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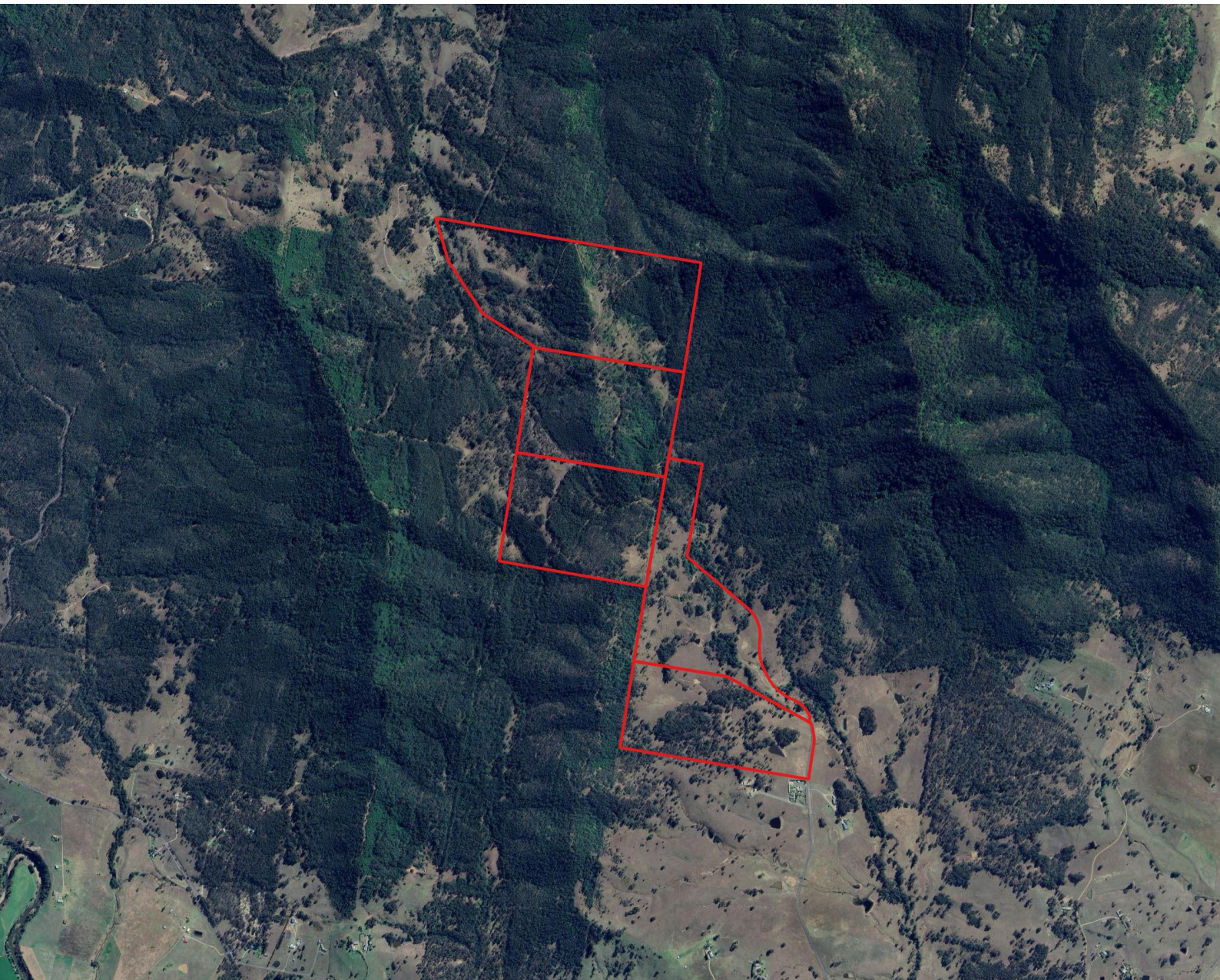
Scoping Report

Proposed 1,000,000tpa Hardrock Quarry

R & J Pittman

Lot 5 Springvale Road, Elderslie, NSW
Blind Creek Road, Glendon Brook, NSW

September 2024



Proposed 1,000,000tpa Hard Rock Quarry

Lot 5 Springvale Road, Elderslie NSW 2335
Blind Creek Road, Glendon Brook, NSW 2335

Report Prepared for – R & J Pittman

Version Control

Rev. No.	Revision Date	Author	Reviewer	Details
0	15 May 2023	Marie Duffy	Jonathan Berry	Draft
1	14 February 2024	Jason Princehorn	Shaun Smith	Final draft
2	8 August 2024	Shaun Smith	Jason Princehorn	Final for lodgement

Report Prepared by:

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ABN: 93 640 388 683

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1. INTRODUCTION

Wedgetail Project Consulting Pty Ltd (Wedgetail) has been commissioned by R & J Pittman (the Applicant) to prepare a Scoping Report to support a request to the Department of Planning, Housing, and Infrastructure (DPHI) for Secretary's Environmental Assessment Requirements (SEARs) for a proposed 1,000,000 tonne per annum (tpa) hard rock quarry. The proposed development is located across Lot 5 Springvale Road, Elderslie, and Blind Creek Road, Glendon Brook, NSW. The Site is approximately 6 km north of Branxton and 20 km east of the township of Singleton in the Singleton Local Government Area (LGA). The Project location is shown as **Figure 1**.

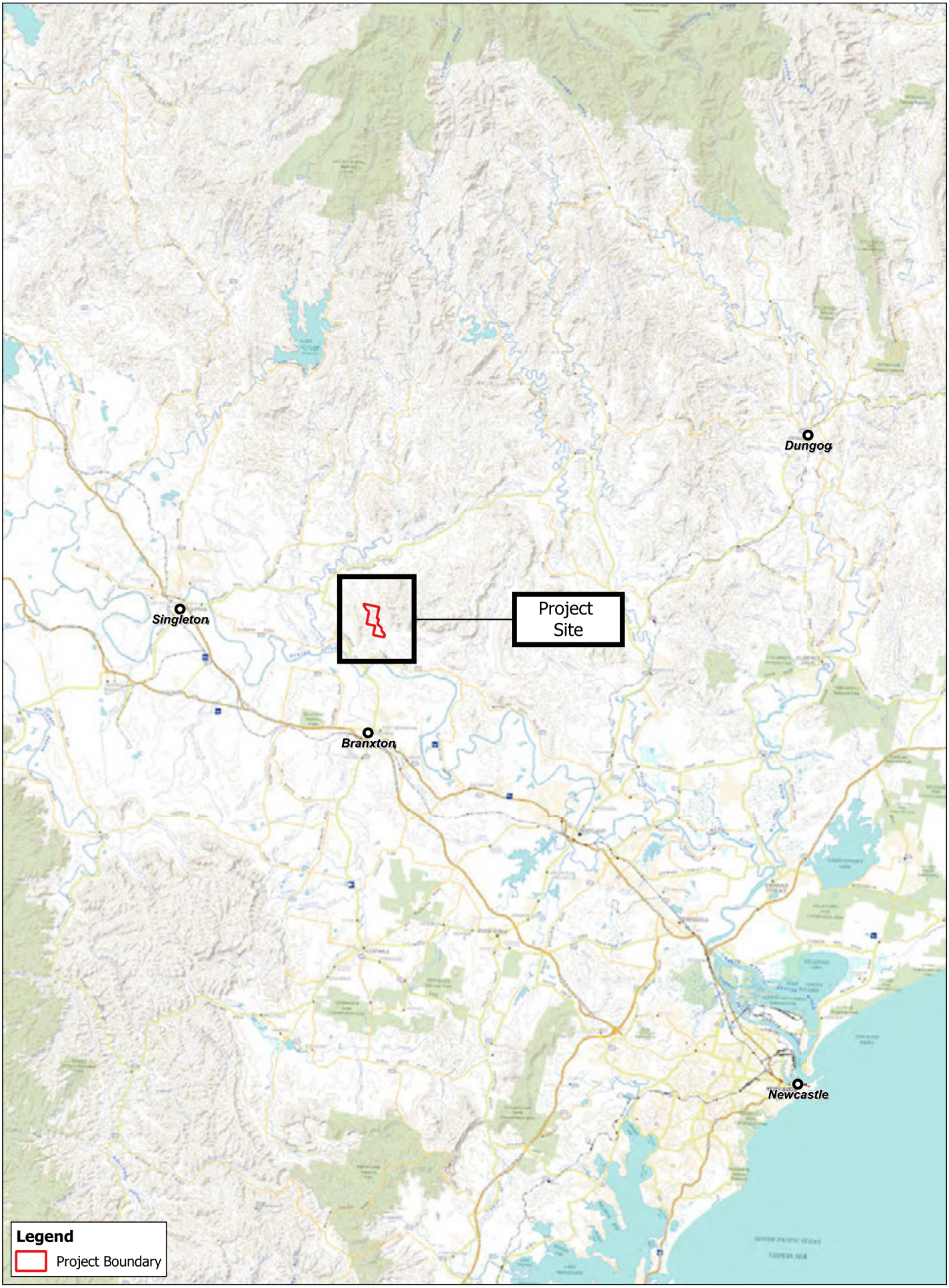
Pursuant to Schedule 1, Clause 7 of the *State Environmental Planning Policy (Planning Systems) 2021*, development that extracts from a total resource of more than 5 million tonnes is classified as State Significant Development (SSD) and requires the preparation of an EIS, prepared in accordance with the *Environmental Planning and Assessment Regulation 2021* (EP&A Regs). The proposed quarry, under current design plans, is expected to extract approximately 30 million tonnes (mt) over the project lifetime, and therefore constitutes SSD.

Under Schedule 2, Part 3 of the EP&A Regs, an EIS must be prepared in accordance with SEARs as issued by the Planning Secretary. The application must include particulars of the location, nature and scale of the development or activity. This scoping report has been prepared to provide the relevant project information to support an application for SEARs.

This document has been prepared in accordance with NSW Department of Planning and Environment's (DPE's) *State significant development guidelines – preparing a scoping report* (DPE, 2022). As outlined in the guideline, the primary purpose of scoping is to ensure the EIS focuses on the issues that are of greatest concern and likely to cause the greatest impacts, and to ensure that the level of assessment of every issue is proportionate to its importance.

The document has been structured as follows:

- **Section 1 - Introduction**: Provides an outline of the background and objective of the proposal, as well as Applicant details and a summary of the report structure,
- **Section 2 – Strategic Context:** Discusses the existing environment and strategic context of the site and its locality,
- **Section 3 – Proposed Project:** Details the key components of the proposed quarry development,
- **Section 4 – Statutory Context:** Provides a summary of the statutory context and legislative framework for the proposal,
- **Section 5 - Consultation:** Details consultation undertaken to date to inform the scoping report and proposed consultation to inform the EIS,
- **Section 6 – Proposed Assessment of Impacts:** Provides an overview of the key environmental and community issues for the project and the level of assessment predicted to be required in the EIS, and
- **Section 7 - Conclusion:** Provides a summary of the scoping phase



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Site Location - Regional Context

Pittman Building Services Pty Ltd
Scoping Report - Proposed Hard Rock Quarry
253 Stanhope Road, Elderslie NSW 2335

Figure:

1

1.1 APPLICANT

Applicant details are summarised in **Table 1** below.

Table 1: Applicant Details

Name	R & J Pittman
Address	253 Stanhope Road, Elderslie NSW 2335
Contact	Jamie Pittman
Email	jamie@pittmanbuilding.com.au
Phone	0413 150 020

1.2 PROJECT SUMMARY

The proposed development involves the extraction of an identified, easily accessible, hard rock and gravel resource along several ridgelines traversing the subject property. The development would extend across Lot 65 DP 752473, Lots 903 & 904 DP1061259, and Lot 5 DP1102521.

The property has been owned by the Applicant since 2005 and has primarily been used for cattle grazing. The proponent also operates a stud farm within the subject property.

The property was historically cleared for agricultural activities. No extractive activities have taken place on the site to date.

The intent of the quarry would be to supply aggregate and conglomerate suitable for road base and concrete batching in the wider region. The Applicant intends to capitalise on the identified quarry resource within the subject site, in particular in the context of current market conditions, being high demand and a low number of approved hard rock quarries in the region.

Key strategies that will be implemented to avoid or minimise adverse impacts include:

- Development of a Construction Environment Management Plan (CEMP) which will outline specific actions to minimise, control and mitigate potential environmental impacts associated with construction of the proposed quarry. The CEMP will include procedures for monitoring, managing, reporting and responding to any potential environmental issues that may arise during the construction of the proposed quarry,
- Purchase of Biodiversity Credits to offset the residual impacts as required under the NSW Biodiversity Offsets Scheme,
- Development of an Environmental Management System (EMS) for the operation of the proposed quarry. Implementation of the EMS will assist in minimising environmental impacts and facilitate continual improvement in environmental performance,
- The EMS will provide specific mitigation measures and controls to avoid or minimise adverse environmental impacts. In addition, will include mechanisms for compliance with all relevant legislation, standards, policies, licences, and approvals, and
- Development of Environmental Management Plans (EMP's) to ensure effective environmental performance of the proposed quarry. EMP's will be developed for air

quality, noise, blasting and vibration, surface and groundwater, traffic and transport, waste, biodiversity and rehabilitation to name a few.

Feasible alternatives to the current project design considered during the preliminary design phase are described in **Section 1.5**.

1.3 OBJECTIVES OF THE PROJECT

The construction and operation of the proposed Quarry is based on the following identified objectives:

- To assist in meeting the high demand for concrete batching products and road construction materials in the Sydney Metropolitan Area, as well as in the Hunter and Newcastle region as required,
- To allow for the extraction of approximately 30 mt of aggregate and conglomerate from the identified quarry footprint over a period of 30 years,
- To provide for the most environmentally, socially and economically viable option of carrying out the development on the site,
- To develop and implement an Environmental Management System (EMS) that incorporates robust monitoring and review processes consistent with current best practice standards, and
- To, as far as feasible, minimise the impacts of the development on the surrounding landowners or adverse changes to the amenity of the area.

1.4 NEED FOR THE PROJECT

As outlined in **Section 2.10**, the resource is a hard rock latite tuff and agglomerate, which has a variety of uses including concrete batching aggregate, road base material and construction aggregate. The development would extract and deliver this valuable resource to the construction and infrastructure sectors in the Sydney metropolitan area primarily, as well as the Hunter region and Central Coast area. The site is located within 168 km of the Sydney CBD and has access to the Hunter Expressway and M1 motorway. The quarry is essential for the guaranteed supply of construction materials for major/critical infrastructure projects of local, State and National significance. These projects are currently driving strong market demand and this demand is anticipated to remain strong well into the future.

1.5 PROJECT ALTERNATIVES

1.5.1 Do Nothing

The proposal is for long-term access to a source of hard rock primarily suitable for concrete manufacturing and road base (DGB 20). The material produced onsite would be used in the batching of concrete, in road construction as well as in civil construction projects.

It is noted that there are few hard rock quarries in the region, leading to a shortage of certain quarry products, particularly stone for quality concrete batching, in the Lower Hunter, Central Coast and the Metropolitan Sydney areas. The majority of the available resource (i.e. latite

tuff – refer **Section 2.10.1**) at the proposed Quarry is particularly suitable for use in concrete batching as it is strong, durable and has undergone a low degree of weathering. This type of quarry material is in high demand in the region due to a scarcity of hard rock quarries in the region.

The site is primarily considered highly suitable for the operation of a quarry due to its proximity to Sydney (<170km). In addition, the site is relatively isolated with most of the quarry footprint having historically been cleared and disturbed for agricultural grazing. If approved, quarry material extracted at the proposed quarry would help to meet the demand for material suitable for concrete manufacturing in the Sydney metropolitan area.

If the proposed development is not approved, demand for quarry material will need to be met from elsewhere and may result in resources being identified and extracted from sites at greater distances to the Sydney region, potentially increasing impacts to the receiving environment. Should alternate projects be required that are not in such proximity to state-wide infrastructure (New England Highway / Hunter Expressway), the cost of transporting the product and therefore the product itself is likely to increase resulting in increased costs of infrastructure projects.

Further, the local area would not benefit from the capital investment and employment opportunities which would be created by the quarry construction and operation, and contributions to the regional and state economy would also be jeopardised.

1.5.2 Alternatives

During preliminary project development, design changes have occurred to mitigate potential impacts of the Quarry upon nearby receivers and the surrounding environment, these changes have included:

- **Quarry footprint** - The quarry design initially consisted of a larger pit, extending over approximately 80 ha to the north. To minimise impacts on biodiversity, the disturbance area of the northern pit was adjusted, which reduced the total combined disturbance area of the proposed three (3) pits to 51.59 ha,

- **The quarry extraction plan** - Initial plans aimed to work Pit 2 in a first instance – Pit 2 was moved due to proximity to the national park and creeks, and

- **Processing location** - The processing area was originally sited on relatively level ground on Lot 4 in Deposited Plan 1102521, adjoining Springvale Road for easy truck access. On review, the location was considered too close to the closest adjoining residence to the south and the processing location was moved further north to Lot 5 in Deposited Plan 1102521 to minimise adverse noise impacts on potential sensitive receivers.

2. STRATEGIC CONTEXT

2.1 LOCALITY OF THE SITE

The Applicant proposes to develop a hard rock quarry called 'on a ridge' located approximately 10 km north of the village of Branxton and 16 km east of Singleton, within the Local Government Area (LGA) of Singleton in NSW. The proposed site access is located off Springvale Road, a no through road which terminates at the subject property. The site entrance is approximately 2 km north of the Stanhope Road and Springvale Road intersection, with the Stanhope Road and Elderslie Road intersection located a further 2km to the south-west in the vicinity of the Hunter River.

The development will extend over two (2) properties:

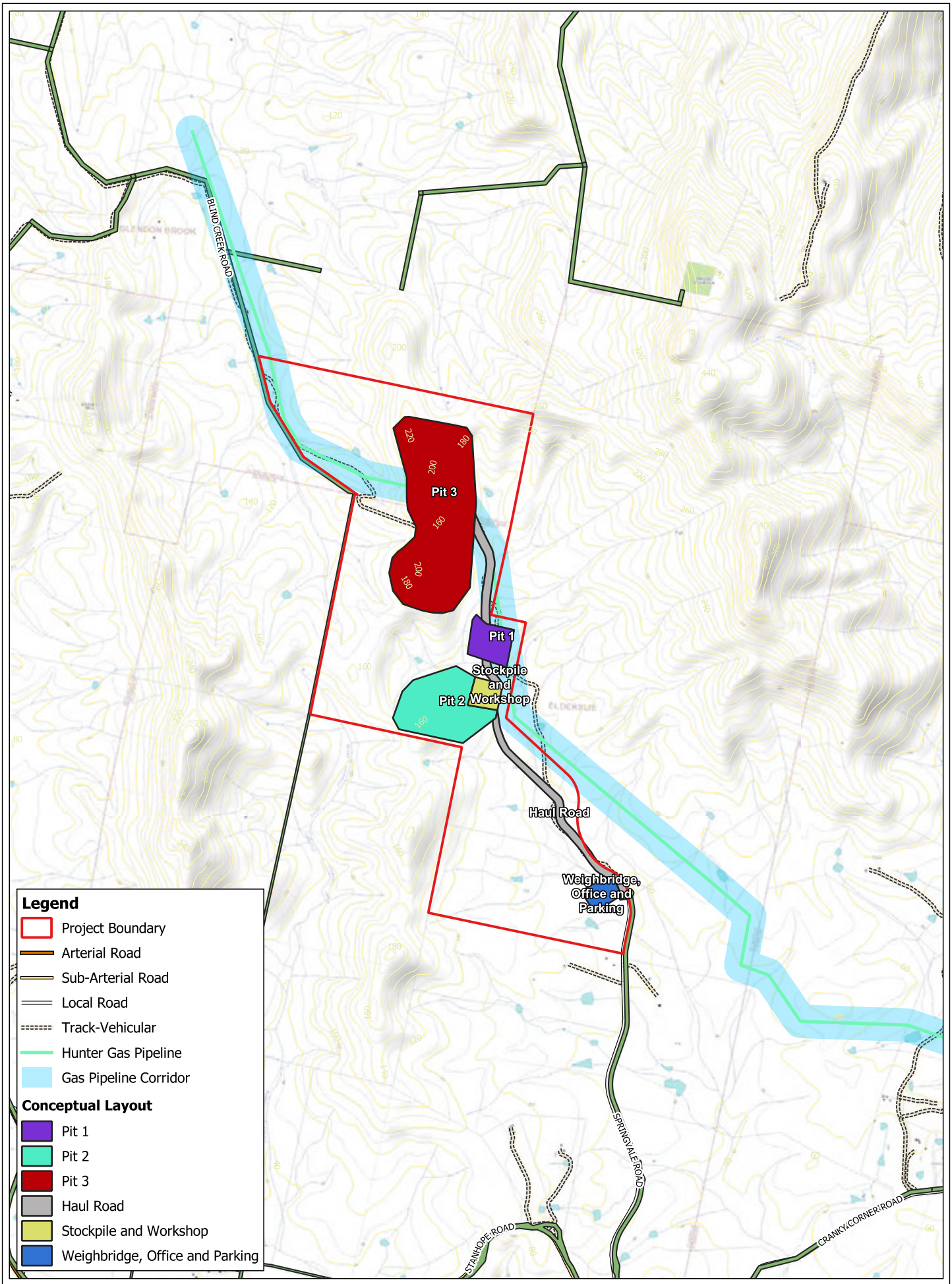
- Blind Creek Road in Glendon Brook Creek, Parish of Marwood, County of Durham in Elderslie NSW 2335, and
- Lot 5 Springvale Road in Elderslie, Parish of Marwood, County of Durham in Elderslie NSW 2335.

The cadastre of the project area is described as follows:

- Lot 5 in Deposited Plan 1102521,
- Lot 65 in Deposited Plan 752473, and
- Lot 903 & Lot 904 in Deposited Plan 1061259.

The haul road extends over approximately 13km from the site entrance to the Hunter Expressway. The haul road incorporates Springvale Road, Stanhope Road, Elderslie Road and the New England Highway. Elderslie Road was previously used by the Great Greta Coal Mine to haul Coal. It is approximately 166km from the proposed Quarry to the exit of the Pacific Motorway onto the Pacific highway at Hornsby.

Refer to **Figure 2** for the locality of the subject land.



0.25 0.5 0.75 1 1.25 1.5 km

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Site Location - Local Context

Pittman Building Services Pty Ltd
Scoping Report - Proposed Hard Rock Quarry
253 Stanhope Road, Elderslie NSW 2335

Figure:

2

2.2 STRATEGIC PLANNING

2.2.1 Greater Sydney Region Plan 2018: A Metropolis of Three Cities

The 2018 Greater Sydney Region Plan, "*A Metropolis of Three Cities*" by the Greater Sydney Commission, envisions a metropolitan area organised around three distinct cities. The primary objective is to ensure that the majority of residents can conveniently access their workplaces, educational institutions, healthcare facilities, services, and attractive destinations within a 30-minute commute. The plan anticipates substantial economic expansion in the central and western sectors of greater Sydney, attributing a pivotal role to the development of the Western Sydney Airport and Aerotropolis in transforming these regions.

To support this economic growth and the construction of vital infrastructure projects across Sydney, significant quantities of aggregate, such as that produced at the proposed Quarry, will be essential.

2.2.2 Hunter Region Plan 2041

The Hunter Regional Plan 2041 (DPE 2022) outlines a 20-year land use strategy for the Local Government Areas (LGAs) of Cessnock, Dungog, Lake Macquarie, Maitland, MidCoast, Muswellbrook, Newcastle, Port Stephens, Singleton, and Upper Hunter. It envisions the Hunter becoming the foremost regional economy in Australia by 2041, fostering connections among people and promoting environmental stewardship. Central to this vision is the development of a lively metropolitan city and the establishment of sustainable 15-minute neighbourhoods. The plan articulates nine objectives for the region, with relevance to the Project being:

- **Objective 1**: Diversify the Hunter's mining, energy, and industrial capabilities,
- **Objective 3**: Establish 15-minute neighbourhoods to encourage diverse, multi-modal, inclusive, and vibrant communities, and
- **Objective 5**: Plan for 'nimble neighbourhoods,' encompassing varied housing options and phased development.

The proposed quarry aligns with these objectives by contributing to the diversification of the Hunter's industrial capacity. Additionally, it plays a crucial role in supplying key construction materials in close proximity, essential for realising the desired infrastructure and housing development within the region.

2.2.3 Draft Hunter Regional Transport Plan 2041

The draft *Hunter Regional Transport Plan 2041* (TfNSW 2022) outlines a vision for the management and development of the transport network, infrastructure, and services in the Hunter Region, aligning with community aspirations. The plan articulates 18 objectives focused on enhancing connectivity, addressing traffic concerns, and improving safety across various modes of transportation, including roads, railways, footpaths, cycleways, and air travel.

The proposed quarry is positioned to broadly support the objectives outlined in this plan through the supply of aggregate products essential for constructing and maintaining transport infrastructure.

2.2.4 The Greater Newcastle Metropolitan Plan 2036

The Greater Newcastle Metropolitan Plan 2036 (DPE 2018) envisions the Hunter as the preeminent regional economy in Australia, anchored by a dynamic new metropolitan city. The plan delineates desired outcomes for the region, which essentially involve: Facilitating the provision of housing in proximity to employment and services and Enhancing connectivity to job opportunities, services, and recreational amenities.

The proposed quarry is positioned to support these outcomes by supplying essential construction materials in close proximity to metropolitan centres, thereby contributing to the region's development.

2.2.5 The Singleton Council Local Strategic Planning Statement 2041

The Singleton Council Local Strategic Planning Statement 2041 (LSPS) lists a range of planning priorities for the Local Government Area (LGA). Planning Priority 4.4 states "the mineral resource industry is productive, accountable and considerate of surrounding land uses". Similarly, the Hunter Regional Plan 2041 has as its Planning Priority 5 to "*promote sustainable use of mineral and energy resource*", stating that development proposals for aggregate extraction should balance "*economic benefits with the protection of the environment and local communities*".

The proposed Quarry has been located to avoid any land use conflicts and limit possible environmental impacts for the local community.

2.3 LAND USE CONTEXT

The subject land is zoned RU1 – Primary Production. The subject lots are bordered by land similarly zoned for rural use to the northwest and south. Land use in the area is dominated by areas of remnant vegetation on steeper terrain and ridges, with gentler sloping ground in valleys cleared for agricultural grazing. Homesteads are primarily located to the south of the subject property along the Stanhope and Elderslie roads.

The town of Branxton is located approximately 5 km from the subject property. Branxton has a population of 2,255 people per the 2021 census data. Coal mining is the main industry of employment for the town's inhabitants. Elderslie Road, which forms part of the proposed haul route, traverses the western section of the township of Branxton before joining the Newell Highway.

The larger town of Singleton is located approximately 17 km west of the subject property, with a population of 24,577 people per 2021 census data. Coal mining is also the top industry of employment in the town, and it is noted that coal mining is also a key land use in the wider area and is the main industry of employment in the Singleton LGA, providing for 20% of employment in the area. The proposed haul route does not approach Singleton and given the extensive separation distance between the proposed quarry and the town, the

proposal is unlikely to have adverse impacts on residents or infrastructure or services within the town.

Rural properties and homesteads are present mostly to the south of the proposed quarry site along haul roads. The nearest receivers to the closet pit extraction area (Pit 2) of the quarry are:

- A rural property and the Hunter Pet Motel commercial operation located on Lot 3 in DP1102521, approximately 1.2km and 1.3km south-east respectively,
- A rural property located on Lot 7 DP1102521, approximately 1.7 km south-east,
- A rural property located on Lot 2 DP800005 approximately 2.1 km south of the proposed quarry (owned by the Applicant), and
- A rural property located on Lot 3 DP800005 approximately 2.2 km south of the proposed quarry.

The Elderslie Airport is also located approximately 3.5 km south of the proposed quarry. It has a single 700 m long runway and is primarily used by parachuting clubs and skydiving centres.

Land in the locality of the proposed quarry is mostly zoned RU1 – Primary Production with the only other land zone present within 4 kilometres of the property being C3 – Nature Conservation under the Singleton LEP. This consists of the Tangory Nature Reserve, which is managed by the NSW National Parks and Wildlife Service (NPWS) and extends over an area of 499.63 ha to the east of the subject property.

Given the existing zoning around the site, the potential for additional subdivision and construction of additional residences is considered limited. The proposed quarry is considered in keeping with existing development and the rural character of the surrounding area.

A detailed description of the land uses within a 2 km buffer surrounding the subject lot is provided in **Table 2** below.

Table 2: Surrounding Land Use within 2 km of the Proposed Development

Aspect	Existing Land Use Description
North	Land north of the quarry primarily consists of cleared vegetation and remnant vegetation within the Applicant's property (over a distance of approximately 3 km). The Tangory Nature Reserve adjoins the property to the north, supporting remnant vegetation on undulating topography at the foothills of the Tangory Mountain. There are no sensitive receptors within 2 km of the site in a northerly direction.
East	Land east of the extraction area comprises the Tangory Nature Reserve and remnant vegetation east of the reserve. Land east of the Springvale haul road has mostly been cleared for agricultural production with small lots extending along the Springvale haul road. It is noted that the Applicant owns all but two lots along this road.
South	South of the extraction area, remnant vegetation extends for approximately 2 km before transitioning to land partially cleared and used for grazing. Elderslie Airport is located approximately 3.5 km south of the extraction area. Privately-owned residences occur along Springvale Road, Stanhope Road and Elderslie Road. The closest of these is the residence at the Hunter Pet Hotel located on Lot 3 in DP1102521, which is approximately 400 m south-west of the site office and

Aspect	Existing Land Use Description
	1.2 km south of the closest extraction area. The Hunter River also flows in an easterly direction 3.6 km south of the proposed quarry area. The proposed haul road traverses the Elderslie bridge, which spans the Hunter River.
West	Remnant vegetation extends in the majority of the 2 km zone to the west of the proposed extraction area. The extraction area is bordered by a steep ridge with an elevation of approximately 250 m, with some cleared land on the western foothills of the ridge.

2.4 TOPOGRAPHY

The Subject Land mostly extends over the western foothills of the Tangory Mountain and generally comprised of gently undulating land with several NW - SE striking ridgelines and saddles with peak elevations of up to 220 Mahdi. Steeper slopes exist on the western face of the ridgelines, with grades of up to 60°. Shallower slopes exist along eastern faces (20 - 30°).

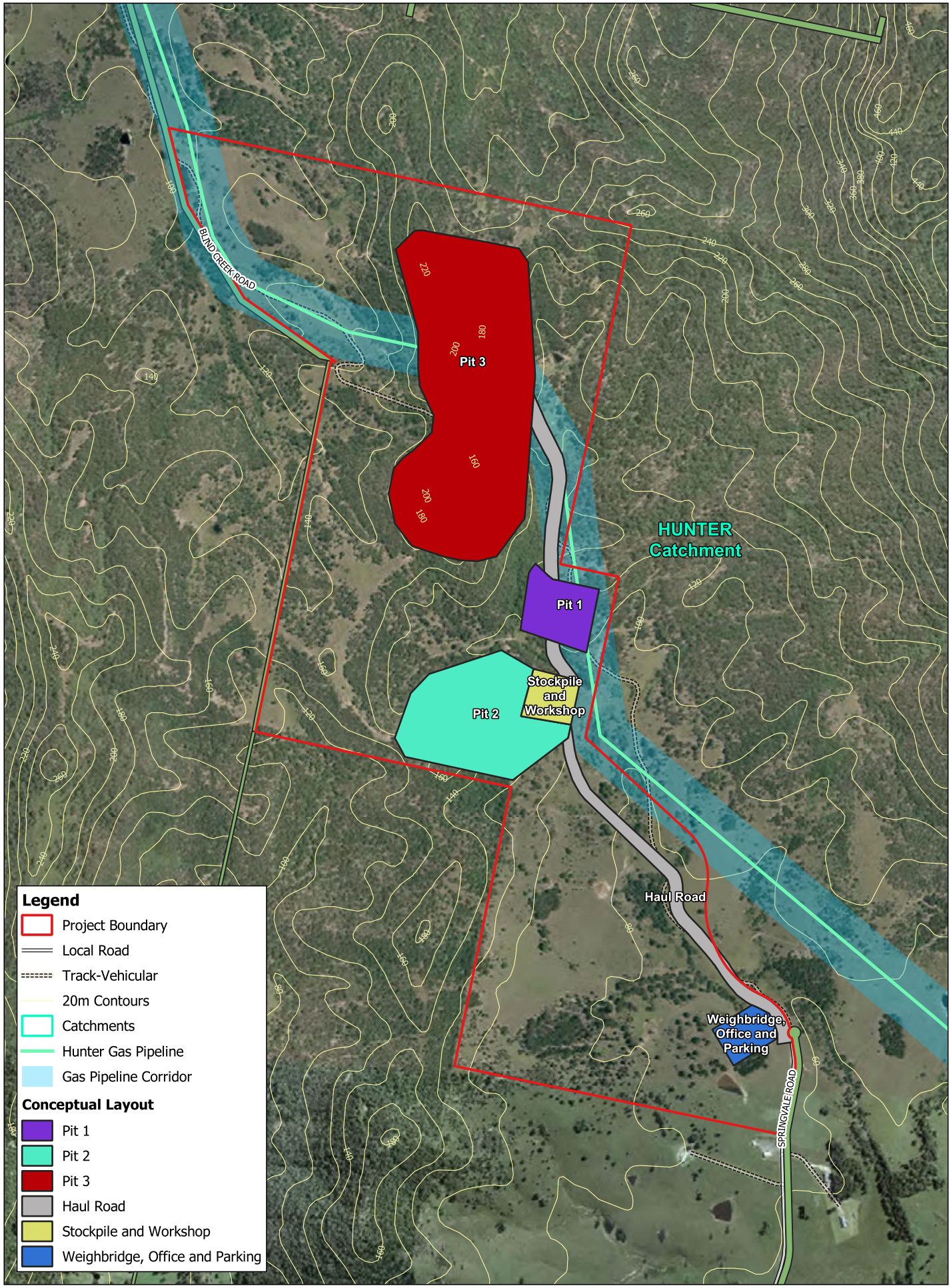
Elevations within the Subject Land range from approximately 90 m Australian Height Datum (AHD) in the stockpile and workshop area to 220 m AHD at the highest point of Pit 3 based on 10 m contours.

The quarry comprises three (3) pits, a stockpiling area and a site office. These are distributed as follows:

- Office and weighbridge on relatively flat land at the site entrance off Springvale Road,
- Pit 1 on the terminal end of an east-west aligned ridge forming part of Tangory Mountain foothills, and
- Pit 2, the processing area, and Pit 3 are located on two (2) hills in the northern section of a north-south aligned ridge to the west of Tangory Mountain. The pits are located on the eastern faces of the hills.

The land surrounding Pit 1, Pit 2 and its associated processing area is drained by several 1st and 2nd order unnamed watercourses, which converge to form a 3rd order watercourse in the depression separating the two (2) pits before continuing to flow in a south-easterly direction.

The topography and drainage of the proposed Quarry is shown in **Figure 3**.



200 400 600 800 m

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Topography and Drainage

Pittman Building Services Pty Ltd
Scoping Report - Proposed Hard Rock Quarry
253 Stanhope Road, Elderslie NSW 2335

Figure:

3

2.5 GEOLOGY

The site is located within Tamworth Belt which is in the southern section of the New England fold Belt. The New England Fold Belt extends 1,500 km from Queensland to the Sydney Basin in the south and south-west. The Tamworth Belt has been split into numerous terranes defined by major faults; Emu Creek, Rouchel, Gresford, Myall and Hastings Blocks.

The site is situated within the southwestern portion of the allochronous Gresford Block, in close proximity to the Hunter–Mookie thrust fault that resulted in major east-west compression and shortening of the region.

The Singleton 1:250,000 Geological Map (Rasmus et al, 1969) lists the subject property to contain:

- Conglomerate acid tuffs and lithic red siltstones of the Wallaringa Formation (mapped as Clwa),
- Intermediate to acid crystal and vitric tuff and lavas, conglomerate (agglomerate) and sandstone of the Gilmore Volcanics Group (mapped as Clg), and
- Conglomerate, lithic sandstone, shale and occasional thin coal of the Mt Johnstone Formation (mapped as Cuj).

The target geological profile for the potential hard rock quarry is the intermediate to acid crystal and vitric tuff and lavas of the Gilmore Volcanic Group. The geology of the site is shown in **Figure 4**.

2.6 LAND RESOURCES

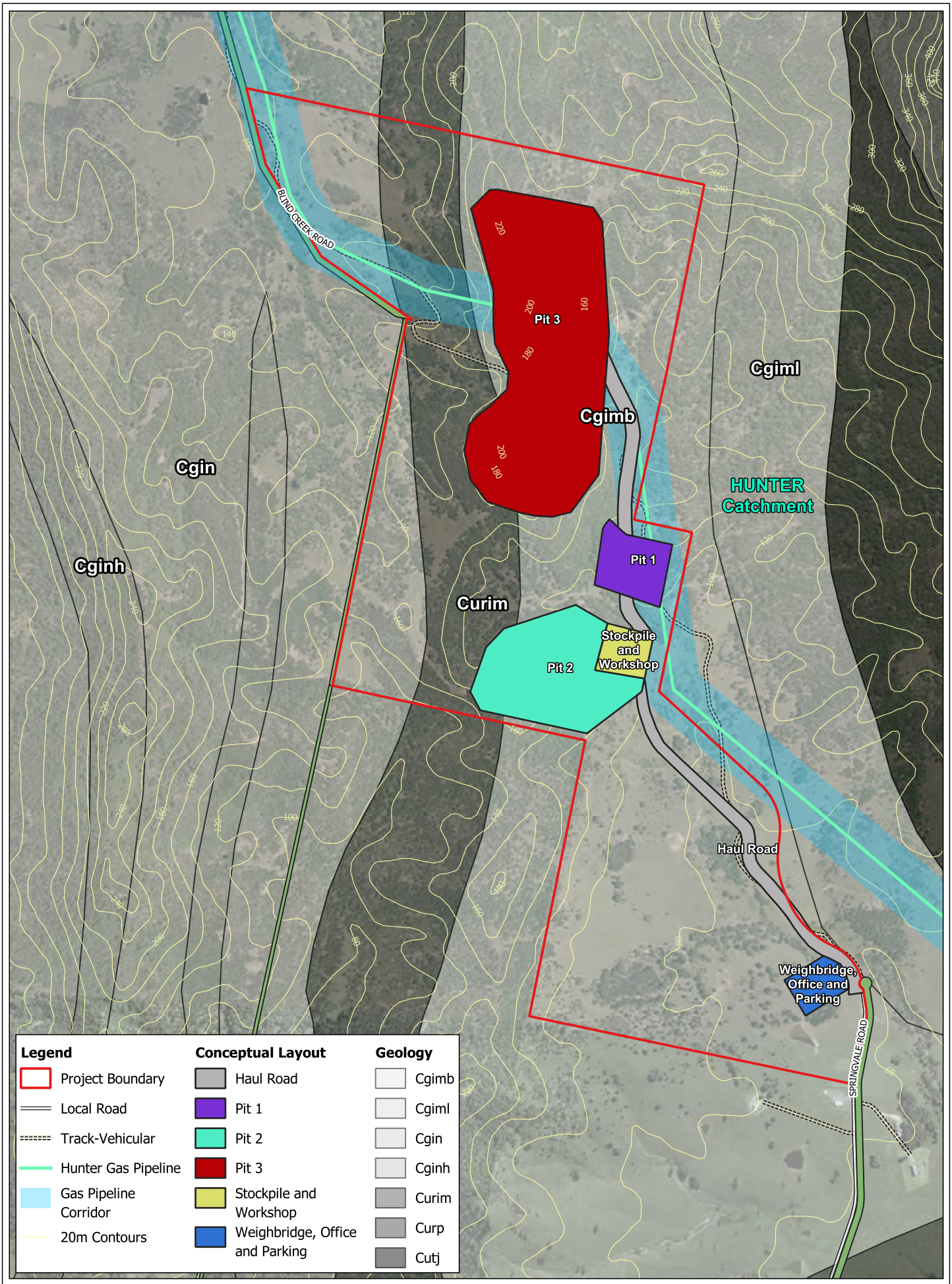
2.6.1 Soils

Soil profiles within the proposed quarry footprint are relatively shallow, typically extending from 0.8 m – 1.0 m below ground level (BGL), with rock outcrops occurring throughout.

The NSW Soil and Land Information Database eSPADE (OEH, 2023) was accessed to provide preliminary information on soils within the project area. Soil mapping indicates that the project area is associated with two (2) soil landscapes, namely the Stanhope Soil Landscape and the Lochinvar Soil Landscape.

Most of the project area, including the majority of the extraction areas, extends across the Stanhope Soil Landscape. The main soils of this landscape unit are brown podzolic soils on mid-lower slopes and yellow podzolic soils on the upper slopes. These soils are hardsetting, moderately permeable and imperfectly drained with low fertility. They are subject to erosion.

The workshop, stockpile area and the site office in the southern section of the site are located within the Lochinvar soil landscape. The main soils within this landscape consist of non-calcic brown soils in gently sloping areas. These comprise a silty clay loam topsoil and brown medium clay subsoil. Key characteristics of these soils are a hardsetting surface, moderate drainage and moderate permeability, with moderate fertility and a moderate erosion hazard.



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Geology

Pittman Building Services Pty Ltd
Scoping Report - Proposed Hard Rock Quarry
253 Stanhope Road, Elderslie NSW 2335

Figure:

4

2.6.2 Land and Soil Capability

Land and soil capability assessment is based on the biophysical features of the land, including slope, wind hazard, soil pH, surface structural stability, salinity, rocky outcrop, water logging potential and existing erosion of a landform. The following table summarises the appropriate land use for each capability class.

The southernmost section of the site containing the office, weighbridge and part of the haul road is mapped as Land and Soil Capability Class 3. Pit 1 and the stockpile area have a Land and Soil Capability Class 6, while Pit No. 2 and Pit No.3 extend over Land and Soil Capability Class 6 and Class 7. A description of these Land Classes is provided in **Table 3**.

Table 3: Land and Soil Class Capability

Class	Most Intensive Use	Land Definition
Class 3	Regular cultivation, but must be consciously managed to prevent degradation	Suited to grazing, including the use of improved pastures. Cultivation is limited to cash or forage crops in rotation with pastures.
Class 6	Grazing only	Non-arable and often non-trafficable. Land suitable for grazing but not cultivation. Maintain or improve perennial pastures and preserve ground cover.
Class 7	Unsuitable for rural production	Includes steep (slope 33 to 50%) extremely erodible, or saline or shallow soils. Generally unsuited to agriculture or at best suited only to light grazing.

2.6.3 Biophysical Strategic Agricultural Land

Biophysical Strategic Agricultural Land (BSAL) is land with high-quality soil and water resources capable of sustaining high levels of productivity.

The southernmost section of the proposed development area, which will support the site office, weighbridge, car parking, and part of the access road, is mapped as BSAL on the NSW's central resource for Sharing and Enabling Data (SEED data portal), as shown in **Figure 5**.

No other land mapped as strategic agricultural land or Critical Industry Cluster Land (Equine or Viticulture) has been identified within the subject area.

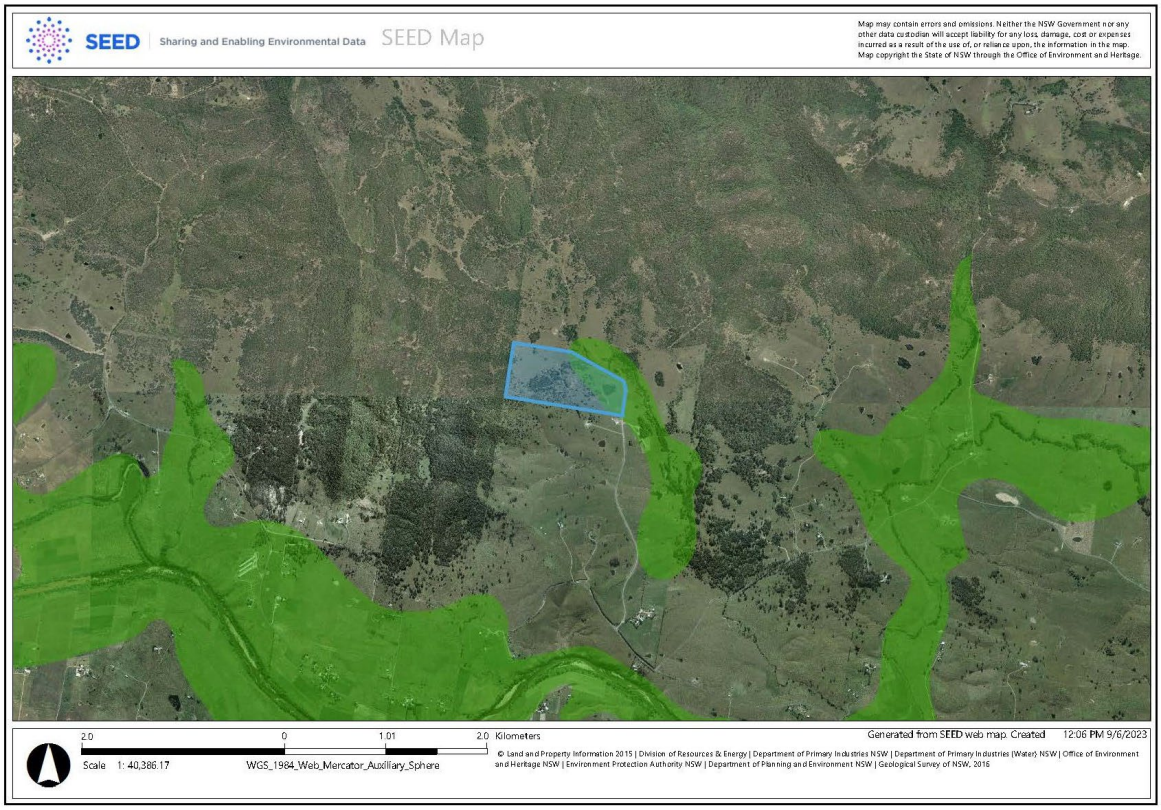


Figure 5: SRLUP – Biophysical Land in the Vicinity of the Project Area

2.6.3.1 Acid Sulphate Soils

Deposits of Acid Sulphate Soils (ASS) are commonly found less than five meters above sea level, particularly in low-lying coastal areas. As the subject is not coastal and is situated at elevations greater than 150m above sea level, it is unlikely that ASS is located within or adjoining the property. There was no evidence of ASS during the site inspection and a review of the *Singleton Local Environmental Plan 2013* and the NSW Government ePlanning Portal has determined that the site is not mapped with lands for potential occurrence of acid sulphate soils (ASS).

2.7 WATER

2.7.1 Surface Water

The quarry site is located within the Luskintyre Water Source as part of the Hunter Catchment. The subject site is well above the 1% AEP flood height as a result of local topography.

The area around the subject site does not support permanent water features, however, there are several ephemeral drainage lines in proximity to the site, with overland flow draining via these drainage lines to a single catchment. The topography slopes towards the extraction areas and there are no drainage lines in the direct vicinity of Pit 3.

Pit 1 is in the vicinity of a 1st order drainage line to the east and a 2nd order drainage line to the west. These lines originate on the foothills of the Tangory Mountains. The 2nd order drainage line to the west merges with another 2nd order drainage line which bounds Pit 2 along the west and north, to form a third order drainage line. Lines draining Pit 1 rise to the

west of the valley, along the eastern flanks of the north south ridge which traverses the property. The 3rd order drainage line flows to the east between the two pits and continues south, receiving flow from additional drainage lines prior to merging with Stanhope Creek. Stanhope Creek merges with the Hunter a further 1.5 km downstream.

The entire site is contained within a single catchment, with land use in the catchment principally consisting of conservation areas, light agricultural use (grazing) and rural living.

The volume and pattern of flows in the Hunter River system have been significantly altered by the construction and operation of Glenbawn and Glennies Creek dams. Large volumes of water are also taken and stored for power station use in Lake Liddell.

Water sharing plans have been developed to address environmental requirements downstream of the major dams and to ensure sustainable use of water by all water users. The subject site is downstream of the major dams and the area is covered by the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2022.*

2.7.2 Groundwater

The proposal is located on fractured rock and is situated within the New England Fold Belt Coast Groundwater Source. The water sharing plan for the area is the *North Coast Fractured and Porous Rock Groundwater Sources 2016.*

It is the southern coastal section of a folded and fractured aquifer known as the New England Fold Belt, which extends from Port Stephens in the south to the NSW – QLD border in the north, and east of Moree. The New England Fold Belt Coast Groundwater Source is a fractured rock aquifer with groundwater contained within, and moving through, fractures in the rock that are present due to the folding and faulting of the rock formations. Yields are typically low, being around 1 L/s, however, yields up to 10 L/s may be obtained from highly fractured fault systems. Groundwater is typically recharged by direct rainfall infiltration. This combined with the degree of mineral leaching that has occurred over time, results in typically good-quality water.

The connection between surface and groundwater is low to moderate and the impact on in-stream values is low and is not a major contributor. The travel times between groundwater and surface water are years to decades.

The long-term annual extraction limit (calculated by the NSW Office of Water in accordance with the Water Management Act 2000) of the New England Fold Belt Coast groundwater source is 60,000 ML/year. The water sharing plan further defines while the total water requirements in 2016 were 35,468 (DPI Water, 2016). Therefore, it is considered that the current extraction rates from the GOB Aquifer are within sustainable limits.

Publicly available bore logs were examined in the surrounding area (MinView, 2023). There are no registered bores within 2.5 km of the site.

Sensitive groundwater receptors can include municipal and private water supply wells, and groundwater-dependent ecosystems and permitted sites for Aboriginal water use. Evaluation of the area suggests there are no sensitive groundwater receptors in the immediate vicinity of the project site. Publicly available bore logs were examined within the locality of the proposed quarry site. There are no registered groundwater bores within 2.8 km of the subject site. A groundwater assessment will be prepared as part of the EIS to further assess potential groundwater impacts.

The preliminary resource assessment carried out for the proposal included the drilling of four (4) boreholes and the installation of three (3) groundwater monitoring wells in these boreholes.

Groundwater levels were measured in December 2017, with groundwater recorded at depths of 20.87 m below ground level (mBGL) at MW01/BH102, 30.54mBGL at MW02/BH103 and 33.80 mBGL at MW03/BH104.

Data loggers were installed in each of the wells in January 2018 and have been logging groundwater information to be used for the groundwater assessment as part of the EIS.

Based on preliminary assessment results (refer **Section 2.6.2**), ephemeral perched groundwater at the soil and rock interface, within fault zones and areas of major jointing in rock. Groundwater is likely to be encountered within 20 m to 30 m below ground level (BGL) in areas of groundwater monitoring.

2.8 VEGETATION

The subject site was historically cleared, with vegetation within the subject site consisting of regrowth, with very little old growth trees observed during site inspections.

Vast swatches of vegetation are dominated by African Olive, which has taken over the undergrowth and shaded areas, excluding native vegetation entirely in some areas.

Vegetation within the subject lots was assessed by Wedgetail ecologists, with the following Plant community Types (PCTs) identified:

- PCT 3110 “Greater Sydney Enriched Grey Myrtle Dry Rainforest”,
- PCT 3244 “Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest”,
- PCT 3315 “Central Hunter Ironbark – Spotted Gum Forest”,
- PCT 3315 “Central Hunter Ironbark – Spotted Gum Forest (Regrowth)”,
- PCT 3444 “Lower Hunter Spotted Gum – Ironbark Forest”,
- PCT 3446 “Lower North Foothills Ironbark-Box-Gum Grassy Forest”,
- PCT 3446 “Lower North Foothills Ironbark-Box-Gum Grassy Forest (Regrowth)”,
- PCT 4023 “Coastal Valleys Swamp Oak Riparian Forest”, and
- PCT 4073 “Lower North Hinterland River Oak Forest”.

Five of the PCTs have associations with threatened ecological communities, including PCT 3110, PCT 3315, PCT 3444, PCT 3446 and PCT 4023.

2.9 INFRASTRUCTURE

2.9.1 Access

The proposed extraction area is currently accessible from the Hunter Expressway via the New England Highway (~1.4 km), Elderslie Road (~6.3 km), Stanhope Road (~2.5 km) and Springvale Road (~2.2 km). Springvale Road provides access to the property, with unsealed

internal tracks only suitable for four-wheel drive vehicles providing the existing access to the proposed extraction area. Most of these tracks are in a relatively poor condition and are often difficult to traverse during wet weather.

Springvale Road is a two-lane sealed road maintained by Council, servicing a small number of rural properties along the road from the Stanhope Road and terminating in a turning circle at the entrance of the subject property (south-east of Lot 5 in DP1102521).

