



Executive Summary

Maroota Friable Sandstone Extraction Project



Deerubbin LALC

DESIGN
COLLABORATIVE



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1. Introduction

Design Collaborative Pty Ltd has prepared an Environmental Impact Assessment (*EIS*) on behalf of the Deerubbin Local Aboriginal Land Council (*DLALC – the Applicant*) to accompany a State Significant Development Application. This executive summary provides a high-level overview of the *EIS*, including the Project's Site and the surrounding area, proposed operations, strategic and statutory context, community consultation, environmental assessment and justification. References to annexures are found in the *EIS*.

The Development Application seeks consent for a proposed friable sandstone extraction industry (*the Project*) located at Wiseman's Ferry Road, Maroota (*the Project Site*). The Project is declared a State Significant Development as it involves extracting more than 5 million tonnes of resource across the Project's life.

Project Site

The Project Site (**Figure 1**) comprises three parcels of land described as:

- Lot 7005 DP 1055724;
- Lot 202 DP 752025; and
- Lot 213 DP 752025.

The Project Site is predominantly undeveloped with dense vegetation consisting of forest, woodland and heathland covering the majority of the site. Development is limited to a number of fire trails that traverse the site; an access road that bisects Lot 7005 DP1055724 known as 'Patricia Fay Drive' that connects Wiseman's Ferry Road to an adjoining sand quarry to the north. A powerline and slurry pipeline run alongside Patricia Fay Drive.

Drilling and studies examining the potential sand resource on the Project Site were supervised by Grahame Lee & Associates in 2008, 2009 and April 2017 (**Annexure 7**). Those investigations uncovered two sand bearing deposits on the Project Site. These being:

- Maroota Sand in a small area in the eastern part of the site containing in the order of 30,000 tonnes; and
- Hawkesbury Sandstone occurring over the whole of the site, underlying the Maroota Sand in the order of 20 million tonnes.

The Project Site is located in the south-west outskirts of the Maroota Township. Maroota is around 40kms to the north of the Parramatta CBD, 50kms to the north-west of the Sydney CBD and some 8kms to the south of Wisemans Ferry. Old Northern Road and Wisemans Ferry Road provide main road links from the Project Site to the Sydney metropolitan area.

The character of the local landscape is predominantly natural bushland, existing sand extraction sites and open to semi-open rural lands for pastoral and agricultural activities.

Project Objectives

The Project's objectives are:

1. Secure access to an extensive Hawkesbury Sandstone deposit that has the potential to provide a long-term source of construction sand to the Sydney market and fund DLALC's projects and programs.
2. Mitigate potential adverse impacts through the implementation of recommended mitigation and monitoring measures.
3. Produce and process up to 500,000 tonne per annum of saleable product for distribution.
4. Progressively rehabilitate the Project Site for use as productive agricultural lands following the life of the quarry.



Figure 1: Project Site (Source: Nearmaps, 2021)

Proponent

The Project's Proponent and Applicant is Deerubbin Local Aboriginal Land Council (*DLALC*). DLALC is a not-for-profit Aboriginal Land Council constituted under the *Aboriginal Land Rights Act 1983 (the ALR Act)*. The organisation is governed by a Board that is elected by local Aboriginal community members every two years. DLALC was established as the Local Aboriginal Land Council for a large part of Greater Western Sydney and the Blue Mountains.

The purpose of the ALR Act is to provide land rights for Aboriginal persons through the transfer of unused Crown land to Land Councils. The land can be used to support Aboriginal social, economic and cultural development.

DLALC's mission and commitment is to strengthen the confidence and self-reliance of Aboriginal people and families and to provide them with greater opportunities. Its functions include acquiring and managing land and providing community benefit schemes, including community housing, employment assistance, education and training, scholarships, cultural activities, funeral funds, child-care, and aged care services.

Over time, DLALC have become the largest private landholder in the Penrith, Blue Mountains, Hills and Hawkesbury Shire LGAs. They also possess significant assets in Parramatta and Blacktown.

DLALC has been actively working towards using its landholdings to realise their mission and functions by evolving and operating according to their Community Land and Business (CL&B) Plan, which outlines their legal obligations, objectives, and strategies.

