ENVIRONMENTAL IMPACT STATEMENT

PROPOSED RAZORBACK QUARRY

39 Razorback Road Running Stream, NSW

Plantation Pine Products Pty Ltd

1 March 2023

Document Control

VERSION NO.	DATE	AUTHOR	REVIEWER	DETAILS
1.0	1/3/2023	Shaun Smith – Principal Environmental Planner	Mark Daniels (Development and Planning Manager) Zac Rowlandson (CEO – Bettergrow)	Draft for review
2.0	1/3/2023	Shaun Smith – Principal Environmental Planner	Mark Daniels (Development and Planning Manager)	Final for lodgement

Please note: In preparing this report Space Urban Pty Ltd have assumed that all information and documents provided to us as a result of a specific request or enquiry were complete, accurate and up to date. Where we have obtained information from a government register or database, we have assumed that the information is accurate. Where an assumption has been made, we have not made any independent investigations with respect to the matters the subject of that assumption. As such we would not be aware of any reason if any of the assumptions were incorrect.

Approval for Issue

NAME	SIGNATURE	DATE
Shaun Smith	[redacted]	1/03/2023

Statement of Validity

Submission of Environmental Impact Statement (EIS) prepared under the Environmental Planning and Assessment Act 1979.

EIS PREPARED BY	
Name	Shaun Smith
Qualification	Bachelor of Natural Resources (UNE) Diploma of Business Management (AETS)
Address	2 Wella Way, Somersby NSW 2250
In respect of	
Development Application	
Proponent Name	Plantation Pine Products Pty Ltd
Proponent Address	2 Wella Way , Somersby NSW 2250
Environmental Impact Statement	
	An EIS is attached.
Declaration	
Certificate	I certify that I have prepared the contents of this EIS and to the best of my knowledge, It is in accordance with Part 8, Division 5 of the *Environmental Planning and Assessment Regulation 2021,* It contains all available information that is relevant to the Environmental Assessment (EA) of the development to which this statement relates, and It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.
Signature	[redacted]
Name	Shaun Smith
Date	1/03/2023

Executive Summary

Overview

Space Urban Pty Ltd (Space Urban) has prepared this this Environmental Impact Statement (EIS) on behalf of Plantation Pine Products Pty Ltd (PPP), to support an application to Mid-Western Regional Council (MWRC), for the development and operation of a sand and gravel quarry at the property 'Turonfels' located at 39 Razorback Road, Running Stream, NSW.

The quarry is proposed to extract up to 200,000 tonnes per annum (tpa) over a period up to 20 years and will include access roads, a site office, workshop, and weighbridge. The quarry will be progressively rehabilitated to pasture and pine plantation with potential future use of the facilities area for forestry related activities.

The development is deemed to be '*Designated Development*' under the *Environmental Planning & Assessment Act 1979* (EP&A Act), and as such Secretary's Environmental Assessment Requirements (SEARs) for the preparation of this EIS are required and were subsequently issued on 2 March 2021.

Site Description

The project site is located within the MWRC Local Government Area in a rural setting. The development site is described as Lot 2 DP 569979, 39 Razorback Road Running Stream, NSW.

The project area covers up to 25 hectares (ha) and is located approximately 1 km west of the Castlereagh Highway on Razorback Road, approximately 65 kilometres south of Mudgee, 65km north-west of Lithgow and 200 kilometres north-west of Sydney. The proposed quarry is permissible within the RU1 - Primary Production zoned land.

The majority of the subject site is currently utilised for pine plantations. Surrounding lands are primarily larger agricultural holdings undertaking mixed grazing, along with a scattering of pine plantations and other agricultural uses.

Project Description

The project involves the extraction of sand and gravel materials up to 200,000 tpa over a period up to 20 years. The resource targeted under this application is approximately 4 Mt of weathered conglomerate and sandstone. The underlying resources are broadly weathered conglomerates from the surface to 10 m and the less pebbly sandstones to 20 m below the surface.

The development will have a total disturbance area of approximately 24.7 ha and will include a gravel access road, site office, workshop, shaker grid, weighbridge, and raw water dams. Progressive rehabilitation of the quarried land will be undertaken which will return the site to pasture and pine plantation.

Extraction will be undertaken typically by bulldozer for topsoil stripping and excavator for extraction and screening. Product will be loaded on to highway trucks with either an excavator or a front end loader. Raw materials will be either screened onsite or transported direct to the consumer, and products will generally be pebble for decorative use or sand for concrete.

Project Need and Alternatives

The quarry has the potential to provide a local sand resource in the Mid-Western LGA. At a distance of less than 200 km from Sydney, the sand products generated by the proposed quarry are expected to meet a variety of needs for landscaping and concrete sands within the Sydney and broader catchments.

The quarry will provide social and economic benefits through employment (directly and indirectly), local spending on consumables and maintenance and the distribution of this contribution through the local community. The quarry would also increase competition in the sand market and assist with keeping sand prices lower.

Throughout the planning stages of the Proposal, the Applicant considered alternatives with respect to site access from Razorback Road, intersection upgrades with the Castlereagh highway, transportation of the sand products, and surface water management structures. All other components were decided upon and designed following the assessment and consideration of all relevant information and data. No other alternatives are available in the locality that could be quarried as economically as this resource as there is no overburden to be removed and no washing is required.

Planning Approval Pathway

The *Environmental Planning and Assessment Act 1979* (EP&A Act) forms the statutory framework for environmental assessment and planning approval in NSW. The project is considered 'Designated Development' in accordance with Section 4.10 of Part 4 of the EP&A Act and Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regs). Specifically, Schedule 3, Part 2, Clause 26 of the EPA&A Regs defines designated development for '**Extractive Industries**' as:

"*(1) Development for the purposes of an extractive industry facility is designated development if the facility obtains or processes for sale, or reuse, more than 30,000 cubic metres of extractive material per year.*

(2) Development for the purposes of an extractive industry facility is designated development if the facility disturbs or will disturb a total surface area of more than 2 hectares of land by— (a) clearing or excavating, or (b) constructing dams, ponds, drains, roads, or conveyors, or (c) storing or depositing overburden, extractive material, or tailings".

The proposed quarry seeks to extract at up to 200,000 tpa from a total resource of 4 million tonnes (Mt) with a disturbance area of approximately 25 hectares (ha), including the quarry, office, workshop, and access road. Accordingly, the development meets the requirements for assessment under 'Designated Development'.

The assessing body for the development is MWRC and the determining authority is the Joint Regional Planning Panel (JRPP).

Consultation and Stakeholder Engagement

Government

Consultation with government agencies was initiated by the Department of Planning and Environment (DPE) during the preparation of the Secretary's Environmental Assessment Requirements (SEARs). Government agencies that provided a response to DPE for inclusion in the SEARs included:

- Mid-Western Regional Council,
- NSW Department of Planning and Environment,
- NSW Environment Protection Authority,
- NSW Office of Environment and Heritage,
- Transport for NSW,
- Subsidence Advisory NSW,
- NSW Department of Primary Industries, and
- NSW Rural Fire Service.

Consultation with the above agencies has continued during the preparation of this EIS.

Community

The purpose of the community consultation program was to identify the key community stakeholders, present the stakeholders with details of the proposed Project and give the stakeholders an opportunity to provide feedback and identify any issues or concerns they may have. The community consultation program focused upon those landowners adjacent to or likely to be directly impacted upon by the construction and or the operation of the Project. Community consultation consisted of a mailbox drop of project information, individual meetings, and the development of a project website.

Aboriginal Community

Consultation with Aboriginal stakeholders for the Project was undertaken in accordance with Section 60 of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2019* and followed the process outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRP).

As a result of the consultation process, eight Aboriginal groups registered their interest in the Project. Notification of the Registered Aboriginal Parties (RAPs) was provided to Heritage NSW on 14 November 2021. Following provision of the methodology, field work, and preparation of the draft Aboriginal Cultural Heritage Assessment Report (ACHAR), comments were received from three RAPs. All three RAPs commented that they 'agree with the findings of the assessment'.

Environmental Impact Assessment

Traffic and Access

A **Traffic Impact Assessment** (TIA) for the proposed development has been undertaken by Pavey Consulting Services to determine the potential traffic, intersection, and road impacts during construction and operations. The assessment has been prepared in accordance with the relevant road assessment standards, guidelines, and policies, and in consultation with the government agencies. The assessment has been prepared with regard to *Austroads Guide to Traffic Management Part 3 Traffic Studies and Analysis*, *Austroads Guide to Traffic Management Part 12 Traffic Impacts of Developments*, and *NSW Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (2002)*. The assessment has also been prepared to satisfy the SEARs and agency comments.

Access to the proposed quarry is off Razorback Road. Razorback Road joins the Castlereagh Highway at a "T junction" which has been upgrade in the past to a standard Channelised Right Turn (CHR) and Basic Left Turn (BAL). Deceleration lengths and storage areas are consistent with current standards and traffic volumes.

The intersection with Razorback Road and the Castlereagh Highway consists of a left-turn deceleration lane for northbound vehicles on the highway and a protected right-turn for southbound vehicles turning into Razorback Road. There is no dedicated acceleration lane for vehicles turning south onto the Castlereagh Highway, however, an overtaking lane continues for south bound traffic for approximately 150 m south of the intersection.

Castlereagh Highway is a 100 km/h highway connecting Lithgow in the south with Mudgee in the north.

Razorback Road is a local road connecting the Castlereagh Highway with Turon Road, but primarily services local properties. The road is sealed for approximately 20 m from the intersection with the Castlereagh Highway, beyond the sealed section the road is of gravel construction approximately 6 m in width.

The proposed quarry operations are assumed to generate:

- Up to 5 laden trucks per hour exiting the Razorback Road intersection during operating hours (7 am to 6 pm Monday to Friday),
- Up to 5 unladen trucks per hour entering the Razorback Road intersection during operating hours (7 am to 6 pm Monday to Friday),
- Up to 4 vehicles of employees entering Razorback Road from approximately 7 am, and
- Up to 4 vehicles of employees leaving Razorback Road from approximately 6 pm.

It is anticipated that for all phases of this development the distribution of traffic will be as follows:

- 50 / 50 split to the north and south for heavy vehicles, and
- 100% from the north for employees.

The traffic impacts from the proposed development have been assessed and the key findings are as follows:

- The available sight distance of Razorback Road to the south along Castlereagh Highway is adequate for the speed environment,
- The available sight distance of Razorback Road to the north along Castlereagh Highway is inadequate for the speed environment. However, a proposed concept design has been development to trim back the embank to the north and this design provides a clear sight distance meeting Austroads guidelines,
- Total traffic generation remains low and has no impact on the intersection performance and demonstrates that the current protected right run storage and left turn de acceleration lane is adequate and no other intersection improvements are necessary,
- Minor signage upgrades are required to improve the awareness of the approaching intersections, and
- Sealing of Razorback Road to 15m west of the quarry access will ensure that the minor increase in vehicle movements will not have an adverse effect on road safety or amenity of adjacent properties.

Air Quality

An **Air Quality Impact Assessment** (AQIA) for the proposed development has been undertaken by Todoroski Air Sciences. The purpose of this assessment was to determine the potential dust and greenhouse gas generating sources from construction and operations, undertake modelling of worst-case scenarios likely at the site, determine the likely impacts, and propose suitable mitigation measures and strategies. The dust assessment has been prepared in accordance with the NSW Environment Protection Authority (EPA) publication *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2016)*, and the greenhouse gas assessment has been prepared in accordance with the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard Revised Edition (WBCSD & WRI)*. The assessment also considers the SEARs and agency comments.

The assessment has modelled the potential worst-case air quality impacts associated with the proposed development.

Air dispersion modelling using the CALPUFF model was used, with generally conservative assumptions to predict the potential for off-site air quality impacts in the surrounding area due to the Project.

It is predicted that the operation of the Project would comply with the assessment criteria for all assessed air pollutants and therefore would not lead to any unacceptable level of environmental harm or impact in the surrounding area.

The estimated annual average greenhouse gas emission is calculated to be approximately 0.0004% of the Australian greenhouse gas emissions for the year to March 2022 period and approximately 0.002% of the NSW greenhouse gas emissions for the 2020 period.

The assessment demonstrates that the operation of the Project would not cause any unacceptable air quality impacts to the surrounding environment.

Noise and Vibration

A **Noise and Vibration Impact Assessment** (NVIA) has been undertaken for the proposed development by Spectrum Acoustics Pty Ltd. The purpose of this assessment was to determine potential noise and vibration impacts at the nearest residential receivers surrounding the site. The assessment also considered construction, operational and transport noise impacts associated with the development. The assessment has been prepared in accordance with the *NSW Noise Policy for Industry (NPfI)*, *NSW Interim*

Construction Noise Guideline (ICNG), *NSW Road Noise Policy (RNP)*, and *NSW Assessing Vibration: a Technical Guideline*. The assessment has also been prepared to satisfy the SEARs and agency comments.

The assessment has found no exceedances of default minimum construction and operational noise trigger levels at any sensitive receiver.

Noise emissions from the extraction and processing area are not predicted to exceed the noise emission criteria and no specific noise mitigation or management measures are required. At maximum production rate, traffic noise levels should be minimised at the receiver adjacent to Razorback Road identified as R4 by limiting the speed of trucks to 40 km/h as they pass the residence and minimising the use of engine brakes.

The low levels of predicted operational noise suggest that routine noise compliance monitoring would not be necessary for this project.

Biodiversity

MJD Environmental Pty Ltd has prepared a **Biodiversity Assessment** (BA), including a Test of Significance 5 (Part Test), for the proposed development. The purpose of the assessment was to examine the likelihood of the proposed development having a significant effect on any threatened species, populations or ecological communities listed under the *NSW Biodiversity Conservation Act 2016* (BC Act). The assessment also recognises the relevant requirements of the EP&A Act, as amended. Preliminary assessment was also undertaken having regard to those threatened entities listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The assessment has also been prepared to satisfy the SEARs and agency comments.

The objective of this BA was also to examine the likelihood of the proposed development having a significant effect on any threatened species, populations or ecological communities listed under the *NSW Biodiversity Conservation Act 2016* (BC Act). This BA recognises the relevant requirements of the *EP&A Act 1979* as amended by the *NSW Environmental Planning and Assessment Amendment Act 1997*. Preliminary assessment was also made with regard to those threatened entities listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This BA included an appraisal of the subject site to determine the appropriate assessment pathway under the BC Act, which determined that the proposal does not trigger the Biodiversity Offset Scheme (BOS) entry threshold due to the existing approval of a Timber Plantation over the land under the *Plantations and Reafforestation Act 1999*. Furthermore, a review of historical aerial photos over the land determined that the subject site was cleared of native vegetation prior to 1990, containing only pasture areas and some scattered trees. The proposed development footprint is likely to satisfy the criteria of "Low-Conservation Grassland" due to the minimal native grasses found within the area (as determined under vegetation plot surveys). The historical vegetation clearing and classification of grasslands as "Low Conservation Grasslands" indicates that this area can be classified under Section 60H of the *Local Land Services Act 2013* (LLS Act) as Category 1 – Exempt Land. Under Section 7.4(2) of the BC Act, the clearing of vegetation within Category 1 -Exempt Land is to be disregarded when assessing the total development footprint against the vegetation clearing threshold (Clause 7.2(4) of *Biodiversity Conservation Regulation 2017*. As such, a Test of Significance Assessment undertaken in accordance with Section 7.3 of the BC Act is the applicable assessment pathway for the proposed development.

The ecological field assessment found that the proposed development will remove up to:

- 24 ha of Pine Plantation/Disturbed Grassland, and
- 0.25 ha of PCT 1191: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, Southeastern Highlands Bioregion (Low Condition).

The BA Test of Significance considered whether the removal of vegetation on subject site totalling 0.25 ha would constitute a significant impact on known threatened species, populations, and ecological communities from the locality such that a local extinction may occur (5 Part Test).

The BA concluded that a significant impact would not occur to those entities assessed.

Surface Water and Groundwater

A **Surface and Groundwater Assessment** (SGWA) has been prepared by VGT. The purpose of this **SGWA** is to describe the proposed water management system for the Site and to clarify how potential water impacts generated by the development will be managed.

The principal objectives of the proposed water management system are:

- To minimise erosion and sedimentation from all active and rehabilitated areas, thereby minimising sediment ingress into surrounding surface waters,
- To ensure the segregation of 'dirty' water from 'clean' water and manage 'dirty' water appropriately such that any discharge from the Site meets the relevant water-quality limits, including limits contained in the relevant guidelines and any limits imposed by specific project approvals. 'Dirty' water is defined as surface runoff from disturbed catchments. 'Clean' water is defined as surface runoff from catchments that are undisturbed or rehabilitated catchments,

- To minimise the volume of water discharged from the Site but, should the discharge of water prove necessary, ensure sufficient settlement time is provided prior to discharge or employ other means such as flocculants to ensure the water meets the objectives identified in the point above,
- That appropriate licences and approvals are held or can be obtained under the Water Management Act 2000, or any relevant exemptions that apply under Schedule 4 of the Water Management (General) Regulation 2018,
- To ensure any water used in the processing of materials is contained within the closed system on the Site,
- To monitor the effectiveness of surface water and sediment controls and to ensure all relevant surface water quality criteria are met,
- To minimise the impact to any groundwater resources,
- To determine a water balance for the Site based on current and projected usage, and
- Develop a set of performance criteria and appropriate environmental management measures for the Site.

The proposed surface water and sediment and erosion controls for the quarry development will ensure minimal impacts to the surrounding environment. Surface water collected over the disturbed surfaces can be effectively contained, treated (if required) and discharged back into the downstream environment with very little change to the downstream flows and riparian communities. The quarry is unlikely to intersect groundwater and thus the impact to aquifers and groundwater dependant ecosystems is considered negligible.

A risk assessment based on Risk Based Framework for Considering Water Health and Outcomes in Strategic Land Use Planning Decisions (OEH & EPA 2017 found that the risks are low and potential impacts can be managed adequately and feasibly.

The water balance suggests that adequate water can be held on site, with the construction of the Clean Water Dam to undertake dust suppression and irrigation of rehabilitation. A Water Access Licence (WAL) will not be required for these activities as the total volume of water proposed to be held on the property is below the Harvestable Rights. The construction of any new dams, however, will require approval from Water NSW.

The final landform will be a vegetated, stable, free draining bowl with the Dams 1 and 2 being retained. This will be compatible with surrounding land uses of forestry and agriculture.

Aboriginal Heritage

An **Aboriginal Cultural Heritage Assessment Report** (ACHAR), including consultation, has been prepared for the proposed development by NGH Pty Ltd. The purpose of this assessment was to identify the presence of Aboriginal sites across the Project site, determine the risk of impact to Aboriginal sites, undertake Aboriginal consultation, identify the presence of any significant historic heritage items within the locality of the development site, risk of impact by the development, and to provide mitigation and management measures based on assessment findings. The heritage report has been prepared in accordance with the relevant OEH guidelines and has also been prepared to satisfy SEARs and agency comments.

ARAS (2020) completed an aboriginal cultural heritage due diligence and archaeological survey report for the proposed works that was used to inform an initial scoping report for the project. Utilising predictive models from both the Hunter regions and the central Tablelands, the 2020 assessment determined that surface archaeological evidence is probably located on elevated creek terraces to the north and south-west of the proposed development area where 3rd or 4th order streams such as Two Mile Creek intersect with spring areas (i.e., Black Springs). A pedestrian sample survey of archaeologically sensitive landforms (ridgetops and alluvial flats) was conducted as part of the 2020 (ARAS) assessment, which noted variable survey conditions with some low surface visibility due to vegetation and grass cover. No Aboriginal objects or areas of archaeological sensitivity were identified. The results of the survey concluded all landforms within the Project Area have been subject to significant disturbance because of furrow ploughing for pine developments and recent bushfires have damaged mature native trees.

A further archaeological survey was undertaken on 17 March 2022, with NGH Senior Heritage Consultant Bronwyn Partell and a representative from Mingaan Aboriginal Corporation. No Aboriginal Objects were identified during the survey of the proposed works. One area of Potential Archaeological Deposit (PAD) was identified outside the proposed works footprint and will not be subject to harm as a result of the proposed works.

The following recommendations have been made:

- The proposed works for the Razorback Quarry may proceed with caution within the project area as assessed by the ACHAR.
- If any items suspected of being Aboriginal in origin are discovered during the work, all work in the immediate vicinity must stop and Heritage NSW notified, and the Unexpected Finds Protocol provided as Appendix B to the ACHAR must be followed.
- In the unlikely event that human remains are discovered during the proposed works, all work must cease in the immediate vicinity. The appropriate heritage team within Heritage NSW and the local police should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal. If the remains are deemed to be

Aboriginal in origin the Registered Aboriginal Parties should be advised of the find as directed by the appropriate heritage team within Heritage NSW. Heritage NSW would advise the Proponent on the appropriate actions required.

- Additional archaeological assessment would be required if the proposal activity extends beyond the area assessed by the ACHAR. This would include consultation with the registered Aboriginal parties and may include further field survey.

Historic Heritage

A **Historic Heritage Assessment** has been prepared by Heritage, Archaeology + Planning for the proposed development. The purpose of the assessment was to identify the presence of any significant historic heritage items (if any) within the locality of the development site, whether any of these items would be impacted upon by the development and provide relevant mitigation and management strategies where appropriate. The assessment has also been prepared to satisfy the SEARs and any agency comments.

The Project area has been an agricultural holding since 1909 through to present day. There is no evidence of it being used as a place of residence and no historical farm buildings were erected. The Project area has no heritage items or heritage potential to add to the understanding of New South Wales development. In addition, the site has no potential to retain a significant archaeological record.

The sole structure of note, due to its form, is a corrugated iron machinery shed which cannot be classified as historically significant and does not provide opportunity for significant research potential. Similarly, the Cypress Pine plantings along Razorback Road while not of significance are aesthetically pleasing and perform a completely functional task as a wind break.

Despite part of the property being listed in the historic Turon Goldfields, no historic gold mining activity, gold mining stamping batteries or other historic mining plant infrastructure was located. The Project area itself has no potential to provide information extending the understanding of NSW cultural or natural history.

The following recommendations have been proposed:

- Should the machinery shed proposed to be moved, modified, or demolished at a later date archival photography should be conducted to record the rudimentary building methodology used, and
- All efforts should be made to retain and maintain the Cypress Pine wind break along Razorback Road.

Visual Amenity

A **Visual Impact Assessment** (VIA) has been prepared for the proposed development by Integrated Environmental Management Australia (IEMA). The purpose of this assessment was to provide a qualitative and quantitative assessment of the potential visual impacts generated by the development and address the SEARs requirements. The assessment was also prepared to determine the most appropriate visual treatments to mitigate visual impacts from the Project.

Analysis of the site was performed utilising GIS analysis tools and a proposed Civil 3D design model to create the theoretical visual catchment of the proposed quarry. This process also identified potential receptors.

A Zone of potential Theoretical Visibility (ZTV) was prepared as part of this VIA for each of the receptor areas nearest to the project or in areas with the most potential impact. The location of potential visibility was determined and combined to form the view catchment. From this analysis, it was determined the nearest receptor areas that had the potential to be impacted by the proposed quarry and as such determined the areas to investigate during the site inspection.

The receptors for the VIA were identified through the desktop study which involved aerial photography, GIS data and ZTV mapping. Based on the assessment, six potential receptors areas were identified near the subject land.

Two (2) of the six receptor areas were identified as in the potential ZTV. This included private residences (project related residences were excluded). A third point (VP3) was selected for the VIA as it was on a public road that was elevated and had regional views back across the site. This is the route the residents from area 6 would take when leaving their properties and heading back to the Castlereagh Highway.

Photographic imagery was taken of the site on 12 January 2023 to assist with the assessment of visual impacts. Three photomontages were prepared to assist with the process.

Three receptors (VP1, VP2, and VP3) were used as the base case for the photomontages. They were selected based on their sensitivity and proximity to the site.

A digital model of the quarry at the Stage 4 disturbance footprint has been used for the photomontages as this represents the maximum impact of disturbance and is considered a worst case. Stage 4 is not expected to occur until 14 years after commencement of the quarry.

The zone of theoretical visibility identified only two (2) receptors where the site might be visible. Existing vegetation (pines and native vegetation were not included in the initial desktop assessment to identify worse case). A third site was selected to be included in the VIA from Berwick Road at a higher elevation. This road services two (2) additional houses which do not have a view across the quarry. There will also be minimal impact on other local roads as no major clearing at the site is required.

Using computer modelling, photographs, and additional information collected during a site visit, three (3) photomontages were produced to demonstrate how much of the quarry would be visible at Stage 4 of the quarry development. Stage 4 was selected because it was the greatest area of disturbance during the life of the quarry.

At all three (3) nominated sites the significance of the visual impact was assessed using criteria relating to receptor sensitivity and the magnitude of change. A rating of LOW was determined at all three (3) locations.

Land Resources

A **Land Resources Assessment** (LRA) has been prepared by VGT. The purpose of this **LRA** is to address the SEARs, including an assessment of:

- potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management, and remedial measures,
- potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds etc), and
- the compatibility of the development with other land uses in the vicinity of the development, in accordance with the requirements of Clause 12 of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

The 327 hectare property is currently comprised of the following land uses:

- 68% or 222 ha is planted out as pine plantation at various stages of progression, from recently planted tubestock to mature plantations through to areas that have been recently harvested and not yet re-planted,
- 19% or 61 ha is other wooded or remnant vegetation, comprising both native and non-native species and includes the dwelling and yard area, and
- 13% or 44 ha is comprised of access tracks and grassland areas through and surrounding the plantation area that are not planted as plantation. This includes a former pasture area around the area of the proposed quarry and the plantation firebreaks.

The site is situated west and on the foothills of the Blue Mountains Range west of Sydney, NSW. The contact between the Triassic and Permian aged suites is approximately 500 m west of the site.

The local geology is the lower most portion of the Narrabeen Group, of which is most likely to be part of the Caley Formation which is Claystone, Shale, and Quartz Lithic Sandstone (source Western Coalfield (Southern Part) 1:100,000 NSW Mines Department Geological Sheet. The surface exposures are sparse and small farm borrow pits show poorly consolidated conglomerates, with sandstone and clay matrix.

The soils on the Site are identified as Turonfels on the Environment NSW eSpade online data viewer. This soil landscape comprises undulating to rolling low hills with the dominant soils being red earths on mid to upper slopes, and yellow podzolic soils and yellow earths on lower slopes. Chocolate soils and skeletal sands and loams also occur on upper slopes.

Topsoils run to a depth of approximately 20 cm are dull yellowish-brown loam, fine sandy with weak polyhedral peds; the pH is approximately 6.5. Subsoils show a sharp change to dull yellow orange fine sandy clay loam with weak structure; pH 6. They are moderately permeable, have a moderate to high erodibility and a moderate erosion hazard. Below the soil layers run sandstone, shale, conglomerate, and siltstones, which are much lighter in colour.

The Land and Soil Capability Class has been determined as Class 4. Class 4 land is described as:

'***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*'.

The Land and Soil Capability class in the rehabilitated landform is expected to drop from LCS class 4 to Class 6 on the quarry final batters, primarily due to the increase in batter slopes within the final void. The pit floor will remain as Class 4 land.

The DPI's Land Use Conflict Risk Assessment (LUCRA) has been used to identify potential land use conflict with sensitive receptors including surrounding agricultural land uses. Where the potential for conflict is real, this can be significantly reduced through the implementation of mitigation measures. All potential land use conflicts can be reduced to low (scoring less than 10) through the implementation of the following measures:

- Implementation of a water cart and re-vegetation to reduces nuisance dust,
- Clearing, extraction, hauling and land forming operations to be avoided in dry or windy conditions,
- Ensuring all sediment and erosion controls are in place prior to surface disturbing activities,
- Plant and equipment to meet industry standards for noise emissions,

- Visual and acoustic bunds will be established using topsoil and overburden,
- Clearing, extraction, hauling and land forming operations to be undertaken during consented hours,
- Refuelling to be undertaken in hardstand areas, and
- Fire extinguishers to be carried by plant and equipment.

Mitigation measures have been developed which provide management of any residual impacts.

Bushfire

MJD Environmental Pty Ltd has prepared a **Bushfire Assessment Report** (BAR) for the proposed development. The assessment was prepared to consider the bushfire hazard, and associated potential threats, relevant to the proposal and to outline the minimum mitigative measures required in accordance with *Planning for Bush Fire Protection 2019* (PBP), as adopted through the *Environmental Planning & Assessment Amendment* (Planning for Bush Fire Protection) *Regulation 2020*. The assessment also adheres to the methodology and procedures outlined in PBP (2019) via assessment of acceptable solutions as outlined in Chapter 8 of PBP (2019). The assessment has been prepared to satisfy the SEARs and agency comments.

The proposed development can meet the performance criteria for acceptable solutions for commercial development, giving due regard to the requirements of Chapter 8 of PBP 2019. A suitable package of protection measures has been developed that are commensurate with the assessed level of risk to the development. The following will be applied to the development:

- Provision of defendable space between the hazard and development,
- High resilience building typology on elevations facing the hazard, and
- Access and circulation suitable for a fully loaded fire appliance.

A managed fuel zone (slashed paddock) of 50 m will be established around the site facilities (crib room, weighbridge etc). The area is to be managed to IPA standards at a minimum with due regard to Appendix 4 PBP (2019).

The assessment found that hazard vegetation types occur within 140 m of the Site. The primary risk is from the pine plantation 'forest' class vegetation located on the Site. These hazards have been assessed as having the greatest effect on bushfire behaviour. The slope under the hazard vegetation has been assessed as varying from upslope to 0-5^{o} Downslope.

The following key recommendations have been generated to enable the proposal to comply with PBP (2019):

- A managed fuel zone (slashed paddock) of 50 m will be established around the site facilities (crib room weighbridge etc). The area is to be managed to IPA standards as a minimum with due regard to Appendix 4 PBP (2019),
- Access will have due regard to the requirements of Table 5.3b, Chapter 8.3.1 and Appendix 3 of PB (2019) and the discussion set out in section 3.2 of the BAR,
- Services are to be provided and connected to the site in accordance with PBP (2019) as summarised and assessed in Chapter 3, Section 3.3 of the BAR, and
- Careful consideration of future site landscaping and ongoing fuel management must occur to minimise the potential impact of bushfire on the site in accordance with PBP (2019) as summarised and assessed in Chapter 3, Section 3.4 of the BAR.

Socio-Economic

A **Socio-economics Assessment** has been prepared by Space Urban to address the SEARs requirements. The assessment provides an overview of the community profile, a brief description of management and mitigation measures that would be implemented, and a discussion of residual socio-economic impacts and benefits associated with the development.

Running Stream is located within the Mudgee Region – East in the Mid-Western Regional Council's economic and community profiles. This region stretches from the Turon River south of the quarry to Bylong in the north. The key attributes for the economy for this region are as follows:

- Employment
  - 53 jobs at Running Stream out of 11,427 for the LGA.
- Jobs by industry for the Mid-Western region are shown below:
  - 7.1 % of jobs are in the Agriculture, Forestry and Fishing sector,
  - 7.9 % in Education,
  - 9.2 % in retail,
  - 7.9 % in accommodation and food service,

- 4.3 % in manufacturing,
- 11.1 % in health care and social assistance,
- 2.6 % in transport, postal and warehousing,
- 15.9 % in mining,
- 8.3 % in construction, and
- 4% in other industries.

- For the Mid-Western Region as a whole, Mining represents the largest employer at 15.9% in that industry.

Locally to the site the main industries are agricultural grazing of alpaca, cattle and sheep, and pine forestry plantations. Key metrics for the broader Mid-Western LGA are as follows:

- 55% of the workforce earn less than $1000 per week,
- Over 46% of the workforce are aged 35-54,
- Unemployment is at 4% as of 2021, and
- Population is steadily increasing, as of 2021 it was 25,713.

The proposed quarry will contribute to employment in the local area both during construction and operations, both directly and indirectly. While the quarry is within the Mid-Western LGA, the quarry is located mid-way between Mudgee and Lithgow, as such Lithgow may share a portion of the socio-economic benefits associated with the project.

The local region has more than adequate resources to cater for the construction and operational employment demands associated with the quarry.

Waste Management

Space Urban has prepared a **Waste Minimisation and Management Plan** (WMMP) to demonstrate how waste will be avoided or minimised, reused, recycled, and disposed lawfully during the construction and operation of the proposed development. The *Waste Avoidance and Resource Recovery Act* 2001 (WARR Act) and the *Protection of the Environmental Operations Act* 1997 (POEO Act) govern the issues of waste generation, reuse, recycling, transport, and disposal and prioritise waste solutions according to how successfully they conserve natural resources. Priority is given to reducing the overall amount of waste, followed by the reuse, and then recycling of any wastes that are unavoidably created, with disposal as a last resort. The aim is to extract the maximum practical benefits from the products and to manage waste in an environmentally sustainable manner.

The construction phase of the project will generate several different types of waste products from packaging and off-cuts. Waste materials generated which will be fully recycled includes timber, concrete, timber pallets, timber packing materials, steel, and plastic film. Other waste materials that may be generated during construction include electrical waste (e.g., off-cuts from wiring), plumbing fixtures and fittings, and paints. Some consumer packaging and residual waste will be generated by contractors on site during construction works. All waste materials will be transported to appropriately licenced facilities for sorting, recycling and/or disposal as appropriate. An overall recycling rate of 95% is expected during construction works.

The most significant volume of waste to be generated during site preparation works will be green waste resulting from the clearing of pine plantation trees. Where appropriate, cleared vegetation will be mulched and spread on site to prevent the spread of weed species from the site. During operations the main waste sources will be from general office activities and workers refuse.

The following mitigation measures will apply to waste management and mitigation onsite:

- A designated waste storage area, providing for the separation and temporary storage of waste generated on site, will be provided during construction,
- All waste materials will be regularly cleared from the site and transported by a suitably licenced contractor for recycling or disposal as appropriate,
- Ordering will be limited to only the required amounts of materials,
- Assessment of suspicious potentially contaminated materials, hazardous materials and liquid wastes will be undertaken,
- Routine checks will be undertaken of waste sorting and storage areas for cleanliness, hygiene and OH&S issues, and contaminated waste materials,
- Off-site waste disposal will be transported and disposed of in accordance with licensing requirements,
- Staff and subcontractors will be informed of site waste management procedures, and

- Regular monitoring, inspection and reporting will be undertaken, and findings implemented.

Rehabilitation

A **Rehabilitation Management Plan** (RMP) has been prepared by VGT. The purpose of this **RMP** is to address the SEARs, including:

- a detailed description of the proposed rehabilitation measures to be undertaken throughout the development and during quarry closure,
- a detailed rehabilitation strategy which justifies the proposed final landform and considers the objectives of relevant strategic land use plans and policies, and
- detailing measures to be undertaken to ensure sufficient financial resources are available to implement the rehabilitation strategy.

The quarry will be progressively rehabilitated to pasture and pine plantation with potential future use of the facilities area for forestry related activities, consistent with surrounding land uses. Final landform for the quarry is intended to be a deepened saddle along an existing ridge. Batter slopes will be generally no greater than 3 Horizontal: 1 Vertical. Vegetation will consist of pasture grasses initially to improve soil stability and then planted with pine consistent the adjacent pine plantation.

The Land and Soil Capability class in the rehabilitated landform is expected to drop from LCS class 4 to Class 6 on the quarry final batters, primarily due to the increase in batter slopes within the final void. The pit floor will remain as Class 4 land. Class 6 land is described as:

*'**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.'*

This land capability is suited to the proposed uses of low level grazing and forestry.

Rehabilitation progress will be monitored at least annually and includes initiating upgrading or repair as appropriate. Items to be monitored will include, but not limited to:

- Inspection (including photography) for unacceptable visual impacts to sensitive receptors,
- Weed and pest inspections to be undertaken at least annually and engage contractors if required,
- Inspections to determine that the total foliage cover in rehabilitated areas is on a trajectory to be greater than or equal to 70% (Blue Book C -factor equivalent of 0.05),
- Determining if the Land and Soil Capability classification or Agricultural Land Classification criteria are on a trajectory to be met,
- Pasture establishment is consistent with the range of species utilised within the region and in good health,
- Pine Plantation establishment has commenced, and
- Monitoring confirms the non-target species (weeds) represent less than 10% of projected foliage cover (or equivalent to surrounding vegetation not disturbed by mining activities).

Justification and Conclusions

This Environmental Impact Statement (EIS) has been prepared to support an application to Mid-Western Regional Council (MWRC), for the development and operation of a sand and gravel quarry at the property 'Turonfels' located at 39 Razorback Road, Running Stream, NSW.

The quarry is proposed to extract up to 200,000 tpa over a period up to 20 years and will include access roads, a site office, workshop, and weighbridge. The quarry will be progressively rehabilitated to pasture and pine plantation with potential future use of the facilities area for forestry related activities.

In addressing the requirements of the Secretary's Environmental Assessment Requirements (SEARs), the assessment has demonstrated that the proposed development is 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 document.

This assessment 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 reduced which will ensure the quarry can operate without significant impacts to the receiving environment and meet the objectives of Ecologically Sustainable Development.

As detailed throughout this EIS, it has been assessed that the Proposal could be constructed and operated in a manner that would satisfy all relevant statutory goals and criteria, environmental objectives, and reasonable community expectations.

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Glossary

ABBREVIATION	TERM / REFERENCE
AHIMS	Aboriginal Heritage Information System
AHIP	Aboriginal Heritage Impact Permit
AQIA	Air Quality Impact Assessment
BC Act	*Biodiversity Conservation Act 2016*
Blue Book	*Managing Urban Stormwater – Soils and Construction* (Landcom 2004)
BoM	Australian Bureau of Meteorology
CIA	Cumulative Impact Assessment
CLM Act	*Contaminated Land Management Act 1997*
DA	Development Application
DAWE	Commonwealth Department of Agriculture, Water, and the Environment
dB	Decibel
dB(A)	A Weighted decibel
DP	Deposited Plan
DPI	Department of Primary Industries (including Agriculture and Fisheries)
DPE	NSW Department of Planning and Environment
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation 2021	*Environmental Planning and Assessment Regulation 2021*
ha	Hectare
Heritage Act	*Heritage Act 1977*
km	Kilometres

L	Litre
LALC	Local Aboriginal Land Council
L_{eq}	Equivalent continuous sound level
LEP	Local Environmental Plan
LGA	Local Government Area
m	Metre
m^2	Square metres
ML	Megalitre
MNES	Matters of National Environmental Significance
NPfI	NSW EPA *Noise Policy for Industry*
NPfI Guide	*A guide to the Noise Policy for Industry*
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
NVIA	Noise and Vibration Impact Assessment
POEO Act	*Protection of the Environment Operations Act 1997*
PPP	Plantation Pine Products Pty Ltd
RBL	Rating background level
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
Space Urban	Space Urban Pty Ltd
TfNSW	Transport for NSW
TIA	Traffic Impact Assessment
tpa	Tonnes per annum

1 Introduction

1.1 Overview

Space Urban Pty Ltd (Space Urban) has prepared this this Environmental Impact Statement (EIS) on behalf of Plantation Pine Products Pty Ltd (PPP), to support an application to Mid-Western Regional Council (MWRC), for the development and operation of a sand and gravel quarry at the property 'Turonfels' located at 39 Razorback Road, Running Stream, NSW.

The quarry is proposed to extract up to 200,000 tonnes per annum (tpa) over a period up to 20 years and will include site access, haul road, site office, workshop, weighbridge, and shaker grid. The quarry will be progressively rehabilitated to pasture and pine plantation with potential future use of the facilities area for forestry related activities.

PPP is both the owner of the property and the proponent for the development and are a wholly owned subsidiary of the Borg group of companies. Borg is an Australian owned company employing people across a range of sectors, primarily in the manufacturing of melamine panels and components for joinery applications. To maintain consistency of supply for its manufacturing process, PPP purchased the 'Turonfels' property in 2018 with over 100 hectares of radiata pine plantation. During improvement works on the property the presence of a potential sand and gravel resource became apparent, which initiated investigations into the feasibility of a quarry on the site.

Key components of the development will include:

- Up to 200,000tpa of extraction over a 20 year period,
- Operations to occur Monday to Friday and Saturday mornings only,
- Construction of an internal haul road, sediment control dams, site office, weighbridge, shaker grid, and workshop,
- Construction of noise/visual bunds,
- Installation of site drainage to separate clean and dirty water area,
- Extraction by excavator and transport by highway trucks,
- Onsite material screening and stockpiling, and
- Progressive rehabilitation.

As the quarry proposes to extract 200,000tpa of material, the development is deemed to be '*Designated Development*' under the *Environmental Planning & Assessment Act 1979* (EP&A Act), and as such Secretary's Environmental Assessment Requirements (SEARs) for the preparation of this EIS are required and were subsequently issued on 2 March 2021.

The location of the site at a regional context is shown on **Figure 1** and the site extent is shown on **Figure 2**.

1.2 Purpose of this Report

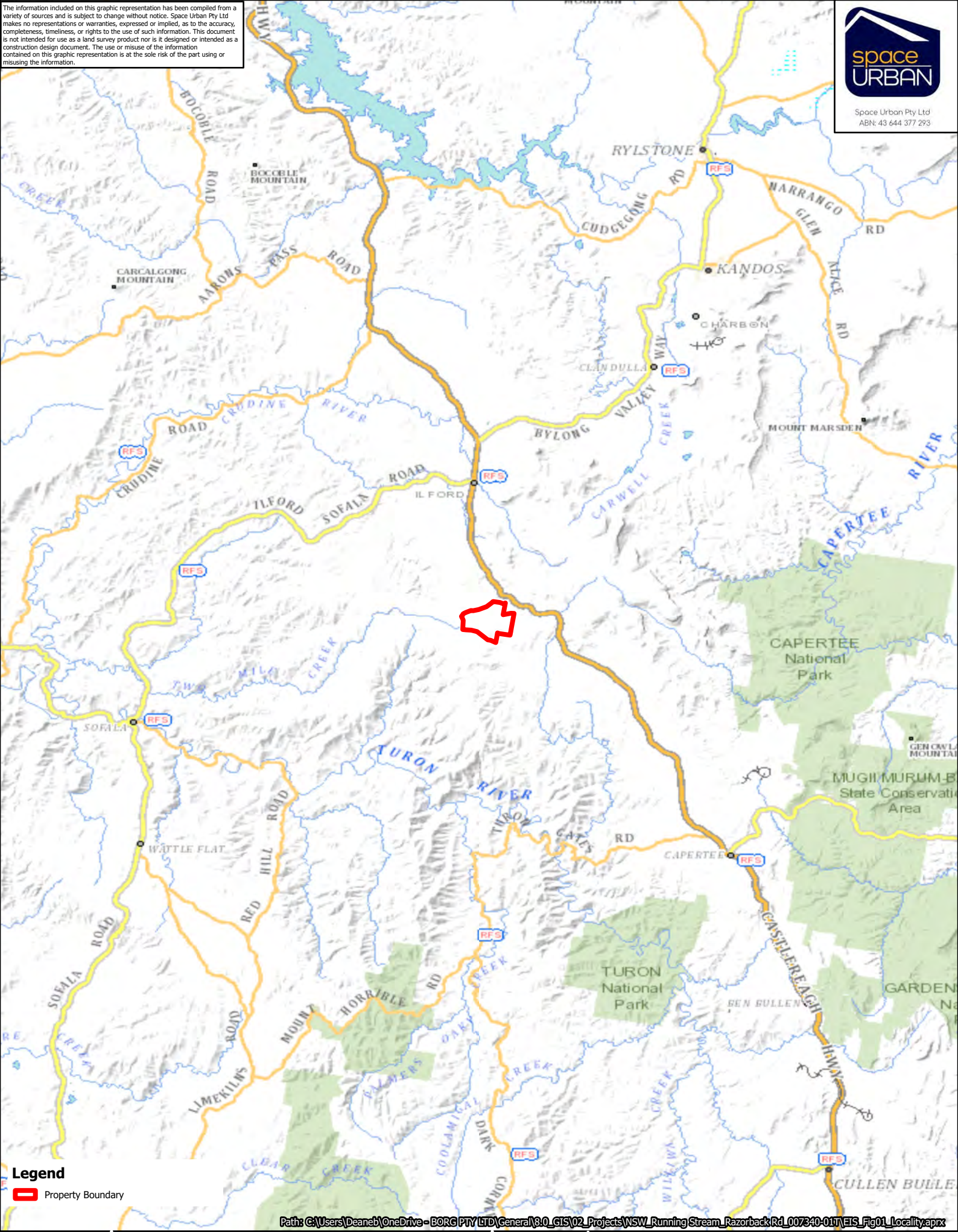
The purpose of this EIS is to assess, and propose mitigation measures for, the environmental and social impacts of proceeding with the development. This EIS has also been prepared to meet the Secretary's Environmental Assessment Requirements (SEARs) for the proposed facility, issued by the Department of Planning and Environment (DPE) (refer to **Section 1.7**), as well as the recommendations of other consulted agencies and relevant stakeholders. The document has been prepared in accordance with the EP&A Act and the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation).

In addition to describing the Project, the EIS presents a comprehensive and focussed assessment of the associated planning and environmental issues to a level of detail commensurate with the scale of the development, the characteristics and previous use of the site, and the legislative framework under which the development is to be assessed and determined. The matters dealt with in the EIS are presented in a manner that clearly addresses the specific requirements of the SEARs, as well as the requirements of other consulted government agencies and stakeholders.

1.3 The Applicant

The Applicant for the development is Plantation Pine Products Pty Ltd (PPP). PPP is a wholly owned subsidiary of the Borg Group who employ people across a range of sectors including, forestry, manufacturing, building products, engineering and design, waste and recycling, renewable energy, logistics, and land development.

Space Urban Pty Ltd
ABN: 43 644 377 293



Legend

Property Boundary

Path: G:\Users\Deaneb\OneDrive - BORG PTY LTD\General\8.0_GIS\02_Projects\NSW_Running Stream_Razorback Rd_007340-01\EIS_Fig01_Locality.aprx

Figure: 1

Locality

Environmental Impact Statement
Razorback Quarry, Running Stream, NSW

User: deaneb
Version 1
Date: 5/05/2022 2:32 PM

N

Source: © Department of Customer Service 2020, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, USGS, Pine Plantation Australia - 2021

Scale: 1:250,000

0 2 4 6 8 Km

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Figure: 2

Subject Site

N

Source: © Department of Customer Service 2020, NSW DFSI - 2021

Environmental Impact Statement
39 Razorback Road, Running Stream NSW

User: deaneb | Version 1

Date: 5/05/2022 3:56 PM

Scale: 1:15,000

0 100 200 300 400 500 Metres

space URBAN
Space Urban Pty Ltd
ABN: 43 644 377 293

1.4 Project Site

The site is located at 39 Razorback Road, Running Stream NSW, and is formally described as being on Lot 2 DP569979, Parish of Warrungunia, County of Roxburgh. Total property area is 327 hectares (ha), however the development footprint occupies an area of approximately 25 ha. The property is accessed from Razorback Road via the Castlereagh Highway and is approximately 55km south-east of Mudgee. The site currently operates as a forestry plantation, with the development footprint presently planted with juvenile pine. Prior to plantation activities, the site was utilised for cattle grazing and general farming practices.

1.5 Approval Pathway

The *Environmental Planning and Assessment Act 1979* (EP&A Act) forms the statutory framework for environmental assessment and planning approval in NSW. The project is considered 'Designated Development' in accordance with Section 4.10 of Part 4 of the EP&A Act and Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regs). Specifically, Schedule 3, Part 2, Clause 26 of the EPA&A Regs defines designated development for '**Extractive Industries**' as:

> "*(1) Development for the purposes of an extractive industry facility is designated development if the facility obtains or processes for sale, or reuse, more than 30,000 cubic metres of extractive material per year.*
>
> *(2) Development for the purposes of an extractive industry facility is designated development if the facility disturbs or will disturb a total surface area of more than 2 hectares of land by— (a) clearing or excavating, or (b) constructing dams, ponds, drains, roads, or conveyors, or (c) storing or depositing overburden, extractive material, or tailings*".

The proposed quarry seeks to extract at up to 200,000 tpa from a total resource of 4 million tonnes (Mt) with a disturbance area of approximately 25 hectares (ha), including the quarry, office, workshop, and access road. Accordingly, the development meets the requirements for assessment under 'Designated Development'.

The assessing body for the development is MWRC and the determining authority is the Joint Regional Planning Panel (JRPP).

1.6 Capital Investment

A Capital Investment Value (CIV) report has been prepared for the development which has estimated the value of the development works at $2,007,264 based on current rates for equipment, materials, and labour. The full CIV report is attached as **Appendix A**.

1.7 Secretary's Environment Assessment Requirements

A request for Secretary's Environmental Assessment Requirements (SEARs) for the proposed quarry was submitted to the DPE on 1 February 2021. SEARs were subsequently issued by the DPE on 2 March 2021.

Table 1 presents the general requirements and key issues to be addressed in the EIS in accordance with the SEARs and identifies where each requirement is addressed in this EIS. A copy of the formal SEARs for the development are contained within **Appendix B**.

Table 1: Summary of Secretary's Environmental Assessment Requirements

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS	REFERENCE WITHIN EIS
General Requirements	
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.* (Note: the EP&A Reg 2000 has been replaced by the EP&A Reg 2021)	**Entire EIS**
In particular, the EIS must include: • an executive summary; • a comprehensive description of the development, including: – a detailed site description and history of any previous quarrying at the site, including a current survey plan; – identification of the resource, including amount, type, composition; – the layout of the proposed works and components (including any existing infrastructure that would be used for the development); – an assessment of the potential impacts of the development, as well as any cumulative impacts, including the measures that would be used to minimise, manage, or offset these impacts; – a detailed rehabilitation plan for the site;	**Page 4** **Section 2** **Section 3.2** **Section 3** **Section 8** **Appendix Q**

– any likely interactions between the development and any existing/approved developments and land uses in the area, paying particular attention to potential land use conflicts with nearby residential development; – a list of any other approvals that must be obtained before the development may commence; – the permissibility of the development, including identification of the land use zoning of the site; – identification of sensitive receivers likely to be affected by the development using clear maps/plans, including key landform areas, such as conservation areas and waterways; • a suitable monitoring and reporting procedure to ensure that the total resource extracted by the development does not exceed 5 million tonnes; • a conclusion justifying why the development should be approved, taking into consideration: – alternatives; – the suitability of the site; – the biophysical, economic, and social impacts of the project, having regard to the principles of ecologically sustainable development; and – whether the project is consistent with the objects of the Environmental Planning and Assessment Act 1979; and • a signed declaration from the author of the EIS, certifying that the information contained within the document is neither false or misleading.	**Section 2** **Section 5** **Section 5.1** **Figure 3** **Figure 4** **Section 3** **Section 9** **Page 3**
Consultation	
In preparing the EIS for the development, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure, and service providers and any surrounding landowners that may be impacted by the development. The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.	**Section 6**
Key Issues	
The EIS must address the following specific issues:	
• **Water** – including: – a detailed site water balance and an assessment of any volumetric water licensing requirements, including a description of site water demands, water disposal methods (inclusive of volume and frequency of any water discharges), water supply infrastructure and water storage structures; – identification of any licensing requirements or other approvals required under the Water Act 1912 and/or Water Management Act 2000; – demonstration that water for the construction and operation of the development can be obtained from an appropriately authorised and reliable supply in accordance with the operating rules of any relevant Water Sharing Plan (WSP); – a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant Water Sharing Plan or water source embargo; – a detailed consideration of the need to maintain an adequate buffer between all excavations and the highest predicted groundwater table; – an assessment of activities that could cause erosion or sedimentation issues, and the proposed measures to prevent or control these impacts; – an assessment of any likely flooding impacts of the development; – an assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including a detailed assessment of proposed water discharge quantities and quality against receiving water quality and flow objectives; and – a detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts.	**Section 8.5** **Appendix J**
• **Noise** – including a quantitative assessment of potential:	

– construction and operational noise and off-site transport noise impacts of the development in accordance with the *Interim Construction Noise Guideline*, *NSW Noise Policy for Industry* and *NSW Road Noise Policy* respectively; – reasonable and feasible mitigation measures to minimise noise emissions; and – monitoring and management measures.	**Section 8.3** **Appendix H**
• **Air** – including an assessment of the likely air quality impacts of the development in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*. The assessment is to give particular attention to potential dust impacts on any nearby private receivers due to construction activities, the operation of the quarry and/or road haulage.	**Section 8.2** **Appendix G**
• **Biodiversity** – including: – accurate predictions of any vegetation clearing on site; – a detailed assessment of the potential biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependant ecosystems undertaken in accordance with Sections 7.2 and 7.7 of the *Biodiversity Conservation Act 2016*; and – a detailed description of the proposed measures to maintain or improve the biodiversity values of the site in the medium to long term, as relevant.	**Section 8.4** **Appendix I**
• **Heritage** – including: – an assessment of the potential impacts on Aboriginal heritage (cultural and archaeological), including evidence of appropriate consultation with the relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage; and – identification of Historic heritage in the vicinity of the development and an assessment of the likelihood and significance of the impacts on heritage items, having regard to the relevant policies and guidelines listed in Attachment 1.	**Section 8.6** **Appendix K** **Section 8.7** **Appendix L**
• **Traffic and Transport** – including: – accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products; – an assessment of potential traffic impacts on the capacity, condition, safety, and efficiency of the local and State road networks, detailing the nature of the traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads; – a description of the measures that would be implemented to maintain and/or improve the capacity, efficiency, and safety of the road network (particularly the proposed transport routes) over the life of the development; – evidence of any consultation with relevant roads authorities, regarding the establishment of agreed contributions towards road upgrades or maintenance; and – a description of access roads, specifically in relation to nearby Crown roads and fire trails.	**Section 8.1** **Appendix F**
• **Land Resources** – including and assessment of: – potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management, and remedial measures (as appropriate); – potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds, etc); and – the compatibility of the development with other land uses in the vicinity of the development, in accordance with the requirements of Clause 12 of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.	**Section 8.9** **Appendix N**
• **Waste** – including estimates of the quantity and nature of the waste streams that would be generated or received by the development and any measures that would be implemented to minimise, manage, or dispose of these waste streams.	**Section 8.12** **Appendix P**

• **Hazards** – including an assessment of the likely risks to public safety, paying particular attention to potential bushfire risks and the transport, storage, handling, and use of any hazardous or dangerous goods.	**Section 8.10 Appendix O**
• **Visual** – including an assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, including with respect to any new landforms.	**Section 8.8 Appendix M**
• **Social & Economic** – an assessment of the likely social and economic impacts of the development, including consideration of both the significance of the resource and the costs and benefits of the project.	**Section 8.11**
• **Rehabilitation** – including: – a detailed description of the proposed rehabilitation measures that would be undertaken throughout the development and during quarry closure; – a detailed rehabilitation strategy, including justification for the proposed final landform and consideration of the objectives of any relevant strategic land use plans or policies; and – the measures that would be undertaken to ensure sufficient financial resources are available to implement the proposed rehabilitation strategy, recognising that a rehabilitation bond will likely be required as a condition of any future development consent.	**Section 8.13 Appendix Q**
Environmental Planning Instruments	
The EIS must take into account all relevant State Government environmental planning instruments, guidelines, policies, and plans. During the preparation of the EIS you must also consult the Department's EIS Guideline – Extractive Industries – Quarries. The EIS must assess the development against the Mid-Western Regional Local Environmental Plan 2012 and any relevant development control plans/strategies.	**Section 5**

1.8 Project Team

Space Urban has prepared the subject EIS on behalf of PPP. Specialist consultants were also engaged to undertake technical assessments for the development and to provide relevant input into the EIS. Details of the Project team are provided below in **Table 2**.

Table 2: EIS Project Team

NAME	ORGANISATION	ROLE / SPECIALIST ASSESSMENT
Shaun Smith	Space Urban	Project Director and EIS author
Mark Daniels	Space Urban	EIS review – QA/QC
Bronwyn Partell Layne Holloway	NGH	Aboriginal Heritage
Darrell Rigby Lorraine Nelson	Heritage, Archaeology and Planning Nelson Heritage Consulting	European Heritage
Louise Hibbert Andrew Hutton	IEMA	Visual
Josh Smart Matt Doherty	MJD Environmental	Biodiversity
Josh Smart Matt Doherty	MJD Environmental	Bushfire
David Pavey	Pavey Consulting Services	Traffic and Access
Neil Pennington	Spectrum Acoustics	Noise and Vibration
Katie Trahair Philip Henschke	Todoroski Air Sciences	Air Quality
Tara O'Brien	VGT	Surface and Groundwater

Greg Thompson		
Tara O'Brien Greg Thompson	VGT	Land Resources
Sinead Kelly Greg Thompson	VGT	Rehabilitation
Sinead Kelly Greg Thompson	VGT	Quarry Design and Resource Evaluation
Justin O'Brien	OBQS	CIV
Shaun Smith	Space Urban	Waste Minimisation and Management Plan
Shaun Smith Mark Daniels	Space Urban	Consultation and Stakeholder Engagement

2 Site Description

2.1 Site Location

The project site is located within the Mid-Western Regional Council Local Government Area in a rural setting. The development site is described as Lot 2 DP 569979, 39 Razorback Road Running Stream, NSW.

The project area covers up to 25 hectares (ha) and is located approximately 1 km west of the Castlereagh Highway on Razorback Road, approximately 65 kilometres south of Mudgee, 65km north-west of Lithgow and 200 kilometres north-west of Sydney. The proposed quarry is permissible within the RU1 - Primary Production zoned land. Zoning across the site is shown on **Figure 3**.

The majority of the subject site is currently utilised for pine plantations. Surrounding lands are primarily larger agricultural holdings undertaking mixed grazing, along with a scattering of pine plantations and other agricultural uses.

2.2 Existing Land Use

The 327 ha property is comprised of the following land uses:

- 68 % or 222 ha is planted out as pine plantation at various stages of progression, from recently planted tubestock to mature plantations through to areas that have been recently harvested and not yet re-planted.
- 19 % or 61 ha is other wooded or remnant vegetation, comprising both native and non-native species and includes the dwelling and yard area.
- 13 % or 44 ha is comprised of access tracks and grassland areas through and surrounding the plantation area that are not planted as plantation. This includes a former pasture area around the area of the proposed quarry and the plantation firebreaks.

2.3 Previous Land Use

The subject land is within the Parish of Warrangunia. The land to the east is within the Hearn Parish and appears likely to have been under the same ownership. Properties to the north and west are now under separate ownership with their own dwellings.

The land is within the Turon River Gold Field area that was proclaimed on 25 July 1896. Common within the local area are names such as Spring Hill (locality) and Black Springs (property on the northern boundary of the land), this may suggest the frequent occurrence of springs, no springs have been identified on the property, however, being at the headwaters of several catchments it may be possible.

Aerial imagery shows that in the 1960s the Subject Land was already cleared over essentially the same area that is currently cleared, being the gentler slopes on the north and west of the property with the steeper slopes on the south-eastern corner left as what appears to be an open native woodland. Imagery shows evidence of clearing in the way of 60-70m spaced rows of clearing, which topographically is still visible on LIDAR imagery, perhaps due to the push-up and burning of cleared timber.

Pasture improvement has occurred on the land, however, there appears to be only portions of the land subject to potential cropping as shown on the 1973 aerial image. As of 1 January 1990, (the date on which regrowth vegetation is based) the land appears to have been subject to negligible changes in farm and vegetation management.

2.4 Surrounding Land Use

North of the quarry is a newly planted pine plantation within the subject land extending out over 450 m north of the quarry before meeting Razorback Road. Land beyond the Subject Land is predominantly cleared and appears to be used for grazing. A dwelling is located just over 1 km to the north, in the neighbouring Dog Rock Creek catchment that is orientated to the north away from the quarry.

East of the quarry pine plantation extends over 1km east to the dwelling on the Subject Land. The Castlereagh Highway is just over 2 km to the north-east. Three dwellings not associated with the Subject Land are located approximately 2 km to the north-east. Lands outside the subject land are predominantly cleared and likely used for grazing, with some of the slopes remaining vegetated.

Approximately 60 m of the quarry pit edge is Two Mile Creek, located just within the southern boundary of the Subject Land. South-east of the site is pine plantation extending into native vegetation within the Gibbons Creek catchment the land is steeper with a large portion under native timber. The remaining lands are substantially cleared and used for grazing. There are four dwellings south of the quarry, the nearest is just over 1200 m from the quarry.

Pine plantation extends for over 170 m from the quarry, before the Subject Land boundary that is just over 220 m from the quarry pit edge. Beyond the subject land the majority of the area is within the Two Mile Creek catchment and is cleared and used predominantly for grazing. There are three dwellings located to the west of the property. The nearest is 250 m from the quarry pit edge and is a cluster of buildings previously used as an accommodation facility called Moonraker.

Surrounding land ownership and land use is shown on **Figure 4**.