Stanhope Road is a sealed two-lane arterial road that links the Elderslie Road in the west, with the Luskintyre Road in the east. The speed limit along Stanhope Road is currently 80 km/hr. The southern section of Springvale Road, as well as Stanhope Road, are classed as approved roads for B-Doubles up to 26 m in length, per the TfNSW NSW Combined Higher Mass Limits (HML) and Restricted Access Vehicle (RAV) Map.

The Elderslie Road extends from the Gresford Road / Glendonbrook Road intersection in Mitchells Flat to the north-west to the New England Highway outside of East Branxton in the south. The Elderslie Road spans the Hunter River (Elderslie Bridge). The Elderslie Road is an approved route (with travel conditions) for B-Doubles and has been used in the past for hauling mine products. Travel conditions along this route are listed as '*Unladen B-Double vehicles only are allowed to cross Elderslie Bridge*'. Given that the proposed haul route spans the Elderslie Bridge, heavy vehicles hauling quarry products will be restricted to truck and dog combinations.

The New England Highway connects the Hunter region to southern Queensland and supporting heavy-vehicle traffic associated with rural industries. The Hunter Expressway is a 40km-long four-lane expressway connecting the New England Highway at Branxton and Sydney-Newcastle Freeway at Seahampton. The speed limit along the Hunter Expressway is 110km/hr. Trucks hauling quarry product to Sydney will then utilise the Pacific Highway (M1), a major transport route extending from Brisbane to Sydney.

2.9.2 Proposed Hunter Gas Pipeline

The construction and operation of the Queensland – Hunter Gas Pipeline, a Critical State Significant Infrastructure (SSI) project, was first approved in 2009, with an extension granted in 2018 to 2024.

The construction of the high-pressure natural gas pipeline from Queensland to Newcastle will consist of:

- The construction of pigging stations, valve stations and connection points (to other pipelines and facilities),
- The erection of perimeter security fences, security and service lighting and signage,
- The installation of communication and telemetry towers,
- The installation of cathodic protection devices, and
- The construction of pipeline corridor access tracks.

The Hunter Gas Pipeline was acquired by Santos in August 2022. The approved gas pipeline corridor traverses the subject property and intersects Pits 1, 2 and 3 proposed under this application. Refer to **Figure 2** and **Figure 3** for the pipeline corridor and the proposed quarry pits.

2.10 STRATEGIC JUSTIFICATION

The Project Site and Quarry Access Road are located on land zoned RU1 under the Singleton Local Environmental Plan 2013. The proposed extractive industry is a permissible land use within this zone in accordance with the LEP, and the Project has been designed with consideration of the objectives of these zones. Further review of the objectives of these zones will be provided in the EIS.

The Project Site is located strategically within the Hunter Region, and within approximately 160km of Sydney. The proposed resource has been quantified and assessed as being of high quality for concrete production that would be suitable for a range of applications in both construction and infrastructure projects. It is considered that both the location and quality/volume of the targeted material is strategically significant. It is further considered that potential land use conflicts could be largely avoided through careful planning and ensuring that the Project is developed in an environmentally responsible manner that balances good environmental and social practice with economic benefits.

The pit location has been historically cleared for agricultural purposes, the shallow depth of the target resource in this area allows for a reduced amount of overburden. While alternate areas of resource are present within the wider land owned by the proponent, the adopted resource area is considered to have a high resource value while being capable of being extracted easily and with the lowest possible land use conflict and environmental impacts. Further, the Applicant has elected to take a staged approach to development, with the key staging of surface disturbance and infrastructure development tied to projected production. More information on this approach is provided in **Section 3**. The Project provides for significant economic and social benefits.

A range of detailed assessments of potential impacts associated with biodiversity values, transport, noise and dust generation and blasting activities will be presented in the EIS to demonstrate how these matters have been considered in planning and also have they would be managed over the life of the Project to minimise potential environmental impacts.

The primary target material for the quarry will be a high-quality hard rock resource. The materials produced by the quarry are expected to supply market demand for hard rock from concrete batching plants in the Sydney Metropolitan Area. Strategic review of the market for concrete and construction aggregates in the Sydney area and the Upper Hunter region supports the Project. Existing regional demand will be expanded by large regional infrastructure projects.

The extraction of the target resource would ensure downward pressure is exerted on costs associated with construction material supply and would influence market costs associated with construction and infrastructure projects. As a local and independent company, Pitman Building Services would employ local people and seek to supply the operation from local businesses. It is expected that up to 10 full time personnel for the Project would be hired in addition to local contractors and suppliers. At this preliminary stage, it is expected that the net benefits of the Project would outweigh costs associated with residual environmental and/or social impacts, as the Project would:

- contribute towards the supply of construction materials within the surrounding area,
- provide local employment opportunities,

- contribute to the continued economic growth at local, regional, State and National levels through flow-on effects, and
- provide further extraction and sale of strategically important resources, while avoiding, minimising and/or mitigating environmental and social impacts to the greatest extent practicable.

A range of comprehensive assessments are proposed to provide a thorough and technical investigation of possible impacts. The assessments will include recommendations to avoid, minimise and mitigate impacts during operations to ensure the Project would not have unacceptable impacts to the local community and the natural environment.

The proposal is considered unlikely to generate significant cumulative impacts as there are currently no known developments of scale in the locality of the proposal. Potential cumulative impacts are further discussed in **Section 6.4**.

2.11 RESOURCE

A preliminary resource feasibility assessment was carried out in 2017/2018 by Martens Consulting Engineers on Lots 903 and 904 in DP1061259, Lot 5 in DP1102521 and Lot 65 in DP752473. The full report (Preliminary Resource Feasibility assessment) is included as **Appendix A** and is briefly summarised below. Additional resource assessment has been undertaken by VGT in 2023 to quantify the inferred reserves and to develop concept mine plans for each pit. Resource assessment undertaken by VGT is provided in **Appendix B**. Further resource assessment will be undertaken for the Project EIS.

The resource is located within a valley, being enclosed to the north, east and west by ridge lines. Works undertaken as part of the assessment included the drilling of four (4) boreholes to characterise subsurface conditions along the northwest trending ridgeline traversing the central portion of the property. Three (3) groundwater monitoring wells and data loggers were also installed in three (3) of the boreholes for long-term groundwater level monitoring.

Boreholes were terminated at depths of 20m – 40m, before reaching the extent of the hard rock, due to the slow drilling rates as a result of the hardness of the rock being drilled.

Five (5) rock core samples were tested to assess suitability for use as concrete aggregate, asphalt aggregate, rip rap, road base and/or rail ballast.

Investigation of site subsurface materials identified three material units, soil (Unit 1), a latite tuff layer (Unit 2), and an agglomerate layer (Unit 3). Unit 1 was typically shallow across the site (less than 1.0 m), although, in landslide prone areas, the soil profile may be thicker (up to 6.7 m in BH 103). Unit 2 was encountered up to 40.06 m BGL before borehole termination. Unit 3 was encountered to 20.11 mBGL.

It is noted that the site is expected to contain aggregate which could also be quarried, however, this was not identified during the course of preliminary investigations.

2.11.1 Latite Tuff

The resource identified includes 62 (mt) (mt) of Latite Tuff. Latite tuff samples obtained onsite were determined to be hard, and strong and are predicted to be durable and

innocuous in relation to alkali-silica reactivity in concrete. The sample is predicted to be suitable for use as asphaltic aggregate, rail ballast, rip rap and concrete aggregate.

2.11.2 Latite Agglomerate

The preliminary assessment estimated approximately 1.3 mt of Latite Agglomerate available onsite. Latite agglomerate was identified as being hard and strong and predicted to be durable, however the presence of fracture veins in the rock may cause it to fail into smaller pieces. The sample was also predicted to be innocuous in relation to alkali-silica reactivity in concrete. The agglomerate is suitable for use as a road base and concrete aggregate.

2.11.3 Available Resource

A resource assessment has confirmed high quality hard rock resources are present on the property and would be suitable for the production of medium aggregates suitable for concrete manufacture and a range of other uses. A resource of up to 51 mt has been defined in an area of the property that has largely been historically disturbed.

There are three proposed areas of extraction, as presented in **Figure 7** below. The resource estimates are based upon the following assumptions and comments:

- Survey provided by client,
- Volumes undertaken using 12D three-dimensional software,
- All pits are self-draining,
- Base of Pit 1 is (95 to 93.5m RL),
- Base of Pit 2 is (93m RL),
- Base of Pit 3 is (130 to 120m RL),
- A single batter, near vertical (80°) was used,
- Based upon the authors experience density of Latite Tuff 2.5 g/cm3 (to be confirmed with further testing), and
- Extraction envelopes set by the client, consider 40 m buffers set off creeks.

The 80-degree angle single batter design has been undertaken at this stage of the assessment to provide a basic insight into what may be present in these potential extraction areas.

The final landform design, to be undertaken during the EIS process, will consider a full geotechnical review of the drill core for a better understanding and will include final landform bench and batter designs. In addition, a detailed geological mapping assessment of the three pit investigation areas will be undertaken.

A summary of volume calculations undertaken to date is presented in **Table 4** below.

Table 4: Pit Volume Calculation Summary

Pit Name	Extraction Area (Ha)	Approximate Top (m RL)	Approximate Base (m RL)	Bench Width (m)	Bater Height (m)	Total Volume (m^3)	Tonnes (T)
Pit 1	3.89	120.7	93.5	10	~12.5	488,800	1,222,000
Pit 2	14.5	165	93	N/A	Variable	5,080,500	12,701,250
Pit 3	33.2	214	119 - 130	N/A	Variable	14,699,700	36,749,250
Total	**51.59**					**20,269,000**	**50,672,500**

Note* Density estimated 2.5g/cm^3

2.12 ECONOMIC VIABILITY

The resource assessment is of concrete grade materials and includes a preliminary market suitability test. Market prices for a range of aggregates were obtained from available online rates and based on consultation with quarry material companies.

The resource is expected to be able to produce a number of different products – (Tuff, Blended Tuff and Agglomerate, Aggregate and Crusher Dust). With the products expected to fetch between $22 and $45/tonne. The total resource is estimated to be valued at well over $2.5 billion over its 50 year life.

The size and location of the resource are central and critical to not only providing resources to already planned infrastructure and subdivisions currently zoned and under construction but also helping to sustain the planned growth in The master plan for the Regionally Significant Growth Area between Anambah and Branxton. (currently being undertaken by the Department of Planning NSW, Singleton, Maitland and Cessnock councils).

Further to the above the proponent has a pre-commitment for the supply of 500,000 tpa of concrete grade aggregates per annum in the surrounding Local Government Areas.

3. PROPOSED PROJECT

3.1 PROJECT OVERVIEW

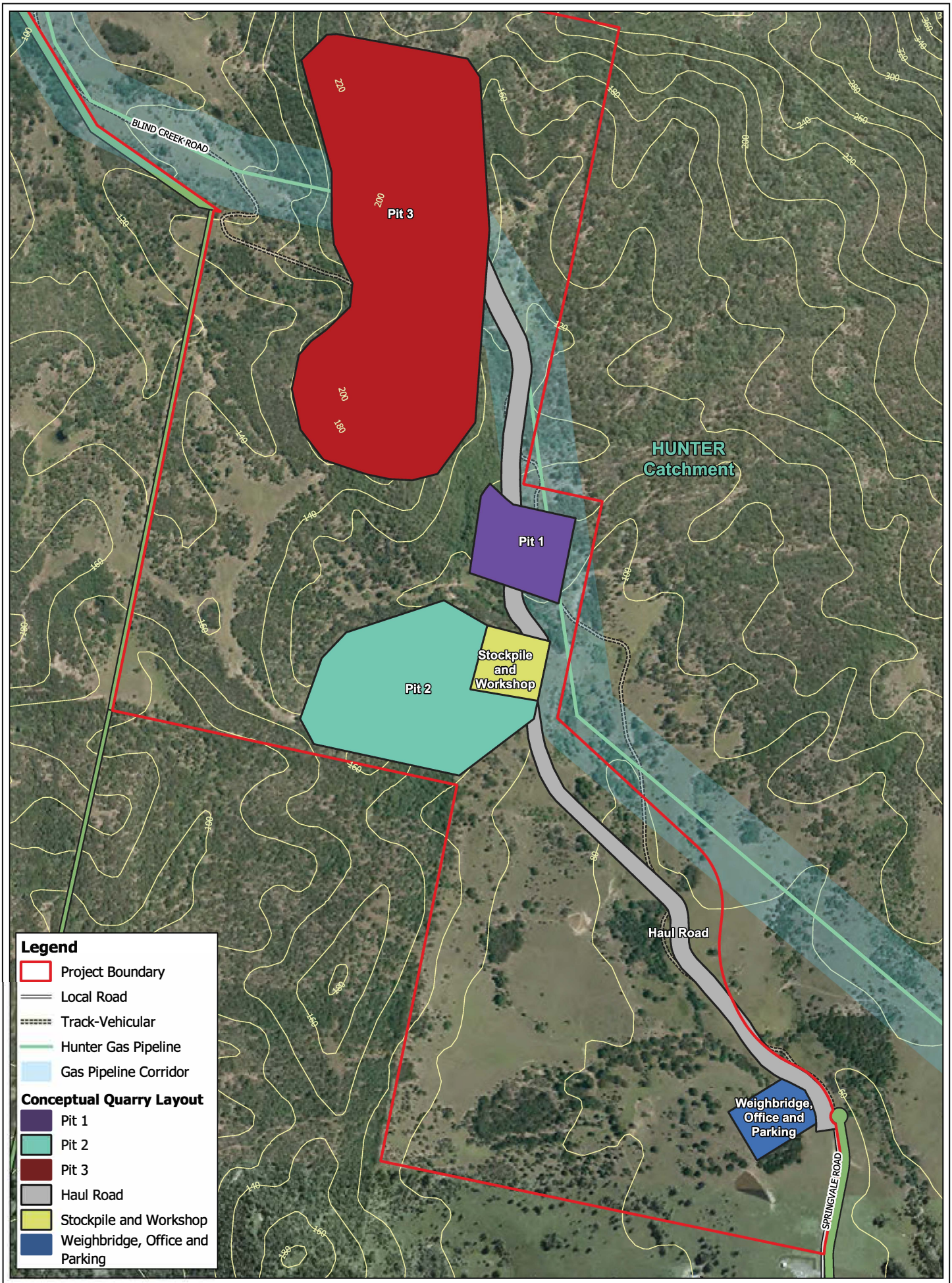
The key details of the Project are shown within **Table 5** below, with the conceptual project layout shown as **Figure 6**.

Table 5: Key Aspects of Proposed Quarry

Element	Key Aspects of the Project
Key Elements	Hard rock quarry extracting up to 1,000,000 tpa over a period of up to 30 years including a sealed access road, site office, workshop, weighbridge, and stockpile area with associated water management infrastructure. Progressive rehabilitation of quarried land returning to pasture and native vegetation.
Location	• Blind Creek Road, Glendon Brook (Lot 65 DP752473, Lots 903 & 904 DP1061259) • Lot 5 Springvale Road, Elderslie (Lot 5 DP1102521)
Property Titles	• Lot 65 DP752473 • Lot 903 & 904 DP1061259 • Lot 5 DP1102521
Landowner	Jamie and Robyn Pittman
Applicant	R & J Pittman
Quarry Operator	TBC
Area	Total Project disturbance area of approximately 61 ha, comprising: • 51.6 ha of extraction area (including 2.1 ha for the workshop and stockpile area) • 7.3 ha of haul roads • 2.1 ha for supporting infrastructure, including site office, weighbridge, and carpark Total Project area land holding of approximately 240 ha.
Project Life	Up to 30 years (under this application).
Potential Resource Life	Up to 50 years
Extraction Rate	Maximum of 1,000,000 tpa.

Element	Key Aspects of the Project
Operating Hours	**Construction Works:** • 7:00 am to 5:00 pm Monday to Friday • 8:00 am to 1:00 pm Saturday • No works on Sunday or public holidays **Quarrying Operations:** • 7:00 am to 5:00 pm Monday to Friday • 8:00 am to 1:00 pm Saturday • No quarrying on Sunday or a Public Holiday **Loading and Dispatch of Trucks:** • 6:00 am to 6:00 pm Monday to Friday • 6:00 am to 1:00 pm Saturday • No haulage on Sunday or a Public Holiday
Operational Workforce	Up to 10 full-time staff, with further support for the local and regional construction industry and associated haulage contractors.
Transport Rate	Maximum of 30 laden trucks per hour at peak rates. • Maximum daily extraction rate of 7,000 tonnes per day • On average, this equates to 110 laden trucks per day in order to meet peak production • Up to 10 employees and contractor vehicles would be expected to arrive and depart within 1 hour of opening and closing
Resource and products	A total of 30 mt of resources were approved for extraction
Blasting	On average one (1) blast per month, carried out by an external contractor
Extraction and Processing	• Maximum extraction rate of 1,000,000 tpa • Weathered rock stripped by bulldozer or excavator • Blasting and ripping of hard rock • Excavator and articulated trucks to feed mobile crusher and screen on the pit floor • Articulated trucks, excavator or front-end loader and articulated trucks, to distribute materials between processing and stockpile areas • Front-end loader to load road registered haulage trucks for saleable products
Water Management	Erosion and sediment control dams, dirty water dams, clean water dams, catch drains and road drainage.
Support facilities and utilities	• Site office, weighbridge, workshop, stores, car parking • Existing site access from Springvale Road with private sealed access road • Power supply from diesel generators and roof-top solar • Telecommunications line run adjacent to the access road • Water supply sourced from onsite dams, surface water runoff, and rainwater tanks. Potable water imported as needed

Element	Key Aspects of the Project
Rehabilitation	Rehabilitation of the development will initially be limited to areas of immediate disturbance such as road batters, access road construction and sediment dams. Progressive rehabilitation of the quarry benches will occur as they become available, with the majority of the rehabilitation taking place at the completion of resource extraction when the quarry floor, stockpile areas, and portions of the infrastructure areas will be rehabilitated.



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DRAWN BY: Keryn Dowling

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Conceptual Project Layout

Pittman Building Services Pty Ltd
Scoping Report - Proposed Hard Rock Quarry
253 Stanhope Road, Elderslie NSW 2335

Figure:

6

3.2 ESTIMATED DEVELOMENT COST

A tentative figure of $5 - 7 million is estimated to be required for the construction of the quarry and associated road upgrades. It is considered likely that the final cost will vary from the amount provided as the required scope of works is modified during the preparation of the EIS to reduce the environmental and social impacts of the proposed SSD. A quantity surveyor will prepare an Estimated Development Cost report (EDC) to determine the estimated capital investment value.

3.3 PROJECT AREA

Based on the current conceptual project design, the project disturbance area is approximately 61 ha (refer to **Figure 6**). The development will consist of 3 pits (Pits 1-3), haul roads, a workshop, and stockpile area (within Pit 2), and a site office, weighbridge, and staff carpark. Disturbance areas for each are detailed in **Table 6**.

Table 6: Project Disturbance Area

Infrastructure	Disturbance Area
Office, Weighbridge, and Carpark	2.1 ha
Haul Roads	7.28 ha
Workshop and stockpiles	2.1 ha – to be established within the footprint of Pit 2. Therefore, this area is accounted for within Pit 2 below
Pit 1 – Hard Rock	3.89 ha
Pit 2 – Ridge Gravel	14.5 ha
Pit 3 – Hard Rock	33.2 ha
Total	**60.97 ha**

The conceptual pit arrangement is provided below in **Figure 7**, while the details for Pits 1-3 are provided in **Figures 8**, **9**, and **10** respectively.

3.4 PROJECT STAGING

3.4.1 Access and Haul Road

The site entrance will be from the terminal end of Springvale Road, a no-through road off Stanhope Road. Springvale Road is an unmarked 2-lane sealed road servicing three (3) rural residences, including the Applicant's residence. The road is maintained by Council.

Products from the quarry would be transported via Stanhope and Elderslie Roads to the New England Highway and Hunter Expressway, a total distance of approximately 13 km. The quarry is primarily targeting concrete batching plants in the Sydney area for the sale of its products, such that haul trucks would continue travelling in a southerly direction along the New England Highway and Hunter Expressway.

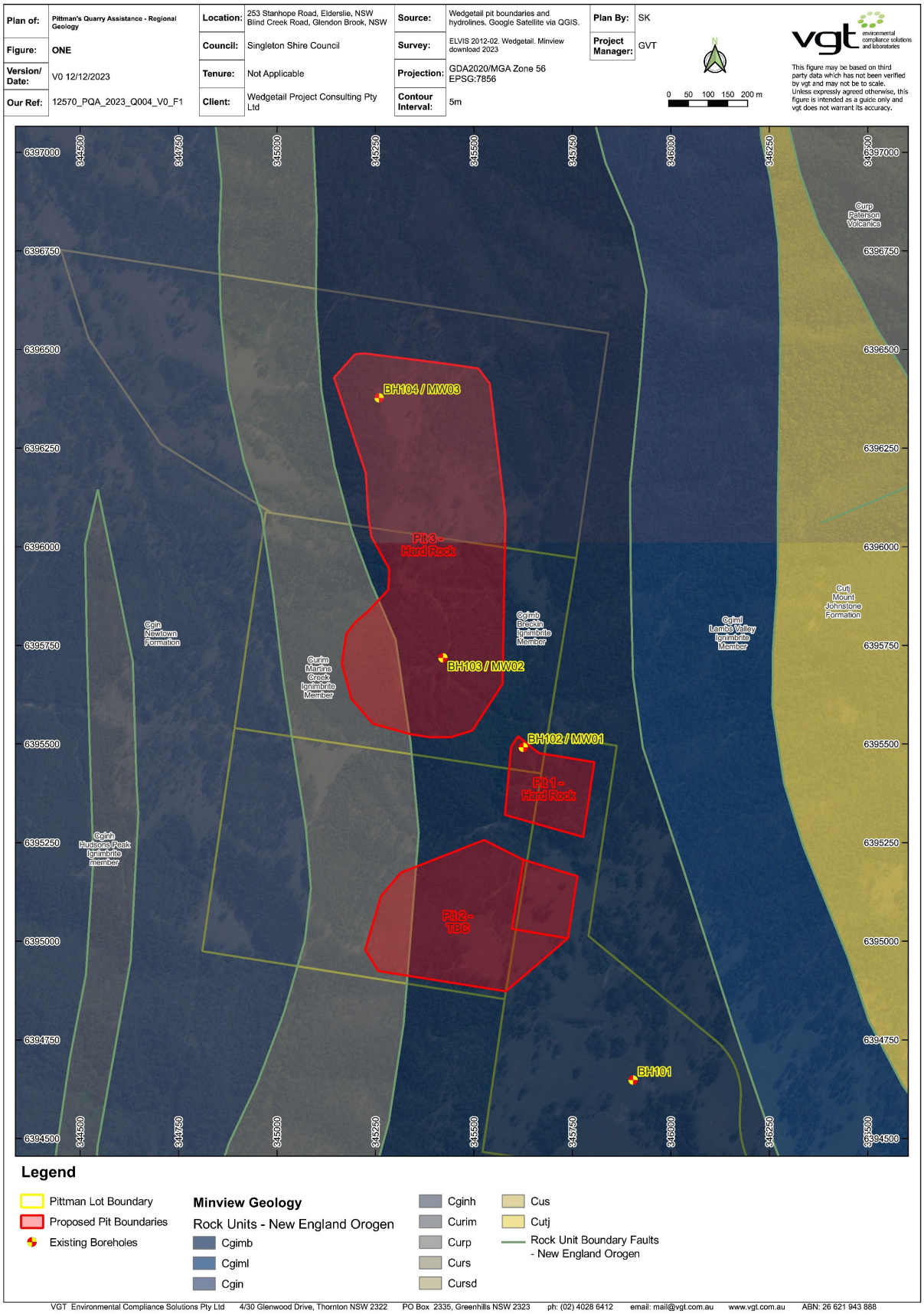


Figure 7: Conceptual Pit Layout

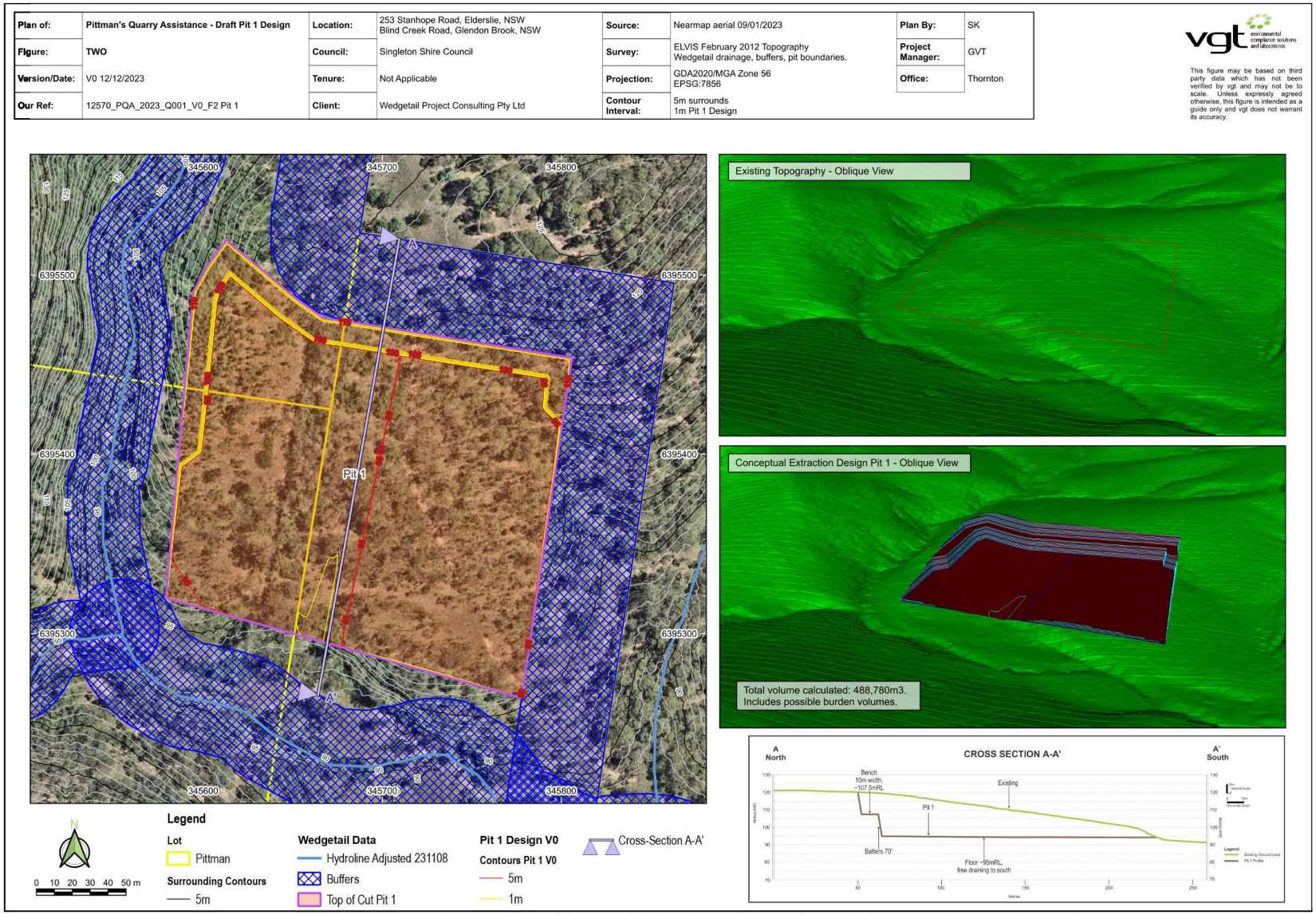


Figure 8: Pit 1 Layout

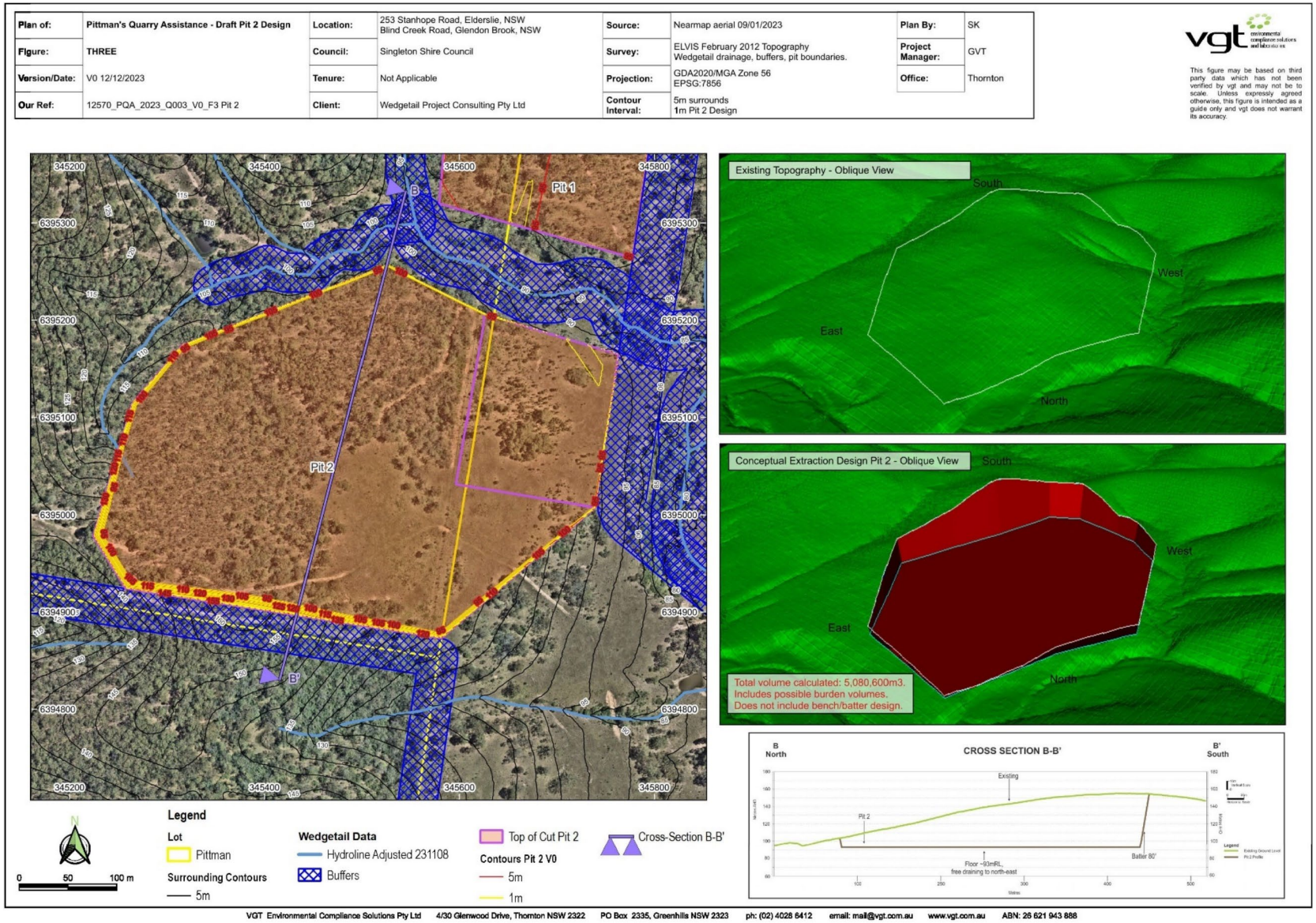


Figure 9: Pit 2 Layout

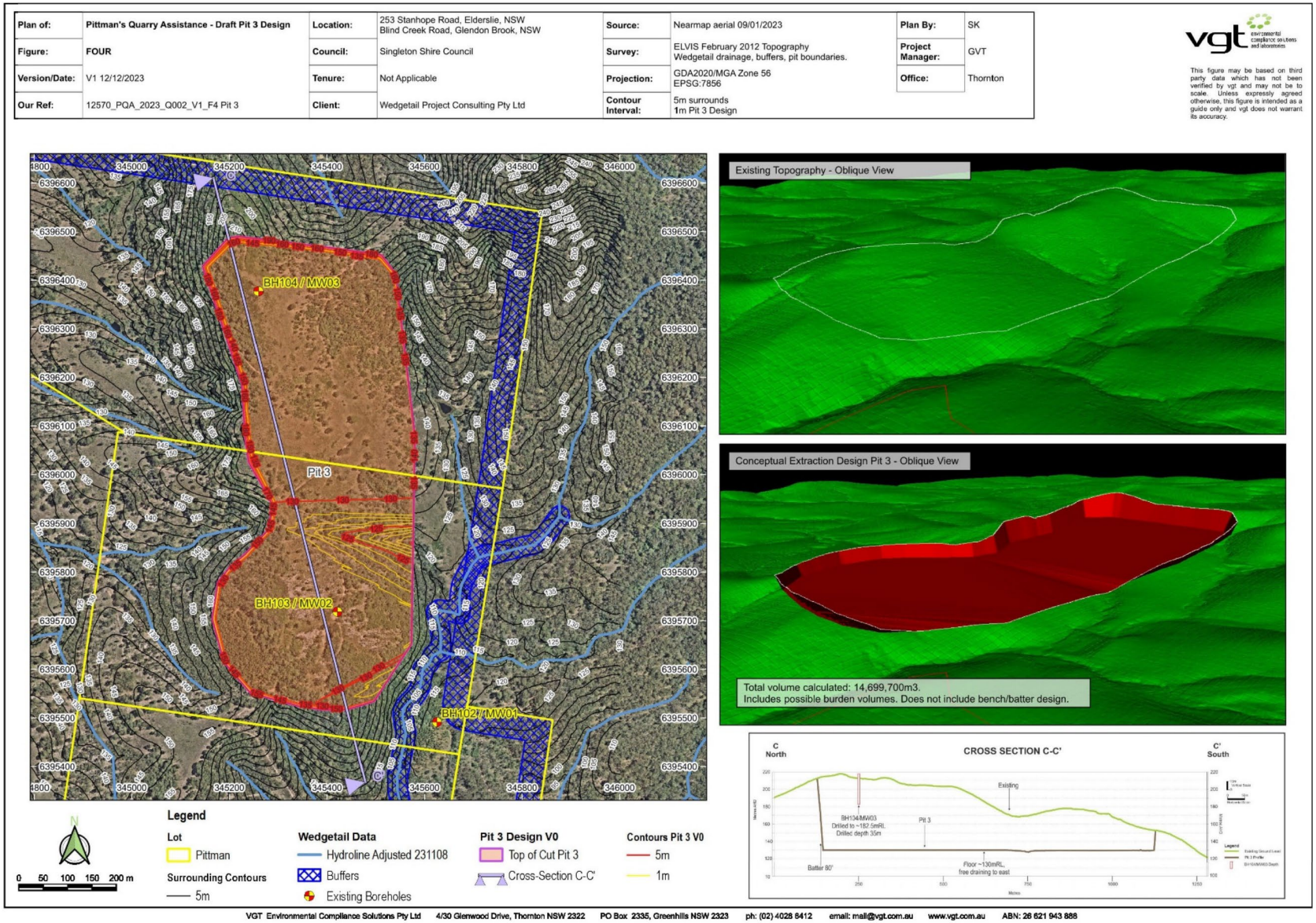


Figure 10: Pit 3 Layout

3.5 PLANT AND EQUIPMENT

Plant machinery expected to be used on-site is listed in **Table 7** below along with its proposed uses.

Table 7: Quarry Plant and Equipment

Plant	Quantity	Usage
Bulldozer (Cat D9, Cat D11)	2	Stripping topsoil, pushing topsoil, ripping and stockpiling
Excavator (35t)	2	Ripping and loading rocks into haul trucks
Site dump truck (30t)	2	Transporting rock to the processing area
Front-end loaders	2	Loading screening plant and product trucks & stockpiling
Water cart with a 22,000 L capacity tank	2	Watering of haul roads
Crushers and Screens	2	Sizing of quarried material
Grader (Cat 12G)	1	Haul road maintenance

3.6 HOURS OF OPERATION

The proposed hours of operation are detailed in **Table 8**. These proposed hours may change, and may possibly be extended, subject to the noise impact assessment and other potentially relevant assessments.

Table 8: Proposed Hours of Operation

Activity	Hours of Operation
Staff maintenance and servicing of plant and equipment	• 6:00 am to 6:00 pm Monday to Friday. • 6:00 am to 1:00 pm Saturday. • No work on Sunday or a Public Holiday.
Transport of materials	• 6:00 am to 6:00 pm Monday to Friday. • 6:00 am to 1:00 pm Saturday. • No work on Sunday or a Public Holiday.
Crushing and screening operations	• 7.00 am to 5:00 pm Monday to Friday • 8:00 am to 1:00 pm Saturday. • No work on Sundays or a Public Holiday.
All other operations, including excavation and soil stockpiling	• 7.00 am to 5:00 pm Monday to Friday • 8:00 am to 1:00 pm Saturday. • No work on Sundays or a Public Holiday.
Drilling and blasting	• 9:00 am to 5.00 pm Monday to Friday[1]

[1] Per guidelines provided in "Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration" (ANZEC, 1990)

3.7 WORK FORCE

The site would be expected to employ up to 10 permanent staff on site at the quarry. Some aspects of the quarry operations, such as haulage of materials, will be provided by contractors.

The quarry, if approved, would also engage a range of service providers including diesel mechanics, fabricators and geotechnical specialists. Most of these would likely be employed from Singleton. A wide range of specialist consultants would also be engaged for monitoring and compliance purposes as required. Consultants may be engaged from outside of the region as independent consultants.

3.8 OPERATIONAL ACTIVITIES

The project will include the following key components:

- An extraction area extending over 51.71 ha, which will enable the extraction and processing of 30 mt over the project lifetime. Processing and screening will occur using mobile equipment within the quarry pit,
- Workshop and stockpile area,
- An access road to the site from Springvale Road,
- Site office, weighbridge, and associated stockpile area, and
- Soil erosion and sediment control measures, consisting of diversion bunds, catch drains and sediment dams.

3.8.1 Site Preparation

Initial works proposed to prepare the project for quarrying activities would include the following:

- Construction of site access and installation of site fencing,
- Removal of existing vegetation within the areas of the initial extraction pit, initial surface water infrastructure, processing, loading and administration areas,
- Removal and stockpiling of topsoil progressively over the extraction area,
- Construction of initial surface water management infrastructure,
- Mulching/grinding, stockpiling and re-use of vegetation and topsoil material as required,
- Construction of processing, loading and administration areas, and
- Removal of initial surface rock resource for processing/stockpiling.

3.8.2 Hard Rock Extraction

Extraction of the material will utilise traditional methods including drilling, blasting and a combination of mechanical methods such as ripping, excavating and use of excavators.

Gravel will be able to be extracted using an excavator. Medium strength hard rock material is likely to require a moderately hard to very hard ripping effort and a minimum a D8 digger.

High strength hard rock material is likely to require an extremely hard ripping effort and at minimum a D9 to D11 dozer, or blasting, with very high strength material likely to require blasting.

Blasting at the proposed quarry will be restricted to between the hours of 9am to 5pm Monday to Friday, with no blasting to occur on Saturdays, Sundays or on Public Holidays.

Blasting is expected to take place up to 12 times a year, on average. The Applicant will notify the closest neighbouring property owners (i.e. sensitive receptors located along Springvale Road) of the timing upcoming blast events in the days prior to blasting events.

Licenced contractors will be utilised for blasting events, bringing explosives used for blasting to site for each event. As such, explosives will not be stored on the site.

3.8.3 Processing

Hard rock material will be passed through a primary crusher located close to the rock face and fed by an excavator.

The preliminary resource assessment has identified that some of the available agglomerate (e.g. within Pit 3, will likely require multiple passes through the primary crusher in order to meet RMS 3051 criteria.

The crushed rock will then be moved by loader to the secondary crusher and sieving system, allowing a range of aggregate sizes to be manufactured.

3.8.4 Stockpiling and Loading

Primary stockpiling of materials will occur following processing, within stockpile areas on the floor of the excavation pit behind the active face. Where possible, stockpiles are located to the south of active quarry operations to provide additional acoustic shielding between the quarry and nearby sensitive receptors.

Materials will then be transported to the main stockpiling area adjacent to the workshop and east of Pit 2. This will act as the principal stockpiling area from which haulage trucks will be loaded. As Pit 2 is developed, the stockpile area will extend into the ridge gravel pit floor as required.

Stockpiles will be subject to watering on windy days to minimise dust generation. Stockpiles will be contained within the controlled drainage area of the development with run-off directed by catch drains to an onsite sediment dam, thus protecting local surface water quality.

3.8.5 Transporting Materials

Speed limits of 10 km/hr will be maintained on site to ensure internal traffic safety. Loads of transported materials will be covered to minimise dust generation. The internal access road from Pit 2 to the site entrance will be sealed to manage dust emissions.

The remainder of the haulage road, from the site entrance to the Hunter Expressway, is bitumen-sealed, therefore dust generation from offsite freight movements will be negligible.

3.8.6 Progressive Rehabilitation

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

Specialist consultants will be engaged to prepare a rehabilitation strategy for the proposal, based on the findings of various technical studies.

The rehabilitation strategy will summarise the objectives and revegetation methodology and monitoring required to successfully implement it, as well as the inclusion of performance and completion criteria for the disturbed land throughout the project area.

3.9 WATER SUPPLY

The main potential source of dust during the construction and operational phase would be traffic dust from trucks moving to and from the quarry site, as well as soil stripping and earthworks during the initial establishment/construction of the quarry.

Under circumstances where the dust is considered to impact adjoining landowners, the proponent would undertake selective road watering to avoid such impacts. Other activities requiring a water supply during the operational phase include raw material modification.

The water use requirements for the Project will be calculated as part of the surface water assessment for the EIS.

The proposed development will require the establishment of sediment ponds which would have a capacity of up to 3 ML each. These ponds would provide the primary water supply for the proposal. This water can be legally extracted from the sediment ponds for dust suppression on the site as it is considered exempt from a separate water use approval under Clause 35 (a) of the *Water Management (General) Regulation 2018*. This exemption applies to any person for the use of water for any purpose as authorised by a development consent under the *Environmental Planning and Assessment Act 1979*.

The Lots encompassing the proposed quarry have a combined total area of 240 ha. Using Water NSW harvestable rights calculator, the maximum harvestable right is 14.4ML.

During periods of water deficit, it is intended to use an existing groundwater entitlement (WAL 13856) which is currently held by the proponent. The license has a total nominal volume of 60 ML, and the pump extracts the Hunter Regulated River Water Source (Management Zone 2b – Hunter River from Wollombi Brook Junction to Downstream Extent of the Hunter River). The WAL was primarily purchased to secure a reliable water supply for farming activities on the Applicant's land holdings.

The proposed development will utilise water captured within the sediment ponds within the quarry as its primary source of water. If this water is not available, it will use existing water entitlements to provide water for dust suppression. No additional water allocations are required as part of this development proposal. The proposal will therefore not require any new licenses or approvals under the Water Act 1912 or the Water Management Act 2000. The existing surface water licence will, however, need to be amended to permit the use of

water for industrial purposes. This is a separate process to this DA which would be initiated following development consent.

3.10 SERVICES

The following services and utilities will be required for the construction and operation of the quarry:

- **Electricity**: The property is connected to power, however extension of the mains connection to the extraction areas is considered onerous. It is proposed to generate the electricity required for the site office, weighbridge, and workshop using a diesel-powered generator and roof-top solar,
- **Water:** Surface water management systems will be designed to ensure that the development is self-sufficient in terms of water supply. It is anticipated that the proposal's operational water supply needs will be met via the capture and reuse of runoff on site. Potable water supply needs for staff amenities will be met via rainwater collection (tanks) from the roofs of the site office and workshop or trucked-in if required,
- **Communications:** Mobile phone reception is available onsite. UHF radio will also be used,
- **Sewage**: a portaloo will be utilised on-site during construction activities which will be pumped out by a licenced collection service and disposed of at a licenced facility. For operations, an onsite wastewater management system will be installed to treat sewerage generated from toilets at the site office. On-site wastewater treatment will require the preparation of an onsite wastewater management plan (OWMP) and a Section 68 activity approval from Singleton Council will be obtained, and
- **Site access**: the existing site access from Springvale Road will be widened and upgraded for heavy vehicle all weather access.

3.11 PROJECT DESIGN MITIGATIONS

Several project alternatives have been considered and the current project design has been determined as the most suitable to avoid/minimise adverse impacts of the proposal.

Key mitigation measures included at this stage include standard best practice measures designed to reduce the potential impact of the proposal on surrounding land uses, the environment and the community, including:

- The creation of a closed water system to minimise the potential for erosion and sedimentation,
- Consideration of biodiversity offset sites within the property,
- Maintaining appropriate setbacks from water bodies,
- No excavating below bed level of water bodies,
- Design of the pit and operations to ameliorate potential operational noise impacts,
- Defining a resource in an area of the property that has largely been historically disturbed, and

- Design of infrastructure and extraction areas to be safe and stable to provide for safe access to the extraction area and surrounds.

Additional mitigation measures will be developed during the preparation of the EIS and subsequent SSD application process. These will draw upon consultation with relevant stakeholders and government authorities.

In addition, mitigation measures will be developed following the preparation of specialist reports, including:

- Aboriginal Heritage Assessment
- Historic Heritage Assessment
- BAR (including offset calculations)
- Air Quality Impact Assessment
- Noise and Vibration Impact Assessment
- Groundwater Assessment
- Surface Water Assessment
- Traffic Impact Assessment
- Resource Evaluation Assessment
- Social Impact Assessment
- Economic Impact Assessment
- Rehabilitation Strategy

The EIS will further include mitigation measures developed from specialist advice towards soils and rehabilitation.

4. STATUTORY CONTEXT

4.1 POWER TO GRANT CONSENT

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and NSW *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) provides the statutory framework for planning approval and environmental assessment in NSW.

Section 4.36 (2) of the EP&A Act states that a State environmental planning policy (SEPP) may declare any development, or any class or description of development, to be State significant development (SSD). The NSW *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) identifies development that is SSD. Section 2.6 (1) of the Planning Systems SEPP states:

1) *Development is declared to be State significant development for the purposes of the Act if:*

    a) *the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and*

    b) *the development is specified in Schedule 1 and 2.*

Section 7 of Schedule 1 of the Planning Systems SEPP provides the following definition of extractive industries:

7 Extractive industries

(1) Development for the purpose of extractive industry that—

    a) *extracts more than 500,000 tonnes of extractive materials per year, or*

    b) *extracts from a total resource (the subject of the development application) of more than 5 (mt), or*

    c) *extracts from an environmentally sensitive area of State significance.*

The project is development for the purpose of an extractive industry that proposes to mine more than 500,000 tpa and extract from a total resource of more than 5 (mt), and is therefore SSD pursuant to Section 2.6 (1) (b) of the Planning Systems SEPP.

Consent for the project is sought under Part 4, Division 4.7 of the EP&A Act. Under Part 4, Division 4.2 of the EP&A Act, the consent authority for SSD is either the Minister for Planning or the Independent Planning Commission (IPC). A development application for SSD must be accompanied by an environmental impact statement (EIS), prepared in accordance with the EP&A Regulation. Before preparing an EIS, an applicant must request SEARs, which set the terms of reference for the EIS.

4.2 PERMISSIBILITY

The site is zoned RU1 – Primary Production pursuant to the *Singleton Local Environmental Plan* 2013 (SLEP 2013). Extractive industries are permissible with consent in the RU1 zone.

4.3 MATTERS FOR CONSIDERATION

A summary of the relevant planning instruments that may be applicable to the project are shown in **Table 9**. A full assessment of the applicability and compliance with all relevant planning instruments will be provided in the EIS.

Table 9: Relevant Planning Instruments

Instrument	Comment	Approval Required
Commonwealth Legislation		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The project area and surrounding site have the potential to provide habitat for a range of EPBC-listed flora and fauna.	A referral to the Department of Agriculture, Water and the Environment (DAWE) for determination of whether the Project is a 'Controlled Action'. A referral will be prepared given that the proposed development has the potential to impact nationally-listed threatened species.
NSW Legislation		
***Environmental Planning and Assessment Act, 1979* (EP&A Act)**	Development consent is required under the EP&A Act for extractive industries in NSW. The project requires approval under Part 4, Division 4.47 of the EP&A Act as a State Significant development. Section 4.41 of the EP&A Act provides that if development consent is granted for a State Significant development, the following potentially relevant authorisations are not required: • A permit under section 201,205 or 219 of the Fisheries Management Act 1994, • An approval under Part 4, an excavation permit under section 139 of the Heritage Act 1977, • An Aboriginal heritage impact permit under section 90 of the National Parks and Wildlife Act 1974, • A bush fire safety authority under section 100B of the Rural Fires Act 1997, and • A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the Water Management Act 2000.	An application will be made under Part 4, Division 4.47 of the EPA&A Act to the NSW Minister for Planning, who is the consent authority for the Project.
Biodiversity	The BC Act provides for the protection	The EIS will be required to

Instrument	Comment	Approval Required
Conservation Act 2016 (BC Act)	and conservation of biodiversity within NSW. Part 4 identifies the threatened biodiversity that will require consideration in the BDAR. Part 6 specifies how the development will be required to comply with the Biodiversity Offsets Scheme.	include a Biodiversity Development Assessment Report (BDAR) and will be subject to the Biodiversity Offsets Scheme.
National Parks & Wildlife Act 1974 (NPW Act)	An Aboriginal Cultural Heritage Assessment will be completed to identify potential impacts to Aboriginal objects. An Aboriginal Heritage Impact Permit is typically required under Section 90 of the NP&W Act to harm an Aboriginal object.	Pursuant to Section 4.41 of the EP&A Act, an Aboriginal Heritage Impact Permit would not be required for the carrying out of the project, if approved.
Water Management Act 2000 (WM Act)	The Development will not require a water use approval under Section 89 of the WM Act, a water management approval under Section 90 or a controlled activity approval under Section 91. However, depending on the expected level of impact on the groundwater aquifer, it may require an aquifer interference approval under Section 91 of the WM Act.	An aquifer interference approval may be required under Section 91 of the WM Act
Protection of the Environment Operations Act 1997	Section 48 of the NSW *Protection of the Environment Operations Act 1997* (POEO Act) outlines that an EPL is required for any scheduled activities at a premise at which Schedule 1 of the Act indicates that a licence is required. Crushing, grinding or separating activities with a capacity to process more than 150 t of materials per day or 30,000 tpa, and land based extractive activities involving the extraction, processing or storage of more than 30,000 tpa of extractive materials, are scheduled activities under the POEO Act.	On determination of the project application, an application for an EPL will be lodged with the NSW Environment Protection Authority (EPA). If the proposed quarry is permitted as SSD under the EP&A Act, an EPL for related scheduled activities cannot be refused, with the prescribed EPL conditions consistent to those set out under the SDD approval documentation.
Roads Act 1993	The proposed SSD includes, in its current design, the provisions for a private access road to join the Stanhope Road with an appropriate approved intersection.	The roadworks will require a Section 138 Approval from Singleton Council. This approval must be consistent with the specifications of the approval (if granted) for the SSD pursuant to section 4.42 of the EP&A Act.
Rural Fires Act 1997	The proposed SSD would be assessed in accordance with NSW RFS Planning for Bushfire Protection 2019. A Bush Fire Safety Authority under	No separate approval required.

Instrument	Comment	Approval Required
	section 100B of the *Rural Fires Act 1997* is not required as the development does not entail subdivision or development for a special fire protection purpose.	
State Environmental Planning Policies		
State Environmental Planning Policy (Planning Systems) 2021	The proposed Quarry is assessed as State Significant Development (SSD) pursuant to Schedule 1, Clause 7 of the Planning Systems State Environmental Planning Policy (SEPP) as an extractive industry that will extract more than five (mt) from a total resource over the lifetime of the project.	Consent is required at the development meets criteria for SSD.
State Environmental Planning Policy (Resources and Energy) 2021	Chapter 2 of the Resources and Energy SEPP requires the consent authority to consider the following matters: • Compatibility of the development proposal with other land uses, • Voluntary land acquisition, • Natural resource management and environmental management, • Resource recovery, • Transport, and • Rehabilitation. The EIS will address the matters listed in Chapter 2 of the SEPP.	No separate approval is required.
State Environmental Planning Policy (Resilience and Hazards) 2021	Under Section 4.6 of the SEPP, potential contamination of the subject land must be assessed prior to issuing development consent. This will be carried out as part of the EIS. Pursuant to Section 3.11 of the SEPP, a preliminary hazard analysis of the project will be carried out in accordance with Applying SEPP 33 (Department of Planning, 2011). The proposal is unlikely to be potentially hazardous or offensive, as it will only involve the use of diesel and small amounts of hydrocarbons.	No separate approval is required.
State Environmental Planning Policy (Transport and Infrastructure) 2021	Schedule 3 of the Transport and Infrastructure SEPP lists traffic generating development (i.e. to be referred to Transport for NSW (TfNSW). The subject proposal is not identified in Schedule 3 of the SEPP as traffic generating development to be referred to Transport for NSW (TfNSW) as the	The proposal does not require a referral to Transport for NSW (TfNSW).