The CL&B Plan identifies the development of a sand extractive industry at the Project Site as a priority project due to the presence of a State significant sandstone deposit which presents an unparalleled opportunity for a revenue stream to fund DLALC's programs and projects (see **Figure 2**). These include, but not limited to:

- The adaptive re-use and repair of the historic Parramatta Gaol as a community facility.
- Developing a scholarship fund to support primary, secondary, and tertiary Aboriginal students.
- The employment of an Education and Employment Co-Ordinator to support DLALC's education and employment objectives.
- Social and affordable housing developments in Western Sydney.
- A depot at Cranebrook to support DLALC's land management operations.
- High intensity agri-businesses.
- Bio-certified lands managed by DLALC.
- A new Sydney cemetery in partnership with Rookwood for Western Sydney.

Therefore, the Project's benefits are not only restricted to the immediate jobs and public benefit that it provides, but also the longer-term economic, social and environmental benefits provided by the projects and programs that it will enable.



Projects Enabled by the Maroota Sand Project

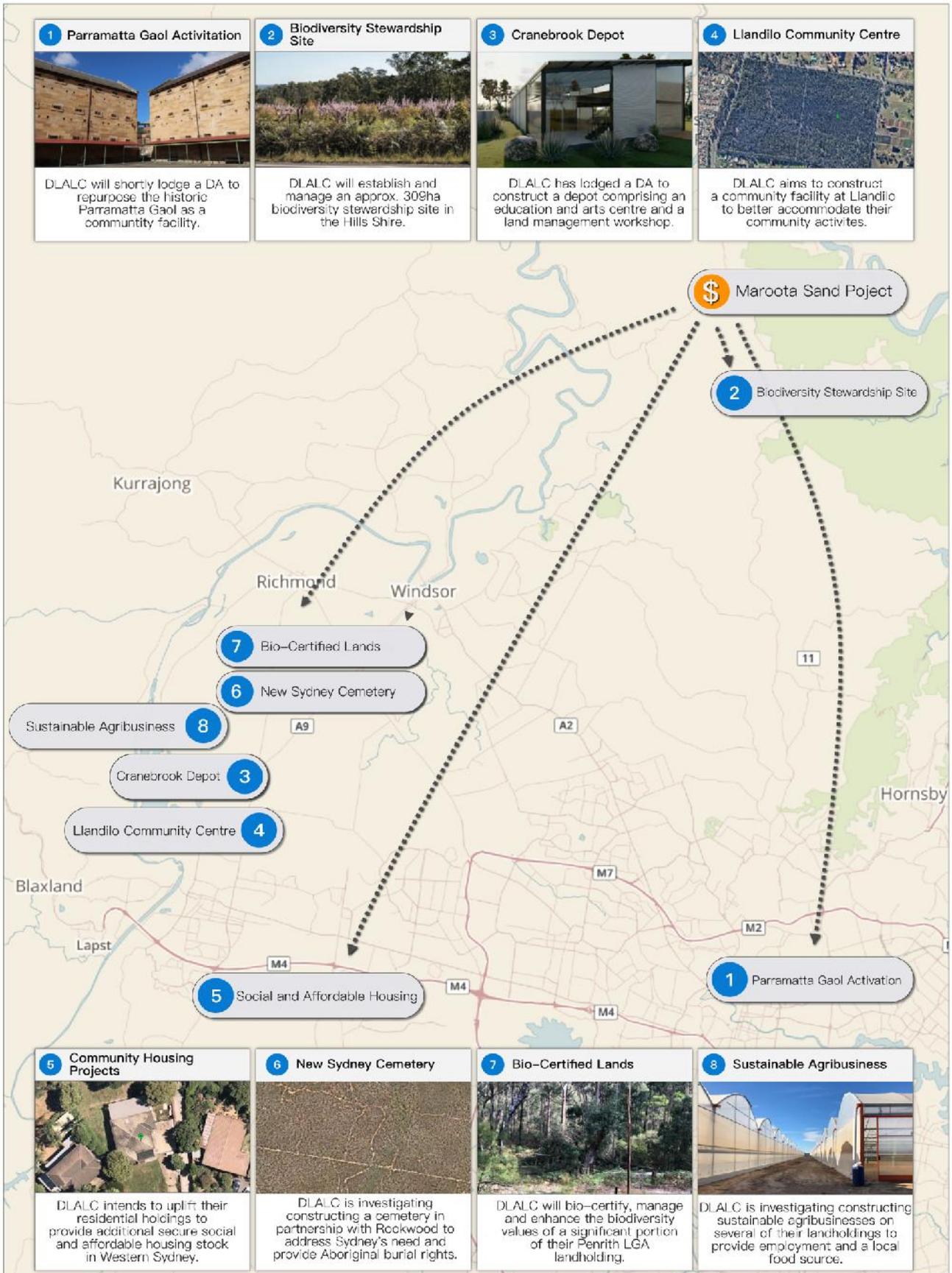


Figure 2: Projects & Programs Enabled by the Project (Source: Maphub 2021; Nearmap 2021; SLR Consulting 2020)