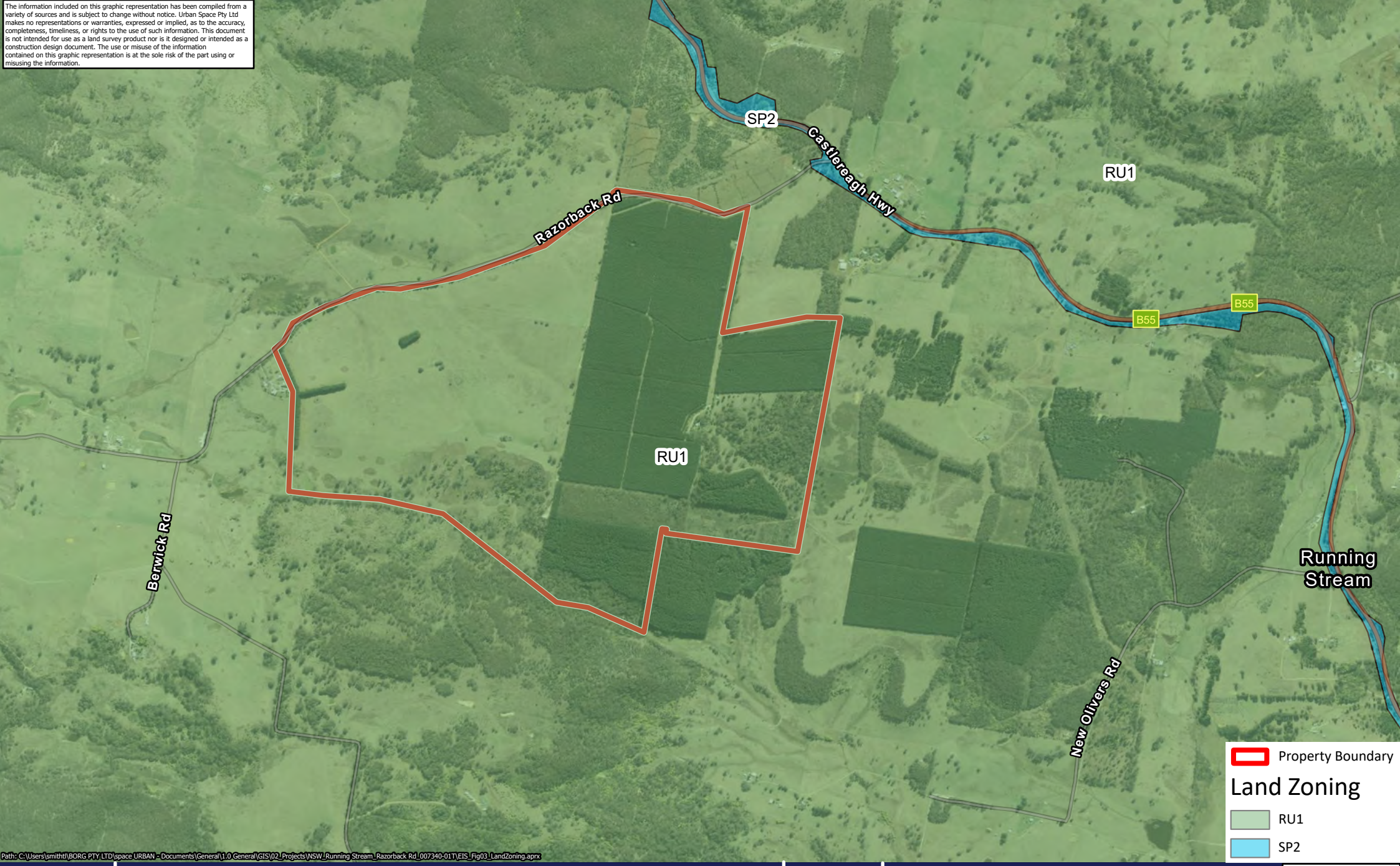

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Figure: 3

Land Zoning

Environmental Impact Statement
39 Razorback Road, Running Stream NSW

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Source: © Department of Customer Service 2020, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, NSW DFSI - 2021, © State Government of NSW and Department of Planning and Environment 2022

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2.5 Topography and Drainage

The elevation of the land within the project area ranges from 1057 m to 1062 m AHD along the access road with quarrying occurring between 1083 and 1055 m AHD. Out of pit bunding and emplacement is likely to extend down to approximately 1053 m AHD. Dams are proposed at 1049 m AHD and 1058 m AHD. The office and workshop area are at approximately 1062 m AHD.

Water from the development area drains to the south into the headwaters of Two Mile Creek or to the north into an unnamed tributary of Two Mile Creek. Two Mile Creek drains to the west and south-west before meeting the Crudine River 18.5 km to the west, approximately 4 km north-west of Sofala. The Crudine River flows into the Turon River that in turn flows into the Macquarie River near Hill End over 40 km to the west of the site.

Approximately 200 m south-east, and outside the project disturbance area, water drains south-east via Gibbons Creek, that drains into Running Stream, then Round Swamp Creek, before reaching the Turon River more than 20 km upstream and south-east of Sofala.

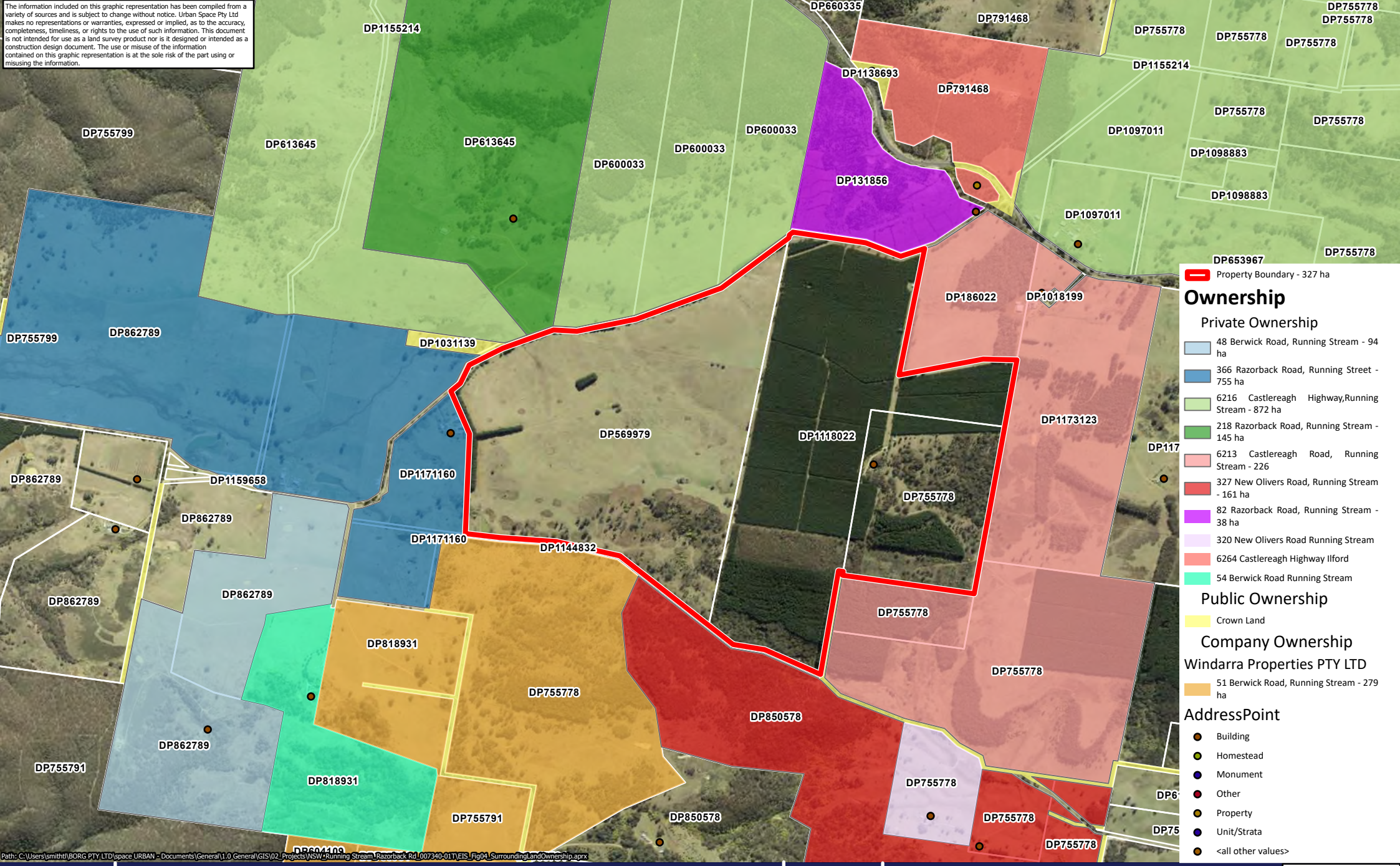
Drainage and topography across the site are shown on **Figure 5**.

2.6 Climate

The property has had an average rainfall of 797.6 mm over the past 18 years recorded by local property owners. These observations are consistent with the BOM rainfall station at Running Stream on the Brooklyn property, which at 1070 m has a similar elevation to the site and has an annual median rainfall of 725.5 mm and average of 845.1 mm. Maximum temperatures are during January reaching an average maximum of almost 25°C, with the coolest temperatures during July where the average minimum is less than 3°C.

Based on winds at the Nullo Mountain weather station approximately 45 km to the north-east, annual distribution of wind direction and strength is described as follows:

- **Summer**
  - Mornings are dominated by strong easterly winds.
  - Afternoons remain largely dominated by easterly winds however winds from the west and north-west increase.
- **Autumn**
  - Morning winds remain dominated by strong easterly winds, weakening in dominance toward the start of winter where the westerly wind contribution increases.
  - Afternoon winds start autumn, like the mornings, having dominant easterly winds, that toward the end of Autumn have shifted to be dominant from the west.
- **Winter**
  - During winter mornings winds are predominantly from the west and north-west increasing intensity as the season progresses.
  - Afternoons are similar to the mornings, with August afternoons having very strong westerly winds.
- **Spring**
  - During spring, morning winds have less dominance from any particular direction until November where the easterlies become dominant.
  - Afternoons continue to have dominant west and north-westerly winds, through to November where the easterly winds start to increase in frequency.



Property Boundary - 327 ha

Ownership

Private Ownership

- 48 Berwick Road, Running Stream - 94 ha
- 366 Razorback Road, Running Street - 755 ha
- 6216 Castlereagh Highway,Running Stream - 872 ha
- 218 Razorback Road, Running Stream - 145 ha
- 6213 Castlereagh Road, Running Stream - 226
- 327 New Olivers Road, Running Stream - 161 ha
- 82 Razorback Road, Running Stream - 38 ha
- 320 New Olivers Road Running Stream
- 6264 Castlereagh Highway Ilford
- 54 Berwick Road Running Stream

Public Ownership

- Crown Land

Company Ownership

Windarra Properties PTY LTD

- 51 Berwick Road, Running Stream - 279 ha

AddressPoint

- Building
- Homestead
- Monument
- Other
- Property
- Unit/Strata
- <all other values>

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Figure: 4

Ownership

Environmental Impact Statement
39 Razorback Road, Running Stream NSW

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Figure: 5

Topography and Drainage

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Environmental Impact Statement
39 Razorback Road, Running Stream NSW

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2.7 Groundwater

The site is within an area mapped as Groundwater Vulnerable under the Mid-Western Local Environmental Plan 2010. During resource assessment drilling, groundwater was located approximately 5-6 m below the proposed quarry floor, as such the quarry is not expected to directly impact groundwater in the area.

The sandy nature of the quarry resource and surrounding area is likely to provide a recharge area for the groundwater table due to the higher permeability. A stock and domestic water bore is located on the property and may be suitable to provide a potable water supply to the proposed site office.

Further discussion on groundwater is provided in **Section 8.5**.

2.8 Biodiversity

The majority (over 80%) of the Subject Land has been historically cleared of native vegetation and planted as pine plantation.

Under the Local Land Services Act 2013, the majority of the area around the proposed quarry is considered to be Category 1 exempt land, with a small area south-east of the quarry likely to constitute Category 2 Regulated Land. There is no Vulnerable Regulated Lands mapped within the site, the nearest mapped area being located on Two Mile Creek south of the quarry.

Plant community type (PCT) mapping has classified the majority of the site as non-native, a small portion of land immediately to the south-east of the quarry pit is mapped as follows:

- On the lower areas as PCT 654 - Apple Box - Yellow Box dry grassy woodland of the Southeastern Highlands Bioregion, and
- On higher areas as PCT 1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands - Southeastern Highlands Bioregion.

Vegetation south of the development area on Two Mile Creek is mapped as:

- Apple Box - Yellow Box dry grassy woodland of the Southeastern Highlands Bioregion, and
- Yellow Box - Blakelys Red Gum grassy woodland on the tablelands - Southeastern Highlands Bioregion.

These vegetation communities, if correctly mapped, may constitute an endangered ecological community at the State and Commonwealth levels.

Bushfires in January 2020 have resulted in the damage and loss of some trees on the property that appear to be evident in prior aerial imagery.

A 10 x 10 km wildlife atlas database search for the site and surrounds identified the presence of one Vulnerable Species under the BC Act, the Capertee Stringybark *(Eucalyptus cannonii).* The quarry and access roads will not require the removal of any trees, however, records for the Capertee Stringybark exist adjacent to Razorback Road. Upgrades to Razorback Road have been designed to avoid removal of trees where possible, subject to ensuring suitable road safety provisions.

The quarry development has been designed to avoid the clearing any native trees, and based on existing mapping and plantation areas, the proposed development is unlikely to cause any major impact to derived native grasslands.

Further discussion on biodiversity is provided in **Section 8.4**.

2.9 Aboriginal Heritage

The majority of the Project Area is significantly disturbed, through the clearing and grubbing of stumps, planting of plantation pine and erection of fence lines reducing the likelihood of any undisturbed items of Aboriginal Heritage to remain insitu. The land is within 200 m of a water course, however, the ephemeral nature of the headwaters of Two Mile Creek in this location make the likelihood of long term camp sites on or near the site unlikely. There are no caves, no trees and no items of Aboriginal Heritage have been recorded within the subject land.

Notwithstanding the above, an **Aboriginal Cultural Heritage Assessment** has been prepared and is discussed detail in **Section 8.6**.

2.10 Historic Heritage

There is no Historic Heritage mapped within the subject land, nor based on aerial imagery is the land expected to contain any significant European Heritage significance.

Notwithstanding the above, a **Historic Heritage Assessment** has been prepared and is discussed in **Section 8.7**.

2.11 Air Quality

Local air quality is likely to be typical of a rural environment. With the exception of pine and native forestry operations there are no other commercial land uses, aside from agricultural grazing activities. The Castlereagh Highway and local gravel roads likely contribute to local air quality.

The proposed quarry activities will be required to adhere to air quality criteria imposed within the Development Consent and any Environmental Protection Licence (EPL) issued for the project.

Further discussion on air quality is provided in **Section 8.2**.

2.12 Noise

Local noise levels are typical of a rural environment. With the exception of pine and native forestry operations, there are no other commercial land uses, aside from agricultural grazing activities. Vehicles travelling on the Castlereagh Highway and to a lesser degree the local gravel roads are likely to contribute to noise levels experienced at local dwellings.

Quarry activities have been designed and mitigated to achieve noise levels consistent with the Industrial Noise Policy 2017 and the Road Noise Policy 2011.

Further discussion on noise impacts is provided in **Section 8.3**.

2.13 Traffic

Access to the quarry is off Razorback Road. Razorback Road is a local to sub arterial road connecting the Castlereagh Highway with Turon Road, but primarily services local properties. The road is sealed for approximately 20m from the intersection with the Castlereagh Highway, beyond the sealed section the road is of gravel construction approximately 6 m in width with gravel shoulders. The Razorback Road reserve is 20 m in width.

Access to the site will be via an upgrade to an existing gravel entry road. **Plate 1** shows the entry to the site from Razorback Road.

Plate 1: Proposed quarry access off Razorback Road

The intersection with Razorback Road and the Castlereagh Highway consists of a left-hand deceleration lane for northbound vehicles on the highway and a protected right hand turn for southbound vehicles turning into Razorback Road. There is no dedicated acceleration lane for vehicles turning south onto the Castlereagh Highway, however, an overtaking lane continues for south bound traffic for approximately 150 m south of the intersection.

Castlereagh Highway is a 100 km/h highway connecting Lithgow in the south with Mudgee in the north. **Plate 2** shows the intersection of Razorback Road and Castlereagh Highway.

Plate 2: Intersection of Razorback Road and Castlereagh Highway

Further discussion on site access and traffic impacts is provided in **Section 8.1**.

2.14 Socio-economic

Running Stream is located within the Mudgee Region – East in the Mid-Western Regional Council's economic and community profiles. This region stretches from the Turon River south of the quarry to Bylong in the north. The key attributes for the economy for this region are as follows:

- Employment
  - 53 jobs at Running Stream out of 11,427 for the LGA.
- Jobs by industry for the Mid-Western region are shown below:
  - 7.1 % of jobs are in the Agriculture, Forestry and Fishing sector,
  - 7.9 % in Education,
  - 9.2 % in retail,
  - 7.9 % in accommodation and food service,
  - 4.3 % in manufacturing,
  - 11.1 % in health care and social assistance,
  - 2.6 % in transport, postal and warehousing,
  - 15.9 % in mining,
  - 8.3 % in construction, and
  - 4% in other industries.
- For the Mid-Western Region as a whole, Mining represents the largest employer at 15.9% in that industry.

Locally to the site the main industries are agricultural grazing of alpaca, cattle and sheep, and pine forestry plantations. Key metrics for the broader Mid-Western LGA are as follows:

- 55% of the workforce earn less than $1000 per week,
- Over 46% of the workforce are aged 35-54,
- Unemployment is at 4% as of 2021, and

- Population is steadily increasing, as of 2021 it was 25,713.

The proposed quarry will contribute to employment in the local area both during construction and operations, both directly and indirectly. While the quarry is within the Mid-Western LGA, the quarry is located mid-way between Mudgee and Lithgow, as such Lithgow may share a portion of the socio-economic benefits associated with the project.

The local region has more than adequate resources to cater for the construction and operational employment demands associated with the quarry.

Further discussion on socio-economic impacts is provided in **Section 8.11**.

2.15 Consultation and Stakeholder Engagement

The main goal of consultation with surrounding landowners, residents, tenement holders, and authorities is to ascertain and address concerns raised by stakeholders. Based on advice provided in the SEARs, the following key project stakeholders were consulted during project development and assessment:

- Surrounding residents and landowners to the project,
- Centennial Inglenook Pty Ltd, holders of EL 7432,
- Mid-Western Regional Council (MWRC),
- Transport for NSW (TfNSW),
- Biodiversity Conservation Division (BCD),
- Environmental Protection Authority (EPA),
- Water NSW,
- Department of Regional NSW – Mining, Exploration and Geosciences (MEG),
- Department of Planning and Environment – Water (DPEW)
- Department of Primary Industries - Agriculture (DPI),
- Central Tablelands Local Land Services (LLS), and
- NSW Rural Fire Service (RFS).

Further detail on stakeholder engagement is provided in **Section 6**.

3 Proposed Development

3.1 Project Overview

Table 3 below provides an overview of the proposed development.

Table 3: Key Project Details

ASPECT	DETAILS
Project Summary	Sand and gravel quarry extracting up to 200,000 tpa over a period of up to 20 years including a gravel access road, site office, workshop, shaker grid, and weighbridge. Progressive rehabilitation of quarried land returning to pasture and pine plantation with potential future use of the facilities area for forestry related activities.
Project Area	Total Project Area of approximately 24.7 hectares, comprising: • 18.8 ha of quarry extraction area. • 1.9 ha in out of quarry bunds. • 2.5 ha for access roads. • 0.9 ha in office, workshop, and hardstand area. • 0.6 ha for dams. From a total land holding of approximately 327 hectares.
Project Life	Up to 20 years.
Extraction Rate	Maximum of 200,000 tpa, and maximum daily rate of 750 tonnes.
Transport Rate	• Up to 5 laden trucks per hour (10 trips per hour) during operating hours. • Up to 4 employee vehicles would be expected to arrive from approximately 7:00 am and leave at approximately 6:00 pm.
Resource and Products	Approximately 4 Mt of weathered sandstone and conglomerate, trucked direct to consumer or third-party processing site where the following products would be created: • Pebble for decorative landscaping. • Sand for use in concrete.
Extraction	• Maximum extraction rate of 200,000 tpa. • Bulldozer to strip topsoil. • Bulldozer and excavator to extract material (rip or direct dig). • Excavator and/or front-end loader to load highway trucks.
Processing	• Limited processing proposed onsite. Potential for screening onsite to remove larger organic materials, and for sizing, prior to haulage offsite.
Site Facilities and Infrastructure	• Site office, weighbridge, workshop, stores, car parking, and shaker grid. • Power supply for site office from onsite generators as required. • Raw water supply sourced from onsite rainwater tanks and dams. Potable water imported where needed for site amenities.

The proposed site layout is shown as **Figure 6**. Further details on project aspects are provided below.

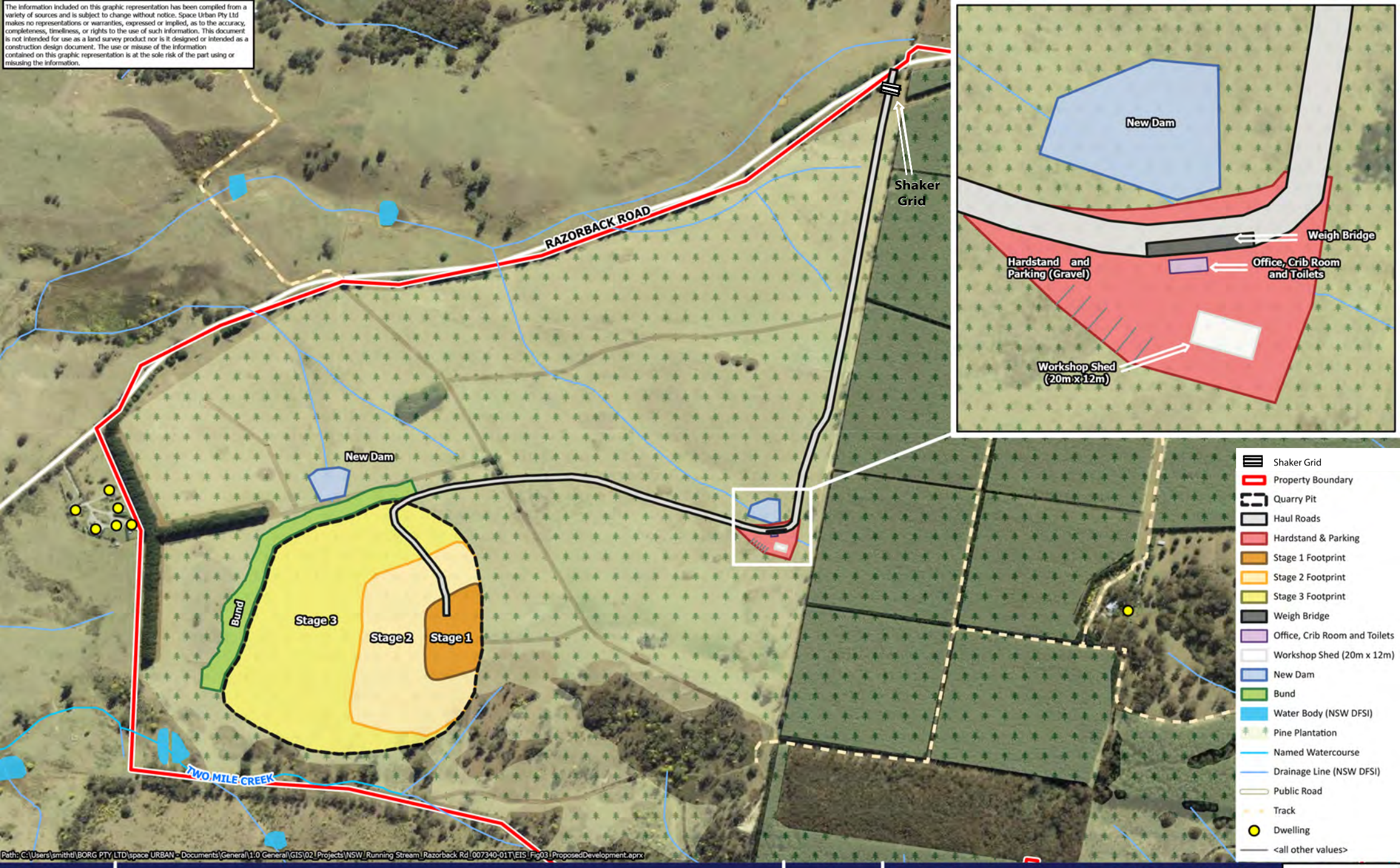

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Figure: 6

Proposed Development

Environmental Impact Statement
39 Razorback Road, Running Stream NSW

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Source: © Department of Customer Service 2020, VGT - 2020, Wedgetail Project Consulting - 2020, NSW DFSI - 2021

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3.2 Resource Description

The resource targeted under this application is approximately 4 Mt of weathered conglomerate and sandstone. While the selected resource forms a potentially greater total resource, at the intended extraction rates, the resource within this application will be 20 years of production at up to 200,000 tpa.

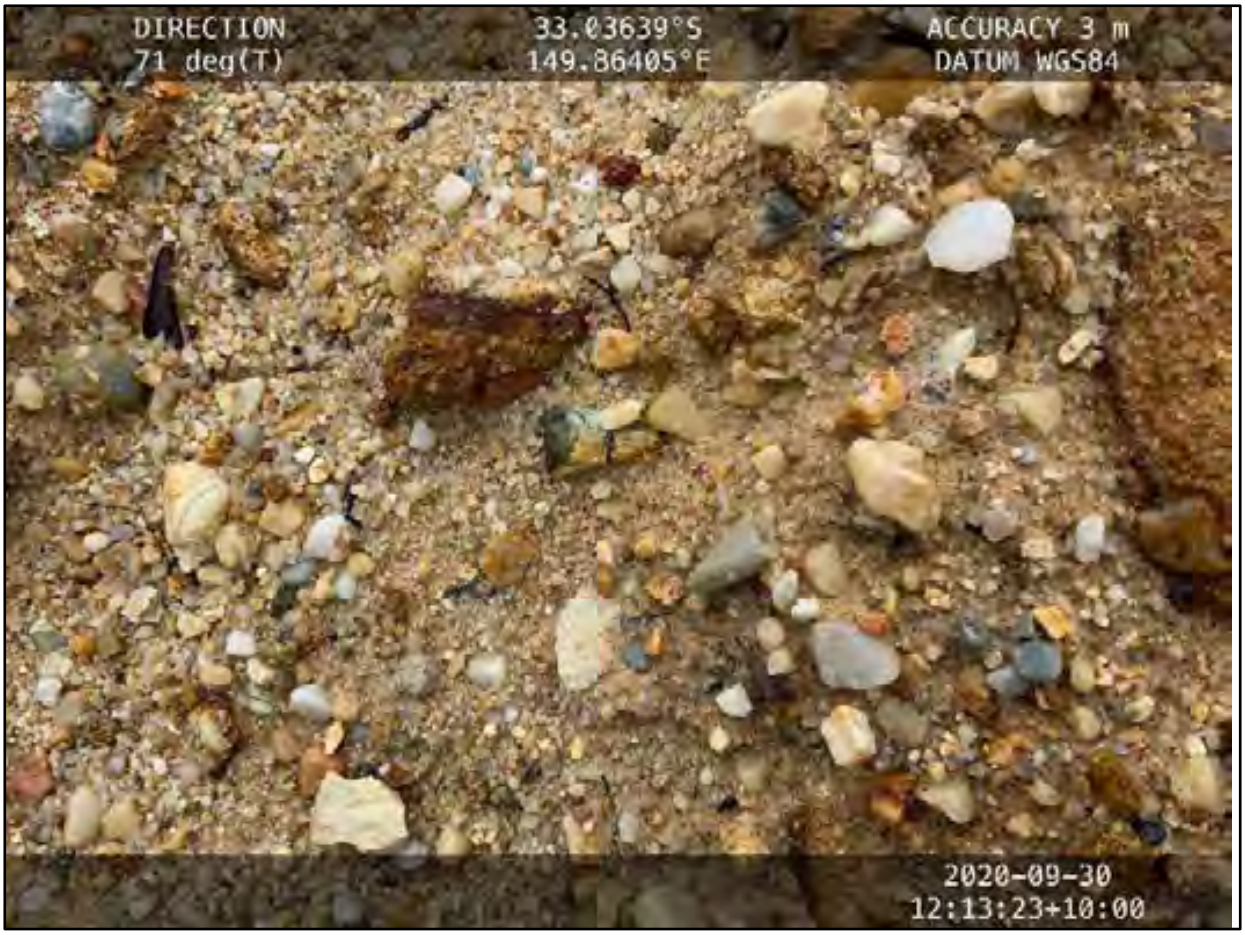

Plate 3: Sandy Gravel Resource Proposed for Extraction

The resource is a weathered Triassic aged conglomerate sandstone. The underlying resources are broadly weathered conglomerates from the surface to 10 m and the less pebbly sandstones to 20 m below the surface. BH 7 was the deepest hole sunk to 30 m, which intersected weathered sandstone from 20 - 30 m as shown below in **Figure 7**. A Resource Assessment has been prepared by VGT and is provided as **Appendix C**.

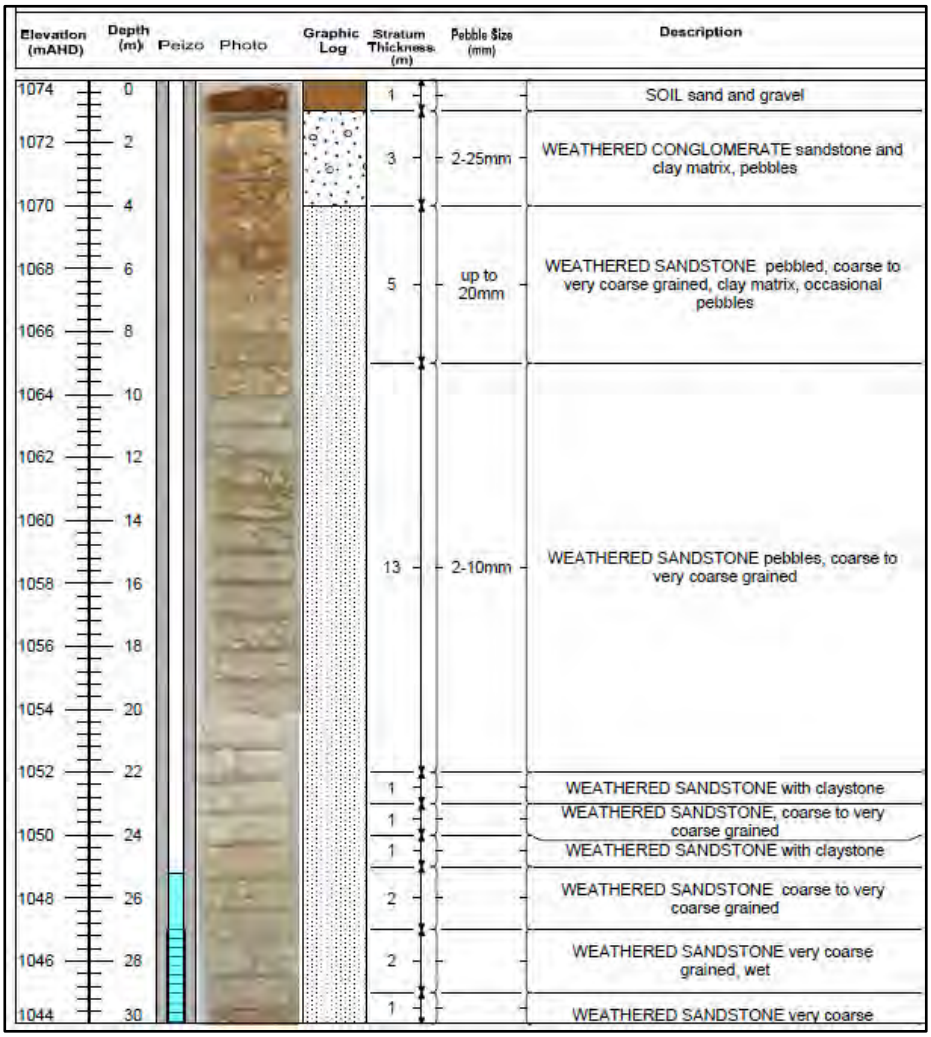

Figure 7: Bore Log BH7 Results

3.3 Quarry Staging

Extraction from the quarry will be undertaken in 3 discrete stages. The following will occur in each stage:

Stage 1

Commence extraction operations in the eastern portion of the extraction envelope. Strip topsoil and overburden, place in separate stockpiles along the western edge of the envelope, see **Figure 8**, and create western bund wall. Commencing the extraction operation in the eastern portion of the site, is the furthest from the Moonraker resident, and the building of the western acoustic and visual bund will reduce noise, dust and visual impacts as the quarry develops. The initial extraction will concentrate more on the northern flank to get down to the proposed floor of 1055 metres RL as soon as possible to reduce the haulage up the north flank and to get operations behind the ridge.

The topsoil ranges in thickness from 20 centimetres (cm) on the ridge to 50 cm on the flanks, but a conservative figure of 50 cm has been adopted.

Stage 2

Continue extraction west and south, lower the floor to 1065 m RL. This exposes the underlying sandstone as soon as practicable to ensure both the conglomerate and sandstone can be utilised for varying products. The active faces will be battered 2 horizontal: 1 vertical with 40 metre benches, see **Figure 9**. Internal haulage will occur from the floor to the upper benches either in centre or southern portions of the site, to minimise noise to residents to the northwest and north.

Stage 3 & 4

Continue extraction west, lower the floor to 1055 m RL, which exposes a significant portion of the site. Benching will be undertaken as shown in **Figure 10**. Extraction will occur on the topmost bench to the western extraction boundary at a 2 Horizontal: 1 Vertical batter, this will be back filled with overburden in the final landform stage.

Quarry staging is provided on **Figures 8**, **9**, and **10**.

3.4 Proposed Products

Raw materials will be transported direct to the consumer or screened onsite, with an expected market for the following products:

- Pebble for decorative landscaping,
- Sand for use in concrete.

3.5 Extraction Rate

The quarry will have an annual extraction rate of up to 200,000 tpa. On average this would equate to approximately 5 laden trucks per hour, however it is more likely to be undertaken on a campaign basis.

The average maximum daily extraction rate will be 750 t to enable flexibility in transport and maximise campaign use of equipment.

Figure 8: Stage 1 - Quarry Design

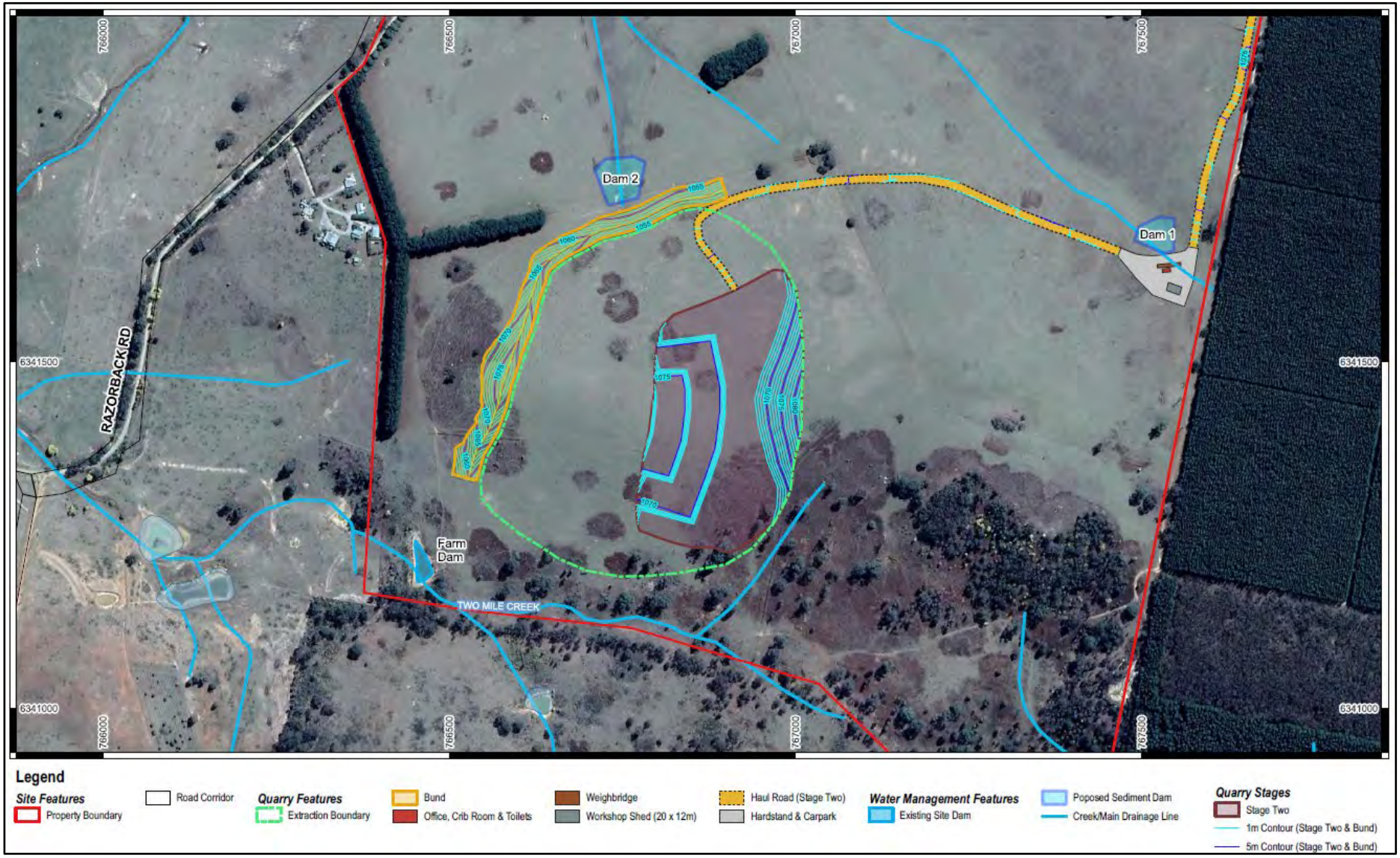

Figure 9: Stage 2 - Quarry Design

Figure 10: Stage 3 & 4 - Quarry Design

3.6 Extraction Method and Equipment

The insitu weathered conglomerate and sandstone is soft enough to allow the materials to be free dug, i.e., no blasting will be required. There is minimal overburden removal required before accessing the proposed product materials.

Topsoil and overburden will be stripped and stockpiled along an out of pit emplacement bund along the western side of the quarry to minimise noise propagation. These stockpiles will be placed 2-3 m in height and seeded for stability for eventual reuse in the quarry rehabilitation where needed.

Material will be won by dozer ripping and excavator working in an east to west direction over two benches maintaining a batter between the quarry operations and the dwelling to the west.

Expected equipment to be used on the site includes:

- Bulldozer (D6 or D8),
- Excavator,
- Front-end loader,
- Mobile screen,
- Site dump truck, and
- Water cart.

3.7 Processing

Limited processing of extracted materials will occur onsite with the exception of a screen to remove organic materials (e.g., sticks) and provide primary separation of the coarse pebble aggregates, finer gravels and the sand, silt, and clays.

The weathered nature of this material, as seen in the drilling and test pitting, shows that the sand and clay matrix surrounding the pebbles is not cemented to the pebbles as seen in most other conglomerates. Laboratory trials to date have shown that wet sieving produces around 18 percent minus 75 micron and dry sieving produces between 2 and 4 percent. To meet concrete sand specifications washing the product is the best method to remove the minus 75 micron clays.

Any material that does not meet the required product specification (i.e., can't be sold direct from the quarry to a consumer) will be trucked offsite for processing at an approved external facility.

3.8 Resource Monitoring

The extraction of material will be monitoring by way of regular pick up by a registered surveyor to determine extraction volumes and from the onsite weighbridge. There will be a requirement to report extraction to both Council and the EPA as part of annual reporting. Weighbridge records will be kept both in hardcopy and electronically for reporting purposes.

3.9 Site Infrastructure

The following infrastructure will be used onsite:

- A demountable building will be installed for use as the office and crib room for operators,
- A 20 m x 12 m steel framed and Colorbond clad shed will be installed for storage and maintenance purposes,
- Toilet facilities will likely be a 'portaloo' that will be serviced by a local waste facility. At a later date an onsite septic system may be installed in accordance with Section 68 of the Local Government Act 1993,
- Lighting plants will be used on occasion when loading trucks, however the majority of activities will be scheduled for daylight hours only,
- Mobile fuel truck,
- 20,000 L water tank for potable supplies,
- Two out of pit dams, in conjunction with in-pit sumps will provide water management capability,
- 20,000 L dedicated tank for emergency bushfire supply, and
- Outgoing trucks will be weighed via a site weighbridge.

The following utilities will be used onsite:

- Communications will be via mobile phone and UHF radio,
- Power will be supplied as needed using onsite generators,

- Potable water will be imported to site from the nearest reticulated supply in Kandos, and/or sourced from rainwater collection or the existing onsite water bore,
- No water will be used for processing, and
- Water for dust suppression will be extracted from water management dams.

3.10 Site Access

Access to the quarry is via the Castlereagh Highway, Razorback Road and then via private haul road. Key details of these are as follows:

- Castlereagh Highway is a sealed three lane sealed arterial road connecting Mudgee and Lithgow. The existing intersection with Razorback Road is via a formalised intersection with a protected right turn into Razorback Road, the right turn out from Razorback Road is into a two-lane southbound section of the highway. A deceleration lane provides for vehicles turning left into Razorback Road. Given this intersection has been relatively recently constructed by TfNSW, and logging activities have been a long-term local activity, it is expected that the intersection should meet the required performance measures, as such no additional works are expected.
- Razorback Road is a gravel local road. The quarries private haul road will start approximately 1 km east of the intersection with the Castlereagh Highway. It is anticipated this road may require sealing along this section to ensure dust and noise is kept to a minimum at adjacent residences and minimise potential of tracking of gravels onto the highway.
- The private haul road will provide a 1,000 m long section of gravel haulage road to the quarry. To limit tracking of materials onto the public road a shaker grid will be installed near the intersection with Razorback Road, with a minimum 20 m sealed section connecting the shaker grid to Razorback Road.

3.11 Intersection Safety and Improvement Works

Pavey Consulting Services (PCS) has prepared a Strategic Intersection Design to assess options to improve sight distance safety at the intersection of Razorback Road and the Castlereagh Highway. Comments raised by Transport for NSW (TfNSW) in the project SEARs raised the potential for sight distance safety issues for laden trucks turning right from Razor back Road onto the Castlereagh Highway. The assessment prepared by PCS reviewed the existing conditions at the Razorback Road/Castlereagh Highway intersection and assessed the available sight distance for all movements against Austroads 2010 guidelines. The existing intersection and northern and southern approaches are shown on **Figure 11**.

Figure 11: Intersection of Razorback Road and Castlereagh Highway

To inform the design study, PCS utilised a previous intersection assessment prepared by Greg Baird and Associates (2021) which considered the use of improved signage and a short right-turn median acceleration lane to improve the poor sight distance (from the north) for heavy vehicles turning out of Razorback Road. PCS assessed this upgrade work as **Option 1**. A further option was also considered which would involve the trimming of the embankment on the northern side of the intersection to improve sight lines that are restricted by vegetation. PCS assessed this work as **Option 2**. An overview of both options is provided below, with the full **Strategic Intersection Design** report provided as part of **Appendix F**.

3.11.1 Option 1 – Median Acceleration Lane

This option considered the extension of an acceleration lane to the south of the intersection with Razorback Road.

Section 5.5 of *Austroads Guide to Road Design Part 4A 2010 – Intersections* provides a range of lengths for acceleration lanes for different road environment speeds based on a heavy vehicle achieving a speed 20km/hr below the mean free speed of the through traffic when it merges. The speed limit at this location is 100 km/hr, therefore the mean free speed at this location is 100km/hr. On this basis a heavy vehicle will need to accelerate to 80 km/hr prior to merging.

In this location the downhill grade of between 2 to 4 % would assist in reducing the acceleration lane, however the length would be in the order of 400 m to 500 m.

Constructability

With regard to the constructability of this option, there is a steep drop-off from the existing pavement, and it may be difficult to contain the road batter with the additional pavement widening required within the existing road reserve. Also, significant vegetation exists on the inside of the curve that may require removal. Typically, the acceleration lane would be similar to **Figure 12** below.

Figure 12: Typical Acceleration Lane Extension

3.11.2 Option 2 – Improving Sight Lines to the North

Sight distance north on the highway is restricted by a vegetated embankment on the northern side of Razorback Road. Signage and vegetation at the toe of the embankment batter further obscure the sight line. An alternative option to avoid a long acceleration lane (as per Option 1) would be to trim the embankment on the northern side of the intersection to improve the sight lines. A land survey of this area has been undertaken and a concept design prepared which has shown that the trimming of this bank would provide the required 205 m sight distance.

Constructability

The existing road embankment appears to be suitable to bench back without the need for a retaining wall. A slope stability investigation would need to be carried out to determine the appropriate batter slope. This would be undertaken as part of a separate assessment and approval.

An earth catch drain at the top of the batter and a concrete dish drain at the bottom of the batter would most likely be required to protect the batter and road pavement from surface water shedding from the area above the batter.

No other pavement widening works would be required if this option was advanced. The survey and concept design prepared support this option.

Figure 13: Proposed Bank Trimming

3.11.3 Preferred Option

Following the preparation of a land survey, concept design, and construction cost estimate (see **Section 8.1**) the preferred option is **Option 2**. **Option 2** increases the northern sight distance to the standard required by TfNSW and is also significantly less cost than **Option 1** to construct.

A site inspection identified the following issues with **Option 1** that were considered in the development of a concept design for a proposed improvement.

- Interaction of the merge of the two traveling lanes into one at the same location as the merge of the acceleration lane into the through lane,
- The road geometry (curvature) has the risk of reducing sight lines due to vegetation on the inside of the curve (including in private property),
- To meet TfNSW requirements the existing CHS would need to be converted into a seagull intersection to ensure that vehicles entering the acceleration lane are protected from through traffic, and
- Significant fill and earthworks would be required to allow for the extension of the merging lane to accommodate the extended acceleration lane.

It is proposed that the intersection upgrade works and improvements to the northern sight distance would be subject of a separate approval under Part 5 of the EP&A Act following further engineering design and consultation with TfNSW and MWRC.

Detail on the intersection upgrade, including a concept design for the bank trimming, is provided in **Section 8.1**.

3.12 Operating Hours

It is likely that the quarry will initially operate on a campaign basis to meet specific demands moving toward a potential full-time quarry pending product demand.

It is intended to operate the quarry under the following hours:

- Construction:
  - 7:00 am to 6:00 pm Monday to Friday.
  - 8:00 am to 1:00 pm Saturday.
- Extraction and haulage:
  - 7:00 am to 6:00 pm Monday to Friday
  - 8:00 am to 1:00 pm Saturday.
- No construction, extraction, or haulage activities after 1:00 pm on Saturdays, Sundays, or public holidays.
- Incidental maintenance activities may occur outside the above times, but only where activities can be conducted and not be audible at neighbouring dwellings.

3.13 Work Force

The quarry once at peak production will employ two (2) people on a full-time basis, in addition to approximately four (4) truck haulage operators and one to two (1-2) contractors for machinery maintenance and refuelling.

3.14 Traffic Generation

The following traffic would be generated from the operation of the development:

- Up to 5 laden trucks per hour (10 trips per hour) during operating hours.
- Up to 4 vehicles of employees would be expected to arrive from approximately 7:00 am and leave at approximately 5:00 pm.

3.15 Parking

Five (5) parking spaces have been provided adjacent to the site office. Should additional parking spaces be required there is adequate area surrounding the maintenance shed for both light and heavy vehicle parking.

3.16 Construction

Construction will occur over an estimated 12 week period during construction hours consistent with the Interim Construction Noise guidelines and will include the following works:

- Bitumen sealing of Razorback Road to entrance of private haul road.
- Construction of private haul road.
- Construction of workshop, crib-hut, and hardstand.
- Construction of the weigh bridge.
- Initial topsoil stripping and placement and planting of topsoil stockpiles as a noise bund along the western boundary of the quarry.

Quarry operations will commence once the above actions are completed or when product is first transported from the site.

3.17 Final Landform

Final landform for the quarry is intended to be a deepened saddle along the existing ridge. Vegetation will consist of pasture grasses initially to improve soil stability and then planted with pine consistent the adjacent pine plantation.

The final landform design is provided as **Figure 14**.

3.18 Environmental Management and Licencing

The proposed quarry will operate under an Environmental Management Plan (EMP) that will be updated as necessary to incorporate any key operational changes. It is expected that an operational EMP will include the following sections:

- Introduction
- Environmental Policy
- Organisational Structure
- Description of Activities
- Identification of Environmental Issues and Impacts
- Risk assessment framework
- Environmental Management Controls
- Management Procedures
- Contingency Plans and Emergency Response
- Complaints Management
- Auditing and Reporting
- Continuous Improvement

The proponent will apply for an Environmental Protection Licence (EPL) appropriate to the type and scale of operations from the NSW Environment Protection Authority.

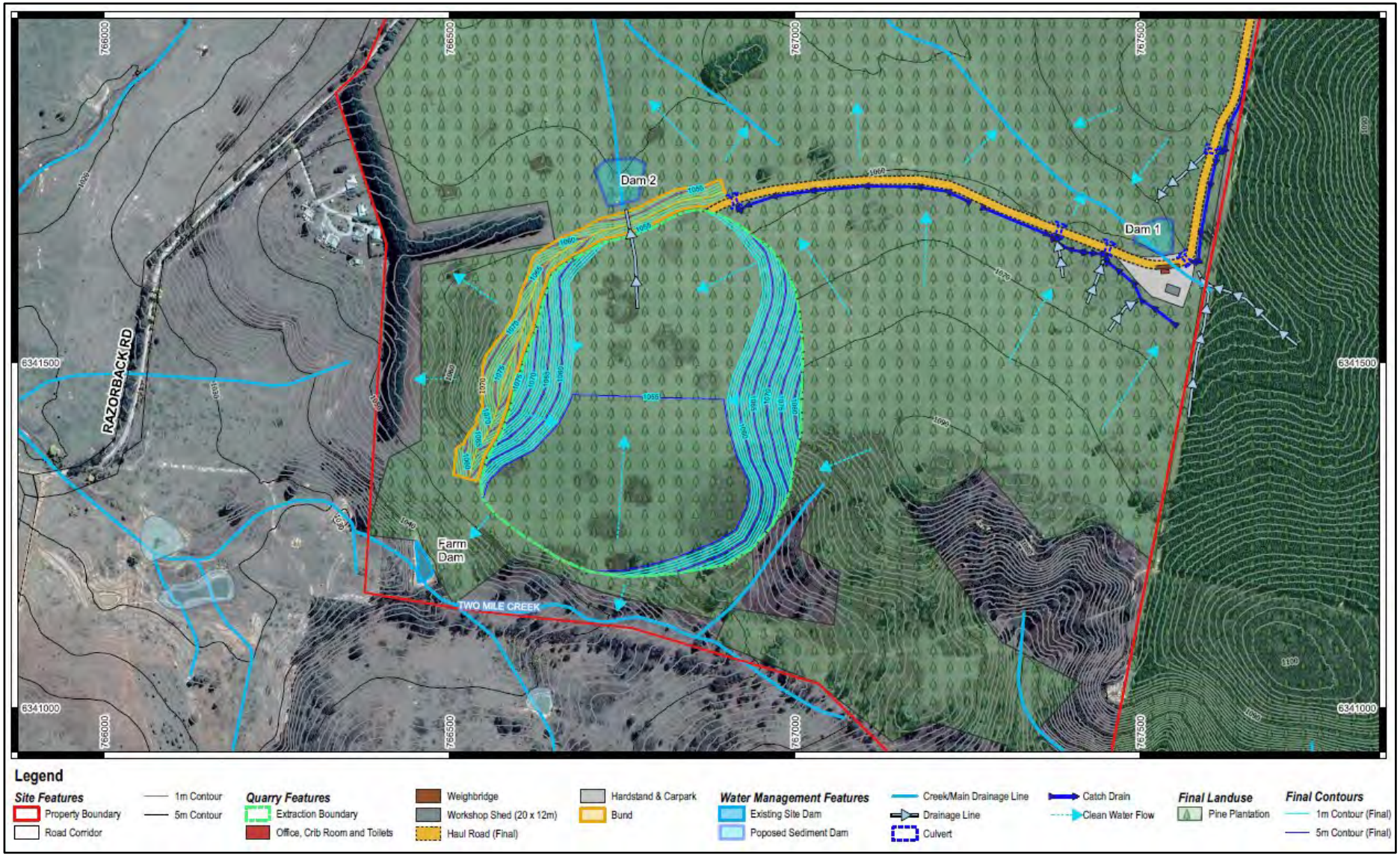

Figure 14: Final Landform

4 Project Need and Alternatives

4.1 Project Need

The quarry has the potential to provide a local sand resource in the Mid-Western LGA. At a distance of less than 200 km from Sydney, the sand products generated by the proposed quarry are expected to meet a variety of needs for landscaping and concrete sands within the Sydney and broader catchments.

The quarry will provide social and economic benefits through employment (directly and indirectly), local spending on consumables and maintenance and the distribution of this contribution through the local community.

The quarry would also increase competition in the sand market and assist with keeping sand prices lower.

4.2 Project Alternatives

Throughout the planning stages of the Proposal, the Applicant considered alternatives with respect to site access from Razorback Road, intersection upgrades with the Castlereagh highway, transportation of the sand products, and surface water management structures. All other components were decided upon and designed following the assessment and consideration of all relevant information and data. No other alternatives are available in the locality that could be quarried as economically as this resource as there is no overburden to be removed and no washing is required.

If the Project does not proceed, a regionally significant sand resource will remain undeveloped, resulting in the need to identify, assess, and approve additional sand resources from other areas. If the project does not proceed and demand for construction sand is not met this could lead to shortfalls in supply and an increase in prices for not only sand but also the products that sand forms a component of.

Failure to proceed with the Project would also result in lost economic benefits for the surrounding local communities.

5 Planning and Statutory Requirements

5.1 Overview

This section identifies the legislative requirements and planning controls relevant to the Project and outlines the key policy and statutory considerations. All associated environmental and planning approvals will be obtained as required for a Designated Development (DD) under Part 4 of the EP&A Act, including but not limited to:

- Commonwealth and State Government planning approvals,
- Local government approvals,
- Operational approvals (such as an Environment Protection Licence), and
- Other potential approvals required under relevant environmental and planning legislation and regulations.

5.2 Commonwealth Legislative Requirements

5.2.1 Environmental Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of Agriculture, Water, and the Environment (DAWE) and provides a legal framework to protect and manage places defined as Matters of National Environmental Significance (MNES). The EPBC Act lists the following places as MNES:

a. World Heritage properties

b. National heritage places

c. Wetlands of International Significance (including Ramsar wetlands)

d. Listed threatened species and ecological communities

e. Listed Migratory Species protected under international agreements (CAMBA and JAMBA)

f. Commonwealth marine areas

g. The Great Barrier Reef Marine Park

h. Water resources (relating to coal seam gas development and large coal mining development)

i. Protection of the Environmental from Nuclear Actions

Under Part 9 of the EPBC Act, actions that may have a significant impact on a MNES are deemed 'controlled actions' and require approval from the Commonwealth Minister for the Environment.

The assessment of the significance of the impact is based on the criteria listed in the EPBC *Significant Impact Guidelines 1.1* (Department of Environment 2003). Should the Environment Minister decide the action will be taken in a manner that will ensure it will be likely to not have an adverse impact on the MNES, approval will be granted.

The **Biodiversity Assessment** prepared for this EIS (refer **Appendix I**) included a Protected Matters Search and a Likelihood of Occurrence. The assessment concluded that the proposed action is unlikely to have an impact to MNES and as such Commonwealth referral under the EPBC Act is not required. Further discussion on MNES is provided in **Section 8.4**.

5.3 NSW Legislative Requirements

5.3.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) forms the statutory framework for environmental assessment and planning approval in NSW. The project is considered 'Designated Development' in accordance with Section 4.10 of Part 4 of the EP&A Act and Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regs). Specifically, Schedule 3, Clause 26, Part 1 & 2 of the EPA&A Regs defines designated development for '**Extractive Industries**' as:

> *"(1) Development for the purposes of an extractive industry facility is designated development if the facility obtains or processes for sale, or reuse, more than 30,000 cubic metres of extractive material per year"*
>
> *(2) Development for the purposes of an extractive industry facility is designated development if the facility disturbs or will disturb a total surface area of more than 2 hectares of land by—*
>
> *(a) clearing or excavating, or*
>
> *(b) constructing dams, ponds, drains, roads, or conveyors, or*
>
> *(c) storing or depositing overburden, extractive material, or tailings".*

The proposed Razorback Quarry seeks to extract at up to 200,000 tpa from a resource of approximately 4 million tonnes (Mt) with a disturbance area of approximately 25 ha, including the quarry, office, workshop, and access road. The project has an expected Capital Investment Value of $2,007,264.

Pursuant to Section 4.12 (8) of the EP&A Act application must be accompanied by an Environmental Impact Statement (EIS) in the form prescribed by the EP&A Regs.

Under Division 4.8 of the EP&A Act the proposed quarry meets the definition for Integrated development due to the following required approvals:

- An Environmental Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997,* and
- Potentially a works or use approval under the *Water Management Act 2000*.

As the proposed quarry will be assessed by the local Council and approved by the Joint Regional Planning Panel (JRPP), the quarry is not integrated development under S138 of the *Roads Act 1993*, despite requiring a S138 approval for the improvement of its intersection with Razorback Road.

5.3.2 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. The BC Act lists threatened species, populations, and ecological communities as well as critical habitat and key threatening processes that must be considered when assessing the effects of an activity.

The BC Act outlines the factors to be considered when making an assessment. If a significant impact is deemed likely following this assessment, a Species Impact Statement (SIS) or a Biodiversity Development Assessment Report (BDAR) may be required. The proposal would not result in a significant impact to biodiversity, hence preparation of an SIS or BDAR is not required, however a **Biodiversity Assessment** has been prepared and is provided in **Section 8.4** and **Appendix I**.

5.3.3 Protection of the Environment Operations Act 1979

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes a licencing regime for pollution generating activities in NSW. Under Sections 47 and 48, an environment protection licence (EPL) is required for 'scheduled development' work and 'scheduled activities' respectively.

Schedule 1 of the POEO Act identifies 'scheduled activities, that require a license for the premises at which the activity is carried out. Clause 19 of Schedule 1 relates to extractive activities.

> ***19 Extractive activities***
>
> "*(1) This clause applies to **extractive activities**, meaning the extraction (by any method, including by excavation, dredging, blasting, or tunnelling) or processing of extractive materials for the primary purpose of the sale of extracted material.*
>
> *(2) However, this clause does not apply to cut and fill operations, or the excavation of foundations or earthworks, that are ancillary to development that is subject to development consent or approval under the Environmental Planning and Assessment Act 1979.*
>
> *(3) The activities to which this clause applies are declared to be scheduled activities if they involve the extraction or processing of more than 30,000 tonnes of extractive materials per year.*
>
> *(4) More than 30,000 tonnes of material are taken to have been extracted in a year at premises at which extraction occurs if the total amount of extractive material transported from those premises in that year is more than 30,000 tonnes.*
>
> *(5) In this clause, **extractive materials** means clay, sand, soil, stone, gravel, rock, sandstone, or similar substances that are not minerals within the meaning of the Mining Act 1992*".

As the quarry proposes to extract over 30,000tpa an EPL will be required.

5.3.4 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) aims to ensure that the heritage of NSW is adequately identified and conserved. The Heritage Act provides protection to items such as places, buildings, works, relics, moveable objects, precincts, or land that have been identified, assessed, and listed on the State Heritage Register.

A search of the State Heritage Inventory and Register has identified heritage items within proximity to the site, but not within the study area. There are no sites or objects of State heritage significance that would be impacted by the proposal. A **Heritage Impact Assessment** has also been prepared and is discussed in **Section 8.7** and is provided as **Appendix L**.

5.3.5 National Parks and Wildlife Act 1974

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

Places or objects of Aboriginal cultural heritage on or in the vicinity of a site are required to be managed in accordance with the NPW Act. Clause 86 of the NPW Act states that "*a person must not harm or desecrate an object that the person knows is an Aboriginal object*."

An **Aboriginal Cultural Heritage Assessment** (ACHA) has been prepared for the development, including consultation with Registered Aboriginal Parties (RAPs), which is discussed in **Section 8.6** and is attached as **Appendix K**. This assessment found no items of significance within the study area.

5.3.6 Water Management Act 2000

The *Water Management Act 2000* (WM Act) provides the legislative basis for water use, management, and planning in NSW. The aims are to ensure that water resources are conserved and properly managed for sustainable use benefitting both present and future generations. It also provides formal protection and enhancement of the environmental quality of waterways and in-stream uses as providing protection of catchment conditions.