Instrument	Comment	Approval Required
	proposal is defined as 'any other purpose' and will not generate 200 or more motor vehicle movements per hour.	
State Environmental Planning Policy (Biodiversity and Conservation) 2021	An assessment of the potential impact of the proposal upon koalas/koala habitat will be undertaken as part of the EIS, and in line with the SEPP requirements in Chapter 3. Following the application of mitigation measures, any residual impacts will be readily offset through retirement of credits under the Biodiversity Offsets Scheme.	No separate approval is required.

4.4 SUMMARY OF REQUIRED APPROVALS

Pursuant to section 4.41 of the EP&A Act, certain approvals are not required for SSD, while under section 4.42 of the Act, certain authorisations that would have been required for the project if it was not a SSD cannot be refused for carrying out SSD that is authorised by development consent under Division 4.7 of the Act.

Separate environmental approvals identified as being relevant to the proposal at this stage are summarised in **Table 10**. The approvals will be considered and assessed in the EIS where relevant to the project.

Table 10: Summary of Approvals Relevant to the Proposal

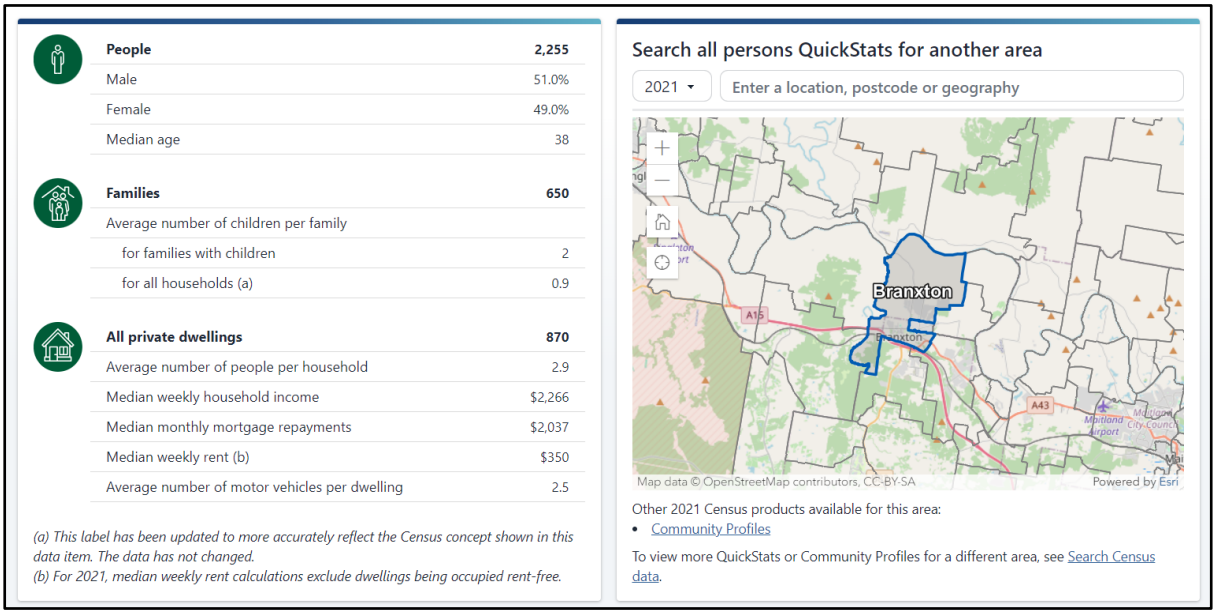
Legislation	Comment
Approvals that do not apply under Section 4.41 of the EP & A Act	
An Aboriginal heritage impact permit (AHIP) under section 90 of the *National Parks and Wildlife Act 1974*.	In the event that any Aboriginal sites or objects are recorded within the proposed development footprint or are assessed as likely to be disturbed by the proposal an AHIP would be required. If potential impacts to Aboriginal Heritage are identified during the course of the Aboriginal Cultural Heritage Assessment, the requirements for an AHIP would be waived as the Project is SSD. However, mitigation measures would be recommended to avoid or minimise any potential impacts.
Approvals required to be issued consistently under Section 4.42 of the EP & A Act	
An environment protection licence under Chapter 3 (section 48) of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in section 43 of that Act).	An EPL will be required for the quarry development, if approved, as it will entail the extraction, processing and storage of more than 30,000 tpa and therefore constitutes a scheduled activity. An EPL application will be lodged with the EPA if the proposal is approved.
A consent under section 138 of the *Roads Act 1993.*	As there will be an upgrade required to the site entrance, consent under S138 will be required.
Approvals that may be required (not covered by Sections 4.41 & 4.42 of the Act)	

Aquifer Interference Approval under Section 91 of the *Water Management Act 2000.*	In the event that the proposal results in disturbance of the water table, the development would require an aquifer interference approval under Section 91 of the Act. This will be assessed as part of the groundwater impact assessment for the EIS.

5. CONSULTATION

5.1 PRELIMINARY STAKEHOLDER IDENTIFICATION

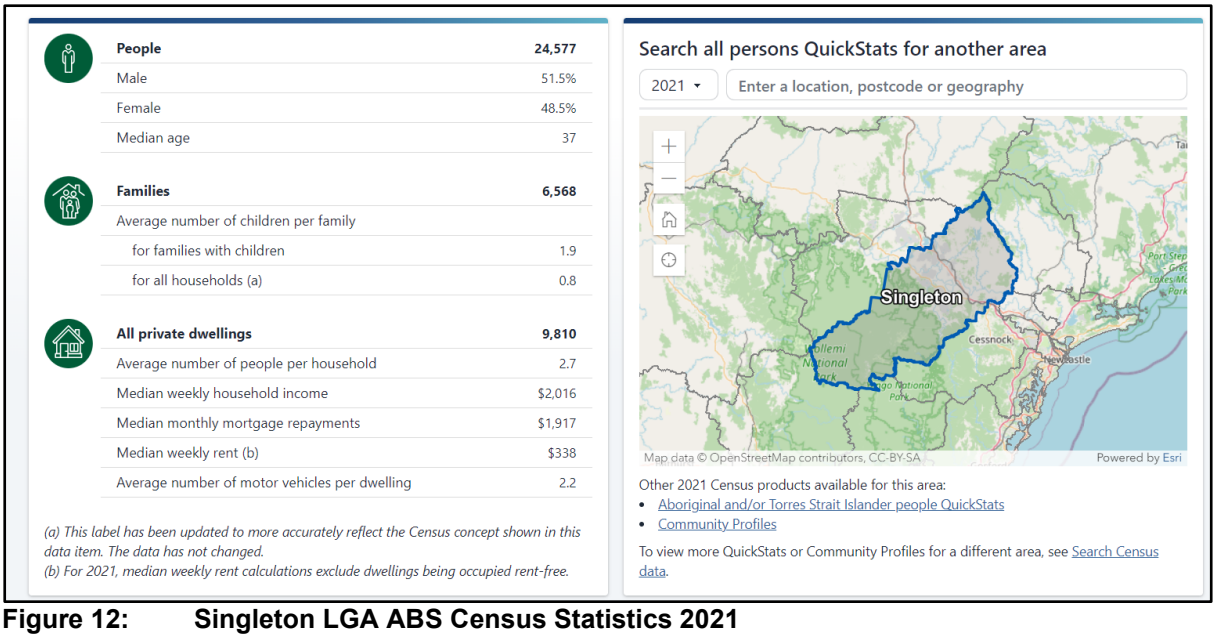
The proposed development is located approximately 9 km north of Branxton and 17 km east of the township of Singleton in the Singleton Local Government Area (LGA). The community of Branxton comprises approximately 2255 people and 870 private dwellings (ABS Census, 2021). The community of Singleton comprises approximately 24,577 people and 9810 dwellings (ABS Census, 2021). Various statistics for the Branxton and Singleton LGA's are shown in **Figure 11** and **Figure 12**.



People	**2,255**
Male	51.0%
Female	49.0%
Median age	38
Families	**650**
Average number of children per family	
for families with children	2
for all households (a)	0.9
All private dwellings	**870**
Average number of people per household	2.9
Median weekly household income	$2,266
Median monthly mortgage repayments	$2,037
Median weekly rent (b)	$350
Average number of motor vehicles per dwelling	2.5

(a) This label has been updated to more accurately reflect the Census concept shown in this data item. The data has not changed.
(b) For 2021, median weekly rent calculations exclude dwellings being occupied rent-free.

Figure 11: Branxton LGA ABS Census Statistics 2021



People	**24,577**
Male	51.5%
Female	48.5%
Median age	37
Families	**6,568**
Average number of children per family	
for families with children	1.9
for all households (a)	0.8
All private dwellings	**9,810**
Average number of people per household	2.7
Median weekly household income	$2,016
Median monthly mortgage repayments	$1,917
Median weekly rent (b)	$338
Average number of motor vehicles per dwelling	2.2

(a) This label has been updated to more accurately reflect the Census concept shown in this data item. The data has not changed.
(b) For 2021, median weekly rent calculations exclude dwellings being occupied rent-free.

Figure 12: Singleton LGA ABS Census Statistics 2021

As noted in **Section 2.3**, Rural properties and homesteads are present mostly to the south of the proposed quarry site along haul roads. The nearest receivers to the closet pit extraction area (Pit 2) of the quarry are:

- A rural property and the Hunter Pet Motel commercial operation located on Lot 3 in DP1102521, approximately 1.2km and 1.3km south-east respectively,
- A rural property located on Lot 7 DP1102521, approximately 1.7 km south-east,
- A rural property located on Lot 2 DP800005 approximately 2.1 km south of the proposed quarry (owned by the Applicant), and
- A rural property located on Lot 3 DP800005 approximately 2.2 km south of the proposed quarry.

The closet receivers to the proposed site office, weighbridge and car park area are located approximately 400 m south on Lot 3 in DP1102521 and 600 m south-east on Lot 7 DP1102521. Lot 3 DP1102521 also supports commercial use - the Hunter Pet Motel off Springvale Road.

The Elderslie Airport is also located approximately 3.5 km south of the proposed quarry (Pit 2). It has a single 700 m long runway and is primarily used by parachuting clubs and skydiving centres.

5.2 CONSULTATION AND STAKEHOLDER ENGAGEMENT

Preliminary community engagement will be undertaken to inform Project design and development, to identify perceived issues / impacts and to build stakeholder relationships with near neighbours, residents and businesses in proximity to the proposed project. Community consultation will be ongoing during the EIS and throughout project development and operation and will include the wider community of the project area and further agency consultation.

The Proponent will consult with all government agencies and other key stakeholders to ensure that any matters raised are adequately addressed during the EIS preparation.

Key stakeholders are likely to include the following, at a minimum:

- Local services and residents in the vicinity of the subject site as well as in the nearby village of Branxton,
- Singleton Shire Council,
- Department of Planning, Housing, and Infrastructure (DPHI),
- NSW Environmental Protection Authority (EPA),
- Transport for NSW (TfNSW),
- NSW Department of Primary Industry (DPI),
- WaterNSW,
- Biodiversity Conservation Division (BCD), and
- Wanaruah Local Aboriginal Land Council (LALC).

This is not an exhaustive list and may be modified dependent on the content of the SEARs and feedback through the consultation process.

6. PROPOSED ASSESSMENT OF IMPACTS

The potential impacts of the proposal upon the surrounding environment and community have been assessed and categorized in accordance with the methodology and categories provided in the DPE guidelines for the preparation of a scoping report (DPE, 2022).

A Scoping Worksheet (**Appendix C**) has been prepared to compile a preliminary assessment of the potential impacts of the proposal on a range of environmental and social factors and inform the likely level of assessment required in the EIS.

Factors considered to determine the likely level of assessment included:

- The current understanding of the local and regional context of the project,
- The current project design (subject to change based on constraints identified during the preparation of the EIS),
- Analysis of data collected to date in project-specific surveys,
- The likely predicted scale of the impact (severity, duration, geographical extent), and
- Nature of the impact (direct, indirect, perceived, cumulative).

Levels of likely assessment required for each matter were categorized into the four (4) broad categories provided in the scoping guidelines:

- **Matters requiring detailed assessment** (**Section 6.1**): The project may result in significant impacts on the matter, with the assessment likely to involve uncertainty in relation to factors such as available data, identification of specific mitigation measures required or methods available to predict impacts. Thus, assessment will require detailed studies carried out by technical specialists,
- **Matters requiring standard assessment** (**Section 6.2**): The project is unlikely to result in significant impacts on the matter. Assessment of impacts may require technical specialists however the impacts are likely to be well understood and capable of being mitigated to comply with relevant standards or performance measures, and
- **Matters requiring no further assessment** (**Section 6.3**): The project will have no impact on the matter, or the impacts of the project on the matter will be so small that they are not worth considering.

In addition, the scoping worksheet identified matters requiring cumulative impact assessment, i.e. an assessment of the likely impacts of the project in combination with other relevant projects.

6.1 MATTERS REQUIRING DETAILED ASSESSMENT

6.1.1 Road, Traffic & Access

The proposed site access is located off Springvale Road, a no through road which terminates at the subject property. The site entrance is approximately 2 km north of the Stanhope Road intersection, with the Stanhope Road and Elderslie Road intersection located a further 2 km to the south-west in the vicinity of the Hunter River.

The haul road extends over approximately 13 kilometres from the site entrance to the Hunter Expressway. The haul road incorporates Springvale Road, Stanhope Road, Elderslie Road and the New England Highway. Elderslie Road was previously used by the Great Greta Coal Mine to haul Coal. It is approximately 166km from the proposed Quarry to the exit of the Pacific Motorway onto the Pacific highway at Hornsby.

The proposed quarry will generate heavy vehicle movements associated with dispatch of processed materials. Light vehicle movements will also be generated by employees, contractors and other visitors to the Quarry.

6.1.1.1 Proposed Assessment

The following key elements will require consideration with respect to roads, traffic generation and access within the EIS:

- Characterisation of the existing road network, including the condition of the road surface and the existing road widths, existing road capacity, daily and peak traffic volumes (considering the peak holiday period and at other times of the year), and the proportion of light and heavy vehicle traffic movements,
- Consideration of the impacts on the road network and required controls for the construction period and during operation,
- Estimated traffic movements including the maximum and average light and heavy vehicle traffic movements during project construction and operation, and
- Recommended management measures to mitigate identified potential impacts of the Project.

The assessment of traffic and access impacts would be prepared using the following relevant guidelines, policies and design requirements, as follows:

- *NSW Roads and Traffic Authority (now TfNSW) Guide to Traffic Generating Developments 2002*,
- Australian Standard AS 2890 Parts 1 and 2,
- *Austroads Guides to Road Design (various publications)*, and
- *Austroads Guides to Traffic Management (various publications)*.

Specific engagement is proposed with TfNSW and Singleton Council. Cumulative impacts will be considered within the traffic impact assessment using publicly available information, or data able to be sourced from the proponent, in accordance with the CIA guideline.

6.1.2 Air Quality

6.1.2.1 Existing Environment

No published information on existing air quality within the locality has been identified. However, as the proposed development site is located in a rural area with no major sources of air pollution, the local air quality is unlikely to exceed any of the air quality criteria. There are no commercial land uses of scale in the locality, with the predominant anthropogenic land use being agricultural grazing. Elderslie Airport, predominantly used for recreational purposes, as well as local roads are likely to have an impact on local air quality.

The key air quality impacts associated with the project will be the emissions of particulate matter and the potential for these emissions to cause adverse impacts at the nearest

sensitive receivers. Blast fume and diesel exhaust emissions are also issues that require consideration.

6.1.2.2 Proposed Assessment

The proposed quarry will implement standard air and dust mitigation measures, including:

- Dust management measures on areas of exposed ground such as water of stockpiles and haul roads,
- Dust management measures in the processing area such as enclosures, extraction fans and water sprays, and
- Progressive rehabilitation to minimise the area of exposed ground at any one time.

A detailed Air Quality Impact Assessment (AQIA) will be carried out as part of the EIS in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA 2017).

The AQIA will likely assess the following:

- Review of background air quality data and identification of potential sensitive receptors,
- Compilation of air emissions inventory for the construction and operational phases of the development,
- Air dispersion modelling to quantify the potential air quality impacts of the project, including PM2.5, PM10, TSP and dust deposition, taking into account proposed mitigation measures,
- Assessment of potential cumulative impacts resulting from the projects and neighbouring developments if applicable,
- Proposed mitigation measures to minimize adverse impacts, if required, and
- Proposed air quality monitoring program to ensure compliance with the relevant air quality criteria and that there are no exceedances of the relevant criteria at the closest sensitive receptor locations.

6.1.3 Biodiversity

6.1.3.1 Project Consideration

Preliminary vegetation surveys undertaken to date identified 9 PCTs across the project area:

- PCT 3110 “Greater Sydney Enriched Grey Myrtle Dry Rainforest”,
- PCT 3244 “Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest”,
- PCT 3315 “Central Hunter Ironbark – Spotted Gum Forest”,
- PCT 3315 “Central Hunter Ironbark – Spotted Gum Forest (Regrowth)”,
- PCT 3444 “Lower Hunter Spotted Gum – Ironbark Forest”,
- PCT 3446 “Lower North Foothills Ironbark-Box-Gum Grassy Forest”,
- PCT 3446 “Lower North Foothills Ironbark-Box-Gum Grassy Forest (Regrowth)”,
- PCT 4023 “Coastal Valleys Swamp Oak Riparian Forest”, and

- PCT 4073 “Lower North Hinterland River Oak Forest”.

The majority of the quarry footprint will impact historically cleared land.

6.1.3.2 Proposed Assessment

The proposed development will exceed the BOS threshold for the clearing of native vegetation. Under the BC Act, where the BOS is triggered, a Biodiversity Development Assessment Report (BDAR) is required. A BDAR will therefore be prepared in accordance with NSW Biodiversity Assessment Method (BAM) (DPIE, 2020) under the *Biodiversity Conservation Act 2016* (NSW) (BC Act), with relevant vegetation and species-credit species surveys carried out to inform the BDAR.

The BDAR will assess the biodiversity values of the land to be impacted and the potential impacts of the proposed quarry on biodiversity values. The BDAR will also set out mitigation measures to be undertaken to avoid and minimise impacts on biodiversity. Following consideration of all these aspects, the residual unavoidable impacts of the project will be calculated in accordance with the BAM by utilising the Biodiversity Assessment Method Credit Calculator.

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

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

An assessment of matters of national environmental significance (MNES) will also be carried out to determine whether the project requires referral to the Commonwealth Minister for the Environment and Energy for a determination as to whether the proposed constitutes a controlled action which requires approval under the *Environment Protection and Biodiversity Conservation Act 1999.*

6.1.4 Noise & Vibration

The proposed quarry site is relatively isolated and located in a rural area. Activity in the receiving environment mostly consists of agricultural operations, with no industrial developments in the area. The closest road, Stanhope Road, is an arterial road with relatively low traffic levels which would not be considered a significant source of noise in the area.

Identified sensitive receptors in the area consist of rural residences and a commercial operation (refer to Section 2.3). The nearest sensitive receivers to the closet pit extraction area (Pit 2), excluding the haul road, are:

- A rural property and the Hunter Pet Motel commercial operation located on Lot 3 in DP1102521, approximately 1.2km and 1.3km south-east respectively, and
- A rural property located on Lot 7 DP1102521, approximately 1.7km south-east.

The nearest sensitive receivers to the site office, weighbridge and car parking area of the proposed quarry are located approximately 400m south on Lot 3 in DP1102521 and 600m south-east on Lot 7 DP1102521.

Noise generating activities associated with the proposed quarry will include:

- Blasting events,
- The use of earthmoving equipment for ripping, excavating and transporting rock,
- Fixed and mobile crushing equipment and mobile screening plant, and
- Additional heavy vehicle traffic on Stanhope Road and Elderslie Road to the west and south of the proposed site access.

Quarry operations will be restricted to the daytime period (7am – 6pm) according to the Noise Policy for Industry (NSW, 2017).

Blasting events will be infrequent, estimated to be required 12 times per year if maximum annual extraction levels are reached. Blasting will be undertaken between the hours of 9:00AM – 5:00PM Monday to Friday in accordance with the Australian and New Zealand Environment and Conservation Council (ANZECC) Guidelines *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990).

In addition to noise impacts, blasting events will have vibration and blast overpressure impacts which will have the potential to impact on neighbouring residences and infrastructure, if not managed properly. Blasting will be designed to avoid the potential for adverse impacts to residences and infrastructure.

6.1.4.1 Proposed Assessment

A detailed noise and blasting impact assessment will be carried out for the proposal to assess the noise, vibration and overpressure impacts resulting from the proposed quarry construction and operation activities (including haulage), in accordance with the following guidelines:

- *Noise Policy for Industry* (EPA, 2017),
- *Road Noise Policy* (EPA, 2011),
- *Interim Construction Noise Guideline* (DECC, 2009),
- *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (Australian and New Zealand Environment and Conservation Council ((ANZECC), 1990), and
- *Assessing Vibration: a technical guideline* (EPA, 2006).

The noise and blasting impact assessment will include:

- Identification of potentially sensitive receivers adjacent to the operation,
- Characterisation of the existing noise environment, identification of sensitive receivers and establishment of Project Noise Trigger Levels (PNTL) for the assessment of potential impacts,

- Analysis of prevailing meteorology to identify significant meteorological conditions that may influence noise propagation,
- Noise modelling to derive predicted noise levels associated with the development,
- Assessment of results including a comparison of noise predictions against noise criteria and recommendations for management of potential adverse or residual impacts, and
- Identification of appropriate blast management practices required to protect the local community and surrounding structures.

Any specific requirements established by the SEARS will also be addressed in the assessment. Assessment results and recommended mitigation measures used to inform the quarry design.

6.1.5 Surface Water

6.1.5.1 Project Consideration

Potential impacts on surface waters which may occur as a result of the quarry operation include:

- Pollution of surface waters through,
    - Increased turbidity of surface waters due to sediment loss and erosion from stockpiles, haul roads or other disturbed areas,
    - Impurities, incidental minerals or other leachates from the disturbed rocks and soil,
    - Stormwater runoff from plant and equipment areas, fuel storage areas, chemical spills and uncontrolled surface runoff, and
- Increased risk of erosion on slopes through increased flow rates.

6.1.5.2 Proposed assessment

A detailed Surface Water Impact Assessment (SWIA) will be prepared for the proposal.

The SWIA will include the following key elements:

- Description of catchments and watercourses within and surrounding the site,
- Determination of baseline water quality data in the quarry catchment,
- Preparation of a site water balance, and
- A water management plan (WMP), including control measures to manage surface water drainage in the quarry and prevent sediment laden run-off draining into adjacent drainage lines.

The EIS will also include hydrological modelling of surface water drainage following construction of the proposed quarry and an assessment of the project's potential impacts on surface water flows and quality. Potential impacts on the receiving environment, including surface water drainage, downstream water users and changes to the local flood regime will also be assessed. Preparation of the EIS will take into account any matters identified in the SEARs.

Project design will include mitigations measures to effectively manage the following, at a minimum:

- The potential impact of the proposal upon intersected drainage lines,
- Erosion and sediment control, including the design of drainage and sediment control systems in accordance with relevant guidelines,
- Dewatering of stormwater, if required,
- Appropriate storage and use of fuels, chemicals and potentially environmentally hazardous substances, and
- Refuelling and spill management procedures.

6.1.6 Groundwater

6.1.6.1 Project Consideration

Groundwater in the area has been described in **Section 2.6.2**.

However further groundwater information will be available upon conclusion of the groundwater monitoring, including hydraulic conductivity, which is unknown at the time of this assessment.

In the absence of mitigation measures, potential impacts of the proposal upon groundwater resources may include:

- Adverse impacts to groundwater quality from infiltration of contaminated or sediment-laden run-off,
- Changes to groundwater flow patterns and groundwater levels as a result of quarrying and seepage of groundwater into the quarry pit, if excavations intercept the water table, and
- Impacts to surface water connectivity and GDEs resulting from inflows of groundwater into the pit changes to groundwater quality and flow.

6.1.6.2 Proposed Assessment

A specialist consultant will be engaged to prepare a Groundwater Impact Assessment as part of the EIS. The assessment will include:

- Review of the requirement to develop and implement field monitoring to obtain relevant hydrogeological data, including the possible installation of a monitoring network,
- Assessment of groundwater data to assess potential impacts on groundwater sources (quantity and quality),
- Review of the requirement to develop tools to quantify groundwater take and predict potential impacts (i.e. numerical groundwater model), and
- Assessment of potential impacts on aquifers and groundwater users.

The results of the groundwater assessment will be integrated into the site water balance for the project. The proposed quarry will adopt best practice management, and the groundwater

impact assessment will set out suitable environmental management and mitigation measures to ensure the potential for impact on groundwater resources is negligible.

The project will also be assessed against the rules of the relevant Water Sharing Plan(s), and Water Access Licence requirements will be identified (if any).

6.1.7 Aboriginal Heritage

6.1.7.1 Project Consideration

The Subject Land is located in lands within the Wanaruah Local Aboriginal Land Council (LALC) area.

A search of the NSW Government Aboriginal Heritage Information System (AHIMS) system was conducted for Lots 4 & 5 DP 1102521, Lot 65 DP 752473, Lot 903 and 904 in DP1061259 using a 50 m buffer. One (1) Aboriginal artefact was recorded within Lot 4 in DP1102521, and one (1) Aboriginal artefact was recorded in Lot 5 in DP1102521. Copies of the AHIMS search results are included in **Appendix D**.

There are no caves or rock overhangs present within the quarry area. The proposed quarry is located within 50 m of water (intersecting several ephemeral drainage lines), with the proposed pit intersecting ridgelines which have been historically cleared for agricultural clearing.

While historical clearing of the site reduces the potential for intact artefacts and modified trees to remain on-site, the presence of two (2) artefacts recorded across Lots 4 & 5 in DP1102521 suggests that the proposal may impact a sensitive landscape, with additional artefacts potentially present within the subject site. Further assessment of the proposal's potential impacts on Aboriginal Heritage will be required and undertaken as part of the EIS.

6.1.7.2 Proposed Assessment

Given the landscape of the locality and the potential for artefacts to be present**,** it is proposed to prepare an Aboriginal Cultural Heritage Assessment Report (ACHAR) for the proposed activity to assess potential impacts to Aboriginal Cultural Heritage during the construction and operation of the proposed quarry. The ACHAR will be prepared by a qualified archaeologist, in consultation with the local Aboriginal community. The presence (or otherwise) of any Aboriginal sites/places within the development site will be verified in the field using standard survey methods, and the impact assessment will set out suitable management and mitigation measures.

It is noted that an Aboriginal heritage impact permit (AHIP) under section 90 of the *National Parks and Wildlife Act 1974* is not required for the disturbance of aboriginal sites or objects.

6.1.8 Social Impacts

The EIS will include preparation of a detailed Social Impact Assessment (SIA) in accordance with the *Social Impact Assessment Guideline for State Significant Projects* (DPIE, 2023).

The SIA will identify any issues or potential impacts that need to be considered in the design and implementation of the Project. The SIA will include consideration of potential impacts of the Project on the community. The issues considered in the assessment will include:

- Environmental impacts on neighbouring communities (e.g. dust, noise, traffic, visual amenity, rehabilitation and final land use),
- Ongoing sustainability and viability of neighbouring communities,
- Impacts on the sense of community,
- Impacts on community infrastructure and services, and
- Impacts on other businesses and key industry sectors.

The SIA will consider the potential for the project to contribute to the local, regional and State economies through capital expenditure and employment.

6.1.9 Economics

6.1.9.1 Project Consideration

Economic impacts of the quarry are anticipated to be overwhelmingly positive, with minimal adverse economic impacts.

Beneficial impacts are anticipated to include:

- Economic growth through increased gross regional / state product during all phases of the quarry from construction to rehabilitation,
- Creation of direct and indirect employment opportunities, including long-term employment for up to 10 employees and further employment for contractors engaged throughout the lifetime of the quarry,
- Support for upstream supply chain businesses through direct and flow-on activity,
- Support for downstream customers, improving the security of supply to meet demand in the locality as well as in the Hunter Valley and Sydney Metropolitan areas, and
- Government revenue through a range of taxes and duties.

6.1.9.2 Proposed Assessment

Specialist consultants will be commissioned to prepare an economic impact assessment for the proposal in line with NSW and Australian Government guidelines.

This will include a cost benefit analysis (CBA) examining the net or incremental impacts (benefits and costs) of the project compared to a 'base case' scenario of what would be expected to occur without the quarry, as well as an assessment of the direct and indirect economic impacts of the proposal on economic activity at the local and regional scale.

A Capital Investment Value (CIV) report will also be prepared for the proposal, including all relevant costs necessary to establish and operate the project, including the design and construction of buildings, structures, associated infrastructure and fixed or mobile plant and equipment.

6.1.10 Topography / Rehabilitation

6.1.10.1 Project Consideration

There is a potential that geological instability may be induced on the quarry site as part of quarry operations (such as through exposure of weak/erodible surfaces or creation of unstable quarry walls with steep slopes). This may lead to the occurrence of geological hazards on site (such as rock fall, land movements or failure of the quarry face).

6.1.10.2 Proposed Assessment

The EIS will include an assessment of the potential impacts upon surface hydrology resulting from the modification of the local topography, including the implementation of control measures to manage surface water drainage throughout the development footprint and prevent sediment laden run-off draining into the creeks.

The EIS will further need to consider the potential for land instability and the implementation of suitable batters for the safety of site personnel during quarrying works. During the operational stage, a geotechnical engineer will be required to inspect the likely rock to be exposed and suitability of the proposed bench / batter profile prior to the establishment of the benches.

The geological stability of the final landform, following the implementation of rehabilitation measures, will also need to be considered.

Specialist consultants will be engaged to prepare a rehabilitation strategy for the proposal, based on the findings of various technical studies.

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

The rehabilitation strategy will summarise the objectives and revegetation methodology and monitoring required to successfully implement it, as well as the inclusion of performance and completion criteria for the disturbed land throughout the project area.

The mitigation and management measures provided throughout the Rehabilitation Strategy will inform the development of a full Rehabilitation Management Plan which would be developed post-approval.

6.1.11 Health & Safety

6.1.11.1 Project consideration

Construction and operation of the proposed quarry will present risks to workers and contractors and with the potential to result in injury or fatality if workers are ill informed of the hazards involved, or risks associated with plant and machinery are not managed.

Examples of potential activities that may result in an injury and / or fatality at the quarry include but are not limited to crush injuries by moving plant, equipment and heavy vehicles,

exposure to hazardous materials and airborne particles, exposure to loud noise and flyrock/falling rock during blasting and quarrying activities and working from heights or close to the edge of quarry benches and site batters.

Product haulage along public roads will also increase heavy vehicle traffic with associated increased road safety concerns.

Unauthorised access to the site by members of the public may also expose members of the public to the same risks encountered by site personnel.

6.1.11.2 Proposed Assessment

The health and safety of onsite personnel, contractors and visitors will be protected by implementing a comprehensive Mine Safety Management System and ensuring that all persons on site are aware of, and comply with, the requirements of the Management System.

A work Health and Safety Management Plan will also be prepared prior to the commencement of construction. Controls listed under the Plan will be included as part of a site induction.

All staff, sub-contractors and visitors to the site are appropriately inducted and made aware of hazards and emergency hazard procedures. A daily toolbox talk will also be undertaken onsite during the quarry construction and operation.

The quarry will also be required to comply with *NSW Work Health and Safety (Mines) Regulation 2014*, and will require personal monitoring of respirable dust, inhalable dust and crystalline silica to be carried out, with monitoring results assessed against *NSW Work Health and Safety (Mines) Regulation 2014 exposure standards*. It is noted that initial testing of quarry materials onsite indicates very low levels of silica.

A detailed social impact assessment will be prepared, including consideration of public health and safety and recommendation of any mitigation measures deemed to be required. An AQIA will be carried out for the proposal and will determine whether dust monitoring is required at the closest sensitive receptors.

6.2 MATTERS REQUIRING STANDARD ASSESSMENT

6.2.1 Land Resources and Land Use

6.2.1.1 Project Consideration

The Subject Land is located within a rural environment, comprising a combination of vegetated hills and ridgelines intersected by drainage lines and valleys which are cleared to varying degrees. Surrounding land uses have been described in **Section 2.3**.

The proposal site is located on hilly terrain which supports vegetation and as such the agricultural value of the land is relatively low.

The southernmost section of the proposed development area, which will support the site office, weighbridge, small stockpile area and part of the access road, is mapped as BSAL on

the NSW's central resource for Sharing and Enabling Data (SEED data portal), as shown in **Figure 5**.

No other land mapped as strategic agricultural land or Critical Industry Cluster Land (Equine or Viticulture) has been identified within the subject area.

The site has a mapped Land Capability Classes 3 (on relatively flat ground), 6 on gentler slopes and 7 on steeper ground and hilltops at present. Land will need to be rehabilitated to a similar or better land capability class.

Soils onsite are relatively shallow (typically less than 1 metre in depth) and are comprised of clay soils underpinned to rock.

The primary risk to soils as a result of the proposed quarry activity is that of soil erosion in particular during the soil stripping phase and the on-going presence of site features such as stockpiles, earthen bunds and on-going site activities.

6.2.1.2 Proposed Assessment

The EIS will include assessment of the social impact of the proposed SSD and potential for impact on the land uses in the surrounding properties. The final design of the proposed quarry will need to address potential social and land use impacts while minimising any potential environmental impact identified during the preparation of the EIS. It is not expected that the proposed SSD will result in substantial change to surrounding land use.

Soil management will also need to be considered throughout the EIS, with specific consideration of erosion potential, land stability and potential limitations to rehabilitation to a similar land capability class. The Surface Water Impacts Assessment (as described in **Section 6.1.5.2**) prepared for the quarry will include an assessment of in-situ soils and prescribe mitigation, control and maintenance measures to minimise soil degradation and erosion and to ensure that overburden is appropriately managed and conserved for re-use in site rehabilitation activities.

6.2.2 Visual Amenity

The site is relatively isolated with most of the quarry footprint having historically been cleared and disturbed for agricultural grazing.

The Subject Land mostly extends over the western foothills of the Tangory Mountain and generally comprised of gently undulating land with several NW - SE striking ridgelines and saddles with peak elevations of up to 220 mAHD. Steeper slopes exists on the western face of the ridgelines, with grades of up to 60°. Shallower slopes exist along eastern faces (20 - 30°).

Elevations within the Subject Land range from approximately 90 m Australian Height Datum (AHD) in the stockpile and workshop area to 220 m AHD at the highest point of Pit 3.

Land use in the area is dominated by areas of remnant vegetation on steeper terrain and ridges, with gentler sloping ground in valleys cleared for agricultural grazing. Rural properties and homesteads are present mostly to the south of the proposed quarry site along the Stanhope and Elderslie roads.

The nearest sensitive receivers to the closet pit extraction area (Pit 2), excluding the haul road, are:

- A rural property and the Hunter Pet Motel commercial operation located on Lot 3 in DP1102521, approximately 1.2km and 1.3km south-east respectively, and
- A rural property located on Lot 7 DP1102521, approximately 1.7km south-east.

Filtered views of the second stage pit may be possible from these properties and from the Blind Creek Road, a Crown Road, but these are unlikely to be significant.

The site entrance will support a weighbridge, site office and car parking area which will be visible from neighbouring residences approximately 400m south on Lot 3 in DP1102521 and 600m south-east on Lot 7 DP1102521.

Current evaluation of the quarry in a visual context, suggests that the quarry pit and processing areas will not be visible from any public roads (except Springvale Road), based on the topography and remoteness of the site, existing vegetation and available separation distances.

6.2.2.1 Proposed Assessment

The proposal's visual impact will be assessed as part of the EIS in order to manage visual impacts during and following the proposed activity. Planning the design of the quarry will also incorporate potential final landforms and associated rehabilitation. The visual impact assessment will address the following key aspects:

- Development of a detailed landscape character and visual assessment to assess the significance of change, visual sensitivity of the surrounding area and inform project consultation and design,
- Development of suitable photomontages from various locations including public lands and dwellings to support the visual assessment and inform community engagement,
- Establishing the landscape and visual baseline to identify representative viewpoints for further assessment, and
- Development of suitable landscaping and visual mitigation considerations to minimise the effect of the proposed development on the surrounding land use.

6.2.3 Hazards

6.2.3.1 Bushfire

Project Consideration

The Site is wholly located on land identified as Category 1 and 3 bush fire prone land under the Singleton Council bush fire prone land map, viewed using the NSW Planning Portal Spatial viewer. The Singleton LGA has a Fire Danger Index (FDI) of 100.

The Subject Land consists of several forest slopes that form part of a larger vegetated corridor that extends north-east towards Tangory Mountain and north-west towards Brook Hill, with cleared areas supporting grassland and open woodland on gentler slopes and flatter areas. The combination of undulating topography and a mosaic of vegetation types results in a region where the practical implementation of adequate bushfire protection measures is essential for reducing both the ignition risk and the susceptibility of a development to bushfire.

Proposed Assessment

Fire protection objectives considered with regards to the development site are outlined in the Rural Fire Service (RFS) guideline "Planning for Bush Fire Protection" (PBP) (RFS 2019).

The proposal would be classed as 'mining (underground and open cut) and petroleum production' per the industrial facility categories set out in the PBP.

The PBP states that in order for an industrial development to comply with the PBP, it must:

- Satisfy the aims and objectives outlined in Chapter 1 of the PBP,
- Consider any issues listed for the specific purpose, and
- Propose an appropriate combination of Bushfire Protection Measures (BPM).

The design and construction of the proposed quarry will be planned in conjunction with RFS guidelines and will address the matters listed above. A bushfire emergency and evacuation plan will also be prepared for the quarry. Additionally, the EIS will consider any additional requirements received in the SEARs.

6.2.3.2 Hazardous and Offensive Development

Project Consideration

The proposal will involve the use of diesel fuel and small amounts of hydrocarbons including lubricating oils and greases. No other hazardous substances or dangerous goods would be used or stored onsite, and the proposal is thus considered unlikely to constitute a potentially hazardous and offensive development.

Proposed Assessment

The EIS will include a preliminary risk screening of the proposal carried out in accordance with guidelines contained in Applying SEPP 33 (Department of Planning, 2011).

The preliminary screening will include:

- A review of the type, quantity and storage location of each dangerous good and hazardous material to be utilised or stored on site against applicable thresholds presented in Applying SEPP 33, and
- Consideration of potential transportation hazards and risks through comparison of the type, quantity and frequency of dangerous goods and hazardous materials to be transported against the application thresholds.

6.2.4 Atmospheric & Greenhouse Gas Emissions

6.2.4.1 Project Consideration

The project will generate greenhouse gas and atmospheric emissions through electricity consumption, the use of diesel-powered mobile equipment and fuel consumed in the transport of quarry products.

6.2.4.2 Proposed Assessment

A greenhouse gas and energy assessment (GHGEA) will be prepared for the proposal using nationally accepted principles developed by the National Greenhouse and Energy Reporting (NGER) scheme, established by the National Greenhouse and Energy Reporting Act 2007 (NGER Act).

6.2.5 Biosecurity

6.2.5.1 Project Consideration

Several weeds were identified onsite during preliminary vegetation surveys. In particular, African Olive (*Olea europaea* subsp. *cuspidata*), a species listed as a Priority Weed in the *Hunter Regional Strategic Weed Management Plan 2017-2022* (Local Land Services, 2017) is widespread across sections of the site.

The primary biosecurity risk associated with the proposed quarry relates to the introduction of new weeds into the site and the propagation of existing weeds from the site footprint into surrounding areas. The principal activities which would increase biosecurity risk consist of stockpiling or transportation of contaminants on vehicles, people, equipment or materials onto and off the Quarry site.

6.2.5.2 Proposed Assessment

The quarry operator will have a General Biosecurity Duty to remove weed species on-site and, once the areas of quarry material extraction are complete, to remediate the site.

A list of weed control measures will be proposed in the EIS. These measures will be incorporated in the construction environmental management plan (CEMP) and operation environmental management plan (OEMP) to control terrestrial and aquatic weeds within the disturbance area as much as practical and limit their spread.

6.2.6 Public Infrastructure

The proposed development will not contain any public infrastructure. There will be an increase in heavy vehicle movements associated with the dispatch of processed materials. Light vehicle movements will also be generated by employees, contractors and other visitors to the Quarry. The increase in heavy and light vehicle movements has the potential to change traffic conditions and contribute to road degradation.

6.2.6.1 Proposed Assessment

Specific engagement is proposed with TfNSW and Singleton Council. Cumulative impacts will be considered within the traffic impact assessment.

6.2.7 Public Land / Conservation Areas

6.2.7.1 Project Consideration

The proposal is located in the vicinity of the Tangory Nature Reserve. The reserve covers an area of 503.64 ha and supports a sanctuary for over 100 fauna species. It was gazetted on

4/11/2022 and it forms part of the off-site environmental lands offset strategy for the Huntlee New Town Development.

The Nature Reserve borders the eastern boundary of the subject property. The proposed development incorporates a minimum 50m buffer from the boundary of the Nature Reserve. The vegetation on ridges within the subject site is part of a greater area of vegetation and habitat associated with the range, ridges and creekline areas that occur within the Tangory Nature Reserve.

Due to the available separation distance, no direct impacts to the Tangory Nature Reserve are predicted to occur from the proposal. Potential indirect impacts on the Tangoory Nature Reserve include:

- Increased bushfire risk from the development. Potential ignition sources include oils, hydraulics, and electronics. Electrical fires can also result from shorts in equipment or surges due to lightning strikes,
- Adverse indirect impacts on flora and fauna (including GDEs) through increased dust deposition, noise disturbance, increased biosecurity threats, and impacts to water quality,
- Restricted wildlife movements resulting from vegetation modification, clearing and disturbance in the vicinity of the reserve, including the clearing of potential wildlife/biodiversity corridors, and
- Visual impacts.

No other public land is considered likely to be impacted by the construction and operation of the proposed quarry.

6.2.7.2 Proposed Assessment

The extent and severity of the proposed quarry's potential impacts on the Tangory Nature Reserve will be analysed in the relevant assessments and specialist reports prepared for the EIS, including a bushfire risk assessment, visual impact assessment, SIA, BDAR, SWIA and AQIA. A summary of the potential impacts on the Tangory Nature Reserve will be provided in the EIS. No additional surveys are considered necessary to inform the proposal's potential impacts on the reserve at this stage.

6.2.8 Waste

6.2.8.1 Project Consideration

The proposal will generate small quantities of waste, mainly consisting of:

- General solid waste, mainly from staff lunches and waste associated with the office,
- Waste oils and greases,
- Batteries, tyres and scrap metal, and
- Wastewater.

It is expected that a portaloo will be utilised during construction only. Waste will be pumped out and transported offsite by a contractor. During operations, sewerage from permanent on-

site amenities will be disposed of via an onsite wastewater management system. A Section 68 approval under the *Local Government Act 1993* will need to be obtained prior to installation. This will be a separate process to the development application.

Waste management practices will be guided by the requirements of the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) and the POEO Act. The WARR Act aims to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development, along with effectively managing resources and waste generation. The WARR Act, waste follows a hierarchy in order from most preferable to least preferable waste options:

- Avoid and reduce waste,
- Reuse waste,
- Recycle waste,
- Recover energy,
- Treat waste, and
- Dispose of waste.

Waste collection will be arranged at regular intervals to ensure no adverse impacts on the environment and community (such as overfilling of receptacles and subsequent littering, odour, pests or other disturbances).

6.2.8.2 Proposed Assessment

A review of the nature and quantity of waste generated by the project will be undertaken, and waste controls, safeguards and contingency measures will be proposed to effectively manage the following:

- Waste classification and disposal,
- Waste handling and management,
- Waste transport, and
- Waste tracking, where required in accordance with Part 4 of the *Protection of the Environment (Waste) Regulation 2014.*

6.3 MATTERS REQUIRING NO FURTHER ASSESSMENT

6.3.1 Parking

There will be sufficient space on site for parking on an as required basis. No formal parking arrangements are considered necessary.

6.3.2 Rail & Airport Facilities

The proposal will not impact upon rail facilities in the region. The haul route traverses the main northern railway line along the New England Highway north of the Hunter Expressway intersection, however there is an overpass at this location, thus no adverse impacts are predicted.

The proposed quarry site is within 3 km of Elderslie Airport at its closest point. The airport is not commercial, being used for recreational purposes. Consultation with CASA is not required as the airport does not have an air traffic control tower. The proposal is not considered to have adverse impacts on the airport, given the nature of the development and the available separation distance.

6.3.3 Odour

The proposal does not entail any significant odour generating activities. No materials to be handled or stored on-site are considered to be offensive or potentially offensive in terms of odour. No further assessment is required.

6.3.4 Livelihood

The proposal will have minor beneficial impacts to the livelihood of people in the locality. Quarry operations are expected to require both permanent and part-time staff during periods of high demand. Contractors will also be employed for some aspects of quarry operations, including haulage.

The quarry footprint is sufficiently isolated to avoid adverse impacts to existing uses of neighbouring properties or affect the livelihood gained from those properties. It is noted however that social impacts and land use impacts of the proposed quarry will be considered in detail during the preparation of the EIS.

6.3.5 Natural Resource Use

The quarry will utilise available natural resources in a sustainable fashion to support local and regional infrastructure projects, such as the upgrade of roads.

Quarry operations will involve the use of diesel fuel for the operation of trucks and diesel generators. Equipment should be switched off when not in use to minimise noise and fuel usage. The establishment of site infrastructure (site office, weighbridge) will also involve the use of a small amount of construction materials such as steel, wood and concrete. These materials are not considered to be in short supply. It is noted that material sourcing for use in the project should aim to use the nearest legally available material to reduce associated fuel use.

6.3.6 Historic Cultural and Natural Heritage Values

In order to establish whether any historic cultural or natural heritage items have been previously recorded on or within close proximity to the Subject Land, searches were undertaken of statutory and non-statutory heritage registers and schedules including the State Heritage Inventory, *Environment Protection and Biodiversity Conservation Act 1999* (National Heritage List, Commonwealth Heritage List), Australian Heritage Database (Department of the Environment) and *Singleton Local Environmental Plan 2013* (LEP).

No natural heritage items are listed in the vicinity of the subject site, such that no constraints are identified in this regard.

The nearest listed general heritage item to the subject site is Johnsons Cottage, listed within the Singleton LEP (Listing No. I140, Gazettal date 09/06/2013). This is located south of the

Stanhope Road and 3.5km south of the site entrance. Given the available separation distance, no adverse impacts are predicted.

The proposed haul route spans the Elderslie Bridge, a heritage item of local significance listed under the Singleton LEP. Listing No I14, gazetted on the 09/06/2013. Heavy vehicle traffic generated by the proposed quarry is unlikely to have an adverse impact on the bridge, and no further assessment is considered to be required.

6.3.7 Hazards

6.3.7.1 Flooding

The site is above the 1% AEP flood height as a result of local topography and the proposal is not within a mapped flood-prone area (Singleton Shire Council mapping and NSW Planning Spatial Viewer).

Part of the haul road (stanhope Road north of Elderslie Bridge) is subject to flooding. Haulage of quarry products would cease while roads are closed however the proposal will not have an impact on movements of floodwater within the area.

The proposal's impact on hydrological flows, including flooding, downstream of the proposal site will be assessed as part of the Soil and Water Impact Assessment.

6.3.7.2 Land Contamination

Other than historical logging and recent grazing and the formation of dirt tracks throughout the subject site and the remainder of the property, the site has not been subject to disturbance or development. The potential for contamination is therefore relatively low. The site is not identified as being contaminated on the NSW contaminated land register. No visual evidence of contamination is present on site.

In the absence of any historical potentially contaminating land uses, no further site investigation is considered warranted. The site is considered suitable for use as a quarry from a contamination perspective.

6.3.7.3 Soil Chemistry

The subject site is not mapped as being at risk of containing deposits of Acid Sulphate Soils (ASS) or salinity. No evidence of ASS or salinity was noted during site inspections.

Soils have been described in **Section 2.5** and soil erosion and sediment control measures will be incorporated into the proposal. Soil chemistry is not considered to pose an issue in the effective management of soils onsite.

6.4 CUMULATIVE IMPACTS

A preliminary review of the Major Projects Planning Portal and the NSW Planning Portal did not identify any proposed projects of a similar nature to the proposed quarry within the study area (i.e. within 5-kilometres of the subject site. Similarly, no proposed projects were identified which may have the potential to generate significant levels of heavy-vehicle traffic along the haul route between the site entrance and the New England Highway.

A detailed review of the locality will be carried out to identify any potential future projects which may result in cumulative impacts in combination with the proposed quarry. If identified, cumulative impacts of the proposal will be assessed in line with the Cumulative Impact Assessment Guidelines for State Significant Projects (Department of Planning & Environment (DPE), 2022). The assessment would focus on emissions (noise/blasting; air quality; surface water) and traffic impacts, that in combination may have the potential to adversely affect the existing amenity of surrounding landowners, residents and road users.

7. CONCLUSION

This Scoping Report has been prepared to support a request for the Secretary's Environmental Assessment Requirements (SEARs) for a proposed 1,000,000tpa hard rock quarry located on Lot 5 Springvale Road, Elderslie, and Blind Creek Road, Glendon Brook, NSW.

Pursuant to Schedule 1, Clause 7 of the *State Environmental Planning Policy (Planning Systems) 2021*, a development that extracts from a total resource of more than 5 million tonnes is classified as State Significant Development (SSD) and requires the preparation of an EIS, prepared in accordance with the *Environmental Planning and Assessment Regulation 2021* (EP&A Regs). The proposed quarry, under current design plans, is expected to extract approximately 30 million tonnes (mt) over the project lifetime, and therefore constitutes SSD.

Under Schedule 2, Part 3 of the EP&A Regs, an EIS must be prepared in accordance with SEARs as issued by the Planning Secretary. The application must include particulars of the location, nature and scale of the development or activity. This scoping report has been prepared to provide the relevant project information to support an application for SEARs.

This report has been prepared having regard to the "*State significant development guidelines – preparing a scoping report*", and provides the following items for the department's consideration:

- A review of the subject site and surrounding locality
- A description of the proposal
- A review of the relevant statutory context relevant to the proposed development
- A preliminary assessment of the key issues relevant to the development
- An outline of proposed consultation intended to be undertaken for the preparation of the application

Accordingly, it is requested that the department issue project specific SEARs to guide the preparation of the environmental impact statement for the proposed development.

APPENDIX A – PRELIMINARY RESOURCE FEASIBILITY ASSESSMENT

Pittman Building Pty Ltd

Preliminary Resource Feasibility Assessment:
Lots 903 and 904 in DP 1061259, Lot 5 in DP 1102521 and Lot 65 in DP 752473, Elderslie, NSW

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P1706007JR01V02
February 2018

martens consulting engineers

ENVIRONMENTAL

WATER

WASTEWATER

GEOTECHNICAL

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PROJECT MANAGEMENT


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Document and Distribution Status

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Revision No.	Description	Status	Release Date	Document Location: File Copy	Document Location: Pittman Building P/L	Document Location	Document Location
1	Preliminary Resource Feasibility Assessment	Draft	16.02.18	1E, 1P, 1H	1P		
2	Preliminary Resource Feasibility Assessment	Draft	28.02.18	1E, 1P, 1H	1P		

Distribution Types: F = Fax, H = hard copy, P = PDF document, E = Other electronic format. Digits indicate number of document copies.

All enquiries regarding this project are to be directed to the Project Manager.

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1 Introduction

1.1 Background

This report documents the findings of a preliminary resource feasibility assessment undertaken by Martens and Associates (MA) at Lots 903 and 904 in DP 1061259, Lot 5 in DP 1102521 and Lot 65 in DP 752473 (the site). The assessment was commissioned by the Client, Pittman Building Pty Ltd, as a component of feasibility investigations associated with a potential hard rock quarry. The site is identified in Figure 1, Attachment A.

1.2 Proposed Development

From our discussions with the client, the proposed development shall involve the extraction of hard rock and construction of an associated processing plant. Dependent upon feasibility assessment results and relevant development consents, potential future operations may involve the extraction of rock up to 40 m from natural waterways and creeks.

1.3 Assessment Objectives

Objectives of this assessment include:

1. Assess preliminary volume and quality of hard rock deposits at the site and suitability for use as construction products.
2. Assess likely groundwater levels and potential implications on quarry development.
3. Provide preliminary comment associated with potential hard rock quarry markets (concrete aggregate, asphalt, rip rap, road base and rail ballast).
4. Highlight key issues impacting the current resource feasibility assessment.
5. Outline recommendations for additional assessments.