2. The Project

The Application seeks consent for the use of approximately 50ha of the Project Site for the extraction, processing and delivery of up to 500,000 tonnes of sand per annum over a period of 28 years to meet the increasing demands of the Sydney construction and building market. **Figure 3** below shows the proposed site layout of the Project. **Table 1** provides a summary of the Project

Access

Access to the Project Site is proposed via the construction of a haul road from Patricia Fay Drive to the site infrastructure area. Its proposed location is shown in **Figure 3** below. The Proponent also proposes to upgrade the intersection of Wisemans Ferry Road/Patricia Fay Drive to current Austroad guidelines to improve the left and right turn lanes from Wisemans Ferry Road into Patricia Fay Drive. That works is not shown below.

Extraction

The proposed extraction area occupies approximately 43.98 ha of the Subject Site. The extraction area will be excavated to a floor elevation ranging between 148 AHD and 165 AHD. No extraction will occur within two metres of the wet-weather high groundwater levels or outside the proposed extraction area. Extraction will be undertaken in six main stages over a 28-year period.

The quarry operation will utilise conventional extraction methods. An excavator will be used to remove friable sandstone and load the raw material into an articulated truck. Where necessary, a bulldozer equipped with ripper bars will be used to rip stronger material before an excavator picks it up and transfers the material. No blasting is proposed as part of the Application.