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 (up to 10% of runoff) and storing water and use of that water on that property. The harvestable right for the landholding (which is 278ha) is 22.24 ML (Water NSW, Harvestable Rights Calculator). Dams constructed for this purpose may be constructed on a first or second order stream only. Dams currently proposed as part of the Project are located on first order streams. One existing dam is located on the property on a second order stream and is estimated to be 5 ML in capacity, This leaves 17.24 ML in available dam storage that does not require a licence,
- **Access Licences** - Schedule 4, Clause 7 of the WM Act provides a 3 ML per annum exemption for aquifer interference activities for approved quarrying activities. Resource drilling and quarry design suggest the quarry floor is located above the groundwater table and it is unlikely to result in extraction or interference with groundwater,
- **Water Use Approvals** - required if additional water is needed beyond the harvestable right allocation or aquifer interference exemption,
- **Water Management Work Approvals** - required if a water supply bore is drilled or dam constructed outside of the harvestable rights framework, and
- **Activity Approvals** - are applicable to a 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, and
    - 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 of the quarry. The quarry will therefore not require an aquifer interference approval.

The WM Act applies where a Water Sharing Plan (WSP) is issued under the Act and has commenced. The proposal is located within the area subject to the WSP for the NSW Murray Darling Basin Porous Rock Groundwater Sources 2020, which regulates the interception and extraction of groundwater sources in the area. The proposal is therefore subject to the requirements of the WM Act and all water extraction or use must be undertaken in accordance with the Murray Darling Basin Porous Rock Groundwater Sources 2020.

5.3.7 Contaminated Land Management Act 1997

The *Contaminated Land Management Act 1997* (CLM Act) establishes a process for investigating and (where appropriate) remediating land that is contaminated. Section 59(2) of the CLM Act requires notification of contaminated sites. Section 60 of the CLM Act requires landowners to report any contamination that represents a significant risk of harm to human health or the environment to the NSW EPA.

There is no know contamination on the site, nor is the site listed on the EPA contamination register. Accordingly, the risk of encountering contamination is considered to be low.

5.4 State Environmental Planning Policies

5.4.1 State Environmental Planning Policy (Planning Systems) 2021

The *State Environmental Planning Policy (Planning Systems) 2021* incorporates provisions from the SEPPs consolidated as follows: Chapter 2 - State and Regional Development, Chapter 3 – Aboriginal Lands, and Chapter 4 – Concurrences and Consents.

For a development for the purpose of extractive industry to be classified as State Significant, the Proposal must either:

- extract more than 500 000t of material per year,
- have a total resource (the subject of the development application) of more than 5 million tonnes, and/or
- extract from an environmentally sensitive area of state significance.

The Proposal does not exceed or trigger any of these thresholds, therefore it is not of State significance.

5.4.2 State Environmental Planning Policy (Resilience and Hazards) 2021

Chapter 4 - Remediation of Land

Under the provisions of Clause 4.6(1) of SEPP (Resilience and Hazard), a consent authority must not consent to the carrying out of any development on land unless:

a) it has considered whether the land is contaminated,

b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and

c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

The site is existing grazing land that has recently been developed as a pine plantation. It is considered there is minimal risk of the land being contaminated due to the previous grazing use.

5.4.3 State Environmental Planning Policy (Biodiversity and Conservation) 2021

The *State Environmental Planning Policy (Biodiversity and Conservation) 2021* incorporates provisions from 11 SEPPs with similar theme-based focus areas. The relevant consolidated SEPPs to this Project are Chapter 4 – SEPP Koala Habitat Protection 2021.

Chapter 4 – SEPP Koala Habitat Protection 2021 contains the land-use planning and assessment framework from the Koala SEPP 2021 for koala habitat within Metropolitan Sydney and the Central Coast and applies to all zones except RU1, RU2 and RU3 in the short term – it will apply to all zones once the Koala SEPP 2020 is repealed.

The SEPP seeks to help koalas thrive by ensuring koala habitat is properly considered during the development assessment process, and to provide a process for councils to strategically manage koala habitat through the development of koala plans of management.

Due to the proposal lying within RU1 – Primary Production Land, the Koala SEPP 2021 does not apply. No koala plan of management occurs within the Mid-Western Regional LGA.

Furthermore, within the subject site, there are only nine (9) eucalyptus trees that are proposed to be removed with only two (2) being classed as Koala Feed Trees listed under Schedule 2 of the Koala SEPP 2021 for the relevant koala management area. Each tree was inspected during field work with no secondary signs of Koala usage or visitations.

Further discussion on habitat impacts is provided in **Section 8.4**.

5.4.4 State Environmental Planning Policy (Primary Production) 2021

The *State Environmental Planning Policy (Primary Production) 2021* (Primary Production SEPP) consolidates, transfers, and repeals the provisions of the following SEPPs:

1. SEPP (Primary Production and Rural Development) 2019 (Primary Production and Rural Development SEPP).
2. Sydney Regional Environmental Plan No 8 (Central Coast Plateau Areas) (Central Coast Plateau SREP).

Chapter 2 – Primary production and rural development contains planning provisions from the Primary Production and Rural Development SEPP to manage primary production and rural development, including supporting sustainable agriculture.

The Proposal is considered with respect to these aims:

- The land subject to the Proposal has not been identified as State Significant Agricultural Land within the *Draft State Significant Agricultural Land Map* prepared in 2021.
- The Proposal would not impact on the agricultural operations of surrounding properties.
- The proposed final landform will be backfilled and re-vegetated and will allow plantation pine to continue.
- The protection of the land that is the subject of the Proposal would not provide any public benefit. In fact, the employment and local economic stimulus that would be generated by the Proposal are likely to be of greater public benefit.

Based on the above, this SEPP is not considered further in the EIS.

5.5 Local Environmental Planning Policies

5.5.1 Mid-Western Regional Local Environment Plan 2012

The Project site is situated within land zoned as Zone RU1 - Primary Production under the *Mid-Western Regional Local Environment Plan 2012* (MWR LEP). The objectives of Zone RU1 are as follows:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To maintain the visual amenity and landscape quality of Mid-Western Regional by preserving the area's open rural landscapes and environmental and cultural heritage values.
- To promote the unique rural character of Mid-Western Regional and facilitate a variety of tourist land uses.

It is noted that extractive industries are permissible with consent within this zone.

Groundwater

Clause 6.4 of Part 6 of the MWR LEP identifies the following objectives with regards to groundwater vulnerability.

- To maintain the hydrological functions of key groundwater systems.
- To protect vulnerable groundwater resources from depletion and contamination as a result of development.

A review of Mid-Western Regional Local Environmental Plan 2012 Groundwater Vulnerability Map Sheet GRV_007 confirms that the Project site is located on land identified as 'Groundwater Vulnerable'.

Section 8.5 provides information on groundwater impacts and identifies management and mitigation measures outlined as part of the Proposal.

Terrestrial Biodiversity

Clause 6.5 of Part 6 of the MWR LEP identifies objectives to maintain terrestrial biodiversity. These objectives include:

- protecting native fauna and flora.
- protecting the ecological processes necessary for their continued existence.
- encouraging the conservation and recovery of native fauna and flora and their habitats.

A review of MWR LEP Sensitivity Biodiversity Map Sheet BIO_007 confirms that the Project site is partially located on land identified as 'Moderate Biodiversity Sensitivity', however the land is outside of the disturbance footprint of the development. Also, the Project site footprint represents highly disturbed agricultural land that has previously moved to a land use of pine plantation. The Proposal is not expected to have additional impacts upon native fauna and flora, their habitats, or ecological processes necessary for their continued existence.

Section 8.4 provides information on biodiversity impacts associated with the Proposal.

Heritage Conservation

Clause 5.10 of Part 5 of the MWR LEP identifies the following objectives with regards to heritage conservation:

- To conserve the environmental heritage of Mid-Western Regional.
- To conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings, and views.

- To conserve archaeological sites.
- To conserve Aboriginal objects and Aboriginal places of heritage significance.

A review of MWR LEP Heritage Map Sheet HER_007 indicated that no identified heritage items or conservation areas are present within the Project site.

Section 8.6 and **Section 8.7** provides further information on Aboriginal and European heritage impacts associated with the Proposal.

5.5.2 Mid-Western Regional Development Control Plan 2013

The aims of the Mid-Western Regional Development Control Plan (DCP) are to:

- implement and support the objectives of the Local Environmental Plan (Mid-Western Regional LEP 2012).
- define development standards that deliver the outcomes desired by the community and Council.
- provide clear and concise development guidelines for various forms of development.
- encourage innovation in design and development by not over-specifying development controls.
- expedite development approvals by providing clear direction of Council's intent and criteria.
- provide certainty of development outcomes for developers and the community.

Table 4 below identifies specific matters addressed by sections of the Mid-Western Regional DCP, their relevance to the Proposal, and the sections of the EIS in which they are addressed.

Table 4: Mid-Western Regional Development Control Plan 2013

RELEVANT DCP CLAUSE	DESCRIPTION		EIS SECTION
5.1 Car Parking	Hours of Operation	a) Off-peak development is development which operates or carries out its business outside the peak demand periods for parking which is generally between 9:00am and 5:00pm weekdays.	3.11
		b) Development of this type will be assessed in accordance with DCP and have regard to the characteristics of the proposed development, its hours of operation and the availability of publicly accessible parking in walking distance of the development site.	3.15
	Landscaping	a) Parking facility design shall consider the likely visual impact of the parking facility and provide an integrated landscape design addressing amenity impacts.	8.8
		b) Landscaping plan including details of species selection of mature shade trees, species condition, size of beds, under storey and ground cover planting, irrigation provision shall be submitted to Council for approval.	8.8
		c) Landscaping shall be provided to separate pedestrian and vehicle conflict points where possible.	8.8
		d) Landscaping provision for sun control (shading) shall be provided at the rate of 1 shade tree for every 6 car parking spaces.	8.8
		e) Existing trees on site are to be retained where possible.	8.8
5.3 Stormwater Management	C – Quality Management	Development Scale – More than 2 500m^2 of disturbed area.	

	During Construction	• A Soil and Water Management Plan (SWMP) must be prepared in accordance with Landcom's Managing Urban Stormwater (2004) otherwise known as 'The Blue Book' (refer to the S2S – Supporting Technical Guidelines).	8.5
	D – Quality Management During Operation	Development Scale – Large: Beyond 100 lots (average lot size of 800m^2 or equivalent land size). • On Site Detention (OSD) up to 100 year Average Recurrence Interval (ARI). • All water quality requirements including Gross Pollutant Traps (GPTs) and biofiltration.	8.5
		Water quality performance targets: • Total Suspended Load (TSL) – 85% reduction of the typical annual load. • Total Phosphorous (TP) – 65% reduction of the typical annual load. • Total Nitrogen (TN) – 45% reduction of the typical annual load. • 90% gross pollutant loads (litter and heavy sediment), oils and grease are retained on site.	8.5
	E – Water Conservation for Non-residential Development	New development applications shall reduce potable water consumption by 40% benchmarked against a development which uses only potable water and which has no water conserving fixtures or fittings.	8.5
		If source substitution such as the use of rainwater tanks or other measures are proposed then the applicant shall ensure that all water shall be fit for its intended purpose.	8.5
5.4 Environmental Controls	Protection of Aboriginal Archaeological Items	a) Aboriginal archaeological relics are protected by the provisions of the National Parks and Wildlife Act 1974, which makes the disturbance or destruction of these relics, without permission of the Director, an offence.	8.6
		b) Proponents should determine whether their site has potential archaeological significance and if so, should submit an archaeological survey with their development application. Generally, where a site is located near a water course or on an elevated area, an archaeological study will be required.	8.6
		c) Proponents should determine if the development application is classified as integrated development under Section 4.46 of the EP&A Act 1979 and if an Aboriginal Heritage Impact Permit is required.	8.6
	Bushfire Management	a) Where the development site is affected by a bushfire hazard as identified on the Bushfire Prone Land Map produced by the NSW Rural Fire Service, the design and management of the development shall comply with the guideline "Planning for Bushfire Protection" and where required; the Australian Standard AS 3959 - Construction of Buildings in Bush Fire Prone Areas.	8.10
		b) Buildings shall be located to ensure that requirements for fuel free or fuel reduced zones	8.10

		do not impact on existing native vegetation on the site.	
		c) Proponents should determine if the development application is classified as integrated development under Section 4.46 of the EP&A Act 1979 and if a Bushfire Safety Authority is required.	8.10
	Riparian and Drainage Line Environments	a) Proponents must identify all drainage lines, streams, creeks, and rivers on development plans and identify how the development has been designed to respect and be setback from such waterways and their vegetation.	8.5
		b) Proponents should determine if the development application is classified as integrated development under Section 4.46 of the EP&A Act 1979 and if a water use approval, water management work approval or activity approval is required.	5.31
	Pollution and Waste Management	a) Proponents should indicate all waste steams i.e., trade, liquid, chemical, solid, medical, and clarify how they will be managed and contained safely on-site and disposed of such that there are no environmental impacts or effects on adjoining properties, stormwater or sewerage systems or waterways.	8.12
		b) Proponents should determine if the development application is classified as integrated development under Section 4.46 of the EP&A Act 1979 and if an environmental protection license is required.	5.31
		c) Proponents will refer to Groundwater Vulnerability Mapping associated with Mid-Western Regional Council Local Environmental Plan 2012.	8.5
	Threatened Species and Vegetation Management	a) An assessment of any potential impact on native flora and fauna is to accompany a development application. If considered necessary by Council a Flora and Fauna Impact Assessment will be required from a suitably qualified professional. This Assessment will determine whether a Species Impact Statement will be required.	8.4
		b) Development applications should indicate all existing vegetation.	8.4
		c) Buildings and access areas should be sited to avoid removal of trees.	8.4

6 Consultation and Stakeholder Engagement

6.1 Overview

This chapter provides an overview of stakeholder engagement for the Project, a description of the stakeholder engagement activities undertaken and a summary of the findings that have been incorporated into this EIS.

6.2 Consultation Requirements

The SEARs issued for this Project stated the following be undertaken with regard to consultation.

> "*In preparing the EIS for the development, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers and any surrounding landowners that may be impacted by the development.*
>
> *The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS*".

Consultation is discussed further below.

6.3 Government Consultation

Consultation with government agencies was initiated by the Department of Planning and Environment (DPE) during the preparation of the Secretary's Environmental Assessment Requirements (SEARs). Government agencies that provided a response to DPE for inclusion in the SEARs included:

- Mid-Western Regional Council,
- NSW Department of Planning and Environment,
- NSW Environment Protection Authority,
- NSW Office of Environment and Heritage,
- Transport for NSW,
- Subsidence Advisory NSW,
- NSW Department of Primary Industries, and
- NSW Rural Fire Service.

Consultation with the above agencies has continued during the preparation of this EIS. A summary of the consultation undertaken with Government agencies is provided in **Appendix D**.

6.4 Community Consultation

The purpose of the community consultation program was to identify the key community stakeholders, present the stakeholders with details of the proposed Project and give the stakeholders an opportunity to provide feedback and identify any issues or concerns they may have.

The community consultation program focused upon those landowners adjacent to or likely to be directly impacted upon by the construction and or the operation of the Project.

6.4.1 Mailbox Drop

A Project postcard with details of the development was provided to surrounding landowners by mailbox drop and included contact details where individuals could obtain additional information on the Project and to provide feedback. The Project postcard provided a summary of proposed operations, amount to be extracted annually, infrastructure, and site rehabilitation.

A copy of the Project postcard is provided in **Appendix D**.

6.4.2 Individual Meetings

Meetings with individual stakeholders were provided upon request or where it was considered there was a specific issue to be addressed with a landowner.

6.4.3 Issues Raised

Three (3) surrounding landowners made contact following the distribution of the Project Postcard. Details of the feedback received is provided in **Appendix D**. PPP will continue to liaise with stakeholders as part of their ongoing commitment to community engagement.

6.4.4 Project Website

Project information has been provided on the Plantation Pine Products website. The website includes an overview of the PPP business, a Project summary, and site figures. The information can be found at www.plantationpineproducts.com.au/proposed-development/.

6.5 Aboriginal Consultation

Consultation with Aboriginal stakeholders for the Project was undertaken in accordance with Section 60 of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2019* and followed the process outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRP). The ACHCRP is a four-stage process of consultation as follows:

- **Stage 1** – Notification of project proposal and registration of interest.
- **Stage 2** – Presentation of information about the proposed project.
- **Stage 3** – Gathering information about cultural significance.
- **Stage 4** – Review of draft cultural heritage assessment report.

As a result of the consultation process, eight Aboriginal groups registered their interest in the Project. Notification of the Registered Aboriginal Parties (RAPs) was provided to Heritage NSW on 14 November 2021. Following provision of the methodology, field work, and preparation of the draft Aboriginal Cultural Heritage Assessment Report (ACHAR), comments were received from three RAPs. All three RAPs commented that they 'agree with the findings of the assessment'.

Details of the full consultation process and findings of the assessment are provided in the ACHAR attached as **Appendix K** and discussed in **Section 8.6**.

7 Project Risk Assessment

7.1 Overview

To assist in identifying the key environmental and social impacts associated with the Project and the likely severity, an Environmental Risk Assessment (ERA) was undertaken in accordance with Australian Standard AS/NZS ISO 31000:2009 Risk Management Principles and Guidelines. The risk assessment is presented in full as **Appendix E**. The methodology used for the ERA process, and a summary of the results, are outlined below in the following sections.

7.2 Methodology

7.2.1 Key Environmental Impacts

The key environmental and social impacts associated with the Project and requiring further assessment and reporting were identified through:

- The existing environmental context of the site and surrounding locality (**Section 2**),
- The outcomes of consultation undertaken to date with government agencies and other relevant stakeholders (**Section 6**),
- Project SEARs (**Section 1.7**),
- Legislative and statutory framework (**Section 5**), and
- Specialist studies undertaken as part of the preparation of this EIS (**Section 8**).

The key environmental and social impacts identified for the Project, in no particular order, were:

- Traffic and transport
- Dust and greenhouse gas
- Noise and vibration
- Surface water
- Groundwater
- Aboriginal heritage
- Historic heritage
- Biodiversity
- Visual amenity
- Land Resources
- Socio-economic
- Waste management, and
- Bushfire.

7.2.2 Evaluating Likelihood

The key environmental and social impacts for the Project were assigned a likelihood between almost impossible and certain in accordance with **Table 5** (column 1). Column 2 provides a description that elaborates on the possible likelihood categories and column 3 provides the frequency.

Table 5: Likelihood Table

LIKELIHOOD	DESCRIPTION	FREQUENCY
Certain	Common Occurrence	At least daily
Very Likely	Expected to occur in most circumstances	Once per week
Likely	Probably will occur or has happened in the past	Once per month
Unlikely	Occurs Infrequently	Less than once per year
Possible	Could happen at some time	Less than once per 10 years
Almost Impossible	Not Likely to Occur	Less than 1 per 100 years

7.2.3 Evaluation Consequence

The key environmental and social impacts were assigned a consequence between catastrophic and negligible in accordance with **Table 6** (column 1). Columns 2 to 7 provide a guide to the elements considered when evaluating a consequence and column 8 provides the severity level.

Table 6: Consequence Table

CONSEQUENCE	HEALTH AND SAFETY	NATURAL ENVIRONMENT	COMMUNITY RELATIONS & CULTURAL HERITAGE	REPUTATION/ MEDIA	LEGAL	DAMAGE/LOSS/ BUSINESS INTERRUPTION	SEVERITY LEVEL
Catastrophic	Multiple Fatality	Significant and irreversible impact on threatened species, habitat(s), or ecosystem(s)	Irreparable damage to sites of high cultural significance	Undeniably justified Government condemnation for illegal / unacceptable behaviour	Major prosecutions and fines resulting in incarcerations for senior executives	Significant Financial Loss. >$10 million	6
Critical	Fatality	Very serious long-term environmental impairment of eco-system function	Very serious widespread social impact. Irreparable damage to valued cultural items	Prolonged condemnation by media and/or NGO (national outcry)	Significant prosecutions and fines. Very serious litigation, including class actions	Major $1 M - $10 M	5
High	Lost Time Injury	Serious medium-term environmental effects	Ongoing serious social issues. Significant but repairable damages to structures/items of cultural significance	Serious public and/or media outcry	Major breach of regulation. Major litigation	High $100,000 - $1 M	4
Moderate	Medical Treatment required. Medical Treatment Injury	Moderate short-term effects but not effecting overall ecosystem function	Ongoing social issues. Minor permanent damage to items of cultural significance.	Attention from media and/or heightened concern by local community	Moderate legal issues, non-compliances, and breaches of regulation	Low financial Loss <$100,000	3
Minor	First Aid Treatment	Minor effects on biological or physical environment	Minor medium-term social impacts	Minor adverse local public or media attention and complaints	Minor legal issues, non-compliances, and breaches of regulation.	Low Financial Loss <$10,000	2
Almost Impossible	No medical attention. Report only	Limited damage to minimal areas of low significance	Low level repairable damage to commonplace structures	Public concern restricted to local complaints	Low level legal issues	Min Financial Loss <$1000	1

7.2.4 Risk Assessment Matrix

The key environmental and social impacts were assigned a risk ranking between negligible and catastrophic in accordance with **Table 7**, based on the assessment of likelihood and consequence as described above.

Table 7: Risk Matrix Table

LIKELIHOOD	CONSEQUENCE					
	NEGLIGIBLE	MINOR	MODERATE	HIGH	CRITICAL	CATASTROPHIC
6 – Certain	6	12	18	24	30	36
5 – Very Likely	5	10	15	20	25	30
4 – Likely	4	8	12	16	20	24
3 – Unlikely	3	6	9	12	15	18
2 – Possible	2	4	6	8	10	12
1 – Almost Impossible	1	2	3	4	5	6

Risk Scores: 1 - 3 = Low 4 - 10 = Moderate 12 - 16 = High 18 - 24 = Very High 25 - 36 = Extreme

7.2.5 Summary of Risk Rankings

Table 8 below provides a summary of the risk rankings for the environmental and social impacts considered as part of the ERA. The risk assessment did not identify any aspects of the Project with a residual risk of catastrophic or critical.

Table 8: Summary of Environmental Risk

RISK	ISSUE
Extreme	None
Very High	None
High	None
Moderate	Traffic and Access Noise and Vibration Air Quality Surface Water Groundwater Biodiversity Aboriginal Heritage Bushfire Cumulative Impacts
Low	Land Resources Greenhouse Gas Historic Heritage Visual Socio-economic Waste Management

Where the individual risks were deemed unacceptable, or where a knowledge gap was identified, specialist technical studies were undertaken and additional mitigation measures and or management responses proposed. The following sections provide a detailed assessment of the key environmental and social impacts for the Project as identified above.

8 Impact Assessment, Mitigation, and Management

This section of the EIS provides a summary of the potential environmental and social impacts of the development and the measures that will be implemented to mitigate and manage these impacts. The issues have been prioritised in accordance with the SEARs, the risk assessment detailed above in **Section 7**, and the outcomes of stakeholder engagement.

8.1 Traffic and Transport

8.1.1 Introduction

A **Traffic Impact Assessment** (TIA) for the proposed development has been undertaken by Pavey Consulting Services to determine the potential traffic, intersection, and road impacts during construction and operations. The assessment has been prepared in accordance with the relevant road assessment standards, guidelines, and policies, and in consultation with the government agencies. The assessment has been prepared with regard to *Austroads Guide to Traffic Management Part 3 Traffic Studies and Analysis*, *Austroads Guide to Traffic Management Part 12 Traffic Impacts of Developments*, and *NSW Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (2002)*. The assessment has also been prepared to satisfy the SEARs and agency comments. The **TIA** is attached as **Appendix F**.

8.1.2 Existing Environment

The majority of the subject land is used for pine plantations. Surrounding lands are primarily larger agricultural holdings practising mixed grazing, along with a scattering of pine plantations and other uses.

Access to the proposed quarry is off Razorback Road. Razorback Road joins the Castlereagh Highway at a “T junction” which has been upgrade in the past to a standard Channelised Right Turn (CHR) and Basic Left Turn (BAL). Deceleration lengths and storage areas are consistent with current standards and traffic volumes.

The intersection with Razorback Road and the Castlereagh Highway consists of a left-turn deceleration lane for northbound vehicles on the highway and a protected right-turn for southbound vehicles turning into Razorback Road. There is no dedicated acceleration lane for vehicles turning south onto the Castlereagh Highway, however, an overtaking lane continues for south bound traffic for approximately 150 m south of the intersection.

Castlereagh Highway is a 100 km/h highway connecting Lithgow in the south with Mudgee in the north.

Razorback Road is a local road connecting the Castlereagh Highway with Turon Road, but primarily services local properties. The road is sealed for approximately 20 m from the intersection with the Castlereagh Highway, beyond the sealed section the road is of gravel construction approximately 6 m in width.

Access into the proposed quarry site will be via an upgrade to an existing gravel entry road within private property. Views of Razorback Road from the proposed quarry entrance are shown as **Plates 4** and **5** and the intersection of Razorback Road with the Castlereagh Highway is shown as **Plate 6**.

Plate 4: Looking west on Razorback Road from the site entrance

Plate 5: Looking east on Razorback Road from the site entrance

Plate 6: Intersection of Razorback Road and Castlereagh Highway

8.1.3 Methodology

This Traffic Impact Assessment (TIA) has been prepared in accordance with the relevant governmental assessment requirements, guidelines, and policies, and in consultation with the relevant Government Agencies.

The TIA has been developed in accordance with:

- Austroads Guide to Traffic Management Part 3 Traffic Studies and Analysis.
- Austroads Guide to Traffic Management Part 12 Traffic Impacts of Developments, and
- NSW Roads and Maritime Services (RMS) Guide to Traffic Generating Developments(2002).

The assessment is based on the following general scope for matters to consider in a TIA which is defined by the NSW Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (RTA 2002):

- The existing locality and surrounding land uses,
- The existing road networks.
- Traffic generation characteristics.
- Traffic impacts, and
- A summary of assessed traffic impacts and any traffic mitigation measures proposed.

8.1.4 Impact Assessment

Traffic Generation

Construction

Construction will occur over an estimated 12 week period during will include the following works:

- Bitumen sealing of Razorback Road to western property boundary,
- Construction of private haul road,
- Construction of workshop and crib hut,
- Construction of the weigh bridge, and
- Initial topsoil stripping and placement and planting of topsoil stockpiles as a noise bund along the western boundary of the quarry.

Traffic movements during construction are anticipated to be:

- Light vehicle movements for construction workers 6 (i.e., 3 movements into and out of the site each day) movements generally in the morning and afternoon as construction workers arrive and leave the site,
- Delivery of construction materials for the site office, workshop, and weighbridge.
- Delivery of temporary construction worker toilets, lunchrooms, and site office,
- Mobilisation and de-mobilisation of heavy plant and equipment, and
- Delivery of concrete where required.

It is anticipated that heavy vehicles peak at 4 (i.e., 2 movements into and out of the site each day) vehicles arriving at the site to unload components).

Operations

The proposed quarry operations are assumed to generate:

- Up to 5 laden trucks per hour exiting the Razorback Road intersection during operating hours (7 am to 6 pm Monday to Friday),
- Up to 5 unladen trucks per hour entering the Razorback Road intersection during operating hours (7 am to 6 pm Monday to Friday),
- Up to 4 vehicles of employees entering Razorback Road from approximately 7 am, and
- Up to 4 vehicles of employees leaving Razorback Road from approximately 6 pm.

Traffic Distribution

It is anticipated that for all phases of this development the distribution of traffic will be as follows:

- 50 / 50 split to the north and south for heavy vehicles, and
- 100% from the north for employees.

Traffic Impact at Intersections

Crash data

Crash data from the NSW Centre for Road Safety Crash and Casualty Statistics Maps (2015-2019) shows no crashes at the intersection between 2015 and 2019. Two serious crashes were recorded on the Castlereagh Highway, and 1 serious crash and 1 injury/fatality crash recorded on Razorback Road a distance from the intersection.

Effect on Intersection Performance

Establishment of current traffic volumes

A traffic count was carried out on the 9 November 2021 between the hours of 8 am and 4 pm am to determine all traffic movements at the intersection (refer Table 1 of TIA in **Appendix F**). Peak hour movements are summarised below in **Table 9**.

Table 9: Maximum Hourly Traffic Movements

	10AM TO 11AM	11AM TO 12AM
Path	**140**	**143**
1A – LV	66	65
1A – HV	14	10
2 – LV	2	3
2 – HV	0	0
3 – LV	1	2
3 – HV	0	0
4 – LV	0	2
4 – HV	0	0
5 – LV	0	0
5 – HV	0	0
6 – LV	48	52
6 - HV	9	9

Intersection operation

How adequate the capacity of an intersection is judged by whether it can physically and operationally cater for the traffic using it. The performance of the intersection relevant to the proposal have been assessed using the intersection modelling SIDRA software. In the absence of historical growth figures, a conservative 3% traffic growth rate was applied to the 2021 traffic counts to determine a 10 year forecast. Scenarios are detailed in **Figure 15** and **Table 10** below.

The analysis was carried out for the following scenarios:

- Existing 2021,
- Existing 2021 with proposed development,
- 10 year planning horizon (with above assumed growth rate), and
- 10 year planning horizon with proposed development.

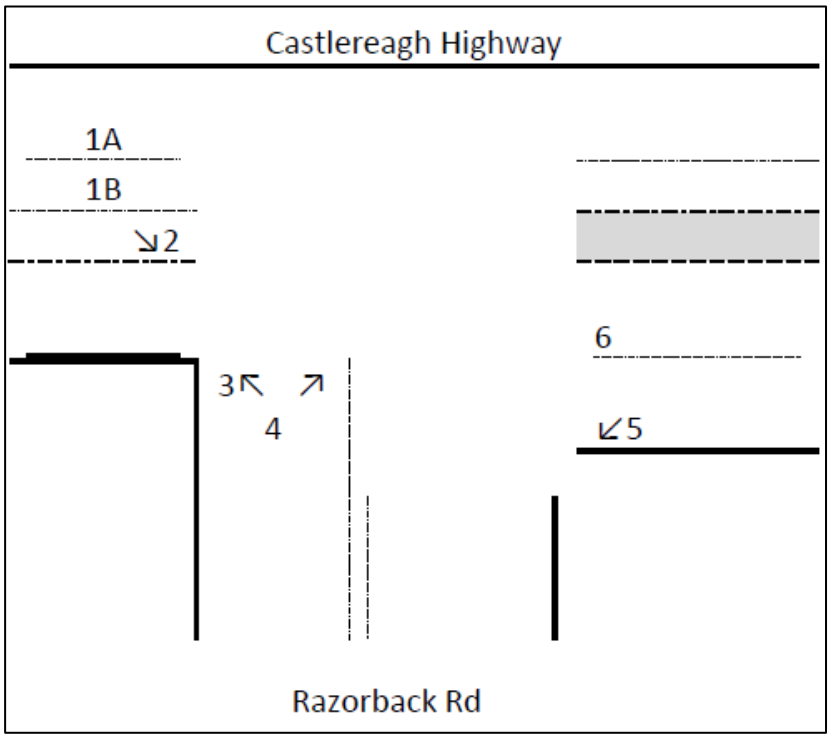

Figure 15: Vehicle Turning Paths

Table 10: Modelled Traffic Scenarios

PATH	EXISTING MOVEMENTS	POST DEVELOPMENT	EXISTING + POST	10 YEARS GROWTH	POST DEVELOPMENT 10 YEARS GROWTH
1A – LV	66	0	66	86	86
1A – HV	14	0	14	18	18
2 – LV	2	4	6	3	7
2 – HV	0	3	3	0	3
3 – LV	1	0	1	1	1
3 – HV	0	3	3	0	3
4 – LV	0	0	0	0	0
4 – HV	0	2	2	0	2
5 – LV	0	0	0	0	0
5 – HV	0	2	2	0	2
6 – LV	48	0	48	62	62
6 - HV	9	0	9	12	12

Traffic Modelling Assumptions

- Analysis was carried out for the maximum hour flow as shown in Table 2 only as worst case scenario for traffic,
- Existing intersection geometry, including lane lengths and widths were measured using engineering survey,
- SIDRA default values were adopted,
- Level of Services Method is set to RTA NSW,
- Speed environment 100 km/hr on Castlereagh Highway and 50 km/hr on Razorback Rd,
- Length of right turn 2 is 90 plus deacceleration lane,
- Length of left turn 5 is 50 m plus deacceleration lane, and
- Heavy Vehicles (HV) 90% in lane 1A and 10% in lane 1B

A summary of the SIDRA analysis is provided below in **Tables 11** to **16**.

Table 11: Intersection Performance (AM Peak) South Bound Castlereagh Highway

CRITERIA	BASE	BASE WITH DEVELOPMENT	BASE WITH 10 YEARS GROWTH	10 YEARS WITH DEVELOPMENT
AV. Delay (sec)	0.0	0.0	0.0	0.0
Level of Service	A	A	A	A

Table 12: Intersection Performance (AM Peak) North Bound Castlereagh Highway

CRITERIA	BASE	BASE WITH DEVELOPMENT	BASE WITH 10 YEARS GROWTH	10 YEARS WITH DEVELOPMENT
AV. Delay (sec)	0.0	0.0	0.0	0.0
Level of Service	A	A	A	A

Table 13: Intersection Performance (AM Peak Right Turn into Razorback Road)

CRITERIA	BASE	BASE WITH DEVELOPMENT	BASE WITH 10 YEARS GROWTH	10 YEARS WITH DEVELOPMENT
AV. Delay (sec)	7.7	8.7	7.8	8.7
Level of Service	A	A	A	A
Q. Length (m)	0	0	0	0

Table 14: Intersection Performance (AM Peak Right Turn out of Razorback Road)

CRITERIA	BASE	BASE WITH DEVELOPMENT	BASE WITH 10 YEARS GROWTH	10 YEARS WITH DEVELOPMENT
AV. Delay (sec)	8.6	14.4	9	15.6
Level of Service	A	A	A	A
Q. Length (m)	0	0	0	0

Table 15: Intersection Performance (AM Peak Left Turn out of Razorback Road)

CRITERIA	BASE	BASE WITH DEVELOPMENT	BASE WITH 10 YEARS GROWTH	10 YEARS WITH DEVELOPMENT
AV. Delay (sec)	7.7	10.8	9	11
Level of Service	A	A	A	A
Q. Length (m)	0	0	0	0

Table 16: Intersection Performance (AM Peak Left Turn into Razorback Road)

CRITERIA	BASE	BASE WITH DEVELOPMENT	BASE WITH 10 YEARS GROWTH	10 YEARS WITH DEVELOPMENT
AV. Delay (sec)	7.8	10.4	7.8	9.6
Level of Service	A	A	A	A
Q. Length (m)	0	0	0	0

The modelling outputs as shown in Table 5 through 10 illustrate that there is no deterioration of Av Delay, Level of Service, or Que length when development traffic is added to either of the 2021 or 2031 simulations of the intersection.

In 2031 (in either scenario) the intersection operates at Level of Service of A on all legs and turn movements in the morning peak hour.

Further the no que length for the right turn into Razorback Rd under the development scenario in 10 years is evident indicating that the 90 m of available for storage of the current road layout is more than adequate.

Impact on Public Transport

There is no impact on public transport as traffic movements are minimal.

Site Distance and Visibility Issues

Austroads guidelines provide general parameter values, which they refer to as the 'Normal Design Domain' (NDD). The TIA discusses the existing intersection in terms of Normal Design Domain criteria only.

Safe Intersection Sight Distance (SISD) is measured from a driver eye height of 1.1 m above the road to a point 1.25 m above the road, which represents the upper part of a car. It is measured along the carriageway from the approaching vehicle to a conflict point.

Austroads SISD allows the use of a 1.5 seconds' or 2.0 seconds observation time for T-intersections on single carriageway roads that have a traffic volume less than 4,000 vehicles per day with the minor road having a traffic volume of less than 400 vehicles per day. Intersection performance is provided below in **Table 17**.

Table 17: Intersection Performance (AM Peak Left Turn into Razorback Road)

SISD – DEISGN SPEED (KM/H)	REACTION TIME (SEC)	SISD (M)	CORRECTION FOR 8% GRADE (M)	RESULTANT SISD (M)
100	1.5	234	-20	214
100	2.0	248	-20	228

Exiting Safe Intersection Sight Distance to the South

Available SISD to and from the south of Razorback Road was measured at greater than 250m from engineering survey and as such meets the Austroads guidelines for both reaction time of 1.5 and 2 seconds. Full details including long sections are shown on Arkhill Engineers drawing on SK4153-012 sight line 2 in the TIA provided as **Appendix F**.

Existing Intersection Safe Sight Distance to the North

Available SISD to and from the north from Razorback Road was measured at 135 m to 140 m, from engineering survey. This does not meet the requirements in Austroads for this speed environment.

As shown below in **Plate 7** sight distance north to the highway is restricted by a vegetated embankment on the northern side of Razorback Road.

Plate 7: Looking north from Razorback Road

Signage and vegetation at the toe of the embankment batter further obscure the sight line.

Due to the reduced site distance from the impact of vegetation and embankment to the north it is proposed to cut back this embankment to achieve the desired site distances detailed above in **Table 17**. Further discussion on the proposed earthworks is provided below.

Proposed Road Works and Intersection Works

Bitumen Sealing of Razorback Road

The applicant proposes to bitumen seal, to Council requirements, that section of Razorback Road from the existing seal near Castlereagh Highway to 15 m west of the entrance to the quarry. Such sealing will ensure that the minor increase in vehicle movements will not have an adverse effect on road safety or the amenity of adjacent properties.

Improved Intersection Warning Signage

The current Castlereagh Highway "side road intersection" sign on approach from the north is installed alongside CAMs and may not be obvious to drivers, reducing driver awareness of the Razorback Road intersection.

Installing a larger sized sign, repositioned to be clear of the CAMs and supplemented with a *TRUCKS CROSSING OR ENTERING* sign would reinforce to drivers that they are approaching an intersection where heavy vehicles may be entering the highway, assisting with driver awareness.

Intersection Improvement

As discussed above in **Section 3.10**, two alternatives were examined to determine if and how an improved sight distance could be achieved, namely provision of an acceleration lane to the south or improving sight distance to the north by removing some of the embankment and vegetation.

The first alternative assessed (or **Option 1**) was the extension of the acceleration lane to the south. Austroads and TfNSW standards set out criteria for minimum length of acceleration lanes on the departure side of intersections. Section 5.5 *Austroads Guide to Road Design Part 4A 2010 - Intersections* provides details of acceptable design lengths for heavy vehicle acceleration lanes. This guide provides a range of lengths for acceleration lanes for different road environments and speeds based on a heavy vehicle achieving a speed 20km/hr below the mean free speed of the through traffic when it merges.

Based on current TfNSW comments the mean free speed would be the speed limit at this location (i.e., 100 km/h.) Hence a heavy vehicle will need to accelerate to 80 km/hr prior to merging. In this location the downhill grade of between 2 to 4 % would assist in reducing the acceleration lane, however the length would be in the order of 400 m to 500 m.

Following an inspection of the site the following issues were identified for **Option 1**:

- Interaction of the merge of the two traveling lanes into one at the same location as the merge of the acceleration lane into the through lane,
- The road geometry (curvature) has the risk of reducing sight lines due to vegetation on the inside of the curve (including in private property),
- To meet TfNSW requirements the existing CHS would need to be converted into a seagull intersection to ensure that vehicles entering the acceleration lane are protected from through traffic, and
- Significant fill and earthworks would be required to allow for the extension of the merging lane to accommodate the extended acceleration lane.

The second alternative considered (**Option 2**) is to improve the sight distance to the north. Sight distance north on the highway is restricted by a vegetated embankment on the northern side of Razorback Road. Signage and vegetation at the toe of the embankment batter further obscure the sight line. The option involves the trimming of the embankment on the northern side of the intersection to improve the sight lines. A land survey of this area has been undertaken and a concept design prepared which has shown that the trimming of this bank would provide the required 205 m sight distance.

The existing road embankment appears to be suitable to bench back without the need for a retaining wall. A slope stability investigation would need to be carried out to determine the appropriate batter slope. This would be undertaken as part of a separate assessment and approval.

An earth catch drain at the top of the batter and a concrete dish drain at the bottom of the batter would most likely be required to protect the batter and road pavement from surface water shedding from the area above the batter.

No other pavement widening works would be required if this option was advanced. The survey and concept design prepared support this option.

Following the preparation of a land survey, concept design, and construction cost estimate the preferred alternative is **Option 2**. **Option 2** increases the northern sight distance to the standard required by TfNSW and is also significantly less cost than **Option 1** to construct. Full details of the land survey and concept design for **Option 2** are provided in the TIA attached as **Appendix E**.

8.1.5 Mitigation and Conclusions

The traffic impacts from the proposed development have been assessed and the key findings are as follows:

- The available sight distance of Razorback Road to the south along Castlereagh Highway is adequate for the speed environment,
- The available sight distance of Razorback Road to the north along Castlereagh Highway is inadequate for the speed environment. However, a proposed concept design has been development to trim back the embank to the north and this design provides a clear sight distance meeting Austroads guidelines,
- Total traffic generation remains low and has no impact on the intersection performance and demonstrates that the current protected right run storage and left turn de acceleration lane is adequate and no other intersection improvements are necessary,
- Minor signage upgrades are required to improve the awareness of the approaching intersections, and
- Sealing of Razorback Road to 15m west of the quarry access will ensure that the minor increase in vehicle movements will not have an adverse effect on road safety or amenity of adjacent properties.

A draft Traffic Management Plan has been prepared as part of the TIA which is included as **Appendix F**.

8.2 Air Quality

8.2.1 Introduction

An **Air Quality Impact Assessment** (AQIA) for the proposed development has been undertaken by Todoroski Air Sciences. The purpose of this assessment was to determine the potential dust and greenhouse gas generating sources from construction and operations, undertake modelling of worst-case scenarios likely at the site, determine the likely impacts, and propose suitable mitigation measures and strategies. The dust assessment has been prepared in accordance with the NSW Environment Protection Authority (EPA) publication *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2016)*, and the greenhouse gas assessment has been prepared in accordance with the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard Revised Edition (WBCSD & WRI)*. The assessment also considers the SEARs and agency comments. The **Air Quality Impact Assessment** report is attached as **Appendix G**.

8.2.2 Existing Environment

Local Climatic Conditions

Long-term climatic data from the Bureau of Meteorology (BoM) weather station at Nullo Mountain Automatic Weather Station (AWS) (Site No. 062100) were used to characterise the local climate in the proximity of the Project. The Nullo Mountain AWS is located approximately 50 km northeast of the Project. The climatic data utilised from the Nullo Mountain AWS has been collected over an approximate 18-to-31-year period for the various meteorological parameters.

The data indicate that January is the hottest month with a mean maximum temperature of 24.3 degrees Celsius (ºC) and July is the coldest month with a mean minimum temperature of 2.5ºC.

Rainfall exhibits variability and seasonal fluctuations across the year with an annual average rainfall of 950.0 millimetres (mm) over 90.5 days. The data indicate that March is the wettest month with an average rainfall of 108.3 mm over 8.9 days and May is the driest month with an average rainfall of 54.7 mm over 6.2 days.

Humidity levels exhibit variability and seasonal flux across the year. Mean 9 am humidity levels range from 70% in October to 85% in June. Mean 3 pm humidity levels range from 54% in October to 74% in June.

Mean 9 am wind speeds range from 15 km/h in April, May, and December to 16.2 km/h in August. Mean 3 pm wind speeds range from 12.9 km/h in April and May to 15.6 km/h in September. Monthly climatic summary for the Nullo Mountain station is provided below in **Figure 16**.

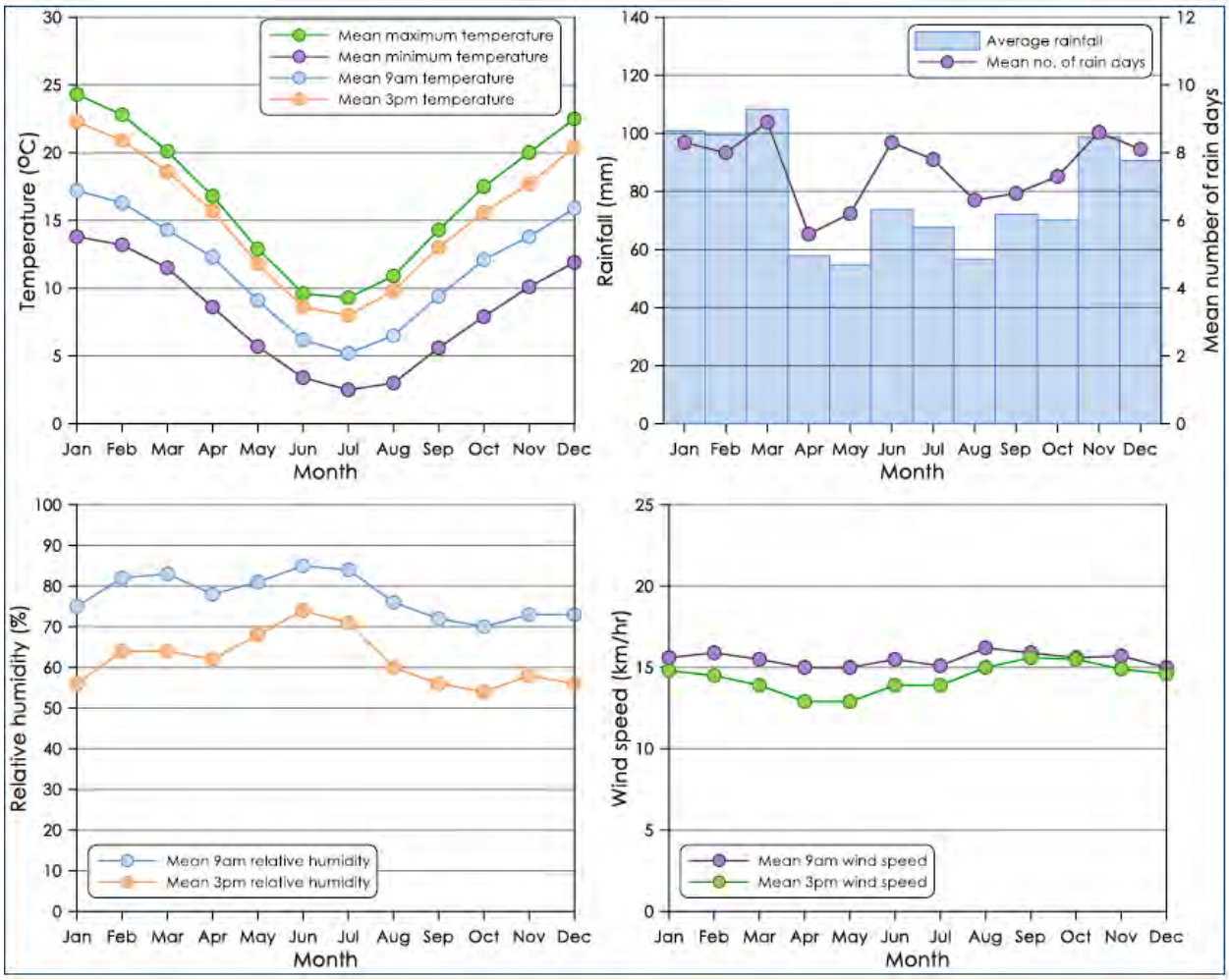

Figure 16: Monthly Climatic Statistics Summary – Nullo Mountain AWS

Local Meteorological Conditions

The Nullo Mountain AWS has been used to represent local meteorological conditions that would be experienced at the Project site. Annual and seasonal windroses prepared from data collected for the 2021 calendar year are presented in **Figure 17**.

Analysis of the windroses shows that on an annual basis, winds range from the west to east-southeast. During summer, winds are predominately from the east-southeast. The autumn wind distribution shows the greatest percentage of winds from the north-northeast and northeast. In winter the highest percentage of winds come from the northwest sector. During spring, winds are predominately from the east-southeast and west to northwest sectors.

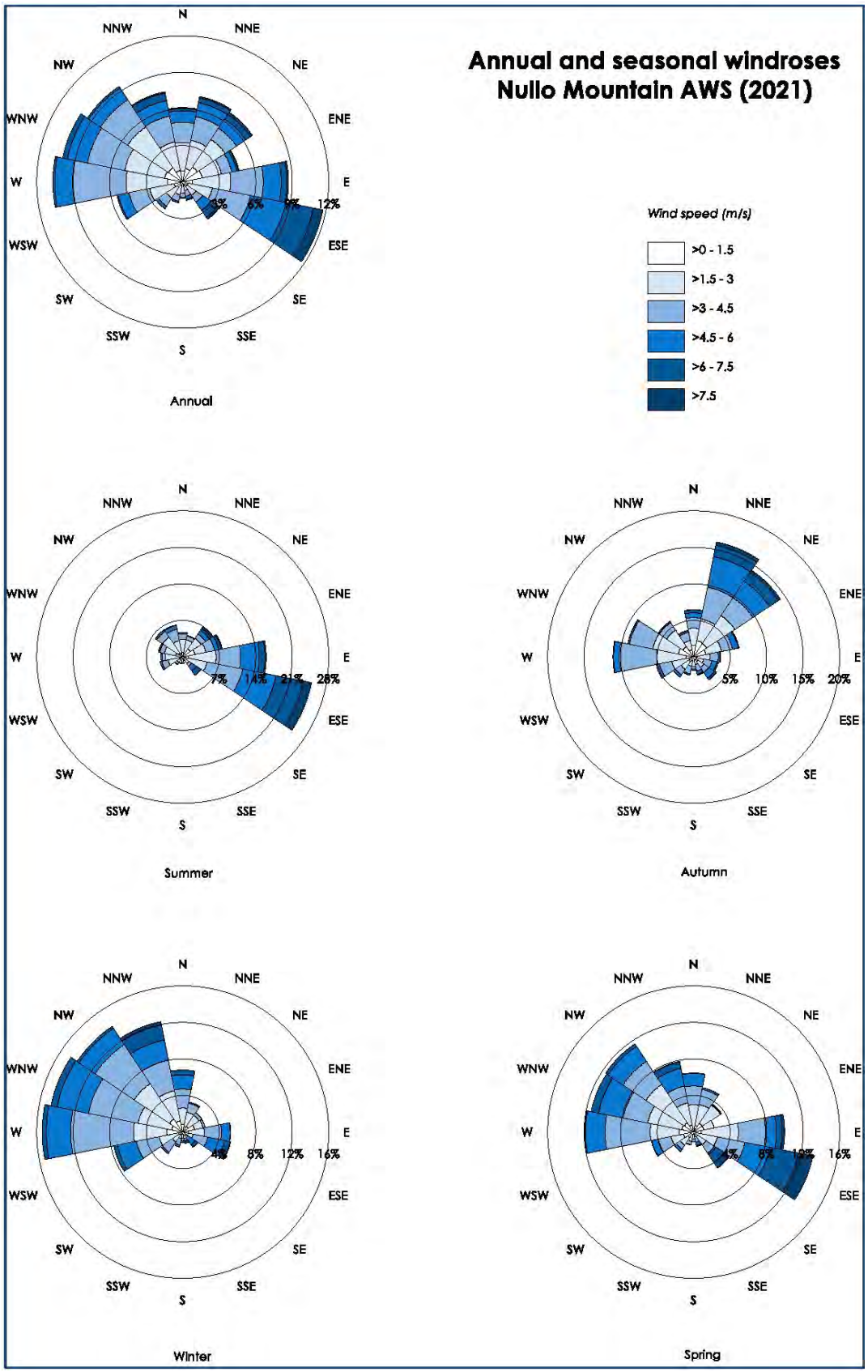

Figure 17: Annual and Seasonal Windroses – Nullo Mountain AWS (2021)

Ambient Air Quality

DPE Monitoring Data

The main sources of air pollutants in the area surrounding the Project include emissions from local anthropogenic activities (such as motor vehicle exhaust and domestic wood heaters), agricultural activities, and industrial activities.

This section reviews the available ambient air quality monitoring data sourced from the nearest NSW Department of Planning and Environment ambient air quality monitoring station at Bathurst which is located approximately 50 km southwest of the Project.

The available PM_{10} monitoring data have been reviewed and are summarised in **Table 18**.

A review of the data indicates that the annual average PM_{10} concentrations at Bathurst were below the relevant criterion of 25µg/m³ for the period reviewed, except for 2019.

The maximum 24-hour average PM_{10} concentrations recorded exceed the relevant criterion of 50µg/m³ at times during the review period. It is noted that there was a significant increase in the frequency of 24-hour average PM_{10} exceedances in 2019 and 2020, predominately due to smoke associated with the 2019/2020 bushfires.

Table 18: Summary of PM_{10} Levels – Bathurst

YEAR	ANNUAL AVERAGE (µG/M³)	MAXIMUM 24 HOUR AVERAGE (µG/M³)	NUMBER OF DAYS ABOVE CRITERION (50 µG/M³)
Criterion	**25**	**50**	**-**
2017	14.1	49.9	0
2018	18.8	**274.1**	8
2019	**27.4**	**296.6**	40
2020	17.0	**320.4**	14
2021	11.3	29.2	0

Source: NSW DPE 2022

The available $PM_{2.5}$ monitoring data from the NSW DPE Bathurst air quality monitoring station have been reviewed and are summarised in **Table 19**. The data indicates that the annual average $PM_{2.5}$ concentrations at Bathurst were below the relevant criterion of 8µg/m³ during the period reviewed, except for 2019.

Table 19: Summary of $PM_{2.5}$ Levels – Bathurst

YEAR	ANNUAL AVERAGE (µG/M³)	MAXIMUM 24 HOUR AVERAGE (µG/M³)	NUMBER OF DAYS ABOVE CRITERION (25 µG/M³)
Criterion	**8**	**25**	**-**
2017	6.1	17.5	0
2018	7.0	**40.5**	2
2019	**11.3**	**199.5**	24
2020	7.6	**207.3**	13
2021	5.1	13.8	0

Source: NSW DPE 2022

The maximum 24-hour average $PM_{2.5}$ concentrations recorded exceed the relevant criterion of 25µg/m³ at times during the review period. Similar to the PM_{10} monitoring data, there was a significant increase in the frequency of 24-hour average $PM_{2.5}$ exceedances in 2019 and 2020, predominately due to smoke associated with the 2019/2020 bushfires.

Background Air Quality Levels

The air quality monitoring data from the NSW DPE Bathurst monitoring station have been used to represent background concentrations at the Project site.

The annual average background PM_{10} and $PM_{2.5}$ levels of 15.3µg/m³ and 6.5µg/m³ respectively were estimated from the average of the recorded annual levels for the 2017 to 2021 period excluding 2019 (which was significantly impacted by bushfires).

An assessment of cumulative 24-hour average $PM_{2.5}$ and PM_{10} impacts using daily varying background levels was undertaken in accordance with the methods outlined in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2022). In correlation with the meteorological data set used, the 2021 calendar year was used for the 24-hour average contemporaneous assessment.

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

A summary of the background concentrations applied to the assessment are outlined in **Table 20**.

Table 20: Summary of Background Pollutant Concentrations

POLLUTANT	AVERAGE PERIOD	UNITS	CONCENTRATION
TSP	Annual	µg/m^3	55.1
PM_{10}	Annual	µg/m^3	15.3
	24 Hour	µg/m^3	Daily varying
$PM_{2.5}$	Annual	µg/m^3	6.5
	24 Hour	µg/m^3	Daily varying
Deposited Dust	Annual	g/m^2/month	2.4

Source: NSW DPE 2022

8.2.3 Methodology

The follow section details the modelling approach applied to the air quality assessment. Modelling for this assessment was undertaken using CALPUFF which can deal with the effects of complex local terrain on the dispersion meteorology over the entire modelling domain in a three-dimensional, hourly varying time step.

CALPUFF is an air dispersion model approved by NSW EPA for use in air quality impact assessments. The model setup used is in general accordance with 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).

Modelling Methodology

Meteorological Modelling

The meteorological modelling methodology applied a 'hybrid' approach which includes a combination of prognostic model data from The Air Pollution Model (TAPM) with surface observations from surrounding weather stations for input in the CALMET model.

The centre of analysis for TAPM was 33^o 2 min south and 149^o 51.5 min east. The simulation involved an outer grid of 30 km, with three nested grids of 10 km, 3 km, and 1 km with 35 vertical grid levels. The CALMET domain was run on an outer domain with a 50 x 50 km area with a 1 km grid resolution and an inner domain with a 10 x 10 km area with a 0.1 km grid resolution.

The 2021 calendar year was selected as the meteorological year for the dispersion modelling based on analysis of long-term data trends in meteorological data recorded for the area. Accordingly, the available meteorological data for January 2021 to December 2021 from the Nullo Mountain, Bathurst Airport and Marrangaroo (Defence) BoM monitoring sites were included in the simulation.

Outputs of the CALMET modelling are provided are provided in the full **Air Quality Assessment** attached as **Appendix G**.

It is considered that the CALMET modelling reflects the expected wind distribution patterns of the area as determined based on the available measured data and the expected terrain effects on the prevailing winds.

Dispersion Modelling

Air dispersion modelling of the key air emission sources was conducted to predict potential air quality impacts from the Project. Fugitive dust emissions associated with activity of the Project were represented by a series of volume sources and were included in the CALPUFF model via an hourly varying emission file. Meteorological conditions associated with dust generation (such as wind speed) and levels of dust generating activity were considered in calculating the hourly varying emission rate for each source.

Emissions Estimation

For the modelled scenarios, dust emission estimates have been calculated by analysing the various types of dust generating activities taking place and utilising suitable emission factors sourced from both locally developed and US EPA developed documentation.

Activities associated with operation of the Project have the potential to generate dust emissions from various activities including - extraction activities, loading/unloading of material, vehicles travelling on-site, and windblown dust generated from exposed areas.

Stage 3 / 4 is considered to be the worst-case operating stage with regard to potential air quality impacts due to the proximity of the extraction area to the nearest residences and largest potential exposed area.

Two scenarios have been modelled for Stage 3:

- annual scenario which considers the maximum annual material extraction rate of 200,000 tpa, and
- peak scenario which considers the maximum daily material extraction rate of 1,500 tpd (which equates to an annual rate of 547,500 tpa).

The estimated fugitive dust emissions for activities associated with the Project are presented in **Table 21**.

Table 21: Estimated Annual TSP Emission Rate for Fugitive Emissions

ACTIVITY	TSP EMISSIONS	
	ANNUAL SCENARIO (KG/YEAR)	PEAK SCENARIO (KG/YEAR)
Bulldozer to strip topsoil/subsoil	10,497	13,287
Loading topsoil/subsoil to haul truck	195	247
Hauling topsoil/subsoil to stockpile (unpaved)	1,132	1,433
Unloading topsoil/subsoil to stockpile	195	247
Bulldozer to strip burden	10,572	13,382
Loading burden to haul truck	196	249
Hauling burden to bund area (unpaved)	760	962
Unloading burden at stockpile	196	249
FEL shaping stockpiles	391	495
Bulldozer for breaking up materials	18,745	23,726
Loading material to mobile screen	348	953
Screening	2,500	6,844
Unloading materials from screen	348	953
Loading materials to truck	348	953
Truck haulage of materials offsite (unpaved)	15,996	43,788
Wind erosion (exposed areas)	8,798	8,798
Wind erosion (Stage 1 area – partial rehabilitation)	850	850
Diesel exhaust emissions	646	945
Total Emissions	**72,714**	**118,360**

8.2.4 Impact Assessment - Dust

Dust Modelling Predictions

The dispersion model predictions for each of the annual and peak 24-hour scenarios are presented below. The results presented include those for the operation in isolation (incremental impact) and cumulative impacts with background levels.

The results show the predicted:

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

It is important to note that when assessing impacts per the maximum 24-hour average levels, the predictions are based on the highest predicted 24-hour average concentrations modelled at each grid (or discrete receptor) point in the modelling domain. At each point, this is the worst day (i.e., a 24-hour period) in the annual modelling period. The predictions thus do not represent just one particular day, but a combination of all the worst-case days at every point. Thus, the extent of the predicted impacts is a large overestimation of what would occur on any single day.

The results below in **Table 22** indicate the Project would be below the relevant incremental criteria at all the assessed existing receptor locations for both the annual and peak daily scenarios. Therefore, it is determined that the operation of the Project would not lead to any unacceptable level of environmental harm or impact in the surrounding area.

Table 22: Incremental Particulate Dispersion Modelling Results for Sensitive Receptors

Receptor ID	$PM_{2.5}$ (µG/M³)		PM_{10} (µG/M³)		TSP (µG/M³)	DD (G/M²/MONTH)
	24 hour Average	Annual Average	24 hour Average	Annual Average	Annual Average	Annual Average
	NSW EPA Air Quality Impact Criteria					
	25	-	50	-	-	2
R1a	8.3	0.6	22.8	1.8	5.2	0.1
R1b	1.4	0.1	4.4	0.4	1.1	0.0
R3a	1.3	0.0	3.9	0.2	0.4	00
R3b	1.8	0.0	5.8	0.1	0.4	0.0
R4	1.5	0.0	5.3	0.2	0.4	0.0
R13	2.9	0.1	8.6	0.2	0.4	0.0

The cumulative (total) impact is the impact associated with the operation of the Project and the ambient background levels. The predicted cumulative annual average $PM_{2.5}$, PM_{10}, TSP and dust deposition levels due to the Project are shown in **Table 23**.

The results in **Table 23** below indicate that the predicted levels would be below the relevant annual average criteria for each of the assessed dust metrics at the assessed receptor locations.