1.4 Summary of Works Undertaken

Works were devised to recover subsurface rock samples for laboratory testing, to satisfy the assessment objectives, and to monitor groundwater levels to determine future excavation limitations. A summary of works undertaken is presented below, with greater detail presented in Section 2 and Section 3:

- Site inspection and surface mapping.

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- Topographic and surface mapping lineament analysis.
- Drilling of four boreholes with a 4WD truck-mounted drill rig, carried out by rock hammering to inferred top of rock followed by HQ rock coring.
- Installation of three groundwater monitoring wells and data loggers for long term groundwater level monitoring.
- Collected rock samples were tested for:
    A. Petrographic analysis
    B. Wet / dry strength variation (T215)
    C. Acid soluble sulfate content (T219)
    D. Particle shape distribution (T106)
    E. Particle shape by proportional calliper (T213)
    F. Fractured faces of coarse aggregate (T239)
    G. Remaining rock samples have been stored for future reference

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2 Site Description

A summary of general site details is provided in Table 1.

Table 1: Summary of site details.

Item	Details
Property address	The property is located in proximity to Blind Creek Road, Elderslie, NSW and consists of the following Lots: o Lots 903 and 904 in DP 1061259 o Lot 65 in DP 752473 o Lot 5 in DP 1102521
Site area	Approximately 90 ha (based on SIX Maps).
Investigation Area	Initial investigation included an overview of the client's property (90 ha), however preliminary resource drilling was focused along a NW – SE trending ridgeline through the central portion of the site.
LGA	Singleton Shire Council
Previous assessment	MA understands that no prior resource investigation has been undertaken on the site.
Proposed Land Use	Hard rock quarry extraction and processing.
Current Land Use	Agricultural, primarily cattle grazing. Scattered dams exist across the site.
Surrounding land uses	Surrounding land use is predominately agricultural, with National Park land to the east.
Typical slopes, aspect, elevation	Undulating with several NW – SE striking ridgelines and saddles with peak elevations of ~220 mAHD. Steeper slopes exists on the western face of the ridgelines, with grades of ~60°. Shallower slopes exist along eastern faces (~ 20° - 30°). The southern portion of the site is at ~ 70 mAHD with gentler slopes (~ 10° - 30°) towards the east.
Vegetation	The site is covered predominately in dense bush. Some areas were cleared for cattle grazing, firebreaks and vehicle access paths.

2.1 Geological Setting and History

The site is located within the southern part of the New England Fold Belt (NEFB). Figure 2, Attachment A, adapted from Birgenheir et al., (2009) depicts the site's location in general reference to the regional NEFB geological profiles. The NEFB extends approximately 1,500 km from northern Queensland to NSW, where it is bordered to the south and south west by the Sydney Basin. The southern province of the NEFB has undergone significant deformation since its deposition during the Late Devonian – Carboniferous (~330-350 Ma) Eras. The dominant geological features are a series of oroclines (sharp bends) (Rosenbaum et al, 2012). Within the southern portion of these oroclines exists the Tamworth Belt that was formed as part of an accretionary wedge and forearc basin.

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The Tamworth Belt is characterized by arc related basin fill that has been folded into a series of elongated, typically dome like features of double-plunging anticlines and synclines (Korsch, 1977). The Tamworth belt has subsequently been split into numerous terranes defined by major faults: Emu Creek, Rouchel, Gresford, Myall and Hastings Blocks (Roberts et al, 1991). The site is situated within the south western portion of the allochronous Gresford Block, in close proximity to the Hunter – Mookie thrust fault that resulted in major east - west compression and shortening of the region.

The Singleton 1:250 000 Geological Map (Rasmus et al, 1969) lists the investigation area to contain:

- Conglomerate acid tuffs and lithic red siltstones of the Wallaringa Formation.
- Intermediate to acid crystal and vitric tuff and lavas, conglomerate *(agglomerate)* and sandstone of the Gilmore Volcanics Group.
- Conglomerate, lithic sandstone, shale and occasional thin coal of the Mt Johnstone Formation.

The target geological profile for the potential hard rock quarry is the intermediate to acid crystal and vitric tuff and lavas of the Gilmore Volcanic Group (refer to Figure 5 and Figure 6, Attachment A).

2.2 Site Mapping

2.2.1 Walkover

Results from site mapping undertaken on 19 September 2017 are summarised below:

- Two visually distinguishable units (agglomerate and tuff) were observed across the site with a conforming relationship.
- Rock outcrops were scattered, generally limited to topographic saddles, with minor exposures along peaks and crests. Rock 'floaters' in a soil matrix were abundant along slopes.
- Distinctly weathered and faulted agglomerate was exposed by an access road cutting into the mid – upper slopes in Lots 903 and 904 DP 1061259. Exposed thickness were typically up to 1.5 m, overlain with approximately 1.0 m of soil.
- Conforming contact between agglomerate and tuff was encountered in Lot 5 DP 1102521 along an inferred west – south west / east – north east direction.

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- Measurable geological rock structures were limited due to lack of large outcrops. However, measured rock joints and fault orientations suggest 3 possible geological deformations impacting site geology (Table 2).

2.2.2 Mapping Interpretation

Field mapping identified 3 prevalent geological deformation events and associated faulting and jointing across the site as described in Table 2.

Table 2: Mapped geological deformation events, associated structures and interpretation.

Deformation Event [1]	Regional Direction	Mapped Strike (°) of Structures [2]	Measured Dip(s) (°) of Structures [2]	Field Description
D1	E – W compression (thrusting)	340 310 330 330	78 (W) 60 (SW) 60 (SW) 20 (NE)	Splayed steep faulting and jointing dipping to the west – south west and shallow jointing dipping to the north east, propagating from thrusting of Tamworth Belt during the Hunter – Mookie reverse thrust event. Where measurable, spacing between joints in order of 15 cm to 50 cm.
D2	N – S expansion	072 100 088	41 (S) [3] N/A 48 (S) [3]	Large fault zones cross cutting north – south trending geology.
Late Stage	NW – SE expansion	030	12 (SE)	Pervasive cross cutting joints with spacing between 15 cm to 20 cm.

Notes:

[1] Preliminary deformation event name, nomenclature may not be comparable to works outside of this study.
[2] Refer to Figure 5, Attachment A for mapped locations.
[3] Low confidence value from lack of repeatable measureable structures in outcrop.

Results from the field mapping investigations were combined with topographic maps into a preliminary lineament analysis to generate a site specific geological map and model to aid subsurface investigations (Figure 5, Attachment A).

Key assumptions, based on available data, to generate Figure 5 include:

- Inferred geological boundary positions between Wallaringa Formation, Gilmore Volcanic Group and Mt Johnson / Peterson Volcanics and Seaham Formation.
- Agglomerate encountered up to 130 mAHD elevation in the western portion (Wallaringa Formation) and up to 90 mAHD elevation in the southern portion of site (Gilmore Volcanic Group).
- Potential transition from tuff to agglomerate between 130 mAHD and 90 mAHD, within the Gilmore Volcanic Group.

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- Average dip of 66° used for geological formation contacts based on field mapping of rock defects thought to be associated with D1 compressional event.

- The thickness listed above do not take into account potential variation due to faulting and thrusting.

2.3 Intrusive Field Investigation

Scope of subsurface investigation works included:

- Drilling of four boreholes, BH101 to BH104 to characterise subsurface conditions along the northwest trending ridgeline. Details of encountered subsurface conditions are provided on borehole logs, Attachment B.

- Installation of 3 monitoring wells in BH102 (MW01), BH103 (MW02) and BH104 (MW03) for groundwater level monitoring. Details of monitoring well construction are provided in Attachment B.

- Installation of water level and barometric pressure loggers in monitoring wells for continuous groundwater monitoring.

- Laboratory testing of 5 rock core samples to assess suitability for use as concrete aggregate, asphalt aggregate, rip rap, road base and/or rail ballast.

Drilling investigations were undertaken between 9 and 29 October 2017, Intrusive investigation locations are shown in Figure 5, Attachment A.

2.4 Intrusive Field Investigation Constraints

Boreholes encountered very high strength rock that typically resulted in slow drilling rates (3.5 m to 15 m per day). An initial field investigation scope was amended to accommodate this slower than anticipated drilling rate, e.g borehole termination depths were revised to approximate neighbouring creek and creek tributary elevations. All boreholes were terminated in the prospective resource unit (Gilmore Volcanic Group).

In addition to the above amendment, the drilling scope was limited to only test areas that were identified as prospective units from field mapping observations, and were suitably accessible for drilling operations.

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3 Field Investigation Findings

3.1 Subsurface Materials

Site observations and intrusive investigations identified three general subsurface units as described below:

Unit 1: Soil

Soil profiles within the investigation area were shallow, extending generally from 0.8 m to 1.0 mBGL. A deeper soil profile was intersected in BH103 to 7.7 mBGL. Anecdotal evidence indicates the borehole to be located in an area that has previously experienced landslides, and this could have contributed to a thicker soil profile. However, based on field mapping and drilling technique (rock hammering), this extended soil profile could also include extremely - distinctly weathered agglomerate.

Due to the typical steep topography, shallow soil depths are expected across the majority of site (< 1.0 m).

Unit 2: Latite Tuff

This unit comprises very hard, dark grey aphanitic volcanic tuff with light grey, white and black phenocrysts.

Unit 2 was encountered in BH102, BH103 and BH104 to a maximum (investigation termination) depth of 40.06 m (BH102). The thickness of the unit could not be determined due to termination of BH102, BH103 and BH104 within the unit. However, based on borehole termination depths, the thickness of the latite tuff is at least 39.26 m (BH102), 28.36 m (BH103) and 34.2 m (BH104).

Unit 3: Latite Agglomerate

This unit is defined by mixed gravels and cobbles cemented in an aphanitic matrix. The unit is characterised by a pink to red matrix with varying coloured gravels and cobbles. Where weathering and / or faulting has occurred within this layer, the matrix has altered to silty clay and clay, resulting in zones with reduced rock strength.

Unit 3 was encountered in BH101 to termination depth (20.11 m), with a thickness of 19.11 m, and possibly in the upper portion of BH103 (approximately 7 m thick).

Units are labelled on core photographs in Attachment C.

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3.2 Hydrogeology

A review of NSW DPIW database indicates there are no groundwater bores within 2000 m of the site (Figure 3, Attachment A).

Groundwater inflow was not encountered during rock hammering up to a maximum of 7.7 mBGL. Groundwater conditions below rock hammer termination depths could not be assessed due to the introduction of drilling fluids during HQ3 rock coring.

The three groundwater monitoring wells were purged following construction and MW01 and MW02 again on 15 December 2017.

Groundwater levels were measured on 15 December 2017 prior to purging, using a dip meter. Data loggers (set at 10 minute data collection intervals) were installed in each well on 18 January 2018 and are still logging at the time of preparing this report.

Table 3 summarises site groundwater monitoring bore information and dipped groundwater levels. A more detailed groundwater assessment report will be available once a suitable monitoring period of data has been collected from the data loggers over the next year.

Table 3: Summary of Groundwater monitoring bore information and dip measurements.

Bore ID	Coordinates		Surface Elevation (mAHD) [1]	Bore Depth (m)	Dip Measurement mBGL (mAHD) [2]	Water Bearing Lithology
	Easting	Northing				
MW01 / BH102	345625	6395490	120.34	40	20.87 (99.47)	Rock
MW02 / BH103	345421	6395717	168.47	36	30.54 (137.93)	Rock
MW03 / BH104	345259	6396376	217.80	35	33.80 (184.00)	Rock

Notes:

[1] mAHD levels from Delfs Lascelles Consulting Surveyors (2017).
[2] Dip measurement on 15 December 2017.

3.2.1 Conclusion

Based on current field investigation results, excavations may encounter ephemeral perched groundwater at the soil and rock interface, within fault zones and areas of major jointing in rock. Groundwater is likely to be encountered within 20 mBGL to 30 mBGL in areas of groundwater monitoring. However further groundwater information will be available upon conclusion of the groundwater monitoring, including hydraulic conductivity, which is unknown at the time of this assessment.

No groundwater monitoring is currently being undertaken in the southern portion of site, within Unit 3 (agglomerate).

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3.3 Conceptual Geological Model

Due to investigation constraints (refer to Section 2.4) total thickness of each rock unit could not be measured by intrusive techniques. However based on site investigations and interpretations, it is considered feasible that the primary resource unit is likely to extend to significant depth (and therefore thickness). The following material unit depths have been assigned for preliminary resource feasibility assessment:

- Unit 1 (Soil): surface to 1 mBGL above Unit 2 and / or Unit 3.
- Unit 2 (Latite Tuff): Maximum topographic elevation of 221 mAHD to 130 mAHD.
- Unit 3 (Agglomerate): Topographic elevation of 90 mAHD to 70 mAHD.

The above depth assumptions are to be refined based on the recommendations of this report and contingent to the information as presented in Figure 5, Attachment A. Refer to section 2.2.2 for key assumptions made to develop Figure 5. Conceptual geological model with rock cutting analysis is presented in Drawing No. PS01-JZ01.

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4 Laboratory Testing

4.1 Overview

To assess encountered rock characteristics, one slightly weathered surface sample and one slightly weathered borehole sample were collected and submitted to Geochempet Services, under chain of custody conditions, for rock classification via petrographic analysis.

A further distinctly weathered near surface sample and a distinctly weathered and structurally impacted composite borehole sample were submitted to Resource Laboratories, a National Association of Testing Authorities, Australia (NATA) accredited laboratory, for rock property testing (particle size distribution, wet and dry strength and wet and dry strength variation, particle shape by proportional caliper, fractured faces of coarse aggregate and acid soluble sulphate).

4.2 Test Results

Samples were selected to enable rock characterisation and define rock properties across both distinct lithologies and rock conditions encountered. An overview of the testing regime is provided in Table 4. Tests were selected as typically required by Roads and Maritime Services (RMS) for road pavements (RMS 3051) and for use as coarse concrete aggregates in accordance with AS2758.1 (2014) *Aggregates and rock for engineering purposes: Concrete aggregates.*

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Table 4: Sample testing overview.

Sample ID	Unit and Sample Location	Laboratory Test							
		Petrographic [1]	AS1141.22 [2]	T105 [3]	T106 [4]	T213 [5]	T215 [6]	T219 [7]	T239 [8]
6007/surface/0/R/1	Unit 2 (tuff) Near surface, proximal to BH102	X	-	X	-	-	X	X	-
6007/BH101/R/3-3.18	Unit 3 (agglomerate) BH101 from 3 to 3.18 mBGL	X	-	-	-	-	-	-	-
6007/Agglomerate	Unit 3 (agglomerate) Near surface, proximal to BH101	-	X	X	X	X	-	X	X
6007/BH103+BH104/18-22.0m	Unit 2 (tuff) Combined core from BH102 and BH104 from 18 to 22 mBGL	-	X	X	X	X	-	X	X

Notes:

[1] Petrographic analysis for methods C295 *(Petrographic Assessment of Aggregates for Concrete)*, AS2758.1 *(Aggregates and rock for engineering purposes part 1; Concrete aggregates (Appendix B))* and HB 79 *(Alkali Aggregate Reaction – Guidelines on Minimising the Risk of Damage to Concrete Structures in Australia)*.
[2] AS1141.22 *Wet / Dry Strength Variation (Single)*.
[3] RMS *T105: Preparation of Samples for Testing.*
[4] RMS *T106: Coarse Particle Size Distribution of Road Construction Materials.*
[5] RMS *T213: Particle Shape by Proportional Caliper.*
[6] RMS *T215: Wet / Dry Strength Variation.*
[7] RMS *T219: Acid Soluble Sulphate.*
[8] RMS *T239: Fractured Faces of Coarse Aggregate.*

4.2.1 Petrographic Analysis Results and Suitability for Engineering Purposes

Latite Tuff (Unit 2)

Petrographic laboratory reports identified sample 6007/surface/0/R/1 as latite tuff. For engineering purposes the sample can be summarised as hard, strong and is predicted to be durable and innocuous in relation to alkali-silica reactivity in concrete.

Due to the aforementioned characteristics, the sample is predicted to be suitable for use as a source of concrete aggregate as well as asphaltic aggregate, rail ballast and rip rap.

Latite Agglomerate (Unit 3)

Petrographic laboratory reports identified sample 6007/BH101/R/3-3.18 as latite agglomerate. For engineering purposes the sample can be summarised as essentially hard and strong and is predicted to be essentially durable, however, fracture veins may cause the rock to fail into smaller pieces. The sample is also predicted to be innocuous in relation to alkali – silica reactivity in concrete.

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Due to the aforementioned characteristics, the sample is predicted to be suitable for use as a source of concrete aggregate and road base.

Laboratory petrographic reports are provided in Attachment D.

4.2.2 Wet / Dry Strength Variation

Wet / Dry Strength Variation test results are outlined in Table 5, typical RMS and AS2758.1 requirements are outlined in Table 6 and sample classification in accordance to RMS 3051 and AS2758.1 in Table 7. Wet / Dry Strength Variation analytical certificates are provided in Attachment E.

Table 5: Wet / Dry Strength Variation test results compared to typical RMS requirements.

Sample & Unit ID	Test Method [1]	Significant Breakdown	Results		
			Wet Strength (kN)	Dry Strength (kN)	Wet Dry Strength Variation (%)
6007/surface/0/R/1 (Unit 2 – Tuff)	T215	No	230	248	7
6007/Agglomerate (Unit 3 – Agglomerate)	AS1141.22	Yes	63	115	45
6007/BH103+ BH104/18-22.0m (Unit 2 – Tuff)	AS1141.22	Yes	145	203	29

Notes:

[1] RMS requires testing to T215. AS1141.22 was conducted where not enough sample available.
[2] Concrete Exposure Classification from Table 3 AS2758.1 (2014). Refer to Table 6 for specifications.

Table 6: RMS 3051 and AS2758.1 specifications.

Standard	Specification		Classification [1]
	Wet Strength (kN)	Wet Dry Strength Variation (%)	
RMS 3051	> 100	< 35	DBG20 (HD) – Traffic Category A
	> 70	< 35	DGB20 - Traffic Categories B, C and D DGS20 - Traffic Categories A and B DGS40 - Traffic Categories A and B
	> 50	< 40	DGS20 – Traffic Categories C and D DGS40 – Traffic Categories C and D
AS2758.1 [2]	50	45	A1, A2
	80	35	B1, B2
	100	25	C

Notes:

[1] RMS 3051 classification from Table 3051.3, RMS 3051 (2014). AS2758.1 classification from Table 3, AS2758.1 (2014).

Table 7: Classification of laboratory tested samples in accordance with AS2758.1 and RMS3051.

Sample & Unit ID	Concrete Exposure Classification [1]	RMS 3051 Traffic Category Classification [2]
6007/surface/0/R/1 (Unit 2 – Tuff)	C	DBG20 (HD) – Traffic Category A
6007/Agglomerate (Unit 3 – Agglomerate)	A1, A2	NR [3]
6007/BH103+ BH104/18-22.0m (Unit 2 – Tuff)	B1, B2	DBG20 (HD) – Traffic Category A

Notes:

[1] AS2758.1 classification from Table 3, AS2758.1 (2014). Refer to Attachment F for class description.
[2] RMS 3051 classification from Table 3051.3, RMS 3051 (2014). Refer to Attachment F for class description.
[3] No Rating. Sample failed to meet specification.

4.2.3 Particle Shape by Proportional Caliper

Particle shape by proportional caliper, compared to typical RMS requirements, are outlined in Table 8. Particle shape by proportional caliper analytical certificates are provided in Attachment E.

Table 8: Particle shape by proportional caliper (RMS T213) test results compared to RMS 3051 and concrete aggregate (AS2758.1) requirements.

Sample & Unit ID	Results				RMS and AS2758.1 Specification [1, 2]
	Flat Particles (%)	Flat and Elongated Particles (%)	Elongated Particles (%)	Total Misshapen Particles (%)	Total Misshapen Particles (%)
6007/Agglomerate (Unit 3 – Agglomerate)	21.2	10.2	0.3	32 [3]	< 35
6007/BH103+ BH104/18-22.0m (Unit 2 – Tuff)	22.6	11.2	2.6	36	

Notes:

[1] AS2758.1 requires testing at a 3:1 caliper ratio. However AS2758.1 allows, at the option of the purchaser, for misshapen particles to be determined using a 2:1 ratio with a < 35% total misshapen particle limit.
[2] RMS QA Specification 3051: Granular Base and Subbase Materials for Surfaced Road Pavements (2014).
[3] Agglomerates are varied in nature and further testing would be required to improve unit characterisation and ensure compliance to RMS 3051.

4.2.4 Fractured Faces of Coarse Aggregate

Fractured faces of course aggregate obtained after crushing of the rock samples, compared to typical RMS requirements, are outlined in Table 9. Fractured faces of course aggregate analytical certificates are provided in Attachment E.

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Table 9: Fractured faces of course aggregate test results compared to RMS 3051 requirements.

Sample & Unit ID	Results			RMS Specification [1]
	Particles with No Fractured Faces (%)	Particles with At Least One Fractured Faces (%)	Particles with Two or More Fractured Faces (%)	Particles with Two or More Fractured Faces (%)
6007/Agglomerate (Unit 3 – Agglomerate)	0	100	100	Minimum 85
6007/BH103+ BH104/18-22.0m (Unit 2 – Tuff)	0	100	100	

Notes:

[1] RMS QA Specification 3051: Granular Base and Subbase Materials for Surfaced Road Pavements (2014) DGB20(HD).

4.2.5 Particle Size Distribution

Fractured faces of course aggregate compared to typical RMS requirements are outlined in Table 10. Fractured faces of course aggregate analytical certificates are provided in Attachment E.

Table 10: Particle size distribution results compared to RMS 3051 requirements.

Passing AS Sieve Size (mm)	Sample (% by mass passing)		RMS Specification [1] (% by mass passing)	
	6007/ Agglomerate (Unit 3 – Agglomerate)	6007/BH103+BH104/ 18-22.0m (Unit 2 – Tuff)	DGB20(HD) & DGB20	DGS40
26.5	100	100	100	100
19.0	91	84	95 – 100	95 – 100
13.2	66	53	78 – 92	70 – 90
9.50	45	34	63 – 83	58 – 80
4.75	33	24	44 – 64	43 – 65
2.36	25	17	33 – 49	30 – 55
425 (µm)	17	11	14 - 23	10 – 30
75 (µm)	NT [2]	NT [2]	7 – 14	4 – 17
13.5 (µm)	NT [2]	NT [2]	3 - 7	2 – 10

Notes:

[1] RMS QA Specification 3051: Granular Base and Subbase Materials for Surfaced Road Pavements (2014).
[2] Portion not tested.

4.2.6 Acid Soluble Sulphate

Acid soluble sulphate test results, compared to typical RMS requirements, are outlined in Table 11. Acid soluble sulphate analytical certificates are provided in Attachment E.

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Table 11: Acid soluble sulphate test results compared to RMS 3051 requirements.

Sample and Unit ID	Acid Soluble Sulphate (%)	
	Test Results	RMS Specification [1]
6007/surface/0/R/1 (Unit 2 – Tuff)	0.021	< 0.3
6007/Agglomerate (Unit 3 – Agglomerate)	0.034	
6007/BH103+ BH104/18-22.0m (Unit 2 – Tuff)	0.014	

Notes:

[1] RMS QA Specification 3051: Granular Base and Subbase Materials for Surfaced Road Pavements (2014).

4.3 Tests Not Covered Within This Report

Tests listed in Table 12 are typically required to characterise aggregates for accordance to RMS 3051 and / or AS2758.1 specifications. However, these tests were omitted during preliminary resource investigation for the following reasons:

- Petrographic analysis results, with specific reference to:
  - I. The origin of the material (igneous)
  - II. Expected engineering characteristics
- Condition of encountered rock during field investigations
- Previous experience

Table 12: List of tests and anticipated results, not covered within this report as per typical RMS 3051 and AS22758.1 requirements.

Test	Specification	Requirement	Evidence	Expected Outcome [1]
Permeability (AS1289.6.7.2)	RMS 3051	Max: 5×10^{-8}	Petrographic report	Pass for all aggregate
Plasticity (RMS T109) [2]	RMS 3051: DGB20(HD) – Traffic Category A DGB20 – Traffic Category B and C	Plasticity Index Min: 2 Max: 6	Origin and condition of encountered material Previous experience	Non Plastic for all aggregate
Dry Compressive Strength (RMS T114) [2]	RMS 3051: DGB20(HD) and DGB20 – All Traffic Categories	Min: 1.7 MPa	Condition of encountered rock Petrographic report	Pass for tuff
Light Particles (AS1141.31)	AS2758.1	< 1% of material particles with a density of < 2.0 t/m^3	Origin and condition of encountered material	Pass for tuff

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Test	Specification	Requirement	Evidence	Expected Outcome [1]
Alkali – reactive materials (AS1141.60.1)	AS2758.1	Non - Reactive	Petrographic Report	Non – Reactive for all aggregate

Notes:

[1] Assumes aggregate is fresh and free from structural defects.
[2] RMS T114 specification required if plasticity index is less than 2.

4.4 Conclusion

- Laboratory tests generally indicate that:

  I. All samples tested pass RMS specification 3051 for acid soluble sulphates and fractured faces.

  II. Slightly weathered to fresh, defect free tuff is classified as class C for concrete aggregates (AS2758.1) and likely DBG20(HD) – Traffic Category A (very heavy traffic) or DGB20 – Traffic Category B (heavy traffic).

  III. Moderate structurally impacted tuff in its current form is not suitable for use as road base material or in concrete. However, provided engineer mix design is taken into account for misshapen particles and significant breakdown of material, the structurally impacted tuff may be classified as class B1, B2 for concrete aggregates (AS2758.1).

  IV. Agglomerate in its current form is not suitable for use as road base material or in concrete. However, provided engineer mix design is taken into account for significant breakdown of material, the agglomerate may be classified as class A1, A2 for concrete aggregates (AS2758.1).

Table 13 provides a discussion and summary of the test results that failed to meet specifications along with the impact on the proposed development.

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Table 13: Discussion and summary for failed test results.

Test Method	Sample(s) that Failed Specification Requirements	Discussion	Expected Developmental Impact
Wet / Dry Strength Variation (AS1141.22 & T215)	6007/Agglomerate	Agglomerate by nature is variable in composition due to the presence of large gravels and cobbles in a finer matrix. The fine matrix when impacted by structures (jointing or faulting) or water can alter to clay, reducing the rock engineering properties (particularly strength). Typically agglomerate containing a larger percentage of matrix material will have greater susceptibility to fail the strength requirements. Whilst the sample tested failed to meet the wet strength and wet / dry variation requirements of RMS 3051, discrete bands may exist within the unit (e.g. as seen in BH101 from 6.0 m – 8.0 m that may pass specifications. Further testing across the agglomerate resource area is recommended, to characterise unit consistency.	Considering the wet strength and wet / dry variation of slightly weathered tuff (230 kN and 7 %) and distinctly weathered and partially structurally defected tuff (145 kN and 29%), it may be possible to blend the agglomerate with fresh tuff to meet specifications. Testing of a blended batch would be required to determine if the blended batch would fail due to continued significant breakdown.
Coarse Particle Size Distribution (T106)	6007/Agglomerate 6007/BH103+ BH104/18-22.0m	Crushing of the rock samples produced well graded tuff and poorly graded agglomerate aggregates. Although both samples failed to meet the required particle size distribution curve for RMS 3051 and AS2758.1, the crush produced proportionally larger aggregates that can be re-crushed at a smaller nominal aggregate size and / or blended with previous crushing, which may lead to the required particle distribution (PSD).	Aggregate will likely require additional crushes across a range of nominal aggregate spacing to meet RMS 3051 and AS2758.1 PSD criteria. Additionally, purchasers may require PSD that differs from AS2758.1 and / or RMS 3051 requirements.
Particle Shape by Proportional Caliper (T213)	6007/BH103+ BH104/18-22.0m	Sample 6007/BH103+BH104/18-22.0m was selected for analysis due to the presence of multiple structural defects resulting in poor rock quality designation (RQD). The material was blended from the same depth interval below ground surface across two boreholes within potentially the primary quarry zone to meet sample weight requirements for testing. The test result indicate an approximate representation of the characteristics of structurally impacted tuff. Fresh tuff, free from structural defects, is likely to contain improved particle shape results (i.e. less misshapen particles).	The test results marginally fail RMS 3051 and AS2758.1 (2014: section 8.3.3) specifications (36%, compared to 35%). Where moderate rock defects are encountered, the rock could potentially pass requirements for fractured faces or may be required to blend with fresh tuff. Fresh and non-defected tuff is expected to pass both RMS 3051 and AS2758.1 particle shape requirements.

5 Resource Assessment

5.1 Unit Volumes, Weights and Cut Depth

Unit volumes of extractable rock were calculated using TIN software modelling to represent surface and underlying unit morphology. A boundary buffer of 40 m and batters of 2V:1H were applied to the cut design. Quarry excavation techniques in very high strength rock typically involve benching for drill and blast and batters will likely be designed against encountered geology and defects. The TIN model calculated rock volume from LIDAR surface topography to a determined base excavation level. The site was separated into two distinct zones based on geology: tuff and agglomerate. A base excavation level of 130 mAHD was applied to the area labelled as tuff. The excavation base level was determined to minimise creek impact (generally allowed for a 40 m creek buffer) and for environmental aesthetic reasons. Due to limited information on the intersection with agglomerate, a TIN profile generated from mapped and interpreted outcrops up to 90 mAHD, with a base excavation level of 70 mAHD, was applied to the agglomerate unit. A 1.0 m thick soil profile was applied across the entire site.

Preliminary volumes of material units and extractable rock are provided in Table 14.

Table 14: Unit volumes and weights.

Unit	Calculated Total Unit Volume mAHD (m^3) [1]	Representative Bulk Density (g/cm^3) [2]	Calculated Total Weight (t) for Unit
Unit 1 (Soil)	1,096,000	1.5	1,644,000
Unit 2 [3] (Tuff)	28,493,000	2.6 [4]	74,082,000
Unit 3 [5] (Agglomerate)	710,300	1.9 [4]	1,350,000

Notes:

[1] Calculated from TIN to TIN modelling using 2011 LIDAR survey data, geological field mapping and available borehole information. Earthwork operations conducted after 2011 may alter topography profile and volumes listed are for preliminary uses only. Additional intrusive testing would be required to improve approximations.

[2] Estimated bulk density of insitu material (i.e. no bulking factor applied).

[3] Base excavation level of 130 mAHD across tuff lithology.

[4] Density may differ across unit due to post placement compaction and alteration.

[5] Agglomerate TIN excavation levels from mapped and interpreted surface outcrops up to 90 mAHD with a base excavation level of 70 mAHD.

Bands of alternating geology may exist within the designated units (i.e. bands of agglomerate within tuff or vice versa). Additional intrusive testing would be required to improve resource approximations and geological unit relationships. Notwithstanding this, the volumes

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presented are considered suitable for preliminary feasibility assessment purposes.

5.2 Key Issues Impacting Resource Feasibility

Key issues which may impact resource feasibility include:

1. Creeks and associated creek buffers.
2. Extent and volume of impacted rock from structural defects (faults and jointing).
3. Groundwater level monitoring is ongoing at the time of writing this report and results have not been considered within this preliminary report.
4. Inferred contacts of geological formations and lithologies.

Excavatability implications based on Look (2014) and site testing results are summarised below:

1. Medium strength material - considered likely to require a moderately hard to very hard ripping effort and at minimum a D8 digger.
2. High strength material - considered likely to require an extremely hard ripping effort and at minimum a D9 to D11 digger, or possibly blasting.
3. Very high strength material - likely to require blasting.

5.3 Market Suitability

A range of general market prices for road base aggregates is listed below. Prices were obtained from available online rates and direct contact and discussions with quarry material companies (Boral, 2018). Results are summarised in Table 15.

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Table 15: General market retail price guide.

Resource	Retail Market Price ($/t) [1]	Calculated Total Weight (t) for Unit [2]	Elderslie Preliminary Resource Price [3]
Topsoil [4]	NA	NA	NA
Tuff [5]	$30 (AS2758.1)	61,488,000	$1,844,640,000
	$22 (RMS 3051)		$1,352,736,000
Blended Tuff and Agglomerate [5, 6]	$22 (RMS 3051)	62,501,000	$1,375,022,000
Crusher Dust [7]	$50	10,656,000 [8]	$532,823,000

Notes:

[1] Prices are for use as a guide only and based on product passing RMS 3051 requirements for DGB20 and AS2758.1 exposure classification B1, B2 and C. Market price is subject to change and will vary based on location and quality of product. Delivered wholesale prices would be less than the retail mark-up.

[2] Calculated from TIN to TIN modelling using 2011 LIDAR survey data, geological mapping and available borehole information. Results are considered preliminary and further investigation would be required to refine volume and weight estimations. Does not include loss of material from blasting.

[3] Values rounded to nearest $1,000

[4] No price is provided for soil. Soil may be required to be stored and used for quarry rehabilitation.

[5] PSD results indicate a 17% production for tuff and 25% production for agglomerate of crusher dust during aggregate crushing processes. The relevant percentages have been removed from the calculated total weight.

[6] Total weight of combined agglomerate and tuff based on values from Table 11. Further assessment and blending analysis would be required to determine appropriate volume, weight and suitability for market purposes, which may be less than the values indicated.

[7] Particle sizes less than 5 mm graded through to particle sizes finer than 75 µm, produced from crushing processes(also referred to as fine aggregate in AS2758.1 (2014).

[8] Calculated total weight based on percentage of crusher dust produced from crushing of tuff only.

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6 Conclusions and Recommendations

6.1 Conclusions

Investigation of site subsurface materials identified three material units, soil (Unit 1), a latite tuff layer (Unit 2), and an agglomerate layer (Unit 3). Unit 1 was typically shallow across site (less than 1.0 m), although in landslide prone areas, the soil profile may be thicker (up to 6.7 m in BH103). Unit 2 was encountered up to 40.06 mBGL (up to 39.26 m thick in BH102) before borehole termination. Unit 3 was encountered to 20.11 mBGL (up to 19.11 m thick in BH101. All boreholes were terminated in the prospective resource unit (Gilmore Volcanic Group).

No laboratory testing was conducted on Unit 1 as it did not form part of the investigation scope. However, soil may be required to be stored and used for future quarry rehabilitation purposes or as bunds to reduce noise from quarry operations.

Unit 2 is inferred to extend to a base elevation of 130 mAHD across the area of investigation. It is deemed suitable for use as road base and concrete aggregate, provided mix design measures are applied to take account of particle size distribution. In areas where Unit 2 has been moderately impacted by structural defects (faulting, shear zones, veining and joints), the rock may still be suitable for use in concrete and road base with additional mix design measures to account for increased misshaped particles and significant rock breakdown.

Unit 3 is not suitable for use as road base due to its low wet strength and wet / dry strength variation. This unit may be blended with Unit 2 to increase the overall wet strength and decrease the wet / dry strength variation to pass RMS 3051 requirements. Unit 3 material may still be used in concrete aggregate with an exposure classification of A1, A2 provided engineering mix design practices can reduce significant rock breakdown.

6.2 Recommendations for Further Assessment

Subject to results of other site feasibility studies (e.g. traffic, planning etc.), we recommend a preliminary financial viability assessment be undertaken based on the results of this report and other feasibility studies. If preliminary assessment indicates mining is potentially financially viable, we recommend extending feasibility studies to include the following, to assist with informing a detailed financial viability assessment:

1. Testing of identified unit materials to ascertain unit bulk densities.
2. Investigation into future market wholesale tonnage rates.

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3. Investigation into specifier markets and their requirements.

4. Refinement of unit coverage areas, in particular:

    I. The agglomerate and tuff boundary within the Gilmore Volcanic Group.

    II. Expected lithology within the Gilmore Volcanic Group along the western section of the north – south trending ridgeline.

    III. Expected lithology between 130 mAHD to 100 mAHD.

5. Refinement of required buffers to identified rock extraction zones.

6. Investigation into groundwater management requirements.

7. Assessment of acceptable excavation batter slopes based on rock defects and geology.

8. Further assessment outside the investigation area and of areas not covered by this report.

9. Further assessments as listed in Table 12 would be required, dependent upon the purchaser's requirements and client's decision for the quarry to act as wholesale or retail.

10. Further testing for use as concrete aggregate to AS2758.1 specification within:

    I. Chloride ion content (AS1012.2)

    II. Sugar content (AS1141.35)

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7 References

Australian Standard 2758.1 (2014) amendment 1: 2016, Aggregates and rock for engineering purposes: Concrete Aggregates.

Boral Resources (NSW) Pty Ltd (2018), Quote 083609, Aggregate material pricing: 20MM DGB, 20MM FCR, 20MM DGB and ARRB 20MM FCR, Peats Ridge and Seaham.

Delfs Lascelles Consulting Surveyors (2017), *Detail Survey of Bore Holes Locations on Lots 65 DP752473, 903 & 904 DP1061259 & 5 DP1102521,* Project No. 16815, Drawing No. 1, Revision No. 1.

Geological Survey of NSW (1966), *Sydney 1:250,000 Geology Sheet Sl/56-05 3rd Edition.*

Korsch, R. J. (1977). A framework for the Palaeozoic geology of the southern part of the New England Geosyncline. *Journal of the Geological Society of Australia*, *24*(5-6), 339-355

Look B. (2014), Handbook of Geotechnical Investigation and Design Tables: Second Edition.

Rasmus P. L., Rose D. M. and Rose G. (1969) *Singleton 1:250 000 Geological Sheet Sl/56-01*, 1st edition, Geological Survey of New South Wales, Sydney.

Roads and Maritime Services (2014), QA Specification 3051, Edition 6, Revision 5, *Granular Base and Subbase Materials for Surfaced Road Pavements,* RMS IC-QA-3051.

Roberts, J., B. A. Engel, and J. Chapman, *Geology of the Camberwell 9133, Dungong 9233 and Buladelah 9333 1:100 000 Sheets (Hunter – Myall Region) New South Wales.,* Geological Survey New South Wales, Sydney, 1991.

Rose G., Jones W.H. and Kennedy D.R., (1966) *Newcastle 1:250 000 Geological Sheet Sl/56-02,* 1st edition, Geological Survey of New South Wales, Sydney.

Rosenbaum, G., Li, P., & Rubatto, D. (2012). The contorted New England Orogen (eastern Australia): New evidence from U-Pb geochronology of early Permian granitoids. *Tectonics*, *31*(1).

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8 Limitations

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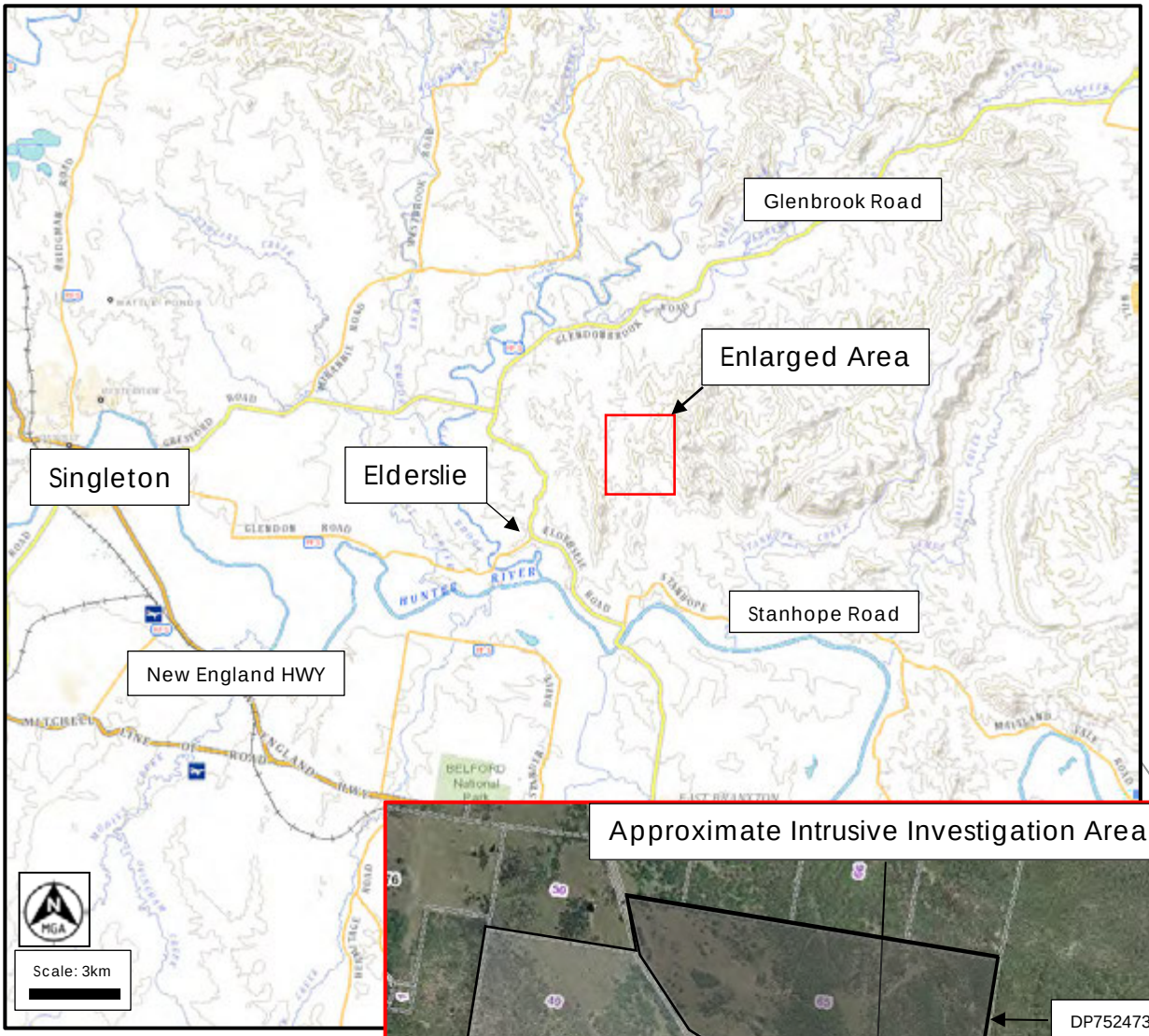
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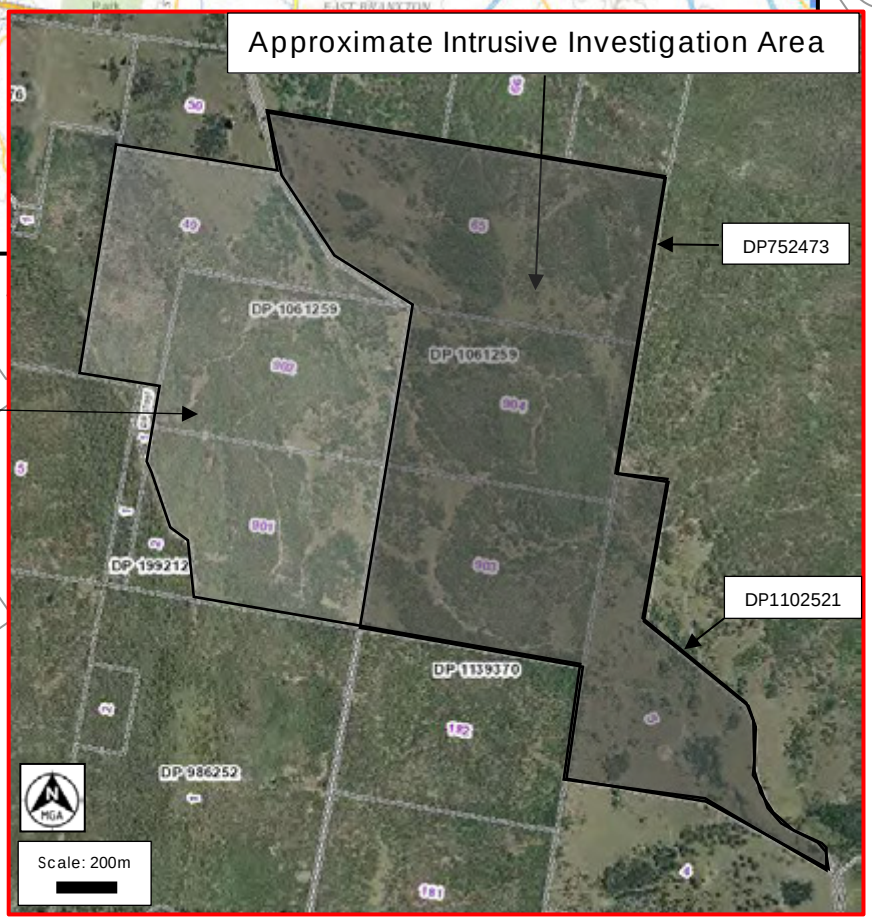
Occasionally sub-surface soil conditions in areas of the site not investigated may be found to be different from those expected. This can also occur with groundwater conditions, especially after climatic changes. Should, during site works, soil or water conditions be found to be significantly different to those detailed in this report, works shall cease immediately and the new conditions should be addressed by Martens & Associates to determine implications before recommencement.

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9 Attachment A – Figures

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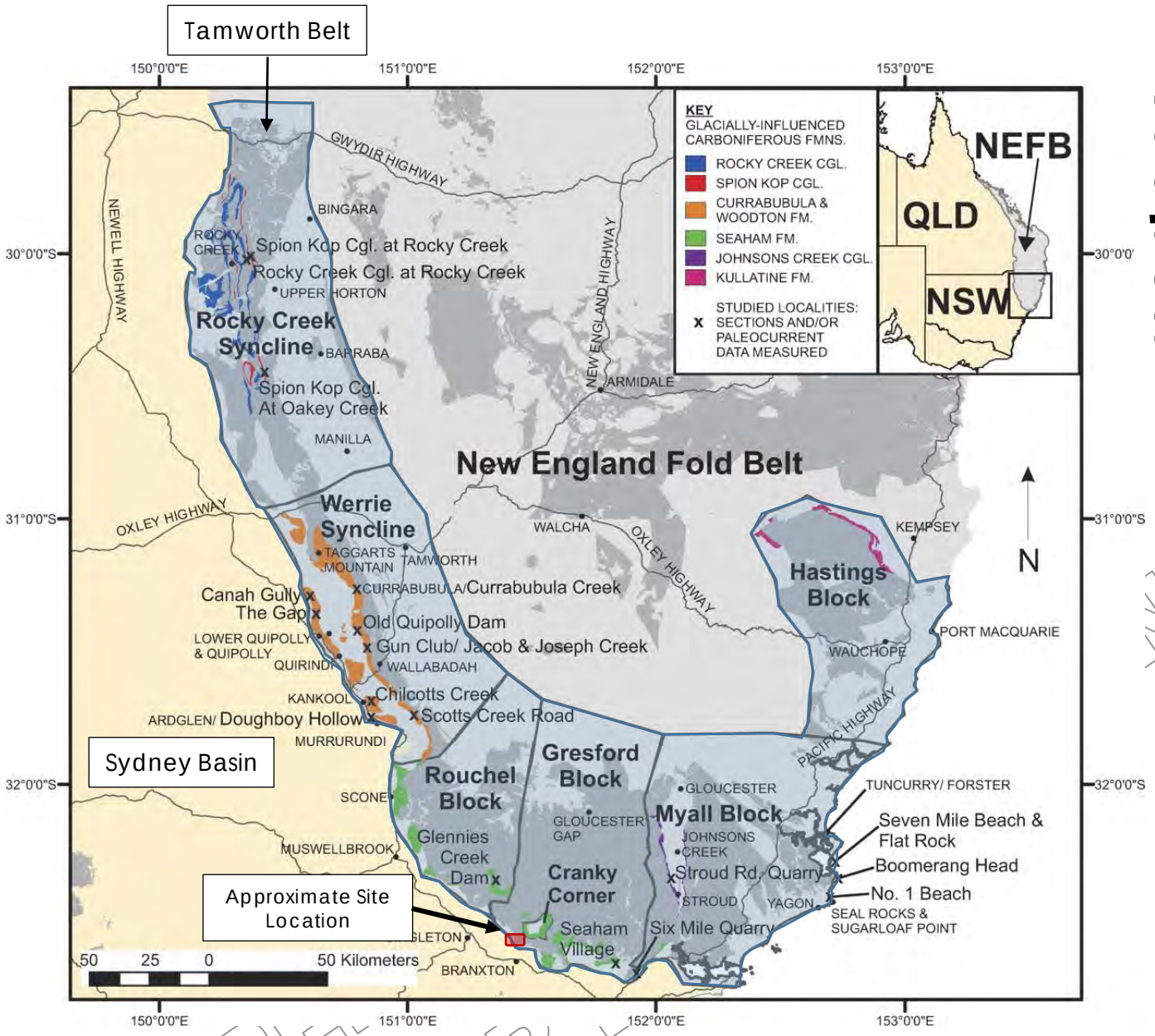




Land currently under client ownership, but not considered within this report, for preliminary resource feasibility assessment.

