide	mg/L $CaCO_3$	1.0	-	2	< LOR to 1	7	< LOR to 1	3	< LOR to 1
Total	mg/L $CaCO_3$	1.0	-	10	9 to 24	12	8 to 47	9	13 to 42
Hardness	mg/L $CaCO_3$	1.0	-	10	17 to 35	12	16 to 47	9	26 to 54
Metals (Laboratory)									
Aluminium	mg/L	0.01	0.055 [C]	10	0.02 to 0.87	12	0 to 3.33	9	0 to 2.22
Arsenic	mg/L	0.001	0.013 [C]	5	< LOR to 0.002	12	< LOR to 0.006	6	< LOR to 0.003
Cadmium	mg/L	0.0001	0.0002 [C]	2	< LOR to 0.0001	7	< LOR to 0.0001	4	< LOR to 0.0002
Chromium	mg/L	0.001	0.001 [C]	2	< LOR to 0.001	7	< LOR to 0.002	3	< LOR to 0.002
Copper	mg/L	0.001	0.0014 [C]	3	< LOR to 0.002	8	< LOR to 0.004	4	< LOR to 0.002
Iron	mg/L	0.01	-	10	0.18 to 1.02	11	1.1 to 2.67	8	0.39 to 1.86

Analytes	Units	LOR	ANZECC Default Trigger	Dam		North		South	
				#	Range	#	Range	#	Range
Lead	mg/L	0.001	0.0034 [C]	2	< LOR to 0.001	7	< LOR to 0.001	3	< LOR to 0.002
Mercury	mg/L	0.0001	0.0006 [C]	2	< LOR to 0.0001	7	< LOR to 0.0001	3	< LOR to 0.0001
Nickel	mg/L	0.001	0.011 [C]	2	< LOR to 0.001	7	< LOR to 0.004	3	< LOR to 0.001
Selenium	mg/L	0.01	0.05 [C]	2	< LOR to 0.01	7	< LOR to 0.01	3	< LOR to 0.01
Zinc	mg/L	0.005	0.008 [C]	4	< LOR to 0.052	9	< LOR to 0.041	5	< LOR to 0.022
Physical (Laboratory)									
Electrical conductivity	mS/cm	1.0	125 to 2200 (200 to 300) [D]	10	153 to 270	12	67 to 295	9	154 to 342
Total Dissolved Solids	mg/L	1.0		10	99 to 176	12	44 to 192	9	100 to 222
Total suspended solids	mg/L	5.0	40 [E]	5	9 to 18	8	5 to 65	4	5 to 17
pH	-		6.5 to 8.0 [B]	10	6.22 to 7.04	12	6.1 to 6.93	9	6.15 to 6.92
Physical (Field measurement)									
Electrical conductivity	mS/cm	1.0	125 to 2200 (200 to 300) [D]	24	153 to 316	24	92 to 405	22	154 to 362
pH	-		6.5 to 8.0 [B]	24	5.77 to 7.91	24	5.44 to 7.73	22	5.98 to 7.50

[A] ANZECC (2000) Table 4.4.3 (Freshwater aquaculture)
[B] ANZECC (2000) Table 3.3.2 (Lowland Rivers)
[C] ANZECC (2000) Table 3.4.1 (Freshwater, 95% protection level)
[D] ANZECC (2000) Table 3.3.3 (Lowland Rivers)
[E] ANZECC (2000) Table 4.4.2 (Freshwater aquaculture)

7.4.3 Impact Assessment

Flooding Impacts

The proposed DCQ has the potential to influence flooding and watercourse stability in Deep Creek as a result of:

- Changes to local catchment areas associated with:
  - Diversion drains
  - Loss of catchment to the quarry pit
- Concentration of flows within bridges and culverts associated with the new access road.

The flood risks (to quarry operations) and impacts to the surrounding flood behaviours were assessed by updating the base flood model to reflect:

- The “maximum” quarry footprint (Stage 4) to estimate the maximum potential flood risk associated with quarry operations
- Final landform to assess the long-term flood impacts as a result of the proposed DCQ.

As such, detailed flood modelling has been performed as part of the SWIA (Appendix J). Flood modelling of impacts for the proposed quarry indicates:

- For more frequent flood events (i.e. the 50% and 10% AEP events), the proposed crossing of Deep Creek is expected to locally increase flow velocities and depths. This is due to the concentration of flow required to drive the modelled flows through the proposed culvert
- For larger events (i.e. the 1% AEP and the Probable Maximum Flood (PMF)), the proposed crossing is expected to reduce flow velocities, with continued increases in depths. This is due to the routing effects of the access track, temporarily storing excess stormwater prior to overtopping the road or discharging through the proposed culvert. It is noted that the increased depths are limited to about 200m upstream of the proposed crossing, with modelled depths downstream of the proposed crossing point expected to decrease.

The SWIA indicates that the proposed quarry will have negligible impact on flood flows or extents during the PMF and as such is not expected to impact on the extent of flood prone land in the wider Deep Creek catchment.

The potential impacts of climate change on flooding within Deep Creek have been assessed using the 1% and 0.2% AEP events. These events are used as representative proxies for potential future changes to the 1% AEP event, in response to increased storm intensities due to climate change.

The modelling indicates that differences in the maximum modelled flood extents for the 1% and 0.2% AEP events largely occur downstream of the proposed cross point, within a section of the creek which broadens to include a small floodplain. Elsewhere, the well-defined channel geometry and limited overbank (floodplain) area associated with Deep Creek within the assessment area limits the modelled increase in flood extent.

Water Quality Impacts

Water quality issues have the potential to arise from discharges from dirty water infrastructure. Discharges are expected to be limited to storm events with rainfall depths in excess of about 91.5 mm (based on the design rainfall depth of the sediment dams of 91.5 mm over 5 days). Water balance modelling indicates that discharges of up to about 100 ML per annum may occur under median climate conditions. Further information regarding the nature of these discharges is provided in Section 4 of the SWIA.

It is considered that, with the proposed water management system (WMS) and consideration of the baseline water quality identified, the project will have minimal impact on water quality in downstream watercourses.

Water Balance

A water balance model was developed as part of the SWIA and used to estimate the range of water transfers, storages, demands, and discharges that are likely to occur during the operational life of the quarry. This allows for an estimate of water security (use) and spill risk to be made, which will inform the identification of the licensing requirements. A full description of the water balance model and it’s outcome is provided in the SWIA (Appendix J).

The site water balance model was developed using the GoldSim modelling package and is based on the proposed water management system for the site and considers the progression of quarrying activities over the life of the proposed development. The water balance model considers:

- Water sources:
    - Direct rainfall onto dam/water storage surfaces
    - Runoff from natural, rehabilitated and disturbed catchment areas
    - Groundwater inflow into the quarry pit
    - External water supplies.
- Losses:
    - Evaporation from dams and the quarry pit

- Water lost to product
- On-site dust suppression (haul roads and stockpiles)
- Spills (Discharges)

The water balance modelling indicates that, provided sufficient water storage is maintained in the quarry (as per the a WMS), the requirement of external water supplies can be minimal, meaning all water demands on site can be met by water harvested on site (mostly within the dirty water management system). As the quarry pit progresses, the volume of water managed within the dirty water management system will increase.

Therefore, as quarry operations progress, the site is more likely to require regular dewatering by discharging to Deep Creek. These discharges will need to be in accordance with any water quality conditions specified within the site EPL, and will require sufficient water quality testing prior to, during and following discharges to demonstrate water quality criteria are met.

Controlled discharges may arise from the following:

- Controlled releases from the sediment dams, following rainfall events (as per Blue Book requirements and subject to EPL conditions)
- Discharge of excess water from the quarry dam (subject to EPL conditions).

They have been selected to allow for efficient management of the water via pipelines that utilise the path of least impact to the receiving environment and located within tributaries of Deep Creek with suitable scour protection controls and pumping procedures. The nominated discharge points would be refined during the development of a on-site water management plans/systems prior to operations commencing.

Uncontrolled overflows from the sediment dams will occur during rainfall events in excess of the design capacity. These overflows are expected to occur on average about twice per year, assuming that the sediment dams are managed in accordance with the Blue Book requirements. The average overflow is provided in the SWIA (Appendix J). Uncontrolled overflows will be managed as dams will be designed with stable spillways for overflows in wet weather events. Whilst volume of uncontrolled discharges are not typically covered by EPL limitations, additional water quality monitoring will be required during overflow events to identify the potential environmental harm. During large rainfall events (i.e. that exceed the design capacity of the sediment dams), discharges from sediment dams may occur (from licenced discharge points), however, would occur at a time of higher flows within Deep Creek thereby reducing the potential water quality impacts to the downstream environment. Event-based water quality monitoring would allow for any potential impacts to be identified, quantified, and reported as necessary.

Water Licensing

As annual site water demands are about 30 ML, provided sufficient water inventories are maintained, the risk of water shortfall during extended dry periods is considered small.

Water Access Licences (WALs) will be required to cover the surface water runoff intercepted by the WMS, where that water is not reused for environmental purposes (e.g. dust control). Based on landholdings of about 300 ha, IDPL has a harvestable right of about 33 ML per annum.

During operations, groundwater seepages into the pit will need to be licensed under the Water Sharing Plan for the *North Coast Fractured and Porous Rock Groundwater Sources 2016* (New England Fold Belt Coast Groundwater Source). It is understood that the final landform will be free-draining and will therefore not represent a loss of groundwater to evaporation. As such it would not require licening under the Water Sharing Plan once the final landform has been completed.

The Environment Protection Licence, to be issued under the POEO Act, will require two discharge locations: one for each of the two sediment dams. As discussed, discharges are expected to be limited to storm events with rainfall depths in excess of about 91.5 mm (based on the design rainfall depth of the sediment dams of 91.5 mm over 5 days). Water balance modelling indicates that discharges of up to about 100 ML per annum may occur (for median climate conditions).

7.4.4 Cumulative Impacts

Flows

During operations, the proposed quarry will result in changes to the catchment area of Deep Creek. This is primarily due to the fraction of the catchment that will be managed within the site WMS.

The results of the flow analysis (Appendix J), indicate a slight increase in the frequency of very low flows (<1 ML per day) in Deep Creek for the operational period of the proposed quarry, with negligible predicted impacts on baseflows.

The analysis of watercourse stability (Appendix J) indicates negligible changes to velocities within Deep Creek (away from the proposed watercourse crossing structures). The proposed quarry is consequently considered likely to have limited impact on waterway stability and scour potential.

Water Quality

Management of potential water quality impacts throughout the life of the proposed quarry would be undertaken using the proposed WMS (Appendix J). The WMS includes a series of erosion and sediment control measures that will be utilised during operation and rehabilitation phases of the operations to manage water quality.

Through management of dirty water within the WMS over the life of the operations, it is not anticipated that water quality in downstream waterways will be adversely impacted as a result of the proposed quarry.

As such the cumulative potential impacts on water quality in downstream watercourses is considered to be low.

Downstream Users

Deep Creek flows into the Karuah River, which has a very large catchment area. The SWIA has indicated that water quality or quantity is not anticipated to be adversely impacted by the proposed quarry on a sub-regional or regional scale.

There are no known licensed water users on Deep Creek downstream of DCQ. The proposed quarry will have minor impacts on the annual flow volumes in Deep Creek, due to the reduced catchment associated with the quarry operations. As such only minimal impacts are expected on basic landholder rights.

7.4.5 Mitigation and Management Measures

The proposed Water Management System (WMS) provided in full in Appendix J, includes drains, diversions, and sediment basins including:

- Dirty water management system, including:
    - Two sediment dams
    - An in-pit water storage dam
    - Catch drains to intercept sediment-laden runoff from disturbed areas, and direct it to one of the two sediment dams
    - Wastewater (sewage) will be managed using a contained pump-out (or similar) system, which would require minimal site infrastructure.
- Clean water management system, including:
    - Diversions and / or windrows to divert undisturbed up-slope catchment areas around the site
    - Culverts and bridges to provide access over existing watercourses.

Figure 3.1 to Figure 3.3 of the SWIA (Appendix J) demonstrate the layout of the above surface water infrastructure that make up the WMS throughout the operational stages of the quarry.

The proposed WMS is intended to limit the potential impacts on downstream water quality by managing water that has the potential to cause environmental harm. This would be achieved, in part, by dewatering the proposed sediment dams to the quarry dam, thereby reducing the potential for uncontrolled discharges of contaminated water into the downstream environment. During large rainfall events (i.e. that exceed the design capacity of the sediment dams), discharges from sediment dams would occur (from licenced discharge points), however would

occur at a time of higher flows within Deep Creek. Ongoing monitoring of these events would allow for any potential impacts to be identified and reported.

The dirty water management system, including sediment dams, is designed in accordance with Managing Urban Stormwater: Soils and Construction (the Blue Book), Volumes 1 and 2E - Mines and Quarries (Landcom 2004 and DECC 2008) to manage runoff from 5 day 95th percentile rainfall events. Volume 2E of the Blue Book (DECC 2008) indicates that for the 95th percentile design storm event the indicative average annual sediment dam overflow frequency will be 1 to 2 overflows per year. The receiving waters in the event of overflows from the sediment dams during events that exceed the design criteria from the WMS is Deep Creek, and then the Karuah River downstream. Sediment dams would be dewatered within 5 days following rainfall events, by pumping to the Quarry Dam (located within the quarry pit) for reuse. Conceptual sediment dam sizes are provided in Table 7-19.

Table 7-19: Conceptual Sediment Dam Sizes

Dam	Local catchment Area (ha)	Settling Zone (ML)	Sediment Storage Zone (ML)	Design capacity (ML)	Pump Capacity (L/s) [A]
Stockpile Area	5.5 (maximum)	4.0	0.2	4.2	12.2
	2.0 (likely)	1.5	0.1	1.6	5.6
Infrastructure Area	3.5 (maximum)	2.5	0.1	2.6	7.5
	1.5 (likely)	1.0	0.1	1.1	3.2
Quarry Area (indicative)	18 (maximum)	13.0	1.2	14.2	-

[A] Assuming dewatering of the sediment dams occurs over four days (i.e. allows for up to one day delay in commencing pumping).

The clean water management system principally consists of diversion drains and bunds (as depicted in Figures 3.1 to 3.3 of the SWIA, Appendix J) to divert flows from the undisturbed upslope areas of the catchment around disturbed areas of the site. These diversions are intended to limit the volume of water required to be managed within the dirty water system (thereby reducing the capacity requirements), as well as reduce the loss of flows into the downstream system (thereby reducing the potential environmental impacts due to reduced flows as a result of water take). The location, extent, and dimensions of the clean water management system components will be refined and specified in the site water management plan that will be prepared in accordance with the requirements of the Blue Book and relevant approval conditions.

The proposed WMS would form the basis of a site Water Management Plan (WMP), that will be developed post approval and outline how the WMS is to be operated to meet EPL conditions, and any other relevant conditions of consent, within the requirements of the POEO Act, taking account of both historical and current water qualities in the surrounding watercourses, and current and future downstream water users.

The WMP will allow for the ongoing assessment of risk as quarry operations progress, and the implementation of improvements and changes to the WMS where required.

In addition, the WMS would include:

- Scour protection measures for the proposed watercourse crossing points associated with the proposed access route
- Sediment dams designed with stable spillways for overflows in wet weather
- Discharge points located within tributaries of Deep Creek with suitable scour protection controls and pumping procedures
- Management for discharge of sediment dams to ensure water quality measures are implemented.

All water management infrastructure, and scour protection measures are to be designed, constructed, maintained, removed, and rehabilitated to:

- Fulfil the statutory conditions of the project approval
- Meet industry standards and best practice, specifically:
    - Landcom 2004. Managing Urban Stormwater – Soils and Construction, Volume 1, 4th Edition.
    - Department of Environment and Climate Change (DECC) 2008. Managing Urban Stormwater – Soils and Construction, Volume 2E – Mines and Quarries.

7.5 GROUND WATER

7.5.1 Introduction

A Groundwater Impact Assessment (GWIA) has been performed by Hydrominex Geoscience Consulting. The full GWIA is available in Appendix P. The GWIA provides an evaluation of the impact of the proposed quarry on the groundwater and surface water in the vicinity and other groundwater users in the area.

The proposed quarry is estimated to have a low inflow of groundwater, due to the low permeability rhyolite rock type, which is the target material for quarrying. The sandstone and siltstone units overlying the rhyolite are generally above the water table, so are not all water bearing.

Quarrying operations in similar volcanic units in the same Water Sharing Plan area are recorded to be essentially dry, suggesting the proposed quarry development will be similar.

The predicted low inflow of groundwater into the quarry will allow groundwater to accumulate in the base of the pit, where it will evaporate or be managed and made available for site activities, such as dust suppression.

The final landform post rehabilitation will be free draining and will therefore not represent a loss of groundwater to evaporation. The floor of the rehabilitated extraction area will be above the groundwater table, and will avoid intersecting groundwater from the lower pH unit below the rhyolite to maintain the best possible long term groundwater quality.

7.5.2 Existing Environment

Sensitive groundwater receptors can include municipal and private water supply wells and groundwater dependent ecosystems and permitted sites for Aboriginal water use. Evaluation of the area suggests there are no sensitive receptors in the immediate vicinity of the project site. The Karuah National Park and Nature Reserve are a significant distance from the proposed quarry and well beyond any groundwater impacts.

The quarry is to be developed within rhyolite subvolcanic rock emplaced within sandstone and siltstone sediments. The rhyolite has no primary porosity, with groundwater only present in discontinuous subvertical fractures. Sandstones and siltstones with some primary porosity, in addition to fracture porosity, overlie and underlie the rhyolite.

The fractures in the sediments and rhyolite allow direct recharge from rainfall (estimated in the Water Sharing Plan to be 4% of rainfall) and flow of groundwater through the proposed quarry area. The rhyolite and underlying sediments are interpreted to be under semi confined to confined conditions and are unlikely to have porosity of more than a few percent associated with fractures in the rhyolite and fractures and some pores in the sandstone.

The North Coast Porous and Fractured Aquifers comprise aquifers that potentially have dual porosity but in general are considered to have low porosity and groundwater storage. Other quarries are present in the general area around Newcastle, such as at Karuah South where volcanic rock is being quarried. Investigations show that the volcanic rocks in that area have low water storage and release when quarried, with quarry operation essentially dry.

The fractured and porous rock aquifers in the area around the site are expected to discharge groundwater into the Karuah River, with potential discharge into creek systems feeding into the river.

The existing environment has been ground thruthed through:

- Geological mapping of the site surface on a 50 m grid over the area, which has moderate outcrop, to determine the distribution of the rhyolite unit and adjacent rock types
- Locating drill sites and undertaking diamond drilling, to obtain rock cores for evaluation of the rock type, quality and relationships between the different geological units
- Photographing and documenting the drill core and studying the core in detail to take samples for geotechnical assessment.

Groundwater Dependent Ecosystems

Ecological surveys identified one non-obligate (partially dependent) Groundwater Dependent Ecosystem (GDE) (Tallowood Brush Box Sydney Bluegum) was identified within the quarry impact area. Weeping Lilly Pilly / Water Gum riparian warm temperate rain forest has also been identified as being present along Deep Creek, however this GDE is not within the area of impact of the quarry.

Groundwater investigations have shown that the rocks to be quarried have low hydraulic conductivity and groundwater storage. Evaluation of surface water and groundwater shows that the water quality is distinct and groundwater contribution to Deep Creek is likely to consist of limited shallow interflow discharge to the creek and limited discharge of deeper groundwater in bedrock fractures. While Deep Creek potentially receives some shallow groundwater discharge, water quality information from pools along Deep Creek show these are substantially fresher water than the groundwater upgradient in the project area, which suggests at most a minor contribution to the Deep Creek alluvium from the bedrock groundwater.

As such, no impacts are identified to the non-obligate GDE identified. Further discussion of groundwater dependent ecosystems is available in the Biodiversity Assessment report (BDAR), available in Appendix L.

7.5.3 Investigation

Preparation of the GWIA included:

- Evaluation of the site geology and hydrogeology, groundwater recharge and discharge, aquifer yield characteristics and groundwater and surface water quality and the proposed quarry development plans
- Evaluation of the baseline groundwater and surface water monitoring information for the site from the network that has been in place since 2014
- Evaluation of whether groundwater dependent ecosystems are present
- Evaluation of the relevant legislation and how the proposed development interacts with the legislation and relevant plans and guidelines
- A review of other groundwater users in the vicinity of the site and information available on registered bores
- Developing a conceptual groundwater model for the site, including the interaction with surface water
- Developing an analytical groundwater model to simulate the impact of quarry operation and the final post closure landform
- Preparation of a long-term monitoring program for the site.

Four bores (DDH2, 4, 8, 17 and 19, Figure 4.7 of Appendix P) were drilled to monitor the behaviour of groundwater in 2014 and have been monitored since.

7.5.4 Results

Groundwater Levels

Groundwater monitoring from 2014 to early 2017 showed essentially constant groundwater levels, but since this time all wells have shown a decline in water level, with the most abrupt noted in the most recent measurements of DDH19 (Figure 4.7 of Appendix P). As there has been no development at the site it is unclear whether this is related to the extended drought period leading up to the winter of 2020. Over the period of monitoring bores have shown variations of generally less than 2 m in water level.

Evaluation of the groundwater levels indicates the groundwater gradient is towards the east and Deep Creek, mirroring the topography. However, monitoring information is located along the ridge and the linear location of

wells limits the certainty in the groundwater contours. The bores extend to depths of 15m to 72.5m below ground surface, depending on surface topography.

Groundwater Quality

Laboratory analysis of samples collected form groundwater bores from 2014 to 2020 were analysed at NATA accredited ALS laboratories. The samples were taken with a bailer or (for surface water samples) collected directly into a bottle. Full results of groundwater monitoring are available in the GWIA provided in Appendix P. Table 4.7 of the GWIA provides a summary of the Groundwater monitoring results and compares them to ANZECC guidelines.

Analyses of the baseline groundwater samples has determined that:

- Exceedances for groundwater samples were more extensive than surface water, with EC and pH commonly outside the ANZECC values
- Groundwater samples show exceedances for Aluminium, arsenic, cadmium, chromium, copper, lead, nickel and zinc
- Groundwater in DDH08 is notably lower pH, at around 4, than the other bores which are generally between pH 6 and 7.5 (with the exception of DDH02, which is around pH 5). The lower pH in DDH08 is considered likely to reflect the presence of shaley material in this drill hole. This drill hole is located in the extreme east of the quarry and drills into the foot wall of the rhyolite unit, into sediments including shales. The quarry is designed to remain in the base of the rhyolite unit and to avoid intercepting lower quality groundwater from this unit below the base of the rhyolite unit. Quarry operations should monitor the water quality and the intersection of any material during quarrying that is not the target rhyolite unit
- Field and laboratory chemistry shows groundwater and surface water conductivity, metal and nutrient contents are sufficiently different that groundwater is probably not contributing a large volume of water to Deep Creek, based on the results of sampling since 2014. Groundwater major ion concentrations are typically at least 10 times those of surface water analyses.

Conceptual Hydrogeological Model

The conceptual groundwater model for the site can be outlined as follows:

- Groundwater infiltration occurs through the thin soil profile and directly into the outcropping sandstone and fractured rhyolite in the area of the proposed quarry and upslope to the west. Recharge is low in general and is estimated by DPIE to be in the order of 4%
- Groundwater is hosted in pores and fractures within the sandstone and within fractures in the rhyolite unit. Groundwater flows through the site area towards the east and lower topographic areas upgradient of the Karuah River
- Groundwater is moderately deep, in the order of 10 to 35 m below surface, with the proposed quarry extending to approximately 70 m below ground surface, depending on location within the proposed quarry
- The hydraulic conductivity in the proposed quarry site is very low, based on permeability testing and observations of the drill core
- Groundwater in the sandstone and rhyolite is derived from rainwater infiltration, and is generally within 1 pH unit of neutral, and is relatively low EC (0.5 to 3.5 mS/cm). Longer groundwater residence times are likely in the deeper groundwater
- Groundwater in bore DDH08 at the eastern end of the proposed quarry site has a pH of around 4. This is thought to represent the presence of shaley units near the base of this hole, beneath the rhyolite and sandstone. The quarry is designed so the base remains in the rhyolite, above the shaly units, limiting interaction and possible future discharge of groundwater from the underlying shaley units
- Some shallow groundwater and interflow probably discharges to Deep Creek east of the proposed quarry site. However, the water quality from sampling of surface water suggests groundwater discharge to the creek is probably relatively minor, as the water in pools in the creek is considerably lower EC than the groundwater in the rhyolite and sandstone
- Excavation of the quarry will result in some inflow of groundwater into the quarry pit, although this is expected to be relatively minor, considering the relatively low porosity and permeability of the sediments and rhyolite

- The quarry occupies only a small part of the catchment for Deep Creek, and is effectively limited to a ridge line between two ephemeral creeks. The groundwater intercepted within the proposed quarry area is unlikely to be an important part of overall groundwater discharge to Deep Creek
- The rhyolite does not have any appreciable sulphide content, hence there is not considered an acid mine drainage risk from quarrying this material.

During operation groundwater interflow through the thin soil profile will discharge into the quarry pit, as will groundwater from fractures and porous sediments that are intersected in quarrying operations. This groundwater will be used for activities on site, such as dust control on roads, limiting flow of this intercepted groundwater to Deep Creek.

Post development low volumes of groundwater may continue to discharge into the quarry excavation, where it will be collected in sumps (see Appendix J) at low points and be allowed to evaporate. The final landform of the quarry will minimise any groundwater flow from the quarry to the creek and, due to the elevation of the quarry floor, will avoid intersecting groundwater from the lower pH unit below the rhyolite to maintain the best possible long term groundwater quality in the quarry.

Estimation of Groundwater Inflows

Important assumptions of the conceptual model are:

- Lowering the water table by open pit development will decrease the saturated thickness of rock materials providing pit inflow
- In addition to seepage from the pit walls, significant seepage will also occur through the pit bottom
- The rock formation is semi-infinite below the pit and there is no impermeable boundary at depth. In reality the pit is designed to not reach the shaly unit underlying the base of the rhyolite, where monitoring suggests the groundwater is lower quality. The underlying shale and sandstone sequence is likely to be more fractured and have primary and fracture porosity, in comparison to the rhyolite. These units have been subject to permeability testing around the pit area
- Steady state flow conditions exist near the quarry pit. This assumption is reasonable, considering the time frame of the quarry development.

A number of scenarios where estimated through numerical modelling which considered a staged inflow into the pit, with inflows differing based around the size of the pit and the saturated thickness of rock in the area excavated. Considering the input variables, it is estimated that inflows into the quarry are in the range of 8 to 51 ML/year over the life of the quarry.

The seepage estimates have been estimated with a range of parameters to assess the potential range of inflows, based on different parameters applied.

Groundwater inflow is expected to be towards the low end of the estimates, given the pit is elongate in an east-west direction and lies between two ephemeral drainages, to which groundwater will naturally drain. These drainages occur outside the north and south limits of the Stage 3 pit.

However, until quarrying intersects the groundwater surface, groundwater inflows will be minor and most water reporting to the pit will be from rain and overland runoff.

Note that as the depth to the standing water level in the center of the quarry area is in the range of 25m to 30m below surface it is likely Stage 1 and much of Stage 2 quarry development will have relatively little groundwater inflow, as the material being quarried is essentially in the unsaturated zone.

As quarrying progresses deeper and excavates below the water table, then groundwater inflows are likely to increase, until reaching an equilibrium through dewatering as the quarry reaches its final extent.

7.5.5 Impact Assessment

Physical and Chemical Parameters of Groundwater

The proposed quarrying activities are considered unlikely to affect the physical and chemical parameters of groundwater, as the quarry is quarrying the lower end of a ridge and quarrying will not require the use of chemicals other than standard explosives for blasting. Quarrying is considered unlikely to result in pH changes, changes to groundwater EC or mobilisation of metals, or acid mine drainage.

The limited groundwater inflow into the proposed quarry is predicted to be low flow from fractures, with relatively low salinity non-toxic groundwater diluted by rainwater once drained into the proposed quarry. Storage for groundwater inflows would be constructed at the eastern end of the quarry. The chemistry of groundwater discharge in the final quarry void would tend to be the composition of rainwater, due to dilution by rainwater.

Potential contamination sources during quarry operations would be associated with hydrocarbon leaks from refuelling equipment or mobile earthmoving equipment, and spills in fuel (and limited chemical) storage facilities. Potential sources of contamination are discussed further in Section 7.11. Extraction operations would require some fuel storage on site in adequately bunded areas to retain any spilled fuel and prevent infiltration into fractures in the rock. Appropriate plans for the workshop and fuel storage and transportation areas and an effective water management plan and control measures will be in place reduce the risk of environmental impacts.

Surface Water Connectivity Impacts

Limited connection is interpreted between the fractured rock groundwater in the proposed quarry site and surface water in Deep Creek. Groundwater discharge into the quarry is not envisaged to be a significant impact on the surface water in Deep Creek or on any adjacent riparian land. Water in the creek is considered to mostly accumulate following significant flow events in the creek. The quarry is designed to retain inflows from groundwater seepage, so this can be used on site for dust suppression and site infrastructure that does not require potable water. In the event of overflow of groundwater from the quarry pit this would be due to extreme storm event run-off, which would dilute the groundwater and contribute to more regional inflows to Deep Creek. Water quality in the quarry and Deep Creek will be monitored regularly as part of the proposed quarry operation.

Residual and Cumulative Impacts

No residual or cumulative impacts have been identified regarding groundwater. Following completion of the proposed quarry operations groundwater will continue to discharge into the quarry pit and evaporate, with no significant impact of the quarry development considered to occur on the surrounding area. The floor of the rehabilitated extraction area will be above the groundwater table, and will avoid intersecting groundwater from the lower pH unit below the rhyolite to maintain the best possible long term groundwater quality.

7.5.6 Mitigation and Management Measures

The objectives of monitoring groundwater are to:

- Evaluate changes in groundwater levels in response to quarrying, to refine the analytical groundwater estimate of inflows into the pit (taking account of rainfall and surface water inflows)
- Evaluate the water quality of the groundwater inflows to the pit and their subsequent dilution by rainfall, prior to discharge from the quarry.

  Monitoring at DCQ would allow modification to the WAL volume to reflect actual inflows. Monitoring would also confirm the quality of groundwater entering the pit and the quality of water that would discharge to Deep Creek following rainfall dilution

- Continued monitoring of the current groundwater network (DDH2, 4, 8, 17 and 19) is recommended prior to and during quarry operations, to evaluate drawdown in the groundwater level associated with quarry operation. This should continue with a period of post-closure monitoring. Recommended monitoring activities and frequencies are outlined in Table 7-200

- As wells within the quarry are likely to be destroyed during quarry operations it is recommended that additional existing wells are added to the monitoring network (such as DDH01, if possible) and new wells are added to compensate for loss of wells within the quarry. These wells should be constructed as purpose-built monitoring wells, with the top of the well-sealed so there is no infiltration of rainfall or run-off between the PVC pipe and annulus of the well. In particular wells should provide information on groundwater quality between the quarry and Deep Creek
- A dedicated monitoring well should be installed down gradient of the petroleum storage area, to monitor for hydrocarbon contamination of groundwater
- Water levels and water quality should be measured during the first year of operations on a monthly basis, followed by quarterly monitoring
- It is recommended data loggers are installed in wells at least during the first year of quarry operations to better understand the drawdown cone developing due to quarrying
- Water quality monitoring should consist of the analytes and frequencies outlined in Table 7-21.
- A rain gauge should be installed on site and rainfall measurements made throughout the life of the quarry operation for comparison with surface and groundwater data
- A database should be maintained with manual water level measurements and measurements from data loggers. Data should be reviewed and plotted at least quarterly, to confirm the quality of the measurements
- Given the natural background groundwater conditions at the quarry site show exceedances of the ANZECC 2000 95% levels for NSW Upland Rivers for many of the metals and some other parameters the selection of trigger values for future reporting needs to be carefully selected.

Table 7-20: Groundwater Monitoring Activities and Frequency

Monitoring	Monitoring Activity	Monitoring Frequency	Objective
Water Level	• Manual dip measurements and data loggers	• At least monthly measurements and monthly downloads of loggers sampling every 6 hours	• Designed to collect useful information on drawdown associated with quarry operation and recharge from rain
Water Quality	• Samples from monitoring wells and surface water sites	• Take samples quarterly, to compare with pre-quarrying data. Review data after 3 years to re-evaluate the sampling frequency	• Designed to detect any change in groundwater and surface water chemistry that could be related to quarry operations
Rainfall	• Automated rainfall measurements	• Measurement of rainfall with <0.5 mm sensitivity	• Designed to collect comprehensive rainfall data for comparison with other data sources

Table 7-21: Analytes and Frequency of Sampling During Operations

Recommended Analytes and Sampling Frequency			
Analyte	**Frequency**	**Analyte**	**Frequency**
Petroleum Hydrocarbons suite (TPH & BTEX)	Monthly initially, then quarterly	pH	Monthly initially, then quarterly
Cations		Electrical Conductivity	Monthly initially, then quarterly
Sodium (Na)	Quarterly	**Metals**	
Potassium (K)	Quarterly	Aluminium	Quarterly
Magnesium (Mg)	Quarterly	Arsenmic	Quarterly
Calcium (Ca)	Quarterly	Cadmium	Quarterly
Ammonia (NH4)	Quarterly	Chromium	Quarterly
Anions		Quarterly	
Chloride (Cl)	Quarterly	Iron	Quarterly
Sulphate (SO4)	Quarterly	Lead	Quarterly
Carbonate alkalinity (CaCO3)	Quarterly	Mercury	Quarterly
Bicarbonate alkalinity (CaCO3)	Quarterly	Nickel	Quarterly
Total Alkalinity (CaCO3)	Quarterly	Selenium	Quarterly
Total Phosphors	Quarterly	Zinc	Quarterly
Nitrite + Nitrate (N)	Quarterly		
Total Nitrogen (N)	Quarterly		
Total Kjeldahl Nitrogen (N)	Quarterly		

A groundwater management plan will be developed for the quarry post approval. Reporting for the operating quarry Groundwater Water Management Plan (GWMP) should contain the following information:

- Presentation and analysis of water levels in groundwater monitoring wells
- Presentation and analysis of groundwater physical and chemical parameters and changes over time
- Presentation of rainfall data and the possible correlations with groundwater and surface water measurements
- Monthly information should be presented in internal reports and in reporting to government agencies.

Reporting should include:

- A map showing the location of sites in the monitoring network
- Rainfall data and annual variations
- Graphs showing changes in groundwater level over time (hydrographs), comparing results between monitoring wells and with rainfall data
- Tables and graphs showing changes in groundwater chemistry, identifying any trends and comparison with ANZECC values and other values which may be relevant trigger values for monitoring and reporting

- Measurement and recording of inflows into the quarry and evaluation against predictions
- Conclusions from monitoring and any suggested modifications to the monitoring network.

7.6 ABORIGINAL HERITAGE

7.6.1 Introduction

An Aboriginal Cultural Heritage Impact Assessment (ACHA) has been performed by Insite Heritage Pty Ltd (Insite Heritage). The full ACHA is available in Appendix I. This chapter provides a summary of the ACHA.

7.6.2 Consultation

Insite Heritage were engaged to conduct consultation for the proposed DCQ in compliance with Section 80C of the NSW *National Parks and Wildlife Act 1974*. Consultation conducted by Insite Heritage is outlined in detail under the DCQ ACHA, and is further summarised in the following five stages:

1. **Stage 1:** Requested identification of potential interested Aboriginal persons or groups relevant to the project location. Requests for project interest were sent to Heritage NSW, Local Land Services, Mid-Coast Council, Karuah Local Aboriginal Land Council (LALC), Native Title services and the Office of the Register Aboriginal Owners. In addition, an advertisement inviting registrations of interest was posted in the Newcastle Herald on 14 August 2020. Registrations closed on 29 August 2020
2. **Stage 2:** Information regarding the DCQ Project and an invitation to register as a Registered Aboriginal Participant (RAP) were sent to all parties identified in Stage 1 (above). Potential RAPs were given 14 days to register interest prior to Insite Heritage notification to Heritage NSW and the Karuah Local Aboriginal Land Council (LALC) of all registrants (note, some names withheld at request of registrant). Registrations closed on 22 September 2020
3. **Stage 3:** Insite Heritage prepared the draft archaeological survey methodology, which was sent to RAPs. The feedback period for draft methodology was for a duration of 28 days and closed on the 30 October 2020 (see Appendix I)
4. **Stage 4:** Insite Heritage, accompanied by representatives of Karuah LALC and Nu-Run-Gee Pty Ltd, conducted field surveys from 9 to 11 November 2020
5. **Stage 5:** A copy of the draft ACHA was provided to all RAPs for feedback within a 28 day review period. All RAPs were given the opportunity to visit the DCQ within the ACHAR review period.

7.6.3 Field Investigation

Surface Surveys

The footprint of the DCQ was surveyed by Insite Heritage, accompanied by representatives of Karuah LALC and Nu-Run-Gee Pty Ltd, separating the DCQ footprint into three 'Survey Units', as shown on Figure 13 and listed below:

- **Survey Unit 1:** Within the DCQ extraction area footprint and the Iron Mountain soil landscape. Thirty percent (30%) of Survey Unit 1 was covered by the field investigation
- **Survey Unit 2:** Primarily located within The Branch soil landscape and includes creek margins where the proposed access road intersects Deep Creek. Survey Unit 2 further includes the undulating plains intersected by the DCQ, located within the Ten Mile Road soil landscape. Some 50% of Survey Unit 2 was covered by the field investigation
- **Survey Unit 3:** Located in the Ten Mile Road soil landscape and includes the route of the access road from Bucketts Way and the stockpile and infrastructure areas. 90% of Survey Unit 3 was covered by the field investigation.

Subsurface Testing

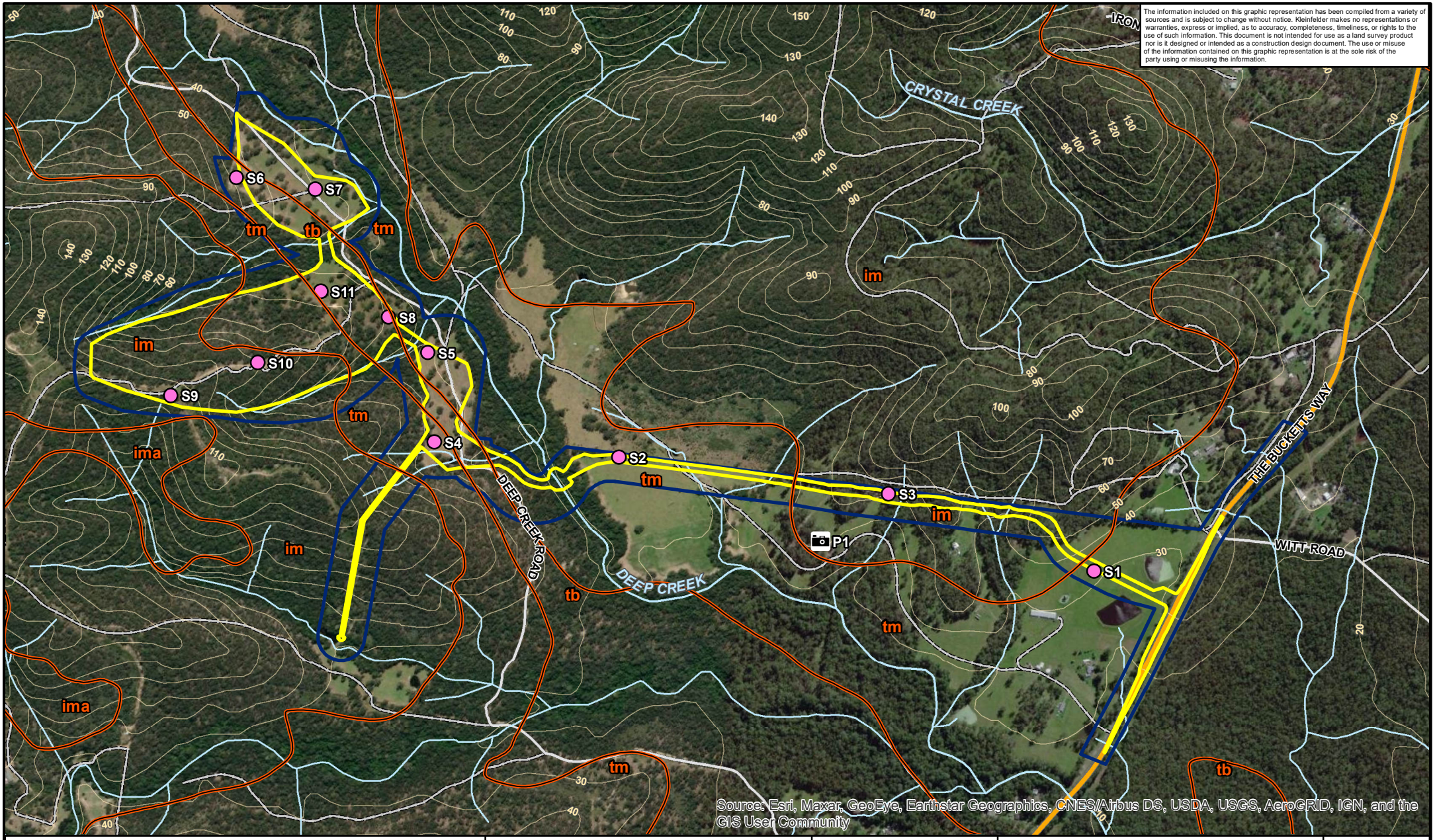
Subsurface testing was undertaken by Insite Heritage, accompanied by representatives of Karuah LALC and Nu-Run-Gee Pty Ltd, during the preparation of the ACHA. Subsurface testing occurred in areas requiring excavation during construction and / or operation of the DCQ, in areas within close proximity to water and within close

proximity to the proposed Deep Creek crossing (avoiding ploughed paddocks to the inherent past disturbance). Subsurface testing locations are shown on Figure 13 and include:

- Three subsurface test pits located downslope of the main DCQ stockpile area
- Three subsurface test pits located in the areas currently proposed to be the footprint of Detention Basin 1
- Three subsurface test pits located in the areas currently proposed to be the footprint of Detention Basin 2
- Two subsurface test pits located in the area of the proposed Deep Creek crossing for the DCQ.