Table 23: Cumulative Annual Average Particulate Dispersion Modelling Results for Sensitive Receptors

Receptor ID	$PM_{2.5}$ (µG/M³)	PM_{10} (µG/M³)	TSP (µG/M³)	DD (G/M²/MONTH)
	NSW EPA Air Quality Impact Criteria			
	8	25	90	4
R1a	7.1	17.1	60.3	2.5
R1b	6.6	15.7	56.2	2.4
R3a	6.5	15.5	55.5	2.4
R3b	6.5	15.4	55.5	2.4
R4	6.5	15.5	55.5	2.4
R13	6.6	15.5	55.5	2.4

Assessment of Cumulative 24 hour Average $PM_{2.5}$ and PM_{10} Concentrations

An assessment of cumulative 24-hour average $PM_{2.5}$ and PM_{10} impacts was undertaken in accordance with the methods outlined in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2022).

The NSW EPA applies a Level 2 contemporaneous assessment approach where the measured background levels are added to the day's corresponding predicted dust level from the Project. Ambient $PM_{2.5}$ and PM_{10} concentration data corresponding with the year of modelling (2021 calendar year) from the NSW DPE monitoring sites at Bathurst has been applied in this case to represent the prevailing background levels in the vicinity of the Project and representative sensitive receptor locations.

The analysis has focused on the R1a privately-owned receptor location which represent the closest and most likely impacted receptor locations surrounding the Project.

Table 24 provides a summary of the findings from the Level 2 assessment at the most impacted representative receptor location. The results indicate that the Project will not increase the number of days above the 24-hour average criterion at the most impacted receptor, and thus meets the EPA cumulative impact assessment criteria at all receptors, at all times.

Table 24: NSW EPA Contemporaneous Assessment – Maximum Number of Additional Days above 24 Hour Average Criterion

Receptor ID	$PM_{2.5}$	PM_{10}
R1a	0	0

Time series plots of the predicted cumulative 24-hour average $PM_{2.5}$ and PM_{10} concentrations for R1a are presented in **Figure 18**.

The results indicate that the predicted $PM_{2.5}$ and PM_{10} levels would not result in any additional days of exceedance of the cumulative 24-hour average $PM_{2.5}$ and PM_{10} criteria due to the operation of the Project.

The assessment of 24-hour average $PM_{2.5}$ and PM_{10} levels is conservative as it considers that the maximum daily extraction rate of 1,500 tpd occurs for every day of the year whereas the typical Project extraction rates would be more like 500 tpd (i.e., three times lower than modelled).

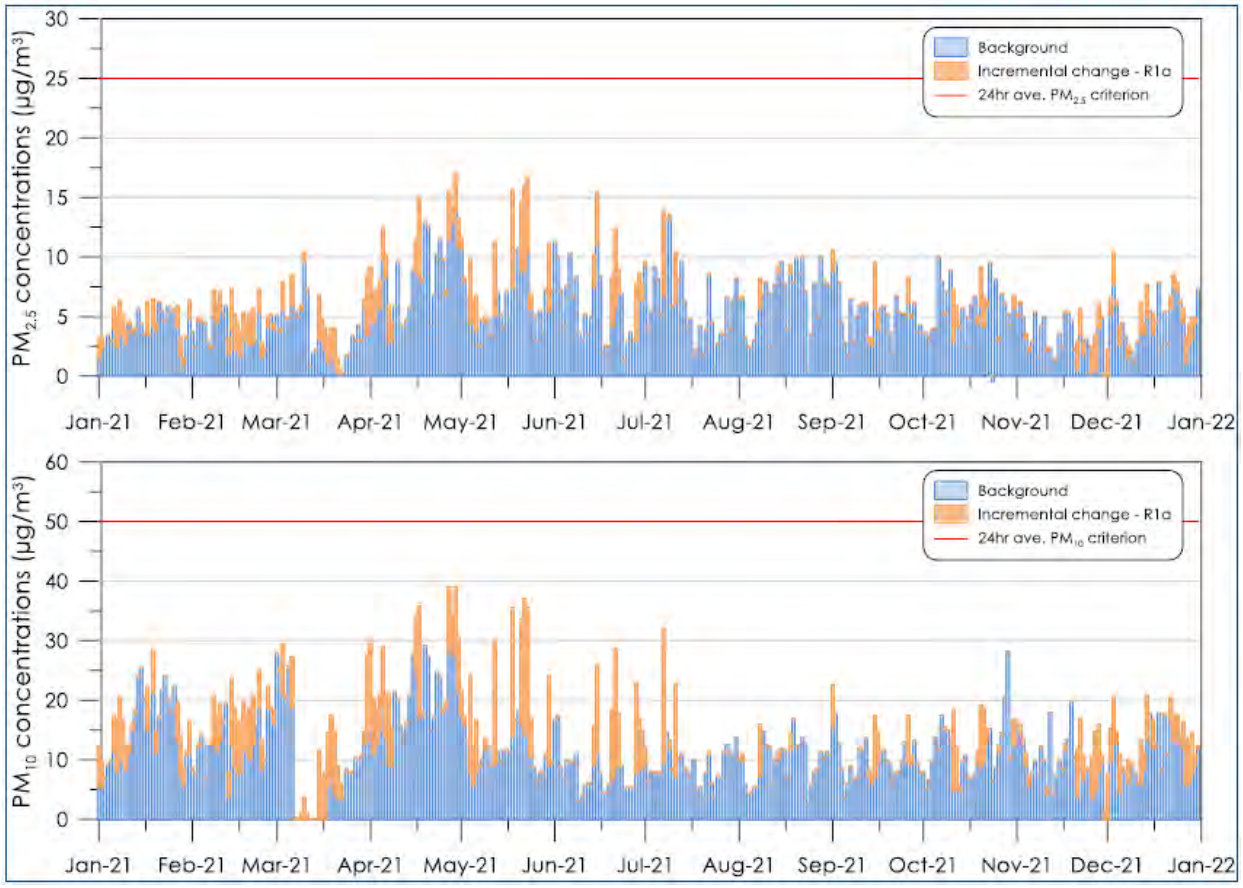

Figure 18: Time Series Plots of predicted Cumulative 24 Hour Average $PM_{2.5}$ and PM_{10} Concentrations for R1a

Assessment of Impacts per VLAMP Criteria

Summary of Modelling Predictions

The results in **Table 22** and **Table 23** indicate the highest maximum predicted level at the assessed privately-owned receptors would be below the applicable VLAMP mitigation and acquisition criteria.

Dust Impacts on More than 25% of Privately Owned Land

As required by the VLAMP, the potential impacts due to the Project, extending over more than 25% of any privately-owned land, have been evaluated using the predicted pollutant dispersion contours.

The results at the criteria level concentrations show the maximum 24-hour average PM_{10} predictions would have the most spatial extent, relative to any of the other assessed dust metrics and hence 24-hour average PM_{10} represents the most impacting parameter.

As shown in **Figure 19**, the extent of the predicted maximum 24-hour average PM_{10} level of 50µg/m³ would not extend over more than 25% of any privately-owned land parcels, and it can be concluded that the Project would not exceed this criterion.

Figure 19: Predicted Maximum 24 Hour Average PM_{10} Concentrations Due to Emissions from the Project (µg/m³)

8.2.5 Impact Assessment – Greenhouse Gas

The National Greenhouse Accounts (NGA) Factors published by the Department of Climate Change, Energy, the Environment and Water defines three scopes (Scope 1, 2 and 3) for different emission categories based on whether the emissions generated are from "direct" or "indirect" sources.

Scope 1 emissions encompass the direct sources from the Project defined as:

> "...from sources within the boundary of an organisation and as a result of that organisation's activities" (Department of Climate Change, Energy, the Environment and Water, 2022).

Scope 2 and 3 emissions occur due to the indirect sources from the Project as:

> "...emissions generated in the wider economy as a consequence of an organisation's activities, but which are physically produced by the activities of another organisation" (Department of Climate Change, Energy, the Environment and Water, 2022).

Scope 3 emissions are often not directly controlled by the operation. These emissions are understood to be considered in the Scope 1 emissions from other various organisations related to the Project.

Emission Sources

Scope 1 GHG emission sources identified from the operation of the Project are based the on-site combustion of diesel fuel. It is noted that site power would come from an onsite diesel generator rather than electricity from the grid and that the weighbridge would likely be solar powered.

Scope 3 emissions have been identified as resulting from the purchase of diesel and the transport of product material to customers.

Estimated quantities of materials that have the potential to emit GHG emissions associated with Scope 1 and 2 emissions for the Project have been summarised in **Table 25** below. These estimates are based on the proposed annual use of diesel for the Project as provided by the Proponent.

Table 25: Summary of Annual Quantities of Materials Estimated for the Project

TYPE	QUANTITY	UNITS
Diesel	240	kilolitres

Scope 3 emissions associated with the transport of the product materials from the Project site have been estimated based on an average distance for proposed customers along with the assumed maximum annual production of the Project (200,000tpa). The average fuel consumption of 53.1L/100km for articulated trucks is applied (ABS, 2022) with an estimated return travel distance of 149km. **Table 26** summarises the estimated diesel fuel required to transport the product material.

Table 26: Estimated Diesel Fuel Required to Transport Product Material

DISTANCE (KM)	AMOUNT OF PRODUCT TRANSPORT (TPA)	PAYLOAD (Tonnes)	ESTIMATED TRAVEL DISTANCE (KM)	KILOLITRES
149	200,000	32	930,000	494

Emission Factors

To quantify the amount of carbon dioxide equivalent ($CO_{2\text{-}e}$) material generated from the Project, emission factors obtained from the NGA 2022 Factors (Department of Climate Change, Energy, the Environment and Water, 2022) are summarised in **Table 27** below.

Table 27: Summary of Emission Factors

TYPE	ENERGY CONTENT FACTOR (GJ/KL)	EMISSION FACTOR (kg $CO_{2\text{-}e}$/GJ)				SCOPE
		CO_2	CH_4	N_20	TOTAL	
Diesel	38.6	69.9	0.1	0.2	70.2	1
					17.3	3
Transport of product (Heavy duty vehicles – diesel – Euro IV)	38.6	69.9	0.1	0.2	70.2	3

Summary of Greenhouse Gas Emissions

Table 28 below provides a summary of the estimated annual $CO_{2\text{-}e}$ emissions from the Project.

Table 28: Summary of $CO_{2\text{-}e}$ Emissions for the Project (t $CO_{2\text{-}e}$)

TYPE	SCOPE 1	SCOPE 2	SCOPE 3
Diesel	650.3	-	160.3
Transport of Product	-	-	1,341.4
Total	**650.3**	**0.0**	**1,501.6**

Contribution of Greenhouse Gas Emissions

Table 29 below provides a summary of the emissions associated with the Project based on Scopes 1, 2 & 3.

Table 29: Summary of $CO_{2\text{-}e}$ Emissions per Scope (t $CO_{2\text{-}e}$)

PERIOD	SCOPE 1	SCOPE 2	SCOPE 3
Annual	650.3	0.0	1,501.6

The estimated annual greenhouse emissions for Australia for the year to March 2022 was 487.1 Mt of carbon dioxide equivalent (Mt $CO_{2\text{-}e}$) (Department of Climate Change, Energy, the Environment and Water, 2022). In comparison, the estimated annual average greenhouse emission for the Project is 0.002 Mt $CO_{2\text{-}e}$ (Scope 1 and 3). Therefore, the annual contribution of greenhouse emissions from the Project in comparison to the Australian greenhouse emissions for the year to March 2022 period is estimated to be approximately 0.0004%.

At a state level, the estimated greenhouse emissions for NSW in the 2020 period was 132.4 Mt $CO_{2\text{-}e}$ (Department of Climate Change, Energy, the Environment and Water, 2022). The annual contribution of greenhouse emissions from the Project in comparison to the NSW greenhouse emissions for the 2019 period is estimated to be approximately 0.002%.

8.2.6 Mitigation and Conclusions

The assessment has modelled the potential worst-case air quality impacts associated with the proposed development.

Air dispersion modelling using the CALPUFF model was used, with generally conservative assumptions to predict the potential for off-site air quality impacts in the surrounding area due to the Project.

It is predicted that the operation of the Project would comply with the assessment criteria for all assessed air pollutants and therefore would not lead to any unacceptable level of environmental harm or impact in the surrounding area.

The estimated annual average greenhouse gas emission is calculated to be approximately 0.0004% of the Australian greenhouse gas emissions for the year to March 2022 period and approximately 0.002% of the NSW greenhouse gas emissions for the 2020 period.

The assessment demonstrates that the operation of the Project would not cause any unacceptable air quality impacts to the surrounding environment.

The following mitigation measures are proposed to minimise the generation and impact of air pollutants from the site.

Dust

The following mitigation measures are proposed to manage dust related impacts:

- Develop a trigger action response plan (TARP) to manage dust,
- Modify activities during adverse meteorological conditions,
- Modify activities during periods of high visible dust,
- Conduct visual inspections of dust generation,
- All equipment will be maintained and operated in a proper and efficient manner,
- Regular watering unpaved roads using water cart,
- Enforce site speed limit of 20km/hr,
- Shut down engines when vehicles are idle over prolonged periods,
- Loads leaving the site are watered and covered,
- Shaker grid used to minimise dirt track out as vehicle exit the site,
- The section of Razorback Road fronting the site and leading to Castlereagh Highway will be sealed,
- Minimise drop heights,
- Water spray used where required on loading/unloading activities,
- Shaping of stockpiles/emplacements where practical to avoid strong wind flows and smooth gradients to reduce turbulence at surface,
- Restrict ground disturbance as much as practical,
- Rehabilitation of disturbed surfaces by revegetation as soon as practical, and
- Watering of exposed areas as required.

Greenhouse Gas

The following mitigation measures are proposed to minimise greenhouse gas impacts from the Project:

- Investigating ways to reduce energy consumption throughout the life of the project and reviewing energy efficient alternatives,
- Regular maintenance of equipment and plant,
- Ensure plant and equipment are switched off when not in use,
- Monitoring the consumption of fuel and regularly maintaining diesel powered equipment to ensure operational efficiency, and

- Source consumable materials from environmentally sustainable sources.

8.3 Noise and Vibration

8.3.1 Introduction

A **Noise and Vibration Impact Assessment** (NVIA) has been undertaken for the proposed development by Spectrum Acoustics Pty Ltd. The purpose of this assessment was to determine potential noise and vibration impacts at the nearest residential receivers surrounding the site. The assessment also considered construction, operational and transport noise impacts associated with the development. The assessment has been prepared in accordance with the *NSW Noise Policy for Industry (NPfI)*, *NSW Interim Construction Noise Guideline (ICNG)*, *NSW Road Noise Policy (RNP)*, and *NSW Assessing Vibration: a Technical Guideline*. The assessment has also been prepared to satisfy the SEARs and agency comments. The **Noise and Vibration Impact Assessment** is attached as **Appendix H**.

8.3.2 Existing Environment

Receivers

Privately-owned residential properties surrounding the Site are shown in **Figure 20** below. Additional residences located at greater distances from the proposed extraction area are also included in the noise modelling domain. Construction and operational calculations are conducted for receivers R1a, R1b, R3a, R3b and R13 and traffic noise impacts are considered at R4.

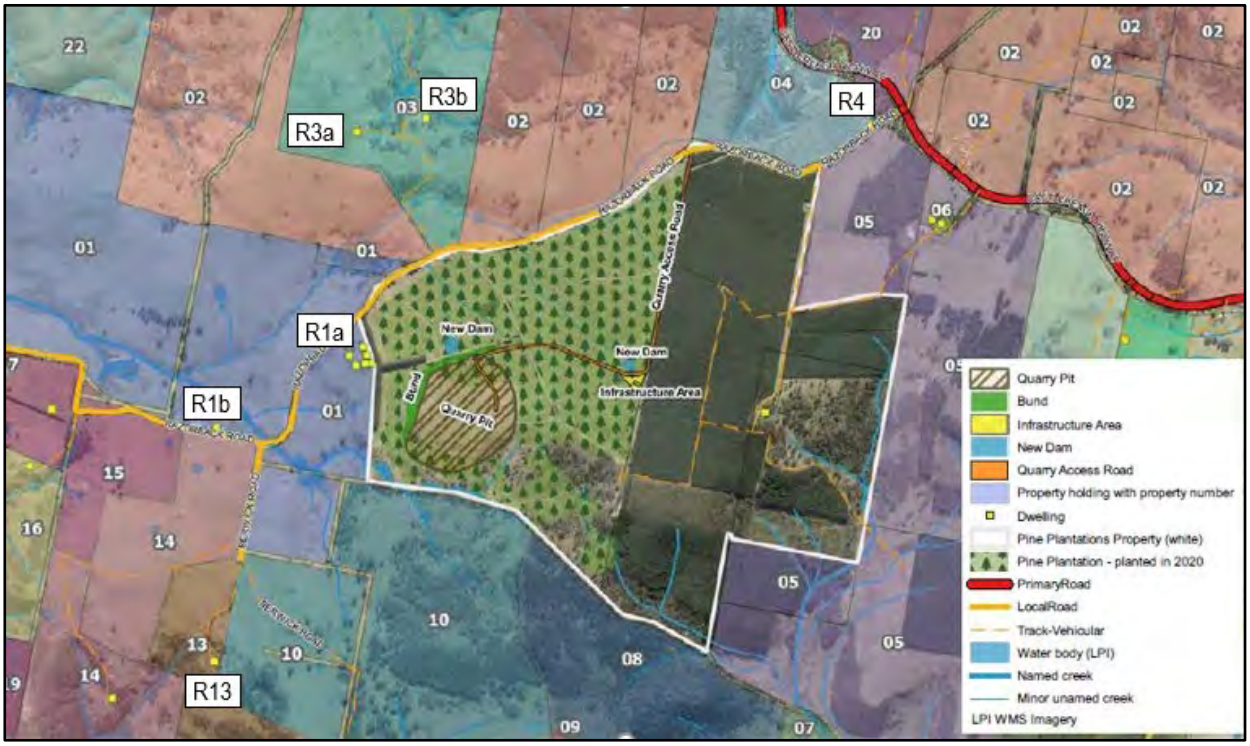

Figure 20: Assessed Residential Receivers

Meteorology

Data from the nearby Nullo Mountain Bureau of Meteorology station has been utilised for this assessment. Long-term 9 am and 3 pm wind roses suggest winds up to 3 m/s occur for 12-14% of the time from the west to northwest and 10% of the time from the east. The data suggests that winds up to 3 m/s do not occur for more than 30% of the time. Since there are no proposed noise-generating activities during night-time hours, inversions have not been considered.

Noise modelling has been conducted under meteorologically neutral daytime conditions of 70% relative humidity, 20°C temperature with no wind or vertical temperature gradient.

Acoustic Environment

The proposed extraction area and residential receivers are several kilometres west of the Castlereagh Highway. There are no industrial sources near the site, which is considered rural in nature. To present a conservative assessment, no background noise monitoring has been conducted. Rather, the NPfI default minimum ratings background levels (RBL) of 35 dB(A),L90 (day) and 30 dB(A),L90 (night) have been adopted.

Noise Trigger Levels

Project-generated noise within the Site is required to be assessed against the provisions of the NPfI. In relation to the residences surrounding the Site, 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 (L_{A90}) 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 near the Site and the residences that are potentially affected by noise emissions from the Project is best described acoustically as an area dominated by environmental noise with some road traffic noise.

Time periods for assessment as defined in the NPfI are:

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

Based on the default minimum daytime background noise level of 35 dB(A),L90 the adopted noise trigger level for all receivers is 40 dB(A),Leq(15min).

Maximum Noise Levels

There are no proposed activities outside daytime hours so assessments of maximum noise levels for potential "sleep disturbance" has not been undertaken.

Construction Noise

Noise criteria for the initial period of constructing access roads and site preparation earthworks in the surface infrastructure area are derived for the EPA's Interim Construction Noise Guideline (ICNG, 2009). Construction works should be confined to the EPA's "standard recommended hours" of 7am – 6pm Monday-Friday and 8am-1pm on Saturday. Construction works outside these hours would usually require approval from the consent authority and must comply with the operational noise triggers stated above.

The applicable construction noise management level is equal to the RBL + 10 dB. Adopting the EPA default minimum daytime RBL of 35 dB(A),L90 gives a construction noise management level of 45 dB(A),Leq(15min). Exceedances of this level at non-project related residential receivers usually triggers the requirement for consideration of reasonable and feasible noise management or control measures.

Traffic Noise

In NSW, noise from vehicle movements associated with an industrial source is assessed in terms of the NPfI if the vehicles are not on a public road. If the vehicles are on a public road, the RNP applies. Noise from the Project must, therefore, be assessed against the project noise trigger levels of the NPfI and the criteria in the RNP.

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

For the assessment of traffic noise, the RNP defines the daytime period as 7:00 am to 10:00 pm, whilst the night period is from 10:00 pm to 7:00 am. On this basis, the RNP recommends noise criteria of Leq (1-hour) 55 during the day period and Leq (1-hour) 50 during the night period.

Blasting and Vibration

There is no proposed blasting or any identifiable significant source of vibration and further consideration of blasting and vibration has not been considered.

8.3.3 Methodology

Modelled Scenarios

One construction and two operational noise scenarios representing the worst case potential for noise impacts at the surrounding residential receivers have been assessed. There is no processing proposed on site, apart from in-pit material

screening. Should further processing and or washing be required this would be undertaken offsite by the customer or other approved facility. The scenarios and noise source locations are indicated in **Figures 21**, **22** and **23**. Noise modelling using the Environmental Noise Model (ENM v3.06) was undertaken for the atmospheric conditions described above in **Section 8.3.2**.

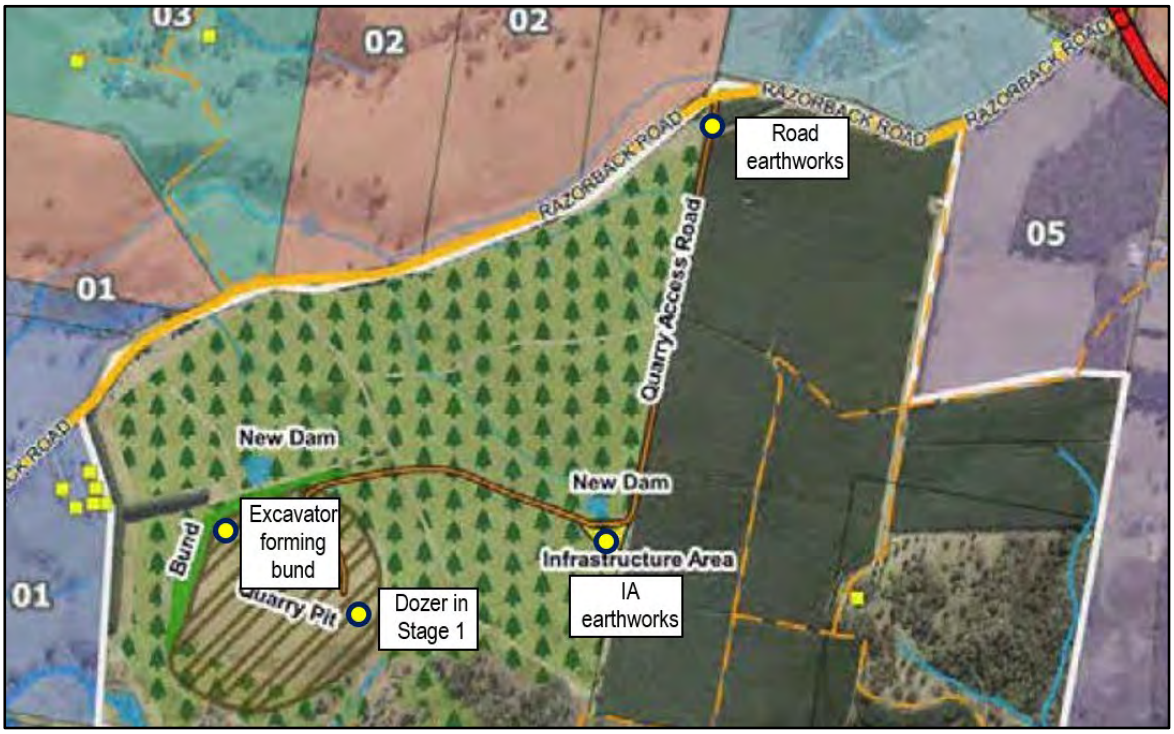

Figure 21: Scenario 1 – Construction

Figure 22: Scenario 2 – Stage 1 Operations

Figure 23: Scenario 3 – Stage 3 Operations

Noise Sources

The sound power levels of the significant noise-generating equipment used in the modelling of each scenario are listed below in **Table 30**.

Table 30: Noise Source Sound Power Levels

EQUIPMENT	NUMBER	USE / ACTIVITY	Lw, dB(A)
	200,000TPA		Leq
Hydraulic Excavator 33t	1	Resource extraction and haul truck loading	104
Tracked dozer (CAT D9)	1	Material handling in extraction area	108
Screen	1	Screening to remove organics	98
Road truck	3*	Hauling product off-site to market	91
Water cart	1	Dust management	90#
Front end loader	1	Loading trucks	98

* Worst-case number on-site at any given time

\# Transient rather than continuous use

Traffic Noise

The potentially most impacted residential receiver at R4 would receive noise impacts of a discrete nature rather than of a constant nature. There are many methods available for calculating the cumulative noise impact arising from discrete signals of various shapes. The methodology employed in this Section was sourced from the US Environmental Protection Agency document No. 550/9-74-004 *Information on Levels of Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974*.

The document refers to *triangular* and *trapezoidal* time signals. A triangular time signal rises from the background level to a peak noise level and then immediately begins to subside. A triangular time signal is a good approximation of the Sound Pressure Level (SPL) signal of a truck as it passes an observation point. A trapezoidal time signal rises from the background level to a maximum level and sustains that level for a period before subsiding. The trapezoidal time signal is a good approximation of the SPL signal of a train as it passes an observation point. Both time signals are depicted below in **Figure 24**.

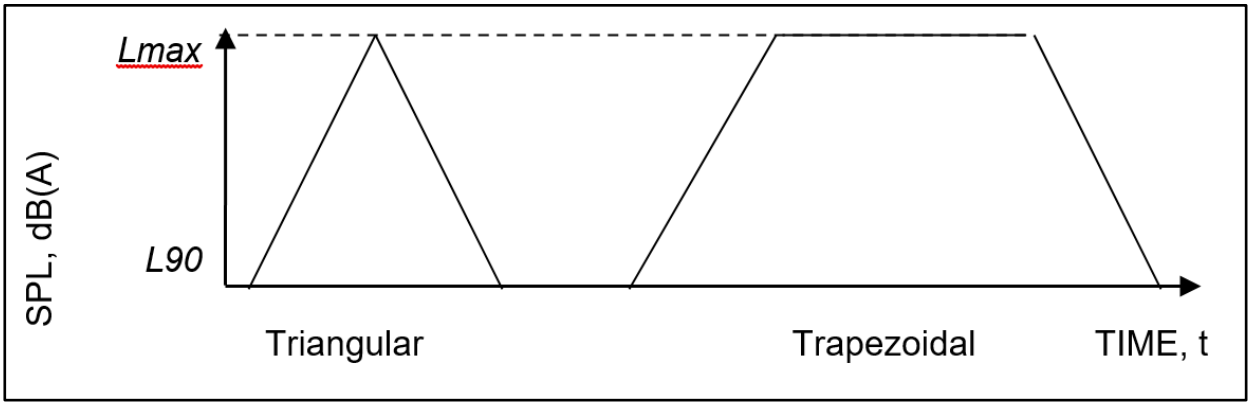

Figure 24: Triangular and Trapezoidal Noise Signals

The value of Leq,$_T$ for a series of identical triangular time patterns having a maximum level of Lmax is given by Equation 1 below.

$$L_{eq},T = L_b + 10\log\left[1 + \frac{ND}{T}\left(\frac{10^{(L\max - Lb)/10} - 1}{2.3} - \frac{\left(L_{\max} - L_b\right)}{10}\right)\right]$$

Where,

- L_b is background noise level, dB(A)
- L_{MAX} is vehicle noise, dB(A)
- T is the time for each group of vehicles (min)
- N is number of vehicle trips
- D is duration of noise of each vehicle (min)

For calculation purposes, Lmax is the maximum vehicle noise at the assessment point(s) and has been based on numerous measurements of quarry truck pass-by noise taken by Spectrum Acoustics at receivers near other quarries in recent years. The background noise level is the level that existed prior to the introduction of the new noise, the LA90 level. The assessment period T corresponds to the stated criterion period, that is, 60 minutes.

Receiver R4 is estimated from Google Earth to be 15 m from the centre of Razorback Road.

8.3.4 Impact Assessment

Predicted Operational Noise Levels

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 nominated above in **Section 8.3.2** and **Figure 20**.

Predicted noise levels for the three modelled scenarios are summarised in **Tables 31**, **32**, and **33**. Any exceedances of the noise trigger level, if they occur, are highlighted in bold type. Noise contours are shown in **Figures 25**, **26**, and **27**.

Table 31: Predicted Noise Levels, dB(A),Leq(15min) - Construction

RECEIVER	NOISE TRIGGER LEVEL	PREDICTED NOISE LEVELS, dB(A),Leq(15min)
R1a	45	41
R1b	45	28
R3a	45	<20
R3b	45	<20
R13	45	<20

Table 32: Predicted Noise Levels, dB(A),Leq(15min) – Operations Stage 1

RECEIVER	NOISE TRIGGER LEVEL	PREDICTED NOISE LEVELS, dB(A),Leq(15min)
R1a	40	25
R1b	40	<20
R3a	40	<20
R3b	40	<20
R13	40	<20

Table 33: Predicted Noise Levels, dB(A),Leq(15min) – Operations Stage 2

RECEIVER	NOISE TRIGGER LEVEL	PREDICTED NOISE LEVELS, dB(A),Leq(15min)
R1a	40	30
R1b	40	22
R3a	40	<20
R3b	40	<20
R13	40	<20

The results in **Tables 31**, **32**, and **33** show predicted levels below the adopted default minimum construction and operations noise trigger levels.

VLAMP Assessment

The DPE's *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extraction Industry Development* (VLAMP) lists five (5) different levels of noise impact and recommended actions. These impact levels and actions are shown in **Table 34**.

Table 34: VLAMP Noise Categories and Recommended Actions

NOISE CATEGORY	PROJECT NOISE LEVELS	RECOMMENDED ACTION
1. Negligible	0-2 dB(A) above PNTL	Not a discernible noise impact – no action required
2. Marginal	3-5 dB(A) above PNTL and project contributes less than 1 dB at residence	Mechanical ventilation and air conditioning
3. Moderate	3-5 dB(A) above PNTL and project contributes more than 1 dB at residence	Mechanical ventilation, air conditioning and facade upgrade
4. Significant	More than 5 dB(A) above PNTL at residence	Mechanical ventilation, air conditioning and facade upgrade, property acquisition
5. Significant	More than 5 dB(A) above amenity limit over 25% of land area	Property acquisition

The noise impact assessment has found that none of the assessed receivers (residences) would be impacted by operational noise under any noise category.

Figure 25: Noise Contours Scenario 1 - Construction

Figure 26: Noise Contours Scenario 2 – Stage 1

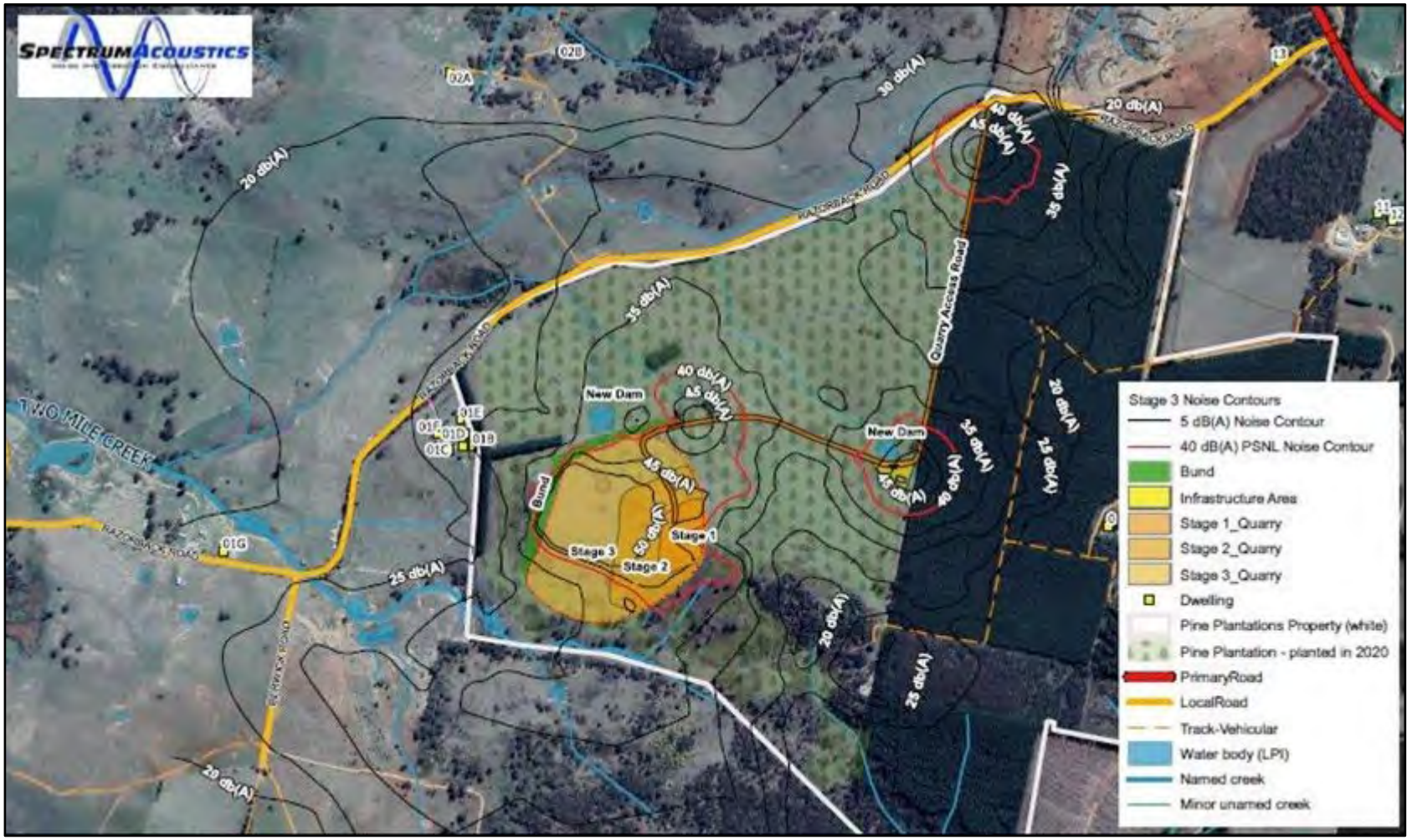

Figure 27: Noise Contours Scenario 3 – Stage 3

Off-Site Road Traffic

Traffic Types and Levels

It is anticipated that the bulk of the products would be despatched from the Site using semi-trailers (27.5 t to 32 t capacity) or rigid trucks (12.5 t to 18 t capacity).

Traffic levels would vary substantially daily throughout the life of the Project. For the purposes of this assessment, a maximum of 5 trucks (10 movement movements per hour) was considered in the assessment of potential noise impacts.

Product Transport Routes

All laden trucks accessing the quarry would travel on Razorback Road from the quarry to the intersection with the Castlereagh Highway.

Traffic Noise Impact Assessment

Based on the maximum annual product despatch rate of 200 000tpa, the Project would generate 5 laden trucks per hour maximum, (or 10 movements), half arriving as empty trucks, and the remaining half departing as full trucks. Potentially the most impacted receiver is R4 at 15 m north of the centre of Razorback Road. Point calculation modelling resulted in a road traffic noise level of 48.9 dB(A),Leq(1hour) based on a nominal speed of 40km/h. This is slightly below the criterion of 50 dB(A),Leq(1hour).

It is recommended that roadside signage should be erected approximately 100 m each side of R4 to advise drivers not to use engine brakes or exceed 40 km/h when passing the residence.

8.3.5 Mitigation and Conclusions

A noise and vibration impact assessment has been conducted for the proposed construction and operation of a quarry producing sand and decorative rock products at a Site in the locality of Running Stream approximately halfway between Lithgow and Mudgee, NSW, off the Castlereagh Highway.

The assessment has found no exceedances of default minimum construction and operational noise trigger levels at any sensitive receiver.

Noise emissions from the extraction and processing area are not predicted to exceed the noise emission criteria and no specific noise mitigation or management measures are required. At maximum production rate, traffic noise levels should be minimised at the receiver adjacent to Razorback Road identified as R4 by limiting the speed of trucks to 40 km/h as they pass the residence and minimising the use of engine brakes.

The low levels of predicted operational noise suggest that routine noise compliance monitoring would not be necessary for this project.

The full **Noise and Vibration Impact Assessment** is provided as **Appendix H**.

8.4 Biodiversity

8.4.1 Introduction

MJD Environmental Pty Ltd has prepared a **Biodiversity Assessment** (BA), including a Test of Significance 5 (Part Test), for the proposed development. The purpose of the assessment was to examine the likelihood of the proposed development having a significant effect on any threatened species, populations or ecological communities listed under the *NSW Biodiversity Conservation Act 2016* (BC Act). The assessment also recognises the relevant requirements of the EP&A Act, as amended. Preliminary assessment was also undertaken having regard to those threatened entities listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The assessment has also been prepared to satisfy the SEARs and agency comments. The **Biodiversity Assessment** is attached as **Appendix I**.

8.4.2 Existing Environment

The subject site is situated to the south of Razorback Road, Running Stream. Large residential properties exist to the west and an existing pine plantation to the immediate east. The site comprises highly disturbed grassland due to the mass plantings of Pine trees (Pinus spp.). No native tree species have regenerated within the plantation area. The Project Area contains native vegetation within the southern gully and the adjacent foothills, however, this area is not to be impacted upon under this proposal. The site lies predominantly on the top of an undulating hill at an elevation of 1050 m. There are two drainage lines within the subject site that flow to the north however, these only operate during periods of heavy rainfall. The property is within the RU1 Primary Production land zoning and has a total area of 151.27 ha, with the Project Area covering approximately 24.27 ha.

8.4.3 Assessment Pathway

The current biodiversity assessment pathway for proposed development activities requires determining the extent of native vegetation clearing with consideration of the minimum lot size as outlined in the LEP for the local government area LGA and whether the proposal will have a significant impact on threatened species and/or threatened ecological communities.

To determine the biodiversity assessment pathway required for the development activity, the Biodiversity Offset Scheme (BOS) threshold is used to determine whether the Biodiversity Assessment Method (BAM) is used to assess the impacts of the proposal and calculate required biodiversity credits to ensure no net loss of biodiversity occurs in the locality.

The *Biodiversity Conservation Regulation 2017* outlines when clearing of native vegetation for a development exceeds the threshold, it will trigger entry into the Biodiversity Offset Scheme and the use of the BAM method.

Thresholds for triggering entry into the BOS entry include:

- Whether the amount of native vegetation being cleared exceeds a threshold area set out in Clause 7.2 (4) of the *Biodiversity Conservation Regulation 2017*, and/or
- Whether the impacts occur on an area mapped on the Biodiversity Values Map (BVM) published by the minister for the Environment.

Under the Mid-Western Regional LEP the subject site has a minimum lot size of 100 ha. As such, the native vegetation clearing threshold for the proposed development is 1 ha (Clause 7.2 (4) of the Biodiversity Conservation Regulation 2017).

In the cases where the extent of native vegetation clearing does not exceed the BOS clearing threshold and the subject site is not mapped on the BVM a Test of Significance (ToS) is required to be undertaken in accordance with Section 7.3 of the BC Act.

In addition, consideration must be afforded to the *Local Land Services Act 2013* (LLS Act) where clearing of native vegetation on Category 1 – Exempt Land (within the meaning of Part 5A of the LLS Act) will occur. Under Section 7.4(2) of the BC Act, the clearing of vegetation within Category 1 - Exempt Land is to be disregarded for the purposes of determining whether a proposed development exceeds the clearing threshold and triggers the BOS.

Prior to the commencement of field surveys, a desktop study was conducted, viewing the historical aerial photos over the land. Historical photography shows the subject site was cleared of native vegetation prior to 1990 containing only pasture areas and some scattered trees. The development area subject to impact under this proposal is likely to satisfy the criteria of "Low-Conservation Grassland" due to the minimal native grasses found within the area. Under such conditions and being deemed as low conservation indicates that this area can be classified under the LLS Act as Category 1 – Exempt Land. This, coupled with the existing approval over most of the land (including the area of the proposed quarry and ancillary components) as a Pine Plantation (refer Appendix 6 of Biodiversity Assessment) exempts this area from the *Biodiversity Conservation Act 2016* and therefore does not generate biodiversity offset credits nor is it taken into consideration with the total native vegetation clearing threshold.

The site which is subject to the proposed development is not mapped as an area of high biodiversity value on the NSW Environment, Energy and Science (EES) BVM. It should be noted that the creek line to the south of the subject site is mapped on the BVM, however, this creek is not to be impacted upon under the proposed development.

Accordingly, a Test of Significance (5-Part Test), undertaken in accordance with Section 7.3 of the BC is the is the applicable assessment pathway for the proposed development.

8.4.4 Methodology

Desktop Assessment

A review of ecological information was undertaken to provide context and understanding of ecological values occurring on the subject site.

Online database searches involving a 10-km buffer around the subject site were undertaken from the:

- NSW BioNet Atlas (accessed 19th October 2021), and
- EPBC Act Protected Matters Search (accessed 19th October 2021).

Field Survey

Field surveys were undertaken on 13 - 14 July 2021. The following sections provide methodology details for survey types.

Vegetation and Significant Flora Survey

The following methods were used to inform the vegetation survey:

- Broad vegetation identification, delineation and stratification into vegetation zones carried out by detailed random meander methods (Cropper 1993),

- Collection of plot/transect based full floristic data as per Section 5 of the BAM, recording the following:
  - Identification of all flora species to genus where identification attributes were present,
  - Composition, Structure attributes within 20x20 m plot, and
  - Function attributes within the 20X50 m plot.
- Collection of subject site landscape attributes that included, landform, aspect, soil type, detailed descriptions of the vegetation condition, current land use and the current impacts.

Two BAM floristic 20x 50 m plot/transect were established within the subject site. Due to a lack of habitat coupled with routine herbicide use/treatment for management of the pine plantation, no formal significant threatened flora survey or targeted searches were undertaken. The subject site was traversed by one MJD Environmental ecologist (13th July 2021) for the purposes of producing a description of native vegetation present and to assess the potential for threatened flora species to occur within the subject site. Vegetation was assessed for the suitability of habitat for cryptic species outside their detectible periods, while comprehensive searches of the site verified presence/absence of more conspicuous species.

Fauna Survey

A desktop assessment of the potential use of the subject site by threatened fauna species (as listed under the BC Act and EPBC Act) identified from the vicinity was undertaken prior to the commencement of field surveys.

Fauna habitat values were assessed during flora surveys. Native vegetation was recorded including one threatened ecological community (in a disturbed condition) with some residing significant terrestrial habitat features including hollow bearing trees and wombat burrows.

Refer to **Figure 28** showing the location of all surveys undertaken. A list of flora species detected during surveys is provided as Appendix 2 of the Biodiversity Assessment (refer **Appendix I** for the **Biodiversity Assessment**).

Opportunistic sightings of secondary indications (scratches, scats, diggings, tracks etc.) of resident fauna were noted.

Habitat Survey

An assessment of the relative habitat value present within the subject site was undertaken. This assessment focused primarily on the identification of specific habitat types and resources in the subject site favoured by known threatened species from the locality. The habitat assessment included:

- presence, size, and types of tree hollows,
- presence of rocks, logs, caves, rocky outcrops, leaf litter, overhangs, and crevices,
- vegetation complexity, structure, and quality,
- presence of freshwater or estuarine aquatic habitats, noting permanency,
- connectivity to adjacent areas of habitat,
- extent and types of disturbance,
- presence of foraging opportunities such as flowering eucalypts, fruits, seeds, or other nectar bearing native plants, and
- presence and abundance of various potential prey species.

Habitat assessment was based on the specific habitat requirements of each threatened fauna species with regard to home range, feeding, roosting, breeding, movement patterns and corridor requirements. Consideration was given to contributing factors including topography, soil, light and hydrology for threatened flora and assemblage

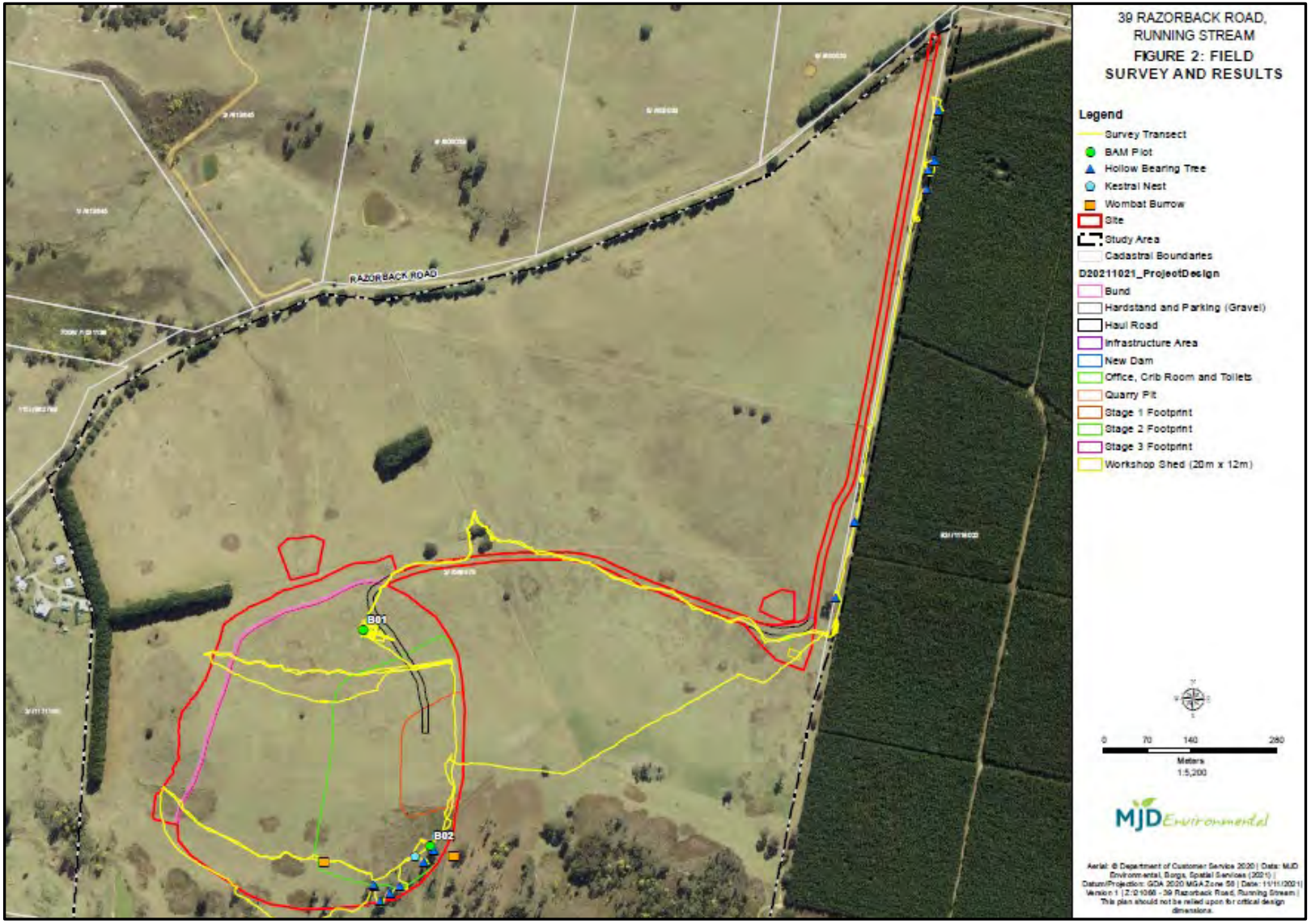

Figure 28: Field Surveys

8.4.5 Results

Desktop Assessment

Using the NSW BioNet Atlas (accessed 19th October 2021), and EPBC Act Protected Matters Search (accessed 19th October 2021), a list of potentially occurring threatened species, populations, and ecological communities from the locality of the subject site (10 km radius) has been compiled (refer Table 2 of Biodiversity Assessment – **Appendix I**). A total of 107 entities were generated, of which 21 threatened flora species, 48 fauna species, 7 ecological community, 13 migratory species and 18 marine species have either been detected or have the potential to occur within the locality.

Flora Survey

Vegetation Mapping and Delineation

The majority of the vegetation observed within the subject site exists in a high disturbed state due to the mass plantation of Pine trees for plantation purposes throughout the Project Area.

Small patches of vegetated areas do exist within the southern extent towards the creek, this area has been identified as remnant PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, Southeastern Highlands Bioregion. The extent of PCT 1191 has been classified as being in 'Low' condition due to the high disturbance within the area, with predominantly all the understorey vegetation consisting of weeds with scattered natives. PCT 1191 contains large mature trees with multiple hollows, with the species assemblage of the remnant overstorey forming the basis for the justification of the assigned PCT. The extent of remnant PCT 1191 is not located within the extent of the approved, managed pine plantation and, as such, has been assessed as 'native vegetation' under the Biodiversity Assessment.

The extant vegetation within the subject site has been described as:

- Pine Plantation / Disturbed Grassland – 24 ha – not a TEC
- PCT 1191 – Snow Gum – Candle Bark woodland on broad valley flats of the tablelands and slopes, Southeastern Highlands Bioregion (Low) – 0.25 ha – not a TEC

Refer to **Figure 29** for vegetation mapping.

Fauna Survey

Avifauna

Species common to open, disturbed landscapes constituted the majority of observations during field surveys. Species observed include Noisy Miner (Manorina melanocephala), Australian Magpie (Cracticus tibicen), Australian Raven (Corvus coronoides), and Galah (Eolophus roseicapillus).

Herpetofauna

No species of herpetofauna were observed during field surveys.

Habitat Survey

Arboreal and Terrestrial Habitat

The fauna habitat within the subject site is sparse, largely limited to the stand of remnant overstorey trees to the southeast of the proposed development footprint. Conversely, the majority of the proposed development footprint has been disturbed through management of the pine plantation and thus does not contain any remnant overstorey trees. Seven (7) hollow-bearing trees were observed within the stand of PCT 1191 to the south of the subject site. Although there was an absence in hollow logs, some denning habitat were detected within the subject site in the form of wombat burrows. Native grass tussocks may also provide marginal habitat for native reptiles such as skinks. Birds foraging for insects on the open grass and grazing mammals are the only species likely to utilise this habitat on a frequent basis. Groundcover vegetation could potentially provide foraging habitat for grazing animals and cover for construction of burrows or nests amongst the dense grass.

Connectivity

The subject site constitutes of disturbed grasslands with heavy ground disturbance from the mass plantings of Pinus spp. and does not contain consistent grass cover to create a safe corridor for many animals. A highly fragmented and disturbed corridor lies within the gully to the immediate south of the subject site. This area is to be retained and will not be impacted upon under the proposed development. In summary, it is highly unlikely that any native corridors will be further fragmented nor impacted upon under this proposal.

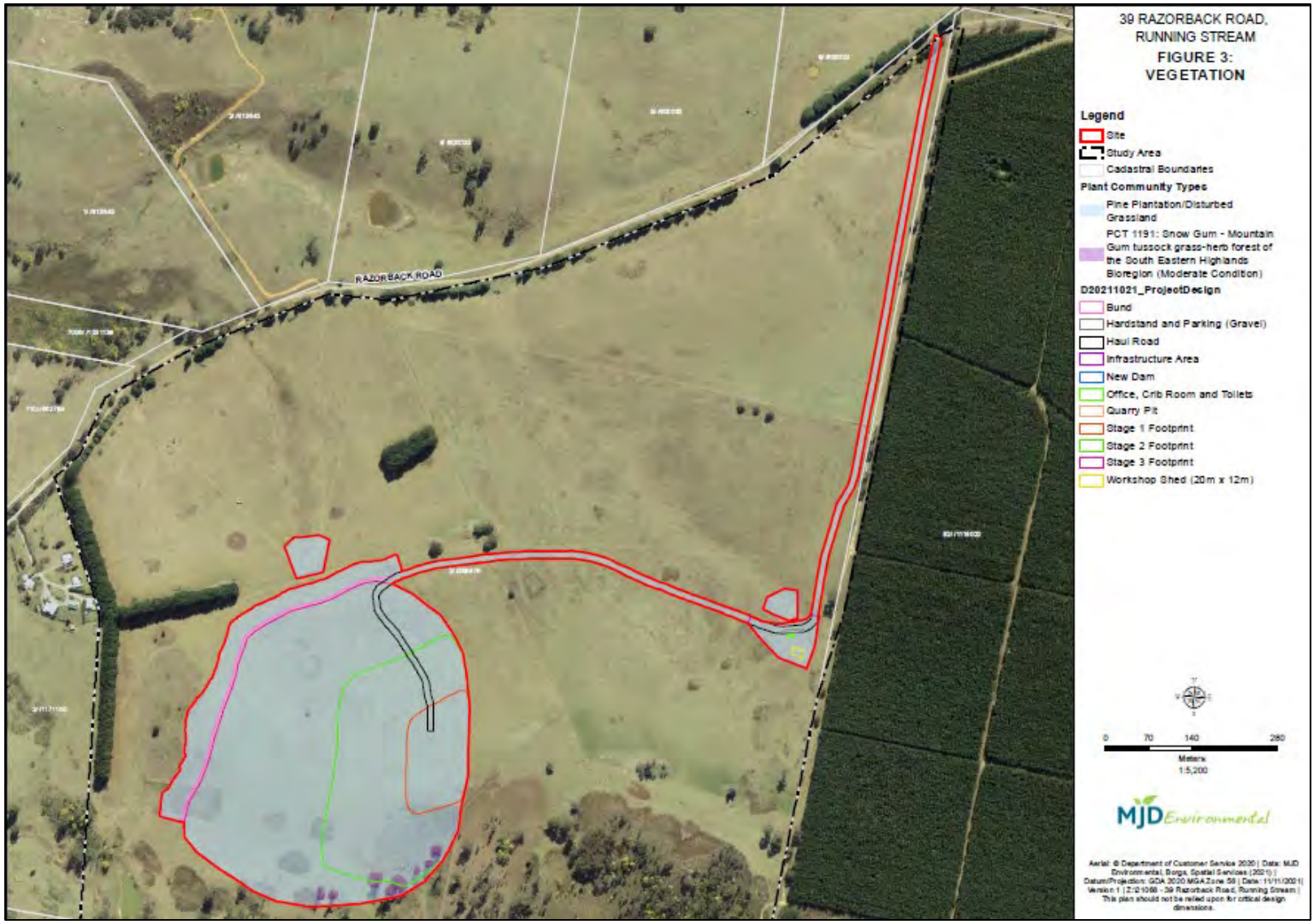

Figure 29: Vegetation Mapping

8.4.6 Impact Assessment

Based on the ecological survey results for the subject site, the following direct and indirect impacts have been generated to inform the impact assessment.

Direct Impacts

The ecological field assessment found that the proposal will remove up to:

- 24 ha of Pine Plantation/Disturbed Grassland, and
- 0.25 ha of PCT 1191: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, Southeastern Highlands Bioregion (Low Condition).

Flora

No threatened flora was detected during field surveys.

Fauna

Up to 7 hollow bearing trees were recorded within the subject site and may be removed for the proposed development. The proposal will also remove multiple wombat burrows observed within the subject site during the field survey.

Indirect Impacts

The proposal may result in the following indirect impacts associated with the construction and operation of the quarry:

- Introduction and dispersal of exotic flora species from machinery, and
- Potential for increased sediment flows in the event insufficient erosion and sediment controls are installed throughout the duration of construction phase of the development.

The following species were assessed under the 5 Part Test of Significance (BC Act) based on the likelihood of occurrence results contained in Table 4 of the Biodiversity Assessment (refer **Appendix I**).

Flora

Caladenia attenuata – Duramana Fingers

Prasophyllum petilum – Tarengo Leek Orchid

Swainsonia recta – Small Purple-pea

Fauna

Birds

Stagonopleura guttata – Diamond Firetail

Hollow-dwelling Bats

Falsistrellus tasmaniensis – Eastern False Pipistrelle

Miniopterus orianae oceanensis – Large Bent-winged Bat

Saccolaimus flaviventris – Yellow-bellied Sheathtail-bat

Herpetofauna

Litoria booroolongensis – Booroolong Frog

Results of the 5-part Test(s) for the above species determined that the proposal is unlikely to have a significant impact on threatened species or ecological communities such that a local extinction would occur.

Key Threatening Processes

A Key Threatening Process (KTP) is defined in the BC Act as a process that "adversely affects threatened species or ecological communities, or it could cause species or ecological communities that are not threatened to become threatened." KTPs are listed under Schedule 4 of the BC Act and may adversely affect threatened species, populations or ecological communities or could cause species, populations or ecological communities that are not threatened to become threatened. Nine (9) KTP's have the potential to operate within the subject site and are summarised as follows:

Anthropogenic climate change - Modification of the environment by humans is considered to contribute to Climate Change and as a result is considered a KTP. The proposal seeks to disturb up to 24 ha of low quality (disturbed) vegetation primarily

consisting of Pine Trees and 0.25 ha of low condition native woodland. The proposal is likely to make a negligible contribution to anthropogenic climate change due to the loss of vegetation (carbon storage), coupled with increased human activities.

Competition and grazing by the feral European Rabbit (Oryctolagus cuniculus) - Signs of this KTP were detected during surveys, with suitable foraging habitat occurs throughout the subject site. It is considered that this KTP is likely to continue to operate in the locality, however the proposal is unlikely to generate additional significant foraging areas for this species and is more likely to reduce foraging areas due to the development.

Invasion of native plant communities by exotic perennial grasses - This KTP is currently operating within the subject site in a moderate abundance within the subject site and surrounding area. The removal of the vegetation in which this KTP is present, may reduce its effects. Conversely the development and associated landscaping may also provide further opportunity for this KTP to establish. However, the development is overall unlikely to cause this KTP to occur within the subject site beyond current levels.

Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae - The exotic rust pathogen of the order Pucciniales spores can be dispersed by wind, water-splash, on plant material (including seed), on people and their clothing and on equipment and has been known to infect plants of the family Myrtaceae. There was no evidence observed of Exotic Rust Fungus impact within the subject site during the survey period. There is potential for that contamination of the subject site with the pathogen to occur from vehicle / machinery movements during construction and operation of the proposed development. Due to this risk of contamination, it is considered the proposal has potential to contribute to this KTP.

Loss and/or degradation of sites used for hill-topping by butterflies – No butterfly species were observed during field surveys within the study area, however the subject site is primarily located along the top and eastern face of an undulating hill. It is unlikely this proposal will cause significant impacts to the mating habitat of butterflies due to the low quantity and quality of tussock grasses within the subject site.

Infection of native plants by Phytophthora cinnamomic – The soil born pathogen Phytophthora cinnamomi spreads in plant roots and has been known to infect a number of native plants. There was no evidence of P. cinnamomi impact observed within the subject site during the survey period. Given the proposal will increase vehicle/machinery movements within the subject site during construction and operations, it is possible that contamination of the subject site with the pathogen may occur. Due to this risk of contamination, it is considered that the proposal has potential to contribute to this KTP, although only within an isolated, highly disturbed landscape.

Predation by the European Red Fox Vulpes (Linnaeus, 1758) – No signs of this KTP were detected during surveys, however suitable foraging habitat occurs throughout the subject site. While it is considered that while this KTP is likely to operate within the subject site, the proposal is unlikely to contribute to an increase in abundance and activity of the European Red Fox.

Clearing of native vegetation - The NSW Scientific Committee final determination for listing 'clearing of native vegetation' as a KTP lists nine factors that have the potential to impact species distribution or result in extinction. The proposal seeks to disturb up to 24 ha of low quality (disturbed) vegetation primarily consisting of Pine Trees and 0.25 ha of low condition native woodland. This loss of vegetation will represent a small loss of habitat for potential threatened species in the area. However, the habitat lost as a result of the proposal is very unlikely to be of significance for the continued survival of threatened species in the locality.

The proposal will not affect habitat connectivity in any significant way, as the subject site is part of a large, disturbed grass field that has been approved to form part of an operational, managed pine plantation.

The subject site lies within a disturbed grassland and does not intersect any defined creek lines. As such, it is unlikely the proposal will have an impact on riparian areas.

The subject site exists as a disturbed grassland in poor condition, the ground is predominantly bear with little vegetation cover. It is unlikely the proposal will further affect dry land salinity.

The proposal will have a minor impact on increasing greenhouse gas emissions and a minor loss of ground cover vegetation due to vegetation removal associated with construction of site infrastructure and staging of the proposed quarry.

The proposal may have a minor impact on ecological function and soil biota. However, it should be noted that the subject site's ecological function and soil biota has been previously impacted via historical disturbance and land clearing works in the area.

On this basis, it is not considered the KTP will be increased in the locality such that a species / vegetation community decline and / or extinction will occur due from the proposed extent of vegetation clearing.

Loss of Hollow-bearing Trees - The proposal intersects seven (7) hollow bearing trees that have been recorded within the subject site. At the time of field surveys, some of the hollows were currently being utilised by Galahs and Long-Billed Corellas. All hollow-bearing trees are located within the extents of PCT 1191, with the remaining grasses devoid of overstorey trees and associated hollows.