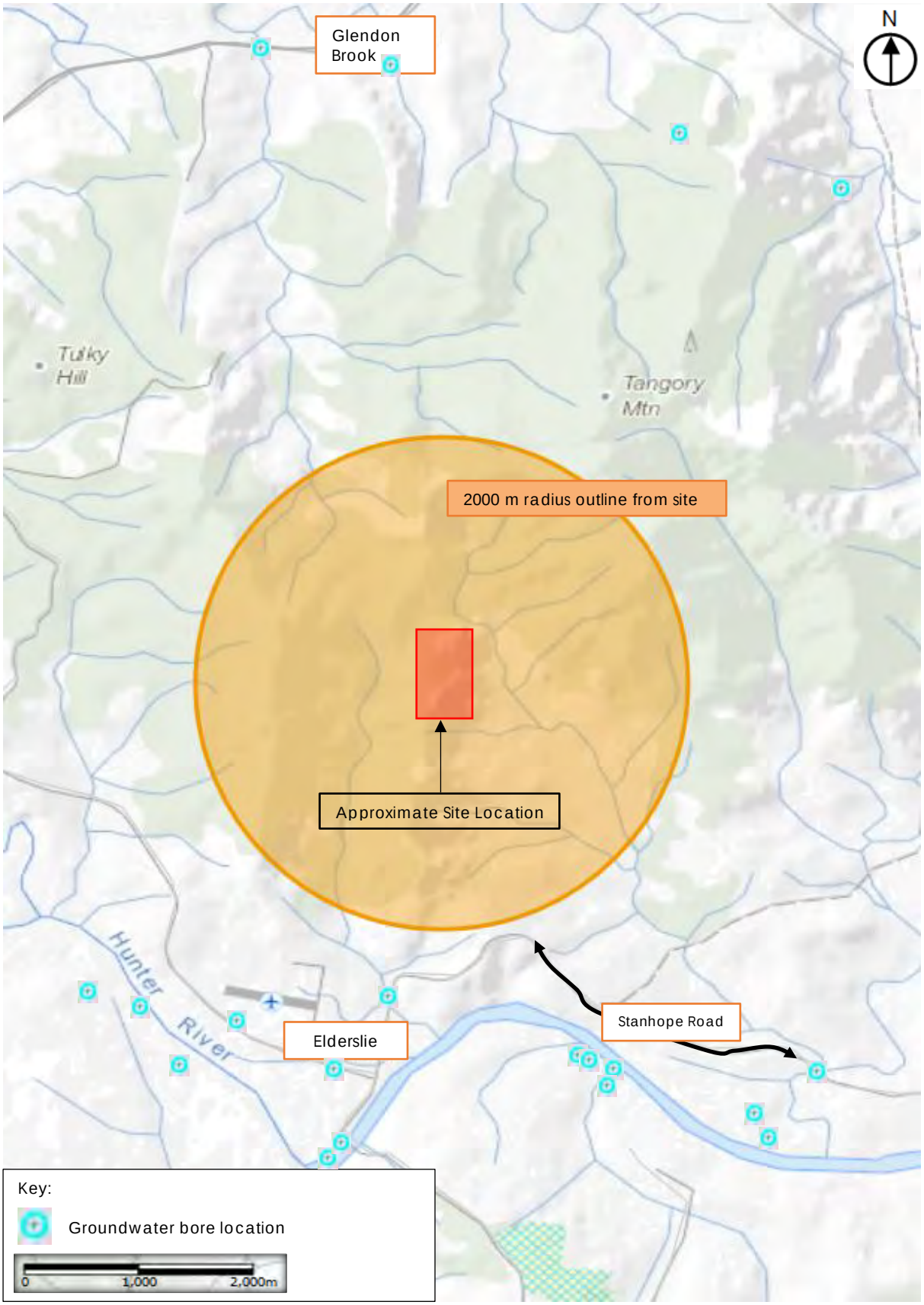
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Drawn:	AM	Site Location: Lots 903 and 904 in DP 1061259, Lot 65 in DP 752473 and Lot 5 in DP 1102521, Elderslie, NSW Source: Six Maps (2017)	Drawing No: FIGURE 1
Approved:	JF		
Date:	5.12.2017		
Scale:	As Above		Job No: P1706007JR01V02



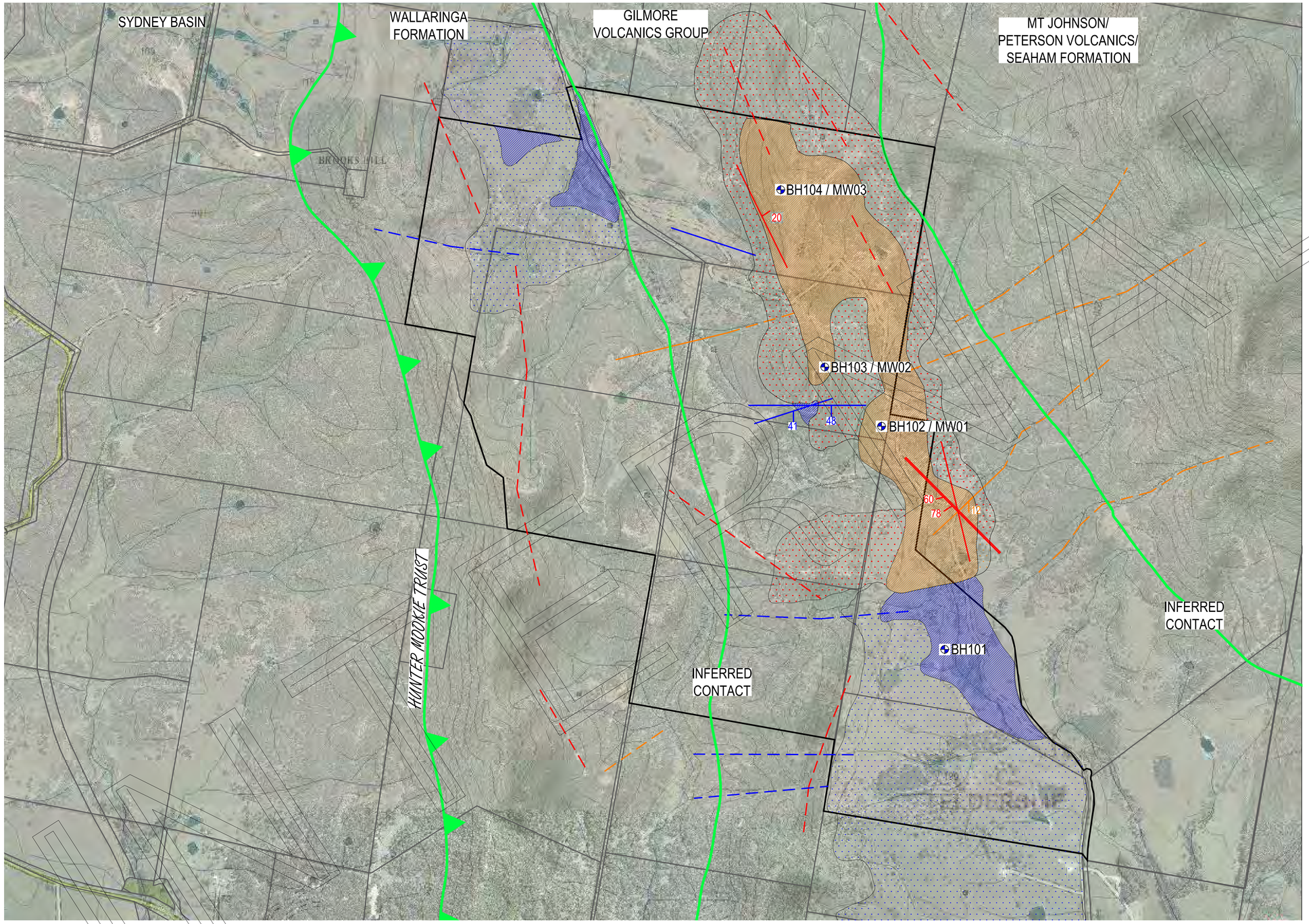
PRELIMINARY NOT FOR ISSUE

Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Site Location within the New England Fold Belt Regional Geological Map Image Source: *Evidence for Dynamic Climate Change on Sub-106 Year Scales from the Late Paleozoic Glacial Record, Tamworth Belt, New South Wales, Australia*, Birgenheir et al., (2009)	Drawing No: FIGURE 2
Approved:	JF		
Date:	5.12.2017		
Scale:	As Above		Job No: P1706007JR01V02



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Drawn:	AM	Bores Surrounding Site Lots 903 and 904 in DP 1061259, Lot 5 in DP 1102521 and Lot 65 in DP 752473, Elderslie, NSW Source: BOM's Australian Groundwater Explorer (2017)	Drawing No: FIGURE 3
Approved:	JF		
Date:	14.12.2017		
Scale:	As Above		Job No: P1706007JR01V02



REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
A	INITIAL RELEASE	17/01/2018	GM	AM	JF	

SCALE

GRID | DATUM | PROJECT MANAGER: JF

CLIENT: PITTMAN BUILDING PTY LTD

PROJECT NAME/PLANSET TITLE: PRE. RES. FEASIBILITY ASSESSMENT

LOTS 903 & 904, DP 1061259
LOT 5, DP 1102521 & LOT 65, DP 752473

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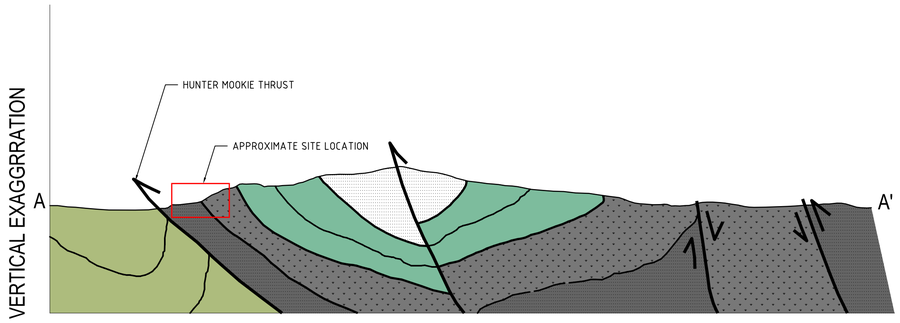
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DRAWING TITLE: FIGURE 5 LINEAMENT ANALYSIS

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706007	PS01	R01	PS01-ZZ00	A

DRAWING ID: P1706007-PS01-R01-ZZ00

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REGIONAL CROSS SECTION
NOT TO SCALE

LEGEND

PERMION

PS- SINGLETON COAL MEASURES (SANDSTONE, SHALE, MUDSTONE, CONGLOMERATE AND COAL SEAMS)

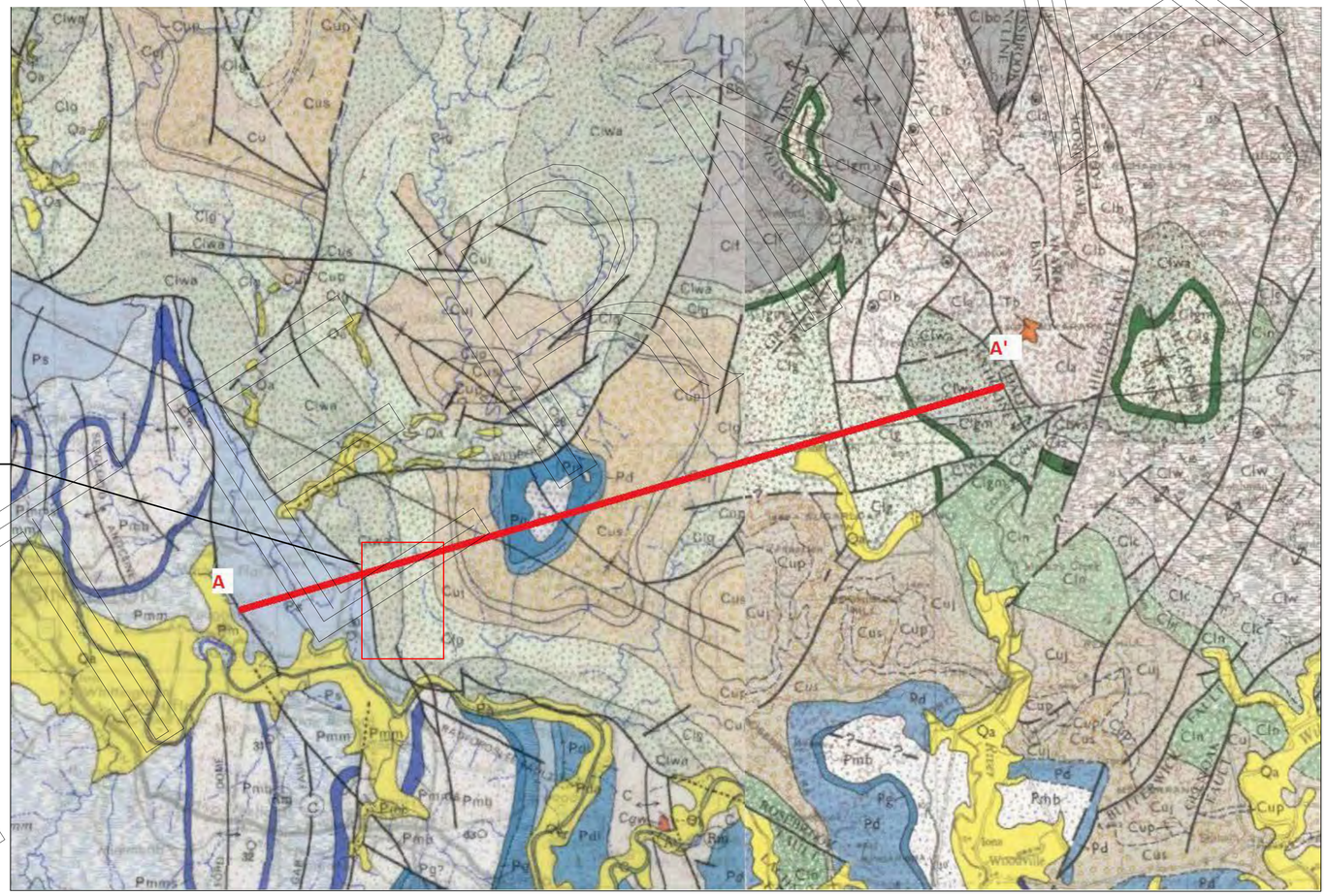
PM- UNDIFFERENTIATED (SANDSTONE, SILTSTONE, CONGLOMERATE)

CARBONIFEROUS

CU- UNDIFFERENTIATED (CONGLOMERATE, SANDSTONE, SHALE, ACID TUFFS)

CLG- GILMORE VOLCANICS GROUP INTERMEDIATE TO ACID CRYSTAL (VITRIC TUFF AND TAVAS, CONGLOMERATE, SANDSTONES, INCLUDES CORRELATIVES)

CLWA- WALLARINGA FORMATION (CONGLOMERATE ACID TUFFS, LITHIC RED SILTSTONES INCLUDES CORRELATIVES)



REGIONAL PLAN VIEW
NOT TO SCALE

NOTE:
BACKGROUND IMAGE SOURCE :
- RASMUS P.L., ROSE D.M AND ROSE G. (1969) SINGLETON 1:250000 GEOLOGICAL SHEET S1/56-01, 1ST EDITION, GEOLOGICAL SURVEY OF NEW SOUTH WALES, SYDNEY .
- ROSE G, JONES W.H AND KENNEDY D.R., (1966) NEWCASTLE 1:250000 GEOLOGICAL SHEET S1/56-02, 1ST EDITION, GEOLOGICAL SURVEY OF NEW SOUTH WALES, SYDNEY
- SCALE OF THIS DRAWINGS IS 1:25000 BASED ON THE SOURCE GOOGLE MAP.

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A	INITIAL RELEASE	17/01/2018	GM	AM	JF	

SCALE

GRID | DATUM | PROJECT MANAGER: JF

CLIENT: PITTMAN BUILDING PTY LTD

PROJECT NAME/PLANSET TITLE: PRE. RES. FEASIBILITY ASSESSMENT

LOTS 903 & 904, DP 1061259
LOT 5, DP 1102521 & LOT 65, DP 752473

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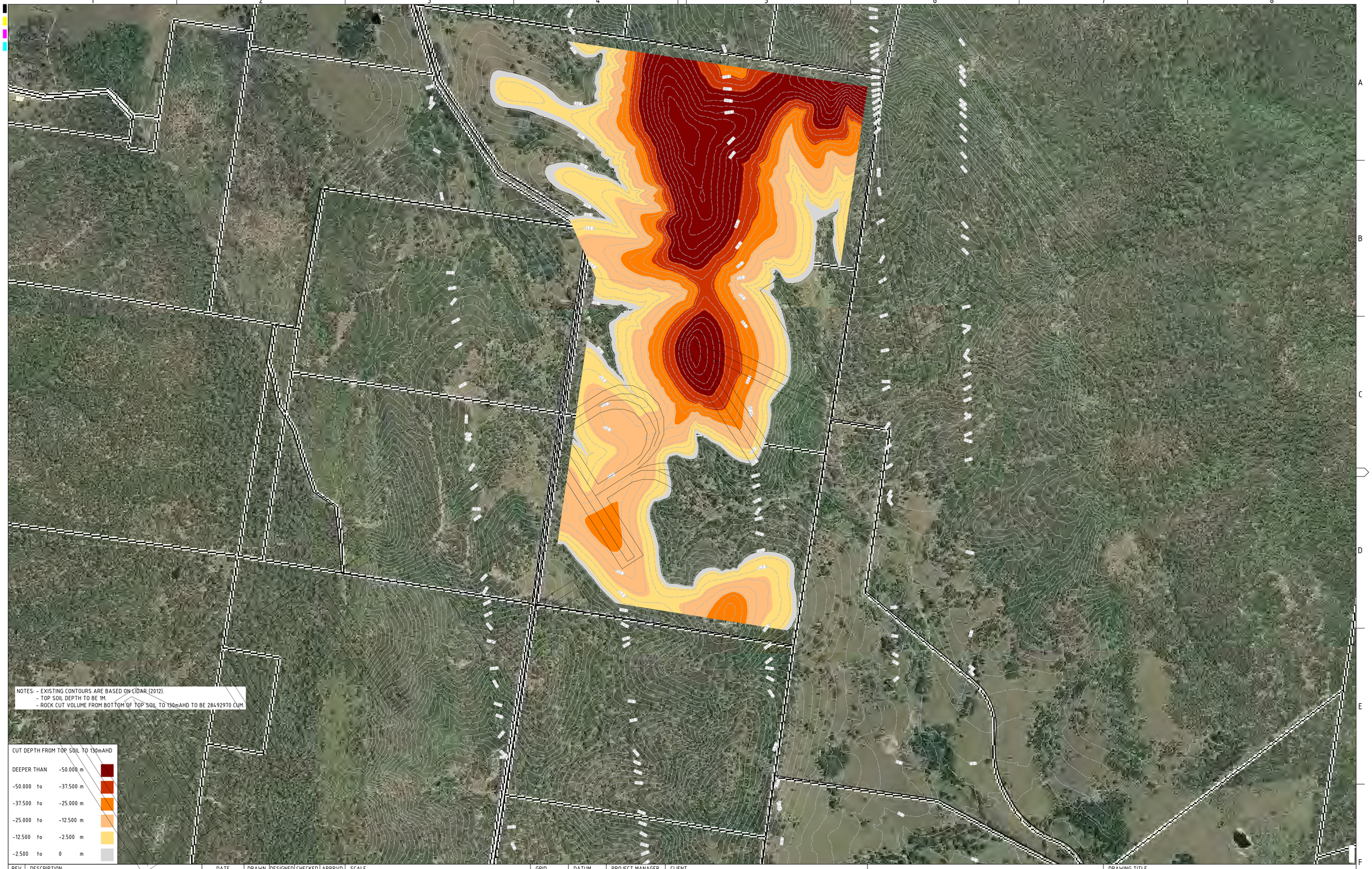
DRAWING TITLE: FIGURE 6 REGIONAL GEOLOGY & CROSS SECTION

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706007	PS01	R01	PS01-ZZ02	A

DRAWING ID: P1706007-PS01-R01-ZZ02

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SCALE

GRID	DATUM	PROJECT MANAGER
MGA	mAHD	JF

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PROJECT NAME/PLANSET TITLE

PRE. RES. FEASIBILITY ASSESSMENT

LOTS 903 & 904, DP 1061259
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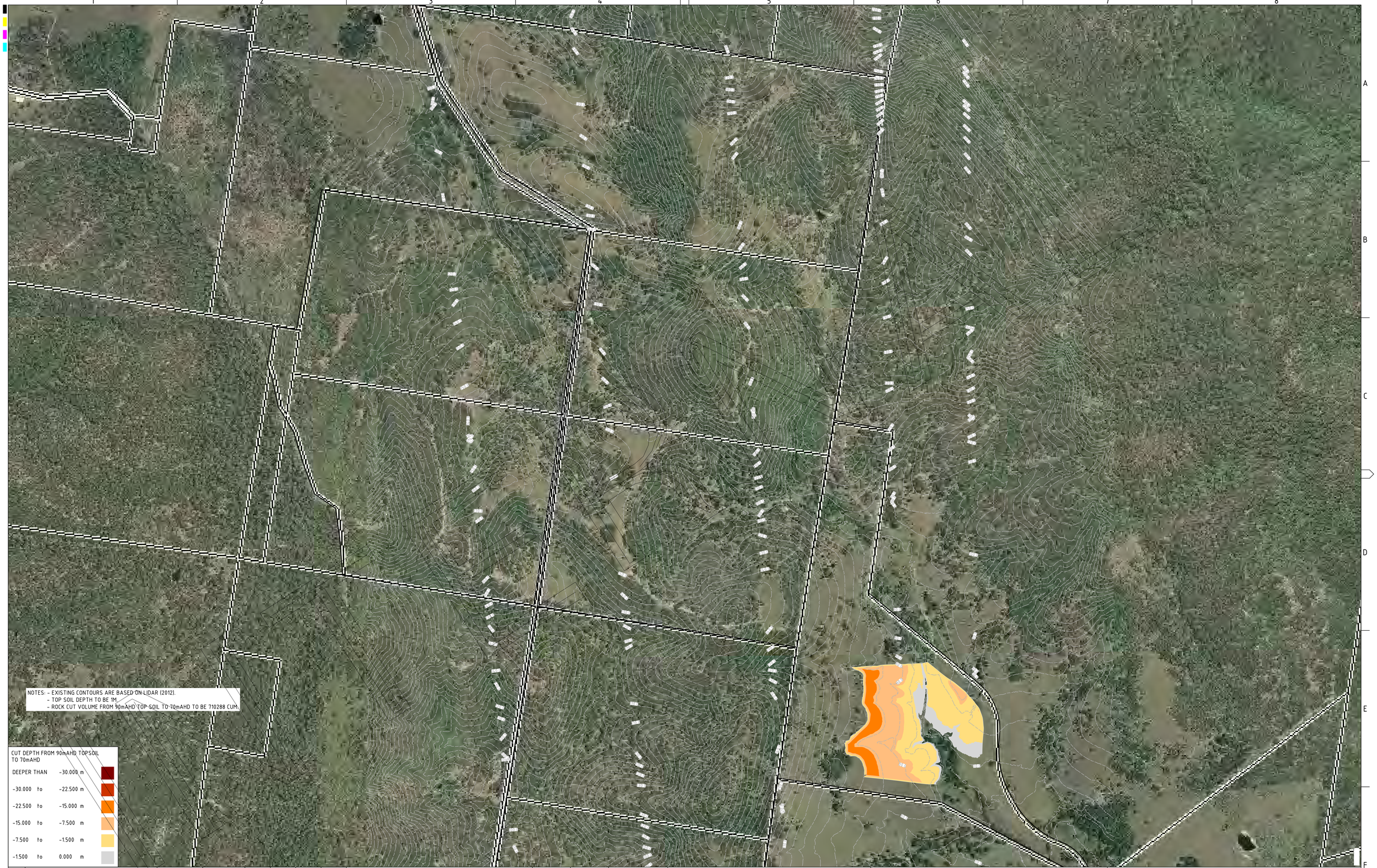
ROCK CUTTING ANALYSIS
(TUFF)

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706007	PS01	R01	PS01-JZ01	A

DRAWING ID: P1706007-PS01-R01-JZ01

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A1 / A3 LANDSCAPE (A1LC_v02.0.01)



REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
A	INITIAL RELEASE	16/02/2018	CT	AM	JF	

SCALE

GRID	DATUM	PROJECT MANAGER
MGA	mAHD	JF

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PROJECT NAME/PLANSET TITLE
PRE. RES. FEASIBILITY ASSESSMENT

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DRAWING TITLE
ROCK CUTTING ANALYSIS
(AGGLOMERALE)

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706007	PS01	R01	PS01-JZ02	A

PRINTED: 16/02/2018 - USER: CTAN
A1 / A3 LANDSCAPE (A1LC_v02.0.01)
DRAWING ID: P1706007-PS01-R01-JZ02

10 Attachment B – Borehole and Monitoring Well Logs

PRELIMINARY DRAFT
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CLIENT	Pittman Building Pty Ltd		COMMENCED	18/10/2017	COMPLETED	26/10/2017	**REF BH101**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 1 OF 2
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Agglomerate	VEGETATION	Grass	PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	77.22 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 20.11 m depth	NORTHING		ASPECT	Southeast	SLOPE 2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T		Not Encountered		77.22 *1.00*				CL	CLAY, low plasticity, brown.			RESIDUAL SOIL
			2						Continued as Cored Borehole			
			4									
			6									
			8									
			10							D		
			12									
			14									
			16									
			18									
			20									
			22									
			24									

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - BOREHOLE

MARTENS 2.00 LIB.GLB Log MARTENS BOREHOLE P1706007BH101-BH104, MW02-MW04 V01.GPJ <<DrawingFile>> 16/02/2018 13:42 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Martens 2.00 2016-11-13 Prj: Martens 2.00 2016-11-13

CLIENT	Pittman Building Pty Ltd		COMMENCED	18/10/2017	COMPLETED	26/10/2017	**REF BH101**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 2 OF 2
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Agglomerate	VEGETATION	Grass	PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	77.22 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 20.11 m depth	NORTHING		ASPECT	Southeast	SLOPE 2%

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
					1.00		Continuation from non-cored borehole				
HQ3	Not Encountered	100	9 (91)	2	76.22		AGGLOMERATE, grey, pink, brown.	HW		1.04: DB 1.10-1.14: CS, Sandy clay 1.18-1.22: CS, Sandy clay 1.33: JT, 10°, SN, Pl, Ro 1.34-1.39: JTSet 3, 10°, Sandy clay FILLED, Pl 1.35-1.55: FZ, 2 - 45° 1.45-1.50: CS, Sandy clay 1.73-1.75: JTSet 2, 5°, SN, Pl, Ro 1.81-1.86: CS, Sandy clay 1.91-1.94: SZ, Sandy clay 2.00-2.10: DB 2.16-2.23: JTSet 2, 2°, CN, Pl, Ro 2.32: JT, 10°, CN, ST, Ro 2.38-2.45: JTSet 2, 2 - 5°, CN, Pl, Ro 2.90: DB 3.18: HB 3.28: JT, 2°, VNR, Pl, Ro 3.40: JT, 5°, SN, Pl, Ro 3.54: JT, 5°, gravelly clay SN, Pl, Ro 3.70: VN, 45°, Carbonate 3.70-3.75: VNSet 2, 5°, Carbonate 3.82-4.00: FZ, 2 - 45° 4.34: JT, 5°, CN, UN, Ro 4.57: JT, 5°, CN, UN, Ro 4.68-5.17: FZ, 5 - 75°, SN, ST 5.40: JT, SN, IR, Ro 5.56: JT, 45°, CN, Pl, Ro 5.65: JT, 2°, SN, UN, Ro 5.90-6.00: DB 6.10-6.15: VN, 85°, Carbonate, Pl 7.15-7.25: VNSet 2, 70°, Carbonate, Pl 7.52: JT, 45°, SN, Pl, Ro 7.62: JT, 2°, CN, Pl, Ro 8.20: JT, 2°, CN, UN, Ro 8.39: JT, 2°, CN, Pl, Ro 8.66-8.69: JTSet 2, 2°, CN, Pl, Ro 8.91-8.93: JTSet 2, 2°, CN, Pl, Ro 9.10: JT, 2°, CN, Pl, Ro 9.26-9.60: DB, Sandy clay 9.75-9.98: JTSet 4, 2°, CN, Pl, Ro 10.22: JT, 45°, CN, ST, Ro 10.47: JT, 5°, SN, UN, Ro 10.59: JT, 5°, SN, UN, Ro 10.66: JT, 5°, SN, UN, Ro 10.72: JT, 5°, SN, UN, Ro 10.82: JT, 5°, SN, UN, Ro 11.00-11.58: SZ, 5 - 90°, Sandy clay 11.95-12.20: FZ, 2 - 80°, Sandy 12.45-12.76: JTSet 4, 2°, Sandy CT, Pl, VR 12.75-19.23: SZ, 2 - 80°, Sandy clay	
		100	88 (100)					MW			
		100	76 (82)	4							
		100	64 (64)								
		100	96 (100)	6							
		100	62 (88)	8							
		100	60 (92)	10							
		100	50 (75)	12				HW			
		100	55 (68)								
		100	22 (39)	14							
		100	14 (43)								
		100	0 (21)	16							
		100	0 (59)	18							
		100	43 (43)		*19.20*		NO CORE				
		100	15 (43)	20	57.92 *20.11*		AGGLOMERATE, grey, pink.	MW			
					57.11		Hole Terminated at 20.11 m (Target depth reached)				
				22							
				24							

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - BOREHOLE

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CLIENT	Pittman Building Pty Ltd		COMMENCED	11/10/2017	COMPLETED	17/10/2017	**REF BH102**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 1 OF 3
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Latite Tuff	VEGETATION	Grass	PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	120.34 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 40.06 m depth	NORTHING		ASPECT	West	SLOPE <10%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T				120.34 ***0.80***				CL	CLAY, low plasticity, brown.			RESIDUAL SOIL
									Continued as Cored Borehole	D		

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - BOREHOLE

MARTENS 2.00 LIB.GLB Log MARTENS BOREHOLE P1706007BH101-BH104, MW02-MW04 V01.GPJ <<DrawingFile>> 16/02/2018 13:42 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Martens 2.00 2016-11-13 Prj: Martens 2.00 2016-11-13

CLIENT	Pittman Building Pty Ltd		COMMENCED	11/10/2017	COMPLETED	17/10/2017	**REF BH102**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 2 OF 3
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Latite Tuff	VEGETATION	Grass	PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	120.34 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 40.06 m depth	NORTHING		ASPECT	West	SLOPE <10%

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
					0.80		Continuation from non-cored borehole				
HQ3	15/12/17	100	0 (70)	2	119.54		TUFF, fine grained, aphantic, dark grey.	SW / FR		0.85: JT, 40°, SN, Pl, Ro 0.90-1.28: JT, 90°, VNR, UN, Ro 1.13: HB 1.28: DB 1.47: JT, 2°, CN, Pl, Ro 1.60-3.60: JT Set 5, 40°, SN, Pl, Ro, JT at 1.6m - Carbonate infill, closed. 2.17: HB 2.30: DB 2.44-2.59: JT Set 2, 70° 2.60: JT, 70°, CN, Pl, Ro 2.76: JT, 30°, Clay CT, Pl, Ro 2.90: JT, 15°, VNR, UN, Ro 3.00-3.10: JT, 0°, SN, Pl, Ro 3.10-3.55: JT, 90° 3.10-3.60: JT Set 2, 40°, SN, Pl, Ro 3.10-3.60: JT Set 2, 80 - 90° 3.66-3.80: JT Set 2, 5°, CT, Pl, Ro 3.83: JT, 50°, CT, Pl, Ro 3.90-4.10: JT, 85°, VNR, Pl, Ro 4.10: DB 4.20: JT, 35°, VNR, Pl, Ro 4.50: JT, 5°, Clay CT, Pl, Ro 4.80: HB 4.92: HB 5.04: HB 5.09: HB 5.10: JT, 15°, SN, Pl, Ro 5.20: JT, 5°, SN, Pl, Ro 5.20-5.85: JT Set 3, 85°, Clay CT, Pl, Ro 5.50-6.00: SZ 6.28-6.55: JT Set 3, 5°, SN, Pl, Ro 6.45-6.75: JT90, VNR, Pl, Ro 6.75: DB 6.75-6.82: JT85, VNR, Pl, Ro 6.82-7.49: JT Set 7, 2 - 5°, SN, Pl, Ro 7.60: DB 7.74: DB 7.74-8.74: JT Set 11, 2 - 5°, SN, Pl, Ro 8.50-8.86: JT, 85 - 90°, Clay CT, Pl, Ro 8.86: DB 9.15-9.76: JT, 85°, VNR, Pl, Ro 9.25-9.92: JT Set 7, 5 - 10°, SN, Pl, Ro 9.90-10.55: JT, 85°, VNR, Pl, Ro 10.05-11.10: JT Set 13, 2 - 5°, SN, Pl, Ro 10.20-10.70: JTSet 3, 50°, CN, Pl, Ro 10.88: JT, 35°, SN, Pl, Ro 11.35: DB 11.76-12.78: JT Set 5, 5°, SN, Pl, Ro 13.14: JT, 60°, SN, ST, Ro 13.53-15.50: JT Set 13, 2 - 5°, SN, Pl, Ro 13.80-13.83: VN Set 2, 30°, Carbonate, Pl 14.22: DB 14.65-14.83: JT, 90°, VNR, Pl, Ro 15.66: DB 15.75: HB 16.05: HB 16.23: HB 16.46: HB 16.65-16.75: JT Set 2, 5°, SN, Pl, Ro 16.86: HB 17.17: HB 17.54-17.60: DB 17.71: JT, 10°, SN, Pl, Ro 17.94: JT, 2°, SN, Pl, Ro 18.05: DB 18.17: DB 18.24-18.60: JT Set 3, 25°, CN, Pl, Ro 18.67-18.76: DB 18.88-19.52: JT Set 3, 5°, SN, Pl, Ro 19.24: HB 19.60: HB 19.71-20.30: DB 20.41: HB 20.48: HB 20.70: HB 20.84: DB 20.90: HB 21.23: HB 21.41: HB 21.46: HB 21.57: HB 21.70-22.61: JT Set 3, 5 - 10°, CN, Pl, Ro 21.75-22.00: JT, 80°, Carbonate 22.15-22.20: JT, 90°, VNR, Pl, Ro	
		100	80 (100)								
		100	10 (91)	4							
		100	50 (100)								
		100	60 (60)	6							
		100	82 (100)								
		100	35 (96)	8							
		100	38 (98)	10							
		100	91 (100)	12							
		100	59 (95)	14				FR			
		100	95 (100)	16							
		100	88 (100)	18							
		100	100 (100)								
		100	81 (96)	20							
		100	98 (100)	22							
		100	72 (100)	24							

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - BOREHOLE

MARTENS 2.00 LIB.GLB Log MARTENS CORED BOREHOLE P1706007BH101-BH104, MW02-MW04 V01.GPJ <<DrawingFile>> 16/02/2018 14:28 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Martens 2.00 2016-11-13 Prj: Martens 2.00 2016-11-13

CLIENT	Pittman Building Pty Ltd		COMMENCED	11/10/2017	COMPLETED	17/10/2017	**REF BH102**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 3 OF 3
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Latite Tuff	VEGETATION	Grass	PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	120.34 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 40.06 m depth	NORTHING		ASPECT	West	SLOPE <10%

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
HQ3		100	72 (100)	26			TUFF, fine grained, aphantic, dark grey.	FR		22.32: HB 22.52: HB 22.65: JT, 5°, SN, Pl, Ro 22.82: DB 22.90: HB 23.23: HB 23.49: HB 23.70: DB 23.86-24.53: JT Set 4, 5°, CN, Pl, Ro 24.42: HB 25.27: DB 25.51-27.10: JT Set 8, 2 - 5°, CN, Pl, Ro 26.65-27.80: JT Set 9, 70 - 80°, Carbonate, Pl 27.20: DB 27.37-27.50: JT Set 2, 70°, Clay CT, Pl, Ro 27.42-28.46: JT Set 4, 2°, CN, Pl, Ro 28.00-28.08: JT, 30°, CN, Pl, Ro 28.40: VN, 70°, Carbonate 28.70: DB 28.74-29.61: JT, 80°, Carbonate 29.00-29.10: JT, 70°, CN, Pl, Ro 29.30-30.11: JT Set 7, 2 - 5°, CN, Pl, Ro 29.40-30.00: JT, 85°, Clay CT, Pl, Ro 30.20: DB 30.20-30.25: JT, 90°, CN, Pl, Ro 30.25: JT, 40°, CN, Pl, Ro 30.45: JT, 30°, CN, Pl, Ro 30.55: JT, 20°, SN, Pl, Ro 30.70-31.44: JTSet 2, 60°, Carbonate 30.73: HB 31.25: HB 31.50: JT, 70° 31.58: HB 31.85: DB 32.08: HB 32.21: HB 32.30: JT, 60°, SN, Pl, Ro 32.48: JT, 2°, SN, Pl, Ro 32.73-32.80: DB 33.00: DB 33.10: HB 33.22: HB 33.40: DB 33.67-34.18: JT Set 2, 15°, CN, UN, Ro 34.25: VN, 15°, Carbonate 34.35: DB 34.72: JT, 10°, CN, Pl, Ro 35.18: DB 35.30-35.33: VN, 10°, Carbonate 36.15: HB 36.33: HB 36.38: HB 37.08: HB 37.29: HB 37.57: HB 37.89: HB 38.10: JT, 5°, SN, UN, Ro 38.28-38.55: VN Set 2, 10 - 20°, Carbonate 38.43: HB 38.75: HB 39.06: HB 39.17: JT, 65°, CN, Pl, Ro 39.92: HB 40.05: JT, 2°, CN, Pl, Ro	
		100	60 (100)	28							
		100	15 (98)	30							
		100	91 (100)	32							
		100	90 (95)	34							
		100	100 (100)	36							
				38							
				40	*40.06* 80.28		Hole Terminated at 40.06 m (Target depth reached)				
				42							
				44							
				46							
				48							

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CLIENT	Pittman Building Pty Ltd		COMMENCED	26/10/2017	COMPLETED	01/11/2017	**REF BH103**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 1 OF 3
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Latite Tuff	VEGETATION		PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	168.47 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 36.06 m depth	NORTHING		ASPECT	East	SLOPE 2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T			0	168.47				CL	CLAY, low plasticity, black.			RESIDUAL SOIL
			2									
			4									
			6									
				6.70 161.77				GC	Gravelly CLAY, low plasticity, black.			WEATHERED ROCK
				7.70								
			8						Continued as Cored Borehole			
			10									
			12							D		
			14									
			16									
			18									
			20									
			22									
			24									

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CLIENT	Pittman Building Pty Ltd		COMMENCED	26/10/2017	COMPLETED	01/11/2017	**REF BH103**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Latite Tuff	VEGETATION		Sheet 2 OF 3
							PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	168.47 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 36.06 m depth	NORTHING		ASPECT	East	SLOPE 2%

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				2							
				4							
				6							
					7.70		Continuation from non-cored borehole				
HQ3		100	0 (50)	8	160.77		TUFF, fine grained, aphanitic,brown.	EW - HW		7.70-20.50: Pl, Ro, Fault zone comprising extremely closely - closely joints (set 170) at 2°-5°, moderately wide spaced joints (set 15) at 40°-70°, closed joints (2°-80°) and occasional carbonate vein (5°-90°).	
		100	0 (50)								
		100	0 (87)	10				EW - HW			
		100	0 (50)	12							
		100	0 (100)								
		100	0 (92)	14							
		100	0 (100)	16							
		100	0 (87)								
		100	0 (21)	18							
		100	7 (89)		*19.00* 149.47		dark grey, brown.	SW			
		100	0 (70)	20				HW - MW - SW		20.60: JT, 5°, SN, Pl, Ro 20.75: JT, 20°, SN, ST, Ro 20.90-22.60: JTSet 28, 10°, VNR, Pl, Ro	
		100	20 (100)	22						22.74: DB 23.00-23.25: JTSet 3, 15°, VNR, Pl, Ro 23.25-26.25: JTSet 5, 70°, SN, Pl, Ro, 3 of 5 joints in set are closed. 23.60-23.75: JTSet 3, 2°, SN, UN, Ro 23.90-24.60: JTSet 6, 5°, CN, Pl, Ro 24.35: VN, 5°, Carbonate	
		100	50 (100)								
		100	50 (95)	24				MW - SW			

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CLIENT	Pittman Building Pty Ltd		COMMENCED	26/10/2017	COMPLETED	01/11/2017	**REF BH103**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 3 OF 3
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Latite Tuff	VEGETATION		PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	168.47 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 36.06 m depth	NORTHING		ASPECT	East	SLOPE 2%

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
HQ3	15/12/17	100 100	25 (100)	26			TUFF, fine grained, aphanitic,brown.	MW		24.65: JT, 15°, VNR, ST, Ro 24.80: DB 25.00-26.80: JTSet 19, 5 - 15°, SN-VN, Pl, Ro 25.60-26.00: JT, 90°, VNR, Pl, Ro	
		100	15 (100)							26.40-26.60: JT, 90°, VNR, Pl, Ro 26.60-26.80: JT, 90°, closed	
		100	80 (100)	28				FR - SW		27.19: DB 27.55: HB 27.89: HB 28.05: JT, 2°, SN, Pl, Ro 28.17: DB 28.28: JTSet 3, 5°, CN, Pl, Ro 28.75-29.42: JTSet 3, 5 - 10°, CN-SN, Pl, Ro	
		100	80 (97)							29.62: HB	
		100	40 (100)	30						30.07: HB 30.23: DB 30.42: JTSet 3, 15°, SN-VN, Pl, Ro 30.46: JTSet 3, 15°, SN-VN, Pl, Ro 30.63-30.66: VN, 5°, Carbonate 30.75: VN, 60°, Carbonate 31.00-31.35: JTSet 3, 15°, SN-VN, Pl, Ro 31.10: DB 31.35: DB 31.60-31.75: HB 31.80: JT, Carbonate FILLED, Pl, closed 31.90: HB 32.00: HB 32.10-32.20: JTSet 2, 2°, CN, Pl, Ro 32.30-32.37: JTSet 3, 10 - 15°, SN, Pl, Ro 32.45: DB 32.70: HB 32.80: HB 33.05: HB 33.12: JT, 5°, SN, Pl, Ro 33.29: HB 33.35: JT, 70°, CN, Ro 33.57: JTSet 3, 10 - 15°, CN-SN, Pl, Ro 33.64: JTSet 3, 10 - 15°, CN-SN, Pl, Ro 33.75: JTSet 3, 10 - 15°, CN-SN, Pl, Ro 33.90-34.00: DB 34.15: JT, 15°, CN, Pl, Ro 34.55: JT, 5°, VNR, Pl, Ro 34.82: JT, 60°, VNR, Pl, Ro 34.84: JT, 15°, SN, Pl, Ro 35.07: HB 35.50: JT, 30°, VNR, Pl, Ro 35.58: DB 35.90: JT, 5°, CN, Pl, Ro	
		100	0 (65)								
		100	86 (100)	32							
		100	98 (98)								
		100	81 (100)	34							
		100	86 (100)	36	*36.06* 132.41		Hole Terminated at 36.06 m (Target depth reached)				
				38							
				40							
				42							
				44							
				46							
				48							

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CLIENT	Pittman Building Pty Ltd		COMMENCED	18/10/2017	COMPLETED	26/10/2017	**REF BH104**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 1 OF 3
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Latite Tuff	VEGETATION	Grass	PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	217.8 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 35.00 m depth	NORTHING		ASPECT	East	SLOPE 2-5%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T				217.80 ***0.80***				CL	CLAY, low plassticity, brown.			RESIDUAL SOIL
									Continued as Cored Borehole	D		

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Engineering Log - BOREHOLE

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CLIENT	Pittman Building Pty Ltd	COMMENCED	18/10/2017	COMPLETED	26/10/2017	**REF BH104**	
PROJECT	Preliminary Resource Feasibility Assessment	LOGGED	AM	CHECKED	RE	Sheet 2 OF 3	
SITE	Blind Creek Road, Elsderslie, NSW	GEOLOGY	Latite Tuff	VEGETATION	Grass	PROJECT NO. P1706007	
EQUIPMENT	4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	217.8 m	DATUM	AHD
EXCAVATION DIMENSIONS	Ø100 mm x 35.00 m depth	NORTHING		ASPECT	East	SLOPE	2-5%

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
					0.80		Continuation from non-cored borehole				
HQ3		100	0 (80)		217.00		TUFF, fine grained, aphanitic, dark grey, brown.	HW		0.80-5.45: SZ, Shear zone comprising closely spaced joints (set 19) at 5° - 20° and closely - moderately wide spaced joints (set 8) at 70° - 85°.	
		100	0 (90)	2						1.55: DB	
		100	0 (100)					HW - MW		2.35: DB 2.70: DB	
		100	0 (95)	4						3.35: DB	
		100	0 (95)							4.70: DB	
		100	79 (100)	6				SW		5.35: DB 5.50-5.90: JTSet 3, 2°, CN, Pl, Ro 6.40-6.90: JTSet 2, 50°, VNR, Pl, Ro 6.68: JT, 5°, VNR, Pl, Ro 7.07-7.28: VNSet 3, 2 - 15°, Carbonate 7.13: JT, 5°, SN, Pl, Ro 7.20: JT, 70°, VNR, IR, Ro	
		100	0 (70)	8				MW		7.50-7.60: DB 7.67: JT, 2°, VNR, UN, Ro 7.80: JT, 70°	
		100	7 (100)					SW		7.80-9.00: SZ, Shear zone comprising very closely - closely spaced joints (set12) at 2°-10°, moderatey wide spaced joints (set 2) at 80°-90° and closed joints (set 6) at 45°.	
		100	30 (97)	10						8.20: DB 9.70: DB 10.00-10.07: JTSet 3, 80°, VNR, Pl, Sm	
		100	73 (95)	12				MW SW		11.30: JT, 5°, SN, ST, Ro	
		100	63 (90)							11.90: JT, 50°, SN, Pl, Ro 12.15: HB 12.40: JT, 20°, SN, IR, Ro 12.60: JT, 30°, VNR, Pl, Sm	
		100	66 (100)	14				MW SW		12.70: DB 12.80: HB 13.00-13.40: Shear zone comprising extemely closely spaced joints (set 5) at 80°. 13.50-13.80: JTSet 4, 5°, SN, UN, Ro 13.90: JT, 20°, SN, Pl, Ro 14.33: JT, 50°, VNR, Pl, Ro 14.46: JT, 5°, VNR, Pl, Ro 14.81: HB	
		100	0 (95)	16						14.90: JT, 5°, SN, UN, Ro 15.00: JT, 20°, SN, Pl, Ro 15.30: JT, 20°, VNR, Pl, Ro	
		100	79 (93)	18				MW		15.68: HB 15.80: HB 16.45: DB 16.45-17.60: SZ	
		100	70 (89)	20				SW - FR		17.60: DB 17.60-17.70: JTSet 3, 40°, Carbonate 18.10: JT, 10°, SN, Pl, Ro 18.20: VN, Carbonate 18.45: JT, 10°, SN, UN, Ro 18.65-18.70: JTSet 2, 5°, CN, UN, Ro 18.91: VN, 50°, Carbonate 19.00: DB 19.18-19.40: VNSet 2, 5°, Carbonate 19.60: HB 19.70: JT, 5°, SN, Pl, Ro 20.00-23.90: JTSet 14, 45 - 60°, Carbonate 20.35-21.10: JTSet 5, 5 - 10°, CN, Pl, Ro 20.45-20.75: JTSet 2, 80°, SN, Pl, Ro 21.25: DB	
		100	53 (100)	22						21.50-21.85: JTSet 3, 70°, SN, Pl, Ro 22.08: JT, 5°, CN, Pl, Ro 22.35: VN, 15°, Carbonate 22.50: JT, 15°, CN, Pl, Ro 22.60: HB 22.75: JT, 5°, SN, Pl, Ro	
		100	0 (30)	24	*24.00*					23.00-23.10: JT, 85°, SN, Pl, Ro 23.05: JT, 65°, SN, Pl, Ro 23.12: JT, 10°, VNR, Pl, Ro 23.21: JT, 10°, SN, UN, Ro 23.48-24.00: SZ, Shear zone comprising extremely to very	
		100	88 (100)		193.80		Dark grey.				
		100									

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CLIENT	Pittman Building Pty Ltd	COMMENCED	18/10/2017	COMPLETED	26/10/2017	**REF BH104**	
PROJECT	Preliminary Resource Feasibility Assessment	LOGGED	AM	CHECKED	RE	Sheet	3 OF 3
SITE	Blind Creek Road, Elsderslie, NSW	GEOLOGY	Latite Tuff	VEGETATION	Grass	PROJECT NO.	P1706007
EQUIPMENT	4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	217.8 m	DATUM	AHD
EXCAVATION DIMENSIONS	Ø100 mm x 35.00 m depth	NORTHING		ASPECT	East	SLOPE	2-5%

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
HQ3	15/12/17	100	98 (100)	26			TUFF, fine grained, aphanitic, dark grey, brown.	SW - FR		close joints (set 5) at 80°-90°. 24.24: JT, 5°, CN, Pl, Ro 24.42: HB 24.69: DB 25.40-25.46: DB 25.62: VN, Carbonate 25.62-25.65: JTSet 3, 5°, SN, UN, Ro 25.73: JT, 50°, SN, Pl, Ro 26.18: HB 26.24: JT, 5°, SN, Pl, Ro 26.35-26.44: JTSet 3, 10 - 20°, CN, UN, Ro 26.63: JT, 2°, CN, Pl, Ro 26.76-26.77: JTSet 2, 2°, VNR, UN, Ro 26.84: JT, 10°, VNR, Pl, Ro 27.12: JT, 5°, CN, Pl, Ro 27.30: DB 27.40: JT, 10°, SN, Pl, Ro 27.60: JT, 40°, CN, Pl, Ro 27.75: HB 27.89: HB 27.95: DB 28.20: HB 28.40-28.60: JTSet 2, 5 - 20°, CN, ST, Ro 28.90: HB 29.07: DB 29.16: HB 29.35-29.45: JTSet 2, 10°, CN, ST, Ro 29.40: HB 29.50-29.68: DB 29.88: DB 30.17: HB 30.30: JT, 10°, CN, Pl, Ro 30.50-30.54: JTSet 2, 10 - 15°, SN, UN, Ro 30.95: JT, 5°, SN, Pl, Ro 31.12: HB 31.22: HB 31.28: JT, 15°, SN, Pl, Ro 31.40: JT, 20°, Carbonate CT, Pl, Ro 31.60: JT, 5°, CN, UN, Ro 31.70: DB 31.88: HB 32.15: JT, 5°, SN, CU, Ro 32.45: JT, 2°, CN, Pl, Ro 32.65: JT, 5°, SN, Pl, Ro 32.79: HB 32.89: HB 33.04: DB 33.13: DB 33.20: DB 33.35: JT, 5°, SN, Pl, Ro 33.50: JT, 2 - 40°, CN, ST, Ro 33.68: JT, 2°, CN, UN, Ro 33.85-34.00: DB 34.62: JT, 5°, CN, Pl, Ro 34.92: JT, 5°, SN, UN, Ro	
		100	71 (100)								
		100	100 (100)	28							
		100	92 (96)								
		100	95 (95)								
		100	89 (89)	30							
		100	97 (100)								
		100	89 (100)	32							
		100	93 (100)								
		100	87 (91)	34	*35.00*						
					182.80		Hole Terminated at 35.00 m (Target depth reached)				
				36							
				38							
				40							
				42							
				44							
				46							
				48							

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CLIENT	Pittman Building Pty Ltd		COMMENCED	11/10/2017	COMPLETED	17/10/2017	**REF MW01**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 1 OF 2
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Latite Tuff	VEGETATION	Grass	PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	120.34 m	DATUM AHD
EXCAVATION DIMENSIONS		40.06 m depth	NORTHING		ASPECT	West	SLOPE <10%

Drilling | **Sampling** | **Field Material Description**

METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS
				120.34				CL	CLAY, low plasticity, brown.			ID MW01 Static Water Level
				0.80								
				119.54					TUFF, fine grained, aphantic, dark grey.			
		Not Encountered	2									MW01
			4									
			6									Grout
			8									
			10									
			12									Bentonite
			14									
			16									
			18									
		15/12/17	20									
			22									
			24									

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Engineering Log - BOREHOLE

MARTENS 2.00 LIB.GLB Log MARTENS BOREHOLE P1706007BH101-BH104, MW02-MW04 V01.GPJ <<DrawingFile>> 16/02/2018 13:43 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Martens 2.00 2016-11-13 Prj: Martens 2.00 2016-11-13

CLIENT	Pittman Building Pty Ltd	COMMENCED	11/10/2017	COMPLETED	17/10/2017	**REF MW01**
PROJECT	Preliminary Resource Feasibility Assessment	LOGGED	AM	CHECKED	RE	Sheet 2 OF 2
SITE	Blind Creek Road, Elsderslie, NSW	GEOLOGY	Latite Tuff	VEGETATION	Grass	PROJECT NO. P1706007
EQUIPMENT	4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	120.34 m	DATUM AHD
EXCAVATION DIMENSIONS	40.06 m depth	NORTHING		ASPECT	West	SLOPE <10%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS ID MW01 Static Water Level
		Not Encountered	26						TUFF, fine grained, aphantic, dark grey.			Sand Screen
			28									
			30									
			32									
			34									
			36									
			38									
			40	*40.06*					Hole Terminated at 40.06 m (Target depth reached)			
			42									
			44									
			46									
			48									

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CLIENT	Pittman Building Pty Ltd		COMMENCED	26/10/2017	COMPLETED	01/11/2017	**REF MW02**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 1 OF 2
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Latite Tuff	VEGETATION		PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	168.47 m	DATUM AHD
EXCAVATION DIMENSIONS		36.06 m depth	NORTHING		ASPECT	East	SLOPE 2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS ID MW02 Static Water Level
		Not Encountered	0	168.47				CL	CLAY, low plasticity, black.			MW02
			2									Grout
			4									
			6									
				6.70 161.77				GC	Gravelly CLAY, low plasticity, black.			
				7.70 160.77					TUFF, fine grained, aphanitic,brown.			Bentonite
			8									
			10									
			12									
			14									
			16									
			18									
				19.00 149.47					dark grey, brown.			
			20									
			22									Sand Screen
			24									

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CLIENT	Pittman Building Pty Ltd		COMMENCED	26/10/2017	COMPLETED	01/11/2017	**REF MW02**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 2 OF 2
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Latite Tuff	VEGETATION		PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	168.47 m	DATUM AHD
EXCAVATION DIMENSIONS		36.06 m depth	NORTHING		ASPECT	East	SLOPE 2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS ID MW02 Static Water Level
		Not Encountered 15.47	26						TUFF, fine grained, aphanitic,brown.			
			28									
			30									
			32									
			34									
			36	36.06					Hole Terminated at 36.06 m (Target depth reached)			
			38									
			40									
			42									
			44									
			46									
			48									

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CLIENT	Pittman Building Pty Ltd	COMMENCED	18/10/2017	COMPLETED	26/10/2017	**REF MW03**
PROJECT	Preliminary Resource Feasibility Assessment	LOGGED	AM	CHECKED	RE	Sheet 1 OF 2
SITE	Blind Creek Road, Elsderslie, NSW	GEOLOGY	Latite Tuff	VEGETATION	Grass	PROJECT NO. P1706007
EQUIPMENT	4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	217.8 m	DATUM AHD
EXCAVATION DIMENSIONS	35.00 m depth	NORTHING		ASPECT	East	SLOPE 2-5%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS ID MW03 Static Water Level
		Not Encountered	0	217.80				CL	CLAY, low plassticity, brown.			MW03
				0.80 217.00					TUFF, fine grained, aphanitic, dark grey, brown.			Grout
			2									
			4									
			6									Bentonite
			8									
			10									
			12									
			14									
			16									
			18									
			20									
			22									Sand Screen
			24	*24.00* 193.80					Dark grey.			