Subsurface test pits were located between the margins of the Ten Mile Road and The Branch soil landscapes. In addition to the subsurface test pits, a survey transect was placed in the confluence of two tributaries in the eastern side of the stockpile area.

All subsurface test pits were excavated in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (Department of Environment, Climate Change and Water NSW, 2010). See the DCQ ACHA for complete methodology and photographs of subsurface pit testing.



Legend

- Project Area
- Study Area
- Soil Landscapes Boundary (Newcastle)
- Soil Sampling Location
- Photo Location
- Named Watercourse
- Unnamed Watercourse
- Contours (10m)
- Track-Vehicular
- Arterial Road
- Local Road

Metres
0 50 100 200 300 400 500

N

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PROJECT REFERENCE: 20203112
DATE DRAWN: 2021/10/21 15:29 Version 1
DRAWN BY: GJoyce
DATA SOURCE:
NSW DFSI - 2020
NSW OEH - 2020

Archaeological.Geological Units and Soil Sample Locations

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek NSW 2324

FIGURE:
13

L:\GIS FOLDER\00 CLIENT FILES\124371_IronstoneDev_Woodbury\20203112_DeepCreekQuarry_EIS\Mapping\20203112_EIS_Fig13_ArchaeologicalSurveyUnits_SampleLocations.mxd

7.6.4 Desktop Study

Previous Studies

The ACHA includes the results of an Aboriginal Heritage Information Management System (AHIMS) extensive search for known Aboriginal Items and / or places, which was undertaken by Insite Heritage on 11 August 2020. No sites were recorded within the footprint of the DCQ.

The closest listed site, Site 38-4-0725 (modified tree), is located approximately 3.9 km south east of the DCQ. This site will not be impacted by the proposed development, nor do any other known sites listed on the AHIMS database have potential to be impacted by the proposed construction and operation of the DCQ.

Two past Aboriginal Cultural Heritage studies identified under the AHIMS Search included:

- **Ecological and Aboriginal Heritage Impact Assessment:** Undertaken by OzArk Pty Ltd (2012) (OzArk) for the installation of a Telstra fibre optic cable within a 4.1 km long, 20 m wide corridor. No Aboriginal sites or potential archaeological deposits were recorded during the OzArk (2012) investigation
- **QR Hexham Train Support Facility Aboriginal Heritage Impact Assessment:** Undertaken by McCardle Cultural Heritage Pty Ltd (McCardle) in 2012 and included an area of 255 ha bounded by the Pacific Highway and New England Highway to the north and east and by rural and environmental land to the south and the west. Although the McCardle (2012) investigation did not locate any Aboriginal sites or places, consultation did find that the Hexham swamp area is of high cultural significance to the Awabakal people.

Landscape Assessment

As noted the DCQ intersects the following soil landscapes:

- **Ten Mile Road soil landscape**: intersects the workshop, office, stockpile (primary and secondary) and DCQ access road
- **Ironstone Mountain soil landscape:** intersects the DCQ excavation area
- **The Branch soil landscape:** narrow band (approximately 100 m width) that encapsulates the Deep Creek crossing for the DCQ access road.

The ACHA notes that the Ironstone Mountain soil landscape is not conducive for the formation of rock shelters or overhangs, typical landscape features associated with the location of Aboriginal sites / home bases. While isolated finds associated with hunting, gathering or individual movements may occur, the entirety of the DCQ excavation area avoids impact to the upslope ridgeline where transient occupation may have occurred, limiting the potential for impacting upon unknown items of Aboriginal heritage. In addition, the spur from the ridge down into the valley, while being located within the quarry area, has been disturbed in the past through the construction and use of an approximately 5 m wide access track. It is noted that undisturbed slopes within the quarry footprint do have potential for modified trees but, given the steep topography of the landscape, Insite Heritage considers the potential for modified trees to occur to be unlikely.

The ACHA further notes that the greatest potential for impact to unknown items of Aboriginal heritage occurs at the toes slopes and margins of Deep Creek, where stone artefacts as isolated finds or open camps may occur within topsoil or subsurface layers. Due to the contextually narrow width of the Deep Creek Valley, Insite Heritage (2021) considers it unlikely for the presence of a Main Camp, however periphery camps, and associated items, may occur in the area. Scattered items may occur in the area from travel routes and / hunter gathering processing camps in the locality.

7.6.5 Consultation

The consultation process has not identified any specific cultural values associated with the proposed DCQ footprint.

7.6.6 Surface Survey

Survey Unit 1

The DCQ ACHA notes that access in Survey Unit 1 was difficult during field surveys, largely due to the steep topography and dense vegetation. No rock outcrops or shelters were found, which is typical of the Iron Mountain soil landscape. Insite Heritage notes that, although individual large trees remain within the project footprint, the bulk of trees Survey Unit 1 constitute regrowth.

No artefacts or other cultural material were observed during the site survey within Survey Unit 1.

Survey Unit 2

The DCQ ACHA notes the following with regards to Survey Unit 2:

- The proposed DCQ site office, facilities, workshop and secondary stockpile area are located within the bounds of Survey Unit 2
- Survey Unit 2 includes the undulating plain on the Ten Mile Road soil landscape and is well vegetated with grasses, having been cleared for grazing
- Due to the abundance of groundcover, surface visibility within Survey Unit 2 was low during the site investigation
- Survey Unit 2 contained patches of bare earth and an unformed road within the western boundary.

No artefacts or other cultural material were observed during the site survey within Survey Unit 2.

Survey Unit 3

The DCQ ACHA (Appendix I) surveyed two potential access roads within Survey Unit 3. The two surveyed routes include:

- The first follows The Bucketts Way along the property boundary
- The second is approximately 200 metres south of the first option, and traverses between two dams before connecting to The Bucketts Way
- The proposed access road crosses two soil landscapes, including:
    - The Ironstone Mountain soil landscape for a small portion of the mid-section of the access road. This section will require upgrading, with several loose boulders in the locality
    - The Ten Mile Road soil landscape the remainder of the access road. The Ten Mile Road soil landscape eastern and western extents of the route traverses open paddock with a dense ground cover of grasses. At the western end of the route the paddock has been ploughed which was evident by the uneven ground surface in the area.

No artefacts or other cultural material were observed during the site survey within Survey Unit 3.

7.6.7 Subsurface Testing

A total of 11 sqm of soil was excavated within four locations during subsurface testing. A total of four artefacts were excavated during subsurface testing. These artefacts are detailed in Table 7-22 below. Artefact density across the four subsurface testing locations were as follows:

- No artefacts were identified within subsurface test pits located downslope of the main DCQ stockpile area
- Two artefacts were identified within subsurface test pits located in the areas currently proposed to be the footprint of Detention Basin 1, at a density of 2 artefacts per 3 sqm of soil excavated
- One artefact was identified within subsurface test pits located in the areas currently proposed to be the footprint of Detention Basin 2, at a density of 1 artefact per 3 sqm of soil excavated
- One artefact was identified within subsurface test pits located in the area of the proposed Deep Creek crossing for the DCQ, at a density of 1 artefact per 2 sqm of soil excavated.

Table 7-22: Artefacts Unearthed During Subsurface Testing at the DCQ

Subsurface Testing Location	Artefact / Item	Description	Coordinates (GDA94 MGA Zone 56)
Creek Crossing Test Pit 2 (TP2)	Broken Flake	Broken flake, distal, dark grey with more recent termination tip damage. Cortex developed over the break, 38x31x11 mm.	398332E 6397548N
Detention Basin 1	Broken Flake	Located below the main stockpile TP2. Broken flake distal, tip snap, measuring 120x80x30 mm. Left margin use-wear. Located at 180 mm below the surface in the wall of quad B. Pink silcrete with fine cortex developed on flake surface	397793E 6398223N
Test Pit 3	Broken Flake	Grey fine grained IMT brown, use-wear on the mid right margin, inclusion on the left margin. Measures 24x22x3 mm	397793E 6398211N
Detention Basin 2 Test Pit 1 (TP1)	Flake	Measures 55x45x13 mm, quartzite (sugary appearance), distal point damage, cortex on the platform 20x10mm, pale grey.	398065E 6397782N

Please refer to Appendix I for further details regarding artefacts listed in Table 7-22, including photographs and site cards uploaded to the AHIMS database.

The low density of artefacts (maximum of 1.5 per sqm) indicates a transient use of this landscape and could be described as standard 'background' artefact distribution. The larger size of the artefacts and the absence of debitage and small flakes suggests that the area was not a site of primary reduction or retouch / re-purposing of large flakes, tools or blanks. No cores were found by the test excavations. The absence of debitage indicates that any local stone sources were not used in tool making.

The AHIMS search undertaken by Insite Heritage (2021) illustrates an increasing density of Aboriginal sites and / or places located toward the Karuah River and further eastwards toward Port Stephens. Insite Heritage (2021) notes that whilst this pattern of distribution could well be a result of the location of field surveys, the DCQ study area is reflective of the Foley (1981) model of occupation of a specific home range.

7.6.8 Impact Assessment

The ACHA summarises key information relevant to the impact assessment. This includes:

- Consultation has not identified any specific cultural values associated with the DCQ
- The archaeological assessment located isolated finds in four of subsurface testing pits excavated on the site
- The surface survey of the study area did not locate any cultural material within the DCQ footprint
- The cultural significance of the DCQ area is moderate as an area containing evidence of visitation in the course of resource gathering
- The scientific significance of the DCQ area is low, due to low density, not complex sites resulting from peripheral occupation.

Direct Impacts

The proposed DCQ access road and detention basins will impact on the low- density sites found by test pits. Adjusting the position of the access road or detention basins is unlikely to result in less harm, as the predicted distribution of sites in those areas is a continuum of low density 'background scatter'.

The proposed excavation area, located within the Iron Mountain soil landscape, did not contain any rock shelters or overhangs. In addition, the combination of regrowth vegetation and steep slopes inhibits the potential for unknown modified trees.

However, Insite Heritage (2021) does note the potential for transitory camps and / or isolated finds both within the DCQ footprint, particularly within the toe slopes and margins of Deep Creek. Controls will be implemented during construction and operation of the DCQ to both highlight the potential cultural significance of the DCQ area and highlight the potential for unknown items of indigenous heritage occurring within the DCQ footprint.

Residual Impacts

Without the survey of all trees and surface soil excavation within the entirety of the DCQ footprint, complete removal of potential impacts is not possible. Even following stakeholder consultation, site surveys, review of locations with increased probability for Aboriginal items and / or places and a review of known items in the locality there is potential for unknown items / places of Aboriginal Heritage being located in the DCQ footprint. This is an inherent side-effect of quarries often being located in areas noted as a sensitive landscape under the *NSW Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (2010), often being located near ridgelines and drainage gullies (200 m of waters) (NSW Department of Environment, Climate Change and Water, 2010). As such, additional mitigation measures have been applied to manage potentially adverse impacts to Aboriginal items / places as they occur.

Cumulative Impacts

Cumulative impacts are expected to be minimal as management plans and mitigation measure are designed to include unknown discoveries.

7.6.9 Controls

The following controls will be implemented during construction, operation and rehabilitation of the DCQ:

- Artefacts uncovered during subsurface testing will be relocated and reburied in locations determined through consultation with the DCQ RAPs
- RAPs will be given the opportunity to be present for the relocation of artefacts uncovered during subsurface testing
- Graders will be utilised during the construction of the proposed detention basins, allowing for shallow scraping of topsoil (to depth 300 mm) to lower the possibility of damaging further artefacts that may be present within the proposed detention basin footprints
- RAPs will be offered the opportunity to be present during excavation for the installation of detention basins to allow for identification and collection of any artefacts (or potential artefacts) that are uncovered during excavation works

- All artefacts uncovered during subsurface testing, construction, operation and rehabilitation of the DCQ will be reburied onsite in a location that will not be impacted by the DCQ
- As a State Significant Developments (SSD), DCQ will implement an Aboriginal Cultural Heritage Management Plan (ACHMP) which will act in place of an AHIP for the life of the project
- Once artefacts have been retrieved and reburied AHIMS will be updated with an impact recording and new location details
- In the event of discovery of a previously unknown object in the course of construction works associated with the development the following procedure to be followed:
    - Ground disturbance works in vicinity of the object will cease
    - The works area will be secured to prevent additional works or intrusion
    - The DCQ RAPs and an archaeologist will be notified of the discovery. The artefact will be collected (under the AHIP) and removed to a long term storage location (preferably onsite)
    - If the archaeologist considers the object/feature to be significant (e.g. a hearth), Heritage NSW will be notified and a methodology for salvage will be developed in consultation with Heritage NSW and the RAPs
- In the event that any potential human skeletal remains are uncovered during works, all work in the immediate area of the remains will halt immediately. The incident will be immediately reported to the NSW Police, Heritage NSW and the RAPs
- No action will be undertaken until the NSW Police provide written notification to the Proponent. If the skeletal remains are identified as Aboriginal, the Proponent will contact DPC and the DCQ RAPs to determine suitable salvage methodologies. No works will continue until Heritage NSW provides written notification to the proponent
- Contractors undertaking earthworks associated with the DCQ will be provided with an Aboriginal Cultural Heritage Awareness Induction document, to be undertaken in conjunction with site induction procedures. The document will outline protocols for discovery of previously identified Aboriginal objects and information to aid in the identification of Aboriginal objects.

7.7 HISTORIC HERITAGE

7.7.1 Introduction

A Historic Heritage Impact Assessment (HHIA) has been performed by Insite Heritage. The full HHIA is available in Appendix R. This chapter provides a summary of the HHIA.

7.7.2 Investigation

Existing Heritage Items

In order to establish whether any heritage items have been previously recorded on the Subject Land of within close proximity, searches were undertaken of statutory and non-statutory heritage registers and schedules including the State Heritage Inventory, *Environment Protection and Biodiversity Conservation Act 1999* (National Heritage List, Commonwealth Heritage List), Australian Heritage Database (Department of the Environment), Great Lakes Local Environmental Plan 2014 (LEP) and the non-statutory Register of the National Estate and Register of the National Trust of Australia (NSW).

The Register of the National Estate (RNE) was closed in 2007 and is no longer a statutory list. The RNE is maintained on a non-statutory basis as a publicly available archive and educational resource. The existence of an entry for a place in the RNE does not in itself create a requirement to protect the place under Commonwealth law. Nevertheless, information in the register may continue to be current and relevant to statutory decisions about protection and their place on the register indicates how a group or community may view their heritage value and the significance of such items.

The NSW State Heritage inventory lists heritage items classified in three sections:

- Section 1 - contains Aboriginal Places declared by the Minister for the Environment under the National Parks and Wildlife Act

- Section 2 - contains heritage items listed by the Heritage Council of NSW under the NSW. This includes listing on the State Heritage Register, an Interim Heritage Order or protected under section 136 of the NSW Heritage Act
- Section 3 - contains items listed by local councils on Local Environmental Plans under the Environmental Planning and Assessment Act 1979 and State government agencies under s.170 of the Heritage Act.

These searches did not result in finding any heritage items within or in the immediate vicinity of the Subject Land. The closest recorded items are listed on the Great Lakes Local Environmental Plan 2014 and include dwellings, bridges, community facilities, mills and wharves. None of these recorded items are within ten kilometres of the quarry. Booral is located approximately ten kilometres north-east and thirteen items are listed on the LEP (including Gundayne House which is listed on the State Heritage Register). Carrington is located approximately sixteen kilometres south-east and has six items listed on the LEP (including Tahlee Estate which is listed on the State Heritage Register). Karuah is located thirteen kilometres south and has three items listed on the Port Stephens LEP.

Previous Heritage Assessments/Report

In 2007 the Great Lakes Shire Council, in partnership with the NSW Heritage Office, commissioned a community-based heritage study of the shire area. The final report covered areas surrounding the study area but did not identify any heritage items within it. The Great Lakes Shire Council area is now administered by the Mid-Coast Council.

7.7.3 Desktop Research

European Exploration and Settlement

The earliest mention of the area is when Captain Cook sailed passed Port Stephens, recording in May 1770. In late 1791 a convict transport, the Salamander, visited the harbour to conduct a preliminary survey. In March 1795, the area was further explored and followed the Karuah River as far north as where Allworth now stands. Governor Macquarie considered Port Stephens in 1811 with a view to forming a settlement north of Newcastle, however, he found the land barren and did not proceed (Regional Histories, 1996).

It was not until nearly 1820 that upper Port Stephens began to be settled by Europeans. The European settlement of the area is closely associated with the development of the Australian Agricultural Company (AACo). In 1825 the unsettled land north of the Hunter Valley was selected to establish the AACo settlement. Mainly due to hasty and poor decisions the coastal landscape, with poor soil quality and relatively high humidity, was unsuitable for agricultural pursuits and sheep grazing.

There were several factors that affected land use patterns in the study area during second half of the nineteenth century - the beginning of small acreage settlement after about 1856 - 1860, the beginning of hardwood milling about 1860 following the introduction of steam powered saws and the commencement of the dairy industry after about 1890. The period of first settlement and agricultural endeavour is, therefore, the period to about 1856 (Great Lakes Heritage Study,2007).

The Karuah River Valley was part of the wider National and State post-war settlement scheme of the 1950s (Great lakes Heritage Study, 2007). The scheme set aside land for selection for use by serving or discharged members of the Defence Force. Ex-servicemen who took up the selections were expected to comply with the Government Standards for farming and land development. They were expected to 'improve' the land by clearing or draining it, and they were also required to abide by the 'use the land or lose it' principle. The success of the scheme varied considerably in the region, factors affecting success ranged from the quality of the land selected through to the skill and determination of the landholder.

The 1960s saw further change to the agricultural sector with the commencement of large-scale chicken production. This change resulted in a number of dairy farms converting to chicken or beef production. The poultry industry continued to expand, with significant increases in both egg and poultry meat production. Later deregulation of the dairy industry saw the number of dairy farms in the catchment decline further. Today, agriculture within the Karuah River Catchment is dominated by both the poultry industry (both egg and broiler

production) and the beef industry. The dairy industry continues on small holdings, along as do several other small boutique industries.

Transport

An early parish map (Parish of Karuah) shows a track running along Deep Creek through the study area (Portion 48) continuing in a south-easterly direction to link with the main road running north to Allworth and Booral (this road is now known as The Bucketts Way). The Booral Cemetery is shown on the map, on the western side of The Bucketts Way to the south of Deep Creek (outside of the Subject Land).

Timber

The timber industry has been a major feature in the landscape of the Karuah River catchment since the very early days of European settlement. The first permit for timber cutting was issued in the Port Stephens area in 1816. A flourishing cedar cutting industry was established by 1823 but was substantially declined within a few more years (Engel et al, 2000). Reasonable quantities were cut in the Karuah and Myall River valleys.

There is no remaining evidence of the early 1860s mills that established mechanised timber milling and set the Great Lakes area on the path of becoming a major supplier of hardwood timber. (Great Lakes Heritage Study, 2007).

Mining

As in other parts of Australia, the mining of various minerals has occurred or been attempted within the Karuah River Catchment. Many mines were unsuccessful because of the lack of capital and their location in difficult, steep and remote country (Great lakes Heritage Study, 2007). Small shows of gold were found in the region during the latter half of the 19th century and the Gloucester Gold Field was proclaimed in June 1879. This goldfield covered a large area to the west of the Karuah River including the Subject Land, however there are no records of gold mines operating in the near vicinity. Coal deposits were identified on AACo land north of Stroud in 1855 and pits were subsequently established in 1858 along the Mammy Johnsons River.

Today there is open-cut mining between Stroud and Gloucester. In 1890, a magnetite mine was established at Iron Stone Mountain immediately to the north of Deep Creek close to the Subject Land. One load carrying magnetite was sent to the United Kingdom but there is no evidence that this venture was successful and on-going (Great Lakes Heritage Study, 2007).

7.7.4 Site Inspection

The Subject Land contains a valley floor of 150 to 250m wide, and side slopes on the western side to the approximately 100m below the ridge crest. The valley and slopes are orientated to the north-west and drained by Deep Creek to the south east. The area has been cleared of vegetation on the lower slopes and valley floor for grazing purposes.

Based on the history of the area surrounding the study area, activities that may have been carried out in the vicinity include agriculture and farming, mining, timber cutting and milling along with the dwellings of those involved in these activities. Table 7-23 identifies the different phases of industry and settlement and the types of evidence that may still be extant. Given that the historic record and previous heritage studies have not included an items in or around the Subject Land, the potential of locating evidence of historic activities was assessed as being low.

Conversations with local landholders by the proponent identified two features in the vicinity of the proposed quarry. The ‘Mill Paddock’ located south west of the proposed quarry, with a water pipeline sourcing water from a dam associated with the former mill. A former diary was known to be located to the north west of the quarry on the eastern side of Deep Creek, however is outside the project footprint. The dam, anecdotally associated with ‘The Mill Paddock’ remains within the Subject Land however it will not be impacted by the proposed quarry activity.

Table 7-23: Summary of Potential Historic Activities that May Be Evident within the Subject Land

Phase	Activity	Relic or site type	Assessed potential
Timber cutting	• logging	stumps, tools, camps	low
	• carting	tracks, tramways, bridges, wharfs	low
	• milling	plant, equipment, sawmills, housing, tools The dam associated with 'The Mill Paddock' (located south west of the study area) is known to remain in the study area.	low
Mining	• extraction • processing • transport	Pits, drives, shafts, mullock heaps, plant and equipment, tracks & bridges, housing	low
Farming	• pastoralists	fencing, yards, housing, gardens, implements	low
Farming	• agriculture	fencing, sheds, housing, gardens, processing plants, implements	low
Transport	• road	embankments, cuttings, tracks, bridges, culverts, drains	low
Social & Communal	• schools • churches • cemeteries • post offices • police stations • halls • inns/hotels	buildings & grounds	low

7.7.5 Impact Assessment

Statement of Significance

The Heritage Council of NSW recognises only four levels of significance for heritage in NSW:

- Local
- State
- National
- World.

The four levels of heritage are the places and objects worth keeping. Levels indicate the context in which a heritage place is important – within the local area, state-wide, Australia-wide or worldwide. 'Local', 'state', 'national' and 'world' significance is not about ranking, it concerns context. A heritage place may have one or more level of significance. Further information on levels of significance is available in the HHIA (Appendix R).

No heritage items or structures or potential deposits were located during the field inspection and no evidence of any other activity other than historical grazing was found during the inspection. Based on the historic record of the Subject Land and its immediate surrounds, along with a physical inspection, the quarry has been assessed as being of no heritage significance. As such, no significant impacts to historic heritage have been identified and there are no constraints relating to the area's heritage that would hinder the development of the proposed quarry and its attendant structures.

Mitigation and Management Measures

The quarry has been assessed as within an area of no historic heritage significance. There are no constraints relating to the area's historic heritage that would hinder the development of the proposed project, as such no mitigation or management measures are required.

7.8 TRAFFIC AND TRANSPORT

7.8.1 Introduction

A Traffic Impact Assessment (TIA) has been performed by Intersect Traffic. The full TIA is available in Appendix K**.** This chapter provides a summary of the TIA and presents the findings of the associated Road Safety Assessment.

The primary haulage route proposed for the quarry is south via The Bucketts Way, via Limeburners Creek to the Pacific Highway at Twelve Mile Creek then south to Newcastle via Raymond Terrace via the Pacific Highway. A small number of trips may head north from the site along The Bucketts Way, or will head north along the Pacific Highway at Twelve Mile Creek.

The main traffic impacts of a quarry development lie in the areas of traffic efficiency, amenity, road safety, road pavements and alternate transport modes. Within these areas the main issues usually relate to the levels of service (LoS) experienced on the road network particularly at intersections, the impacts of road noise and dust, the geometric standards of the haulage routes, the construction standard of the haulage routes and the availability and accessibility to alternate transport modes. Road noise has been assessed in Section 7.2.

7.8.2 Existing Road Network

The existing road network has been investigated via both desktop research and a site visit to inspect the condition of the relevant sections of the road network.

The haulage route appears to be constructed of a suitable pavement for use by heavy vehicles given the existing condition of the road network and its current use by heavy vehicles. A visual assessment of the road pavement along the haulage route indicated that there were no major failures or areas of deterioration except where minor shoulder drainage was causing problems. This may be more a result of irregular shoulder construction and maintenance practices rather than as a result of the heavy vehicle usage although it will be impacting on the extent of damage being caused.

It is therefore considered that the road pavements on the existing haulage route from the quarry to the arterial road network (Pacific Highway) are satisfactory.

The Pacific Highway

The Pacific Highway (A1) in the vicinity of the site is under the care and control of Transport for NSW (TfNSW) and would under a functional road hierarchy be classified as a major arterial road. Its main function is to distribute and collect traffic to and from all regions, suburbs, roads, and accesses in the area to service Northern NSW, Central Coast and Sydney and connect to other arterial and sub-arterial roads to service eastern and western regions. South of the site the Pacific Highway connects to The New England Highway as well as other major arterial roads within and to the Lower and Upper Hunter region.

TfNSW have recently completed improvements to the Pacific Highway / The Bucketts Way intersection to improve the efficiency and safety of the intersection. The main improvements to the intersection included the introduction of a left turn slip lane from The Pacific Highway to The Bucketts Way (coming from Raymond Terrace) and the provision of a dedicated left turn lane on The Bucketts Way (separate left and right turn lanes from The Bucketts Way onto the Highway). There is also a dedicated right turn lane from the Pacific Highway (heading south on the Highway) to turn into The Bucketts Way. Other improvements to The Pacific Highway are likely to occur in the future as part of the $25 million program of improvement under Roads of Strategic Importance Commonwealth funding program.

At the time of inspection, The Pacific Highway was in excellent condition and considered suitable for use by heavy vehicles associated with the quarry.

The Bucketts Way

The Bucketts Way near the site is a Regional Road and is under the care and control of MidCoast Council with funding assistance from TfNSW. Under a functional road hierarchy The Bucketts Way is classified as a major collector road. Its main function is to distribute and collect traffic including to and from suburbs and properties in the area between The Pacific Highway at Twelve Mile Creek to the south and the Stroud and Gloucester townships to the north and Krambach and Nabiac to the north. Currently heavy haulage vehicles use The Bucketts Way to transport freight to these areas. At the time of inspection, the Bucketts Way was in good condition and considered suitable for use by heavy vehicles associated with the quarry.

Traffic Volumes

To determine existing traffic volumes on the local road network Intersect Traffic commissioned Northern Transport and Planning (NTPE) to undertake manual traffic counts at the Pacific Highway / The Bucketts Way. The counts were undertaken on 21 February 2019 and determined the AM and PM peak hour periods at the road intersection were 8.00 am – 9.00 am and 3.45 pm – 4.45 pm. The two-way mid-block traffic volumes extracted from this count were:

- The Pacific Highway east of The Bucketts Way – 1,254 vtph AM and 1,493 vtph PM
- The Pacific Highway west of The Bucketts Way – 1,450 vtph AM and 1,790 vtph PM
- The Bucketts Way north of the Pacific Motorway – 264 vtph AM and 423 vtph PM.

These volumes have been used as the 2020 mid-block peak hour volumes in this assessment. The 2030 volumes and 2052 volumes (quarry life) have been calculated by increasing the 2020 volumes by an annual growth rate factor of 2.0% for a period of 10 years. The 2020, 2030 and 2052 mid-block peak hour traffic volumes are shown below in Table 7-24.

Historically traffic growth on The Bucketts Way has been less than 1% per annum therefore adoption of a 2% per annum background traffic growth on The Bucketts Way provides a conservative estimate.

It is noted from the counts that the existing heavy vehicle traffic is approximately 8% on The Bucketts Way and up to 13% on The Pacific Highway.

Table 7-24: Summary of Traffic Count Data and Modelling for Life of Project (vtph)

Road	Section	2020 am	2020 pm	2030 am	2030 pm	2052 am	2052 pm
The Pacific Highway	East of The Bucketts Way	1254	1493	1529	1820	2363	2814
The Pacific Highway	West of The Bucketts Way	1450	1790	1768	2182	2733	3373
The Bucketts Way	North of The Bucketts Way	264	347	322	423	498	654

Road Capacity

The *RTA's Guide to Traffic Generating Developments* (2002) provides guidance on likely levels of service being experienced on two lane two way rural roads for different terrain types. The level of service (LoS) is designated as a level from 'A' through to 'F' with LoS A being the best level of service and LoS F being the worst. The desirable LoS for rural roads before upgrading works to increase the capacity of the roads need to be considered is a LoS C though a LoS D may still be acceptable in certain circumstances.

The definitions for LoS C is:

- LoS C - this level is also in the zone of stable flow but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.

With a level terrain applying to The Pacific Highway (two lanes per direction) and a rolling terrain applying to The Bucketts Way the likely two way mid-block road capacities for these roads will be:

- The Pacific Highway – 2,820 vtph; and
- The Bucketts Way – 970 vtph.

As the existing road network around the proposed quarry site is currently operating below these thresholds (see Table 7-24) good levels of service up to a LoS C will be experienced by motorists on these roads and it is concluded that the existing road network has spare capacity to cater for traffic growth generated by additional development in the area.

Table 7-25: Peak Hour Flow on Rural Roads as per *RTA's Guide to Traffic Generating Developments*

Terrain	Level of Service	Percent of Heavy Vehicles			
		0	5	10	15
Level	B	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290
Rolling	B	500	490	360	310
	C	920	760	650	570
	D	1370	1140	970	700
	E	2420	2000	1720	1510
Mountainous	B	340	230	180	150
	C	600	410	320	260
	D	1050	680	500	400
	E	2160	1400	1040	820

Source: RTA's Guide to Traffic Generating Developments (2002).

Intersection Capacity

In most situations roadway capacity is normally controlled by the intersection capacities within the road network. In this case there are two intersections of direct interest for the proposal because the main haulage route from the quarry is along The Bucketts Way. These are the Pacific Highway / The Bucketts Way and the proposed The Bucketts Way / Quarry Access Road intersection. The concept plan drawings showing more detail of the new quarry access intersection with The Bucketts Way is presented in the TIA (Appendix K).

The Pacific Highway / The Bucketts Way intersection has been modelled using the Sidra Intersection 9 Network modelling package for existing traffic during the following AM and PM peak periods to demonstrate current

operating conditions at this intersection. Future traffic was also modelled with volumes predicted on the basis of a 2% per annum background traffic growth rate over the future horizon period of 10 years to 2030, noting:

- Quarry AM peak period is 6 am – 7 am
- Road network AM peak period is 8 am – 9 am
- Quarry PM peak period is 2 pm – 3 pm.
- Road network PM peak period is 3.45 pm – 4.45 pm.

The road network PM peak period (3.45 pm – 4.45 pm) was not modelled as on the majority of occasions the quarry would be generating little if any traffic during this period as the quarry generally stops delivering at 2 pm. Only rarely, during major orders, would the quarry generate any significant traffic during this period.

Data for the modelling was obtained by Northern Transport Planning and Engineering (NTPE) through manual intersect counts during non-school holiday periods within the defined peak hours. The Sidra Intersection 9 software package predicts likely delays, queue lengths and thus levels of service that will occur at an intersection. Assessment is then based on the level of service requirements of the TfNSW.

Greg Baird & Associates undertook a Road Safety Audit (RSA) of The Bucketts Way from the extents of the proposed quarry access road to the Pacific Highway. The RSA is available in full within the TIA available in Appendix K. In total eight risks were recorded in the audit. It is expected that the issues raised (see below) with respect to the Pacific Highway / The Bucketts Way intersection would be resolved as part of the current TfNSW works on the intersection.

The modelling shows that this intersection currently operates with good levels of service for all movements for all AM and PM peak times modelled indicating little or no delay and / or queuing for motorists. Further with 10 years traffic growth at normal background growth levels i.e. 2% per annum, the intersection continues to operate satisfactorily. Future modelling shows that by 2052 which represents the possible quarry life end the intersection has reached capacity in the PM peak periods and some form of intersection upgrade may be required even without the quarry traffic. However this modelling is considered very inaccurate given the assumptions made in terms of background traffic growth and the time period involved for which network changes that affect the operation of the intersection may occur. Therefore, it is reasonable to conclude that the intersection has spare capacity to cater for additional traffic generated by development in the area through to and beyond 2031 however is likely to need either some form of upgrading or road network improvements to occur prior to the end of the quarry life. As this could happen without the quarry traffic this is considered a regional problem for which the road authority is responsible though the quarry may be responsible for fair and reasonable contribution to the future works. Therefore a nexus would exist for some form of fair and reasonable contribution to this work from the quarry.

Alternate Transport Modes

There is no public transport (bus) service to the area that is within convenient walking distance to the site. The only service that travels along The Bucketts Way is NSW Transports pre-booked coach. Routes C135 from Newcastle and C136 from Gloucester operate a 1 weekday after 6 pm service in either direction to and from Broadmeadow or Gloucester stopping at Raymond Terrace, Limeburners Creek, Allworth and Booral, Stroud Wards River, Craven and Stratford. Whilst there are formal stops at the above towns, arrangements can be made to alight or pickup at prearranged safe locations along the route. As a rural area there are no constructed footpaths therefore facilities for pedestrians are non-existent. Similarly, there are no designated on or off road cycle ways in the area therefore cyclists using the road network would either need to use the formed road shoulders or share the traffic lanes where necessary. In regard to the haulage of extracted material from the site there are currently no alternatives to the use of road haulage to and from the site.

7.8.3 Impact Assessment

Traffic Generation

In the operational phase the quarry is expected to quarry product 49 weeks of the year, 5.5 days per week. The quantity hauled, using 32 tonne truck and dog haulage vehicles, is estimated to be an average of 10,200 tonnes per week or 1,800 tonnes per day. The tonnage per day would vary greatly however a maximum of 4,000 tonnes

could be supplied on any given day based on customers' needs. This maximum quantity would equate to a maximum peak of approximately 110 haulage vehicles leaving the quarry on a peak demand day and approximately 55 haulage vehicles on an average day. The highest peak hour traffic volume would be no greater than 25 laden haulage vehicles exiting in a peak hour based on loading / weighing dispatch times. It is important to realise this will not occur every day and every hour but would be a short term peak associated with a number of concurrent major orders.

It is anticipated that 10 staff would be employed for the operation of the quarry with approximately 6 inward deliveries / visitors per day in addition to the haulage truck trips.

In distributing the peak hour traffic through the adjacent road network, the following assumptions have been made for this site:

- Traffic at the quarry access will have origin / destinations 95% The Bucketts Way south and 5% The Bucketts Way north
- The Bucketts Way south traffic will have origin / destinations 80% west at the Pacific Highway and 20% east
- In the 6-7 AM peak hour, truck traffic will be 50% inbound and 50% outbound, staff and visitors will be 100% inbound
- In the 8-9 AM peak hour, truck traffic will be 50% inbound and 50% outbound, visitors will be 50% inbound and 50% outbound
- In the 2-3 PM peak hour, truck traffic will be 50% inbound and 50% outbound, staff and visitors will be 100% outbound.

Construction traffic generated by the development will not be significant. Traffic generated by the construction would involve contractor traffic and include some plant e.g. excavator, roller, grader, tip trucks as well as utility and employee traffic. With a maximum of 10 to 12 construction contractors on site at any one time peak hour traffic volumes associated with the construction work would be less than 10 vtph with daily traffic movements unlikely to exceed 30 vtpd. Works would be short term as the construction period is expected to require 12 weeks of effort.

Initially some construction would be required to utilise Deep Creek Road to access the site until such stage as the new access is constructed to a suitable standard for construction vehicles. Deep Creek Road will need to be maintained to a suitable traversable standard during this time to minimise any impacts on neighbouring properties.

This level of construction traffic is considered minor and as a short term impact would not adversely impact on the local road network. Safety issues would be managed by a Construction Traffic Management Plan for the construction tasks that would include traffic control plans where required.

Traffic Efficiency

From the assessment of existing traffic volumes as well as road and intersection capacity it can be seen that the local road network around the site is currently operating at good levels of efficiency. The combination of low traffic volumes and a suitable standard of road construction mean that motorists on the local road network experience a good level of service with little or no delays.

As this proposal only results in an increase of up to 252 vtpd or 62 vtph during peak sales days on the road network it will not cause the two way mid-block technical capacity of the road network to be reached therefore satisfactory levels of LoS will still be experienced by motorists on the road network after the construction and operation of the quarry as demonstrated in Table 7-26.

By 2052 the Pacific Highway mid-block capacity may be reached in the PM peak requiring the provision of additional travel lanes however this would be dependent on the accuracy of the background traffic growth assumption made in the assessment. However, as this occurs with or without the contribution of traffic from the proposed Project, it is the responsibility of the road authority to undertake this work albeit a nexus would exist for a fair and reasonable contribution from the quarry to the works.

Table 7-26: Road Capacity Assessment

Road	Section	Capacity vtph	2020 am peak vtph	2020 pm peak vtph	2030 am peak vtph	2030 pm peak vtph	2052 am peak vtph	2052 pm peak vtph	Development	
									am	pm
The Pacific Highway	East of The Bucketts Way	2820	1266	1505	1541	1832	2375	2826	12	12
The Pacific Highway	West of The Bucketts Way	2820	1498	1838	1816	2230	2781	3421	48	48
The Bucketts Way	North of The Bucketts Way	970	324	407	382	483	558	714	60	60

In regard to The Pacific Highway / The Bucketts Way intersection the impact of the additional traffic has been assessed using the Sidra Intersection models established for the intersection.

This modelling shows that the intersection will continue to operate satisfactorily post development during peak trading periods for the quarry through to at least 2030 with the average delay, levels of service and queue lengths for all movements remaining within the criteria determined by the TfNSW as representing satisfactory operation. It is noted that during the AM peaks there is no deterioration in overall LoS for the intersection while in the PM peak the LoS drops from B to C. However a LoS C is still satisfactory operation of the intersection and average delays only increase by up to 18 seconds while queue lengths increase by less than 1 vehicle.

In analysing the modelling results it is noted that the only turn movement that is adversely impacted is the right turn movement out of The Bucketts Way. Therefore by 2052 when the intersection may be failing in the PM peak a simple option to return the intersection to satisfactory operation and thus safety would be to physically impede the right turn movement out of The Bucketts Way ensuring all vehicles exiting The Bucketts Way are forced to turn left (north). Any vehicles with a destination to the south could then utilise the Karuah interchange of the Pacific Highway to conveniently undertake a safe U-turn movement.

The peak hour traffic at the private access to the Deep Creek Quarry development will be a maximum of 472 vtph on The Bucketts Way in 2030 and approximately 62 vtph on the new access road which indicates uninterrupted flow conditions at the private access intersection as the peak traffic volumes fall well below the thresholds for uninterrupted flow conditions contained in Austroads *Guide to Traffic Management – Part 6 – Intersections, Interchanges & Crossings (2009)*.

Therefore the proposed quarry access will not adversely impact on the local and state road network. A turn lane warrant assessment for the access using 2030 traffic volumes and in accordance with Austroads Guide to Road Design Part 4A Signalised and unsignalised intersections has determined that the access will be required to be constructed to a CHR(s) / AUL standard particularly given the heavy vehicle use on the quarry access road.

Road Safety

This section provides a summary of road safety in the context of the TIA.

In terms of road safety the main issues that need to be considered regarding the TIA are type of traffic, road geometry and intersection safety. An increase in traffic volumes increases the risk of traffic accidents and thus impacts on the standard of road geometry required for the road. The road geometry impacts on the safe travelling speed in a number of ways including horizontal alignment, vertical alignment and lane widths. Intersections represent the major traffic conflict points on a road network and thus are a location of increased accident risk.

Greg Baird & Associates undertook a Road Safety Audit (RSA) of The Bucketts Way from the extents of the proposed quarry access road to the Pacific Highway including the Pacific Highway / The Bucketts Way intersection. This audit was undertaken on the basis of the road network condition and layout as at the date of the audit and did not include some improvements undertaken at the intersection post audit date. The full RSA is provided in Attachment E of the TIA, however, a summary of the findings is as follows.

- The existing right turn lane on the Pacific Highway at The Bucketts Way intersection was only 110 metres long but needs to be 155 metres for comfortable deceleration
- There is no acceleration lane for left turning vehicles out of The Bucketts Way onto the Pacific Highway
- There is no hold line for the southbound highway right turn lane into The Bucketts Way to provide guidance on where to stop. Line marking at the seagull island is faded
- On the day and night of the audit, the width marker (D4-3) signs on the Limeburner's Creek Bridge were observed to be rotated and not visible in the direction of travel. As well, no reflectors were observed delineating the older style bridge railing
- The available safe intersection sight distance (SISD) to and from the north of the proposed quarry access intersection on The Bucketts Way appears to be about 195 m, suitable for a travel speed of about 85 km/h. However, the proposed intersection layout includes a CHR(S) right turn lane for vehicles waiting to enter the quarry access and a southbound acceleration lane for vehicles turning right to exit the quarry access. The right turn and acceleration lane remove potential conflict between southbound through traffic and traffic entering or leaving the proposed quarry access. Double barrier lines prohibit overtaking in the southbound approach to the proposed intersection. Sight distance to and from the south of the proposed quarry access is satisfactory
- The drawings show a 370 m long acceleration lane for vehicles exiting the quarry access intersection southbound (turning right), including merge taper. Assuming a 3.1 m wide acceleration lane and a 3% downgrade (as shown on the drawings), Austroads guidelines indicated that the proposed acceleration lane length will allow a heavy vehicle to accelerate to between 70 km/h and 75 km/h by the start of the taper. As sight distance to and from the merge is satisfactory, a merging speed of 70 km/h to 80 km/h is considered acceptable
- At the time of the audit the new central island in The Bucketts Way was not painted or delineated. Some edge lines on The Bucketts Way were also yet to be completed
- An existing two cell pipe culvert crosses under The Bucketts Way, in the area requiring widening for the acceleration lane. While not directly affected by construction, the existing western side headwall is within the clear zone and opposite the proposed merge. Once the final merge geometry and headwall locations are determined, both headwalls should be assessed to determine whether safety barrier protection is required.