Commonwealth EPBC Act

An EPBC Act Protected Matters Search (accessed 19-10-2021) was undertaken to generate a list of Matters of National Environmental Significance (MNES) located within 10 km of the subject site. An assessment of those MNES relevant to biodiversity has been undertaken in accordance with the EPBC Act Policy Statement 1.1 Significant Impact Guidelines Matters of National Environmental Significance (DoE, 2013). The search provided the following results:

Listed Threatened Species - A total of 49 threatened species listed under the EPBC Act have been recorded on the protected matters search.

Listed Threatened Communities - A total of 3 threatened ecological communities listed under the EPBC Act have been recorded on the protected matters search.

Listed Migratory Species - The protected matters search nominated 13 migratory species or species habitat that may occur with the 10 km subject site buffer search area. Although migratory species may intermittently be present on subject site, no habitat on the subject site is critical to the survival of a listed migratory species. Therefore, it is unlikely that the proposal over the subject site will impact migratory species.

Listed Marine Species - The protected matters search nominated 19 marine species or species habitat that may occur with the 10km subject site buffer search area. Although migratory species may intermittently be present on subject site, no habitat on the subject site is critical to the survival of a listed migratory species. Therefore, it is unlikely that the proposal over the subject site will impact migratory species.

Wetlands of International Significance (declared Ramsar wetlands) - The subject site is not part of nor within proximity to any Wetlands of International Importance. The closest wetland has been identified as the Macquarie Marsh that is located 200 – 300 km upstream from the subject site.

Commonwealth Marine Areas - The subject site is not part of or within proximity to any Commonwealth Marine Area.

World Heritage Properties - The subject site is not a World Heritage area and is not near any such area.

National Heritage Places - The subject site is not within a National Heritage area, however, it is located within proximity to the Greater Blue Mountains Area.

Great Barrier Reef Marine Parks - The subject site is not part of or within proximity to any Great Barrier Reef Marine Park.

Nuclear Actions - The proposal over the subject site is not and does not form part of a Nuclear action.

Water Resources in relation to Coal Mining and CSG - The proposal over the subject site is not and does not form part of a Coal Mining/CSG action.

In summary the proposed action is unlikely to have an impact to MNES assessed in this report and as such Commonwealth referral under the EPBC Act is not required.

SEPP (Koala Habitat Protection) 2021

The *State Environmental Planning Policy (Koala Habitat Protection) 2021* commenced on 17 March 2021 to replace and repeal the State Environmental Planning Policy (Koala Habitat protection) 2020. The principles of the Koala SEPP 2021 are to:

- Help reverse the decline of koala populations by ensuring koala habitat is properly considered during the development assessment process.
- Provide a process for councils to strategically manage koala habitat through the development of koala plans of management.

Due to the proposal lying within RU1 – Primary Production Land, the Koala SEPP 2021 does not apply. Furthermore, within the subject site, there are only nine (9) eucalyptus trees that are proposed to be removed with only 2 being classed as Koala Feed Trees listed under Schedule 2 of the Koala SEPP 2021 for the relevant koala management area. Each tree was inspected during field work with no secondary signs of Koala usage or visitations. No koala records occur within 2.5 km of the subject site within the last 18 years. Furthermore, no koala records occur within the surrounding area of up to 20 km.

8.4.7 Mitigation and Conclusions

The Biodiversity Assessment included an appraisal of the subject site to determine the appropriate assessment pathway under the BC Act, which determined that the proposal does not trigger the BOS entry threshold due to the existing approval of a Timber Plantation over the land under the *Plantations and Reafforestation Act 1999*.

A review of historical aerial photos over the land determined that the subject site was cleared of native vegetation prior to 1990, containing only pasture areas and some scattered trees. The proposed development footprint is likely to satisfy the criteria of “Low-Conservation Grassland” due to the minimal native grasses found within the area (as determined under vegetation plot surveys). The historical vegetation clearing and classification of grasslands as “Low Conservation Grasslands”

indicates that this area can be classified under Section 60H of the LLS Act as Category 1 – Exempt Land. Under Section 7.4(2) of the BC Act, the clearing of vegetation within Category 1 -Exempt Land is to be disregarded when assessing the total development footprint against the vegetation clearing threshold (Clause 7.2(4) of *Biodiversity Conservation Regulation 2017*). As such, a Test of Significance Assessment undertaken in accordance with Section 7.3 of the BC Act was determined to be applicable assessment pathway for the proposed development.

The ecological field assessment found that the proposal will remove up to:

- 24 ha of Pine Plantation/Disturbed Grassland, and
- 0.25 ha of PCT 1191: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, Southeastern Highlands Bioregion (Low Condition).

The Test of Significance considered whether the removal of vegetation on the Project site would constitute a significant impact on known threatened species, populations, and ecological communities from the locality such that a local extinction may occur (5 Part Test). The assessment concluded that a significant impact would not occur to those entities assessed.

The following mitigation measures are recommended to ensure best practice environmental management:

- All contractors will be specifically advised of the designated work area. The following activities are not to occur outside of designated work areas to minimise environmental impacts:
    - Storage and mixing of materials,
    - Liquid disposal,
    - Machinery repairs and/or refuelling,
    - Combustion of any material, and
    - Any filling or excavation including trenching, topsoil skimming and/or surface excavation.
- All construction vehicles/machinery are to use the designated access from main roads,
- Vehicle and machinery speeds will be limited to reduce the potential of fauna strike and to reduce dust generation,
- Plant and machinery will be cleaned of any foreign soil and seed prior to being transported to the subject site to prevent the potential spread of weeds and Phytophthora cinnamomi,
- If machinery is transported from an area of confirmed infection of Phytophthora cinnamomi to the subject site, stringent wash down must be completed before leaving the area, removing all soil and vegetative material from cabins, trays, and under carriages,
- All liquids (fuel, oil, cleaning agents, etc.) will be stored appropriately and disposed of at suitably licensed facilities. Spill management procedures will be implemented as required,
- Rubbish will be collected and removed from the subject site,
- During the creation of access tracks, erosion or sediment measures will be considered and installed as required,
- Ensure the extent of clearing is clearly marked in the field prior to the commencement of vegetation clearing, and
- Ensure that only the minimum vegetation clearing required is undertaken.

Further specific mitigation measures are provided in Section 6 of the **Biodiversity Assessment Report** attached as **Appendix I**.

8.5 Surface and Groundwater

8.5.1 Introduction

A **Surface and Groundwater Assessment** (SGWA) has been prepared by VGT. The purpose of this **SGWA** is to describe the proposed water management system for the Site and to clarify how potential water impacts generated by the development will be managed.

The principal objectives of the proposed water management system are:

- To minimise erosion and sedimentation from all active and rehabilitated areas, thereby minimising sediment ingress into surrounding surface waters,
- To ensure the segregation of ‘dirty’ water from ‘clean’ water and manage ‘dirty’ water appropriately such that any discharge from the Site meets the relevant water-quality limits, including limits contained in the relevant guidelines and any limits imposed by specific project approvals. ‘Dirty’ water is defined as surface runoff from disturbed catchments. ‘Clean’ water is defined as surface runoff from catchments that are undisturbed or rehabilitated catchments,

- To minimise the volume of water discharged from the Site but, should the discharge of water prove necessary, ensure sufficient settlement time is provided prior to discharge or employ other means such as flocculants to ensure the water meets the objectives identified in the point above,
- That appropriate licences and approvals are held or can be obtained under the Water Management Act 2000, or any relevant exemptions that apply under Schedule 4 of the Water Management (General) Regulation 2018,
- To ensure any water used in the processing of materials is contained within the closed system on the Site,
- To monitor the effectiveness of surface water and sediment controls and to ensure all relevant surface water quality criteria are met,
- To minimise the impact to any groundwater resources,
- To determine a water balance for the Site based on current and projected usage, and
- Develop a set of performance criteria and appropriate environmental management measures for the Site.

A copy of the full **SGWA** is provided in **Appendix J**.

8.5.2 Existing Environment

The following provides an overview of the existing environment in relation to hydrology across the site.

Land Use

The 327 hectare property is currently comprised of the following land uses:

- 68 % or 222 ha is planted out as pine plantation at various stages of progression, from recently planted tubestock to mature plantations through to areas that have been recently harvested and not yet re-planted,
- 19 % or 61 ha is other wooded or remnant vegetation, comprising both native and non-native species and includes the dwelling and yard area, and
- 13 % or 44 ha is comprised of access tracks and grassland areas through and surrounding the plantation area that are not planted as plantation. This includes a former pasture area around the area of the proposed quarry and the plantation firebreaks.

Geology and Soils

Geology

The site is situated west and on the foothills of the Blue Mountains Range west of Sydney, NSW. The contact between the Triassic and Permian aged suites is approximately 500 m west of the site.

The local geology is the lower most portion of the Narrabeen Group, of which is most likely to be part of the Caley Formation which is Claystone, Shale, and Quartz Lithic Sandstone (source Western Coalfield (Southern Part) 1:100,000 NSW Mines Department Geological Sheet. The surface exposures are sparse and small farm borrow pits show poorly consolidated conglomerates, with sandstone and clay matrix.

Soils

The soils on the Site are identified as Turonfels on the Environment NSW eSpade online data viewer. This soil landscape comprises undulating to rolling low hills with the dominant soils being red earths on mid to upper slopes, and yellow podzolic soils and yellow earths on lower slopes. Chocolate soils and skeletal sands and loams also occur on upper slopes.

Topsoils run to a depth of approximately 20cm are dull yellowish-brown loam, fine sandy with weak polyhedral peds; the pH is approximately 6.5. Subsoils show a sharp change to dull yellow orange fine sandy clay loam with weak structure; pH 6. They are moderately permeable, have a moderate to high erodibility and a moderate erosion hazard. Below the soil layers run sandstone, shale, conglomerate, and siltstones, which are much lighter in colour. The typical soil profile onsite is shown as **Plate 8**.

Plate 8: Typical Soil Profile Onsite

Topography

The Site is undulating to rolling low hills with elevations from 1,040 – 1,090 m. Slopes range from 6 – 20%, with slope lengths from 400 – 900 m. Drainage lines are few and variably spaced.

Climate

Climatic conditions at Running Stream are considered to be Cfb according to the Köppen-Geiger climate classification i.e., warm, and temperate with significant rainfall.

Rainfall data sourced from the Bureau of Meteorology (Lithgow- site 063224) records an average annual rainfall of 862 mm with higher rainfall experienced during the summer months. The mean annual average temperature is 18.5ºC and the mean annual minimum temperature is 6.4ºC. Morning winds are predominately westerly with a smaller component of north westerly and south westerly winds. Afternoon winds are similar in direction but stronger.

Hydrology

Regional Hydrology

The Site is located near the north-eastern watershed of the Macquarie River Catchment. Drainage lines on the site flow either into Two Mile Creek to the west of the Site or into Gibbons Creek to the southeast of the Site (refer Figure 3 of **SGWA**, **Appendix J**).

Two Mile Creek flows in the Crudine River and thence the Turon River some 20 kilometres to the west of the Site eventually meeting the Macquarie River. Gibbons Creek enters Running Stream and thence Round Swamp Creek and eventually the Turon River in the south.

Drainage and Watercourses

There are no defined drainage lines within the footprint of the proposed quarry due to the elevated ridgeline (refer Figure 4 of **SGWA**, **Appendix J**). Several drainage lines are located to the north of the quarry and flow into an unnamed creek to the north that joins Two Mile Creek. A drainage line in the south-west of the quarry flows south to directly join Two Mile Creek and

another in the south-east joins Gibbons Creek lying further to the east. The ridgeline setting for the proposed quarry ensures that clean surface water can be directed around the disturbed area of the quarry and the dirty water catchment is restricted to the quarry footprint.

There is one farm dam located on the Site in the south-west corner within the Two Mile Creek drainage line.

Flooding

The site is not identified as affected by flooding according to the NSW Government GIS planning services spatial data. It is located on an elevated setting and the risk of flooding is negligible.

Surface Water Quality

No testing has been undertaken of surface water to date.

Water Quantity

The Maximum Harvestable Right Dam Capacity has been calculated using the Water NSW online calculator tool and estimates that the MHRDC is 26.4 ML, for the property described as 39 Razorback Road, Running Stream (330 ha). The site contains one farm dam that has an estimated area of 800 m^2. If the depth is assumed to be approximately 2 m, the maximum volume of water that could be held by the farm dam is 1,600 m^3, or 1.6 ML. Estimated dam volumes are shown in **Table 35**.

Table 35: Estimated Sediment Dam Volumes

DAM ID	DAM AREA (M^2)	ESTIMATED DEPTH (M)	ESTIMATED VOLUME (M^3)	ESTIMATED VOLUME (ML)
Dam 1 (proposed)	2,185	2	4,370	4.37
Dam 2 (proposed)	3,733	2	7,470	7.47
Existing Dam	800	2	1,600	1.6
Total Volume			13,440	13.44

Therefore, the site could potentially retain up to 24.8 ML before requiring a Water Access Licence (WAL).

Groundwater

The nearest groundwater bore is located some 4 km north of the site and does not provide any quality data on the Water NSW online data page (https://realtimedata.waternsw.com.au/water.stm). It is not located within the same watershed and is therefore not comparable to the Site.

A piezo was established in BH7, located centrally within the proposed quarry, where groundwater was encountered at approximately 1049 m RL. This is some 6 metres below the proposed base of the quarry.

Due to the site being situated on the source of the local watershed, and the maximum depth of the proposed quarry (1,055 m RL), it is unlikely that groundwater will be intercepted.

8.5.3 Proposed Water Management

All surface water captured within the disturbed area of the quarry will the diverted to an In-Pit Sump. Clean water diversion bunds will be constructed around the perimeter of the pit to prevent clean water from entering the disturbed area. Level spreaders will be installed at appropriate intervals to divert concentrated clean water flows down slope to sheet flows along the contours of the hill to the east of the proposed pit (see Figures 5-8 of the **SGWA**, **Appendix J**). Due to the proposed quarry's elevated location, the dirty water catchment is restricted to the footprint of the quarry.

The proposed haul road will be maintained with gravel material to reduce sediment entrainment and provide an all-weather surface. Upslope clean water flows, encountering the haul road to the west of the site office, will be directed via drains to culverts under the road and thence energy dissipators to ensure there are no concentrated flows downslope. Clean water flows to the east of the office and hardstand will generally be diverted via a culvert to a clean water dam (Dam 1) to be constructed to the north of the office and weighbridge area. This dam will also receive surface water from the office and weighbridge area. Clean surface water captured upslope of the north-eastern portion of the haul road meeting Razor Back Road will be directed via culverts under the road downslope. 'Whoa Boys' will be installed at appropriate intervals in the steeper sections of the haul road to reduce slope lengths and divert surface water off the road and reduce the potential for rilling.

Surface water collected within the in-pit sump will be treated, if required and pumped to a final polishing sediment dam to be constructed in the north of the pit (Dam 2) (refer to Figure 5 of the **SGWA**, **Appendix J**). From this dam water can be trickle released downstream and renter the unnamed water course to the north via a natural gully.

The volume of the sediment dams required to catch the design storm event within the fully developed disturbed area as recommended by the *Managing Urban Stormwater Soils and Construction –Volume 2E Mines and Quarries* guideline is shown in **Table 36** below.

Table 36: Required Sediment Dam Volumes

DAM ID	CATCHMENT AREA (ha)	SEDIMENT BASIN STORAGE (SOIL) VOLUME (M^3)	SEDIMENT BASIN STORAGE (WATER) VOLUME (M^3)	DAM VOLUME REQUIRED FOR 90TH PERCENTILE, 5 DAY RAINFALL EVENT FOR A 5 DAY MANAGEMENT PERIOD (M^3)
In Pit Sump (Stage 1)	1.7	284	342	626
In Pit Sump (Stage 2)	7.57	1,263	1,521	2,784
In Pit Sump (at full development)	18.8	3,136	3,778	6,914
Dam 2 (polishing dam)	1.0	17	201	208
Dam 1 (clean water)	33.5	-	6,732	6,732

The In-Pit Sump is unlikely to overtop as the quarry void will be many orders of magnitude larger than the required volume for the design storm at all stages of the development.

Dam 2 is likely to be approximately 2,500 m^3 in volume and will be more than sufficient to contain the design storm event. It should be noted that transfer of water from the in-Pit Sump is via pumping only. The Dam 1 is not required to contain the design storm and will be used to source water for dust suppression and irrigation of rehabilitation. Excess water captured within Dam 1 will flow via a spillway back into natural drainage lines and back to the downstream environment.

Table 37: Estimated Maximum Dam Capacities

DAM ID	MAXIMUM CAPACITY (M^3)	MAXIMUM CAPCITY (ML)	CONTRIBUTION TO MHRDC
In Pit Sump (at full pit development)	7,000	7	Nil
Dam 1	5,000	5.0	5.0
Dam 2	2,500	2.5	2.5
Existing Farm Dam	3,400	3.4	3.4
Total of Water Potentially Held	**17,900**	**17.9**	**10.9**
MHRDC Limit			**26.4**

All dams will be constructed in accordance with Blue Book principles and Standard Drawings included in **SGWA** attached as **Appendix J**. Any new dams will require a Works Approval and Use Approval from Water NSW (below or above harvestable rights).

Water Use

The water usage on the site will be restricted to dust suppression activities and irrigation of rehabilitation. During extraction activities the Site is anticipated to use approximately 75 m^3 of water per day. This equates to five 15,000 L water cart loads and will be sourced from the In-Pit Sump or the Dam 1. Campaigns are expected to be undertaken up to 4 times per annum for a duration of approximately 4 weeks. Thus, the total usage of water for dust suppression is estimated to be 1,500 m^3 per campaign, or 6,000 m^3 per annum.

No other on-site uses for the water are planned at this stage. Potable water for the site office will be supplied by water tanks.

Sources and Security of Water Supply

Dam 1 will have an estimated maximum capacity of 5,000 m^3 and is sufficient to supply the dust suppression requirements per campaign, with time to replenish between. The in-pit sumps and Dam 2 may also be utilised as a source for dust suppression. If required due to dry conditions, potable water may be sourced for dust suppression purposes.

Discharge

The main pollutant in the surface water is entrained sediment from exposed surfaces.

Treatment of Water to be Discharged

The following outlines the procedure for preparing water for discharge from the In-Pit Sump:

- The water in the In-Pit Sump should be sampled and submitted for testing at a NATA approved laboratory,
- If the sampled water meets EPL criteria the dam is suitable for discharge (see below for discharge procedure),
- If the sampled water does not meet the required criteria, the sump will be treated with flocculants (gypsum) and follow up testing conducted,
- Gypsum should be mixed with water from the pit to create a slurry which is sprayed uniformly across the surface of the sump, and
- The water should then be sampled and tested again to ascertain if it meets the discharge criteria.

Discharge of Water

Once the water has been determined to be of suitable quality to discharge, the water will be pumped to Dam 2 to the north of the pit. From there the discharged water will eventually reach the unnamed creek via a natural drainage line by trickle feeding over the spillway when sufficient volume is held in the dam.

No concentrated flows will be permitted to leave the site. The spillway will be fed into an energy dissipater to minimise erosion impacts from the discharged water. The discharge will be supervised to ensure there is no adverse impacts noted such as visible sediment in discharge water, erosion, and gullying, flooding etc. If impacts are noted discharge will cease immediately and remedial action undertaken.

Contaminated Water

The primary risk of contamination of the surface water, apart from sediment, is from the fuels and oils (lubricants and hydraulic fluid) used by the plant and machinery on the site. Refuelling and minor repairs and maintenance is undertaken in the hardstand areas or offsite. Fuel and oil are not stored on site. Diesel fuel is mainly contained within the plant and trucks and minor amounts held in a mobile refuelling tank which is filled off site as required. The site maintains a spill kit and all contractors are required to carry a spill kit on plant or equipment.

Due to the small volumes of hydrocarbons held on site it is unlikely that a spill would cause significant material harm to the environment. Should a spill occur, it could be managed with the spill kits and localised contamination removed from the site.

A portable toilet will be installed on the site during campaigns. No sewerage or septic system will be required.

Erosion

Soil Characterisation

The catchment area and dam volumes for the site have been estimated to determine the risk of sediment laden water leaving the site. The *NSW Managing Urban Stormwater Handbook*, also known as the “Blue Book”, was used to make the determinations. Several assumptions have been made as listed below. The calculations have erred on the side of caution and should be considered a ‘Worst Case Scenario’.

The Soil Hydrological Group for the soil materials is assumed to be D, very high run-off potential. Water moves into and through these soils very slowly when thoroughly wetted. They regularly shed run-off from most rainfall events.

Conservatively, sediment retention basins are designed using the Type D Soils calculations. This includes the sediment storage zone calculation using the estimated soil loss for the site over two months.

The likely soil loss is calculated with the Revised Universal Soil Loss Equation (RUSLE). The values of the other RUSLE factors are - P of 1.3 and the C is assumed to be 1.0 for bare soil.

Erosion Control

The control of erosion and sedimentation at the site will focus on source reduction measures. In general, these measures will include:

- Reading any Surface and Groundwater Management Plan with any engineering plans and any other plans or written instructions issued in relation to development at the subject site,
- Ensuring contractors undertake all soil and water management works as instructed in this specification and constructed following the guidelines stated in the "Blue Book", and
- Inform all subcontractors of their responsibilities in minimising the potential for soil erosion and pollution to downslope areas.

All works are to be undertaken in the following sequence:

- Topsoil in new areas will be surveyed, mapped and the texture, thickness and quality described prior to stripping. Topsoil and overburden not for immediate use will be stockpiled in appropriate areas and limited to 2 m in height and revegetated with temporary ground cover species, mulching or chemical stabilisers or binders if they are to remain in place for more than 30 days. A minimum of 70 percent cover is required for both mulch and vegetative covers,
- Construct earth banks (Stormwater Collection Drains) to divert as much clean water as possible and capture the dirty water in the extraction area,
- Undertake extraction activities in the new area,
- Rehabilitate lands in exhausted areas with overburden then topsoil and revegetate,
- Install barrier fencing to limit access to rehabilitated areas, and
- Ensure management practices are carried out to minimise areas being affected by wind and water erosion.

Topsoil is to be stripped in a moist condition to avoid pulverisation and dust and topsoil stockpiles are not to exceed 2m in height with a minimum crest width of 2m. They should be seeded with a temporary vegetation cover if stockpiles are to remain longer than 30 days. Stockpiles are to be located at least five metres from areas of likely concentrated or high velocity flows, especially drainage lines and access roads. If necessary, earth banks or drains will be constructed to divert localised run-on. Soil materials are to be replaced in the same order they are removed from the ground. It is particularly important that all subsoils are buried, and topsoils remain on the surface at the completion of works.

Earth batters can have maximum gradients of 2(H):1(V) during the works program but will be laid back to lower grades before the rehabilitation program starts. Final batter gradients will be between 3(H):1(V) and 4(H):1(V).

All waterways, drains, spillways, and outlets will be constructed to be stable in accordance with the "Blue Book" for soils with high erodibilities.

Post Closure

The impact of the proposed final landform on surface water is not expected to be significant. The final landform will be self-draining. Surface and Groundwater Management Plan will remain in place until the water quality from the site meets the target objectives for the area. With the use of vegetation and reduced slopes it is expected that there will be limited risk of impacts on surface water post closure.

8.5.4 Surface Water Impacts

Catchment Surface Flow Volumes

Although the site will increasingly divert surface water to the pit as quarrying progresses, it will have very little impact on the total volume of water flowing into the unnamed creek to the north and Two Mile creek to the south. Water captured within the pit will be returned to the downstream environment via the proposed sediment dam. All dams will be within the Harvestable Rights for farm dams and thus retaining less than 10% of the total rainfall for the property.

Downstream Water Users

Downstream land use is primarily rural. The watercourses are generally only used for stock water or recreational purposes and not large-scale irrigation. The capture of the surface water on the site is not expected to adversely impact downstream water users.

Riparian and Ecological Values

The project is not expected to have any significant impacts on the existing condition of nearby watercourses, including the unnamed creek to the north and Two Mile Creek to the south. These systems are characterised by degraded environmental conditions due to agricultural pursuits and land clearing.

There will be no increase in the frequency of discharges over and above current levels in the short to medium term and therefore no additional impacts on riparian environments, including geomorphology and environmental flows. In the long-term, flows are likely to be returned to the predevelopment levels.

Flooding

The development is not located in a flood zone, nor will it exacerbate flood potential within the site nor downstream.

Cumulative Impacts

With the sediment and erosion controls in place, it is predicted that there will be negligible impacts to surface water above that experienced by the current system due to surrounding agricultural and forestry land use.

8.5.5 Groundwater Impacts

Groundwater Quality

The quarry operations are not expected to encounter groundwater due to the ridgeline setting and maximum depth of extraction.

The deepest drillhole, of approximately 30 metres total depth, BH7, was sunk during the resources assessment phase, and indicates that groundwater was encountered at approximately 1049m AHD. This is 5 - 6 m below the proposed quarry floor at 1055 m AHD, as such the quarry is not expected to directly impact groundwater quality within the area. Spill kits will be in-pit at all times should any accidental spills occur.

Groundwater Quantity

The quarry is not expected to 'take' groundwater and will have minimal impact on the local aquifers, noting the sandy nature of the quarry resource and surrounding area, is likely to provide a recharge area for the groundwater table due to the higher permeability.

Groundwater Dependant Ecosystems

Aquatic GDEs

Two Mile Creek is considered to have a High Potential for Ground Water Dependant Aquatic Ecosystems (National Assessment) with and an In Flow-dependent Ecosystem (IDE) likelihood of 4 (from the BOM GDE web portal http://www.bom.gov.au/water/groundwater/gde/map.shtml).

The likelihood grid for inflow-dependent ecosystems expresses the likelihood that landscapes are accessing water in addition to rainfall. The likelihood is expressed as a range of values between 1 (low) and 10 (high), where 10 indicates landscapes that are most likely to access additional water sources. The additional water source may be soil water, surface water, or groundwater.

It is unlikely that the site will intersect groundwater and there will be minimal discharge of water and impact to the surface flows to the GDE during the development. Therefore, the impact to the aquatic GDE in Two Mile Creek is considered low.

Terrestrial GDEs

To the south of the site, Two Mile Creek is identified as generally containing Terrestrial GDEs of a Low Potential GDE (Regional Study) with an IDE likelihood of 8 i.e., Red stringybark- Brittle Gum- Inland Scribbly gum dry open forest of the tablelands; Southeastern. The south-eastern portion of the proposed extraction envelope also maps this Terrestrial Ecosystem.

A pocket of Moderate to High Potential GDE (Apple Box - Yellow Box dry grassy woodland of the Southeastern Highlands Bioregions), with an IDE likelihood of 4, has been identified to the south to which the project will partially encroach upon. This comprises of approximately 0.25 ha of PCT 1191*: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, Southeastern Highlands Bioregion* (Low Condition).

Located centrally within the property is a Terrestrial GDE (Red stringybark- Brittle Gum- Inland Scribbly gum dry open forest of the tablelands; Southeastern) of Low Potential and an IDE likelihood of 4. The access track/haul road will bisect this community.

The site is considered Category 1 Exempt Land under Local Land Service Act 2013 which affords dispensation when undertaking clearing for the project. The Biodiversity Assessment (MJD Environmental 2022, refer **Appendix I**) concluded that there would be no significant impact to ecological communities due to the clearing of vegetation on the site.

8.5.6 Water Balance

A water balance model has been prepared to assess the ability of the project site to provide on-site water detention and to understand potential changes in surface water drainage. As per the 'Blue Book' and EPA requirements, the model investigated the following:

- Determine if the In-Pit Sump will overtop during the next 10 years of operation using historical rainfall data as a guide, and
- Demonstrate that there is sufficient water security for the site operations over the next 10 years of operation.

The primary source of water on the site is from rainfall collected into the In-Pit Sump, Dam 1, and Dam 2. A farm dam is also located on the site to the west of the current pit. Water will be consumed on the site for dust suppression purposes. It may also be utilised in the future to irrigate rehabilitated areas; however, this has not been accounted for in the water balance due to the expected irregularity of the irrigation.

Modelling Assumptions

The following assumptions were applied to the water balance model:

- The water balance model has been run using the first, second and final extent of the void as the water storage Area,

- The Dam 2 (polishing dam) volume has been estimated to be 2,500 m^3. It only receives rainfall from its immediate catchment (1 ha) and water from the In-Pit Sump when pumping occurs. It has not been modelled in the water balance,
- The catchment area for surface water within the pit for Stage One, Stage Two and the Final Stage are 1.7 ha, 7.6 ha and 18.8 ha respectively,
- 10mm of rainfall has been applied prior to the expected runoff to commence,
- The existing site scenarios were modelled with the application of a daily time step for a 10-year period, 2010 to 2019,
- Historical rainfall data from the Bureau of Meteorology (Running Stream (Brooklyn) - site 063012) has been used for the years 2010 to 2019,
- The wettest year and driest years were 2010 (1,283 mm) and 2019 (461 mm) respectively,
- A runoff coefficient of 0.64 (from the blue book) has been used assuming a Soil Hydrological Group of D,
- Maximum In-Pit Sump volume before overtopping have been calculated from SURPAC 3D modelling of the stage voids,
- The affective area of evaporation has been assumed to be the dam surface areas. The actual area will vary according to the dam volume but for this calculation the area is assumed to be 1,700 m^2 and vertical dam walls are assumed for ease of calculation,
- A pan evaporation factor of 0.75 for the water storage (to convert recorded pan evaporation to pond surface evaporation),
- Groundwater seepage into the dam is assumed to be negligible,
- Dissipation from the dam is assumed to be negligible,
- Evaporation rates were obtained from the nearest available comparative site which was the Bureau of Meteorology (Bathurst Agricultural Station- site 063005). Where actual data was not available, historical averages were applied,
- Discharge from the pit is achieved via pumping. The flow rate averages 100 L/min and is assumed to flow 24 hours a day when the EPL conditions are met. This approximates 144 cubic metres of water released per day when required, and
- Dust suppression water is supplied by the proposed Dam 1, which has a nominal capacity of 5,000 m^3 and a catchment of 33.5 ha. Water from the Pit and Dam 2 may be used in conjunction with Dam 1 but for the purposes of modelling, only water from Dam 1 has been included, as the worst-case scenario.

Stage 1

The 10-year modelling period indicates that the In-Pit Sump is unlikely to flood a portion of the pit floor, even when rainfall exceeds the design storm event. In extreme rainfall periods the treatment and emptying of the in-Pit Sump may exceed a 5-day period however, the quarry void itself is many orders of magnitude larger than the In-Pit Sump (~62,000 m^3) and the risk of uncontrolled discharge is negligible.

Stage 2

The 10-year modelling period indicates that the In-Pit Sump may flood a portion of the pit floor during Stage Two, when rainfall exceeds the design storm event (219 mm over an 8-day period). In extreme rainfall periods the treatment and emptying of the in-Pit Sump may exceed a 5-day period however, the quarry void (424,000 m^3) itself is many orders of magnitude larger than the In-Pit Sump and the risk of uncontrolled discharge is negligible.

Stage 3 & 4

The 10-year modelling period indicates that the In-Pit Sump may flood the pit floor during Stage Three, when rainfall exceeds the design storm event (219 mm over an 8-day period). In extreme rainfall periods the treatment and emptying of the in-Pit Sump may exceed a 5-day period however, the quarry void (2,200,000 m^3) itself is many orders of magnitude larger than the In-Pit Sump and the risk of uncontrolled discharge is negligible.

Detailed modelling results for Stages 1, 2, and 3 are provided in the **SGWA** attached as **Appendix J**.

Clean Water Dam and Dust Suppression

During extraction activities the Site is anticipated to use approximately 75 m^3 of water per day. This equates to five 15,000 L water cart loads and will be sourced from the In-Pit Sump or the Clean Water Dam. Campaigns are expected to be undertaken up to 4 times per annum for a duration of approximately 4 weeks.

For the purposes of the water balance, water was sourced from Dam 1 as it is more likely to contain water during campaign periods than the In-Pit Sump.

The Dam 1 will have an estimated maximum capacity of 5,000 m^3 and is sufficient to supply the dust suppression requirements per campaign, with time to replenish in-between. If required due to dry conditions, water may be sourced from the other site dams or potable water may be imported for dust suppression purposes.

Modelling indicates that Dam 1 will generally have sufficient capacity to supply water for dust suppression purposes. The exception may occur during extremely dry periods.

Detailed modelling results for the clean water dam are provided in the **SGWA** attached as **Appendix J**.

8.5.7 Land Use Risk Assessment

A risk-based approach has been undertaken to assess the impacts and mitigation measures in accordance with the *Risk Based Framework for Considering Water Health and Outcomes in Strategic Land-use Planning Decisions (OEH & EPA 2017)*.

Context of Proposed Development

The context of the proposal has been described above in **Section 8.5.2**.

Existing and Proposed Land Use

The existing land use, surrounding land uses, and existing environment are discussed in **Section 8.5.2** above. The proposed land use of quarrying is permissible within the RU1- Primary Production zoned land within the Mid-Western Regional Council Local Government Area (LGA). Quarrying will occupy only a portion of the total holding with existing land uses remaining active.

NSW Water Quality and River Objectives

Water Quality Objectives (WQOs) and the River Flow Objectives (RFOs) for the Macquarie-Bogan River Catchment, have been defined by the Office of Environment and Heritage (OEH) and have been used to develop plans and actions affecting water quality and river health. Suggested objectives and key indicators are shown below as well as an assessment of how the land use activity will affect the indicator.

Effects Based Risk Assessment

A risk based assessment on effects on the Water Quality Objectives (WQOs) and the River Flow Objectives (RFOs) for the Macquarie-Bogan River Catchment has been undertaken and is provided in Table 13 of the **SGWA** provided in **Appendix J**.

In summary, the assessment determined that the risk of impact is Low for all objectives with mitigation measures in place.

8.5.8 Monitoring and Maintenance

Surface Water Quality

Any surface water sampling will be collected and tested by a NATA Accredited Facility in accordance with EPL conditions. Analytes to be tested and concentration limits are to be in accordance with the site EPL. These are expected to be as follows:

- pH is to be between 6.5 to 8.5,
- TSS is <50 mg/L, or
- Turbidity <150 µS/cm.

Monitoring of surface water outside the EPL Licence Points may be undertaken from time to time such as at the sediment dams in and out of the pit. Results of all monitoring will be recorded in the EPA Annual Return.

Contaminated Water

- No waste will be stored on-site unless adequately bunded and stored,
- All waste is stored in the appropriate on-site bins for later removal by a licenced contractor,
- Regular visual monitoring will be undertaken to ensure no leaks, spills or other sources of contamination have entered the water management system,
- Should a spill or leak occur onsite, spill containment and clean-up will be undertaken, and
- Spill kills will be kept in designated locations on the site where they can be easily accessed.

Surface Water Flows

The following management checks on the surface water flows will be undertaken at least quarterly and recorded:

- Visual check of stability and operation of all banks, ponds, channels, and spillways, effecting any necessary repairs,

- Visually check the discharge point to ensure that the discharge does not cause erosion or scouring of the creeks. Effecting any necessary repairs,
- Drains and culverts for both clean water and dirty water will be examined for vegetation cover and blockages and maintenance will be performed to ensure they are working as designed,
- Diversion bund walls will be inspected regularly to assess the integrity and effectiveness. Maintenance will be performed when required,
- Removal of spilled materials from hazard areas, including lands closer than five metres from areas of likely concentrated or high velocity flows, especially waterways and access roads,
- Ensuring that rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate, and
- Constructing additional erosion and /or sediment control works as might become necessary to ensure the desired water quality control is achieved.

Erosion and Sediment Controls

Monitoring of the soil erosion, sediment and water is undertaken at least quarterly and recorded. Monitoring will include:

- Topsoil stripping to be visually monitored to check moisture content of soil and depth of stripping,
- Stockpiles to be visually assessed at time of forming to check they do not exceed two metres high,
- Removal of spilled soil or other materials from hazard areas, including lands closer than five metres from areas of likely concentrated or high velocity flows, especially waterways and access roads,
- Ensuring rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate, and
- Constructing additional erosion and/or sediment control works as might become necessary to ensure the desired water control is achieved.

Sediment Dam Management and Maintenance

Sediment dams will be managed using the following:

- Level indicators will be installed in dams with relevant marks located on the peg to indicate the amount of sediment load in the dam,
- All sediment basins will be maintained by de-silting when the capacity is diminished,
- Sediment dams and clean water dams will be visually assessed for water quality and volumes on a regular basis or as required after high rainfall events,
- If discharge is required, the visual assessment will be followed by sampling and testing of the water quality prior to discharge to ensure water quality criteria are met,
- The limit of TSS of less than 50mg/L or turbidity less than 150 µS/cm in the discharged water will be adopted (unless modified by the EPA),
- Ensuring that rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate, and
- Constructing additional erosion and /or sediment control works as might become necessary to ensure the desired water quality control is achieved.

8.5.9 Conclusions

The proposed surface water and sediment and erosion controls for the quarry development will ensure minimal impacts to the surrounding environment. Surface water collected over the disturbed surfaces can be effectively contained, treated (if required) and discharged back into the downstream environment with very little change to the downstream flows and riparian communities. The quarry is unlikely to intersect groundwater and thus the impact to aquifers and groundwater dependant ecosystems is considered negligible.

A risk assessment based on Risk Based Framework for Considering Water Health and Outcomes in Strategic Land Use Planning Decisions (OEH & EPA 2017 found that the risks are low and potential impacts can be managed adequately and feasibly.

The water balance suggests that adequate water can be held on site, with the construction of the Clean Water Dam to undertake dust suppression and irrigation of rehabilitation. A Water Access Licence (WAL) will not be required for these

activities as the total volume of water proposed to be held on the property is below the Harvestable Rights. The construction of any new dams, however, will require approval from Water NSW.

The final landform will be a vegetated, stable, free draining bowl with the Dams 1 and 2 being retained. This will be compatible with surrounding land uses of forestry and agriculture.

Further detail is contained in the **SGWA** provided in **Appendix J**.

8.6 Aboriginal Heritage

8.6.1 Introduction

An **Aboriginal Cultural Heritage Assessment Report** (ACHAR), including consultation, has been prepared for the proposed development by NGH Pty Ltd. The purpose of this assessment was to identify the presence of Aboriginal sites across the Project site, determine the risk of impact to Aboriginal sites, undertake Aboriginal consultation, identify the presence of any significant historic heritage items within the locality of the development site, risk of impact by the development, and to provide mitigation and management measures based on assessment findings. The heritage report has been prepared in accordance with the relevant OEH guidelines and has also been prepared to satisfy SEARs and agency comments. The **ACHAR** is attached as **Appendix K**.

8.6.2 Existing Environment

General Description

The landscape context of the Project area is based on a number of classifications that include the National Interim Biogeographic Regionalisation for Australia (IBRA) system, Mitchell landscapes, NSW soil landscapes and geological maps.

The National Interim IBRA system identifies the Project Area as being located within the Capertee subregion of the Sydney Basin (SB) Bioregion (DE&E, 2016). It covers a portion of NSW from Newcastle in the north, Lithgow in the west, encompasses the Blue Mountains, and extends south past Ulladulla. Further landscape modelling as part of the Mitchell landscapes system (DECC, 2002) shows the Project area is located in the Capertee Plateau. This soil profile has the potential for subsurface Archaeological deposits in shallow soil profiles in locations where Aboriginal occupation may have occurred adjacent to water resources. The presence of swampy and clay rich soils may impact on the potential of organic materials to be present. The presence of sandstone and basalt suggest with quartzite inclusions suggest the regional area contains suitable stone resources for stone tool manufacture, therefore presenting potential for artefacts and grinding grooves in locations of intact landscapes.

Past Land Use

Aerial photography as described by Archaeological Risk Assessment Services (ARAS) (2020) details that image from 1964, 1973, 1982, and 1989 clearly illustrates the development of the land with some pasture improvement (native vegetation clearing) and cropping taking place prior to pine plantations being introduced to the east of the Project Area since the 1990s.

Current Land Use

The 327ha property is currently comprised of the following land uses:

- 68% is planted out as pine plantation at various stages of progression, from recently planted tube stock to mature plantations through to areas that have been recently harvested and not yet re-planted,
- 19% is other wooded or remnant vegetation, comprising both native and non-native species and includes the dwelling and yard area, and
- 13% is comprised of access tracks and grassland areas through and surrounding the plantation area that are not planted as plantation. This includes a former pasture areas and fire breaks.

The Project Area and surrounding region has been impacted by past vegetation clearing, grazing and pine plantation activities which has likely resulted in moderate to high disturbance of the Project Area. If any cultural deposits are present within the Project Area, the past land use has likely impacted their natural depositional environments, reducing archaeological value.

Colonial Chronology of the Region

The below colonial chronological timeline provides insight into the settlement of Europeans within the region and impacts to Aboriginal occupation and natural landscapes.

1813 - Gregory Blaxland, William Lawson, and William Charles Wentworth led the first successful crossing by Europeans through the Blue Mountains.

1821 – First European contact was likely made when James Blackman explored the route from Bathurst to the Cudgegong River in which he was occupied by a local Wiradjuri man.

1822 - Blackman and Lawson trace a route from Wallerawang to Dabee, near Rylstone. George and Henry Cox, William Cox the road builder's sons, settled on the Camping Tree site west of Mudgee at Old Menah.

1848 – Lithgow-Mudgee Road (current Castlereagh Highway) was formed in its present location.

1939 – 1939 the former Rylstone Shire Council sealed the Lithgow-Mudgee Road.

1882 – The land surrounding the assessment area was originally taken up in the late 1890s with the original grant for the village of Capertee being established in as part of the western rail line development (Parkes et al 1979).

1890s - The assessment area was farmed from the late with extensive native tree clearing making way for sheep grazing.

1899 – First parish map of the Project Area identifies the land of the Project area and its surrounds was owned by John Swien Fraser.

1960s - A gradual transferal to state forestry was undertaken in the and then to private commercial pine plantations.

Previous Archaeological Studies

A significant number of studies have been undertaken in Running stream, NSW and the wider region which provide a sound archaeological context for the Project Area. In summary, archaeological research suggests that the Blue Mountains were not routinely inhabited by people during the Last Glacial Maximum (LGM), which lasted from 31,000 – 16,000 years ago and are likely to have been a barrier to humans during this time (Barry et al. 2020; Mooney and Martin 2009).

Archaeological evidence from nearby sites in the Blue Mountains suggests that the earliest evidence for people in the Blue Mountains is approximately 17,500 years ago. As a result, current archaeological knowledge suggest that tablelands region was sparsely occupied during the LGM due to the arid and colder conditions that are likely to have characterised the hinterland region of Running Stream (Mooney and Martin 2009:29). Aboriginal occupation through the landscape was likely opportunistic and associated with the procurement of valuable materials (Barry et al. 2020). It is also likely to have occurred through the riverine corridors, which remained a vital travel route for Wiradjuri Aboriginal communities before and after the Blue Mountains were crossed by Europeans in 1813. The Blue Mountains region and areas further west are likely to have been Increasingly occupied after the LGM during the Holocene, where climactic conditions allowed for more hospitable landscapes to emerge (Mooney and Martin 2009:29).

ARAS (2020) completed a due diligence assessment of the Project Area to inform a scoping report for the proposed works. Utilising predictive models from both the Hunter regions and the central Tablelands, the assessment determined that surface archaeological evidence is probably located on elevated creek terraces to the north and south-west of the proposed development area where 3rd or 4th order streams such as Two Mile Creek intersect with spring areas (i.e., Black Springs). A pedestrian sample survey of archaeologically sensitive landforms (ridgetops and alluvial flats) was conducted in variable survey conditions with some low surface visibility due to vegetation and grass cover. No Aboriginal objects or areas of archaeological sensitivity were identified. The results of the survey concluded all landforms within the Project Area have been subject to significant disturbance because of furrow ploughing for pine developments and recent bushfires have damaged mature native trees.

No other previous archaeological studies have been undertaken within the subject Project Area.

8.6.3 Methodology

The following methodology has been applied to the preparation of the **ACHAR**.

Desktop

Aboriginal Heritage Information Management System (AHIMS) Search

As part of the desktop assessment for this project, an extensive search was undertaken of the Aboriginal Heritage Information Management System (AHIMS). The AHIMS register is maintained by Heritage NSW and provides a database of previously recorded Aboriginal heritage sites. An extensive search provides basic information about any sites previously identified within a search area. An AHIMS search is not conclusive evidence of the presence or absence of Aboriginal heritage sites, however the search will indicate whether any sites are known within or adjacent to the investigation area. A search of the AHIMS database was conducted during a map search over Running Stream and the surrounding area. A copy of this search is provided in the **ACHAR** attached as **Appendix K**.

The parameters for this search were as follows:

- Client Service ID: 643235
- Date:30/11/2021
- From: -33.2 (Latitude), 149.63 (Longitude)
- To: -32.92 (Longitude), 150.12 (Longitude)

- Approximate search area: 40 x 30 km
- Number of Aboriginal sites and Aboriginal objects found: 112
- Number of declared Aboriginal Places found: 0

The results of this search confirmed that no recorded AHIMS sites are located within the Project Area. David Gordon (AHIMS) confirmed that the restricted site will not be impacted by the proposed works. A summary of the recorded site types is provided as **Table 38**, a map of the AHIMS search regionally is provided as **Figure 30**, and a map of the closest Aboriginal site to the development is provided as **Figure 31**.

Table 38: Breakdown of Previously Recorded Aboriginal Sites in the Region

SITE TYPE	NUMBER
Artefact	78
Art (pigment or engraved)	7
Modified Tree (Carved or Scared)	7
Grinding Groove	6
Potential Archaeological Deposit (PAD)	3
Art (pigment or engraved), Artefact	2
Artefact, Conflict	1
Artefact, Habitation Structure	1
Artefact, Habitat Structure, PAD	1
Art (pigment or engraved), Habitation structure	1
Art (pigment or engraved), Artefact	1
Modified Tree (Carved or Scarred), Ceremonial Ring (Stone or Earth)	1
Ceremonial Ring (Stone or Earth)	1
Aboriginal Resource and Gathering, Art (Pigment or Engraved), Artefact, Grinding Groove, Hearth, PAD	1
Restricted Sites	1
Total	**112**

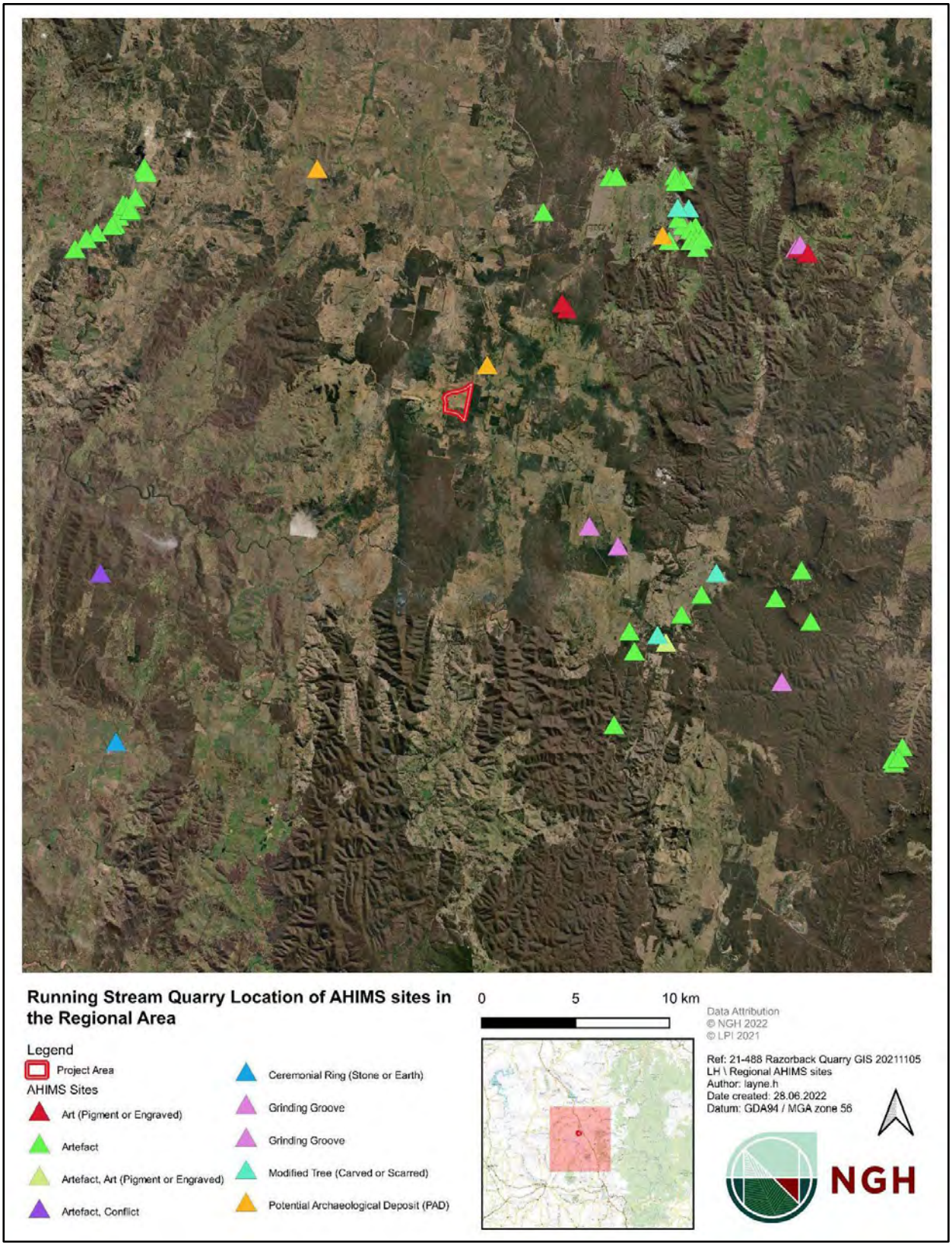

Figure 30: Regional AHIMS Search Results

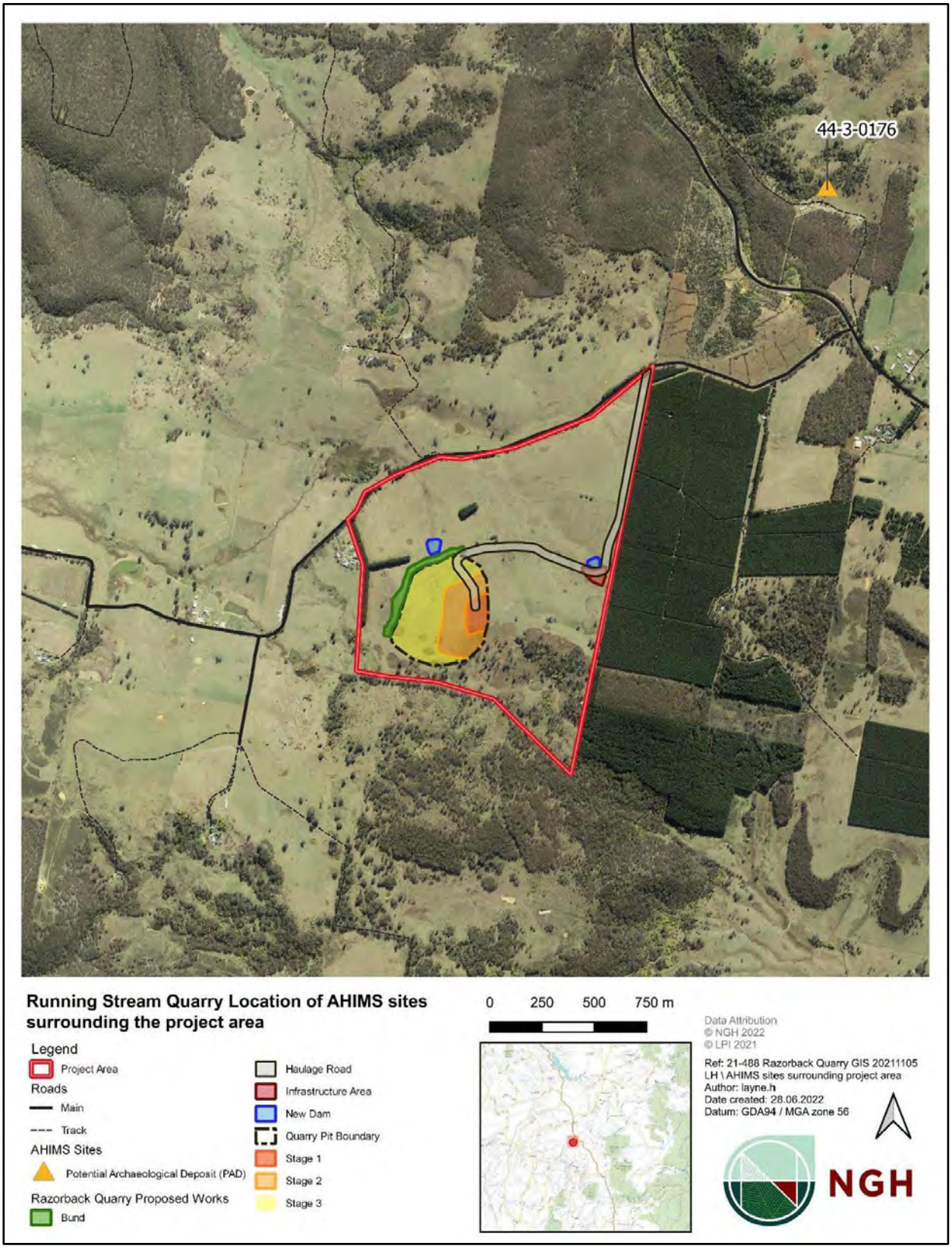

Figure 31: AHIMS Search Results Surrounding the Site

Australian Heritage Database

A search of the Australian Heritage Database identified no registered Aboriginal Places located within the Project area. However, the Wishing Well, off Castlereagh Highway, Running Stream approximately 750 m north of the Project area, is listed on the Register of the National Estate (Non-statutory Archive).

State Heritage Inventory

A search of the NSW Heritage register identified no Aboriginal Places or state heritage items within 1km of the Project Area. The closest state heritage listed item is the Wallerawang-Gwabegar railway, Ben Bullen (SHR# 01082), located 24 km southwest of the Project Area.

Mid-Western Regional Local Environment Plan 2012

The Project Area is located within the area covered by the Mid-Western Regional LEP 2012. Schedule 5 of the LEP 2012 details the environmental heritage items encompassed by the plan. While no Aboriginal sites or places are identified within proximity to the Project Area in the Mid-Western Regional LEP, the listing for the Wishing Well in the road reserve adjacent to Castlereagh Highway (ID: I33R) is located 750 m north of the Project Area.

Consultation

Consultation with Aboriginal stakeholders for the project was undertaken in accordance with Section 60 of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2019* and following the process outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRP). The guide outlines a four-stage process of consultation as follows:

- Stage 1 – Notification of project proposal and registration of interest.
- Stage 2 – Presentation of information about the proposed project.
- Stage 3 – Gathering information about cultural significance.
- Stage 4 – Review of draft cultural heritage assessment report.

In accordance with the stages outlined above, consultation was undertaken with Registered Aboriginal Parties throughout the project. This consultation included the following:

- Advertising for interested parties by placing a public notice advertisement in the Mudgee Guardian on 26 November 2021,
- Writing to required agencies, including Heritage NSW, advising of the project, and seeking known interested parties,
- Writing to any additional identified parties from Heritage NSW and/or other organisations seeking their interest,
- Drafting and sending an ACHA Methodology to RAPs for review,
- Completing Fieldwork with RAP representative(s), and
- Drafting and sending the ACHA report for RAP review.

As a result of the consultation process, 8 Aboriginal groups registered their interest in the proposal. Notification of Registered Aboriginal Parties was provided to Heritage NSW on the 14 November 2021.

The RAPs that registered their interest were:

- Bathurst Local Aboriginal Land Council.
- Wellington Valley Wiradjuri Aboriginal Corporation.
- Gallanggabang Aboriginal Corporation.
- Corroboree Aboriginal Corporation.
- Woka Aboriginal Corporation.
- Mingaan Aboriginal Corporation.
- Warrabinga Native Title Claimants Aboriginal Corporation.
- North-East Wiradjuri Company Ltd.

The full list of consultation steps, including those groups and individuals who were contacted, Aboriginal community feedback, and a consultation log is provided in the **ACHAR** attached as **Appendix K**.

Site Walk-Over

A site walk-over was undertaken with one of the 8 registered groups who were selected based on their input provided to the consultation process, comments to the methodology, and connection to the area. The survey fieldwork was carried out on 17 May 2022 by one archaeologist from NGH and one RAP, Sharon Riley, who was representing Mingaan Aboriginal Corporation. The site walk-over was undertaken over one day only.

8.6.4 Impact Assessment

Site Prediction

Aboriginal site modelling for the region suggests that Aboriginal sites are common in proximity to second order creeks and rock overhang shelters. Site modelling also suggest that the majority of site types in the region are comprised of isolated artefacts and artefacts scatters, with some landforms also containing potential for shelters with art, grinding grooves in locations where sandstone outcropping is present, as well as subsurface PADs on elevated valley flats and terraces. The previously recorded AHIMS sites in the region support this conclusion.

Survey Strategy

The survey fieldwork was undertaken over a single day on 17 March 2022. The survey team consisted of NGH Senior Heritage Consultant Bronwyn Partell and RAP representative Sharon Riley of Mingaarn Aboriginal Corporation. During the survey, notes were made about visibility, photographs were taken, and any possible Aboriginal objects or features identified were inspected, assessed, and recorded if deemed to be Aboriginal in origin.

The survey strategy objective during the current assessment was to cover as much of the ground surface as possible within the project area. As only certain sections of the project area will be subject to development only these areas were targeted by the survey. The survey was undertaken to identify whether Aboriginal sites or PADs were present within the project area.

Where possible, transects were walked with the survey team spread apart at approximately 20m intervals. The survey team consisted of two people allowed for a 40 m wide tract of the project area to be surveyed with each transect. At the end of the transect, the team repositioned along a new transect line at the same spacing and walked back along the same bearing. The nature of the project area made this an ideal survey strategy allowing for maximum survey coverage and opportunity to identify any heritage objects.

The survey was impeded by a variety of factors, namely the thick grass cover or developed nature of the project area, however NGH were confident that the survey strategy was comprehensive and the most effective way to identify the presence of Aboriginal heritage objects within the Proposal Area.

Discussions were held in the field during and after the survey between the archaeologist and Aboriginal community representative to ensure all were satisfied and agreed with the spacing and methodology.

Survey Coverage

The survey was impeded by poor visibility due to a low dense grass cover and the pre-existing disturbances and erosion present throughout the project area. As a result, both ground surface visibility (GSV) and exposure visibility were low ranging from 10-35% with an average of 12% across the entire area that was surveyed.

As the project area had been subject to prior survey and disturbances and GSV was impeded, the survey was targeted to the proposed works area and other surrounding sensitive landforms.

Over the course of the survey, approximately 2.812 km of transects were walked across the project area by each of the two participants. Allowing for an effective view width of 5 m for each person, this equates to a total surface area examined of 2.812 ha of the project area. Due to the poor GSV present it is considered that 0.85% of the project area was effectively surveyed, however 20.34% of the proposed development footprint was effectively surveyed. NGH considers that the effective survey coverage of the project area was sufficient for the purposes of this assessment as the factors that impeded more 'effective' survey coverage have clearly removed much of the Aboriginal archaeological record within the project area.

Survey Results

Despite the low GSV and effective survey coverage, the landforms present within the project area were assessed during the survey to determine whether any PADs were present. While low GSV may prevent the identification of Aboriginal sites, the levels of disturbance evident during this and prior (ARAS 2020) archaeological surveys of the project area is consistent with the previous conclusion that it is unlikely that the proposed works at the Razorback Quarry will harm any Aboriginal Objects.

A significant amount of infrastructure was also observed during the survey, including drainage, fencing, transmission lines, cleared internal roads and tracks, and other agricultural disturbances associated with the pine plantation. The historic land use is likely to have significantly disturbed or destroyed Aboriginal heritage within the project area.

No Aboriginal objects were identified by the participants during the survey. One area of Potential Archaeological Deposit (PAD) was identified during the survey in an area that presented less disturbance that the remainder of the project area, within a

saddle landform that leads into a gentle slope down towards the creek line. There were no surface artefacts identified within the gravels exposed, however the silty topsoil was preserved along much of the landform indicating potential for subsurface archaeological material. This PAD was identified and documented only.

Analysis

The predictions based on the modelling for the project area and previous assessment (ARAS 2020) were that Aboriginal sites and PADs were unlikely to occur within the project area due to the level of historical disturbance that was described in the area. Furthermore, while the results of previous archaeological surveys within the project area and wider region show that there are Aboriginal sites and PADs present across the landscape, the majority of the project area that was surveyed displayed varying degrees of disturbances that resulted in removal of topsoil across archaeologically sensitive landforms. No Aboriginal objects were recorded during the survey, however one area of PAD (outside of the project footprint) was identified.

It is likely that the primary reason for the absence of Aboriginal objects within the project area is due to the historical land use and disturbances that have taken place throughout.

Due to the disturbances observed during the survey and the lack identifiable Aboriginal sites within the proposed development footprint, NGH considered that a subsurface testing programme was not warranted to assess the potential Aboriginal and archaeological heritage impacts of the proposed works.