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CLIENT	Pittman Building Pty Ltd		COMMENCED	18/10/2017	COMPLETED	26/10/2017	**REF MW03**
PROJECT	Preliminary Resource Feasibility Assessment		LOGGED	AM	CHECKED	RE	Sheet 2 OF 2
SITE	Blind Creek Road, Elsderslie, NSW		GEOLOGY	Latite Tuff	VEGETATION	Grass	PROJECT NO. P1706007
EQUIPMENT		4WD truck-mounted hydraulic drill rig	EASTING		RL SURFACE	217.8 m	DATUM AHD
EXCAVATION DIMENSIONS		35.00 m depth	NORTHING		ASPECT	East	SLOPE 2-5%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS ID Static Water Level
		Not Encountered 15/12/17	26 28 30 32 34	*35.00*					TUFF, fine grained, aphanitic, dark grey, brown.			MW03
			36 38 40 42 44 46 48						Hole Terminated at 35.00 m (Target depth reached)			

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Engineering Log - BOREHOLE

MARTENS 2.00 LIB.GLB Log MARTENS BOREHOLE P1706007BH101-BH104, MW02-MW04 V01.GPJ <<DrawingFile>> 16/02/2018 13:43 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Martens 2.00 2016-11-13 Prj: Martens 2.00 2016-11-13

11 Attachment C – Rock Core Photographs with labelled Units

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Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH101 (Dry) Lot 5 DP 1102521, Elderslie, NSW	Drawing No: BH101
Approved:	JF		
Date:	5.12.2017		
Scale	As above with vertical exaggeration.		Job No: P1706007JR01V02



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Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH101 (Wet) Lot 5 DP 1102521, Elderslie, NSW	Drawing No: BH101
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02



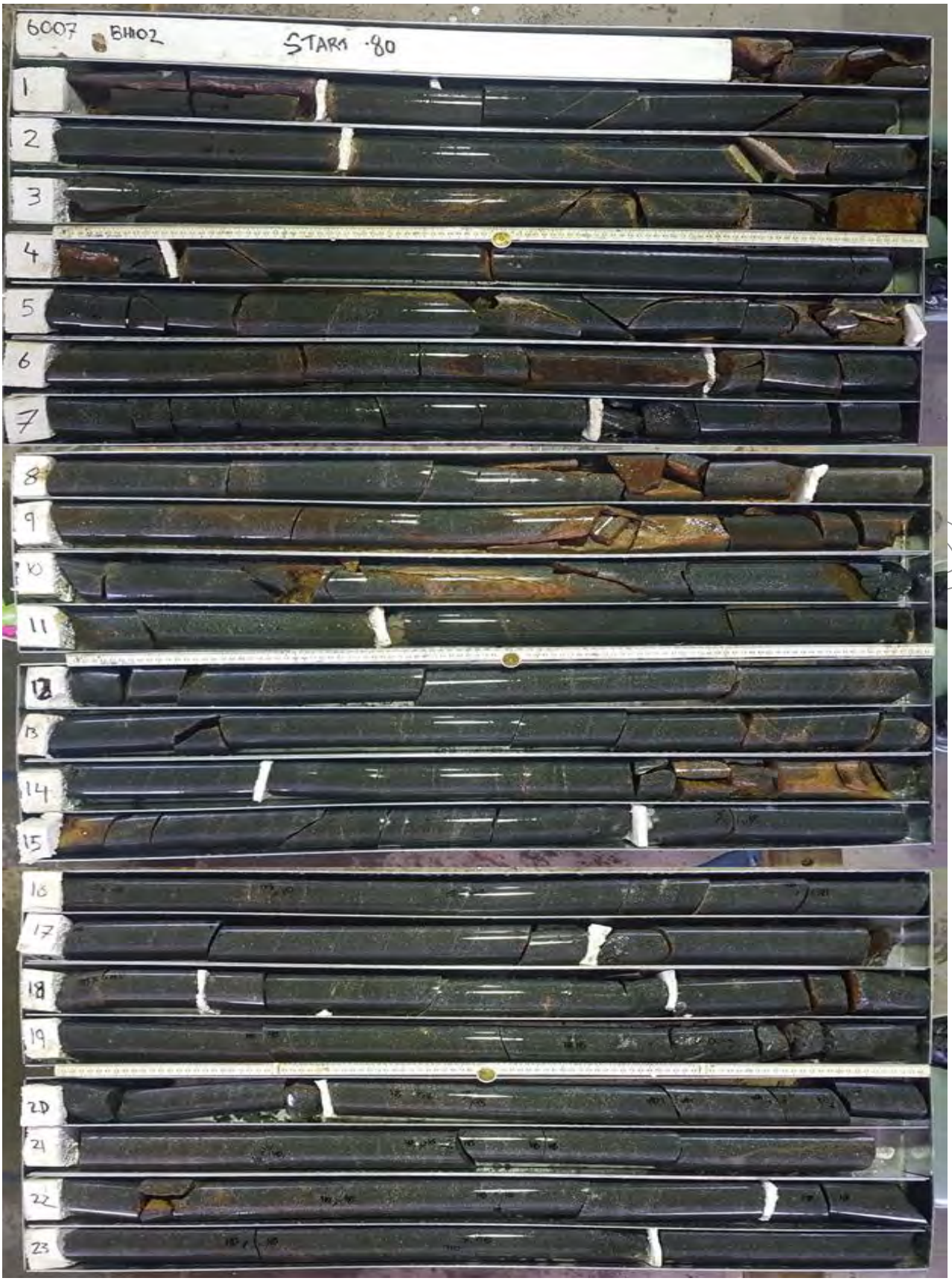
martens

Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH102: 0.8 m – 24.0 m (Dry) Lot 904 DP 1061259, Elderslie, NSW	Drawing No: BH102
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02



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Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH102: 24.0 m – 40.06 m (Dry) Lot 904 DP 1061259, Elderslie, NSW	Drawing No: BH102
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02



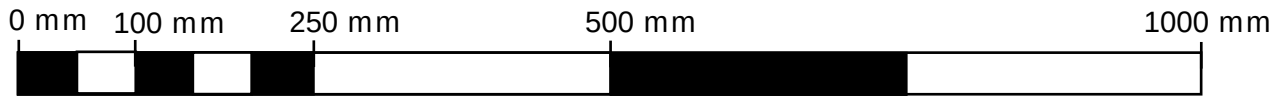
martens

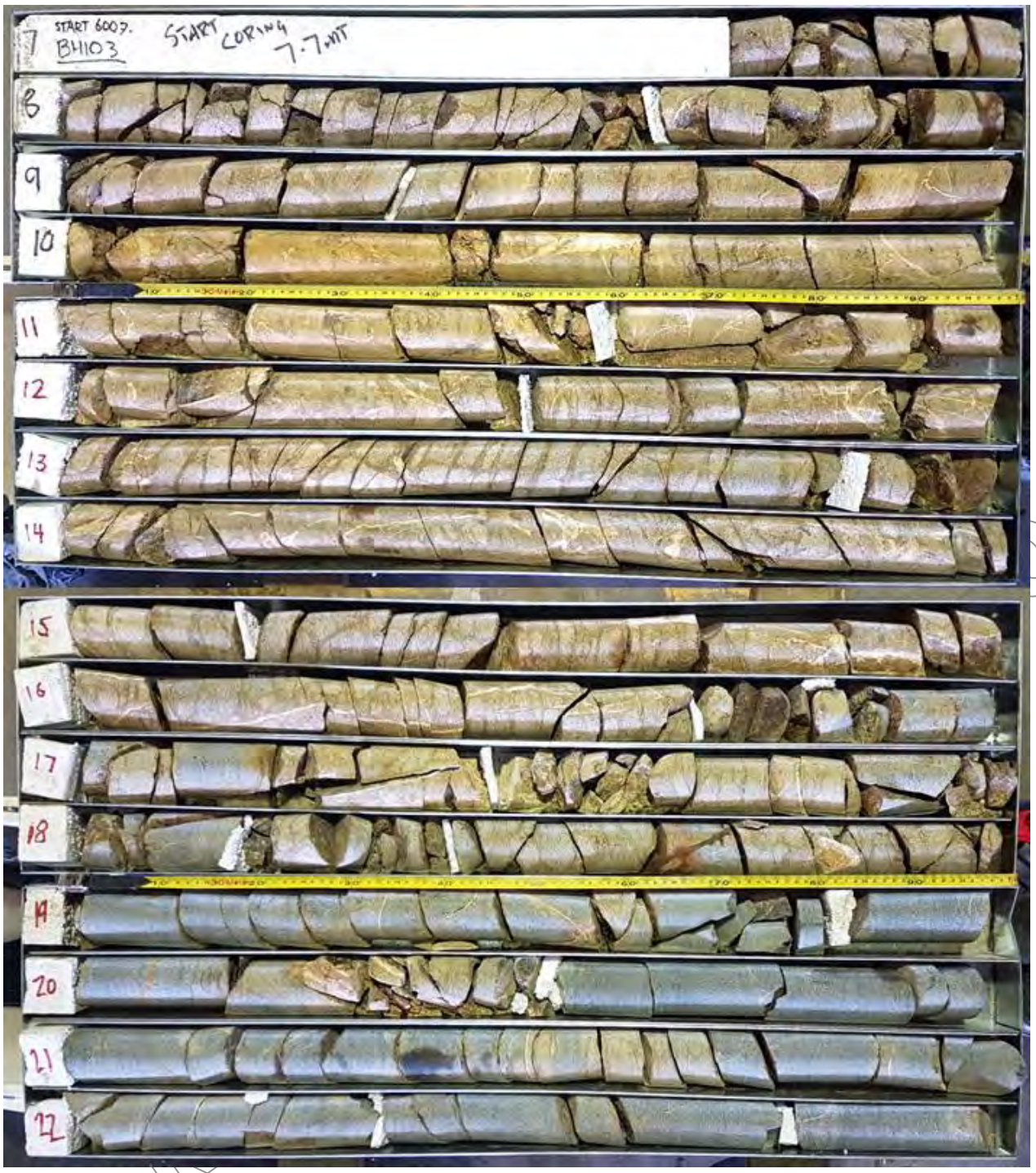
Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH102: 0.8 m – 24.0 m (Wet) Lot 904 DP 1061259, Elderslie, NSW	Drawing No: BH102
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02



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Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH102: 24.0 m – 40.06 m (Wet) Lot 904 DP 1061259, Elderslie, NSW	Drawing No: BH102
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02

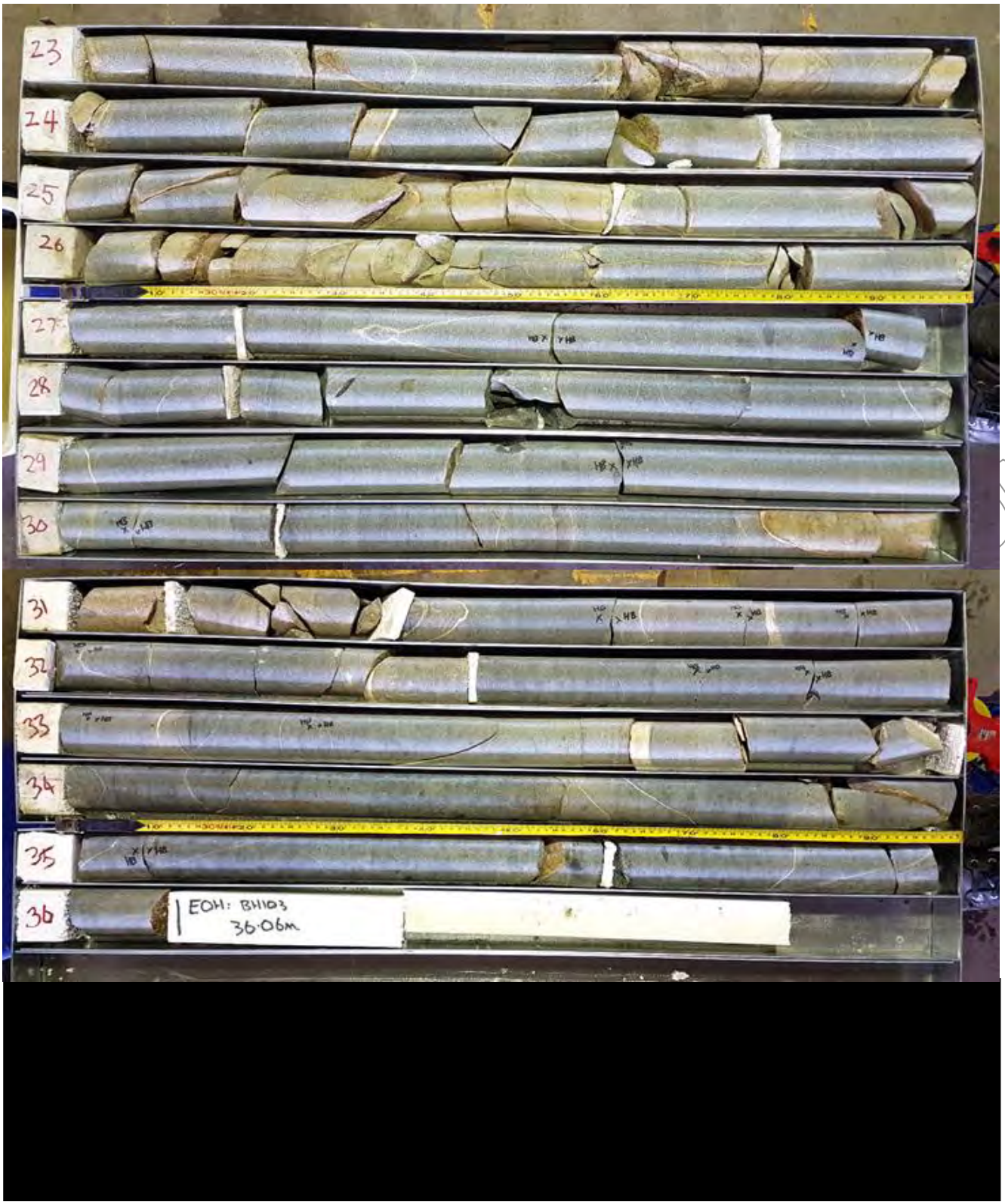




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Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH103: 7.7 m – 23.0 m (Dry) Lot 904 DP 1061259, Elderslie, NSW	Drawing No: BH103
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02

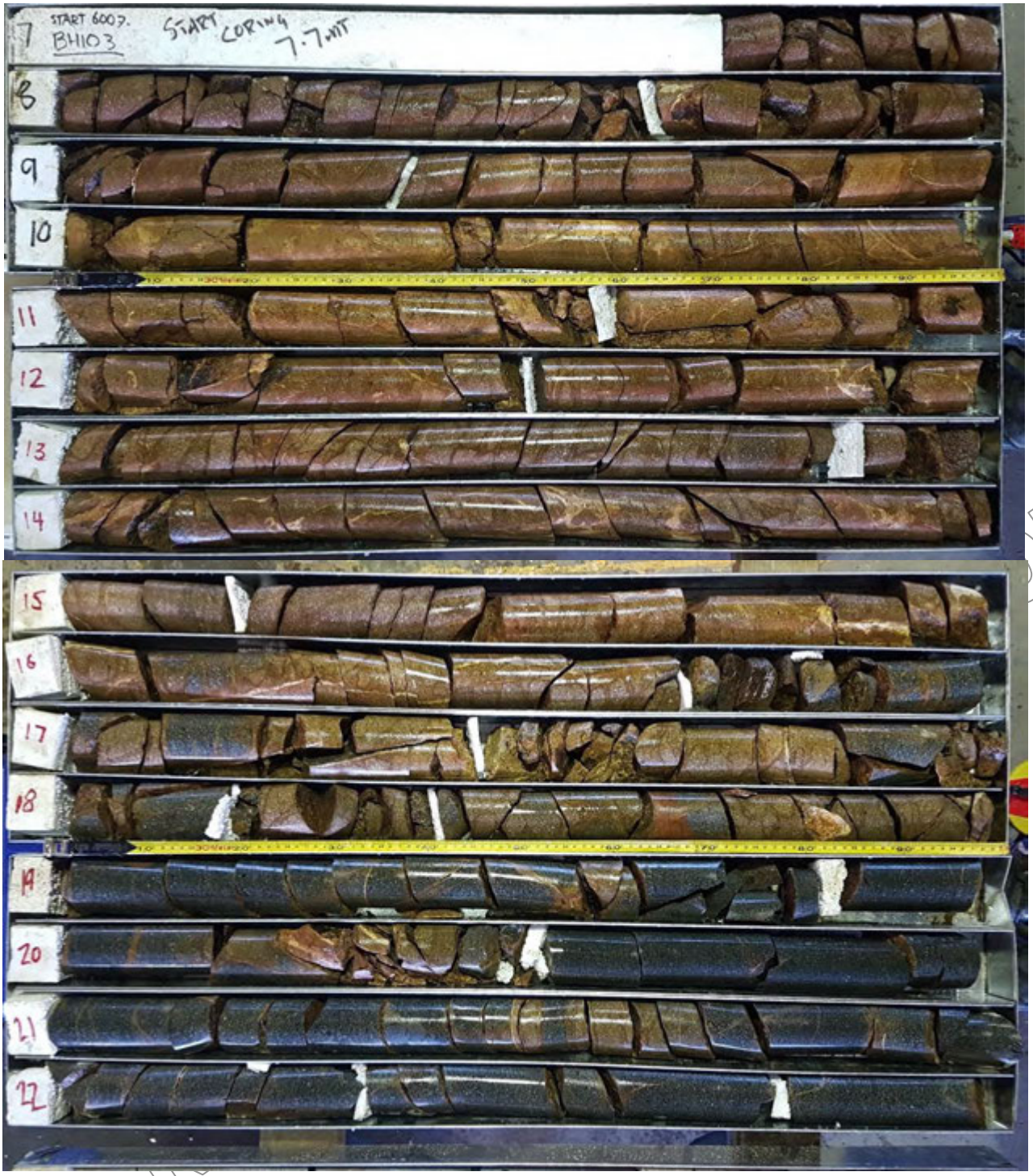
0 mm 100 mm 250 mm 500 mm 1000 mm



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Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH103: 23.0 m – 36.06 m (Dry) Lot 904 DP 1061259, Elderslie, NSW	Drawing No: BH103
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02

0 mm 100 mm 250 mm 500 mm 1000 mm



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Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH103: 7.7 m – 23.0 m (Wet) Lot 904 DP 1061259, Elderslie, NSW	Drawing No: BH103
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02



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Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH103: 23.0 m – 36.06 m (Wet) Lot 904 DP 1061259, Elderslie, NSW	Drawing No: BH103
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration		Job No: P1706007JR01V02

0 mm 100 mm 250 mm 500 mm 1000 mm



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Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH104: 0.8 m – 16.0 m (Dry) Lot 65 DP 752473, Elderslie, NSW	Drawing No: BH104
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02



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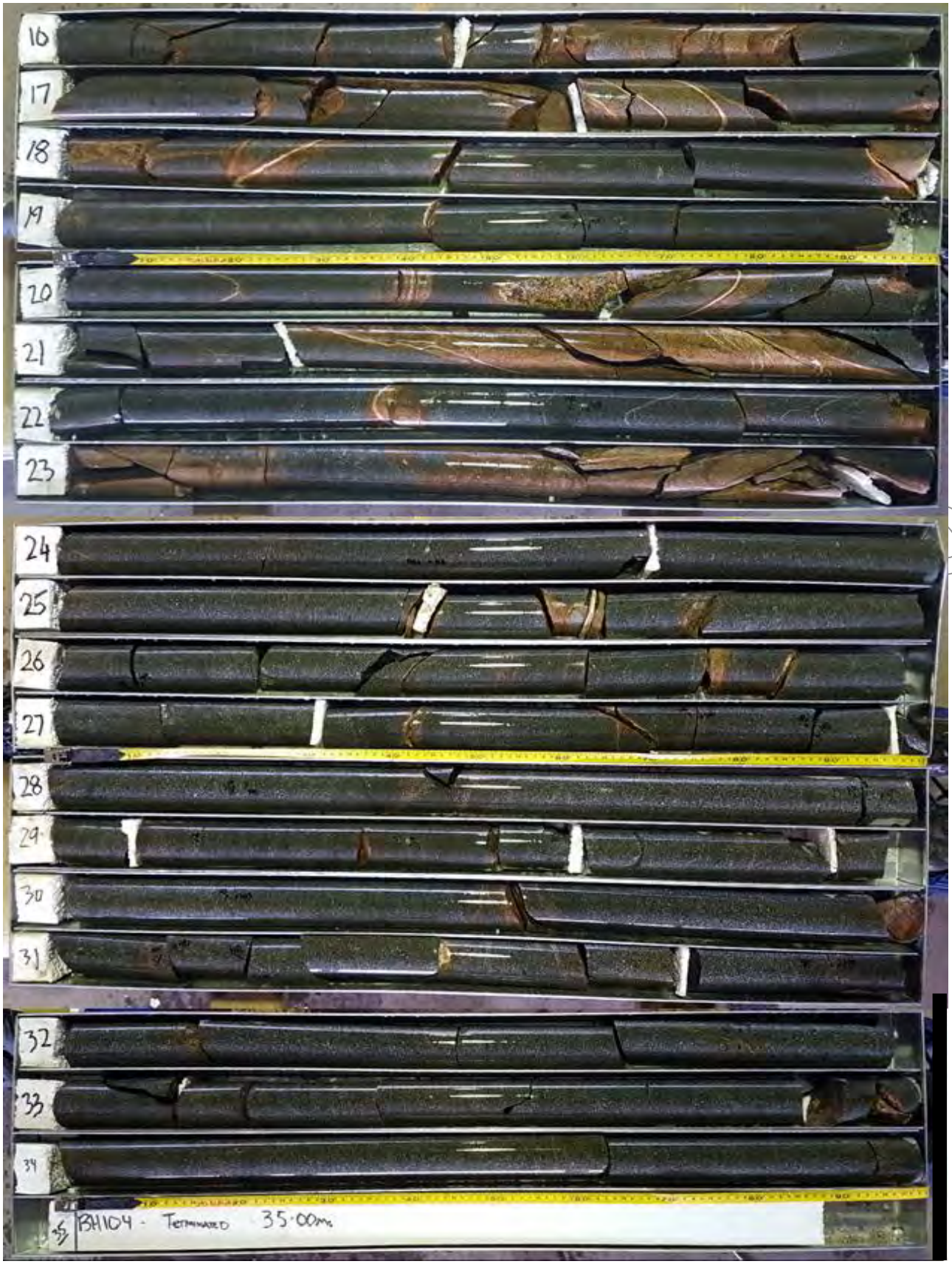
Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH104: 16.0 m – 35.0 m (Dry) Lot 65 DP 752473, Elderslie, NSW	Drawing No: BH104
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02

0 mm 100 mm 250 mm 500 mm 1000 mm



martens

Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH104: 0.8 m – 16.0 m (Wet) Lot 65 DP 752473, Elderslie, NSW	Drawing No: BH104
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02

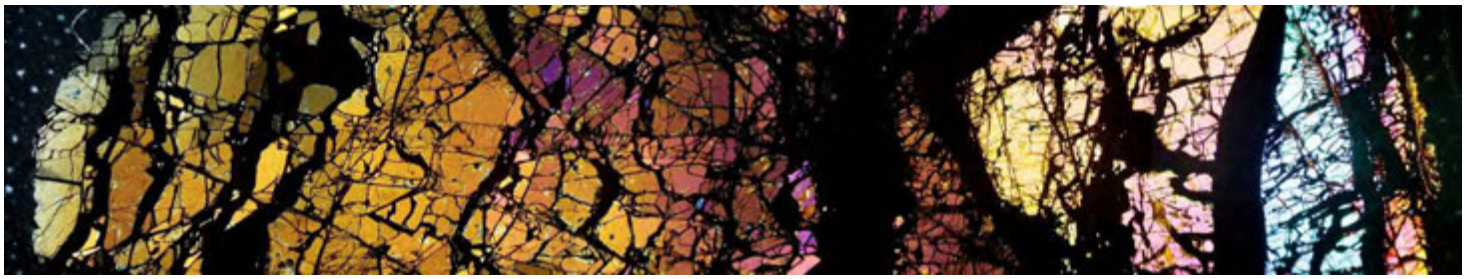


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Martens & Associates Pty Ltd ABN 85 070 240 890		Environment | Water | Wastewater | Geotechnical | Civil | Management	
Drawn:	AM	Photo of Rock Core BH104: 16.0 m – 35.0 m (Wet) Lot 65 DP 752473, Elderslie, NSW	Drawing No: BH104
Approved:	JF		
Date:	5.12.2017		
Scale:	As above with vertical exaggeration.		Job No: P1706007JR01V02

12 Attachment D – Petrographic Analysis Results

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Geochempet Services

ABN 980 6945 3445
PETROLOGICAL and GEOCHEMICAL CONSULTANTS
Principals: K.E. Spring B.Sc. (Hons), MAppSc and H.M. Spring B.Sc.

5/14 Redcliffe Gardens Drive
Clontarf, QLD 4019

Telephone: (07) 3284 0020

Email: info@geochempet.com
www.geochempet.com

PETROGRAPHIC REPORT
ON A CRUSHED AGGREGATE SAMPLE (6007/surface/0/R/1)
FROM A POTENTIAL HARD ROCK QUARRY

prepared for

MARTENS & ASSOCIATES
HORNSBY, NSW

Order Number:
Invoice Number: 0000
Client Ref: Andrew Mesthos

Issued by

K. E. Spring B.Sc.(Hons), MAppSc
1 September 2017

The material contained within this report may not be quoted other than in full. Extracts may be used only with expressed prior written approval of Geochempet Services.

Sample ID:	6007/surface/0/R/1	**Date Sampled**:	07/07/17
Material:	Crushed aggregate/rock	**Date Received**:	09/08/17
Sample Location:	Blind Creek Road, Elderslie	**Job No.**:	P139
Project Name:	P1706007 - Blind Creek Road, Elderslie		
Project:	Resource preliminary investigation		

Work Requested Petrographic analysis in relation to suitability for use as concrete aggregate, asphaltic aggregate, rail ballast and rip rap; petrographic assessment of potential for alkali-silica reactivity

Methods Account taken of ASTM C295 Standard Guide for *Petrographic Assessment of Aggregates for Concrete,* the AS2758.1 – 2014 *Aggregates and rock for engineering purposes part 1; Concrete aggregates (Appendix B),* the AS1141 Standard Guide for the *Method for sampling and testing aggregates*, of the content of the 2015 joint publication of the Cement and Concrete Association of Australia and Standards Australia, (HB 79-2015) entitled *Alkali Aggregate Reaction - Guidelines on Minimising the Risk of Damage to Concrete Structures in Australia*

Identification Latite tuff

Description

The supplied sample consisted of robust, hard, and angular to sub-angular fragments of rock with a dust coating. When washed, the dust coatings were easily removed and the fragments are seen to consist of reddish and medium dark grey variations, both unweathered and slightly weathered, still robust, latite tuff, displaying numerous phenoclasts of mainly light grey plagioclase and hornblende dispersed through a now very finely crystalline feldspathic matrix variably pigmented by hematite staining.

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Plate 1: Photograph of supplied crushed aggregate sample.

A thin section was prepared to permit detailed microscopic examination in transmitted polarised light of 9 randomly selected rock fragments. An approximate mineralogical composition of the aggregate, expressed in volume percent and based on a count of 100 widely spaced points falling within the sectioned fragments, is:

Durable Minerals

30%	feldspar phenoclasts
1%	hornblende as phenoclasts
3%	opaque oxide as phenoclasts
1%	clinopyroxene as phenoclasts
28%	finely microcrystalline feldspars and quartz as devitrification products after former vitric shards and micro-spherulites (3% microcrystalline quartz)
20%	coarser microcrystalline feldspars
3%	coarser microcrystalline quartz
1%	hematite
trace	zircon

The material contained within this report may not be quoted other than in full. Extracts may be used only with expressed prior written approval of Geochempet Services.

Weak &/or Deleterious Minerals

2% sericite/illite
8% chlorite
2% smectite clay
1% limonite/goethite

In thin section, the rock plainly displays textures of mildly flow-banded, tuffaceous style, involving many smoothly corroded, subhedral and broken phenoclasts (about 0.1 to 2 mm in size) dispersed through a now mosaic devitrified matrix (<0.01 mm to about 0.1 in grainsize) containing some ghosted vitric shards and micro-spherulites.

The most abundant phenoclasts are poorly twinned, zoned, prismatic plagioclase, with slight to moderately alteration to sericite. There are prismatic phenocrysts of fresh brown hornblende showing rim alteration (opacite rim alteration). The hornblende rim alteration appears to be related to devolitisation of hydrated minerals as response to decompression during magma ascent. Additional phenocrysts are former mafic silicates which are now completely altered to greenish-brown smectite clay or hematite. Other minor phenocrysts include K-feldspar, clear clinopyroxene and opaque oxide (magnetite and/or ilmenite).

The formerly vitroclastic matrix between the phenoclasts now consists of a microcrystalline mosaic of mainly feldspars, but some hidden quartz (in ghosted vitric shards and micro-spherulites) which are impregnated by fine hematite, chlorite, limonite/goethite and traces of illite/sericite and a few accessory grains of zircon.

Comments and Interpretations

This supplied crushed aggregate sample (labelled 6007/surface/0/R/1) from a potential hard rock source at Blind Creek Road, Elderslie is considered to represent latite tuff, an intermediate volcanic rock. It formed initially by a pyroclastic, ashflow mechanism, rather than as simple lava. Subsequent diagenesis (i.e. modifications induced by burial and the passage of time) and/or hydrothermal action (i.e. modifications by passage of hot fluids) has devitrified the rock and altered it. The rock is slightly altered to sericite, smectite and chlorite clays, mostly affecting the phenocrysts and patches of the groundmass.

For engineering purposes, the rock in the supplied aggregate sample may be summarised as:

- **latite tuff**, an intermediate volcanic igneous rock type
- now finely recrystallized
- non-porous
- unweathered and slightly weathered
- carrying about 13% of soft or weak minerals
- **hard**
- **strong**

The rock is predicted to be **durable**.

The rock is predicted to be **innocuous in relation to alkali-silica reactivity in concrete**. Free silica amounts to only about 6% of which 3% is in the form of quartz which are neither excessively fine

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nor substantially strained, but the rock may contain some difficult to recognise finely microcrystalline quartz (about 3%) in the matrix which may be misidentified as feldspar.

Tuff of the type represented by the supplied sample is predicted to be **suitable for use as concrete aggregate, asphaltic aggregate, rail ballast and rip rap**.

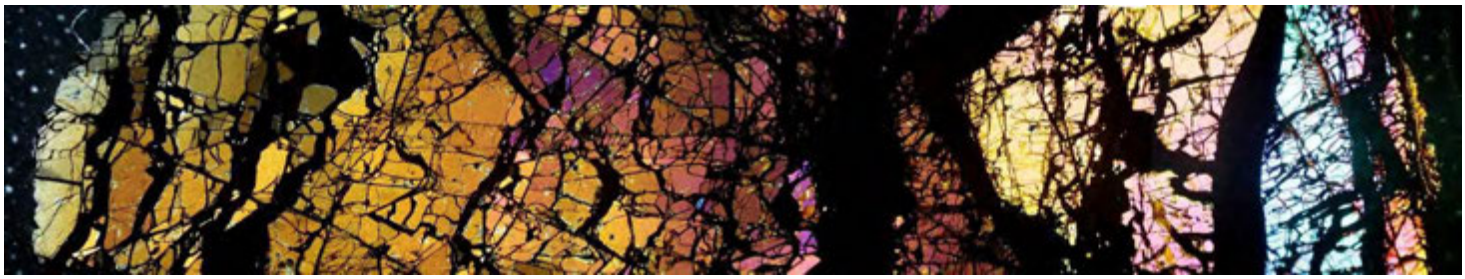
Free Silica Content

About 6%. Quantitative X-ray diffraction analysis would be required to offer a conclusive determination for quartz content.



Plate 2: Micrograph taken at medium magnification in transmitted plane polarised light. The image shows a fragment with finely crystalline quartzofeldspathic groundmass (ghosted former glassy shards are still preserved) with a hornblende phenocryst outline by an opacite rim.

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Geochempet Services

ABN 980 6945 3445
PETROLOGICAL and GEOCHEMICAL CONSULTANTS
Principals: K.E. Spring B.Sc. (Hons), MAppSc and H.M. Spring B.Sc.

5/14 Redcliffe Gardens Drive
Clontarf, QLD 4019

Telephone: (07) 3284 0020
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PETROGRAPHIC REPORT
ON A DRILL CORE SAMPLE (6007)
FROM POTENTIAL QUARRY AT ELDESLIE, NSW

prepared for

MARTENS & ASSOCIATES
HORNSBY, NSW

Purchase Order: P1706007COC03V01
Invoice Number: 00007927
Client Ref: Andrew Mesthos

Issued by

K. E. Spring B.Sc.(Hons), MAppSc
22 November 2017

The material contained within this report may not be quoted other than in full. Extracts may be used only with expressed prior written approval of Geochempet Services

Sample Number: 6007 **Date Sampled**: 30/10/17

Borehole Details: BH101/R/3-3.18 m **Date Received**: 03/11/17

Location: Potential quarry at Eldeslie, NSW

Work Requested Petrographic analysis in relation to suitability for use as road base, concrete aggregate; petrographic assessment of potential for alkali-silica reactivity

Methods Account taken of ASTM C295 Standard Guide for *Petrographic Assessment of Aggregates for Concrete,* the AS2758.1 – 2014 *Aggregates and rock for engineering purposes part 1; Concrete aggregates (Appendix B)* and of the content of the 2015 joint publication of the Cement and Concrete Association of Australia and Standards Australia, (HB 79-2015) entitled *Alkali Aggregate Reaction - Guidelines on Minimising the Risk of Damage to Concrete Structures in Australia*

Identification Latite Agglomerate

Description

The supplied sample consists of a 60 mm diameter drill core which displays apparently hard, robust, variously medium grey and light red, intermediate volcanic rock containing sub-rounded medium-grey clasts (speckled white) from a fraction of a millimetre up to 30 mm and less commonly to at least 60 mm in size dispersed through an interstitial hematite-stained (composed of fine, reddish hematite and pinkish, calcite) and brecciated matrix.



Plate 1. Photograph of supplied drill core sample.

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A thin section was prepared to permit detailed microscopic examination in transmitted polarised light of the drill core specimen. An approximate average composition of the rock, expressed in volume percent and based on a brief count of 100 widely spaced points falling within the thin section, is:

Primary Minerals

68%	feldspar (plagioclase and subordinate K-feldspar)
<1%	clinopyroxene
4%	opaque oxide (magnetite and/or ilmenite)
1%	quartz
<1%	apatite

Secondary Minerals

6%	zeolite
10%	hematite
3%	epidote
2%	calcite
5%	green to brown smectite clay
1%	sericite

Microscopically, the rock is seen to be finely amygdaloidal, abundantly porphyritic to glomeroporphyritic, hypidiomorphic, inter-granular, finely holocrystalline textures of volcanic style reddened by hematite pigmentation. Phenocrysts range in size from about 0.2 to 1.5 mm. Groundmass grains are about 0.05 to 0.1 mm in size. Amygdules are crudely spherical and range up to 0.5 mm in diameter).

The phenocrysts are lath-shaped to tabular, twinned grains of relatively fresh (with argillized and hematitized inclusions) plagioclase feldspar which is sometimes slightly epidotized and sericitized. Other micro-phenocrysts comprise equant grains of fresh or slightly haematized opaque oxide (magnetite and/or ilmenite). The groundmass consists of laths and anhedral grains of feldspar (apparently plagioclase and subordinate K-feldspar), interstitial stumpy prisms of former clinopyroxene (now smectitized), equant grains of opaque oxide, occasional finely acicular prisms of apatite (now hematitized), along with disseminated, interstitial, small patches (mainly 0.05 to 0.7 mm size) of green to brown smectite clay and vughs of reddened zeolite crystals. Small crudely spherical to elongate amygdules are filled with radial aggregates of smectite clay as well as calcite. Minor and local hematitic concentrations along with pervasive hematitic pigmentation in incipiently glassy areas of the groundmass are observed.

The brecciated interstitial matrix contains mainly of calcite, zeolite and hematite associated with some carbonate veining in a network of straight fractures.

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Comments and Interpretations

The supplied drill core sample (labelled 6007) taken from BH101/R/3-3.18 m depth from potential quarry site at Eldeslie is interpreted to consist of latite agglomerate probably from the top or bottom of a lava flow. The alteration is probably the result of hydrothermal effects.

For engineering purposes, the rock represented in the supplied drill core sample may be summarised as:

- **latite agglomerate** (an intermediate volcanic rock)
- finely amygdaloidal
- unweathered
- hematite-pigmentation
- heavily altered
- secondary mineral content is about 27%, including 13% of robust, benign minerals hematite and epidote.
- carries about 2% moderately robust carbonate – calcite
- soft, weak mineral content is about 12% consisting of 6% zeolite and 5% smectite clay which are expansive water sensitive minerals along with 1% sericite
- **essentially hard**
- **essentially strong**

The rock is predicted to be **essentially durable**, fracture veins filled by zeolites may cause the rock to fail into smaller pieces.

Rock equivalent to the supplied sample is predicted to be **innocuous in relation to alkali-silica reactivity in concrete**: it apparently carries about 1% free silica which is neither sufficiently strained or fine enough to be deleterious.

Thus, latite agglomerate of the type represented in supplied drill core sample is predicted to be **suitable for use as a source of road base and concrete aggregate**.

Free Silica Content

Estimated to be 1%.

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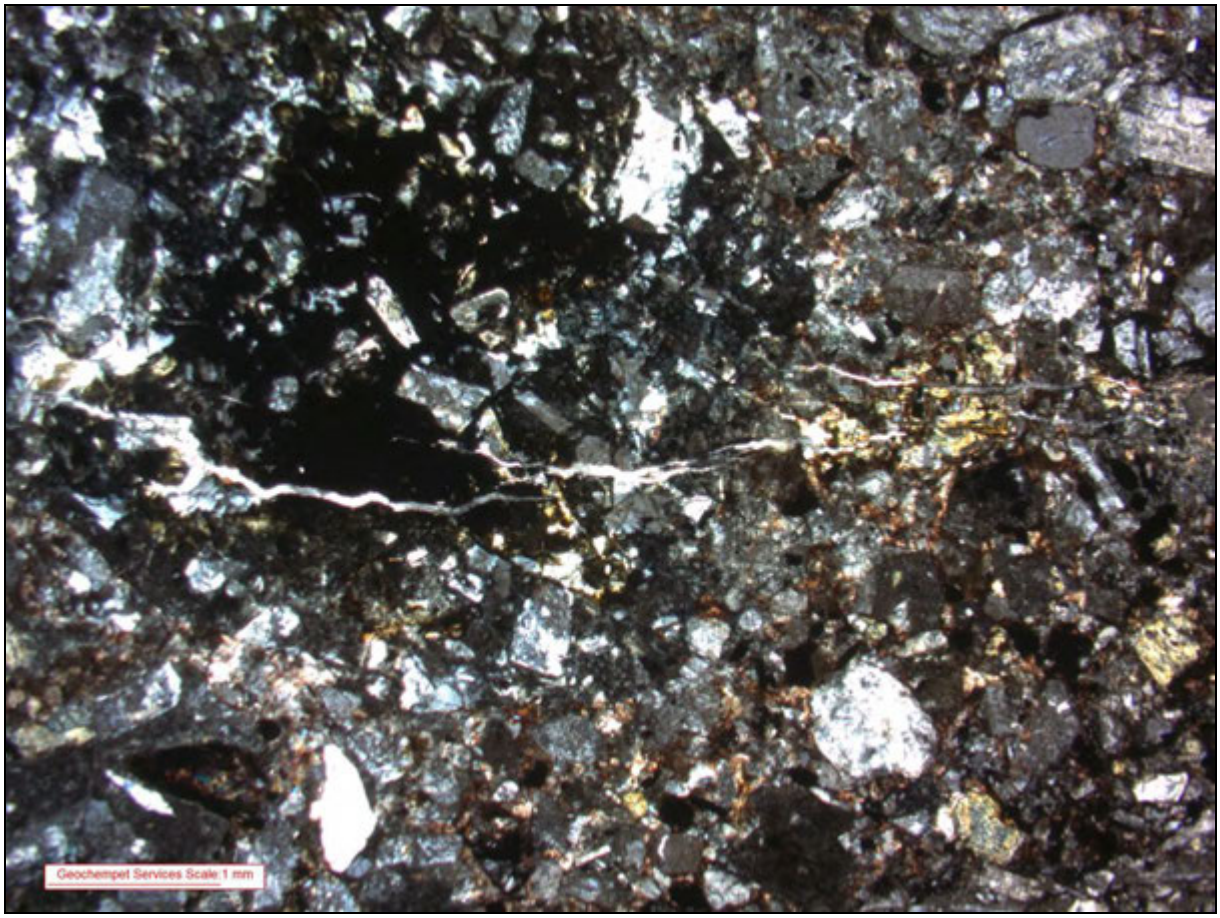


Plate 2. Low magnification, crossed polarised, transmitted light image of latite agglomerate. Note the variations in lithic clasts due to hematite replacement and patches of reddened anisotropic zeolite and green smectite clay. Note the calcite in fracture veins cutting across clasts.

The material contained within this report may not be quoted other than in full. Extracts may be used only with expressed prior written approval of Geochempet Services

13 Attachment E – RMS 3051 Laboratory Testing Results

PRELIMINARY DRAFT
NOT FOR DISTRIBUTION

resource laboratories
AGGREGATE, ROCK, AND SOIL TESTING
ABN: 25 131 532 020
Sydney: 12/1 Boden Road Seven Hills NSW 2147 | PO Box 45 Pendle Hill NSW 2145
Ph: (02) 9674 7711 **| Fax:** (02) 9674 7755 **| Email:** info@resourcelab.com.au

Test Report

Customer: Martens & Associates Pty Ltd **Job number:** 17-0060
Project: Resource Preliminary Investigation: 1706007 **Report number:** 1
Location: Suite 201, 20 George Street, Hornsby NSW 2077 **Page:** 1 of 1

Wet/Dry Strength Variation

Sampling method: Sample tested as received **Test method(s):** RMS T105, T215

	Results				
Laboratory sample no.	11959				
Customer sample no.	6007/Surface/0/R/1				
Date sampled	07/06/2017				
Material description	GRAVEL, grey				
Nature of bulk sample	Crushed rock				
Nominal size of aggregate	14mm				
Size fraction of test portion	-19.0 to +9.5mm				
Test cylinder size (mm)	150				
Significant breakdown	No				
Average wet strength (kN)	230				
Average dry strength (kN)	248				
Wet dry strength variation (%)	**7**				

Notes: Bulk sample jaw crushed during preparation**.** Duplicate testing performed

Approved Signatory: C. Greely **Date:** 19/07/2017

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025.

NATA Accredited Laboratory Number: **17062**

SYDNEY
ANALYTICAL
LABORATORIES

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ERMINGTON NSW 2115

Laboratory:
1/4 ABBOTT ROAD
SEVEN HILLS NSW 2147
Telephone: (02) 9838 8903
Fax: (02) 9838 8919
A.C.N. 003 614 695
A.B.N. 81 829 182 852
NATA No: 1884

ANALYTICAL REPORT for:

RESOURCE LABORATORIES

12/1 BODEN ROAD
SEVEN HILLS 2147

ATTN: CHRIS GREELY

JOB NO:	SAL26361C
CLIENT ORDER:	17-0060
DATE RECEIVED:	07/07/17
DATE COMPLETED:	14/07/17
TYPE OF SAMPLES:	AGGREGATE
NO OF SAMPLES:	1



.....
Issued on 14/07/17
Lance Smith
(Chief Chemist)

SYDNEY ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL26361C
CLIENT ORDER: 17-0060

	SAMPLES	SO4 % as SO3
1	11959	0.021
MDL		0.001
Method Code		C34
Preparation		P5

RESULTS ON DRY BASIS
SAMPLE DESCRIPTION: GREY GRAVEL

ANALYTICAL REPORT

JOB NO: SAL26361C
CLIENT ORDER: 17-0060

METHODS OF PREPARATION AND ANALYSIS

The tests contained in this report have been carried out on the samples as received by the laboratory.

P5	Sample dried, split and crushed to -150um
C34	Acid Soluble Sulphate - RMS T219

resource laboratories
AGGREGATE, ROCK, AND SOIL TESTING
ABN: 25 131 532 020
Sydney: 12/1 Boden Road Seven Hills NSW 2147 | PO Box 45 Pendle Hill NSW 2145
Ph: (02) 9674 7711 **| Fax:** (02) 9674 7755 **| Email:** info@resourcelab.com.au

Test Report

Customer: Martens & Associates Pty Ltd
Project: P1706007
Location: Preliminary Resource Investigation

Job number: 17-0140
Report number: 4
Page: 1 of 1

Wet/Dry Strength Variation

Sampling method: Samples tested as received

Test method(s): AS 1141.22

	Results				
Laboratory sample no.	13687	13688			
Customer sample no.	6007/ Agglomerate	6007/BH103 + BH104/18.0-22.0m			
Date sampled	24/11/2017	24/11/2017			
Material description	GRAVEL, with sand, trace of silt, grey/pale red	GRAVEL, with sand, trace of silt, grey/pale red			
Nature of bulk sample	Boulders	Drill Core			
Nominal size of aggregate	14	19			
Size fraction of test portion	-19.0mm to +9.5mm	-19.0mm to +9.5mm			
Test cylinder size (mm)	150	150			
Significant breakdown	Yes	Yes			
Average wet strength (kN)	63	145			
Average dry strength (kN)	115	203			
Wet dry strength variation (%)	**45**	**29**			

Notes: Oversize material crushed to the required size fraction.

Approved Signatory:  E. Maldonado **Date:** 21/12/2017

SYDNEY
ANALYTICAL
LABORATORIES

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A.C.N. 003 614 695
A.B.N. 81 829 182 852
NATA No: 1884

ANALYTICAL REPORT for:

RESOURCE LABORATORIES

12/1 BODEN ROAD
SEVEN HILLS 2147

ATTN: CHRIS GREELY

JOB NO:	SAL26590B
CLIENT ORDER:	17-0140
DATE RECEIVED:	14/12/17
DATE COMPLETED:	15/12/17
TYPE OF SAMPLES:	AGGREGATES
NO OF SAMPLES:	2

NATA
Accredited for compliance with ISO/IEC 17020

.....
Issued on 15/12/17
Lance Smith
(Chief Chemist)

SYDNEY ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL26590B
CLIENT ORDER: 17-0140

	SAMPLES	SO4 % as SO3
1	13687	0.034
2	13688	0.014

MDL	0.001
Method Code	C34
Preparation	P5

RESULTS ON DRY BASIS
SAMPLE DESCRIPTION: 13687 - 6007/AGGLOMERATE,
13688 - 6007/BH103 + BH104/18.0-22.0m

ANALYTICAL REPORT

JOB NO: SAL26590B
CLIENT ORDER: 17-0140

METHODS OF PREPARATION AND ANALYSIS

The tests contained in this report have been carried out on the samples as received by the laboratory.

P5	Sample dried, split and crushed to -150um
C34	Acid Soluble Sulphate - RMS T219

resource laboratories
AGGREGATE, ROCK, AND SOIL TESTING
ABN: 25 131 532 020
Sydney: 12/1 Boden Road Seven Hills NSW 2147 | PO Box 45 Pendle Hill NSW 2145
Ph: (02) 9674 7711 **| Fax:** (02) 9674 7755 **| Email:** info@resourcelab.com.au

Test Report

Customer: Martens & Associates Pty Ltd
Job number: 17-0140
Project: P1706007
Report number: 1
Location: Preliminary Resource Investigation
Page: 1 of 1

Particle Size Distribution

Sampling method: Samples tested as received
Test method(s): RMS T105, T106

	Results				
Laboratory sample no.	13687	13688			
Customer sample no.	6007/ Agglomerate	6007/BH103 + BH104/18.0-22.0m			
Date sampled	24/11/2017	24/11/2017			
Material description	GRAVEL, with sand, trace of silt, grey/pale red	GRAVEL, with sand, trace of silt, grey/pale red			
% Passing AS Sieve					
150.0mm					
100.0mm					
75.0mm					
63.0mm					
53.0mm					
37.5mm					
26.5mm	100	100			
19.0mm	91	84			
13.2mm	66	53			
9.5mm	45	34			
6.7mm	33	24			
4.75mm	25	17			
2.36mm	17	11			

Notes: Material jaw crushed prior to testing

Approved Signatory:  E. Maldonado **Date:** 21/12/2017

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Accredited for compliance with ISO/IEC 17025.

NATA Accredited Laboratory Number: **17062**

resource laboratories
AGGREGATE, ROCK, AND SOIL TESTING
ABN: 25 131 532 020
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Ph: (02) 9674 7711 **| Fax:** (02) 9674 7755 **| Email:** info@resourcelab.com.au

Test Report

Customer: Martens & Associates Pty Ltd **Job number:** 17-0140

Project: P1706007 **Report number:** 2

Location: Preliminary Resource Investigation **Page:** 1 of 1

Particle Shape By Proportional Caliper

Sampling method: Samples tested as received **Test method(s):** RMS T105, T213

	Results				
Laboratory sample no.	13687	13688			
Customer sample no.	6007/ Agglomerate	6007/BH103 + BH104/18.0-22.0m			
Date sampled	24/11/2017	24/11/2017			
Material description	GRAVEL, with sand, trace of silt, grey/pale red	GRAVEL, with sand, trace of silt, grey/pale red			
Total misshapen particles (%)	32	36			
Flat particles (%)	21.2	22.6			
Flat & elongated particles (%)	10.2	11.2			
Elongated particles (%)	0.3	2.6			
Caliper ratio	2:1	2:1			

Notes: Material jaw crushed prior to testing

Approved Signatory: E. Maldonado **Date:** 21/12/2017

ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025.

NATA Accredited Laboratory Number: **17062**

resource laboratories
AGGREGATE, ROCK, AND SOIL TESTING
ABN: 25 131 532 020
Sydney: 12/1 Boden Road Seven Hills NSW 2147 | PO Box 45 Pendle Hill NSW 2145
Ph: (02) 9674 7711 **| Fax:** (02) 9674 7755 **| Email:** info@resourcelab.com.au

Test Report

Customer: Martens & Associates Pty Ltd
Job number: 17-0140
Project: P1706007
Report number: 3
Location: Preliminary Resource Investigation

Fractured Faces of Coarse Aggregate

Sampling method: Samples tested as received
Test method (s): RMS T105, T239

	Results				
Laboratory sample no.	13687	13688			
Customer sample no.	6007/ Agglomerate	6007/BH103 + BH104/18.0-22.0m			
Date sampled	24/11/2017	24/11/2017			
Material description	GRAVEL, with sand, trace of silt, grey/pale red	GRAVEL, with sand, trace of silt, grey/pale red			
Nominal size of aggregate (mm)	14	19			
Percentage with no fractured faces	0	0			
Percentage with at least one fractured face	100	100			
Percentage with two or more fractured faces	100	100			

Notes: Material jaw crushed prior to testing

Approved Signatory:  E. Maldonado
Date: 21/12/2017

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025.

NATA Accredited Laboratory Number: **17062**

14 Attachment F – Comments on RMS 3051 and AS2758.1 Classification

PRELIMINARY DRAFT
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Source: Reproduced from RMS 3051 (2014) – Table GN.2

Traffic Category	Typical Application	Comments on Specified Material Properties
A	Freeways and major highways	Increased aggregate strength, tightly controlled particle size distribution, a permeability requirement and a plasticity requirement to provide increased resistance to high traffic loading, low permeability and a cohesive surface finish resistant to the effects of traffic prior to sprayed sealing.
B	Rural highways	Traditional level of aggregate strength, an evenly graded particle size distribution and a plasticity requirement to provide a cohesive surface finish resistant to the effects of traffic prior to sprayed sealing.
C	Arterial and collector roads	Traditional level of aggregate strength, an evenly graded particle size distribution and a plasticity requirement to provide a cohesive surface finish resistant to the effects of traffic prior to sprayed sealing. Can be assessed for conformity based on shear criteria.
D	Lower trafficked rural or urban local roads	Generally higher than that for cycleways, shared paths, property access ways and footpath base/subbase requirements unless access is required for maintenance or commercial vehicles. (Note: Industrial areas, grain and stock routes and other freight traffic generating developments may require a higher traffic category due to the high gross mass of these vehicles.)

PRELIMINARY
NOT FOR DISTRIBUTION

Source: AS2758.1 (2014) – Table A1 Exposure Classifications

TABLE A1
EXPOSURE CLASSIFICATIONS

Surface and exposure environment	Exposure classifications for all concrete types
1 *Surfaces of members in contact with the ground*	
(a) Members protected by a damp-proof membrane	A1
(b) Residential footings in non-aggressive soils	A1
(c) Other members in non-aggressive soils	A2
(d) Members in aggressive soils	See Table A2
2 *Surfaces of members in interior environments*	
(a) Fully enclosed within a building except for a brief period of weather exposure during construction	A1
(b) In industrial buildings, the member being subject to repeated wetting and drying	B1
3 *Surfaces of members in above-ground exterior environments*	
In areas that are:	
(a) Inland (>50 km from coastline) environment being—	
(i) non-industrial and arid climatic zone (see Notes 3 and 4)	A1
(ii) non-industrial and temperate climatic zone	A2
(iii) non-industrial and tropical climatic zone	B1
(iv) industrial and any climatic zone	B1
(b) Near coastal (1 km to 50 km from coastline), any climatic zone	B1
(c) Coastal (up to 1 km from coastline but excluding tidal and splash zones) (see Note 5), any climatic zone	B2
4 *Surface of members in water*	
(a) In fresh water	B
(b) In seawater	
(i) permanently submerged	B2
(ii) in tidal, spray or splash zones	C1 or C2
(c) In soft or running water	U
5 *Surfaces of members in other environments*	
Any exposure environment not otherwise described in Items 1 to 4	U

NOTES:

1 In this context, reinforced concrete includes any concrete containing metals that rely on the concrete for protection against environmental degradation. Therefore, when considering durability, plain concrete members containing reinforcement or other metallic embedments should be treated as reinforced members.