It is expected that the issues raised with respect to the Pacific Highway / The Bucketts Way intersection would be resolved as part of the current TfNSW works on the intersection. The other matters will be addressed at detailed design stage of the quarry access intersection with The Bucketts Way.

Cumulative Impacts

The results in the TIA have included an assessment of cumulative impacts. The cumulative impacts of known developments in the area within this assessment are catered for with the adoption of a 2 % per annum background traffic growth. Historically in recent years The Bucketts Way has experienced little if any growth as development in the area has been minimal. Therefore the adoption of a 2% per annum traffic growth is considered conservative. At the time of drafting the TIA the only known other significant development that could proceed in the area is the nearby Hillview Quarry however there is still no certainty that this development will proceed. Therefore it is considered the 2% per annum traffic growth assumption that has been incorporated for future traffic conditions would cater for future other developments in the area including Hillview quarry particularly when extended through to 2052 and no other traffic increase need be applied.

7.8.4 Mitigation and Management Measures

The TIA for the project has found that regarding the road network, the project can be supported as it will not have an adverse impact on the local and state road network in the vicinity of the site and complies with all requirements of MidCoast Council, Austroads and NSW Roads and Maritime Services (RMS). Nonetheless, a Traffic Management Plan (TMP) would be developed prior to any activity commencing. Driver awareness would also be included in site inductions.

Mitigation and Management measure regarding traffic will include:

- Traffic control plans prepared by an accredited person are to be approved by the RMS prior to implementation by an accredited person for the construction of the quarry intersection
- The quarry intersection and associated acceleration and deceleration lanes will have signage installed, which will be agreed in consultation with RMS
- A signed 40km/hr speed limit along internal quarry roads, including Deep Creek Road
- IDPL will implement a Driver Code of Conduct signed onto by all drivers during their site induction
- Haul trucks will be weighed on entry to the site via a weigh bridge at the site office complex and again on leaving the site where product weight and tickets will be generated and recorded for each load.
- IDPL may make a fair and reasonable contribution to road authorities regarding future works on the Pacific Highway / The Bucketts Way intersection commensurate with the relative impact of the traffic generated by the quarry.

7.9 Soils and Land Resources

7.9.1 Introduction

A Land Use, Soils and Rehabilitation Report (LSRR) has been performed and is available in full as Appendix T. The report guides this chapter of the EIS which presents a summary of the baseline, and potential impacts to soils and land resources from the proposed DCQ project.

7.9.2 Desktop Research

Geological Units

Reference to the Newcastle 1:100,000 Geology sheet shows that there are three geological units found within the development footprint (Figure 13). These are:

- Ironstone Mountain (im) – This formation is found in rolling to steep hills on Carboniferous sediments consisting of pebbly conglomerate, lithic sandstone with siltstone interbeds. Soils vary in depth from shallow (25 - < 50cm) to moderately deep (50 - < 100cm). This formation is found on the western upper slopes of the extraction area, and where the access road crosses to the east of the site. The western extent of the extraction area is capped with altered sedimentary units generally meeting this description
- Ten Mile Road (tm) - Found on undulating low hills on Carboniferous sediments and acid volcanics consisting of lithic sandstones, shale, coal and conglomerates with interbedded volcanics that consist of rhyodacites, ignimbrites and tuffs. Soils of this formation are characterised as moderately deep (55 cm) to deep (> 200cm), with some shallow (< 45 cm) units. This formation is found predominantly in the extraction area of the development, with the rhyodacite being the primary focus of the quarry, with the shale and coal units located below the floor of the quarry
- The Branch (tb) - Found on broad plains on deep (up to 20 m) Pleistocene clays on shallow slopes. Soils of this units are characterised as deep (> 300 cm). This formation is mapped as outcropping through the main stockpile area, lower slopes of the extraction area and infrastructure area.

More detailed examination of geology onsite is available within the Resource Evaluation Investigation supporting the EIS for the site prepared by VGT Pty Ltd (2020) available in Appendix O.

Historical Land Use

Using the New South Wales Government's Historical Imagery Viewer provided historical aerial images of the Deep Creek area as far back as 1976 (Plate 1). This imagery shows that land use has not changed significantly over this period of time with grazing the main activity, although potential logging is identified in one image from 1993 (Plate 3). The vegetation in the area surrounding the extraction site remains largely intact until the early 1990s before more vegetation land is cleared.

Plate 1: Historical Aerial Image from 1976

Plate 2: Historical Aerial Imagery from 1984

Plate 3: Historical Aerial Imagery from 1993

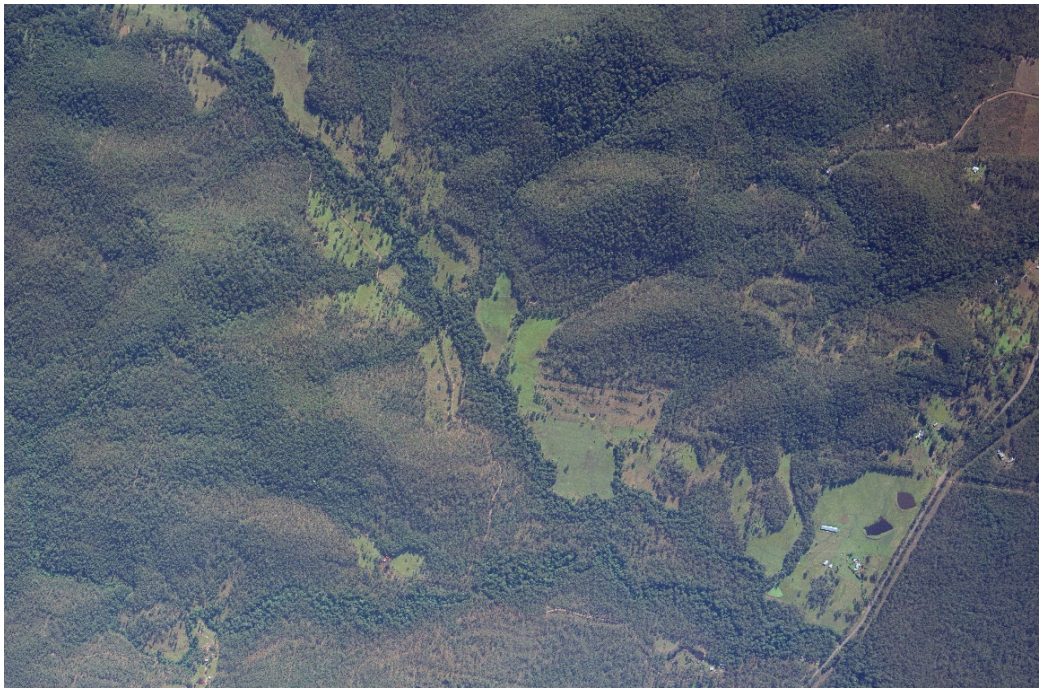
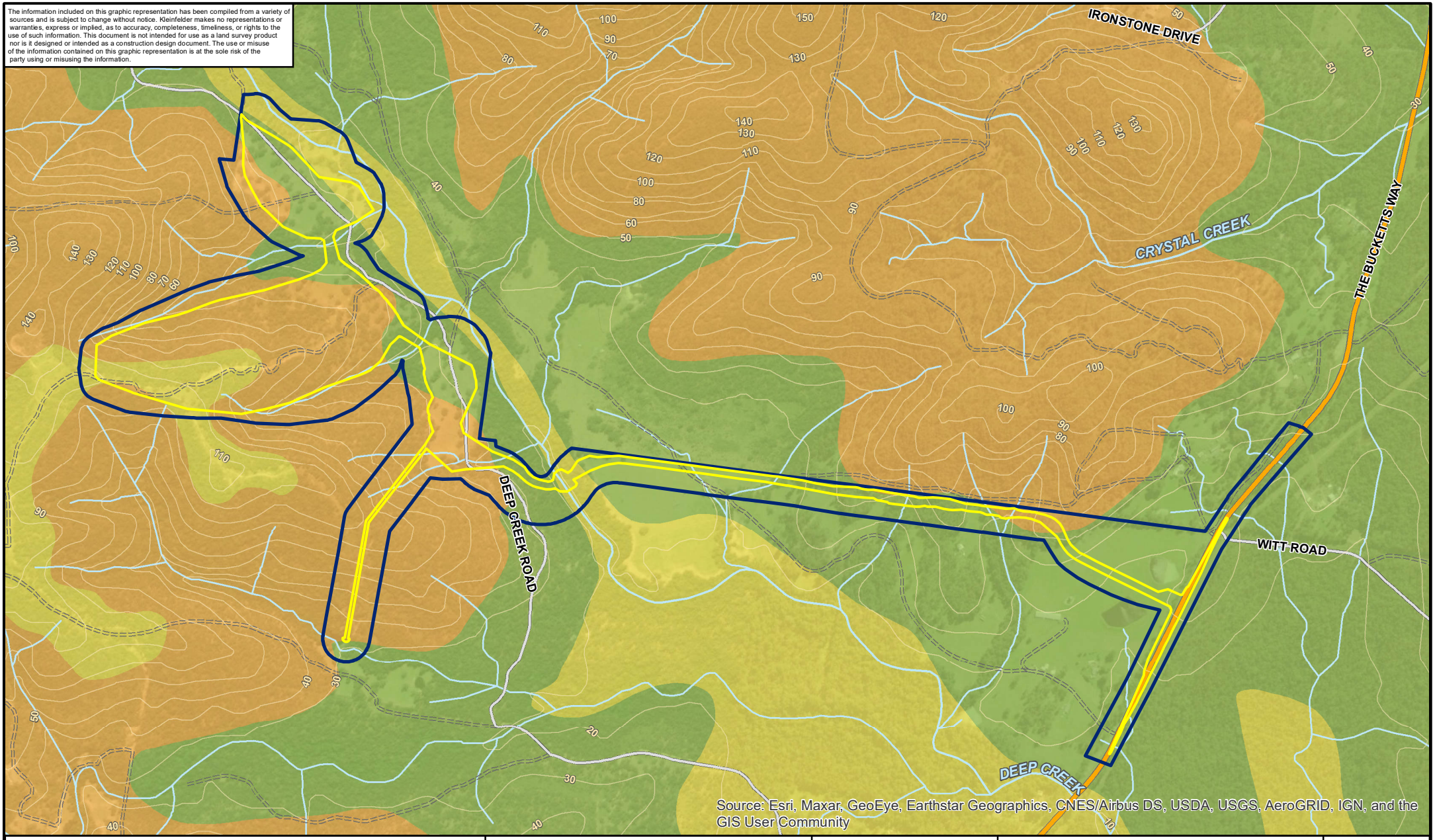


Plate 4: Historical Aerial Imagery from 2001



Legend

- Project Area
- Study Area
- Track-Vehicular
- Arterial Road
- Local Road
- Contours (10m)
- Named Watercourse
- Unnamed Watercourse

Land Soil Capability Class

- 4
- 5
- 6

Metres
0 50 100 200 300 400 500

N

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PROJECT REFERENCE: 20203112
DATE DRAWN: 2021/10/21 15:53 Version 1
DRAWN BY: GJoyce
DATA SOURCE:
NSW DFSI - 2020
NSW DPIE - 1998

Land Soil Capability Mapping

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek NSW 2324

FIGURE:
14

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7.9.3 Field Investigation

A total of 10 soil samples were taken from areas proposed for development which are presented in Table 7-27. The soil samples are relatively similar in characteristics in terms of topsoil/plant growth medium regardless of the geological derivation of the soils. Full results of the soil sample analysis are provided in Appendix 1 of the LSRR (Appendix T), with a summary provided below.

The soil pH over the entire site is very acidic and ranges from a low of 4.2 to a high of 4.96 (1:5 $CaCl_2$). These soils are generally low in fertility with key nutrients including nitrogen assessed as very low to low, and phosphorus as low to moderate. Exchangeable cations magnesium, sodium, calcium and potassium were all very low to moderate only, with minor nutrients including sulphur, copper, zinc, manganese and iron all low to moderate.

Electrical conductivity (EC) indicates that the soils were non-saline and hence non-dispersive. Exchangeable aluminium, when expressed as a percentage of total exchangeable cations, exceeds 30% it is toxic to vegetation. No sample recorded levels above 20% and therefore aluminium toxicity will not be an issue.

These results suggest that the site soils will be suitable for the establishment of native vegetation but will require improvement through fertiliser application or pasture species selection (e.g. pasture legumes to improve levels of nitrogen and phosphorous).

Sample sites S1 and S2 located on the access road and property used for grazing have the highest levels of phosphorus and high levels of nitrogen, indicating that some pasture improvement through fertiliser application has historically occurred.

Table 7-27: Distribution of the Soil Sample Locations

Sample Designation	Quarry Area	Geological Unit
S1	Access Road	Ten Mile Road
S2	Access Road	
S4	Infrastructure Area	
S5	Infrastructure Area	
S7	Main Stockpile Area	
S3	Access Road	Iron Mountain
S9	Extraction Area	
S10	Extraction Area	
S6	Main Stockpile Area	The Branch
S8	Processing & Primary Stockpile Area	

Topsoil Availability

A total of 30 ha is projected to be disturbed over the course of the quarry lifetime with 18 ha of extraction area, and the rest within infrastructure, stockpile and areas with ancillary facilities. Using only these areas for the calculation of available topsoil, this provides a potential 25,200 m^3 of topsoil for rehabilitation with the following caveats:

- There is a physical limit to the space available for stockpiling topsoil, and not all of this area may be able to be used for topsoil collection
- This represents the total available topsoil and does not reflect staging of the development.

Soils deposits were not logged or recovered during the geotechnical or geological investigation of the quarry but were recorded as being between 0.5 and 2.5m deep. There are three soil units identified outcrop within the extraction area, with estimated volumes of soil shown in Table 7-28 below. This shows there is an estimated 17,960 m^3 of topsoil, and a further 142,000 m^3 of subsoil which may be suitable for use in the rehabilitation strategy.

Table 7-28: Estimation of Available Soil Resources

Soil Formation in the Extraction Area	Area (ha)	Ave depth (m)	Total Soil Vol (m^3)	Topsoil Vol (0.1m) (m^3)	Subsoil Vol (m^3)
Iron Mountain	9.79	0.5	48,950	9,790	39,160
Ten Mile	5.22	1.0	52,200	5,220	46,980
The Branch	2.95	2.0	59,000	2,950	56,050
Totals	17.96		160,150	17,960	142,190

Acid Sulfate Soils

The quarry is not within a mapped area with the potential to contain Acid Sulphate Soils (ASS) under the Great Lakes LEP, nor is it mapped within the extent of potential ASS under the NSW OEH Acid Sulfate Soils Risk mapping layer within the NSW Government's Sharing and Enabling Environmental Data (SEED) mapping system (Office of Environment and Heritage 1998; State of NSW 2020). This mapping shows ASS are approximately two kilometres from the quarry (Figure 1 of LSRR, Appendix T). Given the mapping, the elevation of the site and the lack of marine incursion, soil samples were not specifically tested for the formation of acid sulfates.

7.9.4 Existing Land Capability

A summary of the different Land and Capability classes (LSC) is shown in Table 7-29 below. Soil capability mapping (NSW DPI, 2020) (Figure 14) shows that the site has LSC that ranges from Class 4 – Moderate to Class 6 – Low Capability.

Table 7-29: Land and Soil Capability (LSC) Class and General Definitions

LSC	General Definition
Land capable of a wide variety of land uses (cropping, grazing, horticulture, forestry, nature conservation)	
1	Extremely high capability land: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices.
2	Very high capability land: Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.
3	High capability land: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation.
Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)	
4	Moderate capability land: Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology.
5	Moderate–low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.
Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)	
6	Low capability land: Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation

LSC	General Definition
Land generally incapable of agricultural land use (selective forestry and nature conservation)	
7	Very low capability land: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation.
8	Extremely low capability land: Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation.

Note: Table sourced from OEH 2012/0394.

Class 4 land soils are restricted to the lower lying and more gently sloped areas of the quarry, including the access road, infrastructure and main stockpile area.

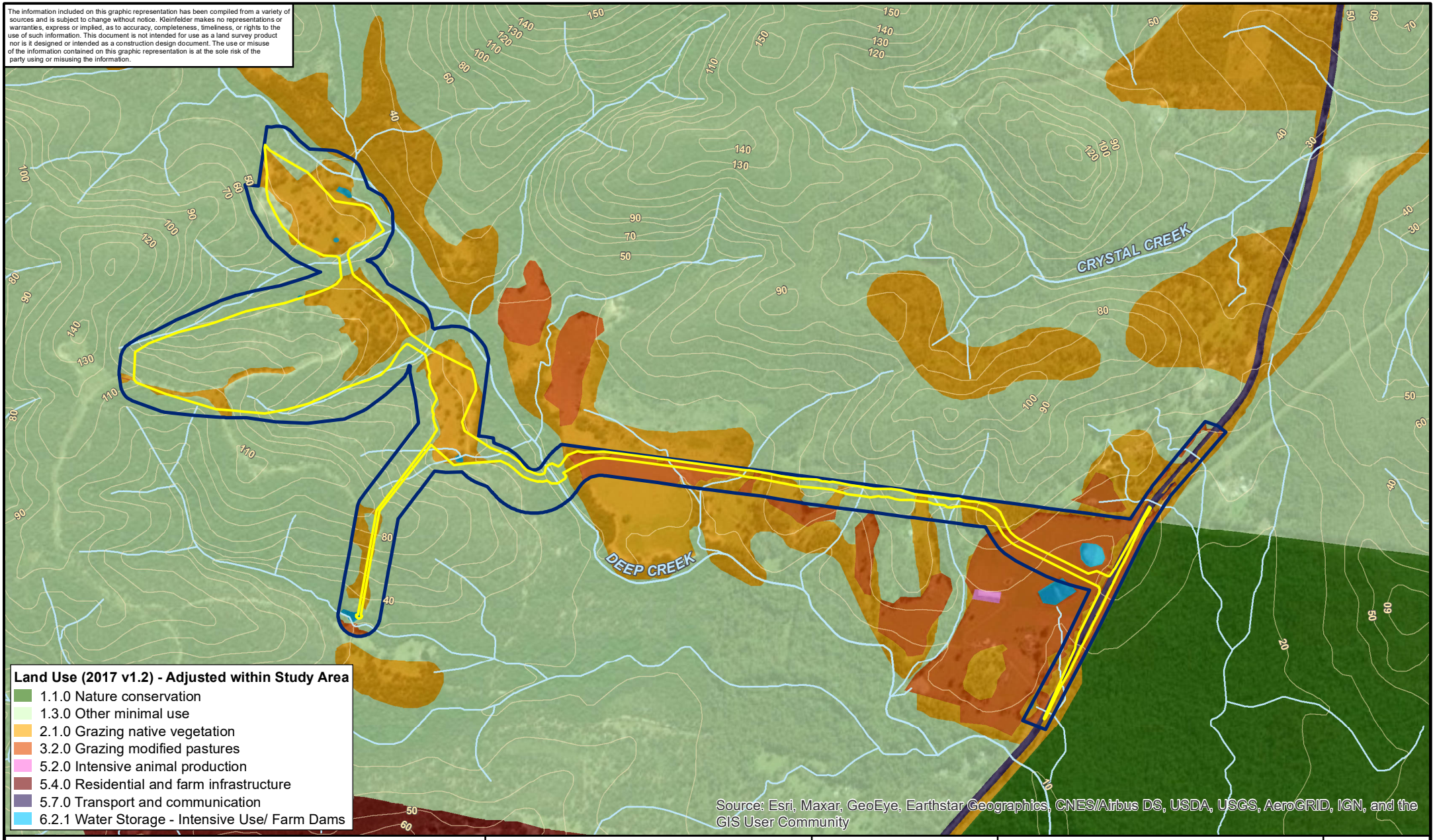
Class 5 land soils is the least extensive of the three land soil classes on site. It is restricted to the very lowest portions of the infrastructure and main stockpile areas, and a small portion of the access road where it crosses Deep Creek itself.

The majority of the extraction area, the entire pipeline corridor and sections of the infrastructure and main stockpile area have areas of Class 6 land soils.

Existing Land Use and Strategic Agricultural Land

Land use is mapped in Figure 15 with data sourced from NSW LUMAP (2021). Three land use classes have been mapped. The first is ‘Land Use 2.1.0 Grazing native pasture’, which covers most of the infrastructure, stockpile and some of the extraction areas. The second is ‘Land Use 3.2.0 Grazing modified pasture’ and encompasses land that has been totally or partially cleared for this purpose. This takes in large sections of the access road. These two areas cover approximately 14 ha of the development footprint. The third land use is classified as ‘Minimal Other Use 1.1.0’ and covers a large section of the access road and the majority of the extraction area of the quarry.

Biophysical Strategic Agricultural Land (BSAL) is defined as land with high quality soil and water resources that are capable of sustaining high levels of agricultural activity. BSAL has been mapped (DPIE 2021) in the area surrounding the development (Figure 16) and is restricted to alluvial flats located to the north and east of the development along the Karuah River and tributaries. There is no BSAL within the development, and with land immediately downstream of the development designated as conservation area (Karuah National Park), there is no threat to BSAL.



Legend

- Project Area
- Study Area
- Named Watercourse
- Unnamed Watercourse
- Contours (10m)

Metres
0 50 100 200 300 400 500

N

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DRAWN BY: GJoyce
DATA SOURCE: NSW DFSI - 2020

Land Use Mapping

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek NSW 2324

FIGURE: **15**

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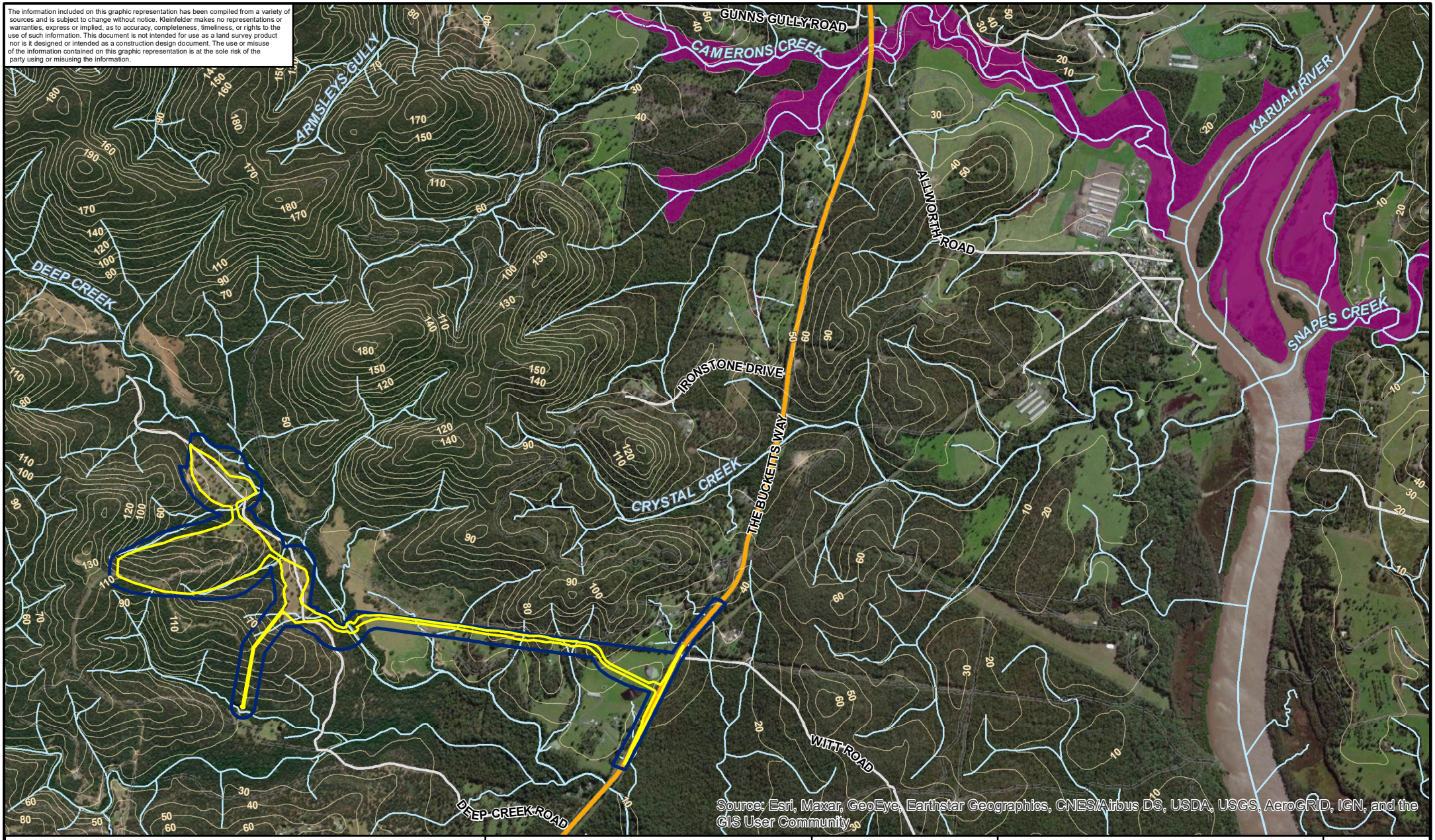

Legend

- Project Area
- Study Area
- Track-Vehicular
- Arterial Road
- Local Road
- Named Watercourse
- Unnamed Watercourse
- Contours (10m)

Strategic Agricultural Land

- Biophysical Strategic Agricultural Land

km
0 0.1 0.2 0.4 0.6 0.8 1

N

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DRAWN BY: GJoyce
DATA SOURCE:
NSW DFSI - 2020
NSW DPIE - 2020

Strategic Agricultural Land in the Vicinity of the Deep Creek Quarry

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek NSW 2324

FIGURE:
16

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7.9.5 Impact Assessment

Soils

The impacts to the soils in the surrounding areas are anticipated to be negligible. Soils on site, along the expanded access corridor, infrastructure, main stockpile and extraction areas will be impacted due to compaction or removal. Potential impacts can be summarised as:

- The access corridor represents the largest risk in terms of soil instability and potential erosion with substantial areas of exposed soils from cut and fill batters for the roadway. Impacts on and offsite are manageable and negligible with appropriate erosion control actions to stabilise un-vegetated banks such as revegetation, and sediment control structures
- Infrastructure and main stockpile areas will largely be affected by compaction and stripping of topsoils and subsoils as cut and fill is required to establish construction areas. Erosion and sediment control structures will be required to prevent run-off and erosion
- Stockpiling of topsoils and subsoils for extended periods of time will lead to degradation of these soils as a rehabilitation resource, but this impact can be contained with suitable management actions outlined in previous sections of this document. These stockpiles can become an erosion issue if appropriate measures such erosion and sediment control structures/actions are not implemented.

Land Capability

The proposed quarry will result in the reduction of land capability over the site.

Table 7-30 below shows the expected reduction in land capability from pre and post development. As a portion of the infrastructure areas and the access road are likely to remain in the final landform, these areas are reduced in their land soil capability. The final landform of the extraction area will result in a larger area of land that has a gentler slope consistent with Class 2 or better, however the soil depth is likely to constitute limitations in land capability. The floor of the pit has been conservatively estimated to be Class 5 or 6 on completion, with the benches also rated Class 6 due to soil depth, size and access.

Table 7-30: Comparison of Land Use Capability Classes Pre and Post Development

Area	Pre-Development	Post Development
Access Road	Class 4	Class 6
Infrastructure	Class 4/5	Class 5/6
Main Stockpile	Class 4/5/6	Class 5/6
Extraction – quarry floor	Class 5/6	Class 5
Extraction – benches	Class 5/6	Class 6

Land Use and Agricultural Suitability

There will be minor changes in agricultural suitability for some areas of the development as outlined in Table 7-31 below, based on the Australian Land Use Mapping (ALUM) V8 (ABARES, 2016). The ALUM classification system is based on a three-tiered hierarchical structure with primary, secondary and tertiary classes based on the degree of modification and impact on a “natural state”.

ALUM consists of six primary classes each with a subset of secondary classes, both based on land use defined by the management objectives of the land manager. Tertiary classes are more detailed and can include commodity groups and/or specific commodities, land management practices or vegetation data (ABARES, 2016).

The proposed access road will impact land that is currently mapped as 1.3.0 other Minimal Use, 2.1.0 Grazing native vegetation and 3.1.0 Grazing modified pastures to land classified as Land Use 5.7.0 Transport and Infrastructure.

Rehabilitation will see the revegetation of the infrastructure and stockpile areas to exotic pastures, the land use classification changes from 2.1.0 Grazing native vegetation to 3.2.4 Pasture legume/grass mixture. Likewise, with the majority of the extraction area is currently classified as 1.3.0 minimal other uses, revegetation of the quarry

floor will result in land classified as 3.2.4 Pasture legume/grass mixture used for light grazing, while the benches will remain 1.3.0 minimal other use. The area set aside for the construction of a residence and/or other infrastructure will become land classes as 5.4.0 Residential and farm infrastructure.

The dams currently within the development footprint will remain classed as 6.2.1 Water storage – intensive use/farms dams, with a farm dam potentially being constructed on the quarry floor, such a feature would also be classed as 6.2.1 Water storage – intensive use/farms dams.

Table 7-31: Comparison of Agricultural Land Capability Pre and Post development

Area	Pre-Development ALUM Classification	Post Development ALUM Classification
Access Road	1.3.0 Other Minimal Use 2.1.0 Grazing native vegetation 3.1.0 Grazing modified pastures	5.7.0 Transport and communication
Infrastructure	2.1.0 Grazing native vegetation	3.2.4 Pasture legume/grass mixtures
Main Stockpile	2.1.0 Grazing native vegetation	3.2.4 Pasture legume/grass mixtures
Extraction – quarry floor & benches	1.3.0 Other minimal uses 2.1.0 Grazing native vegetation	1.3.0 Other minimal uses 3.2.4 Pasture legume/grass mixtures 5.4.0 Residential and Farm infrastructure 6.2.1 Water storage – intensive use/farm dams

Cumulative Impacts

The development of the quarry, in addition to neighbouring rural dwellings, will result in a cumulative increase in lower agricultural suitability land within the locality at least for the operational duration of the quarry. Other quarry proposals within the area such as Hillview Quarry may also contribute to a reduction of the land and agricultural suitability of the area. However, these quarries are typically located on hilly terrain and vegetated areas and as such the land and agricultural suitability affected is typically of lower agricultural value. Therefore, the cumulative impact is unlikely to have an appreciable impact on local agricultural capacity.

There are no impacts associated with mapped BSAL or High Capability Land and onsite survey confirmed there is no land meeting this criteria and as such, there will be no cumulative impact on BSAL or High Capability Land.

Impacts on soils are limited to the extent of the development and while in conjunction with existing roads, dwellings and land use will result in a cumulative increase in compaction and potential for erosion, the development is unlikely to result in any appreciable offsite cumulative impacts providing suitable controls are implemented to limit offsite transfer of soils from the property.

7.9.6 Mitigation and Management Measures

- Impacts on and offsite are manageable and negligible with appropriate erosion control actions to stabilise un-vegetated banks such as revegetation, and sediment control structures
- Erosion and sediment control structures will be required to prevent run-off and erosion
- Stockpiling of topsoils and subsoils for extended periods of time will lead to degradation of these soils as a rehabilitation resource, but this impact can be contained with suitable management actions including:
    - Topsoil stockpiling should be limited to as short a time as possible, subject to operational requirements
    - stockpiles should be constructed as flat and wide as the available space allows (to prevent anerobic conditions deep within the stockpile)
    - The stockpile should also be seeded to reduce erosion and runoff
    - All stockpiles are to be bunded with a soil bund to contain runoff and erosion until vegetation becomes established
    - When the stockpile is due to be utilised, established vegetation is to be mulched and incorporated into the respread soil.

7.10 WASTE MANAGEMENT

7.10.1 Introduction

Waste streams will be generated through construction and operation of the quarry. The waste management practices associated with the DCQ would be guided by the requirements of the Waste Avoidance and Resource Recovery Act 2001 (WARR Act) and the POEO Act. The WARR Act aims to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development, along with effectively managing resources and waste generation. The WARR Act, waste follows a hierarchy in order from most preferable to least preferable waste options:

- Avoid and reduce waste
- Reuse waste
- Recycle waste
- Recover energy
- Treat waste
- Dispose of waste.

In addition to the WARR Act and POEO Act, the following policies and guidelines would be relevant to the management of waste for this project:

- Waste Avoidance and Resource Recovery Strategy (EPA, 2014)
- Waste Classification Guidelines (EPA, 2014).

7.10.2 Waste Generation and Management

Waste will be avoided and reduced wherever possible through reusing or purchasing recycled materials where practicable. Where waste is generated it will be classified and managed as appropriate prior to disposal.

IDPL is aware of EPA's requirements with respect to notification and tracking of waste and is aware of the relevant legislative requirements for disposal of the waste, including any relevant Resource Recovery Exemptions, as gazetted by EPA from time to time.

Waste will be classified as per EPAs Waste Classification Guidelines and disposed of as per the requirements of the WARR Act, with management using the hierarchy of the WARR Act.

Construction and operation of the quarry will require similar types of activities on site, being clearing of vegetation, haulage of rock and other ground materials and land forming. Waste streams from these activities include:

- During construction, general construction waste that may be generated includes scrap building materials. Where possible these materials will be sent for recycling, otherwise they will be removed by relevant contractor/procedure to be disposed of off-site to a suitably licenced waste management facility
- Organic materials may be generated from clearing of vegetation, however they will be recovered and reused wherever possible and are therefore not considered a waste stream. Organic waste will be either mulched or stored for use as habitat features as part of the rehabilitation. Please refer to the rehabilitation plan for management techniques to maximise benefit and minimise organic waste (see Appendix T)
- General waste from the office and administration area will include small quantities of solid waste and recyclables such as paper, glass bottles, aluminium cans, plastics, packaging as well as other non-recyclable waste (such as food contaminated waste) generated by staff. Recyclable material will be collected by a recycling contractor. Non-recyclable general waste will be separated and collected separately and disposed of off-site by a licenced contractor
- Sewage waste will arise from the use of on-site amenities. A contained pump out sewage system will be installed, and sewage waste will be collected by a licenced contractor for off-site disposal
- Waste such as small quantities of greases and lubricants, which are classified as Group B liquid wastes under the Waste Classification Guidelines. Refer to hazards section (below) for management techniques and further assessment

- Waste oil will be produced from machinery on site. All waste oil will be stored in sealed containers within a covered and bunded area and will be removed from site by an appropriately licenced contractor. Waste oil filters will be returned to manufacturers for re-use wherever possible
- Cardboard – will be separated from other waste and stored within a covered skip bin for collection by a licenced contractor once full
- Timber – Timber refers to manufactured timber products (e.g. pallets or crates) as opposed to timber from vegetation clearing (see green waste above). Any waste timber will be removed from the site by a suitably qualified contractor for reuse or recycling.

All excavated material will be either sold as product or reused for rehabilitation. None will be considered waste and processing will not result in waste material.

The quarry will generate only small quantities of the identified waste streams. Where possible these waste materials will be recycled. Waste materials that cannot be recycled will be removed by suitably licenced contractors and disposed of at suitably licenced waste management facilities. Estimated waste volumes are presented in Table 7-32. These estimates have been based upon figures for developments of a similar nature and scale and IDPLs previous experience in the industry.

The Hazards section of the EIS provides details on the risks and materials used on site such as hydrocarbon management, blasting and hazardous waste with appropriate mitigation and management measures recommended further to this chapter.

Table 7-32: Estimated Waste Volumes

Waste Stream	Waste Classification	Estimated Quantity
General Waste	Solid	2 m^3 per month
Sewage	Liquid	2000L per month
Oils/Greases / lubricants	Liquid	350 L per year
Cardboard	Solid	2 m^3 per month
Timber	Solid	5 tonnes per year
Metals	Solid	5 tonnes per year

Cumulative Impacts

While waste streams will be generated for the life of the quarry, they will remain given that no extractive material generates a waste stream and that all cleared vegetation is reused on site. Cumulative impacts with other activities in the area are not anticipated as they will be managed through the mitigation and management measures, notably as waste will be reused or recycled where possible, or disposed of in licensed manner, and therefore no long-term cumulative impact is expected.

7.10.3 Mitigation and Management Measures

- All works would be conducted in accordance with the waste management hierarchy established by the WARR Act. The waste measurements would include:
    - No onsite disposal of waste will occur
    - Scrap metal will be deposited into a dedicated receptacle for periodic collection and recycling
    - Diesel fuel will be stored within self-bunded above ground tank and all rubber tyred machinery refuelling will be undertaken on a bunded and covered hardstand area
    - During excavation any foreign materials of potential impact encountered will signal an immediate stop work in the proximate area until the nature of the object/s can be determined. In the case of uncovered potential asbestos sheeting or pipe laboratory testing may be required to determine if asbestos fibres are present in the surrounding soil

- All wastes generated by the DCQ will be managed via appropriately licensed waste contractors
- All waste oil will be collected and stored in containers within a covered and bunded area, and will be removed from the site by an appropriately licensed contractor with all relevant waste tracking documentation completed
- All oil filters will be separately stored in containers with a covered bunded area, and will be removed from the site by an appropriately licensed contractor with all relevant waste tracking documentation completed
- Sediment / soil will be periodically removed from the various silt control structures and used in progressive rehabilitation of the site
- All office paper and general waste originating from the office and amenities building from routine equipment and vehicle maintenance consumables will be placed in appropriate containers for collection by council or a licensed contractor for disposal/ recycling at an appropriate waste management facility
- Good housekeeping practices and routine inspection/maintenance will be undertaken of all non-public roads, site infrastructure and silt fencing. Damaged infrastructure including sediment control structures will be replaced as required
- Wastewater from the amenities and workshop will be collected in a pump-out system and transported off-site by a licensed contractor
- All waste tyres will be removed by the supplier of replacement tyres
- Install sediment controls downslope of the disturbance area (in accordance with guidelines such as Landcom (2004)
- Any potential asbestos containing materials encountered will be disposed of to a licenced facility using appropriate handling and disposal techniques
- Hazardous substances will be stored with valves / outlets facing away from the predominant bushfire threat, site office and workshop area (where applicable). Connection to gas cylinders will be metal. Any hazardous material storage will occur more than 10m from any bushfire hazard and more than 10m from the proposed workshop and site office. Hazardous materials will be stored in accordance with AS 2187.1-1998 Explosives-Storage, transport and use – storage.

7.11 HAZARDS

7.11.1 Introduction

This section provides a summary of potential hazards in relation to the proposed DCQ.

7.11.2 Flooding

Flood Management

Surface water impacts from the construction and operation of the DCQ has been previously discussed under this EIS in the DCQ Surface Water Impact Assessment (SWIA) (see Appendix J). It provides a complete assessment of surface water impacts in relation to the DCQ and potential flooding hazards will be summarised in the following sections of this EIS.

Existing Environment

Section 2.3 of the SWIA (Appendix J) discusses the existing flood potential within the DCQ as shown in Figure 2.2 of Appendix J, and the excerpt (Plate 5) below. The modelling indicates that flooding is generally confined to the main channel of Deep Creek, with only a small out of bank floodplain about 100 m wide. The quarry, stockpile area, and infrastructure area are all located outside of the modelling 1% Annual Exceedance Probability (AEP) flood extent which represents the 1 in 100 year flood scenario.

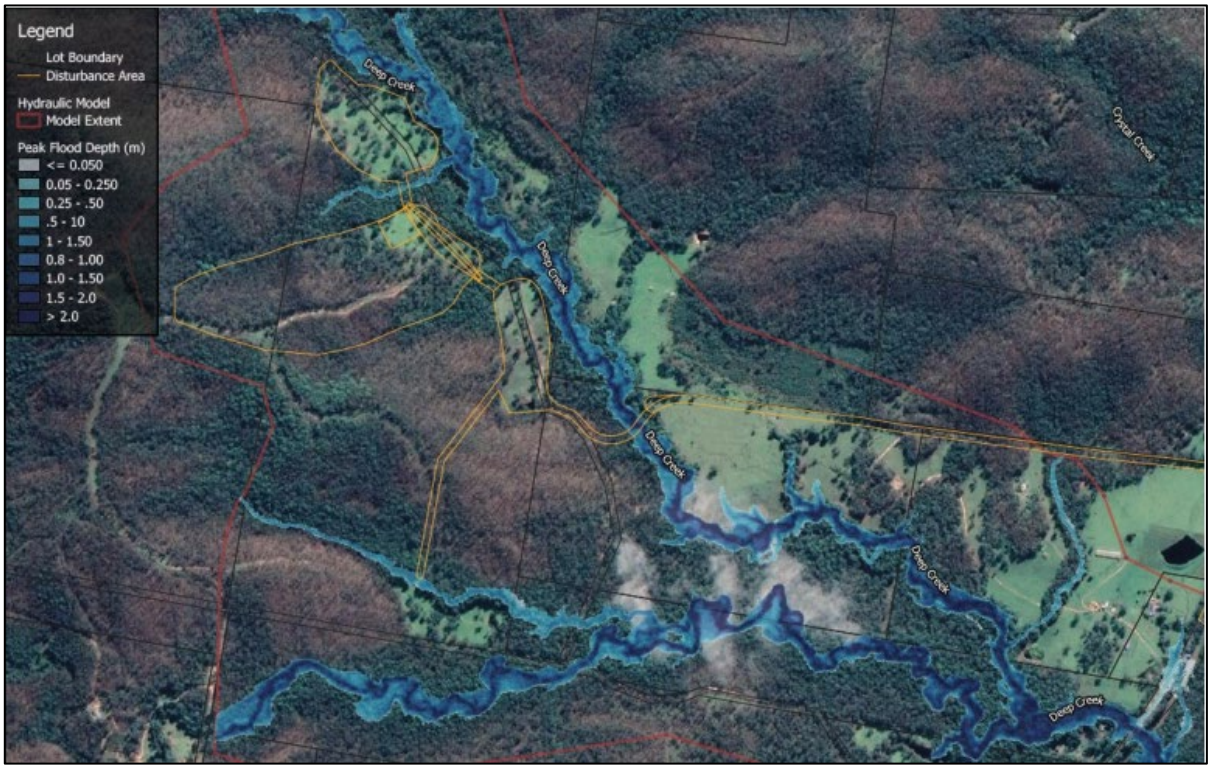


Plate 5: Current Modelled Maximum Flood Depths, 1% AEP (Engeny, 2021).