Based on the results of this investigation and the land use history of the project area, there is negligible potential for the presence of Aboriginal heritage or intact PADs within the proposed development footprint.

8.6.5 Mitigation and Conclusions

No previously identified AHIMS sites are located within the project area and no new Aboriginal sites or PADs were identified within the proposed works areas. As a result, no measures are required to avoid the harm of Aboriginal heritage.

As no physical Aboriginal heritage is present within the development area, the proposed works – as assessed in this report – will avoid any impacts to physical Aboriginal heritage. Therefore, no further mitigation measures are required for the proposed Razorback Quarry in Running Stream, NSW.

It is recommended that:

1. The proposed works for the Razorback Quarry may proceed with caution within the project area as assessed by the ACHAR.

2. If any items suspected of being Aboriginal in origin are discovered during the work, all work in the immediate vicinity must stop and Heritage NSW notified, and the Unexpected Finds Protocol provided as Appendix B to the ACHAR must be followed.

3. In the unlikely event that human remains are discovered during the proposed works, all work must cease in the immediate vicinity. The appropriate heritage team within Heritage NSW and the local police should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal. If the remains are deemed to be Aboriginal in origin the Registered Aboriginal Parties should be advised of the find as directed by the appropriate heritage team within Heritage NSW. Heritage NSW would advise the Proponent on the appropriate actions required.

4. Additional archaeological assessment would be required if the proposal activity extends beyond the area assessed by the ACHAR. This would include consultation with the registered Aboriginal parties and may include further field survey.

Further details on the **ACHA** are provided in **Appendix K**.

8.7 Historic Heritage

8.7.1 Introduction

A **Historic Heritage Assessment** has been prepared by Heritage, Archaeology + Planning for the proposed development. The purpose of the assessment was to identify the presence of any significant historic heritage items (if any) within the locality of the development site, whether any of these items would be impacted upon by the development and provide relevant mitigation and management strategies where appropriate. The assessment has also been prepared to satisfy the SEARs and any agency comments. The full **Historic Heritage Assessment** is attached as **Appendix L**.

8.7.2 Existing Environment

The Project Area was accessed by turning off the Castlereagh Highway onto Razorback Road and continuing along the all-weather dirt access road for approximately one kilometre, where the farm gate is located to the left with “Turonfels” property signage. The field survey took place on 19 May 2022 in clear weather with a light wind featuring 20% cloud cover. The farm access gate and fencing adjacent is modern galvanised steel and star picket construction.

There are various built items on the property, an older machinery shed approximately 300 metres along the main access track, a modern brick residence with nearby metal corrugated farm sheds of similar modern age towards the rear and several concrete water tanks and a windmill located in the north-western paddock adjacent to Razorback Road. These latter items are

also reasonably modern period infrastructure additions. The property is devoid of internal paddock fencing to allow for plantation pine operations.

The Project Area is situated at the headwaters of several catchments in an elevated position. The surrounds appear to be agricultural holdings practising mixed grazing, along with a scattering of pine plantations and other uses. The landform is undulating, generally sloping down towards the north and northwest where it is bordered by Razorback Road and a perimeter wind break planting of advanced cypress pines. The property features no internal fencing, showed no evidence of earlier farm working, moveable heritage items or similar.

The great bulk of the property has been used for plantation pine growing purposes and no aged or older built structures or items were identified. No evidence of early gold mining activity was present.

8.7.3 Methodology

The heritage assessment has been prepared in accordance with guidelines set out by the Heritage Council of NSW *Assessing Cultural Heritage Significance* and *Preparing Statements of Heritage Impact*.

To carry out the heritage assessment, the study has undertaken the following:

- Assess and confirm the significance of the place.

The following primary historical research was undertaken:

- NSW Government Gazette,
- Trove (National Library Online Newspaper database),
- Churches of Australia,
- Geographical Names Board, and
- NSW Land Registry Service.

The following key documents were reviewed:

- 1838 Yearly leases of land (1832-1900), and
- St Johns Union Church, Running Stream.

Fieldwork was carried out to identify potential features likely to be historically significant and to document them if present.

8.7.4 Impact Assessment

A brief overview of local history indicates that Running Stream (like Ilford) was on the Mudgee stock route. In the days of horse and coach transport, regular stops were required for the resting of stock, horses, and people. With a publican's licence issued by 1853 it is likely Running Stream was a stopping point and a small village grew to serve the surrounding farms. Despite the Turon Goldfields, Running Stream did not feature in the gold rush, it appears it remained a rural community and this was compounded with the bypassing of the area by railway in the late nineteenth century.

Local History

Extractive industries have long been operated in the region surrounding the Project Area dating to the early 1800's. Coal and gold mining being the most prevalent, but also limestone and oil shale have been commercially exploited. Historically, there have been a number of mines operated in the vicinity of the Project Area. These included the Razorback Gold and Antimony Mine operated at several periods from around 1876 to 1903 and 1910, and the Cherry Tree Hill deep lead underground gold mine, active between 1936 - 1938 (Stevens. B, 1972). Razorback Gold and Antimony Mine was placed on the London market in February 1888 with the view of floating it as a public company. It was situated approximately 15 km northeast of Sofala, NSW.

The first reference to Running Stream found during this research was an 1838 reference Yearly Leases of Land at Running Stream in County of Roxburgh, parish unnamed. 640 acres was available for land that was bound on the eastern border by W. Lawson's purchase. (1838 'YEARLY LEASES OF LAND.').

The Geographical Names Board website describes Running Stream as a locality named for Running Stream, a watercourse, which is about 10 km long and flows into Round Swamp Creek (Geographical Names Board). Running Stream is within the parish of Hearne, county of Roxburgh, while the Project Area is in parish of Warrangunia on its immediate western border.

While primary documents were not accessed for this report, as all are stored at Kingswood and not available digitally, a perusal of the New South Wales State Archives holdings for Running Stream provides the following snapshot:

- the Running Stream Public School operated from 1876 to 1979,
- a publican's licence was issued as early as 1853,

- a Public Hall was present from 1927 to 1966, and
- the area was subdivided for Soldier Settlement following WW1.

St John's Union Church was opened in 1906 by Ven Archdeacon Dunstan, of Mudgee. The church had a small cemetery in the church grounds (Churches of Australia).

The Project Area

The study area is in the Parish of Warrangunia, County of Roxburgh. The first and second edition of the parish map shows that the subject site had not been taken up as a grant or purchased (Parish of Warrangunia, County of Roxburgh. First edition 1884 & Second Edition 1890). The land was first held by John Swein Fraser on a Conditional Lease, by 1909 ownership had passed to Ada M Thomas. A conditional purchase was a way of obtaining a Crown Grant for land before it was surveyed. Established in 1861, the grant was dependent on a set of conditions being met.

There is no written evidence of any structures in the Project Area, in addition the earliest available historic aerial image shows no evidence of structures in the area. What is evident is the land, sometime previously had been extensively cleared. While the Project Area is within the Turon Goldfields no written evidence of gold mining was found.

Site Structures

A rudimentary, vernacular style farm machinery shed, and workshop is visible from the main farm gate. The original roofing has been replaced with modern corrugated zincalume. The wall cladding is recycled corrugated iron all round, laid horizontally and appears to be painted externally using red primer, commonly known as "red lead", which was used due to its high surface adhesion and the protection it provided from the elements and corrosion. Two fixed timber quarter pane glass windows are fitted along each northern and southern wall elevation and also to the western gable end. There are large, hinged doors on the northern elevation that open outwards to allow machinery drive through access to similar doors on the southern elevation. These southern shed door openings have been sealed with modern zincalume and no longer function as an accessway (refer **Plate 9**).

Plate 9: Machinery Shed

The machinery shed remains functional, is weather tight and in reasonable condition. It is currently used to house 44-gallon drums of oil and other farm management materials.

Memorial Headstone

A Memorial headstone (refer **Plate 10**) is situated close to the modern farm residential building. It commemorates Peter Brougham Docker (1917-2016) and Prudence Margaret Docker 1927-2014).

Plate 10: Memorial Headstone

Landscape Elements

A major feature of the landscape is the wind break perimeter plantings along Razorback Road of what appears to be Cypress Pines. These intentionally planted pines create a visually pleasing framework marking the boundary of the Project Area and defining the route along Razorback Road. A pleasing visual amenity is provided by these mature trees acting as a landscape marker for some distance. Historic aerial photography would indicate some of these plantings were in place in 1964, with the 1973 aerial showing an expansion of the trees in the interim decade. The Cypress Pines are shown as **Plate 11**.

Plate 11: Cypress Pine Windbreak

Archaeological Potential

Historic research indicates the property has no written evidence of any structures and early historic aerial imagery confirms the land has been extensively cleared. While the Project Area is within the Turon Goldfields historic gazettal, no physical evidence of historic gold mining activity was found.

The Project Area is operated as a pine plantation and its condition is wholly related to that activity. The landscape on the gentler north and north-western slopes has been cleared, whilst the south-eastern corner of the property featuring steep slopes has been left as bushland. The land generally has been subjected to various farm management practices over a long period of time.

The machinery shed presents as an original fabric structure using vernacular farm building construction practices and timber off the property. The modern residence and associated outbuildings, modern infrastructure items such as water tanks and windmill are in good condition but are of no heritage interest.

The machinery shed has likely been modified to establish the raised workshop area in the western section apparent from its underpinnings.

There are no moveable heritage items at the site. The Project Area has no historic archaeological potential.

Assessment of Heritage Significance

The Mid Western Regional Council LEP (2012) does not list any items of local heritage significance being present on or near to the Project Area. The field work carried out as part of this heritage assessment has likewise not found any historic heritage item, nor has any potential historic heritage item been identified. There are no items of moveable heritage. Hence, no heritage significance assessment is necessary or warranted.

The Project Area contains no significant historic heritage items. This finding aligns well with the historic research conducted of land titles for the property. That research confirms “Turonfels” was primarily used as an agricultural holding with no permanent or part time residential housing erected until recent times.

8.7.5 Mitigation and Conclusions

The Project site has no heritage items or heritage potential to add to the understanding of New South Wales development.

The sole structure of note, due to its form, is a corrugated iron machinery shed which cannot be classified as historically significant and does not provide opportunity for significant research potential. Similarly, the Cypress Pine plantings along Razorback Road while not of significance are aesthetically pleasing and perform a completely functional task as a wind break.

From inception as an agricultural holding in 1909, through to present time, there has been successive clearing, development and modifications to the landscape solely aimed at furthering the returns of agricultural and primary production activities. For this reason, the property was never used historically as a place of residence and no historic farm buildings were erected.

The following recommendations have been proposed:

- Should the machinery shed proposed to be moved, modified, or demolished at a later date archival photography should be conducted to record the rudimentary building methodology used, and
- All efforts should be made to retain and maintain the Cypress Pine wind break along Razorback Road.

Further details on the **Historic Heritage Assessment** are provided in **Appendix L**.

8.8 Visual

8.8.1 Introduction

A **Visual Impact Assessment** (VIA) has been prepared for the proposed development by Integrated Environmental Management Australia (IEMA). The purpose of this assessment was to provide a qualitative and quantitative assessment of the potential visual impacts generated by the development. The assessment was also prepared to determine the most appropriate visual treatments to mitigate visual impacts from the Project.

The assessment has also been prepared to address the SEARs requirements and has considered the potential visual impacts that the proposed quarry may have on private landowners in the vicinity of the development, as well as key vantage points in the public domain, including any potential new landforms.

The full **VIA** is provided as **Appendix M**.

8.8.2 Existing Environment

Land Use

The 327 ha of property on which the quarry will be located is used for the for the following:

- 68% (222 ha) is planted as pine plantation which are at various stages of progression. This includes recently planted tube stock to mature plantations through to areas that have been recently harvested and not yet re-planted.
- 19% (61 ha) is wooded area or remnant vegetation made up of native and non-native species and includes the dwelling and yard area.
- 13% (44 ha) is access tracks and grassland areas through and surrounding the plantation. This includes a former pasture area around the proposed quarry and the plantation firebreaks.

Surrounding Land Use

Surrounding lands are primarily larger agricultural holdings undertaking mixed grazing, along with scattering of pine plantations and other agricultural uses. North of the quarry is a newly planted pine plantation. Lands beyond the subject land are predominately cleared and appear to be used for grazing with some slopes remaining vegetated. A dwelling is located just over 1 km to the north, in the neighbouring Dog Rock Creek catchment.

To the east, pine plantation extends over 1km to the dwelling on the subject land. The Castlereagh Highway is over 2km to the north-east. Three dwellings not associated with the subject land are located approximately 2 km to the north-east.

Located within 60 m of the quarry pit edge is Two Mile Creek. Pine plantation is to the south-east and extends into native vegetation within the Gibbons Creek catchment. Here the land is steeper with a large portion consisting of native timber. There are four dwellings south, with the nearest only 1200 m from the quarry.

There are three dwellings to the west of the subject land. The nearest is 250 m from the quarry pit edge and is a cluster of buildings previously used an accommodation facility.

Topography and Drainage

Elevation of the land in the project area ranges from 1057 to 1062 m Australian Heigh Datum (AHD) along the access road. Quarrying will occur between 1083 and 1055 m AHD. Out of pit bunding and emplacement will extend to 1053 m AHD. Proposed dams are at 1049 m AHD and 1058 m AHD. The office workshop area will be at approximately 1062 m AHD.

Water drains to the south into the Two Mile Creek headwaters, or to the north into an unnamed tributary of Two Mile Creek. Two Mile Creek then drains to the south-west and west before entering the Crudine River. The Crudine River flows into the Turon River, which then extends into the Macquarie River near Hill End, approximately 40 km west of the subject land.

Outside the project disturbance area, water drains south-east through Gibbons Creek, which drains into Running Stream, then Round Swamp Creek before reaching the Turon River.

Roads and Access

Three roads will provide access to the quarry. Castlereagh Highway is a sealed three-lane arterial road which connects Lithgow and Mudgee. There is a formalised intersection with a protected right turn onto Razorback Road. A deceleration lane is provided for vehicles turning left into Razorback Road. Turning from Razorback Road onto Castlereagh Highway is a two-lane southbound section of highway. Given this intersection is recently constructed by TfNSW and logging has occurred for a long time in the area, the intersection should be adequate for the anticipated traffic from proposed development with no further works required.

Razorback Road is a local gravel road. It is likely this road will need to be sealed at the intersection where it meets the private haul road, approximately 1 km from the Castlereagh Highway, to ensure dust and noise are minimised.

The private haul road will currently use the upgrades from the existing gravel plantations roads before diverting to a 1,000 m long section of gravel haulage road specific for the quarry. To prevent materials from tracking onto the public road, a shaker grid will be installed which connects to a minimum of 30 m of sealed section prior to meeting with Razorback Road.

Vegetation

Majority of the subject land (over 80%) has been historically cleared of native vegetation and is used as pine plantation. The older trees which were harvested in 2022 were planted in 2000 and at the time of harvesting stood more than 18 m tall. Current pines in the area were planted in 2020 and are approximately 2 – 2.5 m tall. This indicates a projected growth rate of the pines at approximately 0.8m per year.

It is predicted by the end of Stage 4 of the quarry, the pines surrounding quarry will provide a screen of trees that are at least 16 m in height reducing dust, noise, and visual impacts from the quarry.

The plant community type (PCT) has classified much of the site as non-native. A small section of land immediately to the south-east of the quarry consists of:

- Apple Box – Yellow Box dry grassy woodland of the South-eastern Highlands Bioregion; and
- Red Stringybark – Brittle Gum – Inland Scribbly Gum dry open forest of the tablelands – Southeastern Highlands Bioregion.

Vegetation communities south of the development on Two Mile Creek consist of:

- Apple Box – Yellow Box dry grassy woodland of the South-eastern Highlands Bioregion; and
- Yellow Box – Blakelys Red Gum grassy woodland on the tablelands – South-eastern Highlands Bioregion.

The quarry and access roads will not require the removal of any trees. Upgrades to Razorback Road have been designed to avoid removal of trees where possible. The quarry development has also been designed to avoid tree clearing and development is unlikely to impact any native grasslands.

8.8.3 Methodology

The following is an outline of the VIA methodology used:

1. **Scope and Objectives:** Define the scope and objectives of the VIA study, including the project site and surrounding area, the types of potential visual impacts, and the stakeholders to be considered.
2. **Baseline Data Collection:** Collect baseline data on the existing visual conditions of the project site and its surroundings, including views from public viewpoints, land use patterns, and visual quality characteristics of the landscape and locate potential receptors.
3. **Desktop Initial Visual Impact Analysis:** An initial viewshed was performed using the identified receptors to evaluate areas of potential visibility. Evaluate the potential visual impacts of the proposed development within the project site and its surroundings, considering the scale, massing, design, and materials of the development. From this initial desktop analysis, the areas of highest potential visibility were identified.
4. **Site Inspection:** The Site inspection included inspection of the proposed quarry design to assess current vegetation, amenity, character, creek lines and existing infrastructure. An inspection of the identified receptors with high potential visibility was undertaken and photos taken to include in the reporting.
5. **Visual Impact Analysis:** Analyse the visual impacts using qualitative and quantitative methods such as an additional viewshed analysis on chosen receptor locations, maps, and photographs taken during the site inspection.
6. **Mitigation Strategies:** Identify and evaluate potential mitigation strategies to reduce the visual impacts of the proposed development project, such as changes to the design, landscaping, and screening.
7. **Evaluation of Alternatives (if necessary):** Evaluate alternatives to the proposed development project, including different locations, scales, and designs, to identify potential alternatives that may have fewer visual impacts.
8. **Stakeholder Engagement:** Stakeholder engagement will be conducted by PPP.

Zone of Theoretical Visibility

Analysis of the site was performed utilising GIS analysis tools and a proposed Civil 3D design model to create the theoretical visual catchment of the proposed quarry. This process also identified potential receptors.

A Zone of potential Theoretical Visibility (ZTV) was prepared as part of this VIA for each of the receptor areas nearest to the project or in areas with the most potential impact. The location of potential visibility was determined and combined to form the view catchment. From this analysis, it was determined the nearest receptor areas that had the potential to be impacted by the proposed quarry and as such determined the areas to investigate during the site inspection.

It is important to note that the model is based on bare earth conditions and as such does not include any screening that existing or future bunding or vegetation screening might provide. This provided a conservative position ahead of validation through the site inspection.

Figure 32 below shows receptor areas and potential ZTV catchments.

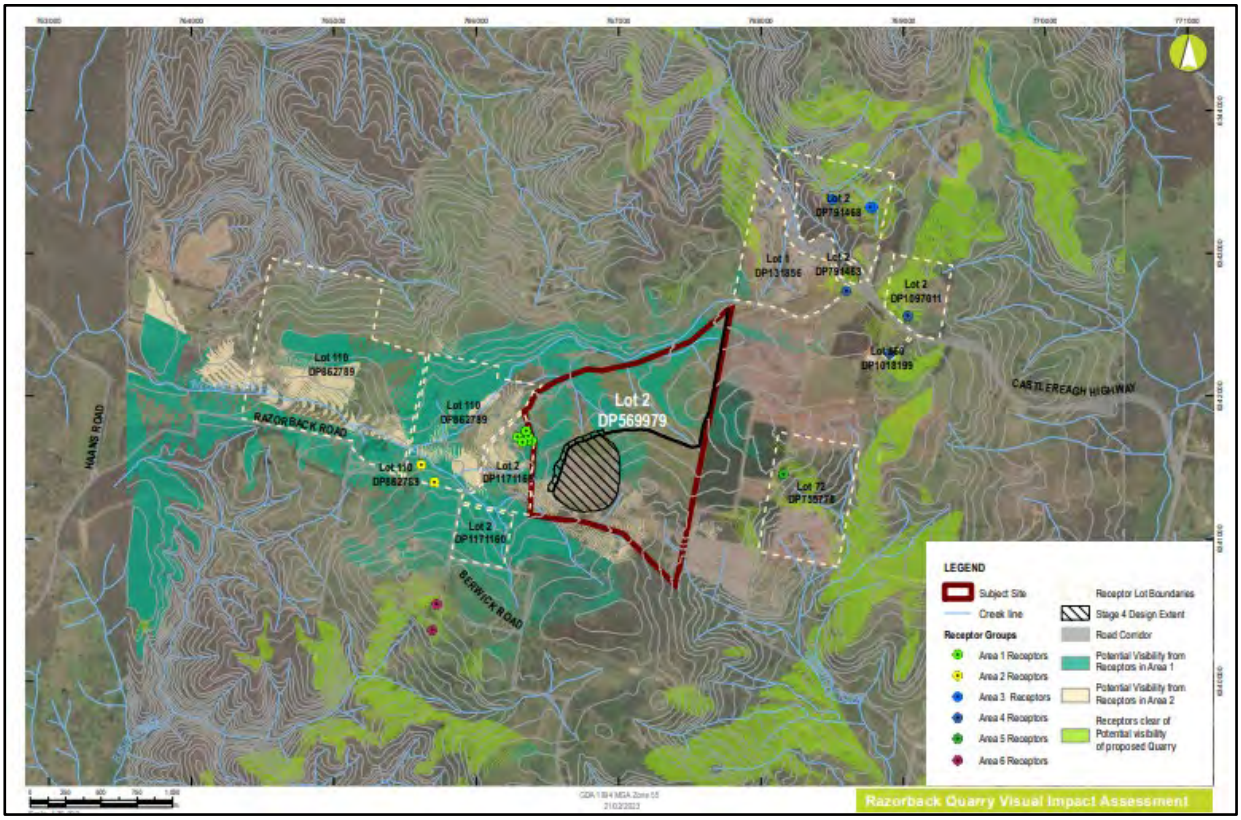

Figure 32: ZTV for all Receptors Near the Subject Land

Receptors

The receptors for this VIA were identified through the desktop study which involved aerial photography, GIS data and ZTV mapping. Based on the assessment, six potential receptors areas were identified near the subject land.

Two (2) of the six receptor areas were identified as in the potential ZTV. This included private residences (project related residences were excluded). A third point (VP3) was selected for the VIA as it was on a public road that was elevated and had regional views back across the site. This is the route the residents from area 6 would take when leaving their properties and heading back to the Castlereagh Highway.

Figures 34, **36**, and **38** show the ZTV for the three nearest receptors listed as VP1, VP2 and VP3.

Receptor Sensitivity Rating

For each of the receptors a VIA is required to establish a Receptor Sensitivity Rating. Receptor sensitivity includes factors such as:

- Receptors interest in the visual environment based on its everyday visual environment and the duration,
- Receptors viewing opportunity, and
- Number of views and distance/angle of view and the extent of screening/filtering of the view.

Table 39 details the Receptor Sensitivity Rating criteria used for this VIA.

Table 39: Receptor Sensitivity Rating

RECEPTOR SENSITIVITY	DESCRIPTION
High	• View is of high importance to the receivers. • High number of receivers. • View to landscape that is rare or unique and vulnerable to change. • View is of heritage sites, scenic routes, lookouts, or regionally important locations. • Majority of project is exposed to receivers.
Moderate	• Some elements of the project can be seen by receivers.

	• Medium number of receivers (rural communities or townships). • View is not scenic but offers quality views for travellers along roads. • View is representative of local character or sense of place but are not rare or unique. • Viewers have moderate interest in their surrounds.
Low	• There is a small number of receivers in the area. • Visual character is of low scenic quality or importance. • Viewers have low interest in the landscape or scenic qualities (e.g., commuters, workers). • Minimal elements of the project can be viewed.
Negligible	• There are minimal or no receivers in the area. • No elements of the project can be viewed.

Magnitude of Change

The magnitude of change is the degree of change to the landscape. It takes into consideration the scale, intensity, extent, and duration of the impact. This includes the loss or addition of any landscape features to the existing landscape.

Table 40 details the ratings of the magnitude of change using High, Moderate, Low or Negligible. Definitions are illustrative only and there is no defined boundary between levels of impacts.

Table 40: Magnitude of Change Rating

MAGNITUDE OF CHANGE	DESCRIPTION
High	**Dominant Change** • Major change in view at close distances, affecting substantial part of the view. • continuously visible for a long duration or obstructing a substantial part or important elements of the view. • Overwhelming loss or additional features in the view such as the nature of view or character of landscape fundamentally changed. • Views to key landscape features affected. • Visual amenity of local residents or road users substantially diminished. • Substantial change to the landscape due to loss of and or change to elements, features or characteristics of the landscape creating an overall worsening of landscape quality.
Moderate	**Considerable Change** • Clearly perceptible changes in views at intermediate distances resulting in either distinct new element in a significant part of the view or a more widely ranging, less concentrated change across a wider area. • Significant loss or addition of features in the view, such that nature of view or character of landscape is altered. • Noticeable contrast of any new features in the view such that the nature of the view or landscape character is changed. • Noticeable contrast of any new features or changes compared to existing landscape. • Views to key landscapes partially obstructed but views remain intact.
Low	**Noticeable Change** • Minor memorable change to the landscape or views. • Temporary or reversible impact. • Landscape dominant element and built form/ development well integrated within it. • Little permanent change or no fundamental change to local landscape character.
Negligible	**Barely Perceptible Change** • No memorable or rarely perceptible change to landscape character or key views.

Visual Impact Significance on Landscape

The Visual Impact Significance is rated using the criteria listed above and calculated using the 5 x 5 matrix shown in **Table 41**. This is based on the information collected during the site inspection, the assessment of the ZTV and the photomontages produced as part of the VIA.

Impacts that constitute a substantial change to the visual environment are likely to be more significant than the impacts that do not cause substantial change.

Table 41: Visual Impact Significance Rating Matrix

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

8.8.4 Impact Assessment

Photomontage Images

Photographic imagery was taken of the site on 12 January 2023 to assist with the assessment of visual impacts. Three photomontages were prepared to assist with the process.

Three receptors (VP1, VP2, and VP3) were used as the base case for the photomontages. They were selected based on their sensitivity and proximity to the site.

A digital model of the quarry at the Stage 4 disturbance footprint has been used for the photomontages as this represents the maximum impact of disturbance and is considered a worst case. Stage 4 is not expected to occur until 14 years after commencement of the quarry.

Two (2) photomontages were from the residences closet to the subject land. Another was from a public road which adjoined to an access road used by two more private residences (who are not able to see the site from their properties).

Table 42 provides a description of the three viewpoints used in the photomontage. The location of VP1, VP2 and VP3 are shown on **Figures 34**, **36**, and **38**.

Table 42: Receiver Description

VIEWPOINT	LOCATION	DISTANCE TO EDGE OF EXTRACTION AREA	DIRECTION
VP1	Cottages of Moonraker	316 m	West
VP2	Razorback Road	804 m	West
VP3	Berwick Road	865 m	South-west

Viewpoint 1 – Cottages of Moonraker

The following photomontages show the view looking east back across the project site from the back veranda on the main house.

Viewpoint 1 - (Cottages of Moonraker) from the back veranda as of January 2023

Viewpoint 1 - (Cottages of Moonraker) when development is in Stage 4 of operations.

Figure 33: Viewpoint 1 – Photomontage (Cottages of Moonraker)

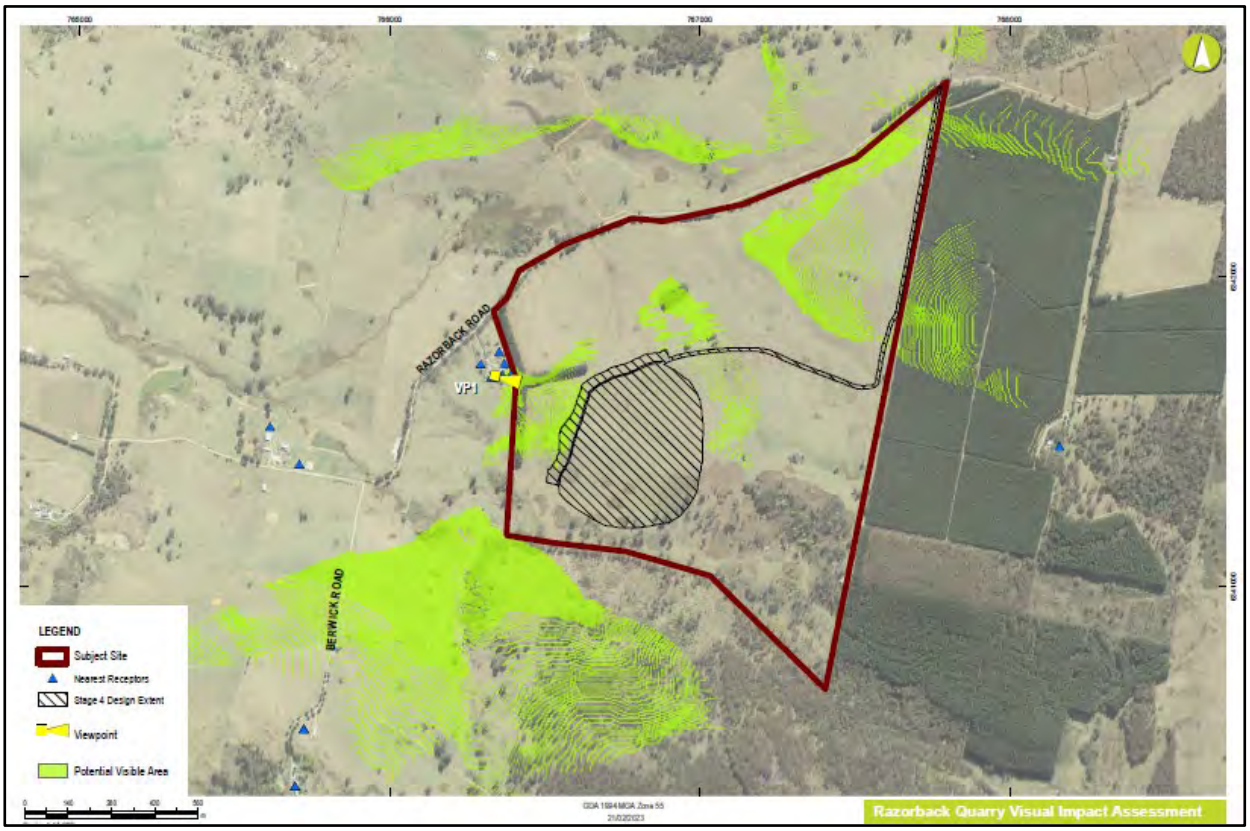

Figure 34: ZTV for Viewpoint 1 (Cottages of Moonraker)

Table 43: Receptor VP1 (Moonraker Cottages)

RECEPTOR - VP1	SUMMARY OF VISUAL IMPACT ASSESSMENT
Receptor Location	Cottages of Moonraker (rear veranda of main house)
Visual Baseline Description	• The site beyond the receptors fence towards the proposed quarry is under pine plantation. Juvenile pine trees were planted at the end of 2020 and are now at a height of approximately 2-2.5 meters. • View of the proposed quarry is obscured by an existing row of mature pine trees and existing buildings and landscaping on the property.
Receptor Sensitivity	Low
Magnitude of Impact	Low
Impact Significance	Low
Mitigation Measures	• Establishment of a visual bund. Beyond the bund no part of the working quarry will be visible. • The existing height of the trees in the existing pine plantation (established 2020) between the site and the receptor are approximately 2-2.5m tall. They are expected to reach a height of 16-18m growing at a rate of 80cm/year. In a relatively short period of time, it is expected that no part of the development will be visible from VP1 due to the establishment of the plantation.

Viewpoint 2 – Razorback Road

The following photomontages show the view looking north -east back across the project site adjacent to the properties at VP2.

Viewpoint 2 - (Razorback Road) as of January 2023.

Viewpoint 2 - (Razorback Road) when development is in Stage 4 of operations.

Figure 35: Viewpoint 2 – Photomontage (Razorback Road)

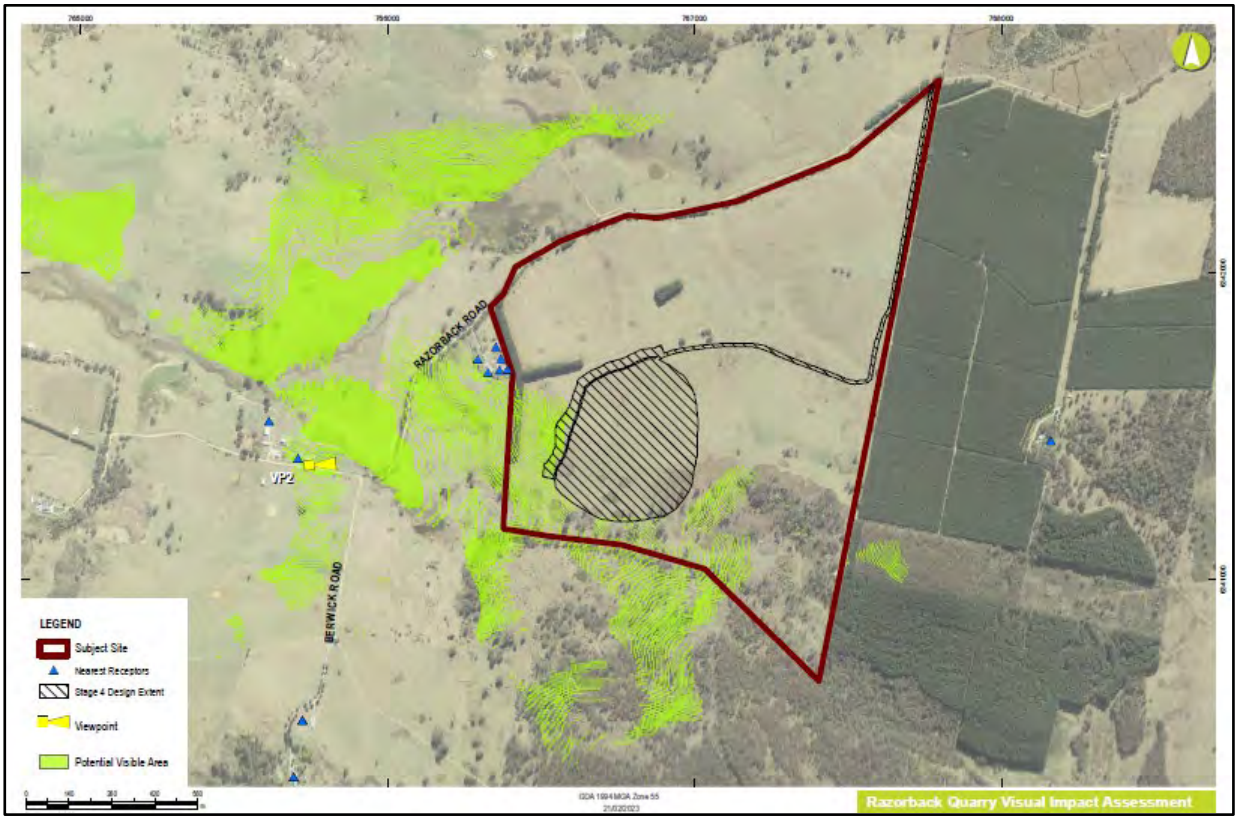

Figure 36: ZTV for Viewpoint 2 (Razorback Road)

Table 44: Receptor VP2 (Razorback Road)

RECEPTOR – VP2	SUMMARY OF VISUAL IMPACT ASSESSMENT
Receptor Location	Razorback Road
Visual Baseline Description	• Site is over 800m from VP2 and is in the background of the regional view shed. • The area around VP2 is predominantly cleared lands. • An existing row of mature pine trees partially blocks the view of the proposed quarry. • Two Mile Creek is in the mid-view near and to the right of VP2.
Receptor Sensitivity	Low
Magnitude of Impact	Low
Impact Significance	Low
Mitigation Measures	• The distance from VP2 to the site means the proposed quarry will not be dominant in the landscape. • Establishment of a visual bund. • The current height of the trees on the pine plantation (established 2020) between the quarry site and the receptor VP2 are approximately 2-2.5m tall. They are expected to reach a height of 16-18m growing at a rate of 80cm/year. In a relatively short period of time, it is expected that no part of the development will be visible. • An approximate tree height for mature pines has been projected onto the photomontage using the existing row of mature trees as a reference. When fully grown the trees will block the view of the quarry.

Viewpoint 3 – Berwick Road

The following photomontages show the view looking north-east back across the project site adjacent to the properties at VP3. There is no receptor at this location rather it is part of the view the residents travelling along the roadway may observe. Note the road at this point is travelling in a northerly direction so to see this view the driver would need to be looking northeast from the roadway.

Viewpoint 3 - (Berwick Road) as of January 2023.

Viewpoint 3 - (Berwick Road) when development is in Stage 4 of operations.

Figure 37: Viewpoint 3 – Photomontage (Berwick Road)

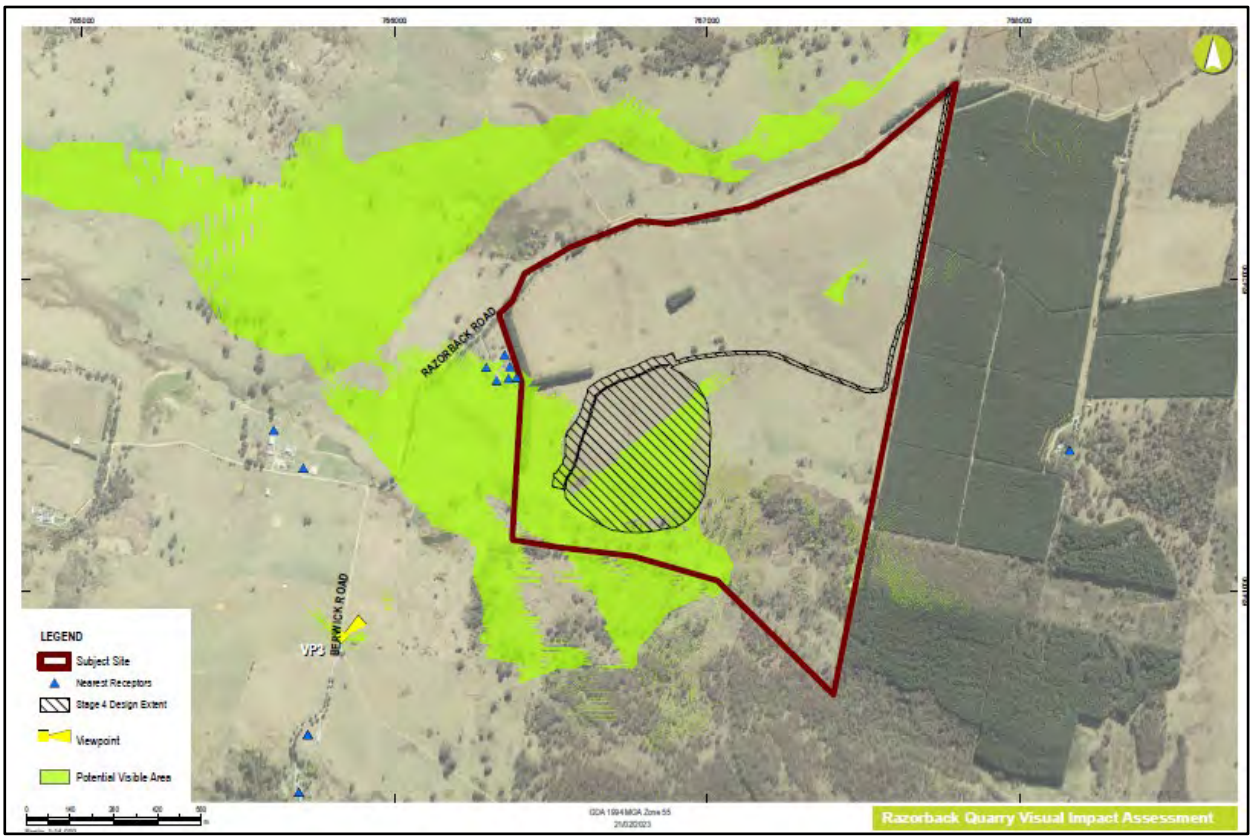

Figure 38: ZTV for Viewpoint 3 (Berwick Road)

Table 45: Receptor VP3 (Berwick Road)

RECEPTOR – VP3	SUMMARY OF VISUAL IMPACT ASSESSMENT
Receptor Location	Berwick Road
Visual Baseline Description	• Site is over 850m from VP3 and is in the background of the regional view shed. • The area around VP3 is predominantly cleared lands and agricultural views. • An existing row of mature pines and existing native vegetation partially block the view of the proposed quarry. • The view is from a roadway adjacent to the houses in Area 6 but is not a view from a specific residence.
Receptor Sensitivity	Low
Magnitude of Impact	Low
Impact Significance	Low
Mitigation Measures	• The distance from VP3 to the site means the proposed quarry will not be dominant in the landscape. • Establishment of a visual bund will provide some mitigation. • Existing native vegetation (not to be cleared) obscures part of the quarry from the view. • The final landform of the quarry remains below the horizon and will be progressively rehabilitated where available. • The current height of the trees on the pine plantation (established 2020) between the quarry site and the receptor VP3 are approximately 2-2.5m tall. They are expected to reach a height of 16-18m growing at a rate of 80cm/year. In a relatively short period of time, it is expected that no part of the development will be visible.

8.8.5 Mitigation and Conclusions

The zone of theoretical visibility identified only two (2) receptors where the site might be visible. Existing vegetation (pines and native vegetation were not included in the initial desktop assessment to identify worse case). A third site was selected to be included in the VIA from Berwick Road at a higher elevation. This road services two (2) additional houses which do not have a view across the quarry. There will also be minimal impact on other local roads as no major clearing at the site is required.

Using computer modelling, photographs, and additional information collected during a site visit, three (3) photomontages were produced to demonstrate how much of the quarry would be visible at Stage 4 of the quarry development. Stage 4 was selected because it was the greatest area of disturbance during the life of the quarry.

Mitigation measures have been proposed to help reduce the visual impacts. These include:

- The quarry has been designed and positioned on the site to ensure it will not be dominant in the landscape. In some cases, existing planted pines and native vegetation obscure the site from the view (including from Razorback Road).
- A visual bund will be constructed along the western side of the quarry.
- The final landform of the quarry remains below the horizon and will be progressively rehabilitated where available.
- The internal roads and site infrastructure (weigh bridges and offices) are located away from the view of receptors.
- The proposed site is located inside an existing pine plantation that will eventually obscure any views. The current height of the trees in the pine plantation (established 2020) are approximately 2-2.5m tall. They are expected to reach a height of 16-18m when fully grown, growing at a rate of 80cm/year.

At all three (3) nominated sites the significance of the visual impact was assessed using criteria relating to receptor sensitivity and the magnitude of change. A rating of LOW was determined at all three (3) locations.

Full details of the **VIA** are provided in **Appendix M**.

8.9 Land Resources

8.9.1 Introduction

A **Land Resources Assessment** (LRA) has been prepared by VGT. The purpose of this **LRA** is to address the SEARs, including an assessment of:

- potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management, and remedial measures,
- potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds etc), and
- the compatibility of the development with other land uses in the vicinity of the development, in accordance with the requirements of Clause 12 of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

This assessment describes the proposed Land Resources management system for the Site and clarifies how potential impacts generated by the development will be managed.

A copy of the full **LRA** is provided in **Appendix N**.

8.9.2 Existing Environment

The following provides an overview of the existing environment in relation to land resources across the site.

Land Use

Current Site

The 327 hectare property is currently comprised of the following land uses:

- 68% or 222 ha is planted out as pine plantation at various stages of progression, from recently planted tubestock to mature plantations through to areas that have been recently harvested and not yet re-planted,
- 19% or 61 ha is other wooded or remnant vegetation, comprising both native and non-native species and includes the dwelling and yard area, and
- 13% or 44 ha is comprised of access tracks and grassland areas through and surrounding the plantation area that are not planted as plantation. This includes a former pasture area around the area of the proposed quarry and the plantation firebreaks.

Surrounding Land Use

North of the quarry is a newly planted pine plantation within the subject land extending out over 450 m north of the quarry before meeting Razorback Road. Land beyond the Subject Land is predominantly cleared and appears to be used for grazing. A dwelling is located just over 1km to the north, in the neighbouring Dog Rock Creek catchment that is orientated to the north away from the quarry.

East of the quarry pine plantation extends over 1 km east to the dwelling on the Subject Land. The Castlereagh Highway is just over 2 km to the north-east. Three dwellings not associated with the Subject Land are located approximately 2 km to the north-east. Lands outside the subject land are predominantly cleared and likely used for grazing, with some of the slopes remaining vegetated.

Approximately 60 m of the quarry pit edge is Two Mile Creek, located just within the southern boundary of the Subject Land. South-east of the site is pine plantation extending into native vegetation within the Gibbons Creek catchment the land is steeper with a large portion under native timber. The remaining lands are substantially cleared and used for grazing. There are four dwellings south of the quarry, the nearest is just over 1200 m from the quarry.

Pine plantation extends for over 170 m from the quarry, before the Subject Land boundary that is just over 220 m from the quarry pit edge. Beyond the subject land the majority of the area is within the Two Mile Creek catchment and is cleared and used predominantly for grazing. There are three dwellings located to the west of the property. The nearest is 250 m from the quarry pit edge and is a cluster of buildings previously used as an accommodation facility called Moonraker.

National Parks

NPWS managed lands in the locality include:

- The Caperteee National Park approximately 10 km to the east of the site,
- Mugii Murumban State Conservation Area approximately 16 km to the southeast of the site,
- Gardens of Stone National Park approximately 18 km to the southeast of the site,
- Turon National Park approximately 16 km to the south-southeast of the site, and
- Winburndale Nature Reserve approximately 17 km to the south of the site.

Geology and Soils

Geology

The site is situated west and on the foothills of the Blue Mountains Range west of Sydney, NSW. The contact between the Triassic and Permian aged suites is approximately 500 m west of the site.

The local geology is the lower most portion of the Narrabeen Group, of which is most likely to be part of the Caley Formation which is Claystone, Shale, and Quartz Lithic Sandstone (source Western Coalfield (Southern Part) 1:100,000 NSW Mines Department Geological Sheet. The surface exposures are sparse and small farm borrow pits show poorly consolidated conglomerates, with sandstone and clay matrix.

Soils

The soils on the Site are identified as Turonfels on the Environment NSW eSpade online data viewer. This soil landscape comprises undulating to rolling low hills with the dominant soils being red earths on mid to upper slopes, and yellow podzolic soils and yellow earths on lower slopes. Chocolate soils and skeletal sands and loams also occur on upper slopes.

Topsoils run to a depth of approximately 20 cm are dull yellowish-brown loam, fine sandy with weak polyhedral peds; the pH is approximately 6.5. Subsoils show a sharp change to dull yellow orange fine sandy clay loam with weak structure; pH 6. They are moderately permeable, have a moderate to high erodibility and a moderate erosion hazard. Below the soil layers run sandstone, shale, conglomerate, and siltstones, which are much lighter in colour.

Soil Erosion Characterisation

The likely soil loss is calculated with the Revised Universal Soil Loss Equation (RUSLE). The values of the other RUSLE factors are - P of 1.3 and the C is assumed to be 1.0 for bare soil.

The potential soil loss of the site has been calculated using *Managing Urban Stormwater, Soil and Construction, Volume 2E Mines and* Quarries for a 90th percentile, 5-day rainfall event assuming a non-sensitive receiving environment.

The Soil Hydrological Group for the soil materials is assumed to be D, very high run-off potential. Water moves into and through these soils very slowly when thoroughly wetted. They regularly shed run-off from most rainfall events.

Slope gradients are *low* to *moderate*, potential erosion hazard is *moderate*, soil erodibility is *moderate* to *high*, the soil texture group is Type D, soil loss class is 1 to 6, and the calculated soil loss is up to 1300 tonnes/ha/yr (see Table 5 of **LRA** attached as **Appendix N**).

Topography

The Site is undulating to rolling low hills with elevations from 1,040–1,090 m. Slopes range from 6–20%, with slope lengths from 400 – 900 m. Drainage lines are few and variably spaced.

Land and Soil Capability

The LSC mapping describes the site's most limiting factor as *4- Moderate to severe limitations*. A site-specific assessment has been undertaken using the Land and Soil Capability Assessment Scheme.

The current and proposed final landform has been assessed using the OEH *The Land and Soil Capability Assessment Scheme (second approximation) - A General Rural Land Evaluation System for NS*W (LSCAS). The scheme defines LSC classes based on the biophysical features of the land. These biophysical features determine the on-site and offsite limitations and hazards of the land and include soil type, slope, landform position, acidity, salinity, drainage, rockiness, and climate.

The landform assessment prior to disturbance is summarised in **Table 46** below.

Table 46: Land Capability Assessment of Existing Area

ASPECT	DETAILS	LAND CAPABILITY CLASSIFICATION
Water Erosion Hazard	Slope along the proposed quarry site east to west and north south ranges from 5-10% (Table 4 of LSCAS, **Appendix N**). (The site is assumed to lie in the Eastern and Central Division)	Class 3
Wind Erosion Hazard	Soil texture is considered to resemble a fine sandy loam most closely with 6-13% clay, therefore the Wind erodibility class of surface soil is 'moderate' (Table 5 of LSCAS, **Appendix N**). Annual average rainfall is around 800 mm per annum and the site lies within a Moderate Wind Erosive Power area (Figure 6 of LSCAS, **Appendix N**).	Class 4

	The exposure to wind is high due to the ridgeline topography.	
Soil Structure Decline Hazard	Soils most closely resemble fine sandy loam soils with no texture modifiers such as sodicity i.e., fragile light textured soil.	Class 3
Soil Acidification Hazard	The soils most closely resemble Red Earth/Yellow Earths/chocolates soils (Table 9 of LSCAS, **Appendix N**). These soils have a medium buffering capacity. Annual average rainfall is around 800 mm per annum.	Class 3
Salinity Hazard	Recharge potential is considered low due to the ridgeline setting. Discharge potential is considered low as the site is well above the groundwater table. The salt store is considered Low.	Class 1
Water Logging Hazard	The soils rapidly drain and are moderately well drained.	Class 2
Shallow Soil and Rockiness Hazard	The extension area has nil rocky outcrops (Table 15 of LSCAS, **Appendix N**).	Class 1
Mass Movement Hazard	No mass movement of soil has been noted.	Class 1
Final LSC Class		**Class 4**

Class 4 land is described as:

> ***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.*

Land Contamination

EPA Contamination Land Register

A search of the NSW EPA Contaminated Land Register shows that the site has not been notified to the EPA. The proponent advises that there are no dangerous goods held on site.

Contaminants of Potential Concern

Table 47: Site Use Summary and Associated Potential Contaminants

SITE USE / CONTAMINANT SOURCE	POTENTIAL CONTAMINANTS	VOLUMES HELD / CONTROL METHODS
Weed and pest spraying	Herbicides and Pesticides (OCP's and OPP's)	Weed and Pest control is undertaken by licenced contractors. Chemicals are not stored on site and only minor amounts are used.
Fuel Storage	Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl benzene, Xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs)	No Fuel is stored permanently on site. Refuelling is conducted in-pit by mobile service vehicles. Re-fuelling vehicles will carry spill kits and catch trays.
Oils/Solvents/Lubricants in production and maintenance	Hydrocarbons	No oils, solvents or lubricants are to be stored on site. All scheduled vehicle and machinery maintenance is to be conducted off site. Should emergency onsite servicing or repairs be required, mobile service vehicles will carry spill kits and catch trays.

Climate

Climatic conditions at Running Stream are considered to be Cfb according to the Köppen-Geiger climate classification i.e., warm, and temperate with significant rainfall.

Rainfall data sourced from the Bureau of Meteorology (Lithgow - site 063224) records an average annual rainfall of 862 mm with higher rainfall experienced during the summer months. The mean annual average temperature is 18.5ºC and the mean annual minimum temperature is 6.4ºC. Morning winds are predominately westerly with a smaller component of north westerly and south westerly winds. Afternoon winds are similar in direction but stronger.

8.9.3 Land Resource Impacts and Mitigation

Land Use

Land Use Conflict Risk Assessment

The DPI's Land Use Conflict Risk Assessment (LUCRA) is used to identify potential land use conflict with sensitive receptors including surrounding agricultural land uses. The LUCRA is to address separation distances and management practices to minimise odour, dust, noise impacts on sensitive receptors including surrounding agricultural land uses.

A Risk Ranking Matrix is used to rank the identified potential land use conflicts. The risk ranking matrix assesses the environmental, public health and amenity impacts according to the:

- probability of occurrence, and
- consequence of the impact.

A rank of 25 is the highest magnitude of risk; a highly likely, very serious event. A rank of 1 represents the lowest magnitude or risk an almost impossible, very low consequence event. The objective is to identify and define controls that lower the risk ranking score to 10 or below.

Refer to Table 8, Table 9, and Table 10 of the **LRA** (see **Appendix N**) for the Risk Ranking Matrix, Probability Table, and Measure of Consequence.

The risk evaluation is provided as Table 11 of the **LRA** (refer **Appendix N**). Specific control measures are discussed in more detail within this report and associated specialist studies.

The LUCRA has identified and assessed several potential instances of land use conflict between the subject development and those existing land uses that surround the site. A number of the potential risks are already low (scoring less than 10) due to intervening separation distances and the prevailing topography. In these cases, no further mitigation is required.

Where the potential for conflict is real, this can be significantly reduced through the implementation of mitigation measures. All potential land use conflicts can be reduced to low (scoring less than 10) through the implementation of the following measures:

- Implementation of a water cart and re-vegetation to reduces nuisance dust,
- Clearing, extraction, hauling and land forming operations to be avoided in dry or windy conditions,
- Ensuring all sediment and erosion controls are in place prior to surface disturbing activities,
- Plant and equipment to meet industry standards for noise emissions,
- Visual and acoustic bunds will be established using topsoil and overburden,
- Clearing, extraction, hauling and land forming operations to be undertaken during consented hours,
- Refuelling to be undertaken in hardstand areas, and
- Fire extinguishers to be carried by plant and equipment.

The proposed mitigation measures are specific, easily understood, easily designed, and relatively easy to implement. With these measures in place the potential for land use conflict will be unlikely and of minimal consequence.

Compatibility with Other Land Users

The majority of the Subject Land is used for pine plantations. Surrounding lands are primarily larger agricultural holdings practising mixed grazing, along with a scattering of pine plantations and other uses. The operation of the quarry is permissible within the RU1- Primary Production zoned land within the Mid-Western Regional Council LGA and is compatible with the surrounding rural land uses. Sensitive receptors are generally located at least 1 kilometre from the project site and are not likely to be significantly impacted. The closest residence is located some 250 m to the west of the site, but the LUCRA has determined that the risk of potential impacts to the surrounding land users can be satisfactorily managed.

The quarry will be progressively rehabilitated to pasture and pine plantation with potential future use of the facilities area for forestry related activities, consistent with surrounding land uses.

Topography and Geotechnical Stability

Topography and Geotechnical Stability Impacts

The elevation of the land within the project area ranges from 1057 m to 1062 m AHD along the access road with quarrying occurring between 1083 m and 1055 m AHD. Out of pit bunding and emplacement is likely to extend down to approximately 1053 m AHD. Dams are proposed at 1049 m AHD and 1058 m AHD. The office and workshop area are at approximately 1062 m AHD. The final quarry topography and drainage has been designed such that it is commensurate with the surrounding land.

Geotechnical risks related from ground movement include such hazards as subsidence, landslips, toppling, settlement, heave, slumping, and fracturing are minimal. No underground activities are undertaken on the site and there is no history of underground working the risk of subsidence is considered negligible. The site is located in the 'Turonfels- Erosional' landscape which are described as having a low mass movement hazard.

The risk of dewatering or heave is also considered negligible given the site will not intersect groundwater nor are there any underground workings on the site. The weathered conglomerate and sandstone are not prone to swelling when wet, the prime cause of heaving. The strata do not contribute chemical leachates harmful to rehabilitation or environment.

Topography and Geotechnical Stability Mitigation

Material will be won by dozer ripping and excavator working in an east to west direction over two benches maintaining a batter between the quarry operations and the dwelling to the west. Batter slopes will be generally a maximum of 3 horizontal to 1 Vertical which are expected to be stable during extraction operations and within the final landform. No stockpiles will be stored on unstable slopes. Clean water diversions upslope will minimise the risk of water infiltration into the batter slopes.

The final landform will be a vegetated, stable, free draining bowl with the Dams 1 and 2 being retained. This will be compatible with surrounding land uses of forestry and agriculture.

Land Capability

Impact of Final Landform on Land Capability

The Land and Soil Capability class in the rehabilitated landform is expected to drop from LCS class 4 to Class 6 on the quarry final batters, primarily due to the increase in batter slopes within the final void. The pit floor will remain as Class 4 land. Class 6 land is described as:

> *'**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.'*

This land capability is suited to the proposed uses of low level grazing and forestry.

Refer to Table 12 of the **LRA** (see **Appendix N**) for the full land capability assessment details.

Mitigation Measures for Land Capability of Final Landform

No mitigation measures are proposed for the final landform as the land will be suitable for low level grazing and forestry.

Soils and Erosion

Soil Impacts

Impacts of soils erosion comprise two components, loss of soil from the site and entrainment of sediment to the downstream environment. Loss of soil from the site has a localised impact, predominately to the maintenance of vegetation and agricultural productivity over the affected area. Erosion that results in the entrainment of sediment may potentially impact the downstream environment if released.

Soil Mitigation

Topsoil Stripping and Storage

Prior to stripping topsoil, all water management features will be constructed to divert as much clean water as possible and capture the dirty water within the quarry sump. Prior to stripping, the vegetation will be sprayed for weeds to assist in reducing the weed content in topsoil.

Where possible topsoil will be stripped and emplaced on previously ripped completed faces. Stripping should not occur in either excessively dry or wet conditions. Grading or pushing soil into windrows for loading into rear dump trucks will be utilised as these are considered less aggressive soil handling processes. This process minimises compression effects of heavy equipment.

Where immediate reuse of the topsoil is not possible it will be stored appropriately on the perimeter of the site. Stockpiles should be located at least 5m from areas of likely concentrated or high velocity flows, eg. drainage lines and access roads. The surface of soil stockpiles should be left in as coarsely structured a condition as possible to promote infiltration and minimise erosion until vegetation is established, and to prevent anaerobic zones forming.

Topsoil stockpiles are not to exceed 2 m in height with a minimum crest width of 2 m and are to be seeded with a temporary vegetation cover if stockpiles are to remain longer than 12 months. If necessary, earth banks or drains will be constructed to divert localised surface water run-off.

Topsoil to a depth of 10 - 15 cm will be stripped first with the subsoils, if found, to a depth of a further 20 – 30 cm stripped and stored separately. The actual depth of stripping of each layer will be recorded and a total volume of topsoil and subsoils

estimated, and an inventory kept. Each stockpile location will be mapped, and barrier fencing will be installed to limit access to rehabilitated areas or the stockpiles.

Topsoil Quality

Topsoil will be sampled and analysed prior to respreading to determine if amelioration measures are required.

Topsoil Re-Spreading

Prior to re-spreading stockpiled topsoil, an assessment of weed infestation on stockpiles should be undertaken to determine if individual stockpiles require herbicide application and / or 'scalping' of weed species prior to topsoil spreading.

Where topsoil resources allow, topsoil should be spread to a nominal depth of 10 cm on all re-graded subsoils. Subsoils will be emplaced first over the battered overburden material used to create the final landform. The depth of subsoils should aim to replicate that of the original soil profile.

Topsoil should be spread, treated with fertiliser, and seeded in one consecutive operation to reduce the potential for topsoil loss to wind and water erosion.

Seedbed Preparation

All areas to be topsoiled should be lightly contour ripped to create a "key" between the soil and the spoil. Ripping should be undertaken on the contour and when soils are moist to achieve the best results. The respread topsoil surface should be scarified prior to, or during seeding, to reduce run-off and increase infiltration. This can be undertaken by contour tilling with a fine-tyned plough or disc harrow.

Topsoil Balance

Topsoil and subsoil resource has been estimated for the site using site survey. Site observations, during the resources assessment by VGT, indicates topsoil/subsoil ranges in thickness from 20 cm on the ridge to 50cm on the flanks. Actual topsoil volumes won will be recorded and a topsoil balance will be developed and maintained. An estimate of topsoil and subsoil volumes is provided below in **Table 48**.

Table 48: Estimated Topsoil and Subsoil Volumes

SOIL DESCRIPTION	ESTIMATED STRIPPING DEPTH (M)	AREA (M^2)	VOLUME ESTIMATES (M^3)
Overburden Bund Area	0.20	20,600	4,120
Stage 1 Topsoil	0.20	17,000	3,400
Stage 2 Topsoil	0.20	58,700	11,700
Stage 3 Topsoil	0.20	112,000	22,400
Total Estimated Topsoil Available			**41,300**
Stage 1 Subsoil	0.30	17,000	5,100
Stage 2 Subsoil	0.30	58,700	17,600
Stage 3 Subsoil	0.30	112,00	33,600
Total Estimated Subsoil Available			**56,300**

Overburden

The following overburden volumes (refer **Table 49**) have been calculated from the Resource Assessment prepared by VGT.

Table 49: Estimated Overburden

ITEM	THICKNESS (M)	AREA (M^2)	VOLUME (M^3)
Stage 1			
Overburden	0.5	17,000	8,500
Bund Wall Construction	Length 142 m	27	3,830
Stage 1 – Overburden Surplus / Deficit			**4,670**
Stage 2			
Overburden	0.5	58,600	29,300
Stage 1 and 2 Overburden Surplus / Deficit			**34,000**
Stage 3			
Overburden	0.5	113,000	56,400
Stage 1, 2, and 3 Overburden Surplus / Deficit			**90,400**

Overburden not required to construct the acoustic and visual bund wall will be used to batter final slopes or will be temporarily stored on the pit floor.