2 The climatic zones referred to are those given in Figure A1, which is based on the Bureau of Meteorology map, Major Seasonal Rainfall Zones of Australia, Commonwealth of Australia 2005.

3 'Industrial' refers to areas that are within 3 km of industries that discharge atmospheric pollutants.

4 For the purpose of this Table, the coastal zone includes locations within 1 km of the shoreline of large expanses of saltwater (e.g. Port Phillip Bay, Sydney Harbour east of the Spit and Harbour bridges, Swan River west of the Narrows Bridge). Where there are strong prevailing winds or vigorous surf, the distance should be increased beyond 1 km and higher levels of protection should be considered. Proximity to small saltwater bays, estuaries and rivers may be disregarded.

5 The spray zone is the zone from 1 m above wave crest level. The tidal/splash zone is the zone 1 m below lowest astronomical tide (LAT) and up to 1 m above highest astronomical tide (HAT) on vertical structures, and all exposed soffits of horizontal structures over the sea.

15 Attachment G – Aggregate Quotes

PRELIMINARY DRAFT
NOT FOR DISTRIBUTION

Boral Construction Materials
Materials Technical Services

Unit 4, 3-5 Gibbon Road
Baulkham Hills NSW 2153 Australia
PO Box 400, Winston Hills NSW 2153

T: +61 (02) 9624 9900
F: +61 (02) 9624 9999

www.boral.com.au

TEST REPORT

CLIENT: BORAL QUARRIES - HUNTER REGION (Seaham)
PROJECT: Testing of DGB20
MATERIAL: DGB20 S/P 558 (0-4,000t) as DGB20 Base
Origin/TRN : RL=75/shot=1704
Location : Blend Plant

FILE No: 18/17
REQUEST No. : 73640
DATE SAMPLED: 16.6.17
DATE TESTED: 23.6.17 to 29.6.17

SPECIFICATION: Roads and Maritime Services QA Specification **3051** - Granular Base and Sub-Base Materials For Surfaced Road Pavements Ed 6 Rev 5 November 2014

Test Method	Results										Specification			
Client Sample No.WSE-17/00029	Lot A - Q01		Lot B - Q02		Lot C - Q03		Lot D - Q04		Lot E - Q05		RMS 3051 Table 3051.1 Particle Distribution Requirements DGB20 Category D			
Laboratory Sample No.	192679		192680		192681		192682		192683					
*RMS T106 and T107	Particle Size Distribution of Road Construction Materials										Specification		Nominated	
A. S. Sieve	% passing	% retained	% passing	% retained	% passing	% retained	% passing	% retained	% passing	% retained	% passing	% retained	% passing	% retained
53.0mm														
26.5mm	100	-	100	-	100	-	100	-	100	-	100	-	100	-
19.0mm	100	0	99	1	98	2	98	2	99	1	95 - 100	-	99	1
13.2mm	92	8	92	7	90	8	90	8	91	8	78 - 92	6 -18	91	8
9.5mm	76	16	79	13	75	15	76	14	74	17	63 - 83	7 - 17	76	15
6.7mm	66	-	68	-	64	-	65	-	62	-	-	-	-	-
4.75mm	58	18	60	19	56	19	57	19	54	20	44 - 64	13 - 25	57	19
2.36mm	43	15	45	15	42	14	42	15	39	15	33 - 49	7 - 19	42	15
425µm	19.0	24	17.0	28	16.5	26	17.5	25	17.5	22	14 - 23	14 - 30	18	25
75µm	7.5	11.5	7.0	10.0	6.5	10.0	7.0	10.5	8.0	9.5	7 - 14	6 - 13	7	10
13.5µm	3.0	4.5	3.0	4.0	3.0	3.5	3.0	4.0	3.0	5.0	3 - 7	3 - 8	3	4
Sample history	Oven dried										RMS 3051 Table 3051.2 Plasticity and Permeability Requirements DGB20 Category D			
Preparation Method	Dry sieved													
*RMS T108 - Liquid Limit (%)			N/A				N/A				Max 23 (if non-plastic)			
*RMS T109 - Plastic Limit (%)			N/A				N/A				Max 20 (if plastic)			
Plasticity Index (%)			Non Plastic				Non Plastic				Max 8			
*RMS T213 Mis-shapen Particles Ratio (2:1) (%)	23										RMS 3051 Table 3051.3 Cohesion, Soundness and Strength Requirements DGB20 Category D Max 35			
*RMS T114 Maximum Dry Compressive Strength of Road Construction Materials	Samples combined													
	MDCS (MPa) (only applies if PI<2)	3.3									min 1.7			
	Optimum Moisture Content at MDCS (%)	8.0												
	Straddling achieved ?	Yes												
RMS T215 Wet / Dry Strength Variation	Samples combined													
Wet Strength (kN)	218										min 70			
Dry Strength (kN)	263										-			
Wet/Dry Strength Variation (%)	DGB20 S/P 557 (0-4,000t) = 17%										max 35			
Fraction tested (mm)	-19.5 to +9.5													
Significant breakdown (%)	<0.2													
Diameter of cylinder (mm)	150													

Notes :
1. * Pre-treated to RMS T102 - Test method CA_n where n = 3 compaction cycles
2. **N/A** = unable to obtain
3. Samples provided by client.

P. McMULLAN, S. MURCOTT, A. WALLACE, T. MEEHAN, S. ANDRADE, R. TOMKINS, A. LOOYENGA, M. FORMOSA, FILE.

Artemio Mendoza

Approved Signatory _____

Date 29.6.17 Serial No. 158738

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Accredited for compliance with ISO/IEC 17025

NATA Accredited Laboratory

Number: 547

Boral Construction Materials
Materials Technical Services

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Baulkham Hills NSW 2153 Australia
PO Box 400, Winston Hills NSW 2153

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TEST REPORT

CLIENT: Boral Quarries - Hunter Region (Seaham)

FILE No.: 18 / 17

PROJECT: Test Request No. WSE-17/00029-Q01-Q05 -
Material Origin/TRN: RL=75/shot=1704 -
Testing of DGB20 S/P DGB20/558 of 4,000t ex. Seaham Quarry

REQUEST No.: 73640

SPECIFICATION: RMS QA Specification 3051 - Granular Base and Subbase Materials for Surfaced Road Pavements - Edition 6 / Revision 5 - November 2014

TEST PROCEDURE: RMS T219 – Acid Soluble Sulfate content in Road Construction Materials

Laboratory Sample No.:	193464	193465	193466	193467	193468
Date Sampled:	16.6.17	16.6.17	16.6.17	16.6.17	16.6.17
Sample Description:	DGB20	DGB20	DGB20	DGB20	DGB20
Client Sample ID:	029-Q01	029-Q02	029-Q03	029-Q04	029-Q05
Lot Number:	A	B	C	D	E
Lot Tonnage:	800	800	800	800	800
Location:	Blend Plant	Blend Plant	Blend Plant	Blend Plant	Blend Plant
Field No.:	1	2	3	4	5

TEST RESULTS:

		ALLOWABLE LIMITS
Sulfate as SO_3 (%)	0.10	Max. 0.3%

Samples submitted by the Client.

Note: The samples were tested after pretreatment (T102 CA 3 cycles) by BMTS, Soils Section Staff.

P.McMullan, S.Murcott, A.Wallace, T.Meehan, S.Andrade, R.Tomkins, A.Looyenga, R.Crabb, A.Ritchie, M.Formosa, Mat.File, File.

Approved Signatory _____ S.Krishnamoorthy

Date 29.6.17. Serial No. 158739

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TEST REPORT

CLIENT:	BORAL QUARRIES - PEATS RIDGE QUARRY	FILE No:	9/17
PROJECT:	Quality Control Testing	REQUEST No:	74597
MATERIAL:	DGB20 S/P 72213 (0 - 4,000 tonnes) as Unbound Base Location : Mixing	DATE SAMPLED:	15.8.17 to 18.8.17
		DATE TESTED:	21.8.17 to 28.8.17

SPECIFICATION: Roads and Traffic Authority NSW QA Specification **3051**. Unbound and Modified Base and Sub-Base Materials for Surfaced Road Pavements (Edition 5, June 1998). Table 3051.2 Unbound and Modified Material (Based on Shear Strength).

Particle Size Distribution Test Methods RMS T106 and T107				**Results**				
				Client Sample No.				
				7299	7298	7297	7305	7308
				15.8.17	15.8.17	18.8.17	16.8.17	17.8.17
				Sample Tonnage				
A. S. Sieve	**RTA QA Spec. 3051.2**	**Nominated Grading**	**Grading Tolerance RTA QA Spec. 3051.2**	800	1600	2400	3200	4000
				Material Origin / TRN : RL				
				rl 125	rl 125	rl 125	rl 140	rl 125
				Laboratory Sample No.				
				195747	195748	195749	195750	195751
	% Passing	**% Passing**	**% Variation**	**% Passing**				
26.5mm	**100**	**100**	**± 10**	100	100	100	100	100
19.0mm	-	**99**	**± 10**	99	99	99	99	99
13.2mm	-	**84**	**± 8 (2)**	83	83	86	85	85
9.5mm	-	-	-	69	70	76	74	73
6.7mm	**50-80**	**68**	**± 5 (2)**	65	65	72	69	68
4.75mm	-	-	-	62	61	70	65	65
2.36mm	-	**46**	**± 4 (2)**	44	44	50	46	46
425µm	-	**14.5**	**± 3 (1)**	14.0	14.0	16.0	14.0	14.5
75µm	-	**6.5**	**± 2 (1)**	6.0	6.5	7.0	6.0	6.5
13.5µm	-	**3.0**	-	3.0	3.0	3.5	3.0	3.0
Total defect points (as per Spec. RTA 3051-13.2. **Max. 5.0 per sample**).				0.0	0.0	0.0	0.0	0.0
Average defect points (as per Spec. RTA 3051-13.2. **Max. average of 3.0**).						0.0		
Note 1: Numerical value in brackets refers to defect weighting values as per RTA Table 3051.2.								

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Approved Signatory _____

Date 28.8.17 Serial No. 160501

Artemio Mendoza

NATA Accredited Laboratory Number: 547

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TEST REPORT

CLIENT:	BORAL QUARRIES - PEATS RIDGE QUARRY	FILE No:	9/17
PROJECT:	Quality Control Testing	REQUEST No:	74597
MATERIAL:	DGB20 S/P 72213 (0 - 4,000 tonnes) as Unbound Base Location : Mixing	DATE SAMPLED:	15.8.17 to 18.8.17
		DATE TESTED:	21.8.17 to 28.8.17

Test Methods RMS T108 and T109		Results				
		Client Sample No.				
		7299	7298	7297	7305	7308
Liquid Limit, Plastic Limit and Plasticity Index of road materials. (RMS T108 and T109 now refer to AS1289.3.1.1 Liquid Limit, AS1289.3.2.1 Plastic Limit and AS1289.3.3.1 Plasticity Index)		15.8.17	15.8.17	18.8.17	16.8.17	17.8.17
		Sample Tonnage				
		800	1600	2400	3200	4000
		Material Origin / TRN : RL				
		rl 125	rl 125	rl 125	rl 140	rl 125
		Laboratory Sample No.				
		195747	195748	195749	195750	195751
	RTA QA Spec. 3051.2					
Liquid Limit (%)	**Max. 20 if non-plastic**		**N/A***		**N/A***	
Plastic Limit (%)	**Max. 20 if plastic**		**N/A****		**N/A****	
Plasticity Index (%)	**Max. 6 for Categories 1, 2a, 2b, 2c and 2d**		**NP**		**NP**	
Sample history			**OD**			
Preparation method			**DS**			
Method used for moisture content determination			**RMS T120**			

N/A* - Test is not applicable due to continual slippage in bowl. Liquid Limit could not be obtained. **NP** - Non-plastic.
N/A** - Unable to roll, plastic limit could not be obtained. **N/App.** - Not Applicable.
Sample history:- NS = Natural state, AD = Air dried, **OD** = Oven dried at 50°C, UN = Unknown
Preparation method:- WS = Wet sieved, **DS** = Dry sieved

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TEST REPORT

CLIENT:	BORAL QUARRIES - PEATS RIDGE QUARRY	FILE No:	9/17
PROJECT:	Quality Control Testing	REQUEST No:	74597
MATERIAL:	DGB20 S/P 72213 (0 - 4,000 tonnes) as Unbound Base Location : Mixing	DATE SAMPLED:	15.8.17 to 18.8.17
		DATE TESTED:	21.8.17 to 28.8.17

Test Method RMS T215		Results				
		Client Sample No.				
		7299	7298	7297	7305	7308
		15.8.17	15.8.17	18.8.17	16.8.17	17.8.17
		Sample Tonnage				
Wet / Dry Strength Variation.		800	1600	2400	3200	4000
		Material Origin / TRN : RL				
		rl 125	rl 125	rl 125	rl 140	rl 125
		Laboratory Sample No.				
		195747	195748	195749	195750	195751
		Samples combined				
	RTA QA Spec. 3051.2	Note: Where all wet/dry variation results are < 25% : 1 per 10,000t is required				
Wet / Dry Strength Variation (%)	**Maximum 35**	**4**				
Average Dry Strength (kN)	-	**440**				
Average Wet Strength (kN)	**Minimum 70**	**422**				
Size of test fraction (mm)		-19.0 to +9.5				
Significant breakdown (%)		< 0.2				
Diameter of cylinder used (mm)		150				

Test Method RMS T114		Results				
		Client Sample No.				
		7299	7298	7297	7305	7308
		15.8.17	15.8.17	18.8.17	16.8.17	17.8.17
		Sample Tonnage				
Maximum Dry Compressive Strength (MDCS) of Road Construction Materials.		800	1600	2400	3200	4000
		Material Origin / TRN : RL				
		rl 125	rl 125	rl 125	rl 140	rl 125
		Laboratory Sample No.				
		195747	195748	195749	195750	195751
		Samples combined				
	RTA QA Spec. 3051.2					
MDCS (MPa)	**Minimum 1.7** (only applies if PI≤1)	**5.7**				
Optimum Moisture Content at MDCS (%)		6.5				
Straddling achieved ?		Yes				

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TEST REPORT

CLIENT:	BORAL QUARRIES - PEATS RIDGE QUARRY	FILE No:	9/17
PROJECT:	Quality Control Testing	REQUEST No:	74597
MATERIAL:	DGB20 S/P 72213 (0 - 4,000 tonnes) as Unbound Base Location : Mixing	DATE SAMPLED:	15.8.17 to 18.8.17
		DATE TESTED:	21.8.17 to 28.8.17

Test Method RMS T213		Results				
		Client Sample No.				
		7299	7298	7297	7305	7308
		15.8.17	15.8.17	18.8.17	16.8.17	17.8.17
		Sample Tonnage				
Particle shape by proportional calliper.		800	1600	2400	3200	4000
		Material Origin / TRN : RL				
		rl 125	rl 125	rl 125	rl 140	rl 125
		Laboratory Sample No.				
		195747	195748	195749	195750	195751
Total mis-shapen particles at 2:1 ratio (%)	**RTA QA Spec. 3051.1 Maximum 35%**	**19**				
Note: Grading results from RMS T106 grading were used to calculate above.						

Test Method RMS T111	Results				
	Client Sample No.				
	7299	7298	7297	7305	7308
	15.8.17	15.8.17	18.8.17	16.8.17	17.8.17
	Sample Tonnage				
Dry density / moisture content relation of road construction materials - standard compactive effort	800	1600	2400	3200	4000
	Material Origin / TRN : RL				
	rl 125	rl 125	rl 125	rl 140	rl 125
	Laboratory Sample No.				
	195747	195748	195749	195750	195751
	Samples combined				
Maximum Dry Density (t/m^3)	**2.251**				
Optimum Moisture Content (%)	**8.8**				
Method used for moisture content determination	RMS T120				
Materials retained on 19mm sieve (%)	1				

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TEST REPORT

CLIENT:	BORAL QUARRIES - PEATS RIDGE QUARRY	FILE No:	9/17
PROJECT:	Quality Control Testing	REQUEST No:	74597
MATERIAL:	DGB20 S/P 72213 (0 - 4,000 tonnes) as Unbound Base Location : Mixing	DATE SAMPLED:	15.8.17 to 18.8.17
		DATE TESTED:	21.8.17 to 28.8.17

Test Method RMS T171 - Texas TXL	Results				
	Client Sample No.				
	7299	7298	7297	7305	7308
	15.8.17	15.8.17	18.8.17	16.8.17	17.8.17
Modified Texas Triaxial Compression Test for disturbed soils, soil aggregate and crushed rock.	Sample Tonnage				
	800	1600	2400	3200	4000
	Material Origin / TRN : RL				
	rl 125	rl 125	rl 125	rl 140	rl 125
	Laboratory Sample No.				
	195747	195748	195749	195750	195751
	Samples combined				
Texas Classification No.			**1.8**		
Angle of shear resistance (deg.)			55.8		
Apparent cohesion (kPa)			73.1		
Average compressive modulus (MPa)			106.1		
Average Relative Density (% MDD)			100.2		
Average Relative Moisture content (% OMC) at moulding			84.0		
Target density (t/m^3)			2.251		
Target Moisture content (%)			7.5		
Amount of material retained on 37.5mm sieve (%)			0		
Normal Stress (kPa)	10	30	60	90	
Compressive Modulus (MPa)	86.7	115.5	105.7	116.6	
Dry Density of Specimen (t/m^3)	2.254	2.258	2.251	2.256	
Relative Dry Density of specimen (%MDD)	100.1	100.3	100.0	100.2	
Moisture content after testing (%)	7.3	7.4	7.4	7.4	

Table 3051.2 - Unbound and Modified Materials (based on shear strength) specification requirements.
(For interpretation of results refer to RTA 3051).

Modified Texas Triaxial Classification No.	**1.8**
For Category 1 materials	Maximum 2.0
For Category 2a materials	Maximum 2.2
For Category 2b materials	Maximum 2.5
For Category 2c and 2d materials	Maximum 3.0

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TEST REPORT

CLIENT:	BORAL QUARRIES - PEATS RIDGE QUARRY	FILE No:	9/17
PROJECT:	Quality Control Testing	REQUEST No:	74597
MATERIAL:	DGB20 S/P 72213 (0 - 4,000 tonnes) as Unbound Base Location : Mixing	DATE SAMPLED:	15.8.17 to 18.8.17
		DATE TESTED:	21.8.17 to 28.8.17

Particle Size Distribution Test Method AS1289.3.6.1				**Results**				
				Client Sample No.				
				7299	7298	7297	7305	7308
				15.8.17	15.8.17	18.8.17	16.8.17	17.8.17
			Grading Tolerance RTA QA Spec. 3051.2	Sample Tonnage				
A. S. Sieve	**RTA QA Spec. 3051.2**	**Nominated Grading**		800	1600	2400	3200	4000
				Material Origin / TRN : RL				
				rl 125	rl 125	rl 125	rl 140	rl 125
				Laboratory Sample No.				
				195747	195748	195749	195750	195751
		From gradings on page 1		Samples combined AS1289.3.6.1 Particle size distribution of material after RMS T171 (Texas Triaxial Test), as per notes in Table 3051.2 (viii).				
	% Passing	**% Passing**	**% Variation**	**% Passing**				
26.5mm	**100**	100	**± 10**	100				
19.0mm	-	99	**± 10**	100				
13.2mm	-	84	**± 8 (2)**	86				
9.5mm	-	-	-	72				
6.7mm	**50-80**	68	**± 5 (2)**	68				
4.75mm	-	-	-	65				
2.36mm	-	46	**± 4 (2)**	47				
1.18mm	-	-	-	29				
600µm	-	-	-	19				
425µm	-	14.5	**± 3 (1)**	15				
300µm	-	-	-	13				
150µm	-	-	-	9				
75µm	-	6.5	**± 2 (1)**	7				
Total defect points (as per Spec. RTA 3051-13.2. **Max. 5.0 per sample**).				0.0				
Note: Numerical value in brackets refers to defect weighting values as per RTA QA Spec. 3051, Table 3051.2.								

Note: Samples provided by client.

S. MURCOTT, T. MEEHAN, A. WALLACE, S. ANDRADE, J. COLLINGS, S. BURTON, T. HAWKINS, K. THOMAS, M. FORMOSA, FILE

QUOTATION ONLY

DATE	17/01/18
QUOTE No.	083609
Quote Valid To	18/03/18

Ref: .

No. Pages: 2

Boral Quarries

ABN 51 000 756 507

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PO Box 42, Wentworthville NSW 2145
Direct Orders 1300 723 999
Facsimile (02) 9033 5150

MARTENS & ASSOCIATES

DELIVERY ADDRESS

PROJECT:

ANDREW MESTHOS

X BIN
ORDER: .

MATERIAL	SOURCE	TRUCK TYPE*	QUANTITY	PRICE PER TONNE (ex-GST)
20MM DGB	PEATS RIDGE			24.00
20MM FCR	PEATS RIDGE			20.00
20MM DGB	SEAHAM			22.00
ARRB 20MM FCR	SEAHAM			17.00

*** Truck Types: "T" = Trailer/Truck & Dog, "R" = Bogie/Rigid. Bogie/Rigid trucks will incur a higher rate of cartage**

SPECIAL CONDITIONS	
1. All products are subject to availability. 2. Engineered Road bases produced to comply with RTA 3051 Ed5 Rev0 1998.	

COLIN GIBB

ACCOUNT MANAGER

THIS QUOTATION IS SUBJECT TO THE BORAL CONDITIONS OF SALE

CONDITIONS OF QUOTATION & SUPPLY – QUARRIES AND "OUTBOUND" RECYCLING

1. DEFINITIONS AND INTERPRETATION

"Australian Consumer Law" means Schedules 1 and 2 of the *Competition and Consumer Act 2010 (Cth)* and any other relevant provisions contained in that Act; **"Client"** means the customer named on the quotation, and if no customer is named, the customer to whom the Goods and Work is supplied; **"Company"** means Boral Resources (NSW) Pty Ltd; **"Conditions"** means these conditions of quotation and any additional matters prescribed on the face of this quotation; **"Consequential Loss"** means loss of revenue, loss of profits, loss of anticipated savings or business, loss of data, loss of value of equipment (other than cost of repair), loss of opportunity or expectation loss and any form of consequential, special, indirect, punitive or exemplary loss or damages, however it arises (including as a result of negligence); **"Consumer"** has the meaning in the Australian Consumer Law; **"Goods"** means the materials supplied or to be supplied as described on the face of this quotation; **"Loss"** means any liability, however it arises (including as a result of negligence) and includes any loss, claim, damage, demand, injury or death and a fine or penalty imposed by a statutory or other authority; **"Rates"** means the unit rate shown on the face of this quotation, or otherwise used to calculate the prices in the quotation; **"Site"** means the location for supply / performance of the Goods and Work specified on the face of this quotation; **"Work"** means the services supplied or to be supplied as described on the face of this quotation.

2. AGREEMENT

Except to the extent otherwise explicitly agreed in writing between the parties, these Conditions (and the credit application completed by the Client and credit guarantees if applicable) govern the entire relationship between the Company and the Client in connection with the provision of the Goods and Work and will prevail over any other document (including purchase order terms or procurement terms provided by the Client or terms on the back of delivery dockets to the extent inconsistent with these Conditions) from time to time. To the extent of any inconsistency between the credit application, the credit guarantees and these Conditions, these Conditions prevail. The Client acknowledges that it has not relied on any representation, inducement, warranty or promise which is not set out below. The Conditions may only be varied by both parties agreement in writing.

3. VALIDITY

This quotation is an offer open to acceptance by the Client within 60 days from the date on the quotation and any such acceptance must be on the basis that supply/performance of the Goods and Work is started within 3 months of the date of the quotation. The offer is made subject to the Client meeting Boral Limited credit approval requirements. The Client's written order to commence the supply/performance of the Goods and Work or such commencement by the Company constitutes acceptance of the offer.

4. EXTENT OF MATERIALS AND WORK

This quotation is based on supply / performance of all of the Goods and Work at the Site. Should the quantities supplied or location of the Site vary from the quotation the Company reserves the right to adjust the Rate.

5. MATERIAL QUALITY

The Client acknowledges and agrees that quarry or recycling materials of a particular description supplied as part of the Goods vary as to the uniformity of grading of material, size, shape moisture content, degradation factor, hardness, texture and other characteristics and, subject to clause 9, the Company expressly disclaims any liability with respect to such variations. The Client acknowledges that the Goods are provided on the basis they do not conform to any Australian Standard or specification except as stated on the face of this Quotation. The Company provides no warranty in relation or their compliance with any environmental law, regulation or standard. The Company shall not be liable for any failure of the Client or others to blend the Goods. At the request of the Client, the Company can provide a summary of traceable stockpiles of the Goods supplied to the Client.

6. BASIS OF PAYMENT

The Goods and Work will be paid for by the Client at the Rates according to the actual quantities supplied, as shown on the delivery docket, subject to these Conditions and any minimum order quantities specified on the face of this quotation or as otherwise notified to the Client by the Company. The actual quantities shown on the delivery docket shall be measured by the Company's weighbridge, or determined on such other basis as agreed between the Company and the Client in writing. The Client acknowledges that the Goods and Work will be paid for in full without any retention or set-off. The Company is under no obligation to accept any products ordered in excess of the Client's requirements as shown on the delivery docket (and supplied as part of the Goods and Work) for return or credit.

7. LIMITATION OF LIABILITY AND INDEMNITY

If the Client is not a Consumer, the Company shall not be liable in any circumstances:

(a) for any damage to any property of whatsoever kind situated in, on or adjacent to the Site resulting from Goods and Work supplied or performed in accordance with these Conditions;
(b) for any defects in the Goods and Work unless the Client notifies the Company within 14 days of the date of delivery of the Goods or the supply of the Work specifying the defect, which notice shall be a condition precedent to any right to recover by the Client;
(c) for any Loss arising from delay;
(d) for any Consequential Loss,
(e) for any Loss arising from the Goods being placed or installed by others,

and, subject to clause 9, the Company's total aggregate liability in all circumstances is limited (to the extent permitted by law) to the amount paid by the Client for the Goods and Work.

To the maximum extent permitted by law, the Client hereby indemnifies and forever holds harmless the Company from all Losses caused or contributed to by any negligent and/or wilful act or omission or any breach of these Conditions by the Client, or by the Company arising from supplying or performing the Goods and Work in accordance with these Conditions.

8. LIMITATION OF LIABILITY – AUSTRALIAN CONSUMER LAW GUARANTEES

Unless the Client indicates otherwise below, the Client acknowledges that the Goods it will acquire from the Company will be obtained for either the purpose of re-supply (in an altered form or condition or to be incorporated into other goods) or for the purpose of using them up or transforming them in trade or commerce in the course of a process of production or manufacture or in the course of repairing or treating other goods or fixtures on land.

☐ *By ticking this box, the Client notifies the Company that it is acquiring the Goods for a purpose other than that stated immediately above, in which event the provisions below may apply.*

If the Client is a Consumer and any of the Goods supplied by the Company are not goods of a kind ordinarily acquired for personal, domestic or household use or consumption, the Client agrees that the Company's liability for a failure to comply with a consumer guarantee under the *Australian Consumer Law* in relation to those Goods (other than a guarantee under sections 51(title), 52(undisturbed possession) and 53(undisclosed securities)) of the *Australian Consumer Law*, is limited to, at the option of the Company, one or more of the following:

(a) the replacement of the Goods or the supply of equivalent goods;
(b) the repair of the Goods;
(c) the payment of the cost of replacing the Goods or of acquiring equivalent goods; or
(d) the payment of the cost of having the Goods repaired.

If the Client is a Consumer and any of the Work services supplied by the Company are not services of a kind ordinarily acquired for personal, domestic or household use or consumption, the Company's liability for a failure to comply with a consumer guarantee under the *Australian Consumer Law* in relation to those services is limited to, at the option of the Company:

(e) the supply of the Work services again; or
(f) the payment of the cost of having the Work services supplied again.

9. SITE ACCESS

The Company will deliver and the Client will receive the Goods at the kerb alignment in a timely manner. The Client will be responsible for providing adequate and timely access to the Site for the Company's material, personnel and equipment and the Client will indemnify the Company for all Loss (including but not limited to delay costs, establishment costs and outlays) incurred by the Company as a result of failure to provide such access. In the case where materials only are supplied by the Company to the Client, the Client shall indemnify the Company for any Loss incurred by the Company arising out of or in connection with the Company's (or its agent's) entry upon the Site for the purposes of delivery. Where the Company leaves equipment on the Site in connection with the supply/performance of the Goods and Work, the Client shall take all reasonable precautions to secure the Site to prevent loss or damage to the equipment or any injury to persons entering upon the Site.

10. DELIVERY

(a) The Company will use reasonable endeavours to supply/execute the Goods and Work in accordance with the Client's schedule. However, should supply/execution of the Goods and Work be early or delayed for any reason beyond the control of the Company or as a result of any cause which the Client is or should reasonably have been aware of all Loss arising from the delay will be the Client's responsibility and the Client shall indemnify the Company in respect of such Loss. The Client is required to give the Company a minimum of 24 hours notice prior to the delivery of Goods, and the Company accepts no liability for delivery outside of the required notice period.
(b) The Client acknowledges that in the course of transportation of the Goods to the point of discharge, settling of the Goods may occur. Prior to discharge from the delivery vehicle, or loading in the event that the Client collects the Goods from the Company's premises, the Client shall check that the Goods description and quantity on the delivery docket conforms with its requirements, and the Client must record any discrepancies in writing on the delivery docket including, but not limited to, discrepancies in quantity and specification. Failure to make such notations on the copy of the docket retained by the Company is deemed to be conclusive evidence that the delivery docket is accurate and the Client accepts the Goods have been supplied in accordance with these Conditions. Use, spreading or compacting of the Goods will be deemed as acceptance of the Goods by the Client.
(c) If the Company (in its absolute discretion) delivers Goods to an unattended Site, the Client must notify the Company of any discrepancies (including any damage to the Goods) regarding the Goods within 24 hours of such delivery and failure to give such notice will be conclusive evidence that the Client accepts the Goods and Work.

11. HOURS

Unless otherwise stated on the face of this quotation, this quotation is based on the whole of the supply/performance of the Goods and Work being conducted during normal hours of the Company which may vary at each location. The Client should check the operating hours of each location at the time of quotation. Should it be necessary to supply/perform the Goods and Work outside of those hours then additional charges will apply which will be calculated in accordance with the variations clause.

12. VARIATIONS

The Company is not obliged to carry out any variation which is outside the scope of the Goods and Work. Any variation that the Company does carry out shall be subject to these Conditions and shall be charged to and paid for by the Client at an agreed rate or failing agreement at the rate determined by the Company.

13. TAX INVOICES

The Client acknowledges that Boral Construction Materials Group Limited (ABN 15 000 028 080) has been appointed as agent for the purpose of invoicing and receiving revenue on the Company's behalf. The Client agrees to pay the amount shown on invoices issued by Boral Construction Materials Group Limited.

14. TERMS OF PAYMENT

The Client must pay for the Goods and Work in cash prior to the delivery or pick up of the Goods unless the Company agrees otherwise in writing.

15. TAXES & OTHER CHARGES

(a) The prices quoted do not include any statutory or government charges. Should any such charges or any other tax become applicable to the materials the subject of this quotation such tax or charge shall be charged to and paid for by the Client in addition to the price otherwise payable under this quotation.
(b) Notwithstanding anything else in these Conditions, if the Company has any liability to pay the Goods and Services Tax ("GST") on the Goods and Work supplied herein to the Client, the Client shall pay to the Company the amount of such GST at the same time as amounts otherwise payable to the Company.
(c) If the introduction of a regime relating to the emission, removal, mitigation, reduction, avoidance or sequestration of greenhouse gases (Carbon Pollution Reduction Scheme) results in any additional financial burden whatsoever to the Company arising from the manufacture or supply of goods or services under these Conditions, the Company may increase the Rates to recover the reasonable net costs incurred by the Company arising from any Carbon Pollution Reduction Scheme affecting the supply/performance of the Goods and Work.

16. FORCE MAJEURE

The Company shall not be liable in any way for any delay in the supply / performance of Goods and Work where such delay occurs by reason of any cause whatsoever beyond the reasonable control of the Company, including without limiting the generality thereof, restrictions of government or other statutory authorities, wars, fires, epidemics, failure or fluctuation in any electrical power supply, storm, flood, earthquake, accident, labour dispute, plant breakdown, materials or labour shortage, the change or introduction of any law or regulation or an act or omission of any supplier or other third party or any failure of any equipment owned or operated by them.

17. TESTING

Goods supplied by the Company and provided to the Client are tested in accordance with the Company's quality control regime. The Company will, at Client's request, use reasonable endeavours to arrange any further testing of the Goods. The costs of any testing will by payable by the Client in accordance with the ruling rates at the time of delivery. Any testing conducted or arranged by the Client will be carried out by a NATA accredited laboratory. The Client will provide the Company with copies of any such third party testing conducted.

18. INFORMATION

(a) The Client acknowledges and agrees that:
  i) the Client must provide all relevant information (including, but not limited to all specifications relating to the Goods and Work, details relating to the Site, and other matters that may affect the Company's ability supply/perform the Goods and Work) to the Company to enable the Company to supply/perform the Goods and Work; and
  ii) the Company in giving this quotation has relied upon the accuracy and completeness of such information,

  and the Client hereby warrants to the Company the accuracy and completeness of all information supplied.
(b) If the Company has provided the Client with any information (including any design services or other advice) in connection with the Goods and Work, the Client acknowledges that it has formed its own opinion as to the correctness or otherwise of the information and has not and will not rely on the Company in respect of such information.

19. RISK AND TITLE

Upon delivery of the Goods to the Site or any temporary stockpiles, all risk in relation to the materials shall pass to the Client. Property in the materials shall not pass to the Client until the Company has been paid in full for the Goods and Work. Where the Goods are sold ex-bin, risk passes to the Client when the Goods are loaded on the Client's vehicle.

20. SAFETY

(a) The Client is responsible for ensuring safe and adequate access to the Site for delivery and all other aspects of Site safety.
(b) The Client shall notify the Company prior to delivery, of any obstacles or peculiarities in relation to the Site including whether the Site or its approach has a gradient greater than 8%.
(c) The driver making any delivery may refuse to complete the delivery, if not satisfied with the Client's compliance with (a) and (b) above, however, making a delivery shall not constitute an assessment of the safety of the Site and in no way relieves the Client of its obligations under these Conditions, including those relating to safety.
(d) The Client acknowledges that breathing dust generated from drilling, sawing or cutting quarry products should be avoided as they may contain crystalline silica. The Client shall ensure that all personnel involved in the Goods and Work avoid contact with exposed skin areas and that a dust mask and goggles are worn as protection from dust when drilling, sawing or cutting. These are general guidelines only and should not be treated as exhaustive. The Client acknowledges that it has appraised itself of the risks in relation to the supply / performance of the Goods and Work, and that it will take appropriate safety precautions and training of its personnel. Contact the Company for more information and a Material Safety Data Sheet.

21. GENERAL

(**Severance**) Any provision of these Conditions which is unenforceable or partly unenforceable is, where possible, to be read down so as to be enforceable, and if it can not be read down, severed to the extent necessary to make these Conditions enforceable, unless this would materially change the intended effect of these Conditions.

(**Waiver**) A right may only be waived in writing, signed by the party giving the waiver, and no other conduct of a party (including a failure to exercise, or delay in exercising, the right) operates as a waiver of the right or otherwise prevents the exercise of the right.

(**No implied terms**) The Client may have the benefit of certain statutory guarantees relating to the Goods and Work services pursuant to the *Competition and Consumer Act 2010* (Cth). Otherwise, to the maximum extent permitted by law, all terms, conditions or warranties that would be implied into these Conditions or in connection with the supply of the Goods and Work by law, statute, custom or international convention (including, but not limited to, those relating to quality or fitness for purpose) are excluded.

(**Insolvency**) If the Client is or becomes or is presumed to be insolvent (including where any steps are taken by a mortgagee to enter into possession of the Client's assets, or to have a receiver, administrator or liquidator appointed in respect of the Client, or to have the Client declared bankrupt, or enter into any scheme of arrangement), the Company may immediately terminate its engagement under these Conditions.

(**Governing law**) These Conditions are governed by the laws of the State or Territory in which the Goods and Work is supplied/performed. The parties submit to the non-exclusive jurisdiction of the courts of that State or Territory and any courts which may hear appeals from those courts.

(**Insurance**) The Client must take out and maintain those policies of insurance that would be held by a reasonably prudent customer in the position of the Client.

(**No Adverse Interpretation**) These Conditions are not to be interpreted against the interests of a party merely because that party proposed this document or some provision in it or because that party relies on a provision of these Conditions to protect itself.

16 Attachment H – Notes About This Report

PRELIMINARY DRAFT
NOT FOR DISTRIBUTION

Information

Important Information About Your Report (1 of 2)

These notes have been prepared by Martens to help you interpret and understand the limitations of your report. Not all are necessarily relevant to all reports but are included as general reference.

Engineering Reports - Limitations

Engineering reports are based on information that may be gained from limited subsurface site testing and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretative rather than factual documents, limited to some extent by the scope of information on which they rely.

Engineering Reports – Project Specific Criteria

Engineering reports are prepared by qualified personnel. They are based on information obtained, on current engineering standards of interpretation and analysis, and on the basis of your unique project specific requirements as understood by Martens. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the Client.

Where the report has been prepared for a specific design proposal (e.g. a three storey building), the information and interpretation may not be relevant if the design proposal is changed (e.g. to a twenty storey building). Your report should not be relied upon, if there are changes to the project, without first asking Martens to assess how factors, which changed subsequent to the date of the report, affect the report's recommendations. Martens will not accept responsibility for problems that may occur due to design changes, if not consulted.

Engineering Reports – Recommendations

Your report is based on the assumption that site conditions, as may be revealed through selective point sampling, are indicative of actual conditions throughout an area. This assumption often cannot be substantiated until project implementation has commenced. Therefore your site investigation report recommendations should only be regarded as preliminary.

Only Martens, who prepared the report, are fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report, there is a risk that the report will be misinterpreted and Martens cannot be held responsible for such misinterpretation.

Engineering Reports – Use for Tendering Purposes

Where information obtained from investigations is provided for tendering purposes, Martens recommend that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document.

Martens would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Engineering Reports – Data

The report as a whole presents the findings of a site assessment and should not be copied in part or altered in any way.

Logs, figures, drawings *etc* are customarily included in a Martens report and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), desktop studies and laboratory evaluation of field samples. These data should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Engineering Reports – Other Projects

To avoid misuse of the information contained in your report it is recommended that you confer with Martens before passing your report on to another party who may not be familiar with the background and purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Subsurface Conditions - General

Every care is taken with the report in relation to interpretation of subsurface conditions, discussion of geotechnical aspects, relevant standards and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions - the potential will depend partly on test point (eg. excavation or borehole) spacing and sampling frequency, which are often limited by project imposed budgetary constraints.

- Changes in guidelines, standards and policy or interpretation of guidelines, standards and policy by statutory authorities.

Important Information About Your Report (2 of 2)

- The actions of contractors responding to commercial pressures.

- Actual conditions differing somewhat from those inferred to exist, because no professional, no matter how qualified, can reveal precisely what is hidden by earth, rock and time.

  The actual interface between logged materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

If these conditions occur, Martens will be pleased to assist with investigation or providing advice to resolve the matter.

Subsurface Conditions - Changes

Natural processes and the activity of man create subsurface conditions. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Reports are based on conditions which existed at the time of the subsurface exploration / assessment.

Decisions should not be based on a report whose adequacy may have been affected by time. If an extended period of time has elapsed since the report was prepared, consult Martens to be advised how time may have impacted on the project.

Subsurface Conditions - Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those that were expected from the information contained in the report, Martens requests that it immediately be notified. Most problems are much more readily resolved at the time when conditions are exposed, rather than at some later stage well after the event.

Report Use by Other Design Professionals

To avoid potentially costly misinterpretations when other design professionals develop their plans based on a Martens report, retain Martens to work with other project professionals affected by the report. This may involve Martens explaining the report design implications and then reviewing plans and specifications produced to see how they have incorporated the report findings.

Subsurface Conditions – Geo-environmental Issues

Your report generally does not relate to any findings, conclusions, or recommendations about the potential for hazardous or contaminated materials existing at the site unless specifically required to do so as part of Martens' proposal for works.

Specific sampling guidelines and specialist equipment, techniques and personnel are typically used to perform geo-environmental or site contamination assessments. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Martens for information relating to such matters.

Responsibility

Geo-environmental reporting relies on interpretation of factual information based on professional judgment and opinion and has an inherent level of uncertainty attached to it and is typically far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded.

To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Martens to other parties but are included to identify where Martens' responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Martens closely and do not hesitate to ask any questions you may have.

Site Inspections

Martens will always be pleased to provide engineering inspection services for aspects of work to which this report relates. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site. Martens is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction.

APPENDIX B – VGT RESOURCE EVALUTION

Pittman Quarry – Resource Overview

1 Regional Geology

The proposed three pits of extraction are principally underlain by the Breckin Ignimbrite Member (Cgimb). The western portion of Pit 2 and the south western portion of Pit 3 intersect the Martins Creek Ignimbrite Member (Curim).

The Brekin Ignimbrite Member is part of the Mowbray Formation, it is described by Minview 3 as a grey Andesitic and red Rhyodacitic Ignimbrite, refer to Figure 1. This pyroclastic rock formed in the Carboniferous Period and is between 330 and 346 million years old.

The Martins Creek Ignimbrite is a blue grey mottled welded andesitic ignimbrite with minor interbeds of beige to grey dacitic ignimbrite. This is also a pyroclastic rock formed in the Carboniferous Period and is between 330 and 346 million years old.

2 Site Geology

The project area has steep sided hills which have hard angular outcrops of volcanic rocks. A detailed geological investigation was undertaken in 2018 by Martens & Associates. Three drill holes were sunk in the investigation area, refer to Figure 1.

Table 1. Drillhole Summary

Hole No.	Overburden (m)	Latite Tuff* (m)	Total Depth of Hole (m)
BH102	0.8	39.26	40.06
BH103	7.7	28.36	36.06
BH104	0.8	34.2	35.00

Note: * The petrographic nomenclature for the hard rock is very similar to Andesite

The cores presented are hard and competent, with numerous solid sticks. None of the holes reached the base of the deposit.

3 Proposed Quarry Development

As presented in Figure 1 there are three proposed areas of extraction. The resource estimates are based upon the following assumptions and comments:

- Survey provided by client;
- Volumes undertaken using 12D three dimensional software;
- All pits are self-draining;
- Base of Pit 1 is (95 to 93.5m RL) refer to Figure 2;
- Base of Pit 2 is (93m RL) refer to Figure 3;
- Base of Pit 3 is (130 to 120m RL) refer to Figure 4;
- A single batter, near vertical (80°) was used;
- Based upon authors experience density of Latite Tuff 2.5 g/cm^3 (to be confirmed with further testing); and
- Extraction envelops set by client, consider 40 metre buffers set off creeks.

The 80 degree angle single batter design for these calculations are undertaken at this stage of the assessment to provide a basic insight into what may be present in these potential extraction areas. The final landform design will consider a full geotechnical review of the drill core to better understand and final landform bench and batter designs.

Table 2. Volume Calculations Summary

Pit Name	Extraction Area (Ha)	Approximate Top (m RL)	Approximate Base (m RL)	Bench Width (m)	Batter Height (m)	Total Volume (m^3)	Tonnes (T)
Pit 1	3.89	120.7	93.5	10	~12.5	488,800	1,222,000
Pit 2	14.5	165	93	N/A	Variable	5,080,500	12,701,250
Pit 3	33.2	214	119 but mostly 130	N/A	Variable	14,699,700	36,749,250

Note* Density estimated 2.5 g/cm^3

4 Further Geological Assessment

A detailed geological mapping assessment of the three investigation areas will be required initially. Based upon these results a number of cored and percussion holes will be required to the proposed extraction depths as presented in Table 2. As presented in Figure 4 the previous drilling is some 60 metres above the proposed extraction floor.

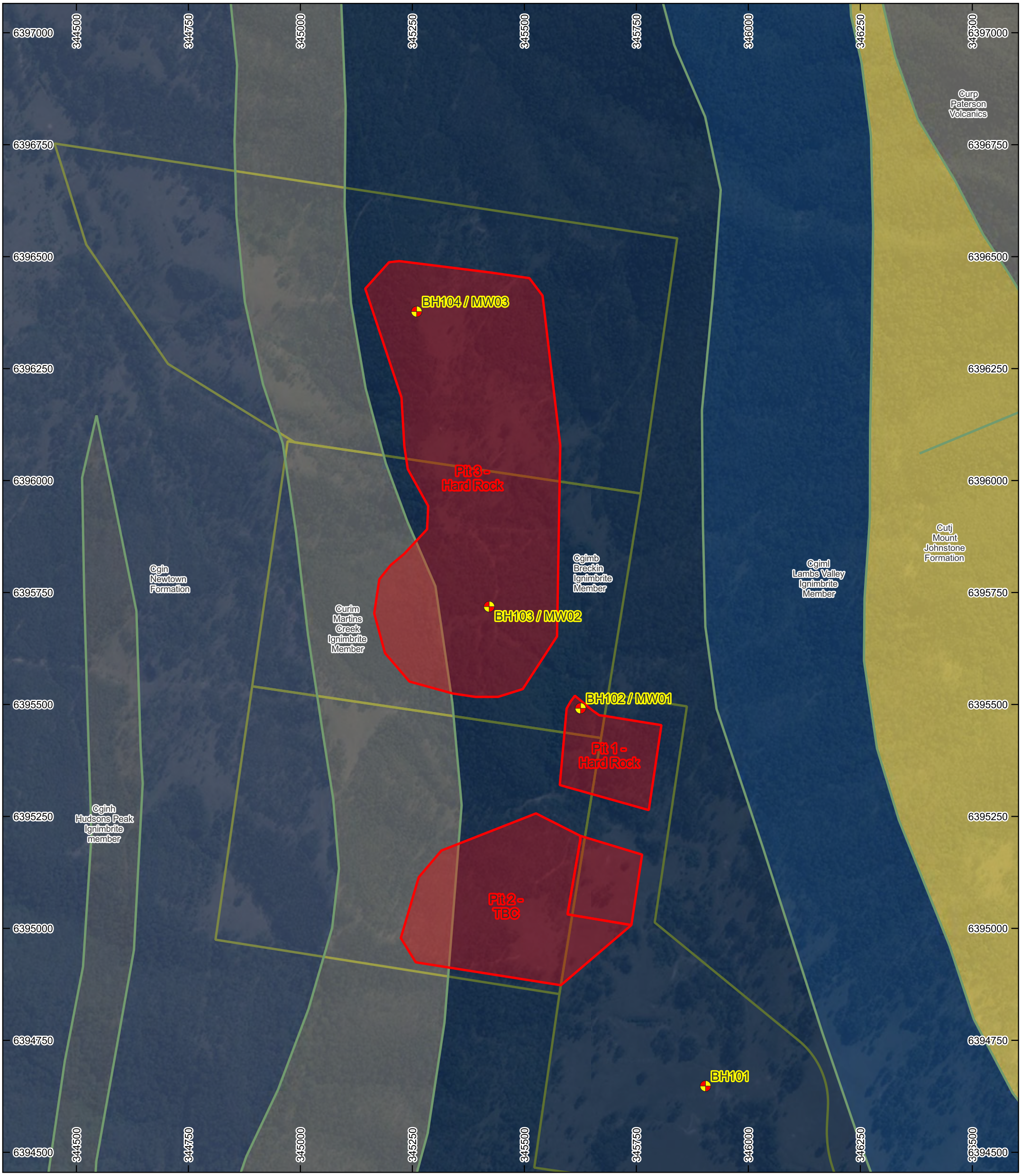
Plan of:	**Pittman's Quarry Assistance - Regional Geology**	**Location:**	253 Stanhope Road, Elderslie, NSW Blind Creek Road, Glendon Brook, NSW	**Source:**	Wedgetail pit boundaries and hydrolines. Google Satellite via QGIS.	**Plan By:**	SK		
Figure:	**ONE**	**Council:**	Singleton Shire Council	**Survey:**	ELVIS 2012-02. Wedgetail. Minview download 2023	**Project Manager:**	GVT		
Version/ Date:	V0 12/12/2023	**Tenure:**	Not Applicable	**Projection:**	GDA2020/MGA Zone 56 EPSG:7856				
Our Ref:	12570_PQA_2023_Q004_V0_F1	**Client:**	Wedgetail Project Consulting Pty Ltd	**Contour Interval:**	5m				

N

0 50 100 150 200 m

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Legend

- Pittman Lot Boundary
- Proposed Pit Boundaries
- Existing Boreholes

Minview Geology

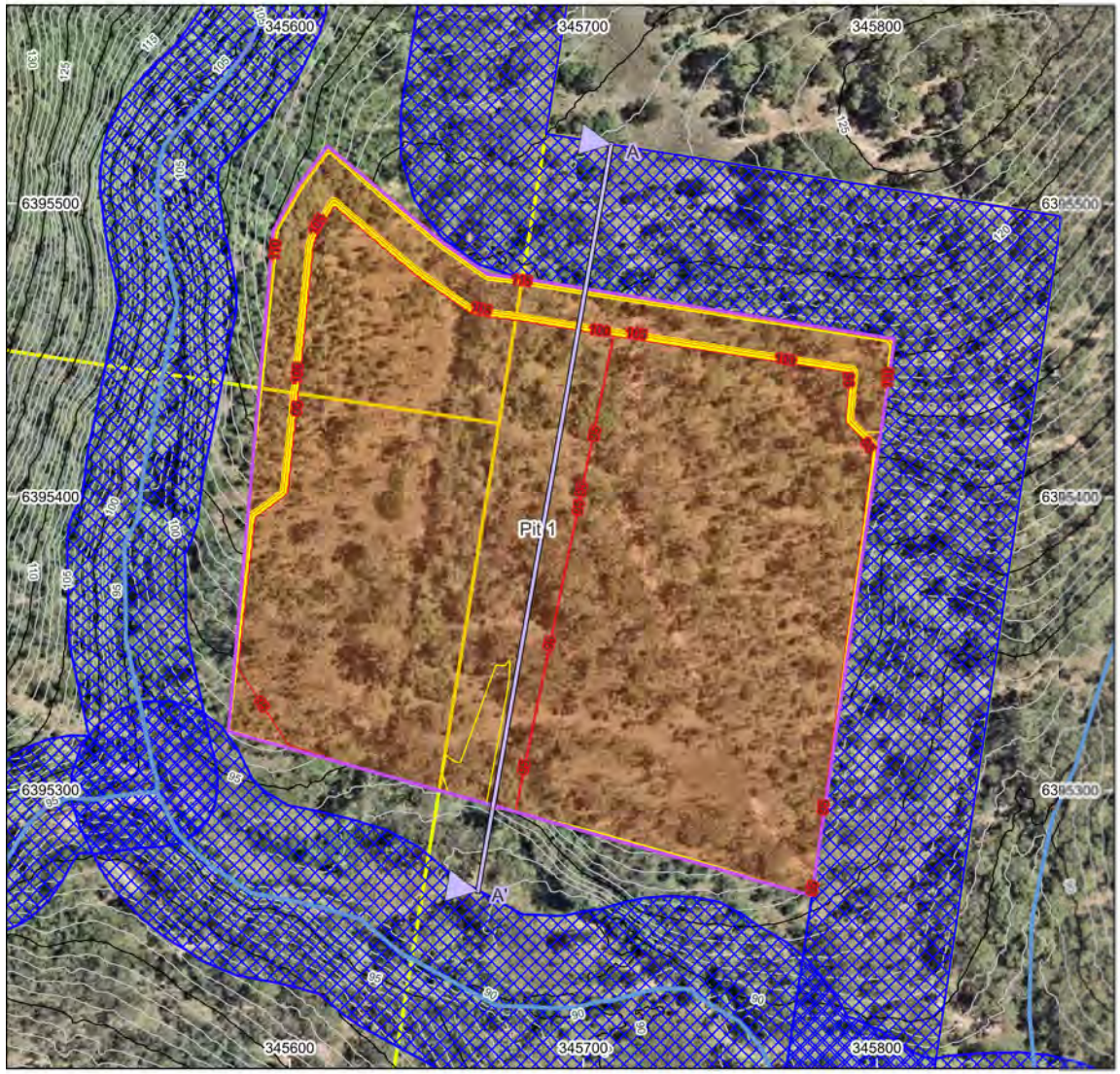
Rock Units - New England Orogen

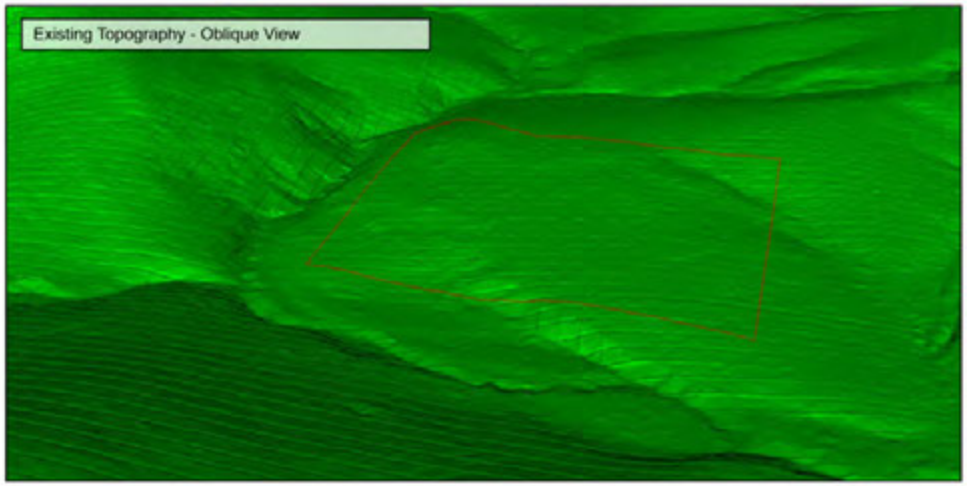
- Cgimb
- Cgiml
- Cgin
- Cginh
- Curim
- Curp
- Curs
- Cursd
- Cus
- Cutj
- Rock Unit Boundary Faults - New England Orogen