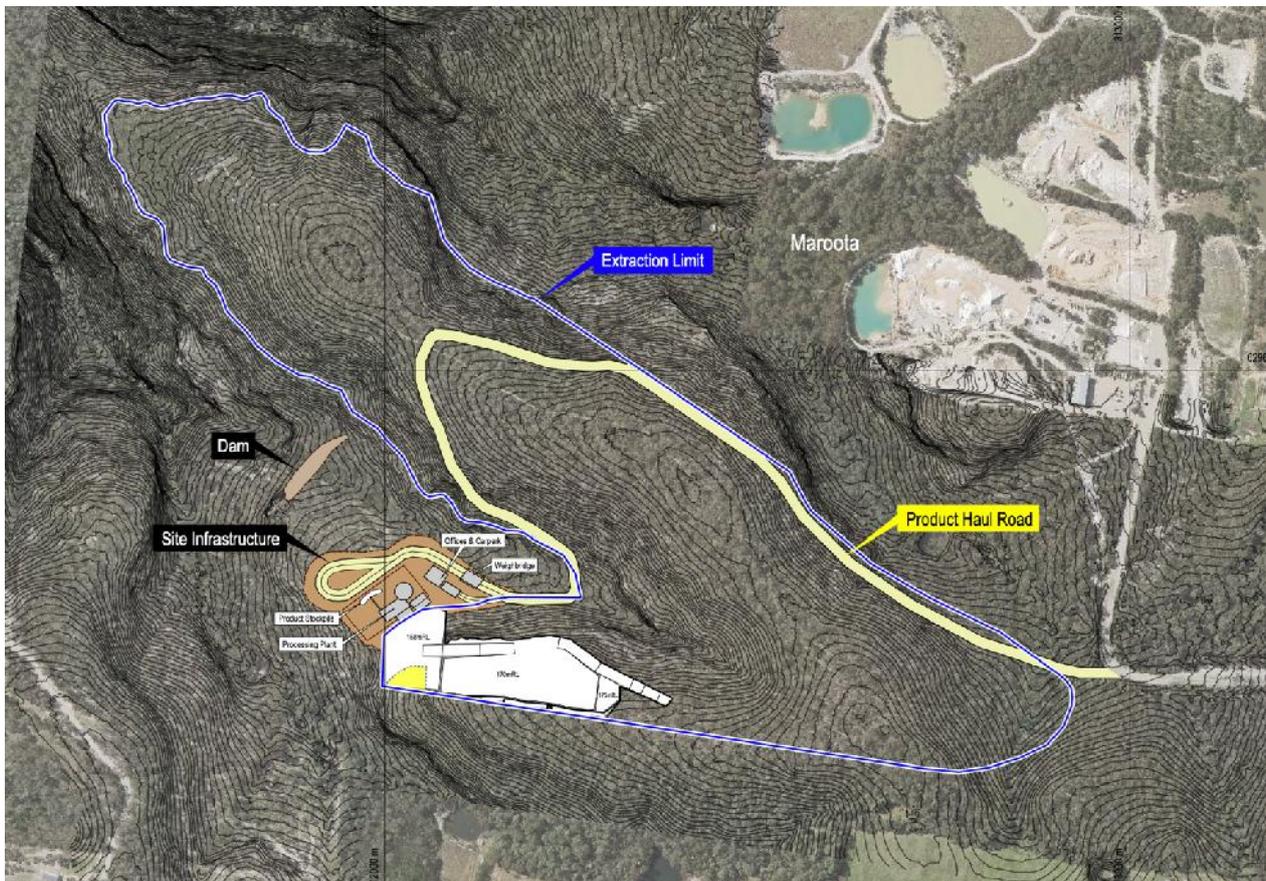


Figure 3: Project Site Layout (Source: RPM Global 2021)

Table 1 – Project Description	
Key Element	Detail
Proposed Land Use	<i>Extractive Industry</i>
Extraction Method	Overburden Stripping & Raw Feed Extraction
Resource	Hawkesbury and Maroota Sandstone, shale and clay
Processing Method	Processed into washed sand of various diameters including for use in concrete and road base, and other resource-based products as appropriate.
Quarry Life	Approximately 28 years. Approval sought for 30 years.
Groundwater Buffer	2m above the wet-weather groundwater levels
Disturbance Area	<ul style="list-style-type: none"> • 43.89 extraction area • 2.4ha site Infrastructure Area • 0.31 ha access haul road (outside the extraction area) • 0.2ha Surface water Dam Total: 47.2ha
Annual Production	500,000 tonnes
Total Resource Recovered	<ul style="list-style-type: none"> • 15.200 million tonnes of raw sandstone processed into 13.680 million tonnes of saleable product • 160 tonnes of shale • 370 tonnes of overburden
Management of Waste	Tailings will be press dried and incorporated with the overburden to form the final landforms. Other waste will be segregated and removed by a licensed contractor.
Plant & Equipment	<ul style="list-style-type: none"> • Relocatable sand processing plant • Weighbridge • Administration office and carpark • Water tank integrated within the production plant • Storage bins for dried tailings • Internal haul roads • Sales haul road • Electrical power supply • Potable water supply • Enviro-cycle sewage system • Machinery workshop and diesel storage tanks • Site fencing • Surface water dam • Groundwater bore
Truck movements	120 truck movements Monday to Friday 60 truck movements Saturday
Employment	<ul style="list-style-type: none"> • 1 full-time quarry manager • 1 full-time and 1 part-time weighbridge & sales • 1 full-time and 1 part-time excavator operator • 2 full-time articulated truck drivers • 2 full-time sales loaders • 1 part-time water cart driver • 1 full-time and 1 part-time sand plant operator • 15-20 privately contracted truck drivers.
Hours of Operation	<ul style="list-style-type: none"> • Sales – 6am to 6pm, Monday to Saturday • Quarry operations – 7am to 6pm, Monday to Saturday

Water Supply

Water will be required for the processing plant, dust suppression, rehabilitation, human consumption and amenities. The proposed sand plant incorporates a plate and frame filter press that compresses tailings and negates the need for tailings dams.

The Project’s water requirements will primarily be supplied by rainfall and runoff captured and stored in a surface water dam and supplemented by a groundwater bore. Groundwater will provide between 31% to 43% of the Project’s annual water requirements. The surface water dam will provide between 57% and 69% of the Project’s annual water requirements.

Truck Movements

The following breakdown of truck movements is anticipated.

Table 2 – Sales Truck Movements		
Time	Monday–Friday	Saturday
6am – 8am	20	20
8am – 10am	25	15
10am – 12pm	25	15
12pm– 2pm	20	10
2pm – 4pm	16	–
4pm – 6pm	14	–
Total per day	120	60

Hours of Operation

The following sales and quarry operational hours are proposed:

- Sales – 6am to 6pm, Monday to Saturday.
- Quarry operations – 7am to 6pm, Monday to Saturday. The filter press will operate overnight to de-water tailings but will not be audible beyond the plant area boundaries.

Rehabilitation

A rehabilitation strategy have been prepared for the Project. The Project Site will be progressively rehabilitated in accordance with that strategy.

The proposed final land use will be a combination of native bushland and improved pasture for a post-mining grazing enterprise. A native bushland corridor, approximately 50m wide, will be incorporated around the reshaped landform’s perimeter to assist in the integration of the impacts of the tree removal from the Project’s viewpoints and from the west.

Biodiversity Offsets

To fulfil their biodiversity offset requirements, the Proponent intends to deliver a viable and ecological function offset by establishing a Biodiversity Stewardship Site on land