DCQ Construction

The proposed DCQ has the potential to influence flooding and watercourse stability in Deep Creek as a result of:

- Changes to local catchment areas associated with:
  - Diversion drains
  - Loss of catchment to the quarry pit
- Concentration of flows within bridges and culverts associated with the access road.

The flood risks (to DCQ operations) and impacts to the surrounding flood behaviours were assessed by the SWIA through updating the base flood model (see Plate 5 and Appendix J) to include:

- The “maximum” quarry footprint – to estimate the maximum potential flood risk associated with quarry operations
- Final landform – to assess the long-term flood impacts as a result of the proposed DCQ.

For full results, see the DCQ SWIA (Appendix J), however in summary the updated modelling of flood risk indicates:

- For more frequent events (i.e. the 50% and 10% AEP events), the proposed DCQ crossing of Deep Creek is expected to locally increase flow velocities and depths. This is due to the concentration of flow required to drive the modelled flows through the proposed culvert
- For larger events (i.e. the 1% AEP and the PMF), the proposed DCQ crossing of Deep Creek is expected to locally reduce flow velocities, with continued increases in depths. This is due to the routing effects of the access track, temporarily storing excess stormwater prior to overtopping the road or discharging through the proposed culvert. It is noted that the increased depths are limited to the vicinity of the proposed crossing, with modelled depths downstream of the proposed crossing point expected to decrease.

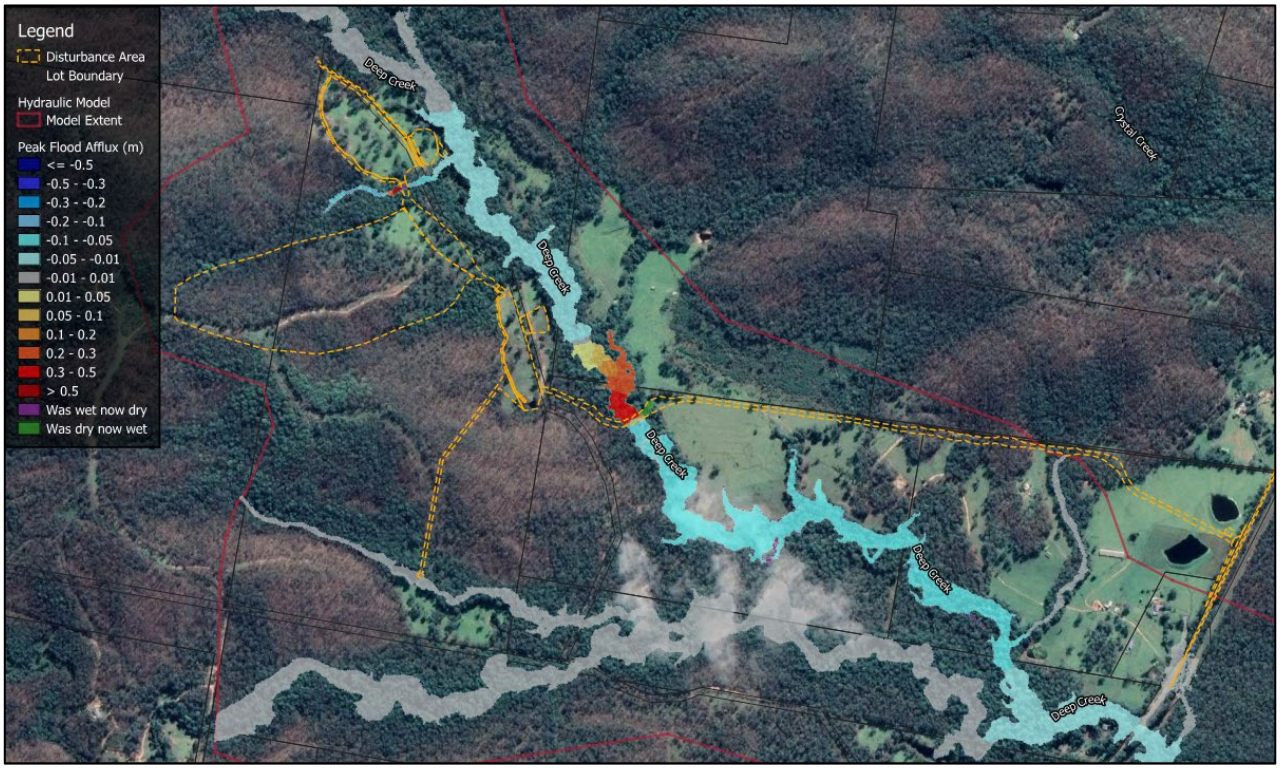


Plate 6: Modelled Maximum Flood Depths Post Construction of the DCQ, 1% AEP

Climate Change

The potential impacts of climate change on flooding within Deep Creek have been assessed by the SWIA (Appendix J) using the 1-in-200 year and 1-in-500-year AEP events. These events are used as representative proxies for potential future changes to the 1% AEP event, in response to increased storm intensities due to climate change.

Climate change modelling indicates that differences in the maximum modelled flood extents for the 1% and 1-in-500-year AEP events largely occur downstream of the proposed cross point, within a section of the creek which broadens to include a small floodplain, as shown in Figure 5.2 of the SWIA (see Appendix J and Plate 7). Elsewhere, the well-defined channel geometry and limited overbank (floodplain) area associated with Deep Creek within the assessment area limits the modelled increase in flood extent.

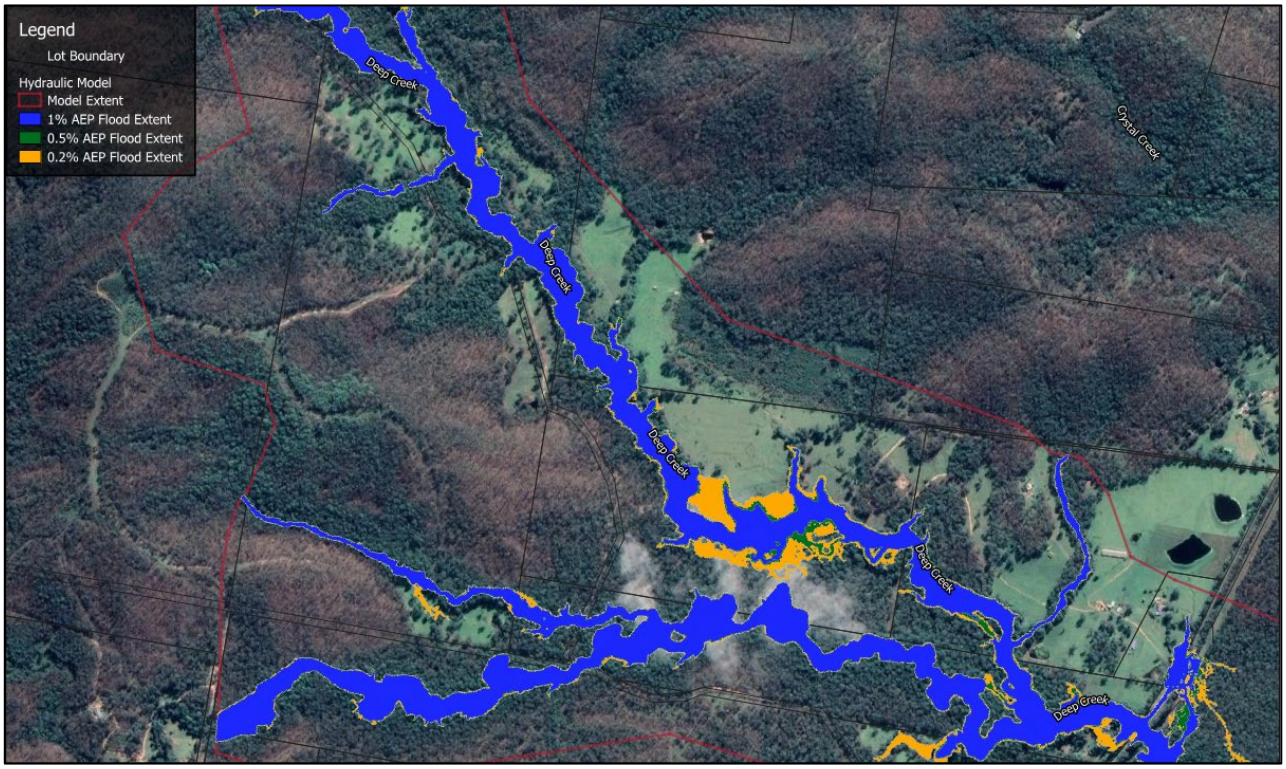


Plate 7: Modelled Maximum Flood Extents under 1-in-200 year and 1-in-500-year AEP Flood Events, Modelled to Reflect Potential Climate Change

Flood Planning Information

Flood Prone Land is defined by the *NSW Floodplain Development Manual* (2005), as "*Land susceptible to flooding by the PMF event. Flood prone land is synonymous with flood liable land*". The assessment indicates that there are regions within the proposed operational areas that are located within Flood Prone Land for Deep Creek. Modelled elevations for the peak flood levels during the PMF event are estimated to be in the order of:

- 32.8 m AHD in Deep Creek adjacent to the proposed quarry pit
- 29.5 m AHD in Deep Creek adjacent to the proposed infrastructure area
- 33.7 m AHD in Deep Creek adjacent to the proposed stockpile area.

The assessment also indicates that the proposed quarry will have negligible impact on flood flows or extents during the PMF and as such is not expected to impact on the extent of flood prone land in the wider Deep Creek catchment.

7.11.3 EPA Searches

POEO Public Register

A search of the NSW EPA Protection of the Environment Operations (POEO) public register (under section 308 of POEO ACT) was undertaken in May 2021. The search indicated no environmental protection licences, applications, notices, audits or pollution studies listed for the DCQ or any property located in the immediate vicinity of the DCQ (NSW EPA, 2021). Furthermore, the Subject Land was found not to be regulated by the EPA.

EPA Contaminated Site Register

A search of the NSW EPA online record of contaminated sites was undertaken in May 2021. This record provides a list of written notices issued by the EPA under the CLM Act in relation to the investigation or remediation of site contamination that presents a significant risk of harm to human health or the environment.

No records were listed on the NSW EPA online register for the Subject Land.

7.11.4 Acid Sulfate Soils

Review of the *Great Lake Local Environmental Plan 2014* the NSW Government ePlanning Portal (DPIE, 2021) has determined that the DCQ is not mapped with lands for potential occurrence of acid sulfate soils (ASS).

7.11.5 Coastal Management

Review of the NSW Government *State Environmental Planning Policy (Coastal Management) 2018 Online Mapping System* in May 2021 determined that the proposed DCQ is not located in a coastal zone and is therefore not subject to the provisions of the *State Environmental Planning Policy (Coastal Management) 2018* beyond potential impacts on downstream water quality.

The SWIA (see Appendix J) provides hydrological modelling of surface water flows pre and post construction of the DCQ. In addition, Section 3 of the SWIA provides a Water Management System (WMS) to provide a summary of actions to be undertaken during the construction and operation of the DCQ to prevent adverse impacts to downstream water quality and to in-stream flow dynamics. The implementation of the WMS and water quality controls (see Section 7.4.5) will prevent adverse impacts from the DCQ upon lands mapped within a coastal zone under the *State Environmental Planning Policy (Coastal Management) 2018*.

7.11.6 Blasting

As currently proposed, each blast event at the DCQ will include a 9000 kg blast producing approximately 11,600 m^3 / 30,600 tonnes of product. This quantity estimate would equate to approximately 16 blasts per year to produce a total 500,000 tonnes, it is possible that smaller blasts may be required depending on the conditions and target resource of the blast and therefore it is anticipated that up to 25 blasts per year could be performed.

Licenced contractors will be utilised for blasting events, bringing explosives used for blasting to sit for each event. As such, explosives will not be stored at the DCQ.

Blasting at the DCQ will be restricted to between the hours of 9am to 4pm Monday to Friday. Blasting will not occur on Saturdays, Sundays or on Public Holidays. Noise associated impacts from blasting are discussed previously in this EIS under Section 7.2.3.

Land Instability

The proposed DCQ is not mapped to occur in an area at risk of mine subsidence, nor is the DCQ mapped in an area of landslide risk under the NSW Government ePlanning Portal (DPIE, 2021).

As such, blasting occurring at the DCQ is not expected to result in unacceptable risk to life and / or property following the application controls listed under Section 7.11.9.

Sensitive Receivers

Potential noise impacts from blasting have been discussed in this EIS in 7.2.3, with sensitive receivers assessed under the Noise and Vibration Impact Assessment (NVIA) available in Appendix Q.

As stated under Section 5.5 of the NVIA (see Appendix Q), blast vibration and overpressure levels will be significantly below the 5% exceedance criteria published under the Australian and New Zealand Environment and Conservation Council (ANZECC) document *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration – September 1990* at assessed residential receivers. It is noted that maximum of 5% of blasts per year can exceed these criteria and still achieve compliance.

Public Road Operation

The proposed DCQ pit shell is located more than 1.5 km from The Bucketts Way. As such, it is not expected that the proposed DCQ will disrupt traffic flow along The Bucketts Way during blasting events.

Portions of Deep Creek Road may require temporary closure using road barriers and blast guards during blasting events.

Public and Personnel Safety

Blasting at the DCQ will occur up to 25 times per year. The proposed DCQ property boundary will fenced to prevent accidental or intentional access by members of the public, providing an element of separation distance that will require ongoing management to prevent adverse accidental impacts (via notification, spotters – see Section 7.11.13). In addition, the closest dwelling (R18) is located approximately 1,020 m from the DCQ pit shell (See Figure 2) and is therefore highly unlikely to be impacted by fly-rock fragments.

Strict management guidelines provided via a Blast Management Plan will need to be followed to ensure nearby residents and site personnel are aware of blasting dates and times, including implementation of a no-go zone during blasting to prevent accidental injury from fly-rock fragments.

7.11.7 Road Safety

Construction of the proposed DCQ includes the construction of a new intersection between the proposed DCQ access road and The Bucketts Way. In addition, primary heavy vehicle access and egress will occur southbound along The Bucketts Way, which requires vehicles to merge onto the Pacific Highway. As such, Greg Baird and Associates Pty Ltd (GB&A) were engaged to prepare a Road Safety Audit (RSA) for the proposed DCQ intersection with The Bucketts Way and the intersection between The Bucketts Way and the Pacific Highway.

The RSA (Appendix K) provides an estimate of the two way traffic forecast for The Bucketts Way and the Pacific Highway intersection, used to determine whether the intersection (noted as being upgraded with the addition of a channelized left-turn lane on the Pacific Highway during the preparation of the RSA) in its current layout would be sufficient to cater for potential increased heavy vehicles resultant of the construction and operation of the DCQ. Table 7-33 outlines calculated peak 2020 and 2030 traffic volumes based upon vehicle counts undertaken on 21 February 2019. The existing heavy vehicle traffic is approximately 8% on The Bucketts Way and up to 13% on the Pacific Highway.

Table 7-33: Calculated Vehicular Traffic Per Hour along the Pacific Highway (GB&A, 2021).

Road	Section	2020 AM Peak vtph*	2020 PM Peak vtph*	2030 AM Peak vtph*	2030 PM Peak vtph*
Pacific Highway	East of The Bucketts Way	1254	1450	1529	1820
Pacific Highway	West of The Bucketts Way	1450	1790	1768	2182
The Bucketts Way	North of the Pacific Highway	264	423	322	423

*vtph = vehicular traffic per hour

Vehicular Crash data, sourced via the NSW Centre for Road Safety *Crash and casualty statistics maps* (2015-2019) and published under the RSA (GB&A) (Attachment E of Appendix K) within the vicinity of the DCQ are listed in Table 7-34.

Table 7-34: NSW Centre for Road Safety Crash and Casualty Statistics (2015-2019)

Location	No. of Serious Crashes	No. of Moderate Crashes	No. of Minor Crashes	Notes
Pacific Highway / The Bucketts Way Intersection	5	1	2	No fatalities.
Between Deep Creek and the proposed DCQ intersection	-	1	-	Summary – off road to left, hit object, in darkness.
Between Deep Creek and Deep Creek Rd	-	-	-	One 'Non-casualty' crash – off road to right, hit object, in daylight.

Utilising the above data, in conjunction with site inspections at daytime and night-time on the 6 April 2021, GB&A prepared a summary of potential road safety risks that require contemplation during the preparation of this EIS and the final DCQ design. Table provides the risk rating determination utilised in the RSA, with Table providing and outline of risk categories and Table providing a summary of the results of the RSA (GB&A, 2021). For the full results of the RSA please see Appendix K.

Table 7-35: Risk Determination under the RSA (GB&A, 2021)

Severity Probability	Minor or property damage A person who suffers no injury or only requires minor first aid treatment.	Moderate A person who attends an emergency department on the same day or on the day after a crash but was not killed or subsequently admitted to hospital.	Serious A person who is admitted to hospital on the same day or the day after a crash and did not die within 30 days of the crash.	Fatal A person who dies within 30 days from injuries received in a road traffic crash.
Weekly Is expected to occur in most circumstances.	**Medium**	**High**	**Extreme**	**Extreme**
Monthly Will probably occur.	**Medium**	**Medium**	**High**	**Extreme**
6 Monthly Might occur at some time.	**Low**	**Medium**	**High**	**Extreme**
Yearly Might occur but doubtful.	**Negligible**	**Low**	**Medium**	**High**
Every 5 years or less May occur but only in exceptional circumstances.	**Negligible**	**Negligible**	**Medium**	**High**

Table 7-36: Risk Ratings under the RSA (GB&A, 2021)

Risk Rating	Level of Prioritisation
Extreme	Should be corrected immediately
High	Should be corrected in the very near future, even if costs are high. Temporary mitigation measures should be considered until final correction action taken.
Medium	Should be corrected in the near future, even if costs are moderate. Any delay to correction should be justified. Temporary mitigation measures should be considered until final correction action taken.
Low	Should be corrected at a suitable time if cost is low.
Negligible	Should be corrected at a suitable time if cost is low.

Table 7-37: Summary of Results under the RSA (GB&A, 2021)

Ref No.	Description of risk to road safety (Reason why this is a safety issue)	Road Safety Audit Category	Probability	Severity	Risk Rating
1 – Length of southbound right-turn lane	The signposted speed zone for the southbound highway lanes is 100 km/h. The existing southbound right turn lane to The Bucketts Way is approx. 110 m long (including taper). The required length for comfortable deceleration for a 100 km/h speed zone, including taper, is 155 m. The existing length provides for the maximum 3.5 m/s^2 deceleration length for 100 km/h or comfortable 2.5 m/s^2 deceleration length for 80 km/h. There is a risk that a vehicle entering the right turn lane at 100 km/h may not have sufficient length to decelerate to zero, causing them to overshoot into the northbound fast lane. This may increase the risk of head-on and side-swipe crashes.	Auxiliary Lanes	Every 5 years or less	Serious	Medium
2 – Lack of left-turn acceleration	No left-turn acceleration lane is provided for heavy vehicles turning left from The Bucketts Way onto the Pacific Highway. Austroads[1] indicates that a laden semi-trailer would require 800 m on a level grade to reach 80 km/h (20 km/h below the posted speed). There is an increased likelihood that a northbound Pacific Highway vehicle, travelling at 100 km/h, would encounter a slow-moving heavy vehicle. The speed differential may not be apparent at a distance, especially in adverse weather or darkness. This may increase the risk of rear-end or sideswipe crashes.	Auxiliary Lanes	Yearly	Serious	Medium

3 – Lack of hold line	There is no hold line for the southbound highway right turn lane into The Bucketts Way to provide guidance on where to stop. Linemarking at the seagull island is faded. Insufficient delineation may lead to a stopped vehicle overhanging into the right-turn lane from The Bucketts Way or into the northbound highway fast lane. This would increase the risk of sideswipe and T-bone crashes.	Delineation	Every 5 years or less	Serious	Medium
4 – Delineation at Limeburners Creek Bridge	Lime Burners Creek Bridge is approximately 6.5 km north of the Pacific Highway / The Bucketts Way intersection, mid-way between the highway and the proposed quarry access. It is a short bridge with a deck about 30 m long. Lane widths are narrowed slightly due to the kerbing at the base of the bridge rail. There are no shoulders. Approaching the bridge from the south, The Bucketts way is relatively straight, and signage indicates a narrow bridge. Approaching from the north, the bridge is on a left-hand curve, with approach sight partially obscured by vegetation. As well as a "Narrow Bridge" sign, a "Reduce Speed" and "No Passing on Bridge" sign provide additional warning. However, on the day and night of the audit, the Width marker signs were observed to be rotated and not visible in the direction of travel. As well, no reflectors were observed delineating the older style bridge railing. Insufficient delineation reduces the visibility of the bridge and railing and may increase the risk of run-off-road crashes colliding with the older style bridge railing.	Delineation	Yearly	Serious	Medium
5 -Note 1 – Safe Intersection Sight Distance	The Austroads[2] guidelines recommend a Safe Intersection Sight Distance (SISD) of about 220 m for a 2.0 second reaction time and design speed of 90 km/h on a downgrade. As shown in Figures 5-1 and 5-2 of RSA (Attachment E of Appendix K), by field inspection, the available SISD to and from the north appears to be about 195 m, suitable for a travel speed of about 85 km/h. However, the proposed intersection layout includes a CHR(S) right turn lane for vehicles waiting to enter the quarry access and a southbound acceleration lane for vehicles turning right to exit the quarry access. Refer to Figure 5-3 of RSA (Attachment E of Appendix K). The right turn and acceleration lane remove potential conflict between southbound through traffic and traffic entering or leaving the proposed quarry access. Double barrier lines prohibit overtaking in the southbound approach to the proposed intersection. Sight distance to and from the south of the proposed quarry access is satisfactory.	Road alignment and cross section	Note		

	The proposed intersection layout includes a CHR(S) right turn lane and a southbound acceleration lane for vehicles turning right from the quarry access.		
7 - Note 3 – Incomplete painting and linemarking	At the time of the audit the new central island in The Bucketts Way was not painted or delineated. Some edge lines on The Bucketts Way were also yet to be completed.	Delineation	Note
8 – Note 4 – Culvert	An existing two cell pipe culvert crosses under The Bucketts Way, in the area requiring widening for the acceleration lane. While not directly affected by construction, the existing western side headwall is within the clear zone and opposite the proposed merge. Once the final merge geometry and headwall locations are determined, both headwalls should be assessed to determine whether safety barrier protection is required.	Roadside hazards	Note

7.11.8 Bushfire

This section provides an assessment of the bushfire risk to and from the proposed project.

The proposed DCQ is located within a wide gully between two forested ridgelines, generally grading downslope towards Deep Creek and Deep Creek Road to the northeast.

Bush Fire Prone Land

The NSW Government ePlanning Portal (DPIE, 2021) maps the proposed DCQ as occurring on lands mapped as 'Vegetation Category 1' and 'Vegetation Buffer'.

Bushfire Threat to Plant and Structures

The principal bushfire planning document in NSW, prepared by the NSW Rural Fire Service (RFS) and legislated under the EP&A Act, Planning for Bush Fire Protection 2019 (PBP, 2019), has been referenced as part of the determination of bushfire threat to the proposed DCQ. As stated under Chapter 2.4.2 of PBP 2019, SSD applications are not subject to Section 4.14 of the EP&A Act and, as such, do not inherently require assessment under PBP 2019, however the requirements of PBP 2019 should still be applied in order to achieve compliance with bushfire design principles in NSW.

The proposed DCQ does not constitute residential infill development, residential subdivision development or special fire protection purpose (SFPP) development under PBP 2019. As such, the proposed DCQ will be assessed consistent with Chapter 8 – Other Development under PBP 2019.

Compliance with Chapter 8 of PBP 2019 requires developments to be designed in accordance with the aims and objectives of PBP 2019. The aim of PBP 2019 is to "provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment". The objectives of PBP 2019 are as follows:

- Afford buildings and their occupants protection from exposure to a bush fire
- Provide for a defendable space to be located around buildings

- Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings
- Ensure that appropriate operational access and egress for emergency service personnel and occupants is available
- Provide for ongoing management and maintenance of Bushfire Protection Measures (BPMs)
- Ensure that utility services are adequate to meet the needs of firefighters (NSW RFS, 2019).

The Mid Coast LGA is located within the NSW RFS North Coast Fire Weather District and has a Forest Fire Danger Index (FFDI) of 80 (NSW RFS, 2017).

Appendix 1 Site Assessment Methodology of PBP 2019 models vegetation fuel load based upon vegetation formations as outlined under the publication Ocean Shores to Desert Dunes (Keith, 2004). Vegetation classes determined under the DCQ BDAR (see Appendix L) and their respective fuel loads under PBP 2019 are shown in Table .

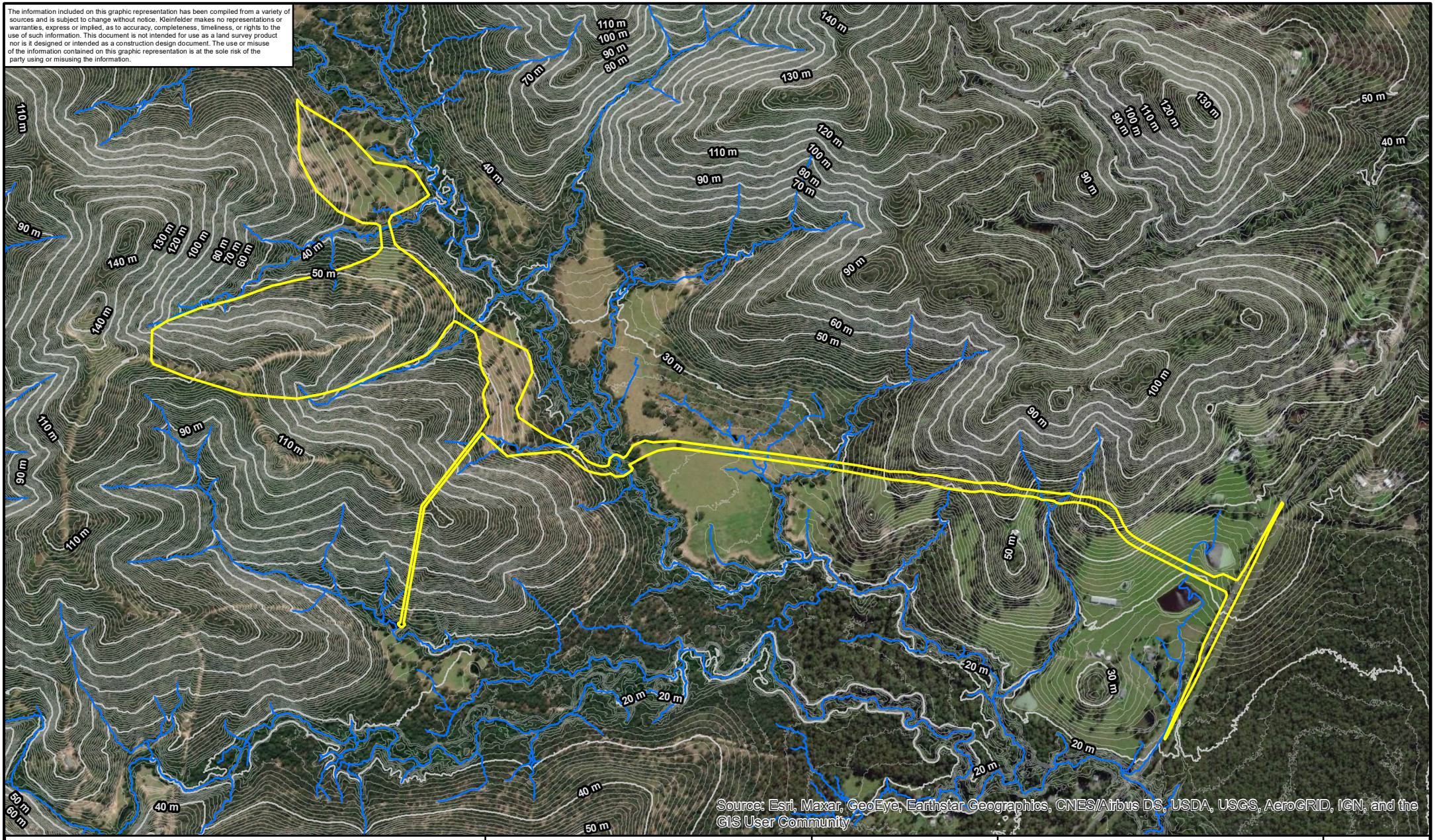
Table 7-38: Vegetation Fuel Load at the DCQ under PBP 2019

Vegetation Zone (DCQ BDAR)	PCT (DCQ BDAR)	Vegetation Class (DCQ BDAR / Keith, 2004)	Surface and Elevated Fuel Load (t/ha) (PBP 2019)	Overall Fuel Load Including Bark and Canopy (t/ha) (PBP 2019)
1	1590	Hunter – Macleay Dry Sclerophyll Forests	22	36.1
2	1590	Hunter – Macleay Dry Sclerophyll Forests	22	36.1
3	1590	Hunter – Macleay Dry Sclerophyll Forests	22	36.1
4	1590	Hunter – Macleay Dry Sclerophyll Forests	22	36.1
5	1619	Sydney Coastal Dry Sclerophyll Forests	22	36.1
6	1619	Sydney Coastal Dry Sclerophyll Forests	22	36.1
7	1619	Sydney Coastal Dry Sclerophyll Forests	22	36.1
8	1567	North Coast Wet Sclerophyll Forests	22	36.1
9	1556	North Coast Wet Sclerophyll Forests	22	36.1
-	Non-Native: Exotic Grassland	-	6 (as per Native Grassland fuel loads)	6 (as per Native Grassland fuel loads
-	Dams (no Wetland Vegetation)	-	-	-
-	Excluded (Tracks and Cleared Areas)	-	-	-

The predominant vegetation types as per Table 7-38 above and PBP 2019 are Forest and Grassland.

Topography within the locality of the proposed DCQ is illustrated in Figure 17 below. In summary, the proposed DCQ intersects slopes of several different grades, which include:

- Main stockpile area: upslope of >10˚ degrees to the west, with downslope of 0-5 degrees to the east
- Office and Weighbridge Area: upslope of 5-10˚ to the southwest and downslope of 5-10˚ to the northeast.



Legend

- Project Boundary
- DEM Derived Creek Lines
- 1m Contours
- 10m Contours

Metres
0 50 100 200 300 400 500

N

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PROJECT REFERENCE: 20203112
DATE DRAWN: 2021/10/21 16:10 Version 1
DRAWN BY: GJoyce
DATA SOURCE:
Commonwealth of Australia (Geoscience Australia) - 2020

Site Topography (ELVIS 2020)

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek, NSW

FIGURE:
17

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Categories of Bushfire Attack Level (BAL) covered under PBP 2019 are summarised in Table 7-39 below. Generally, compliance with the aim and objectives of PBP is satisfied by developments that can meet BAL 29 or lower by habitable buildings within the development footprint.

Table 7-39: BAL levels under PBP 2019

Heat flux exposure (kW/m²)	Description	AS 3959 - 2018 construction level
NA	Minimal attack from radiant heat and flame due to the distance of the building from the vegetation, although some attack by burning debris is possible. There is insufficient threat to warrant specific construction requirements.	BAL Low
≤12.5	Attack by burning debris is significant with radiant heat (not greater than 12.5kW/m²). Radiant heat is unlikely to threaten building elements (such as unscreened glass). Specific construction requirements for ember protection and accumulation of debris are warranted.	BAL 12.5
>12.5 ≤19	Attack by burning debris is significant with radiant heat flux (not greater than 19kW/m²) threatening some building elements (such as screened glass). Specific construction requirements for embers and radiant heat are warranted.	BAL 19
>19 ≤29	Attack by burning debris is significant and radiant heat flux (not greater than 29kW/m²) threatens building integrity. Specific construction requirements for ember and higher levels of radiant heat are warranted. Some flame contact is possible.	BAL 29
>29 ≤40	Radiant heat flux and potential flame contact could threaten building integrity.	BAL 40
>40	Significant radiant heat and significantly higher likelihood of flame contact from the fire front will threaten building integrity and result in significant risk to residents.	BAL FZ

Required separation distances between classified vegetation and DCQ structures to meet each of the aforementioned BALs (see

Table 7-39), known as Asset Protection Zones (APZs), are listed in Table 7-40 below.

Table 7-40: Separation Required for Different BALs under PBP 2019 with an FFDI of 80.

Vegetation Formation	Bushfire Attack Level (BAL)				
	BAL FZ	BAL 40	BAL 29	BAL 19	BAL 12.5
	Separation distance (m)				
Forest	< 15	15 - < 20	20 - < 29	29 - < 40	40 - < 100
Grassland	< 7	7 - < 10	10 - < 14	14 - < 20	20 - < 50

With reference to Table 7-40 the proposed DCQ design includes the provision of the following APZs (upon final landform):

- Office building:
  - 15 m east to pasture grass, 20m to edge of project footprint (forest)
  - 50m north to pasture grass
  - 23m west to pasture grass, 55m to edge of project footprint (forest)

- 33m south to pasture grass, 78m to edge of project footprint (forest).

- Workshop:
  - 12m east to pasture grass, 85m to edge of project footprint (forest)
  - 40m north to pasture grass, 62m to edge of project footprint (forest)
  - 8m west to pasture grass, 16m to edge of project footprint (forest)
  - Borders pasture grass to the south, with forest vegetation 18m southwest.

In light of the above APZs, management of all pasture grasses surrounding the office and workshop compound area to the standard outlined under Appendix 4 of PBP 2019 will result in the proposed office meeting BAL 29 and the proposed workshop meeting BAL 40. As the workshop and office are non-habitable buildings, these APZs are considered sufficient to meet the PBP 2019 objective to "*provide for a defendable space to be located around buildings*." All APZs will be captured in the existing development footprint and will not require vegetation modification works beyond the site boundary referenced under this EIS.

It should be noted that under Chapter 8.3.6 of PBP 2019, mining (underground and open cut) and petroleum production requires a minimum 10m APZ from provided any infrastructure associated with mining and petroleum production. Although the DCQ is a hard rock quarry and not a mine, the nature of the industry in relation to bushfire threat is considered to be commensurate and, as such, the implementation of a 10 m APZ may be considered to be adequate for the DCQ. This 10 m APZ has been met under the current proposal.

Water supply at the DCQ will be sourced from rainwater, onsite dams, surface water runoff, groundwater seepage and imported water as needed.

In accordance with Table 5.3d of PBP 2019, the proposed DCQ will include a 20,000 L static water supply for firefighting purposes. This water tank will be filled from an onsite water source. The water tank(s) will be fitted with a 65mm Storz outlet with ball valve to allow for use by firefighting personnel if required. Small tanks at the office and workshop will initially be filled from an offsite water source and will be maintained through rainfall with potable water additions as required.

Maintenance of a static water supply demonstrates the quarry's compliance with the PBP 2019 objective to "ensure that utility services are adequate to meet the needs of firefighters."

Power supply to the DCQ will be sourced from diesel generators or solar. In addition, a telecommunications line will run adjacent to the access road.

Where utilised, bottled gas will be installed and maintained in accordance with AS/NZS 1596:2014, with valves / outlets facing away from the predominant bushfire threat, site office and workshop area (where applicable). Connection to gas cylinders will be metal. Any gas cylinders will be stored more than 10m from any bushfire hazard.

Hazardous substances will be stored with valves / outlets facing away from the predominant bushfire threat, site office and workshop area (where applicable). Connection to gas cylinders will be metal. Any hazardous material storage will occur more than will be stored more than 10m from any bushfire hazard and more than 10m from the proposed workshop and site office. Hazardous materials will be stored in accordance with AS 2187.1-1998 Explosives-Storage, transport and use – storage.

Construction of the DCQ includes the installation of an approximately 1.8 km long, 8 m wide internal access road. The provision of an 8m wide access road will allow for simultaneous access / egress by site workers and emergency personnel and complies with Chapter A3.9.1 of PBP 2019.

The proposed DCQ access road verges will be designated 'no stopping' zones to maintain a clear thoroughfare. A minimum 4 m vertical clearance will be maintained on DCQ internal roads to allow for tanker access in the event of an emergency.

In the event of an emergency, Deep Creek Rd (public road) will provide a secondary emergency egress from the DCQ for site personnel.

7.11.9 State Environmental Planning Policy No 33

The hazardous substances and dangerous goods required for the DCQ include hydrocarbons, such as fuels (diesel), oils and greases.

Diesel

The quarry may include the provisions of a 5,000 L fuel tank for diesel onsite as a back-up for onsite machinery. This tank would be a self-bunded unit and stored upon an impermeable surface within a bunded refueling pad. Diesel fuel will be delivered to site machinery by a private contractor daily.

Diesel will be transported, stored, handled and managed in accordance with regulations and industry standards. Fuel tankers, where utilised, will be parked in a temporary bunded area on an impermeable surface while re-fueling rubber tyred machines such as dumpers and loaders, and spills in the collection area will be contained and managed in accordance with emergency response procedures. Tracked gear such as crushers, screens, conveyors, excavators and dozers will be fuelled in their work area and if a spill occurs it will be managed with a spill kit in accordance with emergency response procedures. Any incidental contamination will be classified and disposed of in accordance with waste legislation.

Oils and Greases

Small quantities of hydrocarbons, typically oils and greases for maintaining plant and equipment will be stored onsite at the DCQ. These will be stored in a bunded area, installed in accordance with relevant Australian Standards. Recovered oil and grease material will then be collected for removal by a licensed recycling contractor.

Oils and greases will not be stored within the same bund as other flammable liquids, and as such would not be subject to the SEPP 33 screening thresholds. As a result, the storage of these materials is not considered potentially hazardous in terms of SEPP 33.

Screening Assessment

See Appendix X for a screening assessment of the proposed DCQ against the NSW *State Environmental Planning Policy No 33—Hazardous and Offensive Development* (SEPP 33). The screening assessment determined that operations at the DCQ are not considered potentially hazardous.

7.11.10 Site Safety

Construction and operation of the DCQ will present risks to workers and contractors and with the potential to result in injury or fatality if workers are ill informed of the hazards involved, or risks associated with plant and machinery are not managed. Examples of potential activities that may result in an injury and / or fatality at the DCQ include:

- Crush injuries by moving plant and equipment
- Motor accidents or crush by heavy vehicles
- Exposure to hazardous materials and airborne particles
- Exposure to loud noise during blasting and quarrying activities
- Exposure to flyrock during blasting and incidental possible rock projectiles during quarrying works
- Exposure to heat and cold, with associated heat exhaustion or hypothermia
- Working from heights or close to the edge of quarry benches and site batters
- Working within confined spaces, if required.

The above risks will be controlled through the implementation of controls listed in Table 7-41. Following the implementation of workplace health and safety protocols, the potential for injuries or fatalities to workers, contractors or visitors to the DCQ will be minimised.

7.11.11 Public Safety

The proposed DCQ does present inherent risks to the public, primarily through the following mechanism:

- Increase of traffic along the Bucketts Way
- Flyrock and noise from blasting
- Unauthorised access to the DCQ by members of the public. This would expose members of the public to the same risks encountered by site personnel, however members of the public would not have undergone the DCQ induction, are unlikely to be dressed appropriately, are unlikely to understand the risks they are exposing themselves to, and will not know the appropriate communication process with regards to exclusion zones and hazard reporting.

The above risks will be controlled through the implementation of controls listed in Table 7-41. The effectiveness of these controls will be continuously monitored and improved as required to minimise any potential adverse impacts of the DCQ upon members of the public.

7.11.12 Dam Safety

Dams Safety NSW were consulted during the preparation of the EIS as required by the SEARs (see Section 4.3), however no response had been received at the time of writing. Nonetheless, assuming dams are designed by suitably qualified engineers, the risk of failure of dams constructed for the quarry is considered negligible. The largest of the dams is 15ML (as described in the SWIA, Appendix J and Section 7.4) and is excavated into the floor of the quarry with only a minor above ground dam wall that will have limited potential for failure.

The two sediment dams are designed with an above ground dam wall expected to be less than 5m high. These dams are expected to hold less than 10ML in combination and would be pumped down through a controlled discharge following storm events. However, in the event of total dam failure, the volume of water entering Deep Creek will be only constitute a small proportion of flows in Deep Creek during a 5% AEP flood event (or less than the modelled rainfall event for the catchment). Considering flood modelling (Appendix J) identified no significant impacts on downstream properties or dwellings, failure of these dams is unlikely to present any additional risk or hazard to persons downstream.

7.11.13 Mitigation and Management Measures

Management and mitigation measures outlined in Table 7-41 will be applied during the construction, operation and decommissioning of the DCQ.

Table 7-41: Mitigation Measures for the DCQ – Site Hazards

Parameter	Management Controls
Flood Management	• Adoption of surface water mitigation measures stated in Section 7.4.5 • A Soil and Water Management Plan (SWMP) will be prepared for the proposed DCQ to support the CEMP. The SWMP will be implemented throughout the duration of construction

Parameter	Management Controls

Hydrocarbon Management	• A Pollution Incident Response Plan (PIRMP) will be prepared prior to construction. The PIRMP will be prepared in accordance with NSW EPA Guidelines
	• A chemical inventory, updated daily, will be clearly displayed onsite including all Safety Data Sheets (SDS), which must be no older than 5 years
	• All vehicles and machinery should be turned off when not in use
	• If obvious signs of contamination such as discoloured or odorous soils are encountered during site set-up and extraction, work will stop in the vicinity of the area and, if safe to do so, samples will be taken for analysis
	• Daily equipment pre-start inspections will be undertaken by site personnel. These are designed to identify faulty equipment and potential oil leakages
	• A fully bunded and undercover hardstand for fuel, hydrocarbon and chemical storage will be constructed within the office and weighbridge area, located more than 40 m from any drainage lines
	• Personnel to be trained in spill containment and response procedures
	• Spill response kits will be kept and maintained onsite
	• The processing plant area installed on site will include:
	  ○ A bunded parking area for the overnight parking of site machinery
	  ○ If power via electrical mains supply is unavailable, diesel generators will be required. If used, diesel generators will:
	  ▪ Be located within a bunded area
	  ▪ Include an internal double skinned and self bunded diesel storage tank
	  ▪ Be refuelled as required within the bunded refill area
	  ▪ Be returned to the Office and Weighbridge area on conclusion of operations each Saturday. This is proposed in the context of reducing the risk of vandalism over the weekend, and limiting risks (e.g. electrical and diesel) associated with the daily transport of the generator to and from processing plant area.
	• Mobile equipment installed on site will:
	  ○ Be refuelled at a lined and bunded refuelling area
	  ○ Include spill control kits
	  ○ Operators trained in the use and maintenance of spill control kits
	  ○ Return of mobile rubber tyred equipment where practical at end of each day to the Office and Weighbridge area.
	• Refuelling of rubber tyred equipment will be undertaken over a bunded concrete pad by a registered contractor
	• Oils and grease will be stored in a bunded area located more than 40 m from drainage lines
	• Any hydrocarbon spills on site will include the following response:
	  ○ Immediate deployment of spill control kits
	  ○ Notifications of relevant stakeholders (e.g. EPA and Mid Coast Council) consistent with the Pollution Incident Response Management Plan (PIRMP) for any spills estimated to be greater than 30 L
	  ○ Recovery of all contaminated material regardless of size for collection and offsite disposal at a licenced waste facility.

Parameter	Management Controls
Hazardous Waste	• No onsite disposal of waste will occur • Scrap metal will be deposited into a dedicated receptacle for periodic collection and recycling • Diesel fuel will be stored within self-bunded above ground tank and all refuelling of rubber tyred machines will be undertaken on a bunded and covered hardstand area • During excavation any foreign materials encountered will signal an immediate stop work in the proximate area until the nature of the object/s can be determined. In the case of uncovered potential asbestos sheeting or pipe laboratory testing may be required to determine if asbestos fibres are present in the surrounding soil • All wastes generated by the DCQ will be managed by the way of Council collection services or via appropriately licensed waste contractors • All waste oil will be collected and stored in containers within a covered and bunded area, and will be removed from the site by an appropriately licensed contractor with all relevant waste tracking documentation completed • All oil filters will be separately stored in containers with a covered bunded area, and will be removed from the site by an appropriately licensed contractor with all relevant waste tracking documentation completed • Sediment / soil will be periodically removed from the various silt control structures and used in progressive rehabilitation of the site • All office paper and general waste originating from the office and amenities building from routine equipment and vehicle maintenance consumables will be placed in appropriate containers for collection by council or a licensed contractor for disposal/ recycling at an appropriate waste management facility • Good housekeeping practices and routine inspection/maintenance will be undertaken of all non-public roads, site infrastructure and silt fencing. Damaged infrastructure including sediment control structures will be replaced as required • Wastewater from the amenities and workshop will be collected in a pump-out system and transported off-site by a licensed contractor • Install sediment controls downslope of the disturbance area (in accordance with guidelines such as Landcom (2004) • Any potential asbestos containing materials will be disposed of to a licenced facility using appropriate handling and disposal techniques • Hazardous substances will be stored with valves / outlets facing away from the predominant bushfire threat, site office and workshop area (where applicable). Connection to gas cylinders will be metal. Any hazardous material storage will occur more than will be stored more than 10m from any bushfire hazard and more than 10m from the proposed workshop and site office. Hazardous materials will be stored in accordance with *AS 2187.1-1998 Explosives-Storage, transport and use – storage*.

Parameter	Management Controls

Blasting	• Noise management measures as per Section 7.2.4
	• A Blast Management Plan will be prepared prior to the commencement of DCQ operation
	  ○ Consultation will include discussions with Mid-Coast Council towards the feasibility of temporary closure of Deep creek Road during blasting events for public safety.
	• Blasting will generally only be permitted during the hours of 9 am to 4 pm Monday to Saturday, and will not take place on Sundays and Public Holidays
	• Blasting will take place no more than once per day
	• Blasting will include the provision of blast guards, both to stop entry of people and machinery into the blast area, provide communication all clear to the blast coordinator and to stop blasting from occurring in the event the event may result in injury to personnel and / or members of the public or site infrastructure / machinery
	• The Blast Management Plan will include the following items, at minimum:
	  ○ Summary of statutory requirements
	  ○ Outline of blasting frequency and hours
	  ○ Outline of sensitive receivers in the vicinity of the DCQ
	  ○ Baseline noise data and outline of expecting blast noise levels
	  ○ Procedure for blast notifications
	  ○ Blast management and control measures, including measures to ensure both public and personnel safety during blasting (Blast Exclusion Zone)
	  ○ Procedure for monitoring of meteorological conditions, airblast pressure, ground vibration, flyrock (airbourne rocks) and noise during blasting
	  ○ Procedure for management of receiver complaints
	  ○ Procedure for the updating of Blast Management Plan every 5 years, unless required as a result of consultation, utilising monitoring data to inform the scheduled update.

Road Safety	• A Traffic Management Plan (TMP) will be prepared and implemented prior to the commencement of construction of the DCQ
	• Once the final merge geometry and headwall locations are determined for the road widening works in the vicinity of the two cell pipe culvert underneath The Bucketts Way, both headwalls will be assessed to determine whether safety barrier protection is required
	• Consultation with Transport for NSW will include the following suggestions from the RSA (see Appendix K):
	  ○ Installation of signage along The Bucketts Way and the Pacific Highway in the vicinity of the Pacific Highway / The Bucketts Way and The Bucketts Way / DCQ intersections to advise road users of the upcoming intersections, providing notice of potential upcoming deceleration / acceleration requirements
	  ○ Consultation towards the feasibility of installing a northbound acceleration lane on The Bucketts Way / Pacific Highway intersection. As The Bucketts Way provides a prominent thoroughfare to the Pacific Highway from suburbs such as Booral, Stroud and Clarence Town, the provision of an acceleration lane would benefit all businesses and operations utilising heavy vehicles in this region and, as such, the funding for this intersection upgrade is considered outside the scope of the DCQ approval and is thus not the responsibility of IDPL
	  ○ Installation of a hold line for the southbound highway right turn lane into The Bucketts Way (outside the responsibility of IDPL as per the above)
	  ○ TfNSW amendment of width marker signs and installation of delineation devices for Limeburners Creek Bridge for general road safety.

Parameter	Management Controls

Bushfire	• A Bush Fire Management Plan (BFMP) will be prepared prior to the commencement of construction, including the following information at minimum:
	  ○ APZ locations and management details
	  ○ Landscaping requirements, where proposed
	  ○ Access provisions such as locations, passing bays and alternate emergency access
	  ○ Water supplies and bush fire suppression systems (including drenching systems, static water supply, natural water sources etc.) where utilised
	  ○ Schedule of the BAL requirements and building footprints as well as any specific construction details
	  ○ Details regarding the Bush Fire Emergency Management and Evacuation Plan
	  ○ Any other essential bush fire safety requirements.
	• Contractors or employees that smoke must do so in a safe manner having full regard to the safe disposal of cigarette butts to ensure bushfire ignition does not occur. Smoking should be confined to the designated smoking area on site
	• Review bushfire danger ratings and when total fire bans are in place prior to undertaking clearing activities or other hot works onsite. Postpone activity where feasible or increase preparedness through having a fire tanker on standby
	• All mobile machinery and fixed plant to include on-board fire extinguishers
	• Maintain a sufficient asset protection zone (APZ) around the office and workshop area as per PBP
	• All dangerous goods will be stored in accordance with AS1940, AS1596 and the Dangerous Goods Code
	• All DCQ roads / tracks will maintain a 4 m vertical clearance to allow unobstructed access by fire tankers
	• No parking on the DCQ access road is to occur
	• APZs at the DCQ are to be maintained to standards outlined under Appendix 4 of the NSW RFS document *Planning for Bush Fire Protection 2019*
	• The water tank(s) will be fitted with a 65mm Storz outlet with ball valve to allow for use by firefighting personnel if required
	• Where utilised, bottled gas supplies with be installed and maintained in accordance with AS/NZS 1596:2014, with valves / outlets facing away from the predominant bushfire threat, site office and workshop area (where applicable). Connection to gas cylinders will be metal. Any gas cylinders will be stored more than 10m from any bushfire hazard
	• The proposed DCQ access road verges will be designated ‘no stopping’ zones to maintain a clear thoroughfare
	• In the event of an emergency, Deep Creek Rd (public road) will provide a secondary emergency egress from the DCQ for site personnel
	• A minimum 4m vertical clearance will be maintained on DCQ internal roads to allow for tanker access in the event of an emergency.

Site Safety	• Prior to the commencement of construction, a Work Health and Safety Management Plan (WHS Management Plan) will be prepared • Controls listed under the WHS Management Plan will be included as part of a site induction, with all personnel to be presented and sign an induction form prior to the commencement of work at the DCQ • All contractors will be required to partake in a daily toolbox talk by the Construction Manager (or delegate) during construction of the DCQ • All contractors will then be required to undertake toolbox talks for their individual works prior to commencement each day. Hard copies of toolbox talks will be made available to the DCQ Construction Manager and / or Project Manager upon request • All personnel will be required to wear appropriate PPE when onsite, as deemed appropriate by their field of work and the DCQ OHS Management Plan.

Parameter	Management Controls
Public Safety	• Application of controls for road management and blasting listed above • All personnel inducted to the DCQ will be informed of the appropriate communication channels in the event a member of the public is observed onsite • The entirety of the DCQ will be securely fenced to prevent accidental access by members of the public • Vehicles and machinery onsite will be fitted with security flashing beacons, to be operating when vehicles / machinery are in use • Vehicles and machinery are to be fitted with reverse alarms (preferentially broadband alarm) and reverse cameras • All works at the DCQ are to be stopped immediately once management personnel have been informed of unauthorised entry. Works will not recommence until the unauthorised intruder has been located and removed from site or taken to the site office • All visitors to the DCQ will be required to sign in upon entry, where they will be presented with a visitor card and high visibility vest (if required). Visitors will return card (and vest if used) when signing out and leaving the DCQ • The DCQ site entry will include a gate, to be closed and locked outside of construction and or operation hours • Security cameras will be fitted throughout the DCQ both to observe and record intruders, and to provide a visual cue of site security that may discourage unauthorised access.

7.12 VISUAL

7.12.1 Introduction

A Visual Impact Assessment (VIA) has been performed by Mara Consulting and is available in Appendix V.

The VIA describes the existing visual character of the proposed development and then applies a method to assess the visual sensitivity of the proposed site and to assess the visual impact of the changes resulting from the planned development.

7.12.2 Existing Environment

The proposed development site is located in Limeburners Creek, approximately 1.8km from The Bucketts Way. Except for the new road, none of the quarry site is visible from The Bucketts Way.

The topography is hilly with steep slopes and narrow valleys. The quarry site sits along the bottom of a valley alongside Deep Creek. The valley runs west to east, opening up with rolling hills near The Bucketts Way. The extraction area will begin near the bottom of the valley and extend up toward the adjacent ridge line. The quarry will remain below the dominant ridge lines.

Thick bushland occupies most of the site and also surrounds the site on all sides. The bushland forms an effective visual barrier.

7.12.3 Field Investigation

A site visit was undertaken on 8 September 2020 by a registered landscape architect and environmental planner who has substantial experience analysing and mitigating visual impacts on the landscape.

Viewing zones were identified to represent impacts regarding site context, the immediate vicinity, the local area, the district area and the regional area. During the site visit, appropriate viewpoints were confirmed for each viewing zone and an assessment was made of each potential public viewpoint against the extent of the project. Six viewpoints were selected on the basis of where the development would appear to be most prominent either based on degree of exposure or the number of people likely to be affected. The views at each of the viewpoints are provided in Appendix W. The images were taken on 8 September 2020 using a digital camera with a focal length equal to a standard 50mm for a conventional 35mm camera. This focal length is widely accepted as closely approximating the vision of the human eye and as such are determined to accurately reflect the views that the public see.

7.12.4 Results

The VIA concluded that the visual impacts for this quarry are limited to the proposed private access (haul) road as it approaches and connects to The Buckets Way. The proposed quarry itself is not visible from any residences and is shielded by ridge lines and bushland that surround it. This bushland will remain in place throughout the life of the quarry and therefore maintain the existing natural screening.

7.12.5 Impact Assessment

The visual impacts for this quarry are limited. As discussed, the proposed quarry itself is not visible from any residences and is shielded by ridge lines and bushland that surround it. Visual impacts are only present in relation to the private access/haul road. Consequently, visual impacts from the private access/haul road are rated as moderate while the visual impacts from the quarry are rated as low (see Table 7-42).

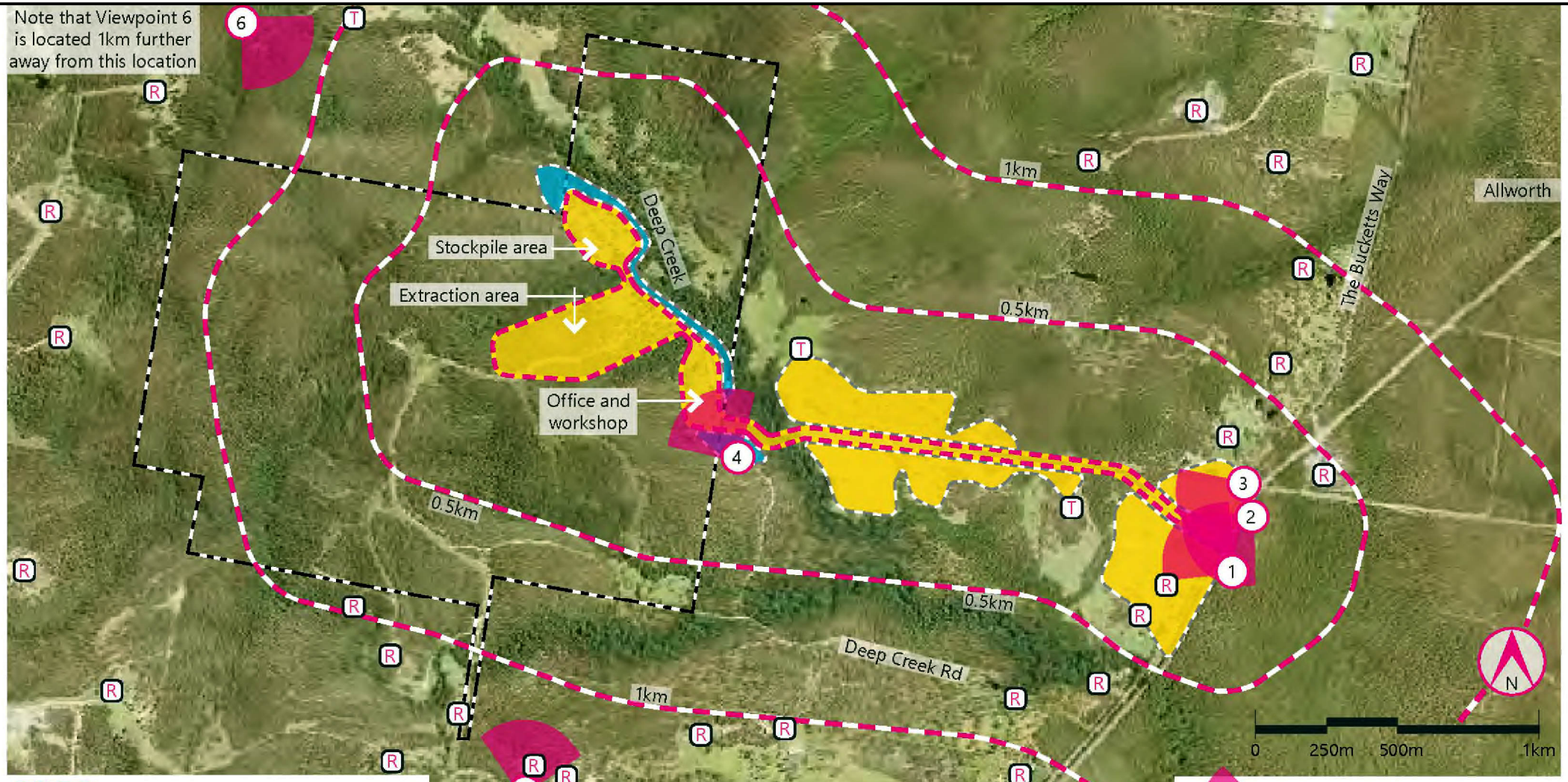
Table 7-42: Viewpoint Visual Impact Summary

Viewpoint (VP)	Visual Sensitivity	Visual Effect	Visual Impact Rating
VP 1	Moderate	Low	Moderate
VP 2	Moderate	Low	Moderate
VP 3	Moderate	Low	Moderate
VP 4	Low	Low	Low
VP 5	Low	Low	Low
VP 6	Low	Low	Low

See Figure 18 for location of each viewpoint and receivers.

The method used in this visual impact assessment is based on established practices and policies. The VIA utilised a system that enables consideration of the visual impact in rural environments. Documents used for broad guidance include the *Roads and Maritime Services Environmental Impact Assessment Guidance Note* (2013): *Guidelines for landscape character and visual impact assessment*. The study method for the VIA follows three key steps:

- Existing visual environment
    - Review proposal and extents of the development
    - Landscape character - Types of landscape and how it is perceived
    - Visual catchment area defined through reviewing maps and satellite imagery to identify where the site is visible from
    - Site visit - undertake inspections from viewpoints, including photographs of the site from each location and verifying the visual catchment.
- Visual impact
    - Assessment of the visual impact by applying the visual sensitivity and visual effect criteria
    - Superimpose the visual model into the viewpoints (photo-montages)
    - Review against baseline information (impact of change from proposal).
- Acceptability of the visual impact
    - Assessment of the acceptability of the visual impact against relevant considerations
    - Drawing conclusion and recommendations.



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PROJECT REFERENCE: 20203112
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DRAWN BY: GJoyce
DATA SOURCE:
Mara Consulting - 2021
NSW DFSI - 2021

Viewing Zones

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek, NSW

FIGURE:
18

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Direct Impacts

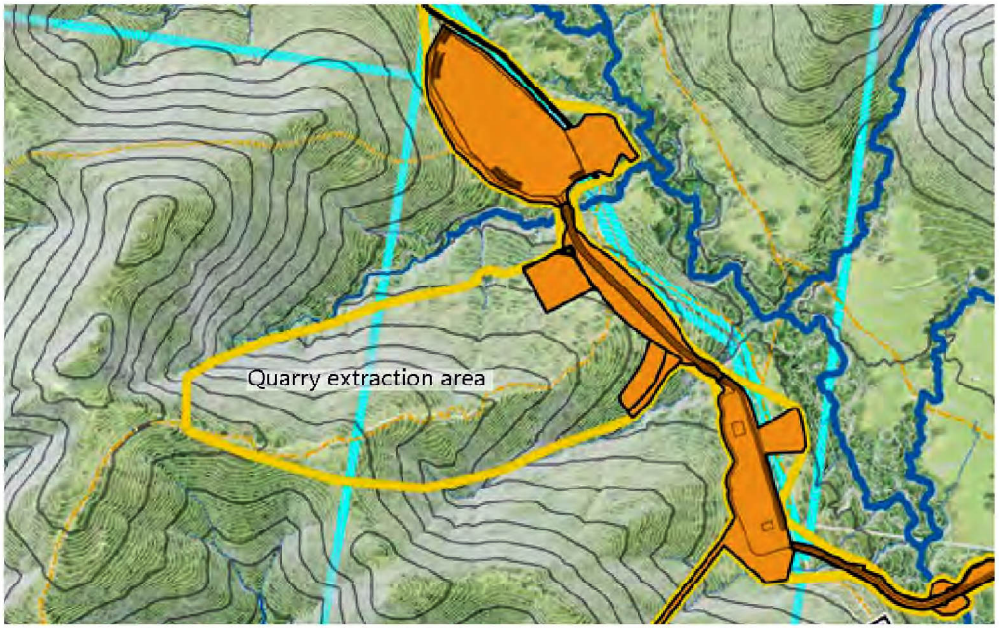
Viewpoints 1 and 2 represent the 'worst case' in terms of visibility because a new road intersection will be installed in this location (see Figure 18). The two viewpoints were close to the proposed intersection and road with direct views of the proposed changes to the roads. Even though these locations are quite close to the site, the context of The Bucketts Way only allows momentary glimpses of the new roadway. Viewpoint 3 is the typical view from a residence, there are three residences with similar views all located near this eastern end of the proposed road. They are also closer to The Bucketts Way than they are to the proposed haul road. The closest residence is approximately 220m from the proposed road. Even though the ratings for viewpoints 1, 2 and 3 are moderate, the impact is from a roadway and will be greatest during construction. After the roadway is established and in use, the visual impact will begin to diminish as the road becomes a part of the landscape.

Indirect Impacts

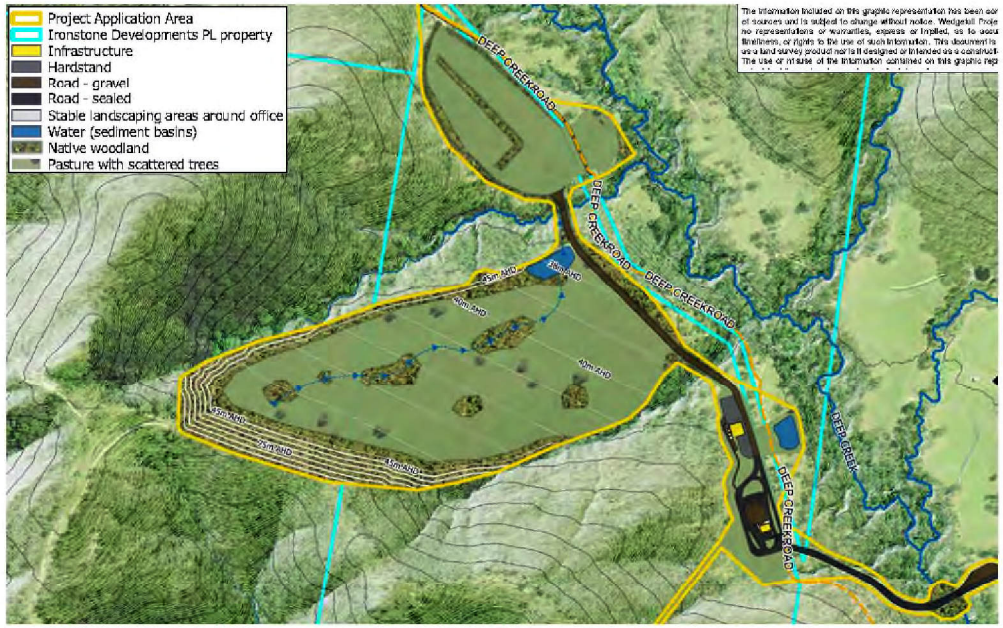
Viewpoints 4, 5 and 6 had views toward the site, but trees, vegetation and topography obscure the proposed development from view, and will do for the duration of the quarry. These illustrate that there are very few locations, if any, from which the quarry will be visible.

Residual Impacts

The visual impacts for this project are limited. The proposed quarry itself is not visible from any residences and is shielded by ridge lines and bushland that surround it. This bushland will remain in place and therefore maintain the existing natural screening. The visual impacts posed by the project will be the private access road as it approaches and connects to The Bucketts Way, though as mentioned the impact will be at its greatest during the short term 12 week construction period and will meld with the landscape following establishment. Figure 19 demonstrates the existing and final landform.

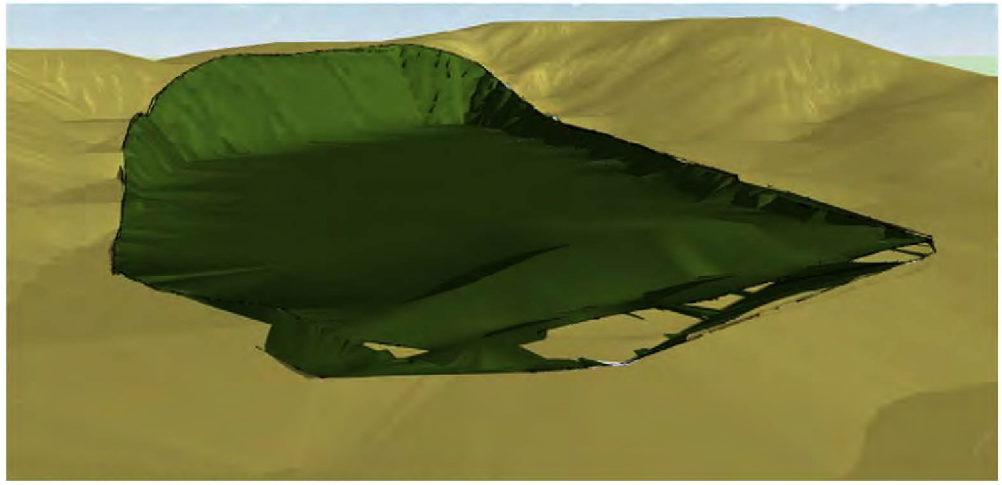


Initial phase of the project prior to any quarrying activity - 3d modelling below



Final condition of the site after rehabilitation - 3d modelling below

Existing landform void of vegetation - extraction area in green



Final landform after rehabilitation

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DATA SOURCE:
Mara Consulting - 2021
NSW DFSI - 2021

Existing and Final Landform

Ironstone Developments Pty Ltd
Deep Creek Quarry
The Bucketts Way, Limeburners Creek, NSW

FIGURE:

19

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7.12.6 Mitigation and Management Measures

Given the lack of visual impacts from the quarry, appropriate mitigation and management measures are as follows.

Visual Character

To maintain the visual character of the area around the site, the following recommendations are suggested:

- Trees and shrubs can be planted along the proposed access road near The Bucketts Way to screen views of the proposed road where it can be seen from nearby residences
- Bushland around the quarry site should be maintained to keep the existing visual screen intact
- Introduce naturalistic land shaping to any disturbed areas including the quarry area after production is completed (see Section 7.15 for rehabilitation strategy and final landform description)
- Re-vegetate any disturbed areas with native and endemic plant species, including trees and under-storey plants (see Section 7.15 for rehabilitation strategy and final landform description).

Built Form, Materials and Colours

- Materials, textures and colour selection should relate to the palette of the surrounding environment to minimise visibility and potential for visual impact
- Reflective surfaces and bright, contrasting colours should be avoided.

7.13 ECONOMIC

7.13.1 Introduction

An Economic Impact Assessment (EIA) has been performed for the development and is provided in full in Appendix N. This chapter presents a summary of the findings of the EIA. A Capital Investment Value (CIV) Report has also been prepared to satisfy the SEARs requirements.

7.13.2 Investigation

The most relevant economy against which to examine the regional impacts associated with the quarry is the regional economy comprised of the SA3s of Great Lakes (in which the development is located, and lies within the Mid Coast Local Government Area (LGA)), Taree-Gloucester, Lower Hunter, Port Stephens, Maitland, Newcastle, Lake Macquarie – East, Lake Macquarie – West. This area is hereafter referred to as the 'Catchment'. This catchment was chosen as it encompasses the location for the key source markets for goods/ labour, represented by a 100-kilometre radius.

The 'Catchment' has shown the following characteristics:

- The 'Catchment' has recorded consistently lower population growth than the State over the seven years to 2019 (prior to the COVID-19 pandemic):
    - Population growth in the 'Catchment' is anticipated to remain lower than the State to 2041
- The 'Catchment's' economy has recorded consistent annual growth
- Quarry activity will be supported by the significant developments in the region over the coming years
- Population serving sectors were the top employers in the 'Catchment' in 2018-19
- Unemployment in the 'Catchment' has recovered from peak levels in 2015
- The COVID-19 pandemic had a more significant impact on employment in the 'Catchment' than the State:
    - Construction is the industry most heavily impacted by the COVID pandemic
- The 'Catchment' is both highly self-sufficient and self-contained
- Demand for rental stock has remained steady in the 'Catchment', whilst more subdued demand is evident in the housing market:
    - Vacancy rates are higher the 'Catchment' than New South Wales on average

It should be noted that recent (since early 2019) economic data has been impacted by the COVID -19 pandemic and is not reflective of 'normal' conditions outside of the pandemic situation. Therefore, where appropriate, data up to early 2019 has been utilised. Further context regarding the EIA in relation to the consideration of COVID-19 pandemic is provided throughout Appendix N.

The following methodology was used to the determine the economic assessment in conjunction with examining the existing economic environment:

- The local effects analysis (LEA) section uses economic impact modelling results as well as information from the existing environment and desktop research to analyse, assess and discuss the economic impacts of the quarry. The LEA includes input and information from:
    - Economic modelling using Input-Output (IO) modelling techniques (a description of IO modelling is provided in Appendix N)
    - Interpretation of modelling output in the context of the regional and state economies, and analysis of other non-quantified changes to the economic environment
    - Evaluation of the significance of impacts in relation to economic resources.

  The assessment identifies the economic impacts specific to the quarry compared to what would be anticipated if the development does not proceed

- The Cost Benefit Analysis (CBA) has been conducted in line with NSW and Australian Government guidelines, examining the stream of relevant economic, social, and environmental costs and benefits

anticipated from the quarry to assess the net present value of the development to the NSW community. Additional details regarding the CBA assessment method used is provided in Appendix N

- Development of Mitigation and Enhancement Strategies

  The mitigation strategies section identifies strategies to avoid, reduce or mitigate the negative economic impacts and enhance and facilitate the capture of the positive impacts identified in the economic impact assessment. These are then considered through the LEA and CBA.

Capital Investment Value

A Capital Investment Value (CIV) Report has been prepared for the project and is available in full in Appendix W. The CIV of a development or project includes all costs necessary to establish and operate the project, including the design and construction of buildings, structures, associated infrastructure and fixed or mobile plant and equipment, other than the following costs:

- Amounts payable, or the cost of land dedicated or any other benefit provided, under a condition imposed under Division 7.1 or 7.2 of the Act or a planning agreement under that Division
- Costs relating to any part of the development or project that is the subject of a separate development consent or project approval
- Land costs (including any costs of marketing and selling land)
- GST (within the meaning of A New Tax System (Goods and Services Tax) Act 1999 of the Commonwealth).

The total CIV for the Deep Creek Quarry is $5,837,812. This amount is in Australian Dollars with base date of December 2020.

The CIV has been assessed based on:

- NSW Government Planning circular PS10-008 ‘New definition of capital investment value’, dated 10 May 2010
- NSW Government Planning & Infrastructure circular PS13-002 ‘Calculating the genuine estimated cost of development’, dated 14 March 2013
- Prefeasibility level design, quantity take-off and estimation developed for the DCQ.

7.13.3 Results

Local Effects Analysis

The modelling of the Local Effects Analysis (LEA) has presented a number of impacts, the majority of which are overwhelmingly positive. Table 7-43 details a summary of the beneficial impacts. The potential adverse impacts were considered to be minimal.

Table 7-43: Assessment of Beneficial Impacts of the Quarry

Impact	Description
Economic Growth	The quarry will contribute to economic growth through increased Gross Regional / State Product (GRP / GSP) during construction, operations, and decommissioning / rehabilitation phases, compared to what would occur without the quarry, flowing from both direct and flow-on impacts. The contribution to GSP will increase from approximately $3.7 million in 2021-22 (first year of construction) to approximately $8.5 million per annum between 2027-28 and 2040-41. The contribution to GSP is then estimated to rise to peak at $10.2 million per annum between 2043-44 and 2048-49 before the operations winds down and ceases by 2051-52. A contribution of approximately $7.6 million is estimated in 2051-52 as a result of final operations decommissioning and rehabilitation activities. In total, the ‘Catchment’ is estimated to capture approximately 91.9% of the total contribution to GSP across the assessment period (from 2021-22 to 2051-52), with the rest of NSW accounting for approximately 8.1%.

Impact	Description
Employment and Incomes	IT is important to note that while the quarry will directly employ up to ten full time staff during operations, more jobs will be supported outside of the direct employment. These are described as Full Time Equivalent (FTE) jobs. The quarry will support jobs and incomes during construction, operations, and decommissioning / rehabilitation phases, compared to what would occur without the quarry, flowing from both direct and flow-on impacts. Including direct and flow-on activity: • Approximately 20 FTE jobs are estimated to be supported in NSW in the first year of construction (2021-22), which decreases in line with construction activity to 2022-23 before operational activity commences in 2023-24 with 17 FTEs • FTE jobs supported in NSW are estimated to rise from 17 in 2023-24 to 31 FTE jobs by 2043-44 and through to 2050-51 • Employment is then estimated to fall to 26 FTE jobs in 2051-52 as production winds up and ceases and decommissioning and rehabilitation activities occur. Approximately 87.8% of jobs supported in NSW will be within the 'Catchment', with the remainder in the rest of NSW.
Support for Upstream Supply Chain Businesses	The quarry will increase quarrying and processing activities in the 'Catchment' and thereby support and create opportunities for suppliers in the 'Catchment' and NSW, providing additional security and longevity of business incomes (and employment). The quarry will also create opportunities to secure new contracts and increase sales to supply and service the needs of the Project through flow-on impacts in the supply chain, during all phases of the Project. The construction phase is estimated to support business revenues for local businesses within the 'Catchment' of approximately $5.8 million through direct construction activity. Flow-on supply chain impacts during construction are estimated to support an additional $3.3 million in business revenue in the 'Catchment'. An additional $0.9 million in business revenues are estimated to be supported in the rest of NSW through direct and flow-on activity. During operations, the quarry is estimated to support approximately $15.7 million in business revenues per annum on average in the 'Catchment' through direct and flow-on activity, with a further $1.3 million in revenues supported for businesses in the rest of NSW.
Support for Downstream Customers	DCQ is anticipated to become an important supplier of road base, crusher dust, aggregates, and rock domestically. The general resource market areas for the products of the quarry include Port Stephens, Newcastle, Maitland, Lake Macquarie, and Mid-Coast. Decorative and high Polishing Aggregate Friction Value (PAFV) products will travel further and have a wider market, including Sydney, Lithgow, Canberra, Port Macquarie, and Coffs Harbour. The quarry will provide a new and alternative supply source to the market which will service the strengthening demand for construction material together with several other planned new supplies coming online in the 'Catchment'. The quarry will thereby improve security of supply within the 'Catchment' to meet the significant number of planned infrastructure and other quarries. Without the quarry, future demand for quarried materials may require supply from outside the 'Catchment' and further afield, which may place increased cost pressures on input costs for these customers due to longer transport distances. To this end the quarry can be seen as important for the longer-term security of supply of domestic production, while also supporting transport and logistics business for the transport of products to customers.
Government Revenue	The quarry will provide a lift in Australian, State and Local government taxation revenues through a variety of taxes and duties. Overall, the quarry is estimated to deliver a total of: • $23.8 million in additional revenue to the Australian Government, through personal income tax, fringe benefits tax, company tax and GST, compared to what would occur without the quarry • $1.5 million in additional revenue to the NSW Government compared to what would occur without the quarry • $11.1 million in road levy revenue to Local Government compared to what would occur without the quarry These additional revenues can be used by government to provide additional infrastructure and services to support business and households throughout Australia.

Source: AEC.

Cost Benefit Analysis

The CBA examines the net or incremental impacts (benefits and costs) of a project compared to a 'base case' scenario of what would be expected to occur without the quarry.

The Net Present Value (NPV) of the quarry has been estimated as the difference between the present value (PV) of future benefits and PV of future costs. A cost benefit analysis (CBA) for the quarry shows that, assuming a discount rate of 7%, the NPV of the quarry to the NSW economy is estimated at $22.7 million.

The benefit cost ratio (BCR) is estimated at 1.26 at a discount rate of 7%, highlighting that the quarry is estimated to return $1.26 for every dollar cost.

The CBA identifies that the quarry is economically desirable for NSW with the benefits outweighing the costs across all discount rates examined (4%, 7% and 10%). Sensitivity analysis shows that, at a discount rate of 7%, there is a 90% probability the development will provide an NPV between $0.4 million and $44.3 million.

The NPV is highly sensitive to the net operating result (i.e., difference between revenue from operations and operational spend in the table below); the larger the net operating result the larger the NPV. Sensitivity testing returned a positive NPV across 98.3% of the 5,000 iterations run in Monte Carlo analysis, with the analysis most sensitive to the net operating result.

Demand For Local Infrastructure and Services

Aside from the infrastructure developed as part of the quarry (i.e. the new intersection with The Bucketts Way), the development is not anticipated to require additional local infrastructure and services to be provided to support the quarry and its workforce. DCQ will deliver new operational activity and workforce opportunities in the 'Catchment', with labour primarily sourced from within the 'Catchment'. There will, therefore, likely be a minimal impact on local infrastructure and services due to no net increase in demand from workers and production activity.

The Traffic Impact Assessment (2021) identified there will be no major failures or areas of deterioration to the road pavements due to increased traffic from the proposed development. Therefore, there is not anticipated to be any significant impact upon road maintenance (i.e., road maintenance expenditure) as a result of the development, and the road levy paid to Council provides capital to cover the costs of any required maintenance works.

Contribution to Government Revenues

There will be a significant contribution of approximately $23.8 million to Local, State and Federal Government through the generation of taxes and royalties as a result of the project. The NSW Government is expected to receive approximately $1.5 million in additional revenue, over the life of the quarry. The Australian Government is estimated to receive approximately $23.8 million in various taxes. It should be noted that a portion of Australian Government revenues are likely to provide benefits to NSW, with the State allocated a portion of GST revenue as well as through the subsequent expenditure and redistribution of Australian Government revenues to provide services and infrastructure throughout Australia (including NSW). Local Governments are expected to receive $11.1 million in road levy revenue over the operational life of DCQ.

7.13.4 Impact Assessment

A summary of the identified impacts follows, while further in depth analysis and impact assessment is provided in the EIA, available as Appendix N.

Direct Impacts

The quarry will allow for additional economic activity in the region, stimulating increases in economic growth, employment and incomes, support for supply chain business and additional government revenues. Economic impacts of the quarry are anticipated to be overwhelmingly positive, with minimal adverse economic impacts identified. These impacts will be across the local catchment as well as State and Federal as described in Appendix N.

Indirect Impacts

If DCQ and the other proposed quarries were to commence construction at a similar point in time, this will result in an increase in jobs and economic activity, including added activity in the property market as well as demand for infrastructure and services. These impacts are anticipated to be normalised across the 'Catchment', and not cause significant strain on available resources.

Residual Impacts

The CBA has demonstrated that the quarry is economically beneficial to both the local catchment and State of NSW. The CBA considered the environmental and social impacts of the development (through the technical studies performed) and the cost of performing the development and did not identify any residual economic impacts as a result of the quarry, due to the management and mitigation measures that will in place to manage them. Further detail is provided in the full CBA, available in Appendix N.

Cumulative Impacts

The cumulative impact assessment examines the potential cumulative impact of a number of existing quarries as well as anticipated future quarry operations (including the DCQ Project) occurring concurrently in the 'Catchment', and other major projects.

The cumulative impact assessment is based on the potential for cumulative development to exacerbate the impacts of the DCQ Project and to what degree. The impact assessment does not assess the aggregate impacts of all developments in combination, but rather the relative implications of developing the quarry should other projects also be undertaken concurrently.

The majority of proposed quarry projects for the region are extensions that will replace or augment activities from existing operations that are nearing completion. Where this occurs, these projects will effectively result in a continuation (and slight increase) of jobs and economic activity rather than a significant lift in activity (outside of short-term construction impacts). Only the short-term construction impacts of these existing operational projects have been included in the cumulative impact assessment; operations of these existing operational projects are inherently incorporated in the analysis as they form part of the existing economic conditions in the regional 'Catchment' for which the assessment of impacts was undertaken.

In addition to this, there are several proposed new quarries which are either in the assessment or EIS preparation phase (including Hillview, Eagleton, Stone Ridge, Karuah South, and Bob's Farm Sandpit). If DCQ and these other proposed quarries were to commence construction at a similar point in time (and, therefore, operate concurrently), this will result in an increase in jobs and economic activity, demand for infrastructure and services, and demand for supplies.

The combination of the continued and/ or augmented operations of existing quarries (incl. any additional construction activity in the short term) and construction and operations of the proposed new quarries outlined in Appendix A of the EIA (Appendix N) is unlikely to have any significant negative implications regarding the impacts of DCQ upon the 'Catchment's' economy.

Where these projects go ahead concurrently to DCQ, there may be:

- Increases in output, GRP, employment, and household income estimates in the 'Catchment' over the relevant period
- Short-term increases in demand for property during construction which may be considered to provide a small positive impact on demand and prices. This impact is anticipated to be normalised across the 'Catchment', and not result in significant strain
- Increased demand for some suppliers, trades, and services, resulting in temporary short-term delays in accessing trades or increased use of suppliers, trades, and services from outside the 'Catchment'
- Provision of increased accessibility to competitively priced and accessible quarried materials in the region.

7.13.5 Mitigation and Management Measures

The EIS performed for the proposed development identified the quarry is not anticipated to generate any adverse economic issues, risks or impacts of significance. Economic impacts of the quarry are anticipated to be overwhelmingly positive, with minimal adverse economic impacts.

While the potential adverse economic impacts from the quarry are minimal, there are some potential areas that should be monitored, and strategies employed to ensure benefits of the quarry to the 'Catchment' and NSW are maximised and any potential adverse impacts minimised:

- To maximise local benefits derived from the quarry, the proponent and contractors engaged by the proponent will be encouraged to source labour locally where possible and practical, and provide training opportunities where practical.
- To maximise local benefits derived from the quarry, the proponent and contractors engaged by the proponent will provide sufficient opportunities and access to information for local businesses to understand the quarry's supply contract arrangements and requirements and improve their ability to secure supply contracts.

7.14 SOCIAL

7.14.1 Introduction

Mara Consulting Pty Ltd (Mara) was engaged to prepare a Social Impact Assessment (SIA) for the quarry under. It has been prepared to the form and content requirements set out in clauses 6 and 7 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation).

It is important to note that social impacts are the way people experience change. The aim of the SIA is therefore, to assess impacts as a result of changes to the current social conditions within the community that may be caused or perceived to be caused by the proposed development. The SIA is available in full in Appendix S.

7.14.2 Updated Guidelines

Since the issuing of the SEARs, the Department of Planning, Industry and Environment (DPIE), has published a new guideline. As such this SIA has been written to meet the newly adopted *Social Impact Assessment Guideline for State Significant Development* (2021) (the SIA Guideline). Additionally, the *Social Impact Assessment Technical Supplement* (2021) has been used in the preparation of the SIA.

7.14.3 Policy Framework

The following review summarises key relevant state and local policy and strategic documents to illustrate the current policy context and the preferred direction for future use and development in the area. The quarry falls within the MidCoast local government area (LGA).

Environment Planning and Assessment Act 1979 (EP&A Act)

The NSW Department of Planning, Industry and Environment (DPIE) is responsible for administering the Environment Planning and Assessment Act 1979 (EP&A Act) and its subordinate legislation and policies. The EP&A Act is the primary land use planning statute in NSW. It governs matters such as planning administration, planning instruments, development assessments, building certification, infrastructure finance, appeals and enforcement.

The Act contains principles to guide planning authorities in making decisions. The objects are to:

- Promote the social and economic welfare of the community and a better environment via the proper management, development, and conservation of the State's natural and other resources
- Facilitate ecologically sustainable development by considering economic, environmental, and social factors in planning decisions
- Promote the best use of land
- Protect threatened and other species of plants and animals, and habitats
- Allow better community participation in environmental planning and assessment.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries)

2007 (Mining SEPP)

The aims of the Mining SEPP are, in recognition of the importance to New South Wales of mining, petroleum production and extractive industries, to:

- Provide for the proper management and development of mineral, petroleum, and extractive material resources for the purpose of promoting the social and economic welfare of the State
- Facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources
- Promote the development of significant mineral resources
- To establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources.

The Mining SEPP also expressly requires the consideration of:

- The compatibility of a proposed mine with other existing and approved land uses
- Impacts on water resources, threatened species and biodiversity
- The greenhouse gas emissions of a project.

Hunter Regional Plan 2036

The Hunter Regional Plan is a NSW DPIE, 20-year strategic plan setting the guiding direction for the region. The project sits within the area covered by the plan. Specifically, Direction 6: Grow the economy of MidCoast and Port Stephens, states:

- 6.3 - Enable economic diversity and new tourism opportunities that focus on reducing the impacts of the seasonal nature of tourism and its effect on local economies
- 6.4 - Promote growth of industries that can leverage accessibility provided by the Pacific Highway.

Community Strategic Plan – MidCoast 2030

In 2018 Council released MidCoast 2030 Shared Vision, Shared Responsibility: Community Strategic Plan (2018-2028), which sets out five strategic values, each supported by specific strategies. Those relevant to this SIA are:

- • A connected community
    - It is safe and easy to get around our region:
        - Plan for, provide and maintain a safe road network that meets current and future needs.
- Our environment
    - We protect maintain and restore our natural environment:
        - Value, protect, monitor, and manage the health and diversity of our natural assets, wildlife and ecosystems
        - Protect, maintain and restore water quality within our estuaries, wetlands and waterways
        - Improve the capacity of industry and the community to achieve the best possible outcomes for the natural environment.
    - We balance the needs of our natural and built environments:
        - Ensure growth and new development complements our existing natural assets, cultural assets and heritage sites
        - Optimise land use to meet our environmental, social, economic and development needs.
- Our thriving and growing community
    - Our region is a popular place to visit, live, work and invest:
        - Provide an environment to grow and strengthen local businesses, and attract new business
    - Our villages and business precincts are vibrant commercial, cultural and social hubs:
        - Ensure strategies and processes recognise, maintain and support sustainable economic growth.

7.14.4 Assessment Methods

The general approach used for the research and preparation of this SIA available in Appendix S is listed below.

Project Setting and Context

The SIA approach included a review of available information, understanding the area of influence, potentially impacted stakeholders and local and state policies that may influence the project or be taken into consideration. This informed the community consultation required to produce the SIA, and in turn allowed for accurate development of the Social Baseline to consider impacts upon.

Consultation

The consultation was designed to meet the requirements of the SEARs. A summary of the level of consultation performed is provided in Table 7-44. Consultation for the SIA was focused on the targeted engagement with key stakeholders to understand perceived impacts and benefits.

Consultation has provided opportunity for stakeholders and members of the community to learn about the project and for the proponent to capture and respond to the matters being raised.

Table 7-44: Consultation Participation Statistics

Activity	Number of contacts
Website visitors	2842
Document downloads (factsheets, FAQs)	136
Emails (in and out)	123
Online survey	21
Online community information session	2
Video presentation	18 views
Letterbox drop (properties) within 2 km of project site	164
Letters mailed (Express post)	84
Phone calls	66
Meetings	33
In-depth interviews	12

Community and stakeholder feedback was invited on the proposed development between September 2020 and August 2021. All feasible channels were used to reach as many people as possible to inform them of the development. When the consultation plan was developed with, COVID-19 measures in place.

Informed by the wider consultation, in-depth stakeholder interviews were held to fully understand what the perceived impacts and opportunities arising from the proposal were. These in-depth interviews were held with:

- MidCoast Council – Social Planner
- MidCoast Council – Senior Ecologist
- MidCoast Water – Water Planning and Assets
- Port Stephens Council – Environmental Planner
- Hunter Water – Water Quality Planning team, and Property Manager
- Transport for NSW – Development Services representatives
- Nearby residents – Five nearby residents.

A survey was open to the community between 10 May 2021 and 4 August 2021. A total of 21 responses were received during this time.

Two online community information sessions were held on 4 August 2021. A mid-morning session from 10-11am, and an evening session from 6pm – 7pm.The event was structured to provide opportunities toasks questions and gather detailed information about the proposal. There were 12 participants across the two sessions. It included:

- Introduction of the project
- Video presentation – 15minute overview of the proposed project
- Questions raised prior to the meeting and answered in the online sessions
- Facilitated Q&A.

The sessions were initially to be held in-person at the community hall, however, with the quick escalation of COVID-19, the sessions were held online to ensure the safety of participants and the project team. While there were concerns over internet connection for some participants, all efforts were made to provide opportunities to participate in the session or access the presentation after the sessions. Measures included:

- Accessing the video presentation via the project website
- A factsheet with questions and answers available on the project website. This was available fordownload
- The feedback period was extended by a week to provide extra time to submit questions orrequest for further information.

Key themes that emerged from the consultation were as presented in Table 7-45.

Table 7-45: Key Themes from Consultation

Key Theme	Description
Traffic and Truck Movements	Stakeholders representing the broader community and nearby residents, raised concerns with traffic, the state of The Bucketts Way and truck movements via the proposed access road. Residents feel that an increase in vehicles would create a bigger risk to road users. Other comments related to the lack of maintenance of the road with greater degradation of the road surface with the increase in heavy vehicles. Comments relating to what respondent's value least in Limeburners Creek, about 40 per cent related to the current traffic and condition of The Bucketts Way. Transport for NSW (TfNSW) raised issues with the intersection of the Bucketts Way with the Pacific Highway which causes a line-up of traffic in peak times. Additional vehicles using the intersection could put more pressure on the intersection. Drivers are more likely to take risky decisions in these circumstances. This sentiment was also raised by stakeholders. Council is responsible for the Bucketts Way Council. TfNSW noted the road had recently been resurfaced in the proximity of the potential access road. The traffic assessment specifies at peak operation there will be an average of 55 laden trucks per day leaving the site. There will be a further 10 light vehicles and 6 other vehicles for deliveries, visitors, and services that access and leave the site each day.
Access Road and Landscaping	Stakeholders highlighted concerns about using Forest Glen Road and Deep Creek Road as the access road. Based on this feedback, the project team investigated alternatives and secured an agreement to create a new private access road, directly from The Bucketts Way to the quarry. The access road will be approximately 1.6km north of the Forest Glen Road intersection. The plan is for a two-lane sealed road, with a new intersection to be constructed on The Bucketts Way which will include acceleration and deceleration lanes. Stakeholders living in close proximity to the access road asked about visual screening of the access road. There will be a mix of native trees and shrubs along portions of the access road. Vegetation will be planted into an earthen bund intended to reduce noise and increase the visual screening effect.
Compensation and Property Value	There was a perception from some stakeholders that a quarry in the vicinity would devalue property prices. Compensation was also asked about in relation to potential property damage and acquisition. This development will be subject to the requirements of the Voluntary Land Acquisition Policy. This includes compensation through to voluntary property acquisition where criteria are exceeded.

Key Theme	Description
Noise, Vibration and Blasting	Noise, vibration and blasting were the overwhelmingly the most common concerns raised by stakeholders. People value the quiet way of life in Limeburners Creek. A high proportion of comments showed that it was quiet and a peaceful way of life in Limeburners Creek. Substantial and enforceable noise mitigation would be needed to reduce the impacts on residents. Additionally, the noise assessment should consider the nearby residents. A request for detailed information about how blasting is to be managed was detailed in feedback received.
Air Quality and Dust Management	Stakeholders considered air quality as a major concern for the development. Some noted health concerns of a nearby resident. Stakeholders said that substantial and enforceable dust mitigation would be required to reduce the impacts on the local community. There was a request for automated dust monitors as part of the quarry.
Impact on Flora and Fauna	Respondents noted environmental impacts as an issue and are concerned wildlife habitat would be removed. Some stakeholders wanted more information about the impacts on koala habitat and raised concerns about impacts on koalas in the area. Comments also related to vegetation, particularly as it provides a corridor for native fauna. One suggestion submitted calls for relocating wildlife from the proposal footprint prior to any work occurring. There was also a request to protect trees, particularly on the ridgeline as well as offsets for bushland that will be impacted.
Visual Amenity Impacts	Some respondents and local residents were concerned that having a quarry nearby would spoil the rural, bushland landscape. Similarly, stakeholders did not believe the quarry could be shielded from sight.
Impact on Livelihood and Ability to use Land for Tourism	The potential change to the way people work and use their land in the Limeburners Creek area were seen as negatives. Stakeholders value the rural setting for living and recreating in a peaceful setting. One stakeholder was concerned about the impact to future business or tourism opportunities.
Broad concerns about other projects in the area	Local government stakeholders and community members were concerned about cumulative impacts from other similar projects in the Port Stephens and MidCoast LGAs.
Water Management	Multiple stakeholders noted concerns about potential discharge into waterways. Port Stephens Council stated any water discharge from the site would need to meet NORBY or higher water quality targets and a maintenance of the current water quality and quantity discharging to the Karuah River system. It was also expected that all discharge water would be treated and discharged from site in accordance with EPA requirements. Stakeholders also referenced Deep Creek and the proximity to the proposal and were concerned with spills and runoff.
Effective sharing of project information	Community members and nearby residents indicated they relied on “word of mouth” information to find out about the development. Many noted they had a high or extremely high level of knowledge about the detailed proposal. Many stated they had never visited the project website and wanted more information about the proposal. Feedback from stakeholders show there is a confusion about the EIS process stages, how and when to provide feedback. Concerns were raised about the ability to access information or attend online information sessions due to the limited internet access in the area. Additionally, stakeholders questioned how inquires and complaints would be managed if the development was approved.
Return and Benefit for the community	Respondents said there would be little value or return for the local community. Few indicated they supported the development. The estimate of ten jobs was seen as not enough to balance the change in the community resulting from the proposal.

Social Baseline Development

The social baseline sets the current environment of the community within the social locality prior to the development being introduced. It uses publicly available data to create a community profile for which the impact identification and assessment can be completed.

The social baseline study was prepared using:

- Existing demographic, health, housing, and socio-economic data from the Australian Bureau of statistics, government agencies, and local government published literature and social research
- Government policies and plans
- Documents relating to similar projects.

The social baseline provides the benchmark against which potential social impacts have been identified and assessed and informs subsequent stages.

To provide a social baseline, localities and study areas were defined as those in Table 7-46.

Table 7-46: SIA Study Area Definitions

Study Area	Geographic Area	ABS data category	Referred to as:
Local study area	Limeburners Creek Allworth	SSC SSC	Local area
Regional study area	Bulahdelah – Stroud Port Stephens Dungog	SA2 SA3 SA2	Regional area
State of New South Wales	NSW state	NSW STE	NSW

The area of social influence of the quarry is limited to the communities of Limeburners Creek and Allworth in the MidCoast Council Local Government Area (LGA). This area of social influence was based on an assessment of the communities likely to be impacted by the proposal and of the geographic proximity of residents and businesses to the development.

The 'local study area' is defined as the area covered by the Limeburners Creek SSC and Allworth SSC. This is the area most likely face impacts to local social infrastructure and services, local workforce, local business, local housing and accommodation, and community health and wellbeing.

Broader impacts due to use of infrastructure, supply chains, haulage routes, transportation of materials and equipment and workforce may affect a larger 'regional area'. These factors require the area of social influence to extend and include portions of the MidCoast Council LGA, Port Stephens LGA and Dungog LGA. These areas have been mapped to the Australian Bureau of Statistics (ABS) Statistical Area Level 2 (SA2) and Level 3 (SA3).

7.14.5 Social Impact Assessment

As stated previously, it is important to note that social impacts are the way people experience change. The aim of the impact assessment in a social context is therefore, to assess impacts as a result of changes to the current social conditions within the community that may be caused or perceived to be caused by the proposed development, as opposed to impacts within set criteria as per the other impact assessments performed for the project.

The social impact identification was determined as a result of the previous steps including review of technical studies, feedback provided during the consultation process and from the social baseline. This included:

- Environmental constraints – review of specialist studies and similar projects in the area to identify potential impacts
- Existing social environment – demographic and social analysis from the baseline study
- Data analysis and consultation findings –to identify potential impacts and benefits
- Local plans and policies –to understand local priorities and values.

The assessment of social impacts was conducted using the SIA Guidelines, which uses categories to identify social impacts. The categories are listed in Table 7-47.

Table 7-47: Social Impact Categories

Impact Category	Description
Way of life	How people live, get around, work, play, and interact
Community	Its composition, cohesion, character, how it operates and sense of place. Access and use infrastructure, services, and facilities, whether provided by a public, private or not-for-profit organisation.
Accessibility	How people access and use infrastructure services and facilities whether provided by a public, private, or not-for-profit organisation.
Culture	Both Aboriginal and non-Aboriginal, shared beliefs, customs, values and stories, and connections to Country, land, waterways, places and buildings.
Health and Wellbeing	Physical and mental health especially for people vulnerable to social exclusion or substantial change, psychological stress resulting from financial or other pressures, and changes to public health overall.
Surroundings	Ecosystem services such as shade, pollution control, and erosion control, public safety and security, access to and use of the natural and built environment, and aesthetic value and amenity.
Livelihoods	People's capacity to sustain themselves through employment or business, whether they experience personal breach or disadvantage, and the distributive equity of impacts and benefits.
Decision-making systems	Particularly whether people experience procedural fairness, can make informed decisions, can meaningfully influence decisions, and can access complaint, remedy and grievance mechanisms.

A social risk assessment was performed that considered each of the social impacts identified and predicts the nature and scale of potential social impacts during the life and closure of the quarry. A social risk approach is used to assess the consequences and likelihood of potential positive and negative social impacts with and without mitigation. The social risk assessment matrix used for the assessment was adapted from the SIA Guideline and the SIA Guideline Technical Supplement.

The following tables are sourced from the DPIE SIA Guideline Technical Supplement (2021) and used to evaluate the likely impacts (positive and negative) of the development.

Table 7-48: Defining Likelihood Levels of Social Impacts

Likelihood Level	Meaning
Almost certain	Definite or definitely expected (e.g. has happened on similar projects)
Likely	High probability
Possible	Medium probability
Unlikely	Low probability
Very unlikely	Improbable or remote possibility

Table 7-49: Characteristics of Social Impact Magnitude

		Meaning
Magnitude	**Extent**	Who specifically is expected to be affected (directly, indirectly, and/or cumulatively), including any potential vulnerable people? Which location(s) and people are affected? (e.g. near neighbours, local, regional).
	Duration	When is the social impact expected to occur? Will it be time-limited (e.g. over particular project phases) or permanent?
	Severity or scale	What is the likely scale or degree of change? (e.g. mild, moderate, severe)
	Sensitivity or importance	How sensitive/vulnerable (or how adaptable/resilient) are affected people to the impact, or (for positive impacts) how important is it to them? This might depend on the value they attach to the matter; whether it is rare/unique or replaceable; the extent to which it is tied to their identity; and their capacity to cope with or adapt to change.
	Level of concern / interest	How concerned/interested are people? Sometimes, concerns may be disproportionate to findings from technical assessments of likelihood, duration and/or intensity.

Table 7-50: Defining Magnitude Levels for Social Impacts

Magnitude Level	Meaning and Examples
Transformational	Substantial change experienced in community wellbeing, livelihood, infrastructure, services, health, and/or heritage values; permanent displacement or addition of at least 20% of a community.
Major	Substantial deterioration/improvement to something that people value highly, either lasting for an indefinite time, or affecting many people in a widespread area.
Moderate	Noticeable deterioration/improvement to something that people value highly, either lasting for an extensive time, or affecting a group of people.
Minor	Mild deterioration/improvement, for a reasonably short time, for a small number of people who are generally adaptable and not vulnerable.
Minimal	Little noticeable change experienced by people in the locality.

Table 7-51: Social Impact Significance Matrix

		Magnitude Level				
		1	**2**	**3**	**4**	**5**
Likelihood level		Minimal	Minor	Moderate	Major	Transformational
A	Almost certain	Low	Medium	High	Very High	Very High
B	Likely	Low	Medium	High	High	Very High
C	Possible	Low	Medium	Medium	High	High
D	Unlikely	Low	Low	Medium	Medium	High
E	Very unlikely	Low	Low	Low	Medium	Medium

Way of Life

Construction

Amenity impacts can occur in different forms. One of the most noticeable forms is noise and accompanying vibration. Noise can interfere with daily life and can disturb sleep patterns. The noise from construction has the potential to impact the local amenity for the neighbouring residents.

For the purposes of this assessment, there are two elements to the construction phase. The first is the construction around the proposed quarry and the preparations to begin extracting the resource material. This will involve earthworks to prepare the quarry and stockpile sites, installation of the weighbridge, office, maintenance sheds and the construction of internal roads and water management ponds.

Noise modelling indicates the shape of the valley and elevated ridgelines contain much of the noise. There is noise that travel across Deep Creek to a neighbouring property. However, there is an agreement in place to purchase this property should the quarry be approved.

The second element of construction noise is the installation of the private access road. The new road will connect the quarry site directly to The Bucketts Way. Associated with the road construction are earth works, compacting and laying of the bitumen surfacing. Noise is sometimes accompanied by vibration, especially when constructing new roads that need tamping and compaction of soil. The noise and vibration could impact the local amenity for the duration of the construction period. This specifically relates to three properties potentially impacted by road construction noise.

Recent research from the ABS indicates that there is an increased number of people working from home because of Covid-19 (ABS 2021). With this short term increase in the number of people working from home, there is an increased potential for noise to impact people during the day during construction.

The noise impacts on the local amenity are expected to continue for the duration of the construction phases of the project. The construction period is expected to last for 12 weeks. Even though these impacts are temporary, they will occur daily until construction is completed.

The likelihood of impacts from noise during the construction period is almost certain. The magnitude of the impacts would be minor with noticeable deterioration to a valued amenity. The unmitigated impact on three properties related to noise through construction of the access road has been assessed as Medium A2.

Operation

After the initial construction period, there will be ongoing operations for the duration of the quarry's life. The ongoing impacts to the way of life would primarily be noise from the quarry activities which include traffic and quarry works.

The most significant impact would be the daily traffic along the roads leading into the quarry. This will occur daily (Monday-Saturday) with peak truck movements likely in the morning (but depending on demand). The NVIA has concluded that the traffic would not exceed noise criteria. Even though the amount of noise generated from the quarry traffic does not exceed criteria, it will increase daily traffic and the existing sound levels experienced by neighbours. This increase in noise will have a limited affect and impact three residences adjacent to the private access road. There may be residual impacts along The Bucketts Way as traffic increases due to the quarry operations.

The ongoing quarry works that impact the way of life include blasting, drilling, and crushing material. The drilling and blasting could occur approximately twice per month but has the potential to impact residents located farther away than other quarry workings. The crushing of quarried material generates the most noise on a daily occurrence. The NVIA has modelled the noise and concluded that noise from ongoing operations will not exceed criteria related to noise at any of the residences. As stated earlier, even though the noise does not exceed triggers for amenity or intrusiveness criteria (as described in the NVIA), there may be a change in noise levels, especially around blasting.

It should be noted that the amenity and intrusiveness criteria were determined from the existing acoustic environment. Noise levels were measured, and 5 dB(A) added to the value. In this case the baseline reading was taken from a residence near The Bucketts Way (R33), which gave a baseline reading of 35 dB(A). Therefore, the trigger values used were 40 dB(A). This method is in accordance with NSW guidelines and indicates compliance.

However, with no baseline measurements taken from other locations, the change in noise levels for receptors located away from The Bucketts Way is unknown.

While noise for residents along Forest Glen Road, for example, is below criteria, still represents a change and therefore a potential impact.

The likelihood of impacts from noise during the operation is possible. The magnitude of the impacts would be minor with mild deterioration to a valued amenity. The unmitigated impact related to traffic and operational noise has been assessed as Medium C2.

Community

Community Character and Cohesion

Community character refers to aspects of place, people and areas that are unique to a town with distinguishing characteristics differing from surrounding locations. The introduction of a new industry, infrastructure growth and traffic can potentially impact such characteristics. These can lead to the loss of community character, which can lead to residents feeling alienated from their local surroundings.

Social cohesion refers to the degree of solidarity and connectedness within a group or community. This is reliant upon the relationships among the members of the community to create a sense of belonging to the group or area. Building social cohesion within a community requires engagement with the local community to develop long-term partnerships. Although difficult to quantify, interviews with local residents indicate there is some community cohesion through helping each other in times of difficulty and knowing each other as neighbours. Rates of volunteering is often used as a measure of social cohesion within a community. In the local area, the rate of volunteering was 16.5%. This rate is lower than the regional area (20.7%) and NSW (18.1%), providing an indication of social cohesion and willingness to help each other in the local community.

The likelihood of impacts on the community character due to the introduction of a quarry is unlikely. The magnitude of impacts would be minor. Therefore, the unmitigated risk of impacts on character of the community has been assessed as Low – D2.

Sense of Place

Consultation conducted for the SIA found that people within the local area valued the rural character and bushland landscape of the area. A major factor in defining sense of place by respondents was the visual character of the landscape and the quietness of the area. In this instance the perceived visual character plays a large part in impacts to sense of place. Even though the quarry is situated in a place where it will have no visual impacts to the adjacent community members, there was concern over degrading the visual landscape by some community members.

Sense of place is not just impacted by the visibility of the activity itself or the physical change in land use, but also the visibility of workers and trucks travelling to and from the quarry site. Any impact from workers and trucks entering and leaving the site should be limited to vehicles travelling along the private access road. While these vehicles are on The Bucketts Way, the noise and movement will merge with the existing traffic.

It is apparent that the knowledge of the existence of a quarry is a main driver of community concern. Even though specialist studies show that there will be very little change to the visible and audible landscape from the surrounding residents and community, there is concern over the quarry regarding the rural landscape and diminishing the value of place.

The likelihood of impacts on the sense of place due to the quarry is unlikely. The magnitude of impacts would be minimal. Therefore, the unmitigated risk of impacts on character of the community has been assessed as Low – D1.

Accessibility

Vehicles are used as the main mode of transport for residents and commuters in the local and regional areas. The Bucketts Way is the main road through the area, carrying all of the traffic heading north and south.

The construction activity for the new intersection onto The Bucketts Way will have a temporary impact on local traffic and access. The construction is anticipated to last for 12-week. Because this road is the main road serving the area, the construction has the potential to cause disruption and delays for travellers.

The construction of the intersection also has the potential to impact the access for four residences located nearby. One of these residences is adjacent to the proposed intersection. Construction traffic is a short-term impact usually lasting for the duration of the construction period. The impact is best mitigated through the preparation and implementation of a Construction Traffic Management Plan.

The likelihood of impacts on traffic from construction is almost certain. The magnitude of impacts is moderate. The risk of impacts on traffic from construction is rated as High – A3.

After the construction of the intersection is complete, the traffic caused by the quarry is not anticipated to impact on accessibility. The TIA states that the existing road network has the capacity to absorb the amount of traffic generated by the proposed quarry.

The TIA indicates there will be an increase in the number of vehicles on The Bucketts Way that may impact on traffic efficiency. However, the road network will not reach its technical capacity and the intersection with the Pacific Highway will only have average delays (as currently experienced). The intersection of the private access road and The Bucketts Way

The likelihood of ongoing traffic impacts after construction is finished is unlikely. The magnitude of impacts is minor. The risk of ongoing impacts on traffic is rated as Low – D2.

Culture

The ACHA indicates a potential importance to the site due to its location near a watercourse. It further recommends that any artefacts found during the construction process be collected and buried in an area that can be protected in perpetuity. The reburial location(s) would be selected in consultation with the community.

The Historic Heritage Assessment that was conducted concludes that based on the historic record and a physical inspection there is no heritage of significance.

The likelihood of impacts on culture is unlikely. The magnitude of impact would be minor. As such, the impact on culture is rated as Low – D2.

Health and Wellbeing

A Noise and Vibration Impact Assessment has been conducted for the development. However, it is silent when it comes to construction noise levels and impacts on the surrounding community. Given the proximity of the new private access road and intersection, some impacts related to noise during construction are anticipated.

The construction is expected to occur during normal construction hours (7:00am – 6:00pm Monday - Friday, and 8:00am – 1:00pm Saturday). Even though the noise is anticipated to occur during daylight hours, exposure can cause stress and anxiety which could lead to longer term health impacts.

Prolonged exposure to noise can also disturb sleep rhythms and cause irritation, cognitive impairment and decreased mental wellbeing. This is especially true for those who are vulnerable to health impacts, such as the younger and older demographic. The local area population is made up of approximately 6.2-9.3% children four years and younger, and 5.0-6.7% of people 75 years and older. This indicates that a portion of the population is susceptible to noise impacts. The local area also has a higher proportion of people with profound or severe disability in the community, and people with psychological stress than in NSW. These groups of individuals are also susceptible to noise impacts.

Given the population susceptible to impacts in the local area, construction noise will most likely result in health and wellbeing impacts.

The likelihood of these impacts is possible, and the magnitude would be minor. Therefore, the health and wellbeing impacts from construction noise are assessed as Medium – C2.

During construction phases, there is the possibility of increased dust and emissions levels from construction activities and vehicles.

The population at most risk to particulate pollution include children, older adults and those who suffer from asthma, heart, or lung disease. Asthma is also used as an indicator of a community's respiratory health. In the local area there is a higher proportion of people who suffer from asthma than in NSW.

A small number of neighbours may be impacted by dust and diesel emissions during construction of the access road. The emissions and dust due to the construction of the access road and intersection are not included in the assessment. Even though these are a temporary potential impact, construction emissions still have the potential to exacerbate health and wellbeing of nearby neighbours due to changes in air quality during construction.

Health impacts from air quality associated by construction activities are likely. The magnitude of the impact would be minor. The impact of construction dust and emissions from construction is assessed at Medium – B2.

Air pollution made up of particles can impact respiratory and cardiovascular health. Dust and emissions from internal combustion engines contribute to the airborne particulate.

The population at most risk to particulate pollution include children, older adults and those who suffer from asthma, heart or lung disease. Asthma is also used as an indicator of a community's respiratory health. In the local area there is a higher proportion of people who suffer from asthma than in NSW.

Some respondents to the consultation identified dust and diesel emissions as a main health concern. As indicated earlier, the air quality modelling for the development does not predict an exceedance of the relevant pollutant impact assessment criteria at the residential receptors. There is one resident next to the private access road alignment who has reported a sensitivity to diesel fumes. Because of the resident's concern, the development has realigned the access road 190m further away from this resident's boundary to minimise potential impact to this residence.

It should be noted that the dust and vehicle emissions modelled in the Air Quality Impact Assessment (AQIA) are for the operation stage of the project. The AQIA only states that the "report has assessed the potential air quality impacts associated with the proposed construction and operation of the Deep Creek Quarry" (Todoroski, 2021, p34). Based on the AQIA, the quarry would not exceed health-based criteria for air quality. The modelling predicts that all the assessed air pollutants generated by the operation of the quarry would comply with the applicable assessment criteria at the assessed receptors, and therefore would not lead to any unacceptable level of environmental harm or impact in the surrounding area.

Nevertheless, the site would apply appropriate dust management measures to ensure it minimises the potential occurrence of excessive air emissions from the site. Overall, the assessment demonstrates that the proposed quarry can operate without causing any significant air quality impact at residential receptors in the surrounding environment, noting one stakeholder will be significantly impacted.

Health impacts from air quality caused by operations activities are likely. The magnitude of the impact would last for an extended period but for a small group of people therefore would be moderate. The impact of operational dust and emissions is assessed at High – B3.

Surroundings

Visual Amenity

The visual amenity of the local area was identified as an important element of the local character during the consultation process. Residents spoke of the proposed quarry impacting bushland character and presenting a negative visual impact within the landscape.

A Visual Impact Assessment (VIA) was undertaken by Mara Consulting to identify any impacts on the visual character of the landscape that might be caused by the proposed quarry. The VIA findings were that the quarry site would not be visible from any of the residences or public viewpoints (except a short section at the end of Deep Creek Road). The landform was such that the workings of the quarry would only be visible from the portion of Deep Creek Road that is adjacent to the quarry pit.

The likelihood of impacts to visual amenity from the quarry would be very unlikely. The magnitude of the impact would be minimal because of the surrounding landform and bushland. The impact of the quarry on visual amenity is assessed at Low – E1.

According to the VIA, the most significant visual impact was determined to be the new quarry access road, especially where it meets The Bucketts Way. The findings of the VIA were that the impact would be moderate where the new road will be installed. The rest of the pdevelopment's visual impact would be low. To reduce the visibility of the roadway, a landscape buffer was recommended to screen it from a private dwelling to the north

The visual amenity is not just impacted by the visibility of the activity itself or the physical change in land use, but also the visibility of workers and trucks travelling to and from the quarry site. The TIA estimates there would be 55 trucks leaving the quarry on an average day (110 during peak demand), with the peak hour volume of 20 trucks leaving the quarry.

The likelihood of impacts to visual amenity due to the access road would be almost certain. The magnitude of the impact would be minor. The impact of the access road on visual amenity is assessed at Medium – A2.

Habitat

The impacts to the local ecology has been assessed in the Biodiversity Development Assessment Report by Kleinfelder (2020). The report identifies potential impacts on native flora and fauna.

Members of the community have expressed concern over the potential loss of Koala habitat due to the proposed quarry location.

The assessment determined that the quarry would impact on 29.02 Ha of Koala habitat within the 308 Ha property. A Koala Plan of Management has been developed for the quarry and is available as Appendix 10 of the BDAR (Appendix L). Management measures will be in place during the construction and operation of the proposed quarry to minimise the impacts. Measures are likely to include preclearing surveys, supervised clearing, vehicle speed management and inductions for all staff, truck drivers and contractors. Offsets will include both long term protection of adjacent quarry-owned land and purchase of offset credits from the local area.

The likelihood of impacts to habitat would be almost certain. The magnitude of the impact would be minor. The impact of the access road on habitat is assessed at Medium – A2.

Water Quality

According to the representative from MidCoast Water, the residents of Limeburners Creek and Allworth suburbs rely on rainwater as their water source. Some properties have bores for groundwater as well.

This reliance on rain and groundwater means the community is susceptible to impacts due to water contamination.

A Groundwater Assessment was undertaken to identify and assess the water quality impact that the quarry might have on the groundwater. It assessed the risk as 'low' with no significant impact to the groundwater systems.

In addition to the groundwater assessment, a Surface Water Impact Assessment (SWIA) was conducted. It found that the quarry would have minor impacts on the annual flow volumes in Deep Creek, but this would have a negligible impact on the flow regimes. The results would have a minor potential to impact downstream riparian ecology.

Impacts on water quality, bodies and hydrological processes that sustain the ecological communities have also been identified. With the management systems in place, the surface water quality due to sediment and contaminant run-off will be contained.

The likelihood of impacts to water quality would be unlikely. The magnitude of the impact would be minor. The impact of the development on water quality is assessed at Low – D2.

Livelihood

Economic Outcomes in Relation to Construction

The capital investment report by Goeldner Consulting indicate an investment of $5.84 million into the proposed quarry development. Within the local area 11.4% of the population work in the construction industry. Approximately 20 full-time equivalent (FTE) workers are estimated to support the project in the first year of construction (AEC Economic Assessment). Additionally, workers on site may frequent local businesses and therefore increase local income and employment opportunities in the local area.

Aside from employment and benefits to local supply chain businesses, there is no planned investment into the community, however, the proponent has expressed a willingness to consider requests for support where they are made. And during the consultation process, community members indicated that local community groups, emergency services and athletic clubs could be supported to offset the impacts to the community.

The likelihood of positive economic outcomes would be almost certain. The magnitude of the impact would be minor. As such, the economic outcome related to the development is assessed as Medium – A2 benefit.

Ongoing financial benefits to the region are estimated at $2 million in wages and salaries (this includes direct and flow-on activity). The economic assessment by AEC states there will be approximately $8.5 million annually to the economy flowing from both direct and flow-on impacts. It also comments that over 91% will remain in the local catchment. Approximately 17 jobs will be created in 2023-24 increasing to 31 jobs in2043-44 through to 2050-51 and then falling to 26 as production slows and decommissioning and rehabilitation starts.

During operations, the Project is estimated to support approximately $15.7 million in business revenues per annum on average in the Catchment through direct and flow-on activity, with a further $1.3 million in revenues supported for businesses in the rest of NSW. The lifecycle for this project is approximately 30 years.

The likelihood of positive economic outcomes would be almost certain. The magnitude of the impact would be moderate. As such, the economic outcome related to the development is assessed as High – A3 benefit.

Decision Making Systems

During the engagement process, it was clear there was a disconnect between the development and some community members. As noted in the consultation themes, stakeholders rely on word-of-mouth information from neighbours and community groups. Additionally, there were concerns about the level of broader consultation, that opportunities for feedback had been rush and the only chance to participate. Including these stakeholders in ongoing communication will help to allay concerns.

COVID-19 added complexity to the engagement activities. As cases were rising in the community, it was decided face-to-face activities would be limited. Subsequently, in-depth interviews were via video or telephone and the information session was online, with the video and materials provided after on the project website. Many community members felt the lack of adequate internet access were limiting effective engagement. Using a range of proactive communication tools is important for effective relationship building through the life of the development.

There was a sense that stakeholders may have felt marginalised as they are not the ultimate decision maker. Part of the operational engagement plan should be to regularly communicate with those affected and interested in the development. Developing proactive communication and engagement activities that includes opportunities for neighbouring properties and other key stakeholders to participate in the project and providing feedback mechanisms, should be considered. For example, consultative committee or reference group that includes representatives and neighbours. By including neighbours and community representative, it should reduce the number of people who feel disengaged.

Additionally, given the high levels of engagement with the project engagement platform (website), which had received approximately 3000 visits to the page at the time writing this report, a project website is recommended as an ongoing communication channel for notifications and updates about the development.

The likelihood that stakeholders feel disengaged and unsupportive of the development is likely, however with ongoing communication and engagement, the impact would be moderate. As such, the impact is assessed as High – A3.

Residual Impacts Post Management

The impacts detailed throughout Section 7.14.5 are pretreatment. That is, they are the impacts prior to mitigation and management measures, as described throughout this EIS. Once these measures are applied, negative social impacts can be reduced, and positive social impacts can be enhanced. Table 7-52 provides social management and mitigation measures and provides an assessment of residual impacts post mitigation and management. It also identifies the residual social impact significance. Following the review of social impacts identified during this assessment, while the quarry presents a change to the community, the social impacts can be managed.

Table 7-52: Identified Impacts and Post Management Significance

Potential impact on people	Significance rating +/- Likelihood level A-E; Magnitude level 1-5	Mitigation and management measures	Residual impact significance rating +/- Likelihood level A-E; Magnitude level 1-5	Monitoring

WL-1: Construction activity will have a negative impact on the amenity of the area.	**(-) Medium A2**	• Implement Construction Management Plan (CMP) prior to the start of construction
		• Work within standard construction hours
		• Proactively communicate with directly impacted residents about construction and noisy works in particular
		  ○ Prior to site establishment
		  ○ Prior to high impact works
		• Use toolbox talks and similar tool to communicate and educate contractors what expectations are when managing noise and vibration on the project site
		• Notify directly impacted stakeholders that there is a potential for noise and vibration from construction activities
		• Proactively manage issues, with nearby residents to avoid escalation to complaints
		• Maintain a complaint process during construction
			(-) Medium A2	• Measures to be included in CMP including complaints and issues management

WL-2: Ongoing operation activity will have anegative impact on the amenity of the area.	**(-) Medium C2**	• Ongoing communication with neighbouring community • Proactively manage issues, with nearby residents to avoid escalation to complaints • Establish a complaints procedure	**(-) Medium C2**	• Monitor noise levels regularly, as per the NVIA • Monitor and record complaints line

Potential impact on people	Significance rating +/- Likelihood level A-E; Magnitude level 1-5	Mitigation and management measures	Residual impact significance rating +/- Likelihood level A-E; Magnitude level 1-5	Monitoring
COM-1: The introduction of a quarry into the local area will impact on the community character and cohesion.	**(-) Low D2**	• Develop Community Engagement Plan (CEP) identifying proactive and ongoing engagement and communication strategy to build positive relationships with surrounding stakeholders • Establish consultative committee or reference group • Ongoing communication with neighbouring community including creating a project website with regularupdates • Proactively manage issues, with nearby residents to avoid escalation to complaints • Investigate opportunities for inviting community members to participate on consultative committee orreference group	**(-) Low D2**	• Implement community engagement plan • Consultative committee established withregular meetings • Website built with regular updates • Reduced number of complaints • Number of community members participating in committees or referencegroups
COM-2: The proposed quarry will impact on the community's sense of place.	**(-) Low D1**	• Maintain bushland around the Project site • Install visual screening (planting) along access road • Maintain a clean site by removing rubbish from the roadway and minimising dust	**(-) Low D1**	• Biodiversity offsets secured • Ongoing conflict resolution via complaints procedure
ACC-1: Increase in traffic during construction. Construction works for the new private roadand intersection will impact on access to the local area.	**(-) High A3**	• Develop a traffic control plan in consultation with relevant authorities, to minimise road and traffic disruptionsfor residents and business • Provide advance communication (i.e. signage, notification materials) about changes to local access, potentialroad hazards (if required) • Post traffic complaints number for the project	**(-) High B3**	• Measures to be included in CMP including complaints and issues management • Follow the traffic control plans

Potential impact on people	Significance rating +/- Likelihood level A-E; Magnitude level 1-5	Mitigation and management measures	Residual impact significance rating +/- Likelihood level A-E; Magnitude level 1-5	Monitoring
ACC-2: Increase in traffic due to quarryactivity. Ongoing quarry activity will increase localtraffic and impact on access.	**(-) Low D2**	• Ongoing communication with neighbouring community • Proactively manage issues, with nearby residents to avoid escalation to complaints • Establish a complaints procedure	**(-) Low D1**	• Implement traffic management strategy • Ongoing conflict resolution via complaints procedure
CUL-1: Cultural and heritage appreciation.The Proposal will impact on the cultural heritage of the site.	**(-) Low D2**	• Engage with local Indigenous community to locate and handle potential cultural artefacts appropriately	**(-) Low E2**	• Maintain an artefact register

HWB-1: Noise from construction activitieswill negatively impact the health and wellbeing of surrounding residents.	**(-) Medium C2**	• Implement CMP
		• Notify directly impacted stakeholders that there is a potential for noise and vibration from constructionactivities
		• Proactively communicate with residents, and surrounding community about construction and noisy works in particular
		  ○ Prior to site establishment
		  ○ Prior to high impact works
		• Use toolbox talks and similar tool to communicate and educate contractors what expectations are whenmanaging noise and vibration on the project site
		• Notify directly impacted stakeholders that there is a potential for noise and vibration from constructionactivities
		• Maintain a complaint process during construction
		• Noise monitoring and reporting
			(-) Medium C2	• Measures to be included in CMP including complaints and issues management
				• Follow CMP recommendations
				• Monitor noise levels
				• Monitor and record complaints line

Potential impact on people	Significance rating +/- Likelihood level A-E; Magnitude level 1-5	Mitigation and management measures	Residual impact significance rating +/- Likelihood level A-E; Magnitude level 1-5	Monitoring
HWB-2: Dust and emissions related to construction resulting in health impacts ofnearby residents.	**(-) Medium B2**	• Implement CMP • Notify directly impacted stakeholders when there is a potential for emissions from construction activities • Monitor particulate and emissions levels • Complaint line during construction	**(-) Medium B2**	• Measures to be included in CMP including complaints and issues management • Follow CMP recommendations • Monitor particulate and emissions levels • Monitor and record complaints line
HWB-3: Dust and emissions related to theongoing operation resulting in health impacts of nearby residents.	**(-) High B3**	• Notify and liaise directly impacted stakeholders • Landscape works along the access road installed early in the project, potentially using mature vegetation • Monitor particulate and emissions levels • Proactively manage issues, with nearby residents to avoid escalation to complaints	**(-) Medium B2**	• Monitor particulate and emissions levels regularly • Monitor and record complaints line

Potential impact on people	Significance rating +/- Likelihood level A-E; Magnitude level 1-5	Mitigation and management measures	Residual impact significance rating +/- Likelihood level A-E; Magnitude level 1-5	Monitoring
SUR-1: Visual impact of quarry: The proposed quarry will negatively impacton the aesthetic value and amenity.	**(-) Low E1**	• Where possible maintain bushland around the quarry area • Keep quarry workings below ridgelines	**(-) Low E1**	• Follow project plans • Monitor rehabilitation of disturbed areas
SUR-2: Visual impact of access road: The proposed access road will negatively impact on the aesthetic value and amenity	**(-) Medium A2**	• Establish landscape screening as soon as possible • Maintain landscape along access road • Manage the timing and number of trucks entering and leaving the quarry site	**(-) Medium B2**	• Monitor and replace screening plants along roadway

Potential impact on people	Significance rating +/- Likelihood level A-E; Magnitude level 1-5	Mitigation and management measures	Residual impact significance rating +/- Likelihood level A-E; Magnitude level 1-5	Monitoring
SUR-3: Impacts on habitat: The proposed quarry will impact on habitatareas and reduce biodiversity of the site.	**(-) Medium A2**	• Follow Koala Plan of Management during construction and operations phases • Biodiversity offsets where required • Moving wildlife prior to works • Minimise impacts to trees, particularly hollow bearing trees and habitat where possible • Develop a vegetation management plan to ensure native vegetation outside the quarry footprint are protected	**(-) Medium B2**	• Monitor per Koala Plan of Management • Monitor per vegetation management plan
SUR-4: Water quality: The proposed quarry will impact negativelyon water quality	**(-) Low D2**	• Implement water quality management plan	**(-) Low D2**	• Monitor per water quality plans • Monitor complaints and record numberof complaints

Potential impact on people	Significance rating +/- Likelihood level A-E; Magnitude level 1-5	Mitigation and management measures	Residual impact significance rating +/- Likelihood level A-E; Magnitude level 1-5	Monitoring
LIV-1: Economic outcomes: Construction will provide a number of directand indirect jobs and benefit a range of individuals and businesses.	**(+) Medium A2**	• Investigate opportunities to use local contractors and suppliers of material and services • Proactively employ local personnel where possible	**(+) High A3**	• Monitor the number of local contractors / businesses engaged in the construction process
LIV-2: Economic outcomes: The operation will provide a long-term economic injection into the community through direct and indirect jobs and opportunities for businesses.	**(+) High A3**	• Investigate opportunities to use local contractors and suppliers of material and services • Proactively employ local personnel where possible • Investigate opportunities to invest in local community (for example: local groups, emergency services and athletic clubs)	**(+) High A3**	• Monitor the number of local contractors / businesses engaged in the construction process

Potential impact on people	Significance rating +/- Likelihood level A-E; Magnitude level 1-5	Mitigation and management measures	Residual impact significance rating +/- Likelihood level A-E; Magnitude level 1-5	Monitoring
DEC-1: Ineffective engagement with surrounding community will result in alienating stakeholders who may becomeunsupportive	**(-) High A3**	• Proactive and ongoing engagement and communication strategy to build positive relationships withsurrounding stakeholders • Establish consultative committee or reference group • Ongoing communication with neighbouring community including creating a project website with regularupdates • Proactively manage issues, with nearby residents to avoid escalation to complaints • Investigate opportunities for inviting community members to participate on consultative committee orreference group	**(-) High B3**	• Implement community engagement plan • Consultative committee established withregular meetings • Website built with regular updates • Reduced number of complaints • Number of community members participating in committees or reference • groups

7.14.6 Mitigation and Management Measures

A range of mitigation, management and enhancement measures based on the impacts associated with the development is presented below. These are intended to reduce the negative impacts of the quarry and enhance the positive ones.

Pre-Construction

- Proactive communication and engagement with neighbours, the community and Council around the development prior to site establishment. Measures could include newsletter and construction updates on the scope of the project, likely high impact activities (noise, vibration, traffic and changes to the landscape), and contact details for inquiries and complaints
- Meetings/presentations with neighbouring properties and community groups prior to construction should also be considered
- Develop an inquiry and complaint process for the construction period
- Engage with the local community and neighbours to develop a working relationship to disseminate information during and after construction.

Construction Phase

A Construction Management Plan (CMP) should be prepared that incorporates the findings of the various project technical studies in relation to communication and notifications. The CMP should detail proposed management and mitigation measures for the identified impacts including:

- Amenity impacts including noise monitoring, buffers for visual impacts
- Traffic management
- Site safety and management
- Health impacts – noise, dust, and emissions
- Heritage management including unexpected finds procedure
- Complaints management process
- Ongoing communications with the community around the project to keep residents updated on construction scheduling. This may include signage, notifications, and other appropriate communication channels.
- Investigate opportunities to use local contractors, suppliers, and service providers.

Operational Phase

- Develop Community Engagement Plan (CEP) identifying proactive and ongoing engagement and communication strategy to build positive relationships with surrounding stakeholders
- Establish consultative committee or reference group
- Ongoing communication with neighbouring community including creating a project website with regular updates and blasting notifications
- Landscape works along the access road installed early in the project, potentially using mature vegetation
- Monitor particulate and emissions levels
- Proactively manage issues, with nearby residents to avoid escalation to complaints
- Investigate opportunities for inviting community members to participate on consultative committee or reference group
- Ongoing engagement with the community, hosting events and open days
- Inquiries and complaints management process.

7.15 REHABILITATION STRATEGY

7.15.1 Introduction

A rehabilitation strategy has been developed which considers the findings of the various technical studies performed. This section of the EIS presents that rehabilitation strategy and summarises the objectives and methods required to successfully implement it. The full rehabilitation strategy is available within the Land Use, Soils and Rehabilitation Report (LSRR) provided in Appendix T.

Rehabilitation of the development will initially be limited to areas of immediate disturbance such as road batters, access road construction and sediment dams. Progressive rehabilitation of the quarry benches will occur as they become available, with the majority of the rehabilitation taking place at the completion of resource extraction when the quarry floor, stockpile areas, and portions of the infrastructure areas will be rehabilitated.

7.15.2 Rehabilitation Objectives and Final Land Use

The objective of the rehabilitation, and the nominated final land use, will be to return the land to a stable, safe, non-polluting landform able to support self-sustaining native vegetation and agriculture in the form of pasture for grazing. The final landform is presented in Figure 9. Native revegetation will draw upon species that have been recorded on site, from two communities that, from vegetation mapping prior to quarry operation, were shown to occupy the area requiring rehabilitation.

7.15.3 Integration of Rehabilitation

The integration of rehabilitation can happen at various stages of the development:

- Consideration should be given to allowing seed collection especially prior to active operations, but also in advance of vegetation clearing operations, allowing for seasonality and availability of seeds
- Topsoil stockpiling should be limited to as short a time as possible, subject to operational requirements. Ideally, topsoil is direct transferred (i.e. stripped and replaced in days to weeks) to reduce degradation of the soil microbial community and seedbank propagules. However, especially in the early days of a mining/quarrying operation before there are areas ready for rehabilitation, topsoil will need to be stockpiled for extended periods of time up to years in duration
- Shade tree patches will consist of stands of native tree species over native grasses or exotic pasture. These will be monitored by observation. The same patches will be monitored to provide consistency with a data set collected as follows:
    - Tree number and species (should be known from rehabilitation data)
    - Height of trees – to determine growth
    - General health of trees
    - Ground cover under the canopy - determined as a general observation
    - Weed presence and species
- Rehabilitation flora monitoring will be conducted annually
- Progressive rehabilitation of the quarry benches will occur as they become available, with the majority of the rehabilitation taking place at the completion of resource extraction when the quarry floor, resource stockpile areas, and the infrastructure areas will be rehabilitated.

7.15.4 Rehabilitation Methodology

Plant Community Types

The Biodiversity Assessment Development Report (BDAR) prepared for the quarry, recorded four native plant community types (PCTs) (Table 7-53). Where revegetation is slated to return to native woodland, species assemblages will be sourced from these communities. PCTs for rehabilitation will be chosen firstly using the corresponding location i.e., if that community was cleared from the extraction area, as far as possible that community will be revegetated in that area, secondly the vegetation community that is best suited to the final landform drainage and soil depth (i.e., vegetation communities suited to dryer and shallower soils versus species suited to wetter and deeper soils). A species list suitable for revegetation is provided in Appendix 2 of the LSRR

(Appendix T). The species list was selected from a combination of the species recorded on site, listed as occurring in those PCTs (if not recorded on site) and that are commercially available or can be successfully collected on site. Flora species to be used for rehabilitation are further discussed in Appendix T.

Table 7-53: Plant Communities Recorded at the Development Site

PCT Number	PCT Name	Vegetation Formation
PCT – 1590	Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Dry Sclerophyll Forests (Shrub/grass sub-formation)
PCT – 1619	Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	Dry Sclerophyll Forests (Shrubby sub-formation)
PCT – 1567	Tallowwood - Brush Box - Sydney Blue Gum moist shrubby tall open forest on foothills of the lower North Coast	Wet Sclerophyll Forests (Shrubby sub-formation)
PCT – 1556	Tallowwood - Smooth-barked Apple - Blackbutt grass tall open forest of the Central and lower North Coast.	Wet Sclerophyll Forests (Shrubby sub-formation)

Methodology

The rehabilitation will use topsoil that has been stripped from site and stockpiled until required followed by seeding with the appropriate vegetation community – woodland or native grassland or exotic pasture. Indicative topsoil volumes required and available on site are provided in Appendix T.

Generally, the process of revegetation is as follows:

- During extraction, blasting may be engineered to fracture the quarry floor to allow application of a friable subsoil layer to improve root penetration and drainage that will improve establishment of grassland and particularly the areas of woody vegetation
- Immediately prior to topsoil spreading, the area will either:
    - be ripped to provide a friable subsoil layer to allow for water and root penetration,
    - or sufficient growth media in the form of subsoil or topsoil will be applied to allow for water accumulation and root development
- Topsoil will be re-spread by machine over the areas to a depth of between 100 mm and 200 mm subject to availability, areas such as the quarry benches would benefit from application of deeper quantities
- Once topsoil has been respread, seed will be broadcast using the equipment/machinery adequate for the area, i.e., batters and the quarry floor (once extraction has ceased) may be able to be seeded using tractor mounted equipment, or where areas are small or difficult to access, seed will require manual seeding either by hand or by “belly-seeders”
- Seed for the revegetation will be purchased from commercial seed suppliers where available, but for greater diversity a few species will be required to be collected from site prior to clearing
- Seed application is the preferred method of revegetation establishment, but tubestock supplied by a recognised native plant nursery can be used if conditions are appropriate (e.g., revegetation of creek lines, visual amenity screens and shade tree patches on the quarry floor)
- The quarry floor is anticipated to consist of hard rock with a shallow topsoil layer. The hard rock floor should be ripped or fractured (as above) to provide a friable subsoil layer to improve root penetration and drainage that will improve establishment of grassland and woody vegetation. Where shade trees are to be established in patches, the subsoil will require extra work to allow for the establishment of deeper root systems for stability. This will be accomplished by ripping / fracturing the quarry floor to a depth of 1 m.

A major issue to be considered with the revegetation of the quarry floor and the benches is hard rock underlying any rehabilitated surface where topsoil has been applied. As stated in the above points, topsoil depth and/or the ability of plant root systems to penetrate into the subsoil is crucial to ensure plant survival – accessing water – and support for the root systems, especially for canopy species. If the planted trees cannot get adequate ground penetration of their major roots, they be become susceptible to toppling as they age.

Indicative Topsoil Volumes

It has been conservatively estimated that approximately 21.2 ha of the quarry will be required to be revegetated. This results in between 21, 200 m^3 (at 100 mm average soil depth) and 106,000 m^3 (at average depth of 500 mm). Table 7-54 presents the estimated topsoil volumes required for revegetation in each area of the proposed quarry.

Table 7-54: Indicative Volumes of Soil Required for Revegetation of the Rehabilitated Areas

Area Name	Size (ha)	Topsoil Volume (m^3)	
		(100mm ave. depth)	(500mm ave. depth)
Main Stockpile	4.4	4,400	22000
Quarry Floor	13.7	13,700	68,500
Quarry Benches	3.1	3,100	15,500
Totals	21.2	21,200	106,000

Where revegetation is restricted to grasses only, a shallow application can be applied, native vegetation would benefit from deeper soil applications. However, with the stated aim to return the quarry floor to light grazing, greater productivity would be achieved with deeper soils allowing for greater water and nutrient retention.

The following monitoring methods are to be used depending upon vegetation type and size of area that has been rehabilitated. Rehabilitation flora monitoring will be conducted annually.

7.15.5 Monitoring Methodology

The following monitoring methods are to be used depending upon vegetation type and size of the area that has been rehabilitated. Rehabilitation monitoring will be conducted annually for both grassland and pasture and linear and patch areas.

Grassland and Pasture Areas

Where the area to be rehabilitated is of sufficient contiguous area (>1 ha), monitoring will be conducted by the establishment of permanent 20m x 20m flora quadrats. It is anticipated that only the quarry floor and product stockpile areas consisting of grassland or pasture rehabilitation areas will require this methodology. The number of quadrats to be established based on the Biodiversity Assessment Methodology (BAM) are for areas of >2 – 5 ha two quadrats, while areas of >5 - 20 ha require three quadrats. Therefore, the main product stockpile area will have two quadrats and the quarry floor will have three quadrats. Data collected within the quadrat will include the following:

- Species composition (including weed species)
- Total vegetation cover (% coverage) as a general observation
- Five 1m x 1m plots will be measured at random to determine detailed cover and litter build up
- Bare soil (if present).

Shade tree patches will consist of stands of native tree species over native grasses or exotic pasture. These will be monitored by observation. The same patches will be monitored to provide consistency with a data set collected as follows:

- Tree number and species (known from ecology survey data)
- Height of trees – to determine growth
- General health of trees
- Ground cover under the canopy - determined as a general observation
- Weed presence and species.

If the number of trees (deemed as canopy species at maturity) on the patch exceeds five individuals, then a minimum of five trees will be consistently monitored to provide representative examples of the tree patch. These

trees are to be marked with tape, paint or a peg to ensure that the same trees are measured in each monitoring event.

In addition, the quarry floor and product stockpile areas will have a walkover-style inspection conducted to identify weed areas, erosion, revegetation failure, fence condition, evidence of feral animal activity and any other feature or criterion requiring action to ensure successful rehabilitation.

Performance and Completion Criteria

The stated objective for a return to grazing will stipulate that revegetation will require a 100% vegetation coverage. Therefore, initial seeding should provide a high coverage (>75%) to be evaluated by monitoring. Successive monitoring events will demonstrate increases in coverage, with additional seeding to be conducted if vegetation has not become established. The number of patches and the number of individual paddock/shade trees will not be mandated, but each patch, when established is to be maintained. That is, if five trees are established in a patch, then five should be maintained whether by natural recruitment or the replacement by tubestock installation.

Completion criteria will therefore be achieved with 100% pasture establishment, with successful establishment of an indeterminate number of shade trees. No listed weeds, especially of woody weeds such as Lantana or Blackberry, or other noxious listed weeds in the MidCoast Council LGA.

Linear and Patch Areas

Areas of linear or patch rehabilitation will be monitored annually by the establishment of transects that run along the length of the feature. The transects will be a maximum of 25m in length. If batters or linear features are of insufficient length to fit this transect, then visual observations only will be made. Data collected for transects will be:

- Number of trees/shrubs within 1m either side of the transect – if they have been established
- Average height of each stratum i.e., canopy species, midstorey species and shrub species (if present)
- Cover to be measured using five 1m x 1m plots positioned at five-meter intervals, alternating either side of the transect to determine detailed cover and litter build up.

Performance and Completion Criteria

Performance and completion criteria will measure increasing vegetation and litter cover (if under trees), with completion assessed as 95% vegetation and/or litter cover – acknowledging that these areas may be more difficult to maintain coverage on due to potential shading in the case of patches under canopy, and ability to hold water in the case of batters. If total bare soil falls below the 95% threshold, then reseeding will be required. No listed or environmental weeds should be present.

Extraction Area Benches

The extraction area benches will be rehabilitated to native vegetation (see below for species) as they will be unsuitable for agriculture. Monitoring of benches can be difficult due to safety concerns of access. If access cannot be achieved, then visual inspection of the benches will be sufficient to determine if native vegetation has become established.

The benches should support native vegetation coverage equivalent to the Spotted Gum – Broad- leaved Mahogany- Red Ironbark shrubby open forest community or be demonstrated to be on trajectory to achieve this coverage as demonstrated by increases over the course of the monitoring.

Key Rehabilitation Learnings

Key learnings will come from the annual monitoring. The flora monitoring will provide data on performance of the rehabilitation as well as what if any parts need to be modified to meet rehabilitation criteria. This could include identifying weed areas, erosion, revegetation failure, fence condition, evidence of feral animal activity and any other feature or criterion requiring action to ensure successful rehabilitation.

7.15.6 General Rehabilitation Considerations

Seed Collection

Seed for native revegetation is sourced from commercial seed collectors and wholesalers and/or native plant nurseries and areas for collection can be difficult to find. Consideration will be given to allowing seed collection especially prior to active operations, but also in advance of vegetation clearing operations, allowing for seasonality and availability of seeds. Therefore, seed would then be available for use in the revegetation, providing an excellent outcome with provenance seed and increased diversity in the revegetation.

Topsoil Stockpiling and Storage

Topsoil stockpiling should be limited to as short a time as possible, subject to operational requirements. Ideally, topsoil is direct transferred (i.e., stripped and replaced in days to weeks) to reduce degradation of the soil microbial community and seedbank propagules. However, especially in the early days of a mining/quarrying operation before there are areas ready for rehabilitation, topsoil will need to be stockpiled for extended periods of time up to years in duration. In such cases, stockpiles should be constructed as flat and wide as the available space allows (to prevent anerobic conditions deep within the stockpile). The stockpile should also be seeded to reduce erosion and runoff. It is suggested that the stockpile be seeded with the target vegetation community (as opposed to a cover crop of often exotic grass species that can act as a weed source for future rehabilitation) i.e., if the stockpile is to be used for revegetation of native woodland communities, utilise a seed mix of that community. Likewise, if the end use of that stockpile is pasture, seed the appropriate seed mix. All stockpiles are to be bunded with a soil bund to contain runoff and erosion until vegetation becomes established. It is recommended that a soil bund be constructed to contain erosion until vegetation has become sufficiently established to prevent any potential erosion. Seeding with the appropriate seed mix achieves the following:

- The vegetation on a stockpile will self-seed, and this acts to maintain the value of the stockpile as a seed source for the target community
- The vegetation cover will help suppress weed infestation of the stockpile
- The target community will act to maintain the appropriate soil microbial community, an often-overlooked aspect of successful revegetation, native or pasture. This especially applies to symbiotic soil microorganisms such nitrogen-fixing rhizobia bacteria and phosphorus-scavenging mycorrhizal fungi
- If the development footprint does not allow for the separation of stockpiles based upon final land use, then it is recommended that a native species seed mix be used. This will help suppress and slow the establishment of weedy species into the native woodland revegetation
- When the stockpile is due to be utilised, established vegetation is to be mulched and incorporated into the respread soil.

Flora Species for Rehabilitation

Rehabilitation of the quarry and associated batters, sediment dams and quarry benches can be divided into woodland areas and grass or pasture areas.

Woodland Rehabilitation Areas

Areas to be rehabilitated to woodland are the Deep Creek access road crossing, and the quarry benches as presented in Table 7-55. The topsoil stockpile area has been recommended for rehabilitation with native species. Revegetation will need to be consistent with operational requirements. Species selection will need to be cognisant of the future growth of trees. There is potential for obstruction of operations so that shrub species from these communities may be more suitable in some areas where trees may obstruct visibility, or vegetation if planted too close to stockpiles may contaminate product with organic matter.

Table 7-55: Woodland Rehabilitation Areas

Area	Years from Commencement of operations	Suggested Plant Community
Quarry Benches	10-30 years	Spotted Gum – Broad leaved Mahogany – Red Ironbark
Deep Creek Access Road Crossing	0-5 years	Tallowwood – Brush Box – Sydney Blue Gum

The Spotted Gum – Broad leaved Mahogany – Red Ironbark community found on the site occurring on slopes with drier, shallower, and rocky soils. Therefore, species from this community appear to be the most suitable for rehabilitating batters and benches where soils are relatively shallow and well drained.

The Deep Creek access road crossing occurs in the Tallowwood – Brush Box – Sydney Blue Gum community and it is recommended that species from this community are used for the rehabilitation of this area, in exposed bank areas surrounding the rock rip/rap stabilisation. This is a relatively small area straddling Deep Creek. It is recommended that tubestock be planted into this area to prevent seed being washed away during any high flow events. Where revegetation is on the creek bank or in a high-water zone, consideration should be given to long-stem tubestock planting. Long-stem planting acts to stabilise stream banks and prevents stems from being washed away.

Species have been selected from the flora surveys undertaken by Kleinfelder. Species that are commercially available are recommended for use and include all canopy species that can be used for rehabilitation. Species that have been marked as available by “on-site seed collection” in Appendix T would be beneficial for biodiversity and vegetation structure. Native grasses and groundcovers are preferred for use to reduce the risk of further spread of invasive species into the adjacent native woodland that has been earmarked as onsite biodiversity offsets.

Grassland/Pasture Areas

Pasture rehabilitation areas include the main stockpile batters, main stockpile areas, the main haul road batters, areas surrounding the sediment dams below the main stockpile and the infrastructure area, the infrastructure surrounds. (Table 7-56). Given the proximity to the proposed onsite offsets and the stated aim of returning the land to the original vegetation community where possible it is recommended that the water pipeline easement be revegetated with native grass species. This area is largely native vegetation and presents a serious weed infestation risk into the onsite offsets if not revegetated to native species (Table 7-56).

Table 7-56: Grassland/Pasture Rehabilitation Areas

Area	Time Frame	Suggested Plant Community
Main Stockpile Area Batters	0-5 years	A range of exotic pasture species including Paspalum, Kikuyu, Clovers, Lucerns.
Haul Road Batter	0-5 years	
Product Stockpile areas and Sediment Dam	0-5 years	
Infrastructure Area and Sediment Dam	0-5 years	
Product Stockpile Floor	30 years	
Quarry Floor	30 years	
Main Stockpile Area (floor)	30 years	

Area	Time Frame	Suggested Plant Community
Water Pipeline Easement	0-5 years	Native Grass/Pasture species including but not limited to *Imperata cylindrica* – Blady Grass *Panicum simile* – Two-colour Panic *Themeda triandra* – Kangaroo Grass *Cymbopogon refractus* – Barbed Wire Grass

Sterile cover crops such as millet or oats can be used in the short term to provide vegetation cover while native grasses become established. Invasive non-native species such as Rhodes Grass (*Chloris gayana*), Coolatai Grass (*Hyparrhenia hirta*), Parramatta Grass (*Sporobolus africanus*) or Giant Parramatta Grass (*Sporobolus fertilis*) should be avoided for revegetation and treated before they become weed infestations.

7.15.7 Mitigation and Management Measures

This section of the EIS has presented the proposed Rehabilitation Strategy which provides for mitigation and management measures regarding the disturbed land throughout. The mitigation and management measures provided throughout the Rehabilitation Strategy will inform the development of a full Rehabilitation Management Plan should the development be approved.

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ENVIRONMENTAL MANAGEMENT, MONITORING AND REPORTING

Deep Creek
QUARRY

8 ENVIRONMENTAL MANAGEMENT, MONITORING AND REPORTING

8.1 INTRODUCTION

Environmental management and monitoring measures, along with commitments related to them are presented throughout the EIS alongside the relevant environmental aspect chapter. This chapter provides a consolidated summary of all the proposed management and monitoring measures, and associated commitments made.

8.2 ENVIRONMENTAL MANAGEMENT MEASURES

Table 8-1: Consolidated Summary of Proposed Environmental Management and Monitoring Measures

Aspect	Management and / or Monitoring Measure
General	• IDPL will produce an Environmental Management Plan (EMP) prior to operations commencing, with a Construction Environmental Management Plan (CEMP) to manage the construction phase. The EMP and CEMP will provide detail on the implementation of the environmental management and monitoring measures presented throughout this EIS and consolidated within this table, and as required by conditions of consent and licences • IDPL will provide an Annual Review of the quarry's environmental performance in line with the requirements of the EMP to the relevant agencies. Annual reviews will be made publicly available via the quarry website • Staff, contractor and visitor inductions will include where relevant an overview of management measures and responsibilities and will include: o EMP requirements o Environmental sensitivities o Hazard and risk management o Designated site access o Waste management, spill response and management o Heritage management and heritage finds protocol o Weed and pathogen control o Bushfire prevention o Emergency response o Incident reporting (environmental and safety) o Driver code of conduct.
Social (Community Relations)	• Establishment of a Community Consultative Committee (CCC) to facilitate meetings with representatives of the local community • Document CCC meeting agendas, issues raised, action items and close-out • A dedicated information contact phone number will be established prior to the commencement of construction and maintained throughout the life of the project • Feedback, enquiries and complaints received will be recorded in a consultation register that will be established prior to the commencement of construction and maintained throughout the life of the project • Complaints recorded in the consultation register will include details of complainant, IDPL response and commitments to follow-up by whom and when will be detailed • Consultation with immediate neighbours via an annual site open day • Community information newsletters providing awareness of: o Project progress o Operating hours, contact information and details of how to provide feedback o Ways in which further information can be sought o Details of breaches of any development approval and licence conditions and IDPL response and corrective actions. • Website to include: o Contact numbers o Copies of community newsletters, details of annual open days o Copies of minutes from Community Consultative Committee o Copies of approvals, copies of licences.

Aspect	Management and / or Monitoring Measure	

Aboriginal Heritage	• As a State Significant Development (SSD), DCQ will implement an Aboriginal Cultural Heritage Management Plan (ACHMP) which will act in place of an AHIP for the life of the project. This is per Section 4.41 of the EP&A Act (SSD)
	• Artefacts uncovered during subsurface testing will be relocated and reburied in locations determined through consultation with the DCQ RAPs
	• RAPs will be given the opportunity to be present for the relocation of artefacts uncovered during subsurface testing
	• Graders will be utilised during the construction of the proposed detention basins, allowing for shallow scraping of topsoil (to depth 300 mm) to lower the possibility of damaging further artefacts that may be present within the proposed detention basin footprints
	• RAPs will be offered the opportunity to be present during excavation for the installation of detention basins to allow for identification and collection of any artefacts (or potential artefacts) that are uncovered during excavation works
	• All artefacts uncovered during subsurface testing, construction, operation and rehabilitation of the DCQ will be reburied onsite in a location that will not be impacted by the DCQ
	• Once artefacts have been retrieved and reburied AHIMS will be updated with an impact recording and new location details
	• In the event of discovery of a previously unknown object in the course of construction works associated with the development the following procedure to be followed:
	  ○ Ground disturbance works in vicinity of the object will cease
	  ○ The works area will be secured to prevent additional works or intrusion
	  ○ The DCQ RAPs and an archaeologist will be notified of the discovery. The artefact will be collected (under the AHIP) and removed to a long term storage location (preferably onsite)
	  ○ If the archaeologist considers the object/feature to be significant (e.g. a hearth), Heritage NSW will be notified and a methodology for salvage will be developed in consultation with Heritage NSW and the RAPs.
	• In the event that any potential human skeletal remains are uncovered during works, all work in the immediate area of the remains will halt immediately. The incident will be immediately reported to the NSW Police, Heritage NSW and the RAPs
	• No action will be undertaken until the NSW Police provide written notification to the Proponent. If the skeletal remains are identified as Aboriginal, the Proponent will contact DPC and the DCQ RAPs to determine suitable salvage methodologies. No works will continue until Heritage NSW provides written notification to the proponent
	• Contractors undertaking earthworks associated with the DCQ will be provided with an Aboriginal Cultural Heritage Awareness Induction document, to be undertaken in conjunction with site induction procedures. The document will outline protocols for discovery of previously identified Aboriginal objects and information to aid in the identification of Aboriginal objects.	

Air quality	General	• Activities to be assessed during adverse weather conditions and modified as required (e.g. cease activity where reasonable levels of dust cannot be maintained using the available means) • Weather forecast to be checked prior to undertaking material handling or processing • Engines of on-site vehicles and plant to be switched off when not in use • Vehicles and plant are to be fitted with pollution reduction devices where practicable • Vehicles are to be maintained and serviced according to manufacturer's specifications • Visual monitoring of activities is to be undertaken to identify dust generation.

Aspect	Management and / or Monitoring Measure	
	Exposed areas/stockpiles	• The extent of exposed surfaces and stockpiles is to be kept to a minimum • Exposed areas and stockpiles are either to be covered or are to be dampened with water as far as is practicable if dust emissions are visible, or there is potential for dust emissions outside operating hours • Minimise dust generation by undertaking rehabilitation earthworks when topsoil and subsoil stockpiles are moist and/or wind speed is below 10 m/s.
	Material handling	• Reduce drop heights from loading and handling equipment where practical • Dampen material when excessively dusty during handling • Dust suppression on crushing and screening; water sprays as required to control fugitive dust emissions.
	Hauling activities	• Haul roads should be watered using water carts such that the road surface has sufficient moisture to minimise on-road dust generation but not so much as to cause mud/dirt track out to occur • Regularly inspect haul roads and maintain surfaces to remove potholes or depressions • Driveways and hardstand areas to be swept/cleaned regularly as required etc • Vehicle traffic is to be restricted to designated routes • Speed limits are to be enforced • Vehicle loads are to be covered when travelling off-site.
Biodiversity	Clearing of native vegetation	• Avoid and minimise clearing impacts to native vegetation where practicable • Clearly delineate the boundaries of the Development Site to ensure no accidental incursions within retained vegetation • Ensure vehicle and equipment parking areas and stockpile areas are identified and sited to avoid areas containing ecological value wherever practicable • Appropriate signage such as ‘No Go Zone’ or ‘Environmental Protection Area’ should be installed • Identify and communicate the location of any ‘No Go Zones’ in site inductions • Further mitigation measures to reduce the potential for impacts to Koalas are presented in the KPoM (Appendix 10 of Appendix L).

	Removal of hollow-bearing trees / habitat trees, resulting in fauna injury and mortality.	• Limit removal of trees to that required within the Development Site
		• Hollows removed will be replaced with nestboxes in retained vegetation within the IDPL landholding at a ratio of 1:1.
		• A pre-clearing protocol will be implemented during clearing works, as follows:
		  ○ Pre-clearance surveys will be undertaken to determine if any inhabiting fauna are present
		  ○ A suitably qualified and trained fauna handler will be present during hollow-bearing tree clearing to rescue and relocate displaced fauna.

Aspect	Management and / or Monitoring Measure	

	Impacts to surface and groundwater quality and quantity due to sediment run-off and/or contaminant runoff into adjacent watercourses	• Source controls such as sediment fences, mulching and jute matting will be utilised where appropriate
		• Site-based vehicles will carry spill kits
		• A Soil and Water Management Plan will be required prior to disturbance activities that includes:
		  ○ An Erosion and Sediment Control Plan for each stage of development
		  ○ A Groundwater Management Plan
		  ○ A Surface Water Management Plan.
		• Limit the use of pesticides in the Development Site where possible to avoid the risk of contamination of nearby watercourses/wetland areas.

	Vehicle collision with fauna	• Speed limits within the Development Site will be limited to 40 km/hr • This speed limit should be communicated in site inductions and through onsite signage • Staff and contractor awareness of increased animal activity during dawn and dusk should be communicated in site inductions and through appropriate onsite signage • Mitigation measures to reduce the potential for vehicle strikes to Koalas are presented in the KPoM (Appendix 10 of Appendix L).
	Transfer of weeds and pathogens to and from site.	Fungal pathogens, including *Phytophora cinnamomi* and Myrtle Rust (*Puccinia psidii*), and invasive weeds can have devastating impacts on native plant communities and inhabiting fauna if not managed. Key measures are recommended to include: • Earth moving equipment and off road vehicles will be required to enter the site clean, free of loose dirt and vegetation matter • Weed infestations within the construction footprint are to be identified and mapped prior to construction • Ensure soil and seed material is not transferred between weedy and weed free areas onsite • A Plan of Management for the control of noxious weeds is to be included in the Biodiversity Management Plan. This is to include weed control works to be conducted throughout the construction phase of the Project, and follow-up weed control within the Development Site post construction.

	Noise, vibration, waste and air pollution impacts to adjacent sensitive habitat areas.	• Increased human activity (from workers and traffic levels) directly adjacent to sensitive habitat areas may cause disturbance to flora and fauna species in adjoining habitat. Impacts from operational activities, such as disturbance to an animal's normal behaviour patterns due to noise, vibration, and dust may cause areas of previously suitable habitat to become sub-optimal and may cause fauna species to vacate areas of previously suitable habitat. Management Plans for the Quarry will consider measures to mitigate impacts on flora and fauna from noise, vibration, waste, and air pollution such as:
		  ○ Traffic Management Plan that will include measures to improve driver behaviour, that will be communicated through inductions and a Drivers Code of Conduct applicable to all haulage contractors. Key measures to be included are:
		  ▪ Speed limits within the Development Site will be limited to 40 km/hr
		  ▪ Speed limit signage
		  ▪ Staff and contractor awareness of increased animal activity during dawn and dusk should be communicated in site inductions and through appropriate onsite signage.

Aspect	Management and / or Monitoring Measure	
		• Enforce 'carry-in, carry-out' policy regarding rubbish and waste materials generated on site to avoid waste materials entering adjacent vegetation. • Restriction of public access and associated impacts from domestic pets, waste dumping and damage to adjoining vegetation must be enforced pre, during and post construction • Fence sensitive areas to delineate 'no go' zones • Noise and vibration minimization practices should be included in the Noise and Vibration Management Plan for the quarry • Dust control measures will be implemented through the Quarry's Air Quality Management Plan, this should include covering loads where required; amending operations under excessive wind conditions including ceasing operations if required; use of water carts and static sprays as required to control dust; rehabilitation or stabilisation of exposed surfaces; and, other dust minimisation measures as become evident during works.
	'On site' offset areas	• Weed control programs to maintain or reduce the existing weeds within the onsite offset area. • Repair and erection of fencing as needed to ensure the exclusion of livestock from the offset area.
	Biodiversity Offset Strategy	• Satisfaction of the Biodiversity Offset Strategy detailed within Section 7.1.14.
Economics	• To maximise local benefits derived from the Project, the proponent and contractors engaged by the proponent will be encouraged to source labour locally where possible and practical, and provide training opportunities where practical • To maximise local benefits derived from the Project, the proponent and contractors engaged by the proponent will provide sufficient opportunities and access to information for local businesses to understand the Project's supply contract arrangements and requirements, and improve their ability to secure supply contracts.	
Erosion and Sediment Control	• A CEMP including erosion and sedimentation controls will be prepared and implemented for all construction activities proposed • Erosion and sediment control plans (ESCP) to be prepared and implemented with all internal road construction activities • Install and maintain erosion and sediment controls on-site as required in accordance with the Code of Practice for Managing Urban Stormwater – Soils and Construction (Landcom, 2004) • Erosion and sediment controls will be monitored monthly to ensure performance is maintained.	
Hazards	Flood Management	• Adoption of surface water mitigation measures stated in (see 'surface water' within this table) • A Soil and Water Management Plan (SWMP) will be prepared for the proposed DCQ to support the CEMP. The SWMP will be implemented throughout the duration of construction.

Aspect	Management and / or Monitoring Measure	

	Hydrocarbon Management	• A Pollution Incident Response Plan (PIRMP) will be prepared prior to construction. The PIRMP will be prepared in accordance with NSW EPA Guidelines
		• A chemical inventory, updated daily, will be clearly displayed onsite including all Safety Data Sheets (SDS), which must be no older than 5 years
		• All vehicles and machinery should be turned off when not in use
		• If obvious signs of contamination such as discoloured or odorous soils are encountered during site set-up and extraction, work will stop in the vicinity of the area and, if safe to do so, samples will be taken for analysis
		• Daily equipment pre-start inspections will be undertaken by site personnel. These are designed to identify faulty equipment and potential oil leakages
		• A fully bunded and undercover hardstand for fuel, hydrocarbon and chemical storage will be constructed within the office and weighbridge area, located more than 40 m from any drainage lines
		• Personnel to be trained in spill containment and response procedures
		• Spill response kits will be kept and maintained onsite
		• The processing plant area installed on site will include:
		  ○ A bunded parking area for the overnight parking of site machinery.
		  ○ If power via electrical mains supply is unavailable, diesel generators will be required. If used, diesel generators will:
		  ▪ Be located within a bunded area.
		  ▪ Include an internal double skinned and self bunded diesel storage tank.
		  ▪ Be refuelled as required within the bunded refill area.
		  ▪ Be returned to the Office and Weighbridge area on conclusion of operations each Saturday. This is proposed in the context of reducing the risk of vandalism over the weekend, and limiting risks (e.g. electrical and diesel) associated with the daily transport of the generator to and from processing plant area.
		• Mobile equipment installed on site will:
		  ○ Be refuelled at a lined and bunded refuelling area
		  ○ Include spill control kits
		  ○ Operators trained in the use and maintenance of spill control kits
		  ○ Return of all mobile equipment at end of each day to the Office and Weighbridge area.
		• Refuelling of equipment will be undertaken over a bunded concrete pad by a registered contractor. No fuel or diesel will be stored on site contained in plant and equipment
		• Oils and grease will be stored in a bunded area located more than 40 m from drainage lines
		• Any hydrocarbon spills on site will include the following response:
		  ○ Immediate deployment of spill control kits
		  ○ Notifications of relevant stakeholders (e.g. EPA and Mid Coast Council) consistent with the Pollution Incident Response Management Plan (PIRMP) for any spills estimated to be greater than 30 L
		  ○ Recovery of all contaminated material regardless of size for collection and offsite disposal at a licenced waste facility.

Aspect	Management and / or Monitoring Measure	
	Hazardous Waste	• No onsite disposal of waste will occur • Scrap metal will be deposited into a dedicated receptacle for periodic collection and recycling • Diesel fuel will be stored within self-bunded above ground tank and all refuelling will be undertaken on a bunded and covered hardstand area • During excavation any foreign materials encountered will signal an immediate stop work in the proximate area until the nature of the object/s can be determined. In the case of uncovered potential asbestos sheeting or pipe laboratory testing may be required to determine if asbestos fibres are present in the surrounding soil • All wastes generated by the DCQ will be managed by the way of Council collection services or via appropriately licensed waste contractors • All waste oil will be collected and stored in containers within a covered and bunded area, and will be removed from the site by an appropriately licensed contractor with all relevant waste tracking documentation completed • All oil filters will be separately stored in containers with a covered bunded area, and will be removed from the site by an appropriately licensed contractor with all relevant waste tracking documentation completed • Sediment / soil will be periodically removed from the various silt control structures and used in progressive rehabilitation of the site • All office paper and general waste originating from the office and amenities building from routine equipment and vehicle maintenance consumables will be placed in appropriate containers for collection by council or a licensed contractor for disposal/ recycling at an appropriate waste management facility • Good housekeeping practices and routine inspection/maintenance will be undertaken of all non-public roads, site infrastructure and silt fencing. Damaged infrastructure including sediment control structures will be replaced as required • Wastewater from the amenities and workshop will be collected in a pump-out system and transported off-site by a licensed contractor • All waste tyres will be removed by the supplier of replacement tyres • Install sediment controls downslope of the disturbance area (in accordance with guidelines such as Landcom (2004) • Any potential asbestos containing materials will be disposed of to a licenced facility using appropriate handling and disposal techniques • Hazardous substances will be stored with valves / outlets facing away from the predominant bushfire threat, site office and workshop area (where applicable). Connection to gas cylinders will be metal. Any hazardous material storage will occur more than will be stored more than 10m from any bushfire hazard and more than 10m from the proposed workshop and site office. Hazardous materials will be stored in accordance with *AS 2187.1-1998 Explosives-Storage, transport and use – storage*.

Aspect	Management and / or Monitoring Measure	

	Blasting	• A Blast Management Plan will be prepared and implemented prior to the commencement of DCQ operation:
		  ○ Consultation during preparation of the Blast Management Plan will include discussions with Mid-Coast Council towards the feasibility of temporary short term closure of Deep Creek Road during blasting events for public safety.
		• Blasting will generally only be permitted during the hours of 9 am to 5 pm Monday to Saturday, and will not take place on Sundays and Public Holidays
		• Blasting will take place no more than once per day
		• Blasting will include the provision of spotters, both to provide a visual cue to where blasting will occur and to stop blasting from occurring in the event the event may result in injury to personnel and / or members of the public or site infrastructure / machinery
		• The Blast Management Plan will include the following items, at minimum:
		  ○ Summary of statutory requirements
		  ○ Outline of blasting frequency and hours
		  ○ Outline of sensitive receivers in the vicinity of the DCQ
		  ○ Baseline noise data and outline of expecting blast noise levels
		  ○ Procedure for blast notifications
		  ○ Blast management and control measures, including measures to ensure both public and personnel safety during blasting (Blast Exclusion Zone)
		  ○ Procedure for monitoring of meteorological conditions, airblast pressure, ground vibration, flyrock (airbourne rocks) and noise during blasting
		  ○ Procedure for management of receiver complaints
		  ○ Procedure for the updating of Blast Management Plan every 5 years, unless required as a result of consultation, utilising monitoring data to inform the scheduled update
		  ○ Mitigation measures outlined under the Voluntary Land Acquisition and Mitigation Policy will be applied as required (no requirements have been identified during impact assessment).

Aspect	Management and / or Monitoring Measure	

	Road Safety	• A Traffic Management Plan (TMP) will be prepared and implemented prior to the commencement of construction of the DCQ
		• Once the final merge geometry and headwall locations are determined for the road widening works in the vicinity of the two cell pipe culvert underneath The Bucketts Way, both headwalls will be assessed to determine whether safety barrier protection is required
		• Consultation with Transport for NSW will include the following from the RSA (see Attachment E of Appendix K):
		  ○ Installation of signage along The Bucketts Way and the Pacific Highway in the vicinity of the Pacific Highway / The Bucketts Way and The Bucketts Way / DCQ intersections to advise road users of the upcoming intersections, providing notice of potential upcoming deceleration / acceleration requirements
		  ○ Consultation towards the feasibility of installing a northbound acceleration lane on The Bucketts Way / Pacific Highway intersection. As The Bucketts Way provides a prominent thoroughfare to the Pacific Highway from suburbs such as Booral, Stroud and Clarence Town, the provision of an acceleration lane would benefit all businesses and operations utilising heavy vehicles in this region and, as such, the funding for this intersection upgrade is considered outside the scope of the DCQ approval and is thus not the responsibility of IDPL
		  ○ Installation of a hold line for the southbound highway right turn lane into The Bucketts Way (outside the responsibility of IDPL as per the above)
		  ○ TfNSW amendment of width marker signs and installation of delineation devices for Limeburners Creek Bridge for general road safety.

Aspect	Management and / or Monitoring Measure	

	Bushfire	• A Bush Fire Management Plan (BFMP) will be prepared prior to the commencement of construction, including the following information at minimum:
		  ○ APZ locations and management details
		  ○ Landscaping requirements, where proposed
		  ○ Access provisions such as locations, passing bays and alternate emergency access
		  ○ Water supplies and bush fire suppression systems (including drenching systems, static water supply, natural water sources etc.) where utilised
		  ○ Schedule of the BAL requirements and building footprints as well as any specific construction details
		  ○ Details regarding the Bush Fire Emergency Management and Evacuation Plan
		  ○ Any other essential bush fire safety requirements.
		• Contractors or employees that smoke must do so in a safe manner having full regard to the safe disposal of cigarette butts to ensure bushfire ignition does not occur. Smoking should be confined to the designated smoking area on site
		• Review bushfire danger ratings and when total fire bans are in place prior to undertaking clearing activities or other hot works onsite. Postpone activity where feasible or increase preparedness through having a fire tanker on standby
		• All mobile machinery and fixed plant to include on-board fire extinguishers
		• Maintain a sufficient asset protection zone (APZ) around the office and workshop area
		• All dangerous goods will be stored in accordance with AS1940, AS1596 and the Dangerous Goods Code
		• All DCQ roads / tracks will maintain a 4 m vertical clearance to allow unobstructed access by fire tankers
		• No parking on the DCQ access road is to occur
		• APZs at the DCQ are to be maintained to standards outlined under Appendix 4 of the NSW RFS document *Planning for Bush Fire Protection 2019*
		• The water tank(s) will be fitted with a 65mm Storz outlet with ball valve to allow for use by firefighting personnel if required
		• Where utilised, bottled gas supplies with be installed and maintained in accordance with AS/NZS 1596:2014, with valves / outlets facing away from the predominant bushfire threat, site office and workshop area (where applicable). Connection to gas cylinders will be metal. Any gas cylinders will be stored more than 10m from any bushfire hazard
		• The proposed DCQ access road verges will be designated ‘no stopping’ zones to maintain a clear thoroughfare
		• In the event of an emergency, Deep Creek Rd (public road) will provide a secondary emergency egress from the DCQ for site personnel
		• A minimum 4m vertical clearance will be maintained on DCQ internal roads to allow for tanker access in the event of an emergency.

Aspect	Management and / or Monitoring Measure	
	Site Safety	• Prior to the commencement of construction, a Work Health and Safety Management Plan (WHS Management Plan) will be prepared • Controls listed under the WHS Management Plan will be included as part of a site induction, with all personnel to be presented and sign onto the induction form prior to the commencement of work at the DCQ • All contractors will be required to partake in a daily toolbox talk by the Construction Manager (or delegate) during construction of the DCQ • All contractors will then be required to undertake toolbox talks for their individual works prior to commencement each day. Hard copies of toolbox talks will be made available to the DCQ Construction Manager and / or Project Manager upon request • All personnel will be required to wear appropriate PPE when onsite, as deemed appropriate by their field of work and the DCQ OHS Management Plan.
	Public Safety	• Application of controls for road management and blasting as listed above • All personnel inducted to the DCQ will be informed of the appropriate communication channels in the event a member of the public is observed onsite • The entirety of the DCQ will be security fenced to prevent accidental access by members of the public • Vehicles and machinery onsite will be fitted with security flashing beacons, to be operating when vehicles / machinery are in use • Vehicles and machinery are to be fitted with reverse alarms (preferentially broadband alarm) and reverse cameras • All works at the DCQ are to be stopped immediately once management personnel have been informed of unauthorised entry. Works will not recommence until the unauthorised intruder has been located and removed from site or taken to the site office • All visitors to the DCQ will be required to sign in upon entry, where they will be presented with a visitor card and high visibility vest (if required). Visitors will return card (and vest if used) when signing out and leaving the DCQ • The DCQ site entry will include a security gate, to be closed outside of construction and or operation hours • Security cameras will be fitted throughout the DCQ both to observe and record intruders, and to provide a visual cue of site security that may discourage unauthorised access.
Historic Heritage	• The report has concluded that the area contains no items of heritage significance and that there are no issues that would constrain the approval of the quarry or require specific management measures.	

Land Use	• Erosion and sediment control structures will be implemented to prevent run-off and erosion from topsoil
	• Stockpiling of topsoils and subsoils for extended periods of time will lead to degradation of these soils as a rehabilitation resource, but this impact can be contained with suitable management actions including:
	  ○ Topsoil stockpiling should be limited to as short a time as possible, subject to operational requirements
	  ○ stockpiles should be constructed as flat and wide as the available space allows (to prevent anerobic conditions deep within the stockpile)
	  ○ The stockpile should also be seeded to reduce erosion and runoff
	  ○ All stockpiles are to be bunded with a soil bund to contain runoff and erosion until vegetation becomes established
	  ○ When the stockpile is due to be utilised, established vegetation is to be mulched and incorporated into the respread soil.	

Aspect	Management and / or Monitoring Measure

Noise and Blasting	A Noise Management Plan (NMP) will be developed for the quarry prior to the commencement of construction, and at a minimum the NMP would include:
	• A noise monitoring program, including:
	  ○ Noise monitoring on commencement of construction and on a quarterly basis for at least the first year of operation to determine compliance with the noise criteria and to inform any further noise mitigation works, should the need arise. Monitoring locations would include R6 and/or R19 and R25 (see Figure 2).
	• Management controls to minimise noise impacts, including:
	  ○ Relevant best practice noise management practices.
	  ○ Ensuring plant and equipment used onsite are generally consistent with the sound power levels used in this noise modelling assessment.
	  ○ The location of plant and equipment relative to bunding and screens is generally consistent with this noise modelling assessment.
	• Response protocols in the event of a monitored exceedance or noise complaint. Response protocols in the event of a monitored exceedance or noise complaint and implementation of reasonable feasible mitigation measures where criteria is exceeded.
	• A Blast Management Plan should be developed prior to undertaking blasting onsite, the Blast Management Plan should include vibration monitoring protocols for each blast and response protocols in the event of any exceedance of blast vibration criteria.

Aspect	Management and / or Monitoring Measure

Rehabilitation	• The BDAR recorded four native plant community types (PCTs). Where revegetation is slated to return to native woodland, species assemblages will be sourced from these communities
	• Generally, the process of revegetation is as follows:
	  ○ Immediately prior to topsoil spreading, the area will either:
	  ▪ be ripped to provide a friable subsoil layer to allow for water and root penetration
	  ▪ or sufficient growth media in the form of subsoil or topsoil will be applied to allow for water accumulation and root development.
	  ○ Topsoil will be re-spread by machine over the areas to a depth of between 100 mm and 200 mm subject to availability, areas such as the quarry benches would benefit from application of deeper quantities.
	  ○ Once topsoil has been respread, seed will be broadcast using the equipment/machinery adequate for the area, i.e., batters and the quarry floor (once extraction has ceased) may be able to be seeded using tractor mounted equipment, or where areas are small or difficult to access, seed will require manual seeding either by hand or by “belly-seeders”
	  ○ Seed for the revegetation will be purchased from commercial seed suppliers where available, but for greater diversity a few species will be required to be collected from site prior to clearing
	  ○ Seed application is the preferred method of revegetation establishment, but tubestock supplied by a recognised native plant nursery can be used if conditions are appropriate (e.g., revegetation of creek lines, visual amenity screens and shade tree patches on the quarry floor)
	  ○ The quarry floor is anticipated to consist of hard rock with a shallow topsoil layer. The hard rock floor should be ripped or fractured (as above) to provide a friable subsoil layer to improve root penetration and drainage that will improve establishment of grassland and woody vegetation. Where shade trees are to be established in patches, the subsoil will require extra work to allow for the establishment of deeper root systems for stability. This will be accomplished by ripping / fracturing the quarry floor to a depth of 1 m
	• The following monitoring methods are to be used depending upon vegetation type and size of area that has been rehabilitated. Rehabilitation flora monitoring will be conducted annually:
	  ○ Where the area to be rehabilitated is of sufficient contiguous area (>1 ha), monitoring will be conducted by the establishment of permanent 20m x 20m flora quadrats. It is anticipated that only the quarry floor and product stockpile areas consisting of grassland or pasture rehabilitation areas will require this methodology. The number of quadrats to be established based on the Biodiversity Assessment Methodology (BAM) are for areas of >2 – 5 ha two quadrats, while areas of >5 - 20 ha require three quadrats. Therefore, the product stockpile area will have two quadrats and the quarry floor will have three quadrats. Data collected within the quadrat will include the following:
	  ▪ Species composition (including weed species)
	  ▪ Total Vegetation cover (% coverage) as a general observation
	  ▪ Five 1m x 1m plots will be measured at random to determine detailed cover and litter build up
	  ▪ Bare soil (if present).

Aspect	Management and / or Monitoring Measure
Rehabilitation	○ Shade tree patches will consist of stands of native tree species over native grasses or exotic pasture. These will be monitored by observation. The same patches will be monitored to provide consistency with a data set collected as follows: ▪ Tree number and species (should be known from rehabilitation data) ▪ Height of trees – to determine growth ▪ General health of trees ▪ Ground cover under the canopy - determined as a general observation ▪ Weed presence and species. ○ If the number of trees (deemed as canopy species at maturity) on the patch exceeds five individuals, then a minimum of five trees will be consistently monitored to provide representative examples of the tree patch. These trees are to be marked with tape, paint or a peg to ensure that the same trees are measured each monitoring event ○ In addition, the quarry floor and product stockpile areas will have a walkover-style inspection conducted to identify weed areas, erosion, revegetation failure, fence condition, evidence of feral animal activity and any other feature or criterion requiring action to ensure successful rehabilitation. • Areas of linear or patch rehabilitation will be monitored by the establishment of transects that run along the length of the feature. The transects will be a maximum of 25m in length. If batters or linear features are of insufficient length to fit this transect, then visual observations only will be made. Data collected for transects will be: ○ Number of trees and within 1m either side of the transect ○ Average height of each stratum i.e. canopy species, midstorey species and shrub species (if present) ○ Cover to be measured using five 1m x 1m plots positioned at five-meter intervals, alternating either side of the transect to determine detailed cover and litter build up. • The extraction area benches will be rehabilitated to native vegetation as they will be unsuitable for agriculture. If access cannot be achieved, then visual inspection of the benches will be sufficient to determine if native vegetation has become established • Stockpiling of topsoils and subsoils for extended periods of time will lead to degradation of these soils as a rehabilitation resource, but this impact can be contained with suitable management actions including: ○ Topsoil stockpiling should be limited to as short a time as possible, subject to operational requirements ○ stockpiles should be constructed as flat and wide as the available space allows (to prevent anerobic conditions deep within the stockpile) ○ The stockpile should also be seeded to reduce erosion and runoff ○ All stockpiles are to be bunded with a soil bund to contain runoff and erosion until vegetation becomes established ○ When the stockpile is due to be utilised, established vegetation is to be mulched and incorporated into the respread soil.

Aspect	Management and / or Monitoring Measure

Social	• Pre Construction
	  ○ Proactive communication and engagement with neighbours, the community and Council around the Project prior to site establishment. Measures could include newsletter and construction updates on the scope of the project, likely high impact activities (noise, vibration, traffic and changes to the landscape), and contact details for inquiries and complaints
	  ○ Meetings/presentations with neighbouring properties and community groups prior to construction should also be considered
	  ○ Develop an inquiry and complaint process for the construction period
	  ○ Engage with the local community and neighbours to develop a working relationship to disseminate information during and after construction.
	• Construction
	  ○ A Construction Management Plan (CMP) should be prepared that incorporates the findings of the various project technical studies in relation to communication and notifications. The CMP should detail proposed management and mitigation measures for the identified impacts including:
	  ▪ Amenity impacts including noise monitoring, buffers for visual impacts
	  ▪ Traffic management
	  ▪ Site safety and management
	  ▪ Health impacts – noise, dust, and emissions
	  ▪ Heritage management including unexpected finds procedure
	  ▪ Complaints management process
	  ▪ Ongoing communications with the community around the project to keep residents updated on construction scheduling. This may include signage, notifications, and other appropriate communication channels.
	  ▪ Investigate opportunities to use local contractors, suppliers, and service providers.
	• Operations
	  ○ Develop Community Engagement Plan (CEP) identifying proactive and ongoing engagement and communication strategy to build positive relationships with surrounding stakeholders
	  ○ Establish consultative committee or reference group
	  ○ Ongoing communication with neighbouring community including creating a project website with regular updates and blasting notifications
	  ○ Landscape works along the access road installed early in the project, potentially using mature vegetation
	  ○ Monitor particulate and emissions levels
	  ○ Proactively manage issues, with nearby residents to avoid escalation to complaints
	  ○ Investigate opportunities for inviting community members to participate on consultative committee or reference group
	  ○ Ongoing engagement with the community, hosting events and open days
	  ○ Inquiries and complaints management process.

Traffic and Transport	• Traffic control plans prepared by an accredited person are to be approved by the RMS prior to implementation by an accredited person for the construction of the quarry intersection • The quarry intersection and associated acceleration and deceleration lanes will have signage installed, which will be agreed in consultation with RMS • A signed 40km/hr speed limit along internal quarry roads, including Deep Creek Road • IDPL will implement a Driver Code of Conduct signed onto by all drivers during their site induction • Haul trucks will be weighed on entry to the site via a weigh bridge at the site office complex and again on leaving the site where product weight and tickets will be generated and recorded for each load. • IDPL may make a fair and reasonable contribution to road authorities regarding future works on the Pacific Highway / The Bucketts Way intersection commensurate with the relative impact of the traffic generated by the quarry.

Aspect		Management and / or Monitoring Measure
Visual		• Trees and shrubs can be planted along the proposed access road near The Bucketts Way to screen views of the proposed road where it can be seen from nearby residences • Bushland around the quarry site should be maintained to keep the existing visual screen intact • Materials, textures and colour selection should relate to the palette of the surrounding environment to minimise visibility and potential for visual impact • Reflective surfaces and bright, contrasting colours should be avoided.

Water Management	Surface Water	• Water management controls will be revised and updated on determination of the project to ensure management measures proposed adequately reflect the requirements of the Conditions of Consent:
		  ○ The revised controls will be prepared in consultation with the NSW EPA and NSW Water for approval by NSW DPIE
		• The proposed WMS would form the basis of a site Water Management Plan (WMP), that will be developed post approval and outline how the WMS is to be operated to meet EPL conditions, and any other relevant conditions of consent, within the requirements of the POEO Act, taking account of both historical and current water qualities in the surrounding watercourses, and current and future downstream water users
		• The WMP will allow for the ongoing assessment of risk as quarry operations progress, and the implementation of improvements and changes to the WMS where required
		• The Water Management System will include:
		  ○ Scour protection measures for the proposed watercourse crossing points associated with the proposed access route
		  ○ Sediment dams designed with stable spillways for overflows in wet weather
		  ○ Discharge points located within tributaries of Deep Creek with suitable scour protection controls and pumping procedures
		  ○ Management for discharge of sediment dams to ensure water quality measures are implemented.
		All water management infrastructure, and scour protection measures are to be designed, constructed, maintained, removed, and rehabilitated to:
		• Fulfil the statutory conditions of the project approval
		• Meet industry standards and best practice, specifically:
		  ○ Landcom 2004. Managing Urban Stormwater – Soils and Construction, Volume 1, 4th Edition
		  ○ Department of Environment and Climate Change (DECC) 2008. Managing Urban Stormwater – Soils and Construction, Volume 2E – Mines and Quarries.

Aspect	Management and / or Monitoring Measure	

	Groundwater	• Monitoring of the current groundwater network will be performed to evaluate drawdown in the groundwater level associated with quarry operation. This will continue with a period of post-closure monitoring
		• As wells within the quarry are likely to be destroyed during quarry operations it is recommended that additional existing wells are added to the monitoring network and new wells are added to compensate for loss of wells within the quarry. These wells should be constructed as purpose-built monitoring wells. In particular wells should provide information on groundwater quality between the quarry and Deep Creek
		• A dedicated monitoring well should be installed down gradient of the petroleum storage area, to monitor for hydrocarbon contamination of groundwater
		• Water levels and water quality should be measured during the first year of operations on a monthly basis, followed by quarterly monitoring
		• Data loggers will be installed in wells at least during the first year of quarry operations to better understand the drawdown cone developing due to quarrying
		• Water quality monitoring should consist of the analytes and frequencies outlined in Table 7-21
		• Water level and water quality data should be analysed following each quarterly sampling round and plotted to evaluate trends in the data that may correlate with rainfall and climatic conditions
		• A rain gauge will be installed on site and rainfall measurements made throughout the life of the quarry operation for comparison with surface and groundwater data. BOM rainfall data may also be used
		• A database will be maintained with manual water level measurements and measurements from data loggers
		• Given the natural background groundwater conditions at the quarry site show exceedances of the ANZECC 2000 95% levels for NSW Upland Rivers for many of the metals and some other parameters the selection of trigger values for future reporting needs to be carefully selected prior to commencing operations
		• A groundwater management plan will be developed for the site post approval. The Groundwater Water Management Plan (GWMP) should contain the following information:
		  ○ Presentation and analysis of water levels in groundwater monitoring wells and analysis of groundwater physical and chemical parameters and changes over time
		  ○ Presentation of rainfall data and the possible correlations with groundwater and surface water measurements
		  ○ Monthly information should be presented in internal reports and in reporting to government agencies.
		• Reporting should include:
		  • A map showing the location of sites in the monitoring network
		  • Rainfall data and annual variations
		  • Graphs showing changes in groundwater level over time (hydrographs), comparing results between monitoring wells and with rainfall data
		  • Tables and graphs showing changes in groundwater chemistry, identifying any trends and comparison with ANZECC values and other values which may be relevant trigger values
		  • Measurement and recording of inflows into the quarry and evaluation against predictions
		  • Conclusions from monitoring and any suggested modifications to the monitoring network
		  • Reporting will be via the AEMR.

Aspect	Management and / or Monitoring Measure

Waste Management	• All works would be conducted in accordance with the waste management hierarchy established by the WARR Act. The waste management measure would include:
	  ○ No permanent onsite disposal of waste will occur. All wastes generated by the DCQ will be managed by the way of Council collection services or via appropriately licensed waste contractors
	  ○ Scrap metal will be deposited into a dedicated receptacle for collection and recycling
	  ○ Diesel fuel will be stored within self-bunded above ground tank and all refuelling will be undertaken on a bunded and covered hardstand area
	  ○ During excavation any foreign materials encountered will signal an immediate stop work in the proximate area until the nature of the object/s can be determined. In the case of uncovered potential asbestos sheeting or pipe laboratory testing may be required to determine if asbestos fibres are present in the surrounding soil
	  ○ All waste oil will be collected and stored in containers within a covered and bunded area, and will be removed from the site by an appropriately licensed contractor with all relevant waste tracking documentation completed
	  ○ All oil filters will be separately stored in containers with a covered bunded area, and will be removed from the site by an appropriately licensed contractor with all relevant waste tracking documentation completed
	  ○ Sediment / soil will be periodically removed from the various silt control structures and used in progressive rehabilitation of the site
	  ○ All office paper and general waste from routine equipment and vehicle maintenance consumables will be placed in appropriate containers for collection by council or a licensed contractor for disposal/ recycling at an appropriate waste management facility
	  ○ Good housekeeping practices and routine inspection/maintenance will be undertaken of all non-public roads, site infrastructure and silt fencing. Damaged infrastructure including sediment control structures will be replaced as required
	  ○ Wastewater from the amenities and workshop will be collected in a pump-out system and transported off-site by a licensed contractor
	  ○ All waste tyres will be removed by the supplier of replacement tyres
	  ○ Install sediment controls downslope of the disturbance area (in accordance with guidelines such as Landcom (2004)
	  ○ Any potential asbestos containing materials will be disposed of to a licenced facility using appropriate handling and disposal techniques.
	• Hazardous substances will be stored with valves / outlets facing away from the predominant bushfire threat, site office and workshop area (where applicable). Connection to gas cylinders will be metal. Any hazardous material will be stored more than 10m from any bushfire hazard and more than 10m from the proposed workshop and site office. Hazardous materials will be stored in accordance with AS 2187.1-1998 Explosives-Storage, transport and use – storage
	• The Development has been positioned to minimise direct impacts on drainage channels such as Deep Creek to the north; however, there is some potential for indirect impacts to water quality downstream through sedimentation. Implementation of appropriate erosion and sedimentation control measures as part of the quarry will be required to minimise the potential for these impacts
	• Protection of the Environment Operations Act 1997. The EPL will require two discharge locations: one for each of the two sediment dams. Discharges are expected to be limited to storm events with rainfall depths in excess of about 91.5 mm (based on the design rainfall depth of the sediment dams of 91.5 mm over 5 days). Water balance modelling indicates that discharges of up to about 100 ML per annum are likely (for median climate conditions
	• Water Management Act 2000. Water access licences, in addition to site harvestable right of about 33 L, will be required to cover the water take from the dam to the south of the quarry. Water balance modelling indicates that by retaining and reusing surface water generated on site (primarily within the quarry footprint), external supply from the dam are expected to be small (up to 1 ML per year).
	• Groundwater seepages into the pit will need to be licensed under the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016 (New England Fold Belt Coast Groundwater Source). It is understood that the final landform will be free-draining and will therefore not represent a loss of groundwater to evaporation.

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JUSTIFICATION AND CONCLUSION

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9 JUSTIFICATION AND CONCLUSION

This chapter of the EIS provides a justification of the proposed project with regard to the objects of the EP&A Act 1979.

9.1 OBJECTS OF THE ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979

This section provides a review of the proposed development against the objects of the EP&A Act, and as such a justification of the Project as proposed. The objects under Section 1.3 of the EP&A Act are:

> *"(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,*
>
> *(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,*
>
> *(c) to promote the orderly and economic use and development of land,*
>
> *(d) to promote the delivery and maintenance of affordable housing,*
>
> *(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,*
>
> *(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),*
>
> *(g) to promote good design and amenity of the built environment,*
>
> *(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,*
>
> *(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,*
>
> *(j) to provide increased opportunity for community participation in environmental planning and assessment."*

9.1.1 Proper Management, Development and Conservation of Natural and Artificial Resources

Object 1.3(a) of the EP&A Act is:

(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

The proposed DCQ provides for the extraction of natural resources and will provide this resource for use within the State for the ultimate benefit of the community through the provision of quality aggregates with the potential for increased road safety. The design of the DCQ has taken into consideration the social, economic and environmental settings present within the area including:

- Positioning of the quarry pit on the eastern side of a dominant ridgeline, and within a location that is screened to the south by several ridgelines to minimize the potential for noise and dust emissions from the quarry to impact on surrounding private dwellings
- Adapting the quarrying direction to provide in pit screening to the south to limit noise impacts
- Adjusting the northern and southern extents of the quarry pit to exclude the majority of the 1st order drainage lines and positioning of the quarry outside the Deep Creek riparian area
- Limiting the depth of the quarry to avoid intersecting potentially lower quality groundwater

- Developing a new private access road and intersection with The Bucketts Way to minimize disturbance of existing residential properties and increase the distance of the access road from the Forest Glen Road area and associated higher number of dwellings
- Adjusting the alignment and inclusion of landscaping on the haulage road to minimize disturbance to adjacent dwellings that noted concerns due to high sensitivity to diesel emissions
- Positioning of the office, workshop and main stockpile area on lands that have been previously cleared.

The controls and mitigation measures detailed within this EIS detail the measures proposed by to avoid, minimise and ameliorate impacts, ensuring the proper management of natural and other resources.

The development of this resource provides direct employment security for 10 personnel and results in direct and indirect economic benefits to the local and regional communities.

9.1.2 To Facilitate Ecologically Sustainable Development

Object 1.3(b) of the EP&A Act is:

> *(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,*

The SEARs issued for the project specifically require the EIS to present '*the reasons why the development should be approved… including the principles of ecologically sustainable development*'.

Section 1.4 of the EP&A Act refers to Section 6(2) of the NSW *Protection of the Environment Administration Act 1991* (POEA Act) for a definition of Ecologically Sustainable Development (ESD).

Section 6(2) of the POEA act provides the following definition:

'…ecologically sustainable development requires the effective integration of social, economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs –

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

i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

ii. an assessment of the risk-weighted consequences of various options,

b) inter-generational equity - namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

c) conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

d) improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services, such as—

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

ii. the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

iii. environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed

to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The Precautionary Principle

The precautionary principle is based upon the principle that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Full scientific impact assessments have been performed in the areas of:

- Biodiversity
- Noise and Blasting
- Air Quality
- Surface Water
- Groundwater
- Aboriginal Heritage
- Historic Heritage
- Traffic and Transport
- Land Resources
- Waste
- Hazards
- Visual Amenity
- Social
- Economic.

These studies have identified baseline data and assessed the potential impacts, including if there are threats of serious or irreversible environmental damage. The EIS demonstrates that no serious or irreversible environmental damage has been determined to occur as a result of the quarry.

While this has been done inherently through quarry design and planning, the EIS also presents management and offset measures to remove, reduce or compensate for any impacts identified. Further, a comprehensive set of management plans would be produced post approval and prior to project commencement to further prevent environmental degradation, as per the precautionary principle.

Inter Generational Equity

Inter generational equity, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations, can be demonstrated to be met through the outcomes of impact assessments presented in this EIS. There will be on site impacts to threatened species and vegetation communities, these will be offset through both the provision of offset sites within the land immediately adjacent to the proposed project site, and through the purchase of offsite biodiversity credits. This will ensure that commensurate areas are protected in perpetuity for future generations and thus meet the intent of the inter generational equity aspect of an ESD.

Conservation of Biological Diversity and Ecological Integrity

The intent of this aspect of an ESD is that conservation of biological diversity and ecological integrity should be a fundamental consideration. This has been considered throughout the project planning since inception. The quarry layout has been designed to limit disturbance to previously cleared areas wherever possible. While some clearing of native vegetation is required it is limited to the minimum required for the quarry. This is demonstrated where the land previously cleared for grazing makes up the majority of the quarry infrastructure areas, thus conserving diversity and ecological integrity as far as is reasonably possible. The pit area, while underlying native vegetation which will require clearing has been selected as it targets the highest quality resource in a more efficient and shallow extraction area than otherwise would be required thus allowing for a reduced disturbance area. Alternative project designs were considered, however they resulted in increased impacts to the receiving environment. The fundamental consideration of biological diversity and ecological integrity throughout the

planning and design of the quarry has therefore led to the intent of this aspect of an ESD being met. Further, the application of progressive rehabilitation and a final landform that provides for a safe, sustainable and non-polluting landform representative of the pre-project environment allows for the current level of biological diversity and ecological integrity to be maintained.

Improved Valuation, Pricing and Incentive Mechanisms

The intent of this aspect of an ESD is that environmental factors should be included in the valuation of assets and services. The economic study considered the impact upon biodiversity through the purchase of biodiversity offset credits and implementation of ongoing management in relation to funds released from the bond held by the Biodiversity Conservation Trust (as would be paid by IDPL). A road levy which will be payable to local Council's and estimated at approximately $10 million to fund road maintenance over the life of the project.

The CBA has identified that should the quarry be approved, economic impacts are positive. The quarry will contribute to economic growth through increased Gross Regional / State Product (GRP / GSP) during construction, operations, and decommissioning / rehabilitation phases, compared to what would occur without the quarry, flowing from both direct and flow-on impacts. The contribution to GSP will increase from approximately $3.7 million in 2021-22 (first year of construction) to approximately $8.5 million per annum between 2027-28 and 2040-41. The contribution to GSP is then estimated to rise to peak at $10.2 million per annum between 2043-44 and 2048-49 before the operations winds down and ceases by 2051-52. A contribution of approximately $7.6 million is estimated in 2051-52 as a result of final operations and decommissioning and rehabilitation activities. In total, the area/region within 100 km of the project site is estimated to capture approximately 91.9% of the total contribution to GSP across the assessment period (from 2021-22 to 2051-52), with the rest of NSW accounting for approximately 8.1%.

9.1.3 Orderly and Economic Use and Development of Land

Object 1.3(c) of the EP&A Act is:

> *(c) to promote the orderly and economic use and development of land,*

The proposed DCQ is positioned within the RU2 zone where extractive industries are permitted with consent. The quarry has been positioned with regard to the proximity of surrounding dwellings, and access to key infrastructure necessary for the development of the quarry, namely The Bucketts Way and Pacific Highway.

As urban areas continue to expand, the ability to undertake quarrying in areas closer to the primary demand (e.g. roads, urban, industrial and commercial developments), without adverse impact on the community is reduced. This drives the need to develop quarry resources from other areas where the density of dwellings is relatively low.

The quarry will not result in any significant displacement of existing rural land use. The quarry has been developed such that it will not result in any significant impacts at adjoining private dwellings or properties. The positioning of the quarry has had regard to the visibility from surrounding properties and publicly accessible areas and will therefore have limited impact on the scenic qualities of the area that may be associated with tourism related land uses.

At the conclusion of quarrying, the land, outside any retained infrastructure, will be returned to a condition comparable, albeit slightly lower than the existing land capability.

9.1.4 Delivery and maintenance of affordable housing

Object 1.3(d) of the EP&A Act is:

> *(d) to promote the delivery and maintenance of affordable housing,*

The DCQ does not have a direct effect on the delivery and maintenance of affordable housing, however the quarry will likely increase the number of available quarry material sources within the region and will likely replace existing suppliers as reserves are depleted. This improved or consistent supply of aggregate ensures the costs

of construction of roads and concrete for a range of development (including for affordable housing) remain viable and feasible to deliver and maintain.

9.1.5 Protection of the Environment

Object 1.3(e) of the EP&A Act is:

> *(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,*

The development and operation of the quarry infrastructure and the extraction of quarry resource inevitably has an impact on the environment. A key environmental risk associated with the DCQ includes the impacts on clearing native vegetation, clearing of threatened flora and loss of habitat and increased risks to threatened fauna.

The design of the DCQ has avoided or minimised impacts on these matters where feasible. Where impacts remain, proposed mitigation measures and offsets to protect the environment are proposed, including:

- Establishing onsite biodiversity offsets (Stewardship Sites) for the local in perpetuity protection of similar ecological values
- Biodiversity management measures to be implemented through an environmental management framework.

The effectiveness of these protection and mitigation measures will be determined through an environmental monitoring program. This program will be reported on annually. Environmental protection measures will be reviewed and improved based on the results from the monitoring program.

9.1.6 Built and Cultural Heritage

Object 1.3(f) of the EP&A Act is:

> *(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),*

The DCQ is located within an area that has been determined through heritage investigations to not have any significant impacts on built or cultural heritage in the area. Isolated finds located onsite during the Aboriginal Heritage impact assessment have been considered, and will be managed, along with any other currently unknown, cultural artefacts consistent with a site specific management plan developed in consultation with the local Aboriginal Community.

9.1.7 Good Design and Amenity of the Built Environment

Object 1.3(g) of the EP&A Act is:

> *(g) to promote good design and amenity of the built environment,*

The design of the quarry has taken on best practice in design elements ensuring geotechnical stability and safety of extraction. The longer term amenity of the area is provided for with the proposed rehabilitation of the quarry.

The office and workshop area has been designed for the purpose of providing a safe, functional space that separates light vehicles and heavy vehicles, provides for water management and keeps the office area separated from the quarry pit to minimise dust within the office and improve safety for visitors.

The new road and intersection proposed by the DCQ have been designed consistent with the relevant road standards and will be required to be constructed consistent with those standards that will provide for the health and safety of motorists using these roads, whilst also minimising the effects on neighbouring properties through there placement and sealing to minimise dust generation. IDPL will contribute levies to the roads authorities to ensure the amenity and design of public road network, including The Bucketts Way, is maintained to suitable standards.

9.1.8 Proper Construction and Maintenance

Object 1.3(h) of the EP&A Act is:

> *(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,*

Infrastructure constructed for the DCQ will be required to meet the relevant standards of construction as required under the Building Code of Australia, where relevant. A review of the requirements for bushfire protection under PBP (2019) has been provided (see Section 7.11.8).

While not directly applicable to this object but somewhat related, roads proposed by the DCQ will be required to be constructed consistent with the relevant standards to provide for the health and safety of motorists using these roads (see Section 3.2.1).

9.1.9 Sharing of Responsibility for Environmental Planning

Object 1.3(i) of the EP&A Act is:

> *(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,*

The development of the DCQ has included early consultation with local councils (Mid-Coast and Port Stephens) Councils, consultation with NSW State government departments (e.g. DPIE) and the Commonwealth government (DAWE). The project will be assessed by the State and Commonwealth governments under the Bilateral framework, this will include the consideration of input from local government prior to determination.

9.1.10 Opportunity for Community Participation in Environmental Planning and Assessment

Object 1.3(j) of the EP&A Act is:

> *(j) to provide increased opportunity for community participation in environmental planning and assessment."*

This EIS documents the various methods of community participation undertaken during the development of the DCQ and also documents the social impact assessment undertaken for the project to better understand the potential impacts of the quarry on the community.

The EP&A Act 1979 provides through the public exhibition of the EIS, further opportunity for public involvement and participation in the environment planning and assessment process for the DCQ.

9.2 CONCLUSION

In addressing the requirements of the SEARs, the Deep Creek Quarry has been demonstrated to be consistent with the objectives of the EP&A Act and is therefore justified based on the findings identified by the environmental, social and economic investigations performed through the production of this EIS.

As a permissible activity under the current RU2 zoning, the quarry is strategically located behind natural ridgelines and positioned on a largely previously cleared area, while well situated to be able to utilise existing suitable road infrastructure efficiently to be able to service both local and regional demand. This strategic site positioning has been done to minimise social and environmental impacts, which are further reduced when the management and mitigation measures described throughout are implemented.

The project will contribute significantly to the identified increased demand for the target products throughout the local, regional and state markets where it is needed to service the requirements of construction and infrastructure, and in particular contribute to increased road safety and environmental benefit through the unique high PFAV and reflective properties identified.

The EIS has demonstrated the quarry will not result in any significant impacts during construction or operations, and no significant residual impacts following completion and rehabilitation. This demonstration has been achieved through a thorough identification of the existing environment, a detailed assessment of the potential environmental, social and economic impacts of the construction and operation of the proposed development, and an assessment of how this may contribute to cumulative impacts arising from existing or proposed activities in the associated areas. Any potential impacts identified as part of the EIS have been demonstrated to be able to be managed, mitigated or offset to ensure that the project can operate without significant impacts to the receiving environment and deliver Ecologically Sustainable Development.

The quarry has been demonstrated to meet the objectives of Ecologically Sustainable Development and the other objects under Section 1.3 of the EP&A Act, and as defined by Section 6(2) of the POEA Act . As the demonstrated Ecologically Sustainable Development is coupled with the 'overwhelmingly positive' economic benefits and limited social impacts identified, the project is justified.

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ABBREVIATIONS

11 ABBREVIATIONS

Abbreviation	Meaning
ABN	Australian Business Number
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ACC	Access
ACHA	Aboriginal Cultural Heritage Assessment
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACHMP	Aboriginal Cultural Heritage Management Plan
AEMR	Annual Environmental Management Report
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information System
AHIP	Aboriginal Heritage Impact Permit
ALS	Australian Laboratory Services
ALUM	Australian Land Use Mapping
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines
APZ	Asset Protection Zone
AQIA	Air Quality Impact Assessment
ASS	Acid Sulfate Soils
AUL	Auxiliary Left Turn
BAL	Bushfire Attack Level
BAM	Biodiversity Assessment Method
BCD	Biodiversity Conservation Division
BCR	Benefit Cost Ratio
BCS	Biodiversity, Conservation and Science Directorate
BDAR	Biodiversity Development Assessment Report
BFMP	Bushfire Management Plan
BOM	Bureau of Meteorology
BOS	Biodiversity Offsets Scheme
BPM	Bushfire Protection Measures
BSAL	Biophysical Strategic Agricultural Land
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CALMET	CALMET software
CALPUFF	CALPUFF Modeling System
CBA	Cost Benefit Analysis
CCC	Community Consultative Committee
CEMP	Construction Environmental Management Plan
CEP	Community Engagement Plan
CHR	Channelised Right Turn
CIV	Capital Investment Report
CLM	Contaminated Land Management

Abbreviation	Meaning
CMP	Construction Management Plan
DA	Development Application
DAP	Development Assessment Panel
DAWE	Department of Agriculture, Water and Environment
DCP	Development Control Plan
DCQ	Deep Creek Quarry
DECCW	Department of Environment, Climate Change and Water
DP	Deposited Plan
DPC	Department of Premier and Cabinet
DPE	Department of Planning and Environment
DPI	Department of Primary Industry
DPIE	Department of Planning Industry and Environment
DPTI	Department of Planning, Transport & Infrastructure
EC	Electrical Conductivity
EEC	Endangered Ecological Community
EIA	Environmental Impact Assessment
EIS,	Environmental Impact Statement
ELVIS	Elevation and Depth Foundation Spatial Data
EMP	Environmental Management Plan
ENM	Environmental Noise Model
EPA	Environmental Protection Authority
EPBC	Environmental Protection and Biodiversity Conservation
EPL	Environmental Protection Licence
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically sustainable Development
FAQ	Frequently Asked Question
FDI	Fire Danger Index
FFDI	Forest Fire Danger Index
FTE	Full Time Equivalent
FZ	Flame Zone
GDA94	Geocentric Datum of Australia 1994
GDE	Groundwater Dependant Ecosystem
GDP	Gross Domestic Product
GRP	Gross Regional Product
GSP	Gross State Product
GST	Goods and Services Tax
GWIA	Groundwater Impact Assessment
GWMP	Groundwater Management Plan
HHIA	Historic Heritage Impact Assessment
HRP	Hunter Regional Plan
HTE	High Threat Exotic
HW	Hunter Water
HWB	Health and Wellbeing
ICAG	Ironstone Community Action Group

Abbreviation	Meaning
ICOMOS	International Council on Monuments and Sites
IDPL	Ironstone Developments Pty Ltd
IO	Input-Output
ISBN	International Standard Book Number
KPoM	Koala Plan of Management
LAF	Sound Level (Frequency Weighted)
LALC	Local Aboriginal Land Council
LEA	Local Economic Area
LEP	Local Environment Plan
LGA	Local Government area
LLS	Local Land Services
LSC	Land and Soil Capability
LSRR	Land Use, Soils and Rehabilitation Report
LUMAP	Land Use mapping
MEG	Mining Exploration and Geoscience
MGA	Map Grid of Australia
MIC	Maximum Instantaneous Charge
ML	Mega Litres
MNES	Matters of National Environmental Significance
MT	Million Tonnes
NATA	National Association of Testing Authorities
NEWA	Noise Enhancement Wind Analysis
NIA	Noise Impact Assessment
NL	Noise Logger
NNTT	National Native Title Tribunal
NORBY	Neutral or Beneficial Effect
NOX	Nitrous Oxide
NPI	Noise Policy for Industry
NPV	Net Present Value
NPW	National Parks and Wildlife
NRAR	Natural Resources Access Regulator
NSW	New South Wales
NT	Native Title
NTPE	Northern Transport Planning and Engineering
NVIA	Noise and Vibration Impact Assessment
OEH	Office of Environment and Heritage
OHS	Occupation Health and Safety
OP	Over Pressure
PAFV	Polished Aggregate Friction Value
PBP	Planning for Bushfire Protection
PCT	Plant Community Type
PHA	Preliminary Hazard Analysis
PIRMP	Pollution Incident Response Management Plan
PM	Particulate Matter

Abbreviation	Meaning
PMF	Predicted Maximum Flood
PNTL	Project Noise Trigger Level
POEO	Protection of the Environment Operations
PPE	Personal Protective Equipment
PV	Present Value
PVC	Polyvinyl Chloride
RAAF	Royal Australian Air Force
RAMSAR	Convention on Wetlands of International Importance
RAP	Registered Aboriginal Party
RBL	Rating Background Level
RFS	Rural Fire Service
RH	Relative Humidity
RMS	Roads and Maritime Services
RNE	Register of the National Estate
RNP	Road Noise Policy
RSA	Road Safety Audit
RTA	Roads and Traffic Authority
RU2	Rural Landscape Zone
SA2	Statistical Area 2
SA3	Statistical Area 3
SAII	Serious and Irreversible Impacts
SAT	Spot Assessment Technique
SDS	Safety Data Sheets
SEARS	Secretary's Environmental Assessment Requirements
SEED	Sharing and Enabling Environmental Data
SEPP	State Environmental Planning Policy
SFPP	Special Fire Protection Purpose
SIA	Social Impact Assessment
SIMP	Social Impact Management Plan
SISD	Safe Intersection Sight Distance
SSC	State Suburbs
SSD	State Significant Development
STE	State and Territory
SWIA	Surface Water Impact Assessment
SWMP	Surface Water Management Plan
TAPM	The Air Pollution Model
TAS	Todoroski Air Sciences
TBDC	Threatened Biodiversity Data Collection
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
TMR	Transport and Main Roads
TPH	Total Petroleum Hydrocarbons
TSP	Total Suspended Particulate Matter
TSS	Total Suspended Solids

Abbreviation	Meaning
UHF	Ultra-High Frequency
VIA	Visual Impact Assessment
VLAMP	Voluntary Land Acquisition and Mitigation Policy
WAL	Water Access Licence
WARR	Waste Avoidance and Resource Recovery
WHS	Workplace Health and Safety
WMP	Water Management Plan
WMS	Water Management System
WSP	Water Sharing Plan

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APPENDICES

Deep Creek
QUARRY

SEE SEPERATE FILES FOR APPENDICES