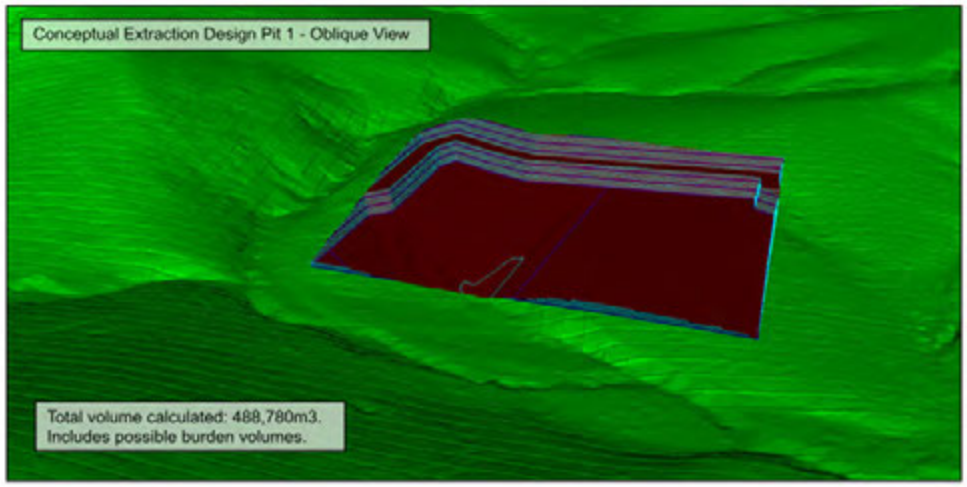
Plan of:	**Pittman's Quarry Assistance - Draft Pit 1 Design**	**Location:**	253 Stanhope Road, Elderslie, NSW Blind Creek Road, Glendon Brook, NSW	**Source:**	Nearmap aerial 09/01/2023	**Plan By:**	SK
Figure:	**TWO**	**Council:**	Singleton Shire Council	**Survey:**	ELVIS February 2012 Topography Wedgetail drainage, buffers, pit boundaries.	**Project Manager:**	GVT
Version/Date:	V0 12/12/2023	**Tenure:**	Not Applicable	**Projection:**	GDA2020/MGA Zone 56 EPSG:7856	**Office:**	Thornton
Our Ref:	12570_PQA_2023_Q001_V0_F2 Pit 1	**Client:**	Wedgetail Project Consulting Pty Ltd	**Contour Interval:**	5m surrounds 1m Pit 1 Design		

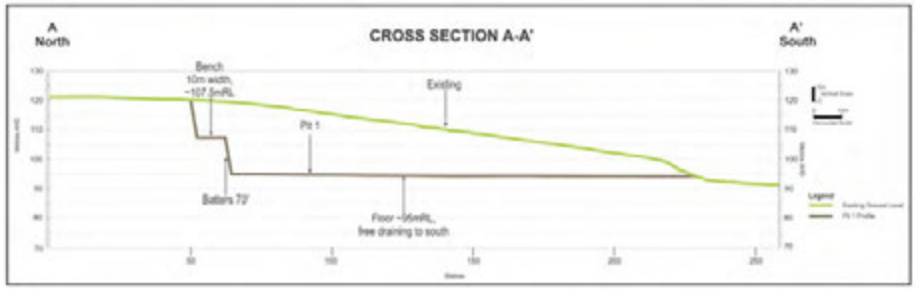
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Legend

Lot
- Pittman

Surrounding Contours
- 5m

Wedgetail Data
- Hydroline Adjusted 231108
- Buffers
- Top of Cut Pit 1

Pit 1 Design V0

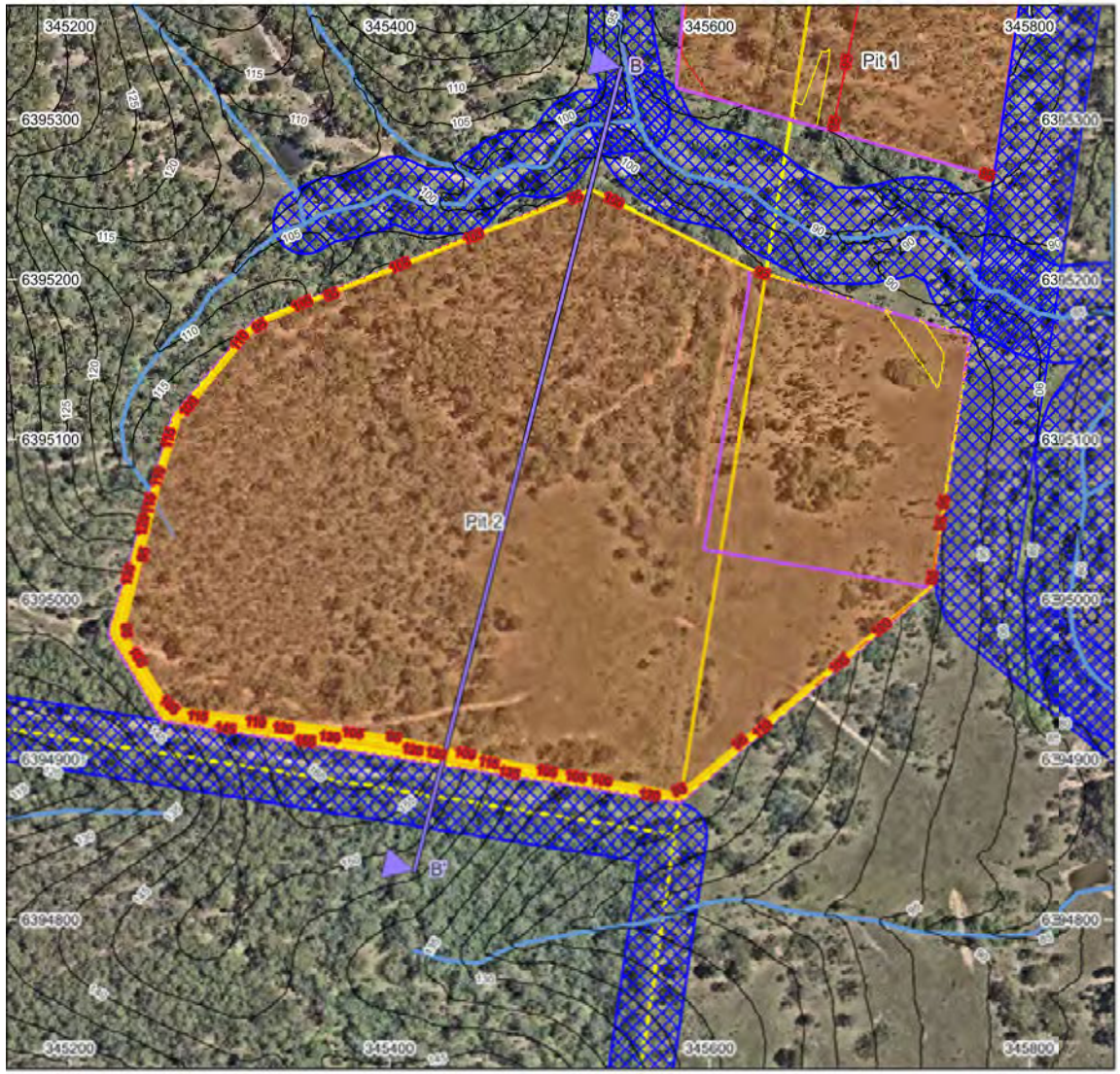
Contours Pit 1 V0
- 5m
- 1m

Cross-Section A-A'

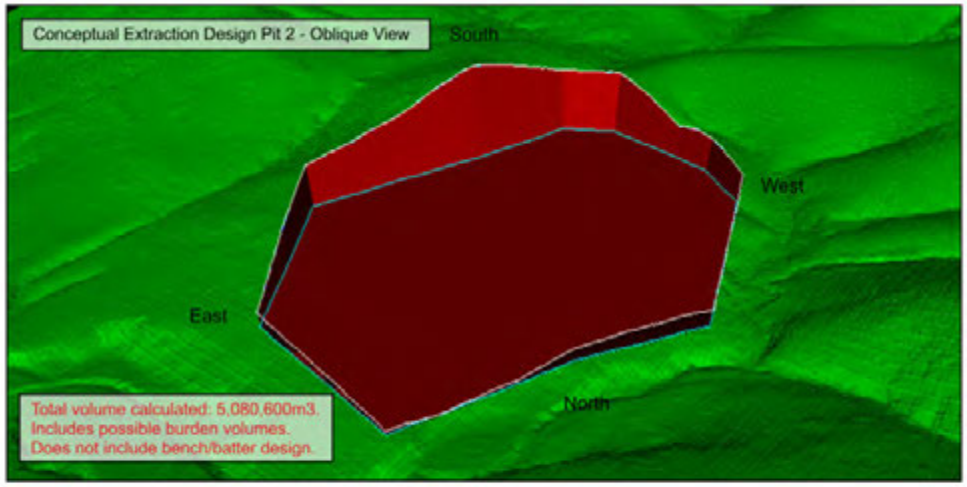
Plan of:	**Pittman's Quarry Assistance - Draft Pit 2 Design**	**Location:**	253 Stanhope Road, Elderslie, NSW Blind Creek Road, Glendon Brook, NSW	**Source:**	Nearmap aerial 09/01/2023	**Plan By:**	SK
Figure:	**THREE**	**Council:**	Singleton Shire Council	**Survey:**	ELVIS February 2012 Topography Wedgetail drainage, buffers, pit boundaries.	**Project Manager:**	GVT
Version/Date:	V0 12/12/2023	**Tenure:**	Not Applicable	**Projection:**	GDA2020/MGA Zone 56 EPSG:7856	**Office:**	Thornton
Our Ref:	12570_PQA_2023_Q003_V0_F3 Pit 2	**Client:**	Wedgetail Project Consulting Pty Ltd	**Contour Interval:**	5m surrounds 1m Pit 2 Design		

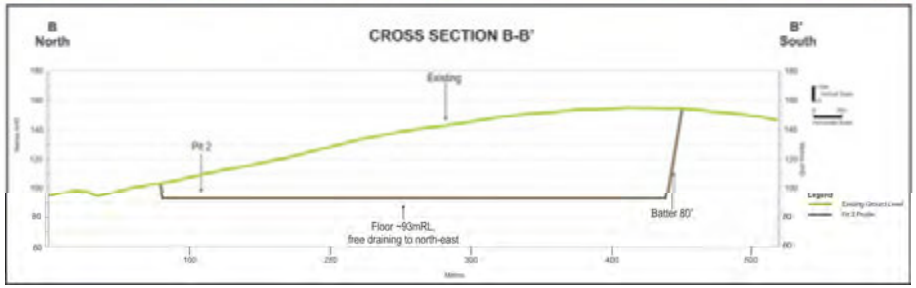
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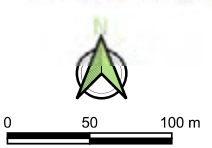
This figure may be based on third party data which has not been verified by vgt and may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and vgt does not warrant its accuracy.











Legend

Lot
- Pittman

Surrounding Contours
- 5m

Wedgetail Data
- Hydroline Adjusted 231108
- Buffers

- Top of Cut Pit 2

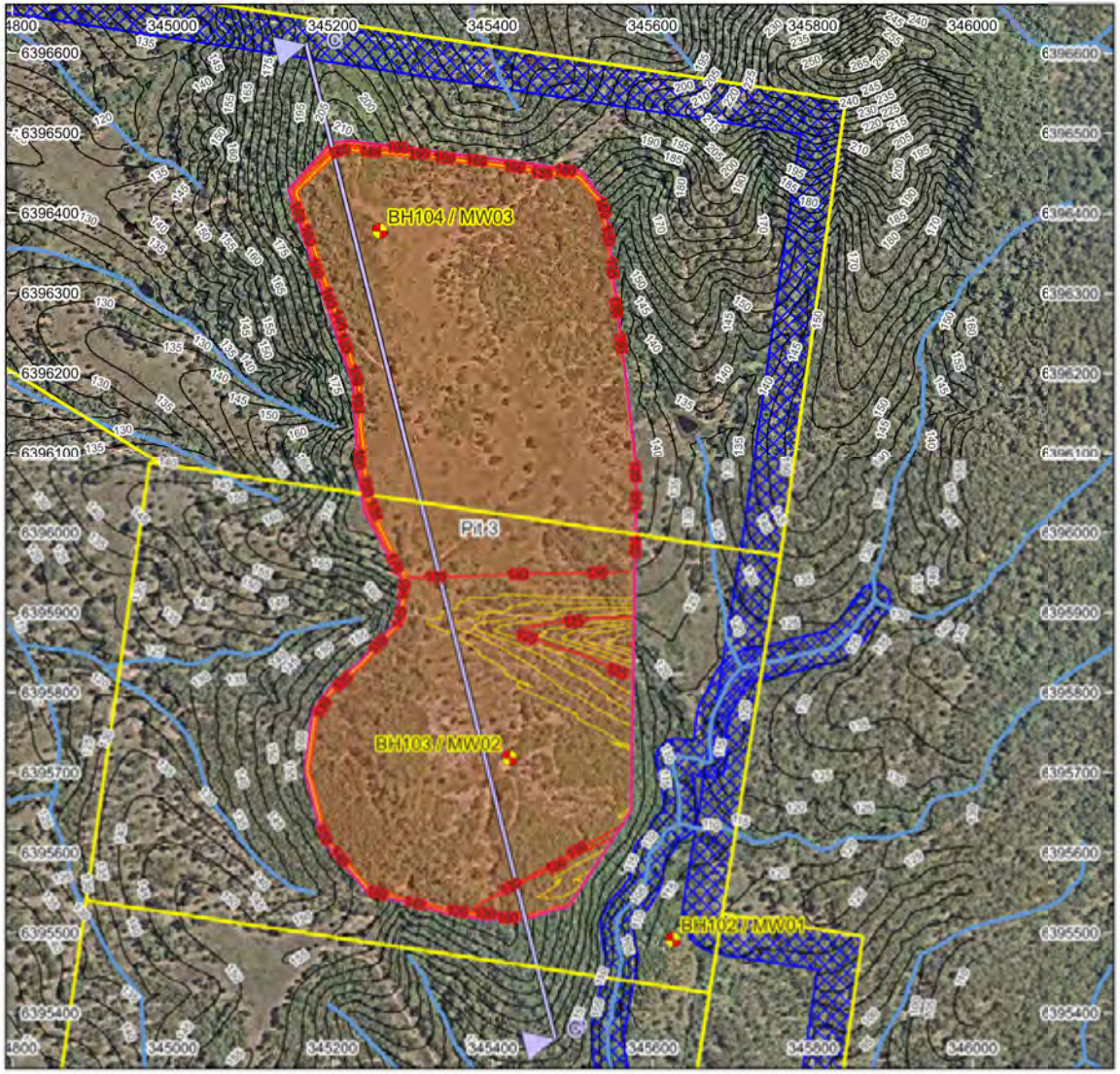
Contours Pit 2 V0
- 5m
- 1m

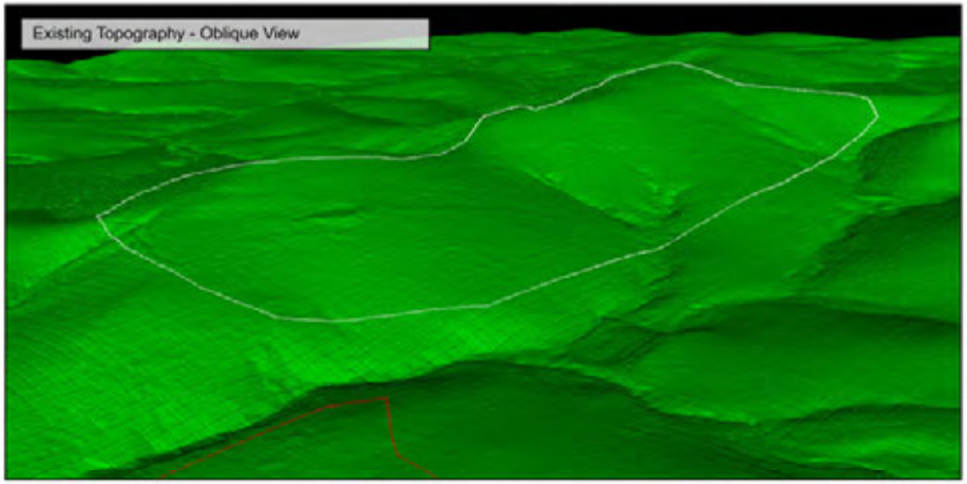
- Cross-Section B-B'

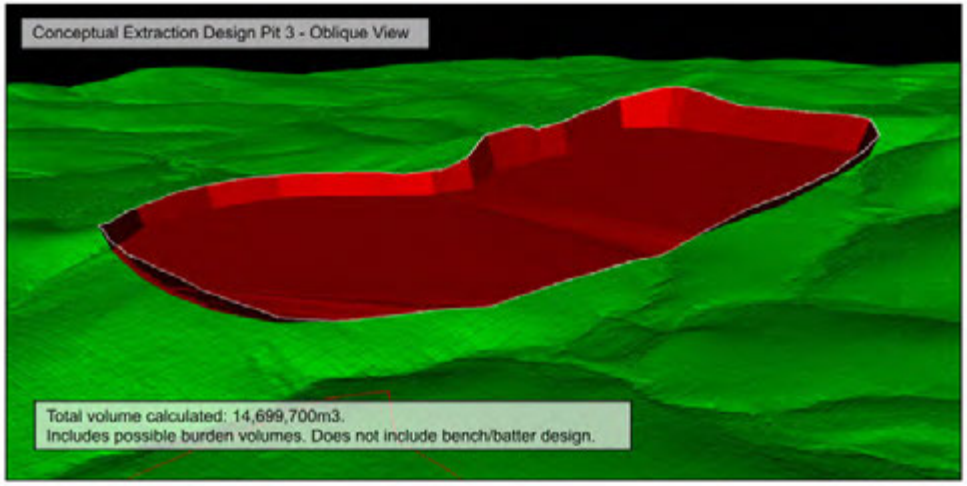
Plan of:	**Pittman's Quarry Assistance - Draft Pit 3 Design**	**Location:**	253 Stanhope Road, Elderslie, NSW Blind Creek Road, Glendon Brook, NSW	**Source:**	Nearmap aerial 09/01/2023	**Plan By:**	SK
Figure:	**FOUR**	**Council:**	Singleton Shire Council	**Survey:**	ELVIS February 2012 Topography Wedgetail drainage, buffers, pit boundaries.	**Project Manager:**	GVT
Version/Date:	V1 12/12/2023	**Tenure:**	Not Applicable	**Projection:**	GDA2020/MGA Zone 56 EPSG:7856	**Office:**	Thornton
Our Ref:	12570_PQA_2023_Q002_V1_F4 Pit 3	**Client:**	Wedgetail Project Consulting Pty Ltd	**Contour Interval:**	5m surrounds 1m Pit 3 Design		

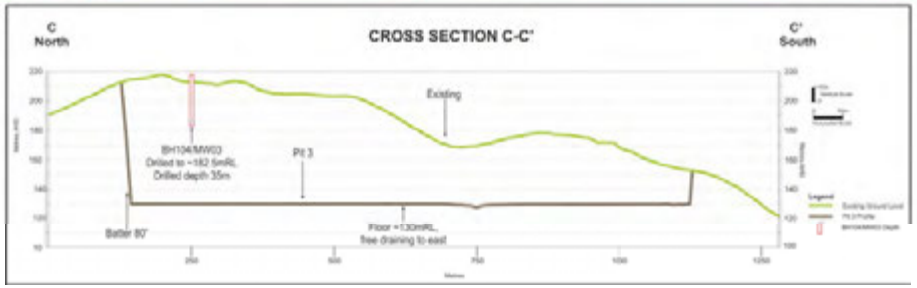
vgt environmental compliance solutions and laboratories

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N

0 50 100 150 200 m

Legend

Lot
- Pittman

Surrounding Contours
- 5m

Wedgetail Data
- Hydroline Adjusted 231108
- Buffers
- Existing Boreholes

Pit 3 Design V0
- Top of Cut Pit 3
- Cross-Section C-C'

Contours Pit 3 V0
- 5m
- 1m

APPENDIX C – SCOPING WORKSHEET

Group	Specific Matter	Is the Project likely to cause an impact without mitigation	Is the impact likely to be significant?	Proposed Level of Assessment	Proposed Level of Community Engagement	Is a Cumulative Impact Assessment required?
Access	Access to Property	Yes	Likely	Detailed	Specific	Yes
	Traffic and parking	No	-	Traffic – detailed Parking – no further assessment	Specific	Yes
	Port and airport facilities	No	-	Airport – no further assessment Port – not relevant	Nil	Nil
	Road and rail facilities	Yes	Likely	Road – detailed Rail – No further assessment	Specific	Yes
Air	Gases	Yes	Unlikely	No further assessment (rail facilities)	Nil	Nil
	Atmospheric Emissions	Yes	Unlikely	Standard	Specific	Yes
	Particulate matter	Yes	Likely	Detailed	Focused	Yes
Amenity	Noise	Yes	Likely	Detailed	Focused	Yes
	Odour	No	-	No further assessment	Nil	Nil
	Vibration	Yes	Likely	Detailed	Specific	Yes
	Visual	Yes	Likely	Standard	Specific	Yes
Biodiversity	Conservation Areas	Yes	Unlikely	Standard	Specific	Yes
	Terrestrial flora and fauna	Yes	Likely	Detailed	Specific	Yes

	Aquatic flora and fauna	Yes	Likely	Detailed	Specific	Yes
Built Environment	Private property	Yes	Unlikely	Standard	Specific	No
	Public land	Yes	Unlikely	Standard	General	No
	Public infrastructure	Yes	Unlikely	Standard	General	No
Economic	Natural resource use	Yes	Unlikely	No further assessment	Nil	Yes
	Livelihood	No	-	No further assessment	Nil	No
	Opportunity cost	Yes	Unlikely	Standard	General	No
Hazards and Risks	Biosecurity	Yes	Unlikely	Standard	General	No
	Bushfire	Yes	Likely	Standard	General	Yes
	Coastal Hazards	No	-	Not relevant	Nil	No
	Dams safety	Yes	Unlikely	Standard	General	No
	Dangerous goods	No	-	Not relevant	Nil	No
	Environmental Hazards	Yes	Unlikely	Standard	General	No
	Flooding	No	-	No further assessment	Nil	No
	Groundwater contamination	Yes	Likely	Detailed	General	No
	Hazardous and offensive development	Yes	Unlikely	Standard	General	No

	Land contamination	No	-	No further assessment	Nil	No
	Land movement	Yes	Unlikely	Standard	General	No
	Waste	Yes	Unlikely	Standard	General	No
Heritage	Aboriginal	Unknown	Unknown	Detailed	Specific	No
	Historic	Unknown	Unknown	Detailed	General	No
	Natural	No	-	No further assessment	Nil	No
Land	Stability	Yes	Unlikely	Standard	General	No
	Soil chemistry	No	-	No further assessment	Nil	No
	Land capability	Yes	Likely	Standard	General	No
	Topography	Yes	Likely	Standard	General	No
Social	Community services and facilities	No	-	Not Relevant	Nil	No
	Health	Yes	Unknown	Detailed	General	Yes
	Housing availability	No	-	Not Relevant	Nil	No
	Safety	Yes	Likely	Detailed	Specific	Yes
	Social Cohesion	Yes	Likely	Detailed	Specific	Yes
Water	Hydrology	Yes	Likely	Detailed	Specific	Yes
	Water quality	Yes	Likely	Detailed	Specific	Yes
	Water availability	Yes	Unlikely	Detailed	Specific	Yes

APPENDIX D – AHIMS SEARCH RESULTS

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Pittman 4

Client Service ID : 864943

Shaun Smith

27 Groves Road
Bennetts Green New South Wales 2290

Attention: Shaun Smith

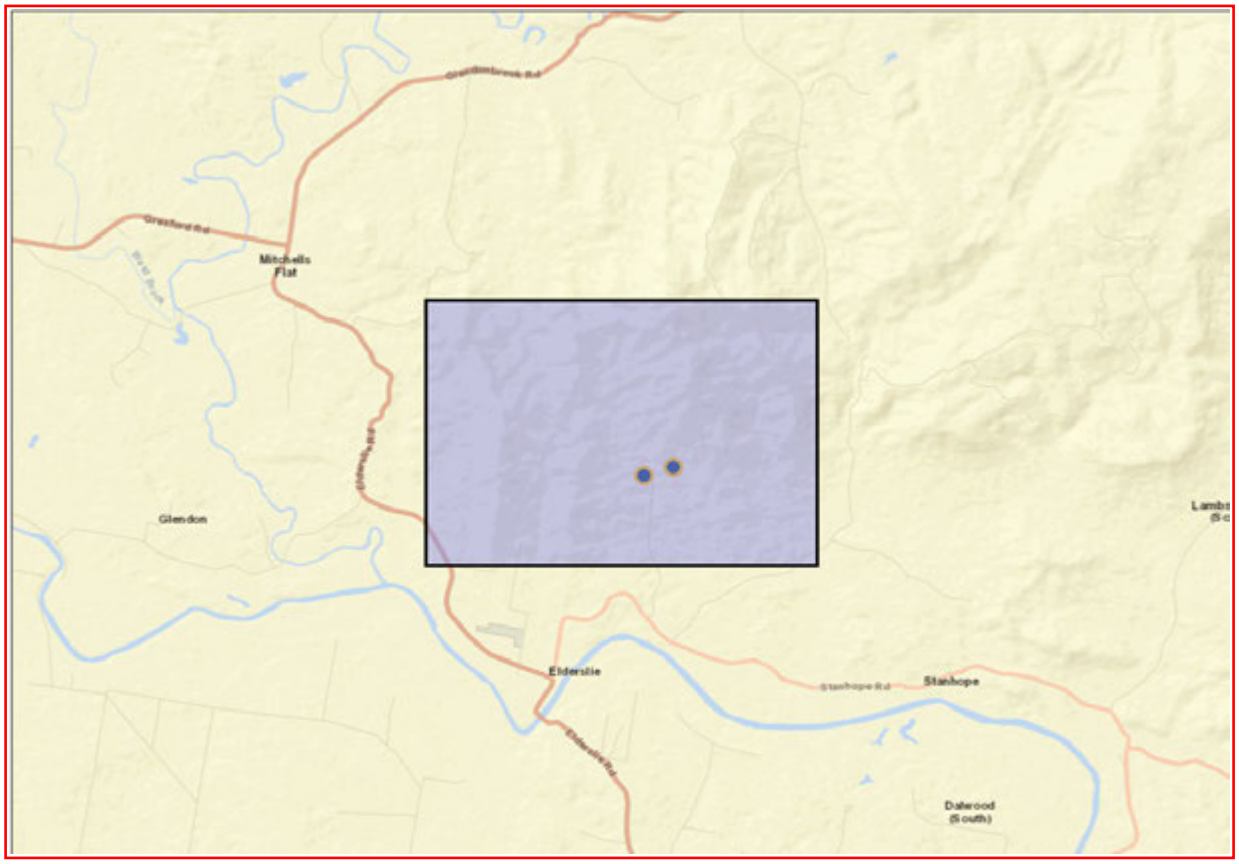
Email: ssmith@wedgetail.com.au

Date: 16 February 2024

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -32.5907, 151.3282 - Lat, Long To : -32.5546, 151.39, conducted by Shaun Smith on 16 February 2024.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

2	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

AHIMS Aboriginal Heritage Information Management System

This information is not guaranteed to be free from errors or omissions. DEC and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omissions.

Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville NSW 2200
ahims@environment.nsw.gov.au

Department of Environment and Conservation (NSW)

Office Use Only

Site Number 37-6-3826

Date received / / Date entered into system / / Date catalogued / /

Entered by (Name) Ashley Oweridge

Information Access

Office Use Only

☐ Gender/male ☐ Gender/female ☐ Location restriction ☒ General restriction ☐ No access

For Further Information Contact:

☐ **Nominated Trustee**

Title | Surname | First Name | Initials

Organisation

Address

Phone number Fax

☐ Client on system

☐ **Knowledge Holder**

Title | Surname | First Name | Initials

Organisation

Address

Phone number Fax

Aboriginal Heritage Unit or Cultural Heritage Division Contacts

Topographic Location

Site Name ELDERSLIE 1

Easting 346753 Nothing 6394386 ☐ AMG ☑ GDA

Mapsheet ELDELN

☐ Client on system

Zone

☐	54	☐ 1.25k topographic map	☐ Non differential GPS
☐	55	☐ 1.25k topographic map	☐ Non differential GPS
☒	56	☒ 1.25k topographic map	☒ Non differential GPS
			☐ Client GIS or CAD system

Primary Recorder

Title | Surname | First Name | Initials

WORTH | SUZIE | SW

Organisation WANARUAH LALC

Address 19 MAITLAND ST MUSWELLBROOK

Phone number 0265431288 Fax 0265425377

Date recorded 21/1/16

☐ Client on system

☐ CLOSED SITE ☒ OPEN SITE

Site Context

Landform

- ☐ Mountains
- ☐ Plain
- ☐ Rolling hills
- ☐ Steep hills
- ☐ Undulating plain

Landform Unit

- ☐ Beach
- ☐ Coastal rock platform
- ☐ Dune
- ☐ Intertidal flat
- ☐ Lagoon
- ☐ Tidal Creek
- ☐ Tidal Flat
- ☐ Cliff
- ☐ Crest
- ☐ Flat
- ☒ Lower slope
- ☐ Mid slope
- ☐ Upper slope
- ☐ Plain
- ☐ Ridge
- ☐ Tor
- ☐ Valley flat
- ☐ Levy
- ☐ Stream bank
- ☐ Stream channel
- ☐ Swamp
- ☐ Terrace
- ☐ Terrace flat

Slope

☐ degrees

Vegetation

- ☐ Closed forest
- ☐ Grasslands
- ☐ Isolated clump of trees
- ☐ Open forest
- ☐ Open woodland
- ☐ Scrub
- ☒ Woodland
- ☒ Cleared
- ☐ Revegetated
- ☐ N/A

Land use

- ☒ Conservation
- ☐ Established urban
- ☐ Farming-intensive
- ☐ Farming-low intensity
- ☐ Forestry
- ☐ Industrial
- ☐ Mining
- ☐ Pastoral/grazing
- ☐ Recreation
- ☐ Semi-rural
- ☐ Service corridor
- ☐ Transport corridor
- ☐ Urban expansion
- ☐ N/A

Water

Distance to permanent water source: 0m-5 m(

Distance to temporary water source: ____ metres

Name of nearest permanent water source: ____

Name of nearest temporary water: ____

Directions for Relocation

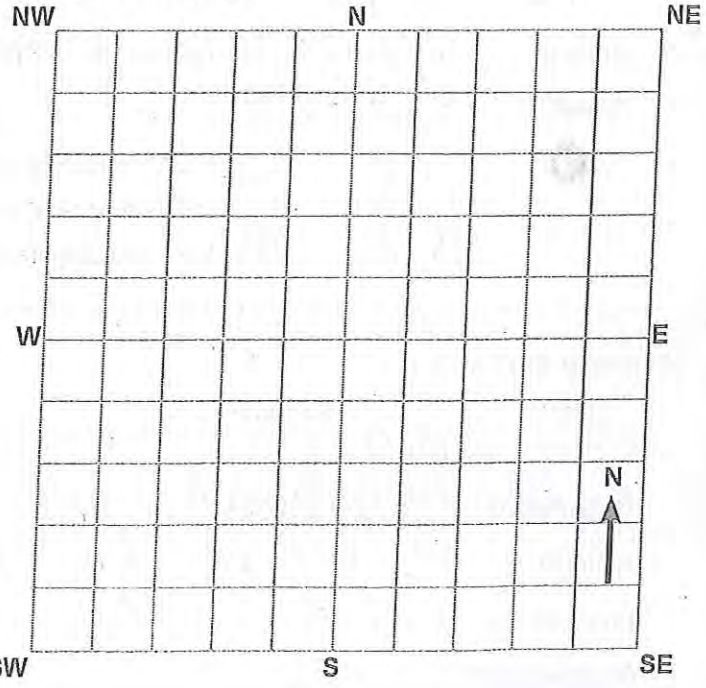
Current Land Tenure

- ☐ Public
- ☐ Private

National Park/other government: Part II Land NPW Act

Primary report I.D. ____ (I.D. Office Use only)

Relocation Map



General Site Information

Closed Site **Open Site**

Shelter/Cave Formation
- [ ] Boulder
- [ ] Wind erosion
- [ ] Water erosion
- [ ] Rock collapse

Rock Surface Condition
- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [X] Other platform

Condition of Ceiling
- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

Shelter Aspect
- [ ] North
- [ ] North East
- [ ] East
- [ ] South East
- [ ] South
- [ ] South West
- [ ] West
- [ ] North West

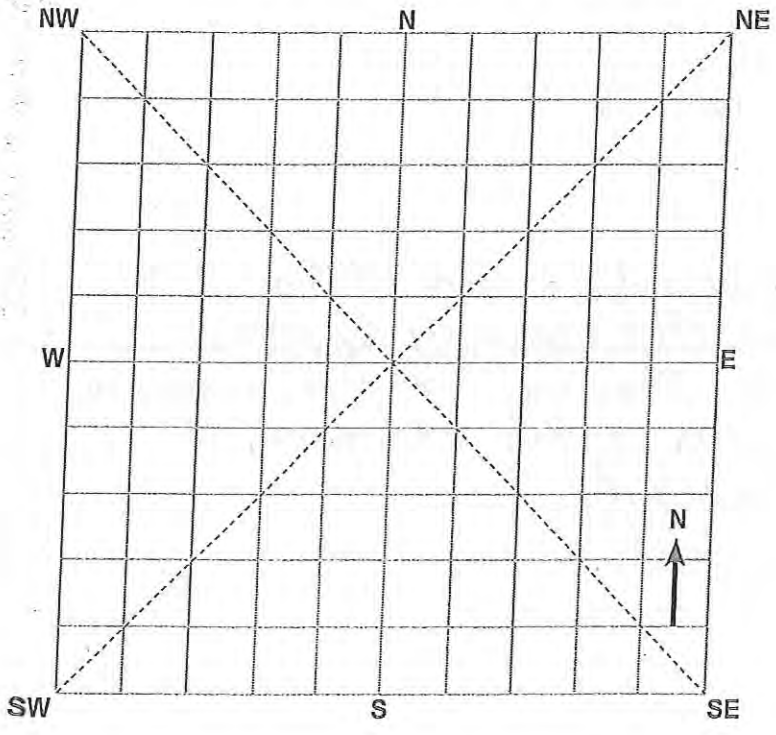
Features (including number of features)

[ ]	1. Aboriginal Ceremony & Dreaming	[ ]
[ ]	2. Aboriginal Resource & Gathering	[ ]
[ ]	3. Art	[ ]
[X]	4. Artefact	[1]
[ ]	5. Burial	[ ]
[ ]	6. Ceremonial Ring	[ ]
[ ]	7. Conflict	[ ]
[ ]	8. Earth Mound	[ ]
[ ]	9. Fish Trap	[ ]
[ ]	10. Grinding Groove	[ ]
[ ]	11. Habitation Structure	[ ]
[ ]	12. Hearth	[ ]
[ ]	13. Non Human Bone & Organic Material	[ ]
[ ]	14. Ochre quarry	[ ]
[ ]	15. Potential Archaeological Deposit	[ ]
[ ]	16. Stone Quarry	[ ]
[ ]	17. Shell	[ ]
[ ]	18. Stone Arrangement	[ ]
[ ]	19. Modified Tree	[ ]
[ ]	20. Water Hole	[ ]

Site Orientation
- [ ] N-S
- [ ] NE-SW
- [ ] E-W
- [ ] SE-NW
- [ ] N/A

Attachments (No.)
- [ ] A4 location map
- [ ] B/W photographs
- [ ] Colour photographs
- [ ] Slides
- [ ] Aerial photographs
- [ ] Site plans, drawings
- [ ] Recording tables
- [X] Other
- [ ] Feature inserts-No [ ]

Estimated Site Extent and Location of Features



Site Context

Closed Site Dimensions (m)
- [ ] Internal length
- [ ] Internal width
- [ ] Shelter height
- [ ] Shelter floor area

Open Site Dimensions (m)
- [ ] Total length of visible site
- [ ] Average width of visible site
- [ ] Estimated area of visible site
- [ ] Length of assessed site area

Site Interpretation and Community Statement - Aboriginal Community Interpretation and Management Recommendations

See the attached report titled NPWS Aboriginal Cultural Heritage Due Diligence Tangary Mountain, Elderslie Report.

Preliminary Site Assessment - Scientific Analysis and Preliminary Management Recommendations

As Above.

This section should only be filled in by the Endorsees

Endorsed by: ☐ Knowledge Holder ☐ Nominated Trustee ☐ Native Title Holder ☐ Community Consensus

Title	Surname	First Name	Initials

Organisation

Address

Phone number Fax

Comments

Artefact identified during Aboriginal cultural Heritage due diligence check in Part 11 land managed by NPWS adjacent to Tangary Mountain, Elderslie. A Red mudstone flake (baked) 29x12x10 with a tiny platform & evidence of having been worked.

An existing trail was followed along and up a steep slope to a ridgeline. Rocks and gravels, native grasses, grey gums and ironbarks were present and a dry creekline was inspected. An old fenceline was followed and it was discussed that fencelines that were going to be replaced or erected (new star pickets and wire – wildlife friendly) will have a 4m buffer firebreak line and it is proposed that a management plan will be established with consideration of a traditional burn program in conjunction with the Rural Fire Service. It is intended to not impact on any mature tree and only minor vegetation clearing will be required. It is mostly cleared along the existing fencelines. African olive is present and will be removed along the fencelines and the main concern is to contain the species not a total eradication program.

On the upper slope at the top end of the existing track, a new fenceline is to be built towards the east. Macrozamia was noted and a fig is present on the ridgeline. The new fenceline then heads south and a mature grey gum with hollows was inspected. Wombat berry was present.

A dam was inspected and water dragon, frogs were observed – fresh water turtles have been seen previously. The proposed fenceline proceeds along the edge of a track across a depression on a ridgeline spur – an old quarry was observed. The fence will cross a minor creekline and river cobbles, silcrete, quartzite and some ochre material was present.

A tree with a nature scar was noted with native bees present.

Towards the end of the track (above the dam), the existing track will be graded and will be registered as a fire trail. Regenerating ironbark woodland was noted with evidence of previous tree clearing and an eroding creek bed was inspected.

A large dam was inspected – cheese trees, cumbungi, dragon flies were noted. Part of this area may have remnants of rain forest species, mosses and lichens and may have been built at the location of possible soak. A red mudstone flake (backed) (346753:6394386) was reported (29 x 12 x 10) with a tiny platform and evidence of having been worked on ventral side, having three scars. This site (TM01) will not be impacted by the proposed fencing or track maintenance, however should any work be carried out within the immediate vicinity of the dam or dam wall, an OEH AHIP will be required to salvage the artefact and to ensure that no other objects will be impacted by the work.





AHIMS Aboriginal Heritage Information Management System

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Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville NSW 2200
ahims@environment.nsw.gov.au

Department of Environment and Conservation (NSW)

Office Use Only

Site Number 37-16-3827

Date received / / Date entered into system / / Date catalogued / /

Entered by (Name) Ashley Deveridge

Information Access

Office Use Only

☐ Gender/male ☐ Gender/female ☐ Location restriction ☒ General restriction ☐ No access

For Further Information Contact:

☐ **Nominated Trustee**

Title | Surname | First Name | Initials

Organisation

Address

Phone number Fax

☐ Client on system

☐ **Knowledge Holder**

Title | Surname | First Name | Initials

Organisation

Address

Phone number Fax

Aboriginal Heritage Unit or Cultural Heritage Division Contacts

Topographic Location

Site Name ELDERSLIE 2

Easting 346321 Nothing 6394253 ☐ AMG ☑ GDA

Mapsheet ELDER1N

☐ Client on system

Zone			
☐	54	☐ 1.25k topographic map	☒ Non differential GPS
☐	55	☐ 1.25k topographic map	☐ Non differential GPS
☒	56	☒ 1.25k topographic map	☒ Non differential GPS
			☐ Client GIS or CAD system

Primary Recorder

Title | Surname | First Name | Initials

WORTH | SUZIE | SM

Organisation WANARUAH LALC

Address 119 MAITLAND ST MUSWELLBROOK

Phone number 0265431288 Fax 0265425377

Date recorded 21/11/16

☐ Client on system

☐ CLOSED SITE ☒ OPEN SITE

Site Context

Landform

- ☐ Mountains
- ☐ Plain
- ☐ Rolling hills
- ☐ Steep hills
- ☐ Undulating plain

Landform Unit

- ☐ Beach
- ☐ Coastal rock platform
- ☐ Dune
- ☐ Intertidal flat
- ☐ Lagoon
- ☐ Tidal Creek
- ☐ Tidal Flat
- ☐ Cliff
- ☐ Crest
- ☐ Flat
- ☒ Lower slope
- ☐ Mid slope
- ☐ Upper slope
- ☐ Plain
- ☐ Ridge
- ☐ Tor
- ☐ Valley flat
- ☐ Levy
- ☐ Stream bank
- ☐ Stream channel
- ☐ Swamp
- ☐ Terrace
- ☐ Terrace flat

Slope

☐ degrees

Vegetation

- ☐ Closed forest
- ☐ Grasslands
- ☐ Isolated clump of trees
- ☐ Open forest
- ☐ Open woodland
- ☐ Scrub
- ☐ Woodland
- ☒ Cleared
- ☐ Revegetated
- ☐ N/A

Land use

- ☒ Conservation
- ☐ Established urban
- ☐ Farming-intensive
- ☐ Farming-low intensity
- ☐ Forestry
- ☐ Industrial
- ☐ Mining
- ☐ Pastoral/grazing
- ☐ Recreation
- ☐ Semi-rural
- ☐ Service corridor
- ☐ Transport corridor
- ☐ Urban expansion
- ☐ N/A

Water

Distance to permanent water source ☐ m(

Distance to temporary water source ☐ metres

Name of nearest permanent water source ☐

Name of nearest temporary water ☐

Directions for Relocation

Current Land Tenure

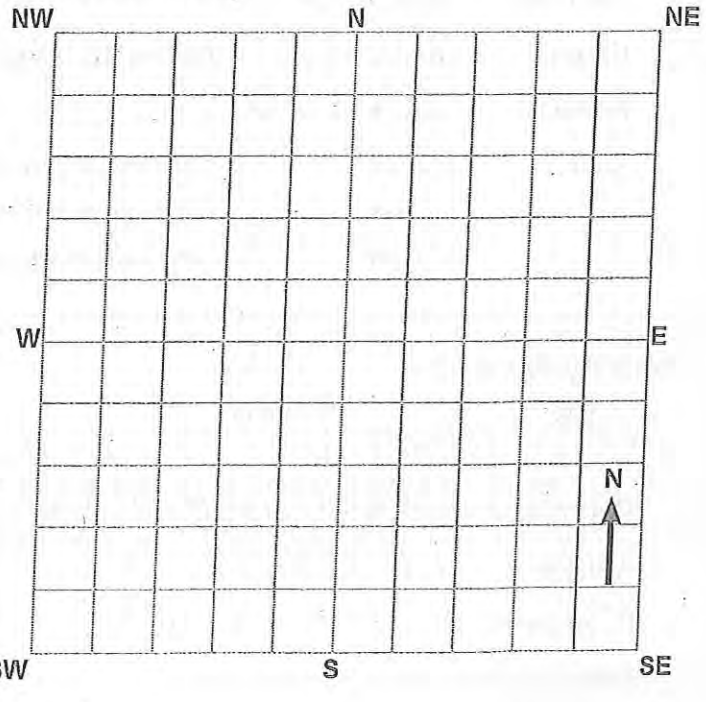
- ☒ Public
- ☐ Private

National Park/other government

Pt 11 Land NPW Act

Primary report I.D. ☐ (I.D. Office Use only)

Relocation Map



General Site Information

Closed Site **Open Site**

Shelter/Cave Formation
- ☐ Boulder
- ☐ Wind erosion
- ☐ Water erosion
- ☐ Rock collapse

Rock Surface Condition
- ☐ Boulder
- ☐ Sandstone platform
- ☒ Silica gloss
- ☐ Tessellated
- ☐ Weathered
- ☐ Other platform

Condition of Ceiling
- ☐ Boulder
- ☐ Sandstone platform
- ☐ Silica gloss
- ☐ Tessellated
- ☐ Weathered
- ☐ Other platform

Shelter Aspect
- ☐ North
- ☐ North East
- ☐ East
- ☐ South East
- ☐ South
- ☐ South West
- ☐ West
- ☐ North West

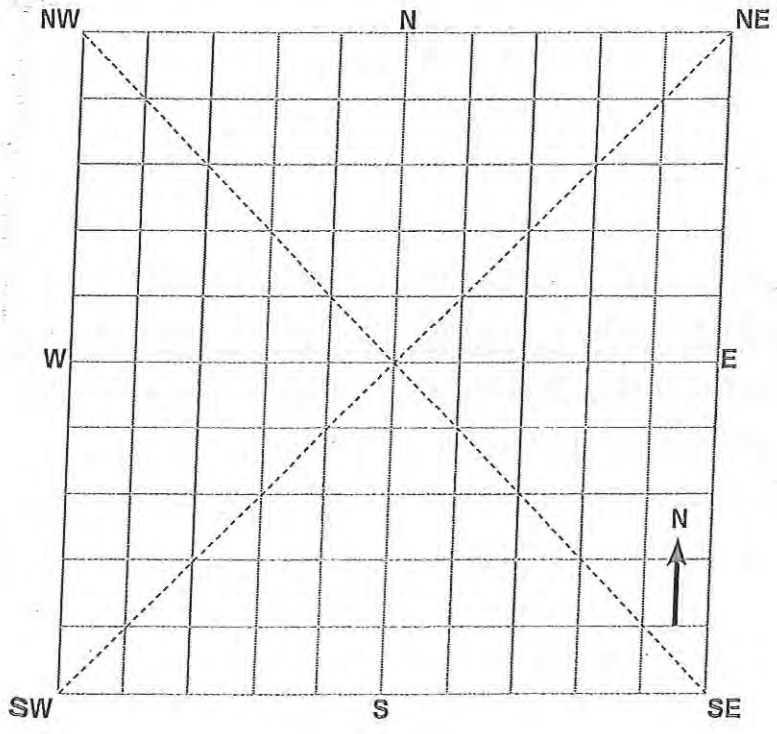
Features (including number of features)

☐	1. Aboriginal Ceremony & Dreaming	☐
☐	2. Aboriginal Resource & Gathering	☐
☐	3. Art	☐
☒	4. Artefact	1
☐	5. Burial	☐
☐	6. Ceremonial Ring	☐
☐	7. Conflict	☐
☐	8. Earth Mound	☐
☐	9. Fish Trap	☐
☐	10. Grinding Groove	☐
☐	11. Habitation Structure	☐
☐	12. Hearth	☐
☐	13. Non Human Bone & Organic Material	☐
☐	14. Ochre quarry	☐
☐	15. Potential Archaeological Deposit	☐
☐	16. Stone Quarry	☐
☐	17. Shell	☐
☐	18. Stone Arrangement	☐
☐	19. Modified Tree	☐
☐	20. Water Hole	☐

Site Orientation
- ☐ N-S
- ☐ NE-SW
- ☐ E-W
- ☐ SE-NW
- ☐ N/A

Attachments (No.)
- ☐ A4 location map
- ☐ B/W photographs
- ☐ Colour photographs
- ☐ Slides
- ☐ Aerial photographs
- ☐ Site plans, drawings
- ☐ Recording tables
- ☒ Other
- ☐ Feature inserts-No ☐

Estimated Site Extent and Location of Features



Site Context

Closed Site Dimensions (m)
- ☐ Internal length
- ☐ Internal width
- ☐ Shelter height
- ☐ Shelter floor area

Open Site Dimensions (m)
- ☐ Total length of visible site
- ☐ Average width of visible site
- ☐ Estimated area of visible site
- ☐ Length of assessed site area

Site Interpretation and Community Statement - Aboriginal Community Interpretation and Management Recommendations

See the attached report titled NPWS Aboriginal Cultural Heritage Due Diligence Tangary Mountain, Elderslie Report

Preliminary Site Assessment - Scientific Analysis and Preliminary Management Recommendations

As Above.

This section should only be filled in by the Endorsees

Endorsed by: ☐ Knowledge Holder ☐ Nominated Trustee ☐ Native Title Holder ☐ Community Consensus

Title	Surname	First Name	Initials

Organisation

Address

Phone number Fax

Comments

Artefact found during Aboriginal Cultural Heritage Due Diligence inspection on NPWS managed land adjacent to Tangary Mountain, Elderslie. Silcrete flaked core 33 x 34 x 14 with broken platform with numerous small flaked scars.

The existing track crosses an old water course with exposed rock platforms. An inspection was carried out but the conglomerate nature of the geology of the platforms was not conducive to grinding grooves.

On the edge of the existing vehicle track, an isolated artefact was reported opposite an ant nest (346321:6394253). The artefact was a silcrete flaked core (33 x 34 x 19) with a broken platform with numerous small flaked scars. The artefact was found just off the track and will not be impacted by grading of the track, provided that the site was temporarily fenced during road work or the track at this location was moved slightly to avoid the site.





Near the entrance to the property, an area was inspected which may become a future camping area or car park. The area is bounded on the eastern side by Stewarts Creek. This area was inspected but no cultural heritage objects or sites were found.

Photographs taken during the course of the due diligence walkover are provided at the end of this report.

THE OFFICE OF ENVIRONMENT & HERITAGE (OEH) DUE DILIGENCE DUE DILIGENCE CODE OF PRACTICE PROCESS

This due diligence Aboriginal cultural heritage impact assessment is required by proponents who are planning development proposals on land to consider the protection of potential Aboriginal objects, places of landscapes of cultural heritage significance in accordance with the NSW Office of Environment and Heritage (OEH) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (2010)*.

Section 7.5 of the OEH Due Diligence Code of Practice identifies activities for which there is a defence in the National Parks and Wildlife Act (1974) Regulations which are covered by Clause 80B (Defence of carrying out certain impact activities: section 87(4)). This is detailed in Figure 4 below, from 'Section 8 – The generic due diligence process' flowchart.

Should further archaeological assessment be required having undertaken the OEH Due Diligence Code of Practice process, a suitably qualified archaeologist will be required to undertake a formal Aboriginal Archaeological Cultural Heritage Impact Assessment in consultation with the Aboriginal community stakeholders in accordance with the OEH *Aboriginal cultural heritage consultation requirements for proponents (2010)*. Copies of the relevant requirements can be obtained from the OEH website at www.environment.nsw.gov.au