Erosion Control

The site is prone to moderate erosion, however this will be limited to the exposed worked areas of the quarry. Eroded soils and sediment will be captured within the in pit sump and will not leave the site. Slopes will be kept moderate where possible in the quarry to reduce the erosion hazard.

Generally, the control of erosion and sedimentation at the site will focus on source reduction measures. These measures will include:

- Reading any Surface Water Management Plan with any engineering plans and any other plans or written instructions issued in relation to development at the subject site,
- Ensuring contractors undertake all soil and water management works as instructed in this specification and constructed following the guidelines stated in the "Blue Book", and
- Inform all subcontractors of their responsibilities in minimising the potential for soil erosion and pollution to downslope areas.

All works are to be undertaken in the following sequence to minimise erosion potential:

- Topsoil in new areas will be surveyed, mapped and the texture, thickness and quality described prior to stripping. Topsoil and overburden not for immediate use will be stockpiled in appropriate areas and limited to 2m in height and revegetated with temporary ground cover species, mulching or chemical stabilisers or binders if they are to remain in place for more than 30 days. A minimum of 70 percent cover is required for both mulch and vegetative covers,
- Construct earth banks (Stormwater Collection Drains) to divert as much clean water as possible and capture the dirty water in the extraction area,
- Undertake extraction activities in the new area,
- Rehabilitate lands in exhausted areas with overburden then topsoil and revegetate,
- Install barrier fencing to limit access to rehabilitated areas, and
- Ensure management practices are carried out to minimise areas being affected by wind and water erosion.

Soil stabilisation is primarily achieved through the rehabilitation of exposed areas. Here, rehabilitation means achieving a C-factor (Revised Universal Soil Loss Equation) of less than 0.1 (equivalent of 60% groundcover) and the program that ensures it will drop permanently, by reducing the risk of erosion by vegetation, paving, armouring, etc. as soon as practicable after activities cease.

Cumulative Impacts

The downstream environment is not affected at present by any other extractive industry or land disturbing activity other than agriculture or forestry. As the operations, utilising the above management procedures, will release negligible volumes of sediment off-site, the operations are expected to have a similar impact on the downstream environment as is currently experienced due to agricultural activities. That is, the cumulative impacts due to potential erosion of soils resulting in sediment entering the downstream environment are considered negligible.

Geochemical Constraints

Geochemical Impacts

The site geochemistry provides a minor risk of pH levels below optimum levels for rehabilitation. The risk of acid mine drainage is considered to be negligible. There is almost negligible risk of spontaneous combustion due to the absence of carbonaceous material at the site.

The geochemistry is not expected to present any difficulties regarding overburden and topsoil management. The soils are somewhat dispersive and will be stored appropriately to minimise erosion if they cannot be immediately utilised.

There will be no tailings generated from the extraction process. Any weathered gravel or sandstone material exposed in the active faces of the quarry are considered chemically stable and do not constitute a risk to the environment during extraction or rehabilitation.

Geochemical Mitigation Measures

The soils on the site are slightly acidic and low to moderately saline. Appropriate amelioration measures may include liming and fertilising of the topsoil and any subsoils during rehabilitation activities.

Cumulative Impacts

The proposal is not expected to contribute any cumulative impacts to the geochemistry that cannot be managed by soil amelioration measures.

Land Contamination

Land Contamination Impacts

Potential contaminants such as hydrocarbons, herbicides and pesticides are likely to be used during site operations and may impact the land and surface water on the site. There is no other history of potential contaminated land.

Land Contamination Mitigation

The following will apply to ensure land contamination is minimised:

- Weed and Pest control is undertaken by licenced contractors. Chemicals are not stored on site and only minor amounts are used,
- No fuel is stored permanently on site. Refuelling is to be conducted in pit by a mobile fuel cart, and will carry a spill kit at all times, and
- No oils/solvents or lubricants are stored permanently onsite. All vehicle and machinery scheduled maintenance is conducted in off site, however emergency repairs and maintenance may be undertaken onsite from time to time. Maintenance contractors will carry spill kits at all times.

Cumulative Impacts

Use of fuels and herbicides and pesticides are typical in rural areas but there will be minimal volumes held on site. It is unlikely that the site operations will contribute to any significant cumulative impacts.

Weeds and Pests

Weed and pest inspections and control will be undertaken on a regular basis. Weed control will be undertaken by licenced contractors and reports supplied to the Proponent describing weed identification, numbers, and control measures.

Waste

The quarrying operations will not directly produce domestic or industrial waste. Domestic wastes will be placed in bins and removed by licenced contractors to a licenced waste facility. Effluent will be collected direct from an on-site portaloo.

Bushfire

The risk of bushfire is low within the disturbed area due to lack of combustible materials. However, equipment use may be an ignition source. Mitigation measures include:

- Refuelling to be undertaken in pit,
- Fire extinguishers to be carried by plant and equipment, and
- Emergency procedures for the site will be developed.

Further detail on Emergency Response is discussed in **Section 8.10**.

Noise

Noise mitigation measures will include:

- Construction and operations to be undertaken only during consented hours,
- Plant and equipment to meet industry standards for noise emissions, and
- A Visual and acoustic bund will be established using topsoil and overburden during the land clearing and extraction phases. The short-term impacts of noise due to construction will be offset by the long-term mitigation of noise impacts due to the bunds.

A detailed assessment of noise has been undertaken and is discussed in **Section 8.3**.

Dust

Dust mitigation measures include:

- Water cart to be deployed during active extraction operations,
- Extraction operations to be avoided in dry or windy conditions,
- Finished faces to be revegetated as soon as practicable,
- Nearest dwelling is 250 m to the west and upwind of the predominant westerly wind direction. Additional vegetation buffers will be established to mitigate dust impacts to this residence, and
- The closest downwind dwellings to the predominant winds are approximately 2 km.

A detailed assessment of dust has been undertaken and is discussed in **Section 8.2**.

Surface Water

Surface water impacts are generally mitigated by ensuring sediment and erosion controls are installed prior to disturbance. Surface water management is discussed in more detail in the **Section 8.5**.

8.9.4 Monitoring and Maintenance

Erosion and Sediment Controls

Monitoring of soil erosion, sediment, and water will be undertaken quarterly and will include:

- Topsoil stripping to be visually monitored to check moisture content of soil and depth of stripping,
- Stockpiles to be visually assessed at time of forming to check they do not exceed two metres high,
- Removal of spilled soil or other materials from hazard areas, including lands less than 5 m from areas of likely concentrated flows, especially waterways and access roads,
- Barrier fencing will be installed to limit access to rehabilitated areas or the stockpiles,
- Visual inspection of the quarry batters and slopes to assess stability, and undertake rectification works to stabilise the landform if required, and
- Constructing additional erosion and/or sediment control works as required to ensure the desired water control is achieved.

Sediment Dam Management and Maintenance

Sediment dams will be managed and maintained as per the following:

- Level indicators will be installed in dams with relevant marks located on the peg to indicate the amount of sediment load in the dam,
- All sediment basins will be maintained by de-silting when the capacity is diminished,
- Sediment dams and clean water dams will be visually assessed for water quality and volumes on a regular basis or as required after high rainfall events,
- If discharge is required, the visual assessment will be followed by sampling and testing of the water quality prior to discharge to ensure water quality criteria are met,
- The limit of TSS of less than 50 mg/L or turbidity less than 150 µS/cm in the discharged water will be adopted (or as specified by the EPA),

- Ensure that rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate, and
- Constructing additional erosion and /or sediment control works as required to ensure the desired water quality control is achieved.

Rehabilitation

Rehabilitation success will be monitored annually and will identifying if rehabilitated lands have effectively reduced the erosion hazard. Maintenance will be undertaken where required.

Further details on rehabilitation monitoring are provided in **Section 8.13**.

Visual Impacts

Visual Impacts to be assessed at least annually and recorded photographically. This will form part of regular compliance inspections of the site.

Weeds and Pests

Weed and pest inspections will be undertaken annually, or more frequently if required.

8.9.5 Conclusions

The proposed quarry development will result in minimal impacts to the surrounding land uses. The LUCRA has identified and assessed potential land use conflict between the subject development and those existing land uses that surround the site. Most potential risks are already low (scoring less than 10) due to intervening separation distances and the prevailing topography. In these cases, further mitigation is not required. Where the potential for conflict is higher, the implementation of several mitigation measures has been proposed, reducing all potential land use conflicts to low.

At the end of the development life, the quarry will be progressively rehabilitated to pasture and pine plantation with potential future use of the facilities area for forestry related activities, consistent with surrounding and current land uses.

8.10 Bushfire

8.10.1 Introduction

MJD Environmental Pty Ltd has prepared a **Bushfire Assessment Report** (BAR) for the proposed development. The assessment was prepared to consider the bushfire hazard, and associated potential threats, relevant to the proposal and to outline the minimum mitigative measures required in accordance with *Planning for Bush Fire Protection 2019* (PBP), as adopted through the *Environmental Planning & Assessment Amendment* (Planning for Bush Fire Protection) *Regulation 2020*. The assessment also adheres to the methodology and procedures outlined in PBP (2019) via assessment of acceptable solutions as outlined in Chapter 8 of PBP (2019). The assessment has been prepared to satisfy the SEARs and agency comments. The **BAR** is attached as **Appendix O**.

8.10.2 Existing Environment

The subject site is situated to the south of Razorback Road, Running Stream. Large residential properties exist to the west and an existing pine plantation to the immediate east. The site comprises highly disturbed grassland due to the mass plantings of Pine trees (Pinus spp.). No native tree species have regenerated within the plantation area. The Project Area contains native vegetation within the southern gully and the adjacent foothills, however, this area is not to be impacted upon under this proposal. The site lies predominantly on the top of an undulating hill at an elevation of 1050 m AHD. There are 2 drainage lines within the subject site that flow to the north however, these only operate during periods of heavy rainfall. The Site lies within a geographical area with a Forest Fire Danger Index (FDI) rating of 80. The site is classified as being affected by Category 1, Category 2, and Category 3 Vegetation on the Bushfire Prone Land Map (DPE 2022). A map of Bushfire Prone Land is provided as **Figure 39**.

Figure 39: Bushfire Prone Land

8.10.3 Methodology

Vegetation Assessment

The vegetation in and around the site, to a distance of 140 m, has been assessed in accordance with PBP 2019. This assessment has been made via a combination of:

- Aerial photo interpretation,
- On-site vegetation classification, and
- Reference to regional community vegetation mapping.

These vegetation communities have been classified for bushfire purposes into structure and formation using the system adopted by Keith (2004) and using Figure A1.2 of PBP (2019) with due regard to Appendix 1 of PBP (2019).

Vegetation classification is presented in **Table 50** below and on **Figure 40**.

Table 50: Vegetation Classification

DIRECTION	DESCRIPTION	VEGTATION CLASSIFICATION
North	• Pine Plantation	Forest
East	• Pine Plantation	Forest
South	• Pine Plantation • PCT 1191 – Snow Gum – Candle bark woodland on broad valley flats of the tablelands and slopes, Southeastern Highlands Bioregion	Forest / Woodland
West	• Pine Plantation • Site access	Forest
North-west	• Pine Plantation	Forest

Slope Assessment

In accordance with PBP (2019), an assessment of the slope was conducted throughout the site (where a hazard is present) and for a distance of 100m around the site in the hazard direction. Both the average slope and maximum slopes were considered to determine the level of gradient which will most significantly influence fire behaviour on the Site. The slope transect was categorised within the slope classification under PBP Appendix A1.4.

Slope assessment was assisted by:

- Preparation of a digital elevation model based on LiDAR, and
- Preparation of slope assessment based on 1 m contours derived from the Digital Elevation Model.

The slope class under the bushfire hazard within 100 m is presented in **Table 51** below and on **Figure 40**.

Table 51: Slope Class

DIRECTION	VEGETATION CLASSIFICATION	SLOPE CLASS
North	Forest	Upslope
East	Forest	Upslope
South	Forest / Woodland	Upslope
		Upslope
West	Forest	Upslope
North-west	Forest	0-5° Downslope

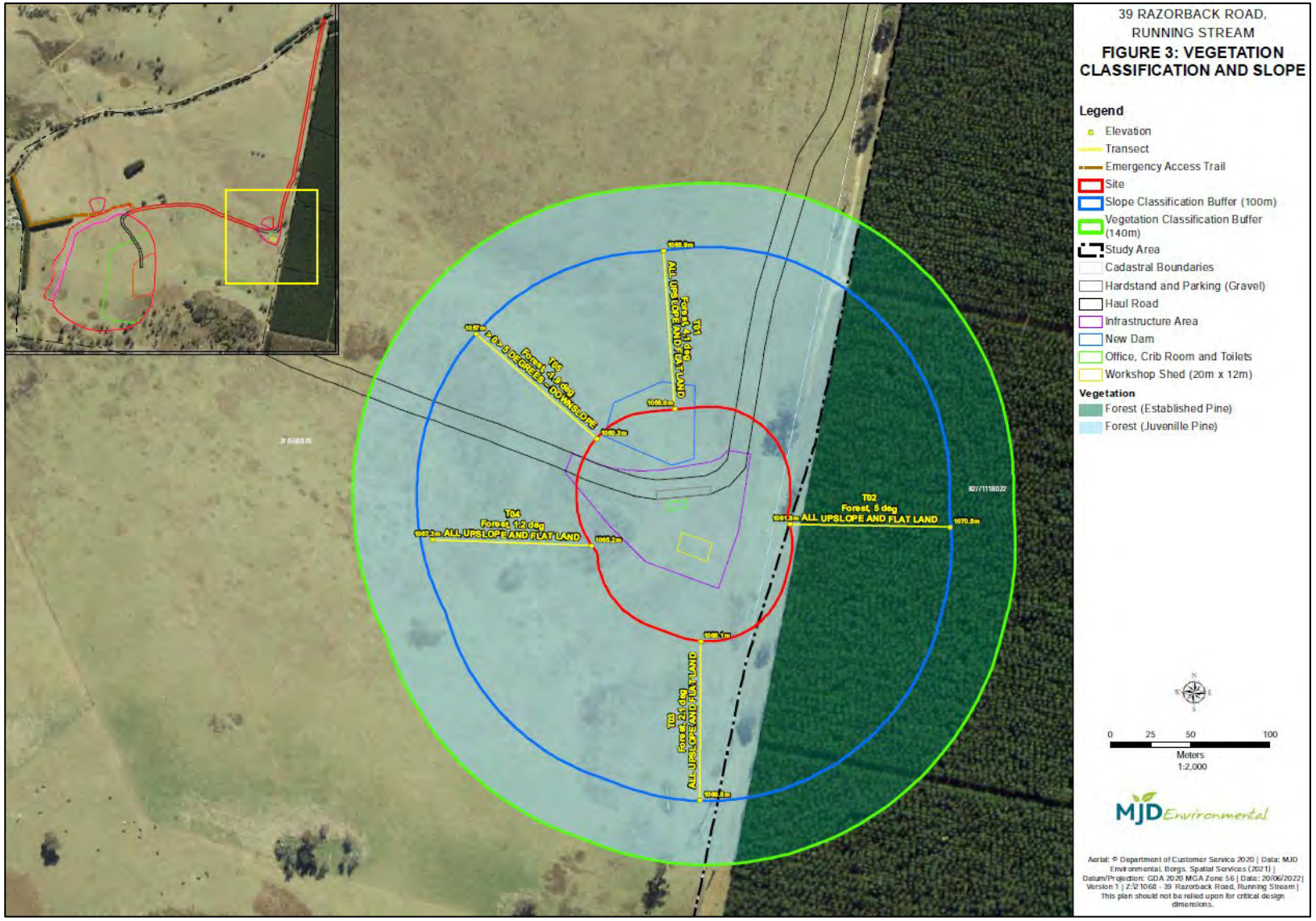

Figure 40: Vegetation Classification and Slope

8.10.4 Impact Assessment

PBP sets out a suite of BPMs and criteria that require consideration and assessment for applicable proposals on bushfire prone land in order to provide an adequate level of protection to new developments.

The measures required to be assessed are listed below and discussed throughout this chapter:

- Asset Protection Zones (APZs),
- Bushfire Attack Level (BAL),
- Access,
- Services – Water supply, Gas and Electricity,
- Landscaping and Fuel Management,
- Emergency Management, and
- Asset Protection Zone Appraisal against 8.3.1 objectives for Commercial Developments.

This development proposal entails industrial development thereby being of a building type that does not strictly trigger the criteria outlined with PBP (2019) for residential and/or Special Fire Protection Purpose (SFPP).

The proposed development can meet the performance criteria for acceptable solutions for commercial development, giving due regard to the requirements of Chapter 8 of PBP 2019, specifically section 8.3.1.

Asset Protection Zones

An APZ is a buffer zone between the hazard and buildings that is progressively managed to minimise bushfire hazard (fuel loads and reduce potential radiant heat levels, flame, ember, and smoke attack) PBP (2019), to mitigate risk to life and assets. Where a forest or woodland vegetation classification has been determined, an APZ can consist of two areas:

1) Inner Protection Area (IPA) – The IPA extends from the edge of the development/ buildings to the OPA. The IPA aims to provide defendable space and reduce potential for direct or spontaneous ignition by providing a heavily reduced or fuel free zone.

2) Outer Protection Area (OPA) – The OPA is located adjacent to the hazard. Within the OPA any trees and shrubs should be maintained in a manner such that the vegetation is not continuous to reduce flame length and fire intensity. A properly managed OPA can aid in ember attack by filtering embers and slowing the fires rate of spread.

The built form of the proposed structures is a factor in the risk profile of the development, where all buildings are to be built to the NCC / NASH and have regard to AS3959. Typically, the buildings are of a non-combustible wall materials and non-combustible roof structures (including metal frame super structure, metal cladding and roofing, or similar) which is highly resistant to radiant heat and are non-combustible materials.

Determining APZs

The subject site lies within the Mid-Western Council LGA and therefore is assessed under a FDI (Fire Danger Index) rating of 80. As per Table A1.12.3 within PBP (2019), the acceptable solution setbacks have been calculated based on the bushfire hazard analysis presented above (which are conservative as these are for a residential context). As the proposal is for commercial development, performance criteria for PBP relates to a package of measures to satisfy the BPM's. **Table 52** below details the acceptable solution for APZ setbacks, and acceptable solution APZ are detailed on **Figure 41**.

Table 52: APZ (Residential Developments PBP 2019)

DIRECTION	VEGETATION CLASSIFICATION	SLOPE CLASS	APZ
North	Forest	Upslope	20m
East	Forest	Upslope	20m
South	Forest / Woodland	Upslope	20m
		Upslope	20m
West	Forest	Upslope	20m
North-west	Forest	0-5° Downslope	25m

A managed fuel zone (slashed paddock) of 50 m will be established around the site facilities (crib room, weighbridge etc). The area is to be managed to IPA standards at a minimum with due regard to Appendix 4 PBP (2019).

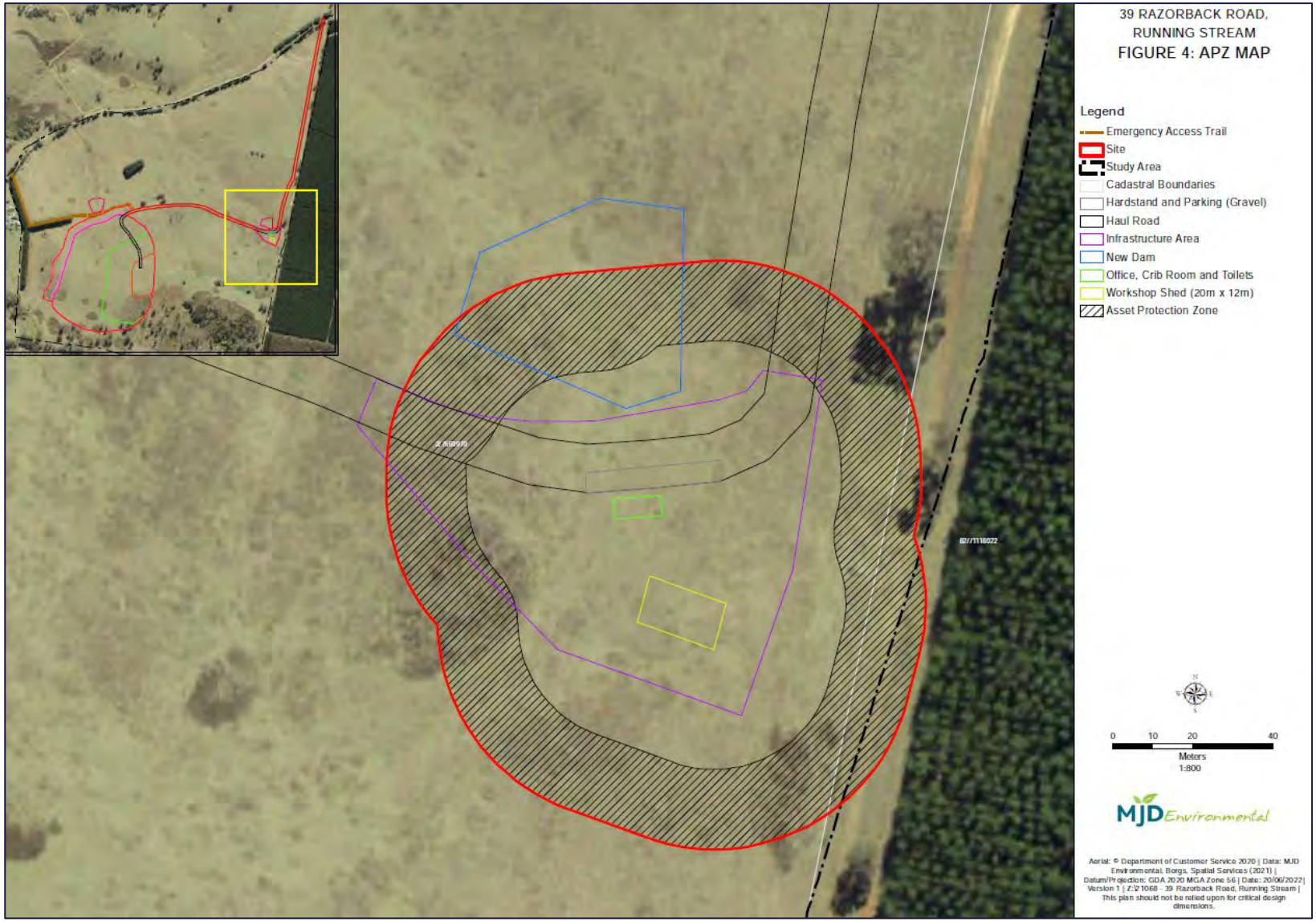

Figure 41: Asset Protection Zones

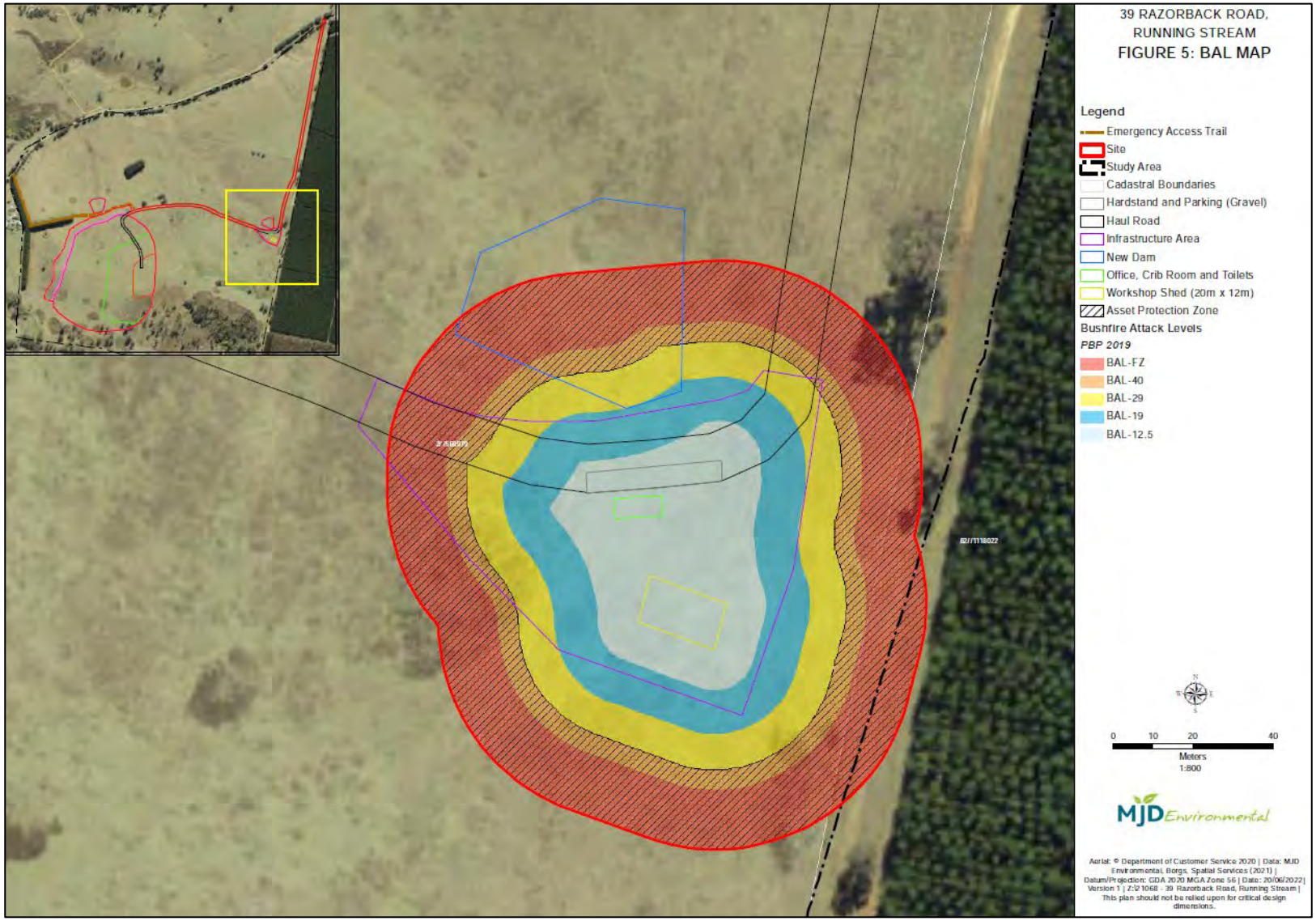

Figure 42: Bushfire Attack Level

Determining BAL

By considering the bushfire hazard analysis outcomes presented above, Table A1.12.6 of PBP (2019) was applied to the vegetation classification and slope analysis to calculate BAL for development based on separation from the hazard for the site. The development is not of a residential or SFPP development type, BAL has been addressed and determined to provide a conservative assessment for the proposal. **Table 53** provides the BAL ratings and **Figure 42** provides BAL mapping.

Table 53: BAL (Residential Developments PBP 2019)

DIRECTION	VEGETATION CLASSIFICATION	SLOPE CLASS	APZ	SEPARATION DISTANCE (M)	BAL
North	Forest	Upslope	20m	<15	BAL – FZ
East	Forest	Upslope	20m	15-20	BAL – 40
South	Forest / Woodland	Upslope	20m	20-29	BAL – 29
		Upslope	20m	29-40	BAL -19
West	Forest	Upslope	20m	40-100	BAL -12.5
North-west	Forest	0-5° Downslope	25m	<19 19-25 25-35 35-47 47-100	BAL – FZ BAL – 40 BAL – 29 BAL -19 BAL -12.5

Access

In the event of a serious bushfire threat to the proposed development, it will be essential to ensure that adequate ingress/ egress and the provision of defendable space are afforded in the commercial development design with due regard to the requirements of Table 5.3b, Chapter 8.3.1 and Appendix 3 of PBP (2019).

Direct access to the site will occur from Razorback Road in Running Stream. Razorback Road is an all-weather unsealed rural road connecting to Castlereagh Highway to the East. The site facilities and weighbridge will be accessed via an access road running down the western boundary. This access shall be compliant with the Property Access criteria set out in Table 5.3b of PBP (2019). A secondary emergency access is available on site travelling in a westerly direction beyond the quarry pit and connecting onto Razorback Road to the north. Refer to **Figure 42** for the location of the secondary access.

Services

The site is to be developed in accordance with the PBP (2019) acceptable solutions for services. The proposal is able to satisfy these requirements given:

- The site will provide a dedicated 20,000 L water tank for emergency bushfire supply,
- The site power supply will be provided by an onsite generator, however the onsite power supply to the residential property on the site may be extended at a later date,
- Any water storage tanks are to include connection points in accordance with PBP (2019) and be readily accessible and clearly marked. If pumps are to be made available, they must be regularly maintained and in good working order, and
- Dams to be constructed on site will provide additional water supply for firefighting.

Gas supply will not be required at the development.

Further details on acceptable solutions for services is provided in Table 6 of the **Bushfire Assessment Report** attached as **Appendix N**.

Landscaping and Fuel Management

All future landscaping on the site is to be designed and managed to minimise impact of bushfire based on the principles set out in PBP (2019) being:

- Prevent flame contact / direct ignition on the dwelling,
- Provide a defendable space for property protection,
- Reduce fire spread,
- Deflect and filter embers,
- Provide shelter from radiant heat, and

- Reduce wind speed.

Consideration will be given to species selection, planting location, flammability, and size at maturity to ensure discontinuous canopy/ structure both vertically and horizontally to ensure the above principles are met.

Ongoing fuel management across the site will be undertaken in accordance with the NSW RFS '*Asset protection zone standards*' and *Appendix 4 - Asset Protection Zone Requirements* of PBP (2019).

Emergency Management

Any fire within the Site would be attended in the first instance by Capertee & District Rural Fire Service, with support available from Fire and Rescue NSW Kandos Fire Station. To assist emergency response from the NSW RFS and/or NSW Fire and Rescue, site access is to comply with the provisions set out in PBP (2019) and all tanks including connection points are to be readily accessible and clearly signposted.

Appraisal against 8.3.1 Objectives

An appraisal against the objectives section 8.3.1 of Chapter 8 of the PBP 2019 are detailed in **Table 54**.

Table 54: Appraisal against 8.3.1 Objectives (PBP 2019)

OBJECTIVE (PBP 2019)	COMMENT
To provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation,	• The proposal shall provide and maintain appropriate property access for ingress/egress to site for emergency vehicle access. • The site has direct public road frontage to Razorback Road. • A secondary emergency access is available on site travelling in a westerly direction beyond the quarry pit and connecting onto Razorback Road to the north. **This objective is satisfied.**
To provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development,	• Occupants have two egress points from the quarry operation. • A managed fuel zone (slashed paddock) of 50 m will be established around the site facilities (crib room, weighbridge etc). **This objective is satisfied.**
To provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building,	• A dedicated 20,000 L water tank for emergency bushfire supply will be installed. • Power will be supplied by site generator, and potential future power supply. • Any water storage tanks will include connection points in accordance with • PBP (2019) and will be readily accessible and clearly marked. Pumps are to be regularly maintained and in good working order. • Dams to be constructed on site provide additional water supply for firefighting. **This objective is satisfied.**
Provide for the storage of hazardous materials away from the hazard wherever possible.	• The nature of this development encompasses the establishment and operation of a quarry and associated plant, site shed, office, laydown areas and associated facilities. Combustible materials will be required to assist operations (e.g., diesel) however will be stored in a self-bunded containerised fuel tank. **This objective is satisfied.**

8.10.5 Mitigation and Conclusions

The Bushfire assessment has considered and assessed the bushfire hazards and associated potential threats relevant to the proposal and outlined the minimum mitigative measures which would be required in accordance with *Planning for Bush Fire Protection 2019* (PBP), as adopted through the *Environmental Planning & Assessment Amendment* (Planning for Bush Fire Protection) *Regulation 2020.*

The proposed development can meet the performance criteria for acceptable solutions for commercial development, giving due regard to the requirements of Chapter 8 of PBP 2019, specifically section 8.3.1. A suitable package of Bushfire Protection Measures has been developed that is commensurate with the assessed level of risk to the development.

The development can comply with the residential APZ setbacks as per PBP 2019 Section 8.3.1. In addition, a package of measures provided by the development includes:

- Provision of defendable space between the hazard and development,

- High resilience building typology on elevations facing the hazard, and
- Access and circulation suitable for a fully loaded fire appliance.

A managed fuel zone (slashed paddock) of 50m will be established around the site facilities (crib room, weighbridge etc). The area is to be managed to IPA standards at a minimum with due regard to Appendix 4 PBP (2019).

The assessment found that hazard vegetation types occur within 140m of the site. The primary risk is from the pine plantation 'forest' class vegetation located on the site. These hazards have been assessed as having the greatest effect on bushfire behaviour. The slope under the hazard vegetation has been assessed as varying from upslope to 0-5° Downslope.

The following key recommendations have been generated to enable the proposal to comply with PBP (2019):

- A managed fuel zone (slashed paddock) of 50 m will be established around the site facilities (crib room, weighbridge etc). The area is to be managed to IPA standards as a minimum with due regard to Appendix 4 PBP (2019),
- Access will have due regard to the requirements of Table 5.3b, Chapter 8.3.1 and Appendix 3 of PBP (2019),
- Services are to be provided and connected to the site in accordance with PBP (2019), and
- Careful consideration of future site landscaping and ongoing fuel management must occur to minimise the potential impact of bushfire on the site in accordance with PBP (2019).

8.11 Socio-economic

8.11.1 Introduction

A **Socio-economics Assessment** has been prepared by Space Urban to address the SEARs requirements. The assessment provides an overview of the community profile, a brief description of management and mitigation measures that would be implemented, and a discussion of residual socio-economic impacts and benefits associated with the development.

8.11.2 Existing Environment

Principal Population Centres

The Mid-Western Regional Local Government Area (LGA) is located within the Central West of NSW and is surrounded by the following LGAs: Warrumbungle, Liverpool Plains, Upper Hunter, Muswellbrook, Singleton, Lithgow, Bathurst Regional, Cabonne and the Western Plains Regional. The population of the Mid-Western Regional LGA was recorded at the 2021 census as 25,713. The town of Mudgee is the administrative centre of the Mid-Western Regional LGA, with a population of 11,563 recorded in the 2021 Census. The locality of Running Stream is located approximately 57 km southeast of Mudgee, with a population of 120 recorded in the 2021 Census.

Census Data

The following demographic data was sourced from the Australian Bureau of Statistics (ABS) 2016 and 2021 census data. Data has been gathered from the community profile tables and quick data sets from the ABS website.

Population and Age Characteristics

Table 55 below provides a summary of population from both 2016 and 2021 census for the locality of Running Stream, the Mid-Western Regional LGA, and for NSW. Population growth between 2016 and 2021 in Running Stream was -10.4% which was significantly lower compared to Mid-West Regional LGA at 6.9% and NSW at 7.91%.

Table 55: Population Statistics 2016 to 2021

GENDER	RUNNING STREAM			MID-WESTERN LGA			NSW		
	2016	2021	% Change	2016	2021	% Change	2016	2021	% Change
Total	134	120	-10.44	24,076	25,713	6.79	7,480,228	8,072,163	7.91
Males	64	63	-1.56	12,110	12,934	6.80	3,687,752	3,987,649	8.13
Females	70	57	-18.57	11,966	12,779	6.79	3,792,476	4,084,514	7.70

Source: ABS 2016 and 2021 Census

Table 56 presents the 2021 Census population data broken down by age. In comparison to both NSW and the Mid-Western Regional LGA, Running Stream has a lower proportion of people younger than 35. Conversely, Running Stream has a higher proportion of people aged over 60 compared to NSW and the Mid-Western Regional LGA. These age distributions potentially reflect limited economic and employment opportunities for those in the early stages of their working life, and increased levels of retired residents in Running Stream compared to both the Mid-Western Regional LGA and NSW.

Table 56: 2021 Census Age Statistics

AGE	RUNNING STREAM		MID-WESTERN LGA		NSW	
	No.	%	No.	%	No.	%
Children						
0-4	0	0.0	1,528	5.9	468,056	5.8
5-9	3	2.4	1,829	7.1	500,810	6.2
10-14	3	2.4	1,752	6.8	501,135	6.2
Studying or Working						
15-19	5	4.1	1,438	5.6	457,896	5.7
20-24	4	3.3	1,092	4.2	496,185	6.1
25-29	0	0.0	1,389	5.4	555,967	6.9
30-34	0	0.0	1,558	6.1	586,057	7.3
35-39	3	2.4	1,545	6.0	580,185	7.2
40-44	5	4.1	1,436	5.6	522,984	6.5
45-49	16	13.0	1,553	6.0	516,915	6.4
50-54	7	5.7	1,779	6.9	500,027	6.2
Approaching Retirement or Retired						
55-59	5	4.1	1,772	6.9	490,155	6.1
60-64	14	11.4	1,723	6.7	471,628	5.8
65-69	15	12.2	1,506	5.9	416,493	5.2
70-74	17	13.8	1,434	5.6	372,234	4.6
75-79	13	10.6	1,106	4.3	268,110	3.3
80-84	9	7.3	677	2.6	183,409	2.3
85+	4	3.3	598	2.3	183,895	2.3
Total Population	120		25,713		8,072,163	
Median Age	61		42		39	

Source: ABS 2021 Census

Employment

Table 57 presents employment statistics from the 2021 Census. The data indicates that levels of full-time employment in Running Stream (55.8%) are similar to those in the Mid-Western Regional LGA (57.1%) and NSW (55.2%). However, levels of part-time employment (46.2%) in Running Stream were higher than those in the Mid-Western Regional LGA (31.9%) and NSW (29.7%). The percentage of the labour force who were unemployed and seeking full-time work was significantly lower in Running Stream (0.0%) compared to Mid-Western Regional LGA (4.0%) and NSW (4.9%). In general, labour force participation in Running Stream (45.6%) is significantly lower than that of both the Mid-Western Regional LGA (57.8%) and NSW (58.7%).

Table 57: 2021 Census Employment Statistics

CATEGORY	RUNNING STREAM		MID-WESTERN LGA		NSW	
	No.	%[1]	No.	%[1]	No.	%[1]
Employed						
Full-time	29	55.8	6,792	57.1	2,136,610	55.2
Part-time	24	46.2	3,794	31.9	1,151,660	29.7
Employed but away from work[2]	0	0.0	841	7.1	395,888	10.2
Total	**53**	**102.0**	**11,427**	**96.1**	**3,684,158**	**95.1**
Unemployed looking for work						
Unemployed	0	0.0	470	4.0	189,852	4.9
Total	**0**	**0.0**	**470**	**4.0**	**189,852**	**4.9**
Labour Force Participation						
In the labour force	52		11,895		3,874,012	
Not in the labour force	48		7,096		2,341,417	
Not stated	9		1,604		386,728	
Total Persons	**109**		**20,495**		**6,602,157**	
Labour Force Participation (%)	**45.6**		**57.8**		**58.7**	

Note 1: Percentage of total labour force

Note 2: Comprises employed persons who did not work any hours in the week prior to Census Night.

Source: ABS 2021 Census

Industry of Employment

Table 58 presents employment by the top industry statistics from the 2021 Census. The top five industries of employment in Running Stream are Agriculture, Forestry and Fishing (36%), Professional, Scientific, and Technical Services (10.9%), Public Administrative and Safety (10.9%), Health Care and Social Assistance (10.9%), and Manufacturing and Wholesale Trade (8.7% respectively). Both Mid-Western Region LGA and NSW have their industry mix more focussed toward healthcare, manufacturing, construction, education, and financial services. Mid-Western LGA have a high proportion of employment in the mining sector at 15.9% compared to NSW with only 1%.

Table 58: 2021 Census Industry of Employment Statistics

SECTOR	RUNNING STREAM		MID-WESTERN LGA		NSW	
	No.	% of labour force	No.	% of labour force	No.	% of labour force
Agriculture, Forestry and Fishing	17	36	806	7.1	74,728	2
Mining	0	0	1,820	15.9	35,406	1
Manufacturing	4	8.7	488	4.3	201,654	5.5
Electricity, Gas, Water, and Waste Services	0	0	109	0.9	35,582	1
Construction	4	8.7	954	8.3	315,520	8.6
Wholesale Trade	0	0	239	2.1	103,466	2.8
Retail Trade	0	0	1,053	9.2	331,486	9
Accommodation and Food Services	0	0	899	7.9	227,466	6.2
Transport, Postal, and Warehousing	0	0	293	2.6	169,608	4.6
Information Media and Telecommunications	0	0	61	0.5	68,068	1.8
Financial and Insurance Services	0	0	115	1	193,679	5.3
Rental, Hiring, and Real Estate Services	0	0	152	1.3	62,633	1.7
Professional, Scientific, and Technical Services	5	10.9	420	3.7	326,595	8.9
Administrative and Support Services	0	0	384	3.4	117,988	3.2
Public Administrative and Safety	5	10.9	490	4.2	222,909	6.1
Education and Training	3	6.5	903	7.9	322,236	8.7
Healthcare and Social Assistance	5	10.9	1,269	11.1	526,176	14.3
Arts and Recreation Services	0	0	122	1.1	51,789	1.4
Other Services	0	0	453	4	125,380	3.4
Inadequately described/Not stated	3	6.5	397	3.5	168,787	4.6
Total	**46**		**11,427**		**3,684,158**	

Source: ABS 2021 Census

Income

Table 59 presents income statistics from the 2021 Census. The data indicates that the median individual, family, and household incomes at Running Stream were significantly lower than those of the Mid-Western Regional LGA, which were on average 43.1% higher. Furthermore, the median individual, family, and household incomes in the Mid-Western Regional LGA were significantly lower than those of NSW.

Table 59: Income Statistics 2021 Census

CATEGORY	RUNNING STREAM	MID-WESTERN LGA	NSW
Median individual income ($/weekly)	$575	$703	$813
Median family income ($/weekly)	$1,292	$1,966	$2,185
Median household income ($/weekly)	$959	$1,486	$1,829

Source: ABS 2021 Census

Housing Costs

Table 60 presents housing cost statistics from the 2021 Census. The data indicates that the median housing loan monthly repayment and the median rent in Running Stream were significantly lower than those of the Mid-Western Regional LGA, with these figures also being significantly lower than those of NSW.

Table 60: Cost of Housing and Household Size Statistics 2021 Census

CATEGORY	RUNNING STREAM	MID-WESTERN LGA	NSW
Median housing loan repayment ($/monthly)	$1,300	$1,733	$2,167
Median rent ($/weekly)	$215	$330	$420
Average number of persons per bedroom	1.1	0.9	1
Average household size	1.9	2.4	2.6

Source: ABS 2021 Census

Education

Table 61 presents post-school education statistics from the 2021 Census. The data indicates that Bachelor Degree Level (and higher) qualifications were held by 11.4% of the labour force of Running Stream, compared to a slightly higher percentage for the Mid-Western Regional LGA (13.3%) and a significantly higher percentage for NSW (27.8%). Advanced Diploma and Diploma Level qualifications are held by 14% of the labour force at Running Stream, 7.7% in Mid-Western LGA, and 9.3% in NSW. Certificate level qualifications were held by 21.1% of the population of Running Stream, a figure slightly higher than that of the Mid-Western Regional LGA (19.8) and significantly higher than that of NSW (11.7%). These statistics may reflect that professional opportunities for those with university qualifications are limited in the Running Stream area, while jobs requiring technical and trade qualifications may make up a higher proportion of available employment opportunities.

Table 61: 2021 Census Post-School Level Education Statistics

EDUCATION TYPE	RUNNING STREAM		MID-WESTERN LGA		NSW	
	No.	% of labour force	No.	% of labour force	No.	% of labour force
Bachelor Degree Level and above	13	11.4	2,747	13.3	1,838,502	27.8
Advanced Diploma and Diploma Level	16	14.0	1,595	7.7	616,322	9.3
Certificate Level	24	21.1	4,086	19.8	771,009	11.7
Level of education inadequately described	7	6.1	616	3.0	184,252	2.8
Level of education not stated	12	10.5	2,240	10.9	549,965	8.3
Total[1]	**72**		**11,284**		**3,960,050**	
Note 1: Count of persons aged 15 years and over with a qualification						

Source: ABS 2021 Census

8.11.3 Impact Assessment

In consideration of the previously assessed impacts on the environment, it is anticipated that the development would not have an unacceptable impact on residents or the environment within or surrounding the Project area. As a result, adverse socio-economic impacts are likely to be negligible.

In terms of positive impacts, the development would likely:

- provide direct employment for up to 8 people on a permanent and contract basis,
- provide for additional employment opportunities for contract truck drivers,
- contribute approximately $550,000 per year in wages and associated benefits to employees, the majority of which is likely to be spent in the Mid-Western Regional LGA,
- contribute to road maintenance through road contributions to the Mid-Western Regional Council,
- contribute through taxes on products, with amounts determined by production rates,
- contribute to state infrastructure development through the supply of products required for construction activities, and
- benefit the Mid-Western Regional Council through the supply of competitively priced, conveniently located, high quality products to local markets for use in construction projects.

8.11.4 Mitigation and Conclusions

In addition to the management and mitigation measures relating to amenity aspects , the operation will implement the following management and mitigation measures to ensure that development related benefits are maximised, and adverse impacts minimised for the surrounding community.

- Proactively consult throughout the life of the development with those residents who could potentially be adversely impacted by the operations,
- Maintain a community complaints register and ensure that the existence of the number is advertised at the site entrance,
- Liaise with Council in relation to any complaints received,
- Give preference when engaging new employees, where practicable, to candidates from surrounding areas over candidates with equivalent experience and qualifications from further afield, and
- Give preference, where practicable and cost-effective, to suppliers of equipment, services or consumables located within surrounding communities.

8.12 Waste Management

8.12.1 Introduction

Space Urban has prepared a **Waste Minimisation and Management Plan** (WMMP) to demonstrate how waste will be avoided or minimised, reused, recycled, and disposed lawfully during the construction and operation of the proposed development. The *Waste Avoidance and Resource Recovery Act* 2001 (WARR Act) and the *Protection of the Environmental Operations Act* 1997 (POEO Act) govern the issues of waste generation, reuse, recycling, transport, and disposal and prioritise waste solutions according to how successfully they conserve natural resources. Priority is given to reducing the overall amount of waste, followed by the reuse, and then recycling of any wastes that are unavoidably created, with disposal as a last resort. The aim is to extract the maximum practical benefits from the products and to manage waste in an environmentally sustainable manner. A copy of the **WMMP** is attached as **Appendix P**.

8.12.2 Existing Environment

There are no existing waste management issues or measures on the site.

8.12.3 Potential Impacts

The construction phase of the project will generate several different types of waste products from packaging and off-cuts. Waste materials generated which will be fully recycled includes timber, concrete, timber pallets, timber packing materials, steel, and plastic film. Other waste materials that may be generated during construction include electrical waste (e.g., off-cuts from wiring), plumbing fixtures and fittings, and paints. Some consumer packaging and residual waste will be generated by contractors on site during construction works. All waste materials will be transported to appropriately licenced facilities for sorting, recycling and/or disposal as appropriate. An overall recycling rate of 95% is expected during construction works.

The most significant volume of waste to be generated during site preparation works will be green waste resulting from the clearing of pine plantation trees. Where appropriate, cleared vegetation will be mulched and spread on site to prevent the spread of weed species from the site.

During operations the main waste sources will be from general office activities and workers refuse.

8.12.4 Mitigation and Conclusions

A **WMMP** has been prepared to guide how waste will be dealt with in the most environmentally sustainable way. The WMMP is contained in **Appendix P**. Waste management and mitigation measures, additional to those proposed in the WMMP, which will be implemented at the facility are outlined in **Table 62** below.

Table 62: Waste Management and Mitigation Measures

MITIGATION MEASURES	RESPONSIBILITY	TIMING / FREQUENCY
A designated waste storage area, providing for the separation and temporary storage of waste generated on site, will be provided during construction.	Construction Manager	On-going
All waste materials will be regularly cleared from the site and transported by a suitably licenced contractor for recycling or disposal as appropriate.	Construction Manager	As required
Ordering will be limited to only the required amounts of materials.	Construction Manager	On-going
Assessment of suspicious potentially contaminated materials, hazardous materials and liquid wastes will be undertaken.	Construction Manager	As required
Routine checks will be undertaken of waste sorting and storage areas for cleanliness, hygiene and OH&S issues, and contaminated waste materials.	Construction Manager	As required
Off-site waste disposal will be transported and disposed of in accordance with licensing requirements.	Site Manger	As required
Staff and subcontractors will be informed of site waste management procedures.	Construction Manager Site Manager	On-going
Regular monitoring, inspection and reporting will be undertaken, and findings implemented.	Construction Manager Site Manager	On-going

8.13 Rehabilitation

8.13.1 Introduction

A **Rehabilitation Management Plan** (RMP) has been prepared by VGT. The purpose of this **RMP** is to address the SEARs, including:

- a detailed description of the proposed rehabilitation measures to be undertaken throughout the development and during quarry closure,
- a detailed rehabilitation strategy which justifies the proposed final landform and considers the objectives of relevant strategic land use plans and policies, and
- detailing measures to be undertaken to ensure sufficient financial resources are available to implement the rehabilitation strategy.

The purpose of this report is to describe the proposed rehabilitation management system for the Site and to clarify how potential impacts generated by the development will be managed.

A copy of the full **RMP** is provided in **Appendix Q**.

8.13.2 Existing Environment

The following provides an overview of the existing environment in relation to land resources across the site.

Land Use

Current Site

The 327 ha property is currently comprised of the following land uses:

- 68% or 222 ha is planted out as pine plantation at various stages of progression, from recently planted tubestock to mature plantations through to areas that have been recently harvested and not yet re-planted,
- 19% or 61 ha is other wooded or remnant vegetation, comprising both native and non-native species and includes the dwelling and yard area, and
- 13% or 44 ha is comprised of access tracks and grassland areas through and surrounding the plantation area that are not planted as plantation. This includes a former pasture area around the area of the proposed quarry and the plantation firebreaks.

Surrounding Land Use

North of the quarry is a newly planted pine plantation within the subject land extending out over 450 m north of the quarry before meeting Razorback Road. Land beyond the Subject Land is predominantly cleared and appears to be used for grazing. A dwelling is located just over 1km to the north, in the neighbouring Dog Rock Creek catchment that is orientated to the north away from the quarry.

East of the quarry pine plantation extends over 1 km east to the dwelling on the Subject Land. The Castlereagh Highway is just over 2 km to the north-east. Three dwellings not associated with the Subject Land are located approximately 2 km to the north-east. Lands outside the subject land are predominantly cleared and likely used for grazing, with some of the slopes remaining vegetated.

Approximately 60 m of the quarry pit edge is Two Mile Creek, located just within the southern boundary of the Subject Land. South-east of the site is pine plantation extending into native vegetation within the Gibbons Creek catchment the land is steeper with a large portion under native timber. The remaining lands are substantially cleared and used for grazing. There are four dwellings south of the quarry, the nearest is just over 1200 m from the quarry.

Pine plantation extends for over 170m from the quarry, before the Subject Land boundary that is just over 220 m from the quarry pit edge. Beyond the subject land the majority of the area is within the Two Mile Creek catchment and is cleared and used predominantly for grazing. There are three dwellings located to the west of the property. The nearest is 250 m from the quarry pit edge and is a cluster of buildings previously used as an accommodation facility called Moonraker.

National Parks

NPWS managed lands in the locality include:

- The Caperteee National Park approximately 10 km to the east of the site,
- Mugii Murumban State Conservation Area approximately 16 km to the southeast of the site,
- Gardens of Stone National Park approximately 18 km to the southeast of the site,
- Turon National Park approximately 16 km to the south-southeast of the site, and
- Winburndale Nature Reserve approximately 17 km to the south of the site.

Geology and Soils

Geology

The site is situated west and on the foothills of the Blue Mountains Range west of Sydney, NSW. The contact between the Triassic and Permian aged suites is approximately 500 west of the site.

The local geology is the lower most portion of the Narrabeen Group, of which is most likely to be part of the Caley Formation which is Claystone, Shale, and Quartz Lithic Sandstone (source Western Coalfield (Southern Part) 1:100,000 NSW Mines Department Geological Sheet. The surface exposures are sparse and small farm borrow pits show poorly consolidated conglomerates, with sandstone and clay matrix.

Soils

The soils on the Site are identified as Turonfels on the Environment NSW eSpade online data viewer. This soil landscape comprises undulating to rolling low hills with the dominant soils being red earths on mid to upper slopes, and yellow podzolic soils and yellow earths on lower slopes. Chocolate soils and skeletal sands and loams also occur on upper slopes.

Topsoils run to a depth of approximately 20 cm are dull yellowish-brown loam, fine sandy with weak polyhedral peds; the pH is approximately 6.5. Subsoils show a sharp change to dull yellow orange fine sandy clay loam with weak structure; pH 6. They are moderately permeable, have a moderate to high erodibility and a moderate erosion hazard. Below the soil layers run sandstone, shale, conglomerate, and siltstones, which are much lighter in colour.

Soil Erosion Characterisation

The likely soil loss is calculated with the Revised Universal Soil Loss Equation (RUSLE). The values of the other RUSLE factors are - P of 1.3 and the C is assumed to be 1.0 for bare soil.

The potential soil loss of the site has been calculated using *Managing Urban Stormwater, Soil and Construction, Volume 2E Mines and* Quarries for a 90th percentile, 5-day rainfall event assuming a non-sensitive receiving environment.

The Soil Hydrological Group for the soil materials is assumed to be D, very high run-off potential. Water moves into and through these soils very slowly when thoroughly wetted. They regularly shed run-off from most rainfall events.

Slope gradients are *low* to *moderate*, potential erosion hazard is *moderate*, soil erodibility is *moderate* to *high*, the soil texture group is Type D, soil loss class is 1 to 6, and the calculated soil loss is up to 1300 tonnes/ha/yr (see Table 5 of **LRA** attached as **Appendix N**).

Topography

The Site is undulating to rolling low hills with elevations from 1,040 – 1,090 m AHD. Slopes range from 6–20%, with slope lengths from 400 – 900 m. Drainage lines are few and variably spaced.

Land and Soil Capability

The LSC mapping describes the site's most limiting factor as *4 - Moderate to severe limitations*. A site-specific assessment has been undertaken using the Land and Soil Capability Assessment Scheme.

The current and proposed final landform has been assessed using the OEH *The Land and Soil Capability Assessment Scheme (second approximation) - A General Rural Land Evaluation System for NS*W (LSCAS). The scheme defines LSC classes based on the biophysical features of the land. These biophysical features determine the on-site and offsite limitations and hazards of the land and include soil type, slope, landform position, acidity, salinity, drainage, rockiness, and climate.

The landform assessment prior to disturbance is summarised in **Table 46** of **Section 8.9.2**. The Final Landform Class has been determined as Class 4.

Class 4 land is described as:

> ***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.*

Hydrology

Regional Hydrology

The Site is located near the north-eastern watershed of the Macquarie River Catchment. Drainage lines on the site flow either into Two Mile Creek to the west of the Site or into Gibbons Creek to the southeast of the Site (refer Figure 3 of **SGWA**, **Appendix J**).

Two Mile Creek flows in the Crudine River and thence the Turon River some 20 km to the west of the Site eventually meeting the Macquarie River. Gibbons Creek enters Running Stream and thence Round Swamp Creek and eventually the Turon River in the south.

Drainage and Watercourses

There are no defined drainage lines within the footprint of the proposed quarry due to the elevated ridgeline (refer Figure 4 of **SGWA**, **Appendix J**). Several drainage lines are located to the north of the quarry and flow into an unnamed creek to the north that joins Two Mile Creek. A drainage line in the south-west of the quarry flows south to directly join Two Mile Creek and another in the south-east joins Gibbons Creek lying further to the east. The ridgeline setting for the proposed quarry ensures that clean surface water can be directed around the disturbed area of the quarry and the dirty water catchment is restricted to the quarry footprint.

There is one farm dam located on the Site in the south-west corner within the Two Mile Creek drainage line.

Flooding

The site is not identified as affected by flooding according to the NSW Government GIS planning services spatial data. It is located on an elevated setting and the risk of flooding is negligible.

Surface Water Quality

No testing has been undertaken of surface water to date.

Water Quantity

The Maximum Harvestable Right Dam Capacity has been calculated using the Water NSW online calculator tool and estimates that the MHRDC is 26.4 ML, for the property described as 39 Razorback Road, Running Stream (330 ha). The site contains one farm dam that has an estimated area of 800 m^2. If the depth is assumed to be approximately 2 m, the maximum volume of water that could be held by the farm dam is 1,600 m^3, or 1.6 ML. Estimated dam volumes are shown in **Table 35** in **Section 8.5.2**.

The site could potentially retain up to 24.8 ML before requiring a Water Access Licence (WAL).

Groundwater

The nearest groundwater bore is located some 4 km north of the site and does not provide any quality data on the Water NSW online data page (https://realtimedata.waternsw.com.au/water.stm). It is not located within the same watershed and is therefore not comparable to the Site.

A piezo was established in BH7, located centrally within the proposed quarry, where groundwater was encountered at approximately 1049 m AHD. This is some 6 m below the proposed base of the quarry.

Due to the site being situated on the source of the local watershed, and the maximum depth of the proposed quarry (1,055 m AHD), it is unlikely that groundwater will be intercepted.

Vegetation Communities

The majority of the vegetation observed within the subject site exists in a high disturbed state due to the mass plantation of Pine trees for plantation purposes throughout the Project Area.

Small patches of vegetated areas do exist within the southern extent towards the creek, this area has been identified as remnant PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, Southeastern Highlands Bioregion. The extent of PCT 1191 has been classified as being in 'Low' condition due to the high disturbance within the area, with predominantly all the understorey vegetation consisting of weeds with scattered natives. PCT 1191 contains large mature trees with multiple hollows, with the species assemblage of the remnant overstorey forming the basis for the justification of the assigned PCT. The extent of remnant PCT 1191 is not located within the extent of the approved, managed pine plantation and, as such, has been assessed as 'native vegetation' under the Biodiversity Assessment.

The extant vegetation within the subject site has been described as:

- Pine Plantation / Disturbed Grassland – 24 ha – not a TEC
- PCT 1191 – Snow Gum – Candle Bark woodland on broad valley flats of the tablelands and slopes, Southeastern Highlands Bioregion (Low) – 0.25 ha – not a TEC

Neither vegetation community described are associated with Threatened Ecological Communities.

Land Contamination

EPA Contamination Land Register

A search of the NSW EPA Contaminated Land Register shows that the site has not been notified to the EPA. The proponent advises that there are no dangerous goods held on site.

Contaminants of Potential Concern

Refer to **Table 40** in **Section 8.9.2** for potential contaminants and control methods.

Climate

Climatic conditions at Running Stream are considered to be Cfb according to the Köppen-Geiger climate classification i.e., warm, and temperate with significant rainfall.

Rainfall data sourced from the Bureau of Meteorology (Lithgow - site 063224) records an average annual rainfall of 862mm with higher rainfall experienced during the summer months. The mean annual average temperature is 18.5ºC and the mean annual minimum temperature is 6.4ºC. Morning winds are predominately westerly with a smaller component of north westerly and south westerly winds. Afternoon winds are similar in direction but stronger.

8.13.3 Final Landform

Post Mining Land Use

The quarry will be progressively rehabilitated to pasture and pine plantation with potential future use of the facilities area for forestry related activities, consistent with surrounding land uses.

Conceptual Final Landform

Final landform for the quarry is intended to be a deepened saddle along the existing ridge as shown on **Figure 43**. Batter slopes will be generally no greater than 3 Horizontal: 1 Vertical. Vegetation will consist of pasture grasses initially to improve soil stability and then planted with pine consistent the adjacent pine plantation.

8.13.4 Proposed Rehabilitation Planning and Management

The rehabilitation program will focus on rehabilitation of disturbed areas. Strategies and measures for the rehabilitation of the site are discussed in more detail in the following sub-sections.

Quarry Staging and Progressive Rehabilitation

The quarry will have an annual extraction rate of up to 200,000 tpa.

Construction

Construction will occur over an estimated 12 week period during construction hours consistent with the Interim Construction Noise guidelines and will include the following works:

- Bitumen sealing of Razorback Road to entrance of private haul road,
- Construction of private haul road and shaker grid,
- Construction of workshop and crib pad,
- Construction of the weigh bridge,
- Construction of the sediment dams and clean water dams,
- Construction of water management features such as drains and diversions, and
- Initial topsoil stripping and placement and planting of topsoil stockpiles as a noise bund along the western boundary of the quarry.

Quarry operations will commence once the above actions are completed or when product is first transported from the site.

Stage 1

Extraction operations will commence in the eastern portion of the extraction envelope. Stripped topsoil and overburden will be placed in separate stockpiles along the western edge of the envelope creating the western bund wall. Commencing the extraction operation in the eastern portion of the site, is the furthest from the nearest sensitive receptor, Moonraker. The building of the western acoustic and visual bund will reduce noise, dust, and visual impacts as the quarry develops. Extraction will concentrate more on the northern flank to progress down to the proposed floor of 1055 m AHD as soon as possible to reduce the haulage up the northern flank and to topographically shield the operations. During Stage One, the floor of 1075 m AHD will be reached.

The extraction batter is 4 horizontal: 1 vertical on the eastern side, creating the final landform contours (see **Figure 44**). The active extraction faces to the west and south are 2 horizontal: 1 vertical, the western face is 6 metres high.

Rehabilitation works will focus on establishing temporary vegetation on the topsoil and overburden stockpiles / bund walls.

Stage 2

Extraction operations will continue extraction north and south of the eastern face and to the west, lowering the floor to 1066 m AHD. This exposes the underlying sandstone as soon as practicable to ensure both the conglomerate and sandstone can be utilised for varying products. Haulage will be undertaken upon the northern flank to the proposed floor of 1066 m AHD. The active faces will be battered 2 horizontal: 1 vertical with 40 m benches in the west (see **Figure 45**). In the east the extraction batter continues at 4 horizontal: 1 vertical. The western bund wall will continue to be constructed and revegetated.

Final landform contours established on the uppermost portions of the eastern face will be battered using overburden materials. As this face increases in depth, catch drains will be developed to slow the flow of surface water and reduce erosion impacts. Topsoil will be placed on these sections and vegetation established as part of the progressive rehabilitation.

Stage 3

Benched extraction will continue in the west to lower the floor to 1055 m AHD, which exposes a significant portion of the site. Extraction will occur on the top-most bench to the western extraction boundary at a 2 Horizontal: 1 Vertical batter, this will be back filled with overburden in the final landform stage (see **Figure 46**). Haulage will be undertaken on to the proposed floor of 1055 metres RL. Overburden and then topsoil will continue to be placed on the eastern flank and the final quarry floor, not required for stockpiling, as part of the progressive rehabilitation.

Stage 4

Continued extraction of the benches in the western side of the operation will create final landform slopes (see **Figure 46**). Stockpiled overburden and topsoil will be emplaced on final landform. Rehabilitation will continue to occur on eastern flank from the topmost benches down to the floor. All topsoiled areas will be revegetated.

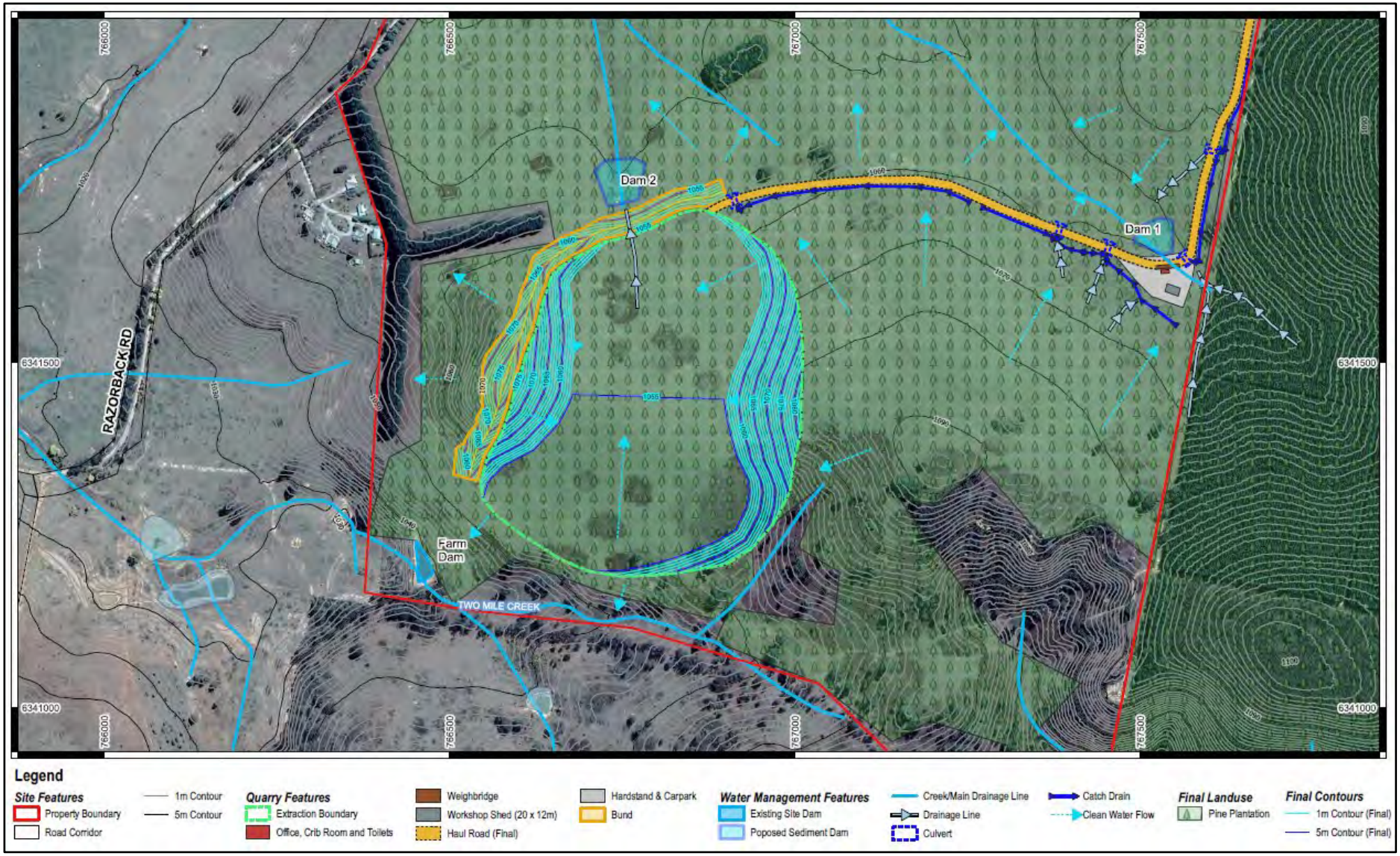

Figure 43: Final Landform

Figure 44: Quarry - Stage 1

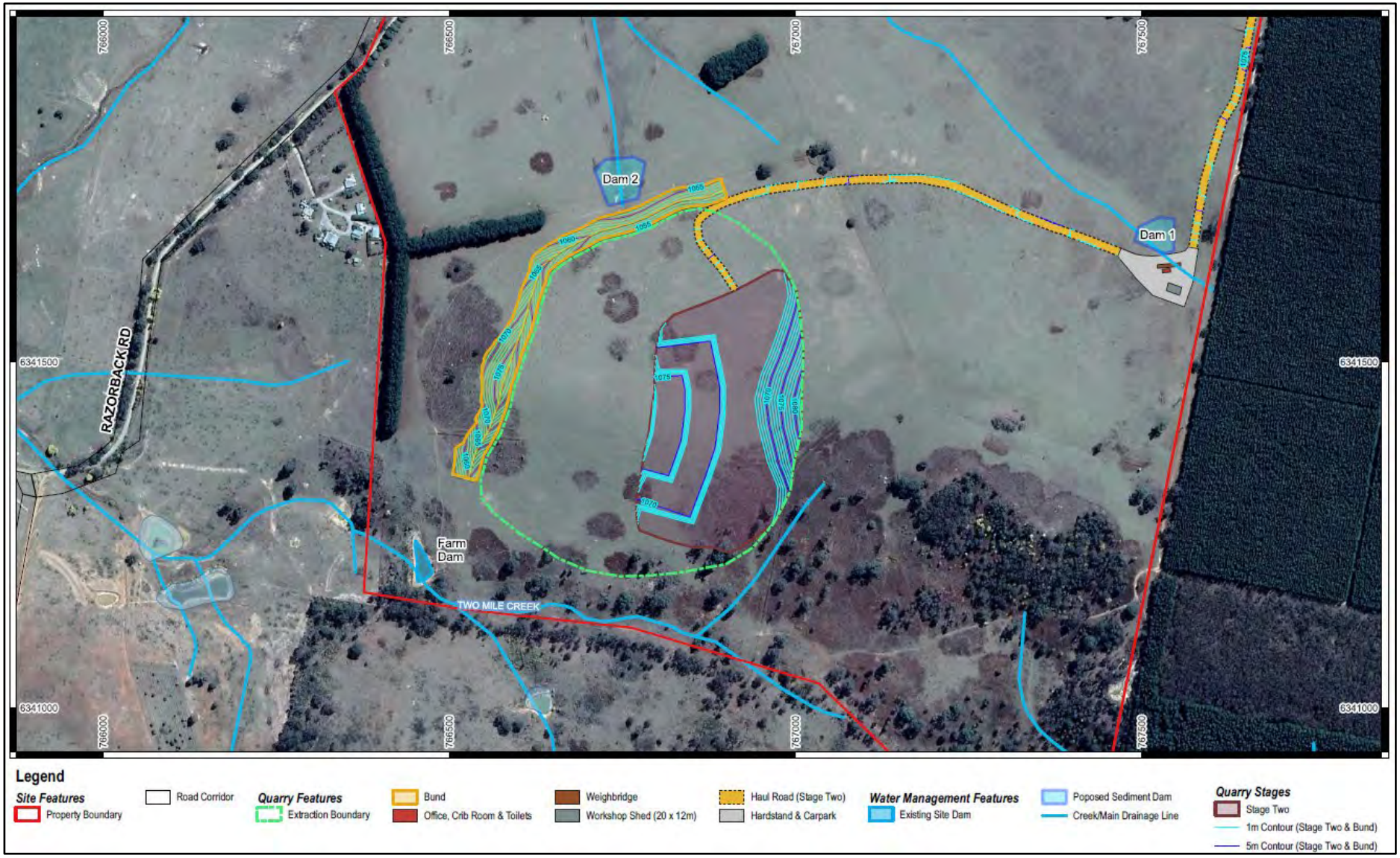

Figure 45: Quarry – Stage 2

Figure 46: Quarry - Stage 3 & 4

8.13.5 Rehabilitation Objectives and Rehabilitation Completion Criteria

The following table (**Table 63**) provides the rehabilitation objectives and criteria for the quarry.

Table 63: Rehabilitation Objectives and Completion Criteria

REHABILITATION OBJECTIVE CATEGORY	PROPOSED REHABILITATION OBJECTIVES	INDICATOR	PROPOSED COMPLETION CRITERIA	VALIDATION METHOD MONTORING OR RECORD
Retention of Infrastructure	All infrastructure that is to remain as part of the final land use is safe and does not pose any hazard to the community.	Tracks suitable for private access or pedestrian usage.	Slopes of major tracks <10° or have cross drains/bank installed. Where unsuitable soils are present, tracks to be stabilised with gravel or similar.	Survey on completion by registered surveyor.
		Infrastructure is in a condition (e.g., structural, other hazards) that is suitable for the intended final land use.	Formal acceptance from the subsequent landowner that infrastructure is in a condition that is suitable for the intended final land use in accordance with formal agreement.	Formal acceptance from landowner.
Surface Water	Runoff water quality from quarry site is similar to, or better than the pre-disturbance runoff water quality.	Water Quality meets the objective of Section 120 of the Protection of the Environment Operations Act 1997. In particular, 'downstream' water quality monitoring will record total suspended solids <50mg/L or within 30% of 'upstream' levels (which is the greater).	Downstream water to be monitored for TSS and comply with required criteria.	Water quality monitoring reports.
Water Approvals	Structures that take or divert water such as final voids, dams, levees etc. are appropriately licensed (e.g., under the Water Management Act 2000) and where required ensure sufficient licence shares are held in the water source(s) to account for water take.	Final landform considers advice from relevant Government Agency whether sufficient licence shares are available in the water source to account for water stored in voids and dams in the proposed final landform.	Water approvals / licences are granted by relevant NSW Government Agency.	Confirmation from relevant Government Agency that relevant water approvals / licences are able to be granted.
Removal of Infrastructure	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.	Removal of all services (power, water, communications) that have been connected on the site as part of the operation.	All utility infrastructure removed.	Statement provided, utility service disconnection record / notification.

		Removal of all plant, equipment and associated infrastructure including processing facilities, stockpile areas, loading facilities, office complex, portable offices, exploration core samples, camp facilities, storage racks, samples.	Infrastructure removed.	As-constructed final landform plan, photos, decommissioning reports etc
		Removal of all water management infrastructure (including pumps, pipes, and power).	Infrastructure removed.	As-constructed final landform plan, photos, decommissioning reports etc
Land Contamination	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.	Waste material and/or visible contamination areas on site surface.	There are no visible signs of contamination following the removal of plant, equipment, and materials. All rubbish / waste materials removed from site.	Statement provided and before / after photos.
		If residual contamination is suspected, soil testing for contaminants of concern as listed by Health Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999) applicable to land use type.	Contamination will be appropriately remediated so that appropriate guidelines for land use are met, e.g., Health Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999). Excess sludge / material has been removed from surface water dams.	Contamination Remediation Report prepared by Land Contamination Consultant Site Contamination Audit Report and Site Audit Statement prepared by EPA Accredited Auditor (where required).
Landform Stability	The final landform is stable for the long-term and does not present a risk of environmental harm downstream / downslope of the site or a safety risk to the public / stock / native fauna. Landform that is commensurate with surrounding natural landform and where appropriate, incorporates geomorphic design principles.	Visual - indicators of erosion and land instability. Visual - indicators that surface water management structure are functioning as designed. Measured - survey of rehabilitated landform to verify final landform construction in accordance with Final Landform and Rehabilitation Plan. Measured – survey / monitoring of rehabilitated landform to specifically monitor settlement (Subsidence) and / or material loss via erosion.	Visual- minimal erosion that would not require moderate to significant ongoing management and maintenance works. Visual – no signs of land instability such as mass movement. Visual - no areas of active gully erosion. Visual - no evidence of tunnel erosion. Visual – no evidence of active scour likely to compromise	Before and after photos, rehabilitation monitoring reports, as constructed surveys, erosion surveys, and independent geotechnical reports (where required) that indicate long-term stability of rehabilitated landform. Stability will continue to be evaluated over 5 years.

			surface water management structure. Survey verifies final landform complies with final landform construction in accordance with Final Landform and Rehabilitation Plan. Survey verifies that settlement (subsidence) and/or material loss is within predicted limits and will not compromise final landform drainage via differential settlement. Total projected foliage cover is greater than or equal to 70% (Blue Book C -factor equivalent of 0.05)	
			Significant surface water management structures (e.g., spillways, drop structures, major drains, and creek diversions) have been constructed in accordance with Managing Urban Stormwater 'Blue Book' DECC 2008 requirements.	An engineering assessment undertaken by a suitably qualified person concludes that significant surface water management structures (e.g., spillways, drop structures, and major drains) have been constructed in accordance with Managing Urban Stormwater 'Blue Book' DECC 2008 requirements.
			High risk landforms (such as steep slopes, high walls) have been constructed in accordance with geotechnical design.	An engineering assessment undertaken by a suitably qualified person concludes that high risk landforms (such as steep slopes, high walls) have been constructed in accordance with geotechnical design.
Bushfire	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.	Appropriate bushfire hazard controls (where required) have been implemented on the advice from the NSW Rural Fire Service.	Bushfire controls implemented.	Statement provided and before / after photos.

Agricultural Revegetation	The vegetation composition of the rehabilitation is recognisable as the target vegetation community (agricultural grazing).	Routine Soil Test (bulked soil samples 0-10 cm). Includes: Total Carbon (TC), Total Nitrogen (TN), Organic Matter, TC/TN Ratio; Bray I and II Phosphorus; Colwell Phosphorus; Available cations (Calcium, Magnesium, Potassium, Ammonium, Nitrate, Phosphate, Sulphur); Available Micronutrients (Zinc, Manganese, Iron, Copper, Boron, Silicon); Exchangeable (Sodium, Potassium, Calcium, Magnesium, Hydrogen, Aluminium, Cation Exchange Capacity); pH and EC (1:5 water); Basic Colour, Basic Texture.	Land and Soil Capability classification or Agricultural Land Classification criteria met. The re-established topsoil / subsoil substrate is capable of supporting the targeted pasture / pine plantation regime on a sustained basis. Pasture establishment is consistent with the range of species utilised within the region. Pasture establishment is in good health and provides adequate cover. Visual- presence of trees confirmed.	Rehabilitation monitoring reports, independent soil reports, environmental monitoring records, independent agronomist reports. Achievement of criteria to be evaluated over a period of 5 years.
		No further active weed control required beyond that considered necessary at analogue sites.	Monitoring confirms the non-target species (weeds) represent less than 10% of projected foliage cover or equivalent to surrounding vegetation not disturbed by mining activities.	

8.13.6 Impacts and Mitigation

Topography and Geotechnical Stability

Topography and Geotechnical Stability Impacts

The elevation of the land within the project area ranges from 1057 m to 1062 m AHD along the access road with quarrying occurring between 1083 m and 1055 m AHD. Out of pit bunding and emplacement is likely to extend down to approximately 1053 m AHD. Dams are proposed at 1049 m AHD and 1058 m AHD. The office and workshop area are at approximately 1062 m AHD. The final quarry topography and drainage has been designed such that it is commensurate with the surrounding land.

Geotechnical risks related from ground movement include such hazards as subsidence, landslips, toppling, settlement, heave, slumping, and fracturing are minimal. No underground activities are undertaken on the site and there is no history of underground working the risk of subsidence is considered negligible. The site is located in the 'Turonfels- Erosional' landscape which are described as having a low mass movement hazard.

The risk of dewatering or heave is also considered negligible given the site will not intersect groundwater nor are there any underground workings on the site. The weathered conglomerate and sandstone are not prone to swelling when wet, the prime cause of heaving. The strata do not contribute chemical leachates harmful to rehabilitation or environment.

Topography and Geotechnical Stability Mitigation

Material will be won by dozer ripping and excavator working in an east to west direction over two benches maintaining a batter between the quarry operations and the dwelling to the west. Batter slopes will be generally a maximum of 3 horizontal to 1 Vertical which are expected to be stable during extraction operations and within the final landform. No stockpiles will be stored on unstable slopes. Clean water diversions upslope will minimise the risk of water infiltration into the batter slopes.

The final landform will be a vegetated, stable, free draining bowl with the Dams 1 and 2 being retained. This will be compatible with surrounding land uses of forestry and agriculture.

Land Capability

Impact of Final Landform on Land Capability

The Land and Soil Capability class in the rehabilitated landform is expected to drop from LCS class 4 to Class 6 on the quarry final batters, primarily due to the increase in batter slopes within the final void. The pit floor will remain as Class 4 land. Class 6 land is described as:

> *'**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.'*

This land capability is suited to the proposed uses of low level grazing and forestry.

Refer to Table 9 of the **RMP** (see **Appendix Q**) for the full land capability assessment details.

Mitigation Measures for Land Capability of Final Landform

No mitigation measures are proposed for the final landform as the land will be suitable for low level grazing and forestry.

Soils and Erosion

Soil Impacts

Impacts of soils erosion comprise two components, loss of soil from the site and entrainment of sediment to the downstream environment. Loss of soil from the site has a localised impact, predominately to the maintenance of vegetation and agricultural productivity over the affected area. Erosion that results in the entrainment of sediment may potentially impact the downstream environment if released.

Soil Mitigation

Topsoil Stripping and Storage

Prior to stripping topsoil, all water management features will be constructed to divert as much clean water as possible and capture the dirty water within the quarry sump. Prior to stripping, the vegetation will be sprayed for weeds to assist in reducing the weed content in topsoil.

Where possible topsoil will be stripped and emplaced on previously ripped completed faces. Stripping should not occur in either excessively dry or wet conditions. Grading or pushing soil into windrows for loading into rear dump trucks will be utilised as these are considered less aggressive soil handling processes. This process minimises compression effects of heavy equipment.

Where immediate reuse of the topsoil is not possible it will be stored appropriately on the perimeter of the site. Stockpiles should be located at least 5 m from areas of likely concentrated or high velocity flows, eg. drainage lines and access roads. The surface of soil stockpiles should be left in as coarsely structured a condition as possible to promote infiltration and minimise erosion until vegetation is established, and to prevent anaerobic zones forming.

Topsoil stockpiles are not to exceed 2 m in height with a minimum crest width of 2 m and are to be seeded with a temporary vegetation cover if stockpiles are to remain longer than 12 months. If necessary, earth banks or drains will be constructed to divert localised surface water run-off.

Topsoil to a depth of 10 - 15 cm will be stripped first with the subsoils, if found, to a depth of a further 20 – 30 cm stripped and stored separately. The actual depth of stripping of each layer will be recorded and a total volume of topsoil and subsoils estimated, and an inventory kept. Each stockpile location will be mapped, and barrier fencing will be installed to limit access to rehabilitated areas or the stockpiles.

Topsoil Quality

Topsoil will be sampled and analysed prior to respreading to determine if amelioration measures are required.

Topsoil Re-Spreading

Prior to re-spreading stockpiled topsoil, an assessment of weed infestation on stockpiles should be undertaken to determine if individual stockpiles require herbicide application and / or 'scalping' of weed species prior to topsoil spreading.

Where topsoil resources allow, topsoil should be spread to a nominal depth of 10 cm on all re-graded subsoils. Subsoils will be emplaced first over the battered overburden material used to create the final landform. The depth of subsoils should aim to replicate that of the original soil profile.

Topsoil should be spread, treated with fertiliser, and seeded in one consecutive operation to reduce the potential for topsoil loss to wind and water erosion.

Seedbed Preparation

All areas to be topsoiled should be lightly contour ripped to create a "key" between the soil and the spoil. Ripping should be undertaken on the contour and when soils are moist to achieve the best results. The respread topsoil surface should be scarified prior to, or during seeding, to reduce run-off and increase infiltration. This can be undertaken by contour tilling with a fine-tyned plough or disc harrow.

Topsoil Balance

Topsoil and subsoil resource has been estimated for the site using site survey. Site observations, during the resources assessment by VGT, indicates topsoil/subsoil ranges in thickness from 20cm on the ridge to 50cm on the flanks. Actual topsoil volumes won will be recorded and a topsoil balance will be developed and maintained. An estimate of topsoil and subsoil volumes is provided in **Table 48**.

Overburden

Overburden volumes (refer **Table 49**) have been calculated from the Resource Assessment prepared by VGT.

Overburden not required to construct the acoustic and visual bund wall will be used to batter final slopes or will be temporarily stored on the pit floor.

Erosion Control

The site is prone to moderate erosion, however this will be limited to the exposed worked areas of the quarry. Eroded soils and sediment will be captured within the in pit sump and will not leave the site. Slopes will be kept moderate where possible in the quarry to reduce the erosion hazard.

Generally, the control of erosion and sedimentation at the site will focus on source reduction measures. These measures will include:

- Reading any Surface Water Management Plan with any engineering plans and any other plans or written instructions issued in relation to development at the subject site,
- Ensuring contractors undertake all soil and water management works as instructed in this specification and constructed following the guidelines stated in the "Blue Book", and
- Inform all subcontractors of their responsibilities in minimising the potential for soil erosion and pollution to downslope areas.

All works are to be undertaken in the following sequence to minimise erosion potential:

- Topsoil in new areas will be surveyed, mapped and the texture, thickness and quality described prior to stripping. Topsoil and overburden not for immediate use will be stockpiled in appropriate areas and limited to 2 m in height and

revegetated with temporary ground cover species, mulching or chemical stabilisers or binders if they are to remain in place for more than 30 days. A minimum of 70 percent cover is required for both mulch and vegetative covers,

- Construct earth banks (Stormwater Collection Drains) to divert as much clean water as possible and capture the dirty water in the extraction area,
- Undertake extraction activities in the new area,
- Rehabilitate lands in exhausted areas with overburden then topsoil and revegetate,
- Install barrier fencing to limit access to rehabilitated areas, and
- Ensure management practices are carried out to minimise areas being affected by wind and water erosion.

Soil stabilisation is primarily achieved through the rehabilitation of exposed areas. Here, rehabilitation means achieving a C-factor (Revised Universal Soil Loss Equation) of less than 0.1 (equivalent of 60% groundcover) and the program that ensures it will drop permanently, by reducing the risk of erosion by vegetation, paving, armouring, etc. as soon as practicable after activities cease.

Cumulative Impacts

The downstream environment is not affected at present by any other extractive industry or land disturbing activity other than agriculture or forestry. As the operations, utilising the above management procedures, will release negligible volumes of sediment off-site, the operations are expected to have a similar impact on the downstream environment as is currently experienced due to agricultural activities. That is, the cumulative impacts due to potential erosion of soils resulting in sediment entering the downstream environment are considered negligible.

Geochemical Constraints

Geochemical Impacts

The site geochemistry provides a minor risk of pH levels below optimum levels for rehabilitation. The risk of acid mine drainage is considered to be negligible. There is almost negligible risk of spontaneous combustion due to the absence of carbonaceous material at the site.

The geochemistry is not expected to present any difficulties regarding overburden and topsoil management. The soils are somewhat dispersive and will be stored appropriately to minimise erosion if they cannot be immediately utilised.

There will be no tailings generated from the extraction process. Any weathered gravel or sandstone material exposed in the active faces of the quarry are considered chemically stable and do not constitute a risk to the environment during extraction or rehabilitation.

Geochemical Mitigation Measures

The soils on the site are slightly acidic and low to moderately saline. Appropriate amelioration measures may include liming and fertilising of the topsoil and any subsoils during rehabilitation activities.

Cumulative Impacts

The proposal is not expected to contribute any cumulative impacts to the geochemistry that cannot be managed by soil amelioration measures.

Flora and Fauna

Impacts to Flora and Fauna

The Biodiversity Assessment (refer **Section 8.4**) made the following determinations:

> ***'Direct Impacts***
>
> *The ecological field assessment found that the proposal will remove up to:*
>
> - *24 ha of Pine Plantation/Disturbed Grassland, and*
> - *0.25 ha of PCT 1191: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, Southeastern Highlands Bioregion (Low Condition).*
>
> *Flora*
>
> *No threatened flora was detected during field surveys.*

Fauna

Up to seven (7) hollow bearing trees were recorded within the subject site and may be removed for the proposed development. The proposal will also remove multiple wombat burrows observed within the subject site during the field survey.

Indirect Impacts

The proposal may result in the following indirect impacts associated with the construction and operation of the quarry:

- *Introduction and dispersal of exotic flora species from machinery.*
- *Potential for increased sediment flows in the event insufficient erosion and sediment control are installed throughout the duration of construction of the proposed development.'*

Mitigation Impacts to Flora and Fauna

Recommendations for mitigation measures from the Biodiversity Assessment specific to flora and fauna are reproduced below.

- All contractors will be specifically advised of the designated work area. The following activities are not to occur outside of designated work areas to minimise environmental impacts:
  - Storage and mixing of materials,
  - Liquid disposal,
  - Machinery repairs and/or refuelling,
  - Combustion of any material, and
  - Any filling or excavation including trenching, topsoil skimming and/or surface excavation.
- All construction vehicles/machinery are to use the designated access from main roads,
- Vehicle and machinery speeds will be limited to reduce the potential of fauna strike and to reduce dust generation,
- Plant and machinery will be cleaned of any foreign soil and seed prior to being transported to the subject site to prevent the potential spread of weeds and Phytophthora cinnamomi,
- If machinery is transported from an area of confirmed infection of Phytophthora cinnamomi to the subject site, stringent wash down must be completed before leaving the area, removing all soil and vegetative material from cabins, trays, and under carriages,
- All liquids (fuel, oil, cleaning agents, etc) will be stored appropriately and disposed of at suitably licensed facilities. Spill management procedures will be implemented as required,
- Ensure the extent of clearing is clearly marked in the field prior to the commencement of vegetation clearing, and
- Ensure that only the minimum vegetation clearing required is undertaken.

Pre-Clearance Survey

The proponent is to engage a suitably qualified ecologist to undertake pre-clearance surveys prior to any vegetation clearing works occurring on site.

- Prior to the commencement of any vegetation removal, a preclearance survey will be conducted by the Project Ecologist to identify significant habitat features, which include but are not limited to:
  - Tree hollows,
  - Nests,
  - Arboreal termite terraria, and
  - Any areas observed to be currently utilised by BC Act or EPBC Act listed threatened fauna.
- During the pre-clearance survey, any significant habitat features or trees that are known to have resident fauna present and all hollow-bearing trees will be:
  - Marked around the trunk of the tree at approximately 1.5 m high with a 'H' marked several sides of the trunk using fluorescent spray marking paint, and/ or
  - Marked with highly visible flagging tape.

Hollow Bearing Tree Felling

The following will apply with regard to tree removal:

- Tree removal is to be strictly limited to the extent of vegetation approved for removal under the relevant Consent,
- Where generated, mulch/tub grindings generated from the removal of vegetation on the subject site is to be reused on the subject site,
- Felled trees must be stockpiled and processed within marked clearing boundaries,
- All removal of hollow-bearing trees or significant habitat features is to be supervised by the Project Ecologist, Hollow bearing trees or trees containing significant habitat features are to be knocked with an excavator bucket followed by a waiting and observation period to alert any resident fauna that have not moved on from the tree and to encourage the fauna to vacate,
- All trees are to be slowly lowered (soft felled) where possible - machinery will ease the tree down to ground level by controlling the speed at which the tree descends to the ground, this will reduce impact to tree hollows and any potential fauna that may still be present during the removal process, and
- Following felling and when safe, the supervising Project Ecologist shall inspect the tree and hollows for displaced fauna.

Revegetation

Planting Methods

After the surface is stabilised and topsoiled, direct seeding/spreading of pre-treated seed grass species endemic to the area will be undertaken. Prior to planting, the area will be ripped along the contours of the slope. The revegetated area will be watered regularly, if required, for the first six months after planting to assist in the establishment of the grassland.

Species Mix

The site is located in what is considered to be the Central Tablelands area of NSW within a high rainfall zone (>750mm per annum). The Department of Primary Industries (DPI) recommended the following species and sowing rates for long-term pasture (refer **Table 64**).

Table 64: Recommended Species for Long-Term Pasture in the Central Tablelands (high rainfall)

MITIGATION MEASURES	RESPONSIBILITY
Phalaris	2 kg/ha
Tall Fescue	4-5 kg/ha
Perennial Ryegrass	1-2 kg/ha
Sub Clover	4 kg/ha
White Clover	0.5-1 kg/ha

Land Contamination

Land Contamination Impacts

Potential contaminants such as hydrocarbons, herbicides and pesticides are likely to be used during site operations and may impact the land and surface water on the site. There is no other history of potential contaminated land.

Land Contamination Mitigation

The following will apply to ensure land contamination is minimised:

- Weed and Pest control is undertaken by licenced contractors. Chemicals are not stored on site and only minor amounts are used,
- No Fuel is stored permanently on site. Refuelling is to be conducted in pit by a mobile fuel cart, and spill kits will be carried at all times, and
- No oils/solvents or lubricants are stored permanently onsite. All vehicle and machinery scheduled maintenance is conducted in off site, however emergency repairs and maintenance may be undertaken onsite from time to time. Maintenance contractors will carry spill kits at all times.

Cumulative Impacts

Use of fuels and herbicides and pesticides are typical in rural areas but there will be minimal volumes held on site. It is unlikely that the site operations will contribute to any significant cumulative impacts.

Weeds and Pests

Weed and pest inspections and control will be undertaken on a regular basis. Weed control will be undertaken by licenced contractors and reports supplied to the Proponent describing weed identification, numbers, and control measures.

Waste

The quarrying operations will not directly produce domestic or industrial waste. Domestic wastes will be placed in bins and removed by licenced contractors to a licenced waste facility. Effluent will be collected direct from an on-site portaloo.

Bushfire

The risk of bushfire is low within the disturbed area due to lack of combustible materials. However, equipment use may be an ignition source. Mitigation measures include:

- Refuelling to be undertaken in pit,
- Fire extinguishers to be carried by plant and equipment, and
- Emergency procedures for the site will be developed.

Further detail on emergency response is discussed in **Section 8.10**.

Surface Water

Surface water impacts are generally mitigated by ensuring sediment and erosion controls are installed prior to disturbance. Surface water management is discussed in more detail in the **Section 8.5**.

Compatibility with other Land Users

The majority of the site is used for pine plantations. Surrounding lands are primarily larger agricultural holdings practising mixed grazing, along with a scattering of pine plantations and other uses. The operation of the quarry is permissible within the RU1- Primary Production zoned land within the Mid-Western Regional Council LGA and is compatible with the surrounding rural land uses.

Sensitive receptors are generally located at least 1 kilometre from the project site and are not likely to be significantly impacted. The closest residence is located some 250 metres to the west of the site, however the Land Use Compatibility Assessment (see **Section 8.9**) has determined that the risk of potential impacts to the surrounding land users can be satisfactorily managed.

The quarry will be progressively rehabilitated to pasture and pine plantation with potential future use of the facilities area for forestry related activities, consistent with surrounding land uses.

Rehabilitation Trials and Research

Future rehabilitation research will likely involve selection of suitable species and when final surfaces become available, undertaking trials to determine the best approach to establishing revegetation. The results of any trial will be used to address any knowledge gaps in relation to:

- development and further refinement of rehabilitation completion criteria, and
- achievement of rehabilitation objectives and rehabilitation completion criteria.

8.13.7 Monitoring and Maintenance

General Rehabilitation Monitoring

Rehabilitation progress will be monitored at least annually and includes initiating upgrading or repair as appropriate. Items to be monitored will include, but not limited to:

- Inspection (including photography) for unacceptable visual impacts to sensitive receptors,
- Weed and pest inspections to be undertaken at least annually and engage contractors if required,
- Inspections to determine that the total foliage cover in rehabilitated areas is on a trajectory to be greater than or equal to 70% (Blue Book C -factor equivalent of 0.05),
- Determining if the Land and Soil Capability classification or Agricultural Land Classification criteria are on a trajectory to be met,
- Pasture establishment is consistent with the range of species utilised within the region and in good health,
- Pine Plantation establishment has commenced, and
- Monitoring confirms the non-target species (weeds) represent less than 10% of projected foliage cover (or equivalent to surrounding vegetation not disturbed by mining activities).

Surface Water Management Monitoring

Erosion and Sediment Controls

The following will be implemented:

- Topsoil stripping to be visually monitored to check moisture content of soil and depth of stripping,
- Stockpiles to be visually assessed at time of forming to check they do not exceed two metres high,
- Removal of spilled soil or other materials from hazard areas, including lands closer than five metres from areas of likely concentrated or high velocity flows, especially waterways and access roads,
- Barrier fencing will be installed to limit access to rehabilitated areas or the stockpiles,
- Visual inspection of the mine batters and slopes to determine if areas of instability are apparent and undertake works to stabilise the landform as required, and
- Constructing additional erosion and/or sediment control works as might become necessary to ensure the desired water control is achieved.

Surface Water Flows

The following will be implemented:

- Visual check of stability and operation of all banks, ponds, channels, and spillways, effecting any necessary repairs,
- Visually check the discharge point to ensure that the discharge does not cause erosion or scouring of the creeks. Effecting any necessary repairs,
- Drains and culverts for both clean water and dirty water will be examined for vegetation cover and blockages and maintenance will be performed to ensure they are working as designed,
- Diversion bund walls will be inspected regularly to assess the integrity and effectiveness. Maintenance will be performed when required,
- Removal of spilled materials from hazard areas, including lands closer than five metres from areas of likely concentrated or high velocity flows, especially waterways and access roads,
- Ensuring that rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate, and
- Constructing additional erosion and /or sediment control works as might become necessary to ensure the desired water quality control is achieved.

Surface Water Quality

Samples, if required, are collected and tested by a NATA Accredited Facility in accordance with the EPL conditions. Analytes tested and concentration limits will be those listed in the EPA licence and are expected to be as follows:

- pH is to be between 6.5 to 8.5, and
- TSS is <50mg/L, or
- Turbidity <150 µS/cm.

Monitoring of the surface water outside the EPL Licence Points may be undertaken from time to time such as the other sediment dams in and out of the pit. The results of all monitoring are recorded to the EPA in the Annual Return.

Contaminated Water

The following will be implemented:

- No waste (including sewerage) will be stored on-site unless adequately bunded and stored,
- Regular visual monitoring will be undertaken to ensure no leaks, spills or other sources of contamination have entered the water management system, and
- Should a spill or leak occur, contractors will proceed as per their Spill and Leaks procedures.

Sediment Dam Management and Maintenance

The following will be implemented:

- Level indicators will be installed in dams with relevant marks located on the peg to indicate the amount of sediment load in the dam,

- All sediment basins will be maintained by de-silting when the capacity is diminished,
- Sediment dams and clean water dams will be visually assessed for water quality and volumes on a regular basis or as required after high rainfall events,
- If discharge is required, the visual assessment will be followed by sampling and testing of the water quality prior to discharge to ensure water quality criteria are met,
- The limit of TSS of less than 50mg/L or turbidity less than 150 µS/cm in the discharged water will be adopted (unless modified by the EPA),
- Ensuring that rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate, and
- Constructing additional erosion and /or sediment control works as might become necessary to ensure the desired water quality control is achieved.

8.13.8 Security Bond

A security bond will be calculated for the site using the Rehabilitation Cost Estimate Tool published by the Resources Regulator. This will provide a best practice estimation of the cost of rehabilitation that may be required under any consent conditions that may be imposed.

8.13.9 Review and Improvement

Continuous Improvement

Continuous improvement of this RMP will be achieved through the ongoing evaluation of environmental management performance against environmental policies, objectives, and targets.

The continuous improvement process is designed to:

- identify areas of opportunity for improvement of environmental management and performance,
- determine the cause or causes of non-conformances and deficiencies,
- develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies,
- verify the effectiveness of the corrective and preventative actions,
- document any changes in procedures resulting from process improvement, and
- make comparisons with objectives and targets.

RMP Update and Amendment

The processes described above may result in the need to update or revise this Plan. The approval of updates or revisions to the RMP will need to be considered in accordance with any consents, leases, licences, or direction from relevant authorities.

Notwithstanding the above, the rehabilitation strategy will be reviewed every five (5) years.

Training

Employees and contractors working on-site will undergo site induction training, which will cover rehabilitation management, including:

- Existence and requirements of this Plan,
- Relevant legislation,
- Access restrictions and disturbance limitations,
- Internal speed limits,
- Biodiversity management measures (see BMP),
- Injured wildlife response procedures, and
- Emergency and spill response procedures.

8.13.10 Conclusions

The majority of the Subject Land is used for pine plantations. Surrounding lands are primarily larger agricultural holdings practising mixed grazing, along with a scattering of pine plantations and other uses. The procedures outlined within this report will ensure that progressive rehabilitation will mitigate the impacts to the neighbouring sensitive receptors and environment.

In conclusion the land proposed to be disturbed can be progressively rehabilitated to permit the final land use of grazing and pine plantation consistent with surrounding land uses.

8.14 Statement of Commitments

The mitigation measures, monitoring activities, and management strategies outlined in **Section 8** above will be implemented for all activities associated with the proposed facility. **Table 65** below details the key commitments proposed in this EIS to effectively mitigate and manage the potential environmental impacts of the development.

Table 65: Consolidated Statement of Commitments

SUMMARY OF COMMITMENTS	SECTION IN THE EIS
General	
a) PPP 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. b) PPP will provide an Annual Review of the quarry's environmental performance in line with the requirements of the EMP to the relevant agencies. c) 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.	**To be prepared post-approval**
Traffic and Transport	
• The available sight distance of Razorback Road to the south along Castlereagh Highway is adequate for the speed environment, • The available sight distance of Razorback Road to the north along Castlereagh Highway is inadequate for the speed environment. However, a proposed concept design has been development to trim back the embank to the north and this design provides a clear sight distance meeting Austroads guidelines, • Total traffic generation remains low and has no impact on the intersection performance and demonstrates that the current protected right run storage and left turn de acceleration lane is adequate and no other intersection improvements are necessary, • Minor signage upgrades are required to improve the awareness of the approaching intersections, and • Sealing of Razorback Road to 15m west of the quarry access will ensure that the minor increase in vehicle movements will not have an adverse effect on road safety or amenity of adjacent properties.	**Section 8.1**
Air Quality (including greenhouse gas)	
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. **Haulage** • 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.	**Section 8.2**
Noise and Vibration	
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: o 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. • Management controls to minimise noise impacts, including: o Relevant best practice noise management practices. o Ensuring plant and equipment used onsite are generally consistent with the sound power levels used in this noise modelling assessment. o 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 are exceeded.	**Section 8.3**
Biodiversity	
• All contractors will be specifically advised of the designated work area. The following activities are not to occur outside of designated work areas to minimise environmental impacts: o Storage and mixing of materials, o Liquid disposal, o Machinery repairs and/or refuelling, o Combustion of any material, and	

o Any filling or excavation including trenching, topsoil skimming and/or surface excavation. • All construction vehicles/machinery are to use the designated access from main roads. • Vehicle and machinery speeds will be limited to reduce the potential of fauna strike and to reduce dust generation. • Plant and machinery will be cleaned of any foreign soil and seed prior to being transported to the subject site to prevent the potential spread of weeds and Phytophthora cinnamomic. • If machinery is transported from an area of confirmed infection of Phytophthora cinnamomi to the subject site, stringent wash down must be completed before leaving the area, removing all soil and vegetative material from cabins, trays, and under carriages. • All liquids (fuel, oil, cleaning agents, etc.) will be stored appropriately and disposed of at suitably licensed facilities. Spill management procedures will be implemented as required. • Rubbish will be collected and removed from the subject site. • During the creation of access tracks, erosion or sediment measures will be considered and installed as required. • Ensure the extent of clearing is clearly marked in the field prior to the commencement of vegetation clearing. • Ensure that only the minimum vegetation clearing required is undertaken.	**Section 8.4**
Surface and Groundwater	
• Any surface water sampling will be collected and tested by a NATA Accredited Facility in accordance with EPL conditions. Analytes to be tested and concentration limits are to be in accordance with the site EPL. These are expected to be as follows: o pH is to be between 6.5 to 8.5, o TSS is <50mg/L, or o Turbidity <150 µS/cm. • Monitoring of surface water outside the EPL Licence Points may be undertaken from time to time such as at the sediment dams in and out of the pit. Results of all monitoring will be recorded in the EPA Annual Return. • No waste will be stored on-site unless adequately bunded and stored. • All waste is stored in the appropriate on-site bins for later removal by a licenced contractor. • Regular visual monitoring will be undertaken to ensure no leaks, spills or other sources of contamination have entered the water management system. • Should a spill or leak occur onsite, spill containment and clean-up will be undertaken. • Spill kills will be kept in designated locations on the site where they can be easily accessed. • The following management checks on the surface water flows will be undertaken at least quarterly and recorded: o Visual check of stability and operation of all banks, ponds, channels, and spillways, effecting any necessary repairs, o Visually check the discharge point to ensure that the discharge does not cause erosion or scouring of the creeks. Effecting any necessary repairs, o Drains and culverts for both clean water and dirty water will be examined for vegetation cover and blockages and maintenance will be performed to ensure they are working as designed, o Diversion bund walls will be inspected regularly to assess the integrity and effectiveness. Maintenance will be performed when required, o Removal of spilled materials from hazard areas, including lands closer than five metres from areas of likely concentrated or high velocity flows, especially waterways and access roads, o Ensuring that rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate, and o Constructing additional erosion and /or sediment control works as might become necessary to ensure the desired water quality control is achieved.	**Section 8.5**

• Monitoring of the soil erosion, sediment and water is undertaken at least quarterly and recorded. Monitoring will include: o Topsoil stripping to be visually monitored to check moisture content of soil and depth of stripping, o Stockpiles to be visually assessed at time of forming to check they do not exceed two metres high, o Removal of spilled soil or other materials from hazard areas, including lands closer than five metres from areas of likely concentrated or high velocity flows, especially waterways and access roads, o Ensuring rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate, and o Constructing additional erosion and/or sediment control works as might become necessary to ensure the desired water control is achieved. • Sediment dams will be managed using the following: o Level indicators will be installed in dams with relevant marks located on the peg to indicate the amount of sediment load in the dam, o All sediment basins will be maintained by de-silting when the capacity is diminished, o Sediment dams and clean water dams will be visually assessed for water quality and volumes on a regular basis or as required after high rainfall events, o If discharge is required, the visual assessment will be followed by sampling and testing of the water quality prior to discharge to ensure water quality criteria are met, o The limit of TSS of less than 50mg/L or turbidity less than 150µS/cm in the discharged water will be adopted (unless modified by the EPA), o Ensuring that rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate, and o Constructing additional erosion and /or sediment control works as might become necessary to ensure the desired water quality control is achieved.	
Aboriginal Heritage	
• The proposed works for the Razorback Quarry may proceed with caution within the project area as assessed by the ACHAR. • If any items suspected of being Aboriginal in origin are discovered during the work, all work in the immediate vicinity must stop and Heritage NSW notified, and the Unexpected Finds Protocol provided as Appendix B to the ACHAR must be followed. • In the unlikely event that human remains are discovered during the proposed works, all work must cease in the immediate vicinity. The appropriate heritage team within Heritage NSW and the local police should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal. If the remains are deemed to be Aboriginal in origin the Registered Aboriginal Parties should be advised of the find as directed by the appropriate heritage team within Heritage NSW. Heritage NSW would advise the Proponent on the appropriate actions required. • Additional archaeological assessment would be required if the proposal activity extends beyond the area assessed by the ACHAR. This would include consultation with the registered Aboriginal parties and may include further field survey.	**Section 8.6**
Historic Heritage	
The Project site has no heritage items or heritage potential to add to the understanding of New South Wales development. In addition, there is no potential to retain a significant archaeological record. The sole structure onsite of note, due to its form, material use, and ongoing function as a machinery shed cannot be classified as historically significant and does not provide opportunity for significant research potential. The following will be implemented: • Should the machinery shed proposed to be moved, modified, or demolished at a later date archival photography should be conducted to record the rudimentary building methodology used, and	**Section 8.7**

• All efforts should be made to retain and maintain the Cypress Pine wind break along Razorback Road.	
Visual Amenity	
• The quarry has been designed and positioned on the site to ensure it will not be dominant in the landscape. In some cases, existing planted pines and native vegetation obscure the site from the view (including from Razorback Road), • A visual bund will be constructed along the western side of the quarry, • The final landform of the quarry remains below the horizon and will be progressively rehabilitated where available, • The internal roads and site infrastructure (weigh bridges and offices) are located away from the view of receptors, and • The proposed site is located inside an existing pine plantation that will eventually obscure any views. The current height of the trees in the pine plantation (established 2020) are approximately 2-2.5m tall. They are expected to reach a height of 16-18m when fully grown, growing at a rate of 80cm/year.	**Section 8.8**
Land Resources	
• Erosion and sediment control structures will be implemented to prevent run-off and erosion from topsoil, • 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, • Barrier fencing will be installed to limit access to rehabilitated areas or the stockpiles, • Weed and pest inspections to be undertaken at least annually.	**Section 8.9**
Bushfire	
The following key recommendations have been generated to enable the proposal to comply with PBP (2019): • A managed fuel zone (slashed paddock) of 50m will be established around the site facilities (crib room, weighbridge etc). The area is to be managed to IPA standards as a minimum with due regard to Appendix 4 PBP (2019), • Access will have due regard to the requirements of Table 5.3b, Chapter 8.3.1 and Appendix 3 of PBP (2019), • Services are to be provided and connected to the site in accordance with PBP (2019), and • Careful consideration of future site landscaping and ongoing fuel management must occur to minimise the potential impact of bushfire on the site in accordance with PBP (2019).	**Section 8.10**
Socio-Economic	
• 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.	**Section 8.11**
Waste Management	

• A designated waste storage area, providing for the separation and temporary storage of waste generated on site, will be provided during construction. • All waste materials will be regularly cleared from the site and transported by a suitably licenced contractor for recycling or disposal as appropriate. • Ordering will be limited to only the required quantities of materials. • Assessment of suspicious potentially contaminated materials, hazardous materials and liquid wastes will be undertaken. • Routine checks will be undertaken of waste sorting and storage areas for cleanliness, hygiene and OH&S issues, and contaminated waste materials. • Off-site waste disposal will be transported and disposed of in accordance with licensing requirements. • Staff and subcontractors will be informed of site waste management procedures. • Regular monitoring, inspection and reporting will be undertaken, and findings implemented.	**Section 8.12**
Rehabilitation	
<u>Topography and Geotechnical Stability</u> • Material will be won by dozer ripping and excavator working in an east to west direction over two benches maintaining a batter between the quarry operations and the dwelling to the west, • Batter slopes will be generally a maximum of 3 horizontal to 1 Vertical which are expected to be stable during extraction operations and within the final landform, • No stockpiles will be stored on unstable slopes, • Clean water diversions upslope will minimise the risk of water infiltration into the batter slopes, • The final landform will be a vegetated, stable, free draining bowl. **<u>Soils and Erosion</u>** ***Soils*** • Prior to stripping topsoil, all water management features will be constructed to divert as much clean water as possible and capture the dirty water within the quarry sump, • Prior to stripping, the vegetation will be sprayed for weeds to assist in reducing the weed content in topsoil, • Where possible topsoil will be stripped and emplaced on previously ripped completed faces. Stripping should not occur in either excessively dry or wet conditions, • Stockpiles should be located at least 5m from areas of likely concentrated or high velocity flows, eg. drainage lines and access roads, • The surface of soil stockpiles should be left in as coarsely structured a condition as possible to promote infiltration and minimise erosion until vegetation is established, and to prevent anaerobic zones forming, • Topsoil stockpiles are not to exceed 2 m in height with a minimum crest width of 2 m and are to be seeded with a temporary vegetation cover if stockpiles are to remain longer than 12 months. If necessary, earth banks or drains will be constructed to divert localised surface water run-off, • Topsoil to a depth of 10 to 15cm will be stripped first with the subsoils, if found, to a depth of a further 20 to 30cm stripped and stored separately. The actual depth of stripping of each layer will be recorded and a total volume of topsoil and subsoils estimated, and an inventory kept. Each stockpile location will be mapped, and barrier fencing will be installed to limit access to rehabilitated areas or the stockpiles. ***Erosion Control*** The control of erosion and sedimentation at the site will focus on source reduction measures. These measures will include: • Reading any Surface Water Management Plan with any engineering plans and any other plans or written instructions issued in relation to development at the subject site, • Ensuring contractors undertake all soil and water management works as instructed in this specification and constructed following the guidelines stated in the "Blue Book", and	

- Inform all subcontractors of their responsibilities in minimising the potential for soil erosion and pollution to downslope areas.

All works are to be undertaken in the following sequence to minimise erosion potential:

- Topsoil in new areas will be surveyed, mapped and the texture, thickness and quality described prior to stripping. Topsoil and overburden not for immediate use will be stockpiled in appropriate areas and limited to 2m in height and revegetated with temporary ground cover species, mulching or chemical stabilisers or binders if they are to remain in place for more than 30 days. A minimum of 70% cover is required for both mulch and vegetative covers,
- Construct earth banks (Stormwater Collection Drains) to divert as much clean water as possible and capture the dirty water in the extraction area,
- Undertake extraction activities in the new area,
- Rehabilitate lands in exhausted areas with overburden then topsoil and revegetate,
- Install barrier fencing to limit access to rehabilitated areas, and
- Ensure management practices are carried out to minimise areas being affected by wind and water erosion.

Section 8.13

Geochemical Constraints

- Soils on the site are slightly acidic and low to moderately saline. Appropriate amelioration measures may include liming and fertilising of the topsoil and any subsoils during rehabilitation activities.

Flora and Fauna

- All contractors will be specifically advised of the designated work area. The following activities are not to occur outside of designated work areas to minimise environmental impacts:
  - Storage and mixing of materials,
  - Liquid disposal,
  - Machinery repairs and/or refuelling,
  - Combustion of any material, and
  - Any filling or excavation including trenching, topsoil skimming and/or surface excavation.
- All construction vehicles/machinery are to use the designated access from main roads,
- Vehicle and machinery speeds will be limited to reduce the potential of fauna strike and to reduce dust generation,
- Plant and machinery will be cleaned of any foreign soil and seed prior to being transported to the subject site to prevent the potential spread of weeds and Phytophthora cinnamomi,
- If machinery is transported from an area of confirmed infection of Phytophthora cinnamomi to the subject site, stringent wash down must be completed before leaving the area, removing all soil and vegetative material from cabins, trays, and under carriages,
- All liquids (fuel, oil, cleaning agents, etc) will be stored appropriately and disposed of at suitably licensed facilities. Spill management procedures will be implemented as required,
- Ensure the extent of clearing is clearly marked in the field prior to the commencement of vegetation clearing, and
- Ensure that only the minimum vegetation clearing required is undertaken.

Land Contamination

The following will apply to ensure land contamination is minimised:

- Weed and Pest control is undertaken by licenced contractors. Chemicals are not stored on site and only minor amounts are used,
- No fuel is stored permanently on site. Refuelling is to be conducted in pit by a mobile fuel cart, and spill kits will be carried at all times,
- No oils/solvents or lubricants are stored permanently onsite. All vehicle and machinery scheduled maintenance is conducted in off site, however emergency repairs and maintenance may be undertaken onsite from time to time.

Weeds and Pests

- Weed and pest inspections and control will be undertaken on a regular basis,
- Weed control will be undertaken by licenced contractors and reports supplied to the Proponent describing weed identification, numbers, and control measures.

Waste

- The quarrying operations will not directly produce domestic or industrial waste,
- Domestic wastes will be placed in bins and removed by licenced contractors to a licenced waste facility,
- Effluent will be collected direct from an on-site portaloo.

Bushfire

The risk of bushfire is low within the disturbed area due to lack of combustible materials. However, equipment use may be an ignition source. Mitigation measures include:

- Refuelling to be undertaken in pit,
- Fire extinguishers to be carried by plant and equipment,
- Emergency procedures for the site will be developed.

9 Justification and Conclusions

9.1 Ecologically Sustainable Development

9.1.1 Introduction

Throughout the design of the development, PPP has endeavoured to address each of the following principles of Ecologically Sustainable Development (ESD):

1) 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.

2) **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.

3) **Conservation of Biological Diversity and Ecological Integrity,** namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.

4) **Improved Valuation, Pricing, and Incentive Mechanisms,** namely, that environmental factors should be included in the valuation of assets and services.

9.1.2 The Precautionary Principle

The Precautionary Principle states that if there are threats of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

The Development has been assessed for impacts relating to air quality and odour, noise, traffic and transport, visual amenity, water resources, flora and fauna, Aboriginal heritage, and non-indigenous heritage. This EIS, combined with the consultation undertaken with relevant government agencies, and local stakeholders, has provided an understanding of the potential implications of the development and subsequently confirm the mitigation measures required.

Through the adoption of an anticipatory approach, each potential issue arising from the Project has been identified, evaluated, and mitigated through a series of design or management solutions.

9.1.3 Inter-generational Equity

Intergenerational Equity is centred on the concept that the present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. There is a moral obligation to ensure that today's economic progress, which would benefit current and future generations, is not offset by environmental deterioration.

Throughout the assessment, the type and extent of potential impacts caused by the Project have been analysed and mitigated. The assessment methodologies have adopted a risk-based and worst-case scenario approach to ensure improved environmental, social, and economic protection for current and future generations. The environmental management and mitigation measures have been developed to minimise the impact of the Project on the environment for future generations.

The management and mitigation measures proposed in **Section 8** above would assist in ensuring that the development does not pose any significant impact or risk to the surrounding environment and safeguards the environment for future generations.

9.1.4 Conservation of Biological Diversity and Ecological Integrity

The principle of Conservation of Biological Diversity and Ecological Integrity holds that the conservation of biological diversity and ecological integrity should be a fundamental consideration for development proposals.

The site comprises lands located on part of a capped open cut mining void which has been filled with mine spoil and ash from the Bayswater Power Station. The development footprint, including the existing approved composting facility, is located on a graded hardstand area, surrounded by perimeter bunding. An ecological assessment has been undertaken by a qualified specialist to identify the extent of biological diversity on site and the surrounding area. There is not considered to be any significant impact on any threatened species, Endangered Ecological Community, critical habitat, or endangered populations by the proposed works on any state or nationally listed species under the EPBC Act 1999, or BC Act 2016.

9.1.5 Improved Valuation, Pricing, and Incentive Mechanisms

The principle of Improved Valuation, Pricing and Incentive Mechanisms deems that environmental factors should be included in the valuation of assets and services. The cost associated with using or impacting upon an environmental resource is seen as a cost incurred to protect that resource.

This principle involves consideration of the Proposal and the surrounding environmental resources (e.g., air, water, land and living things) which may be affected, and the financial resources required by the proponent to minimise or manage these impacts on surrounding environmental resources.

PPPs principal objective for the development is the design and operation of an extractive industry in a manner that minimises disturbance and any impact on the environment and surrounding residents. PPP is financially committed to this and other measures and will provide adequate financial resources to reinstate any disturbed habitat through appropriate rehabilitation procedures.

It is anticipated that income received from the sale of quarry products will achieve an acceptable profit level and allow all environment-related tasks and commitments to be achieved, including the rehabilitation of the site once extraction operations are complete.

9.2 Project Need

The quarry has the potential to provide a local sand resource in the Mid-Western LGA. At a distance of less than 200 km from Sydney, the sand products generated by the proposed quarry are expected to meet a variety of needs for landscaping and concrete sands within the Sydney and broader catchments.

The quarry will provide social and economic benefits through employment (directly and indirectly), local spending on consumables and maintenance and the distribution of this contribution through the local community. The quarry would also increase competition in the sand market and assist with keeping sand prices lower.

Throughout the planning stages of the Proposal, the Applicant considered alternatives with respect to site access from Razorback Road, intersection upgrades with the Castlereagh highway, transportation of the sand products, and surface water management structures. All other components were decided upon and designed following the assessment and consideration of all relevant information and data. No other alternatives are available in the locality that could be quarried as economically as this resource as there is no overburden to be removed and no washing is required.

If the Project does not proceed, a regionally significant sand resource will remain undeveloped, resulting in the need to identify, assess, and approve additional sand resources from other areas. If the project does not proceed and demand for construction sand is not met this could lead to shortfalls in supply and an increase in prices for not only sand but also the products that sand forms a component of.

Failure to proceed with the Project would also result in lost economic benefits for the surrounding LGA and communities.

9.3 Objects of the EP&A Act 1979

Development Consent is being sought under Part 4 of the EP&A Act and must therefore satisfy the objects of the EP&A Act. **Table 66** identifies the objects of the EP&A Act and confirms that each has been satisfied by the Proposal and this EIS.

Table 66: Objects of the EP&A Act

OBJECT		COVERAGE
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 development would provide for the use of the site for extraction and processing operations without compromising the surrounding land uses, natural resources, community, or environment.
b)	to facilitate ecologically sustainable development by integrating relevant economic, environmental, and social considerations in decision-making about environmental planning and assessment.	On the basis that the development would have minimal additional residual impacts on the biophysical environment and as discussed in **Section 8**, the Proposal is considered to conform to the principles of ecologically sustainable development.
c)	to promote the orderly and economic use and development of land.	The development would result in a beneficial use of land for extractive activities without limiting surrounding land uses and restore the disturbance area to an active pine plantation following quarrying activities.
d)	to promote the delivery and maintenance of affordable housing.	Not applicable to the application.
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 would disturb a total of 24 ha of pine plantation and disturbed grassland, and 0.25 ha of PCT 1191: Snow Gum – Candle bark woodland. Neither of these communities are Threatened Ecological Communities. A Biodiversity Assessment (MJD, 2022a) determined that the development would not involve significant additional impacts to threatened species, populations and ecological communities or their habitats.

f)	to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	No Aboriginal sites or sites of historic heritage significance were identified during surveys for the proposal.
g)	to promote good design and amenity of the built environment.	Not applicable to the application.
h)	to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not applicable to the application.
i)	to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	The relevant environmental planning legislation has been reviewed in **Section 5**. It has been concluded that the development would meet the requirements of all relevant legislation and would not constrain the ability of different levels of government to exercise their functions.
j)	to provide increased opportunity for community participation in environmental planning and assessment.	The Applicant anticipates that this application will be made publicly available by MWRC and that the public will be encouraged to make submissions.

9.4 Conclusions

Space Urban Pty Ltd (Space Urban) has prepared this this Environmental Impact Statement (EIS) on behalf of Plantation Pine Products Pty Ltd (PPP), to support an application to Mid-Western Regional Council (MWRC), for the development and operation of a sand and gravel quarry at the property 'Turonfels' located at 39 Razorback Road, Running Stream, NSW.

The quarry is proposed to extract up to 200,000 tpa over a period up to 20 years and will include access roads, a site office, workshop, and weighbridge. The quarry will be progressively rehabilitated to pasture and pine plantation with potential future use of the facilities area for forestry related activities.

In addressing the requirements of the Secretary's Environmental Assessment Requirements (SEARs), the assessment has demonstrated that the proposed development is 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 document.

As a permissible activity under the RU1 zoning, the quarry is ideally positioned within a developing pine plantation and undulating topography which provides suitable visual screening and from the surrounding rural landscape. The site has access to existing suitable road infrastructure which will allow for the efficient transport of material to both local and regional markets. This site positioning minimises the social and environmental impacts, which are further reduced when management and mitigation measures proposed are implemented.

This assessment 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 reduced which will ensure the quarry can operate without significant impacts to the receiving environment and meet the objectives of Ecologically Sustainable Development.

As detailed throughout this EIS, it has been assessed that the Proposal could be constructed and operated in a manner that would satisfy all relevant statutory goals and criteria, environmental objectives, and reasonable community expectations.

On this basis this development should be recommended for APPROVAL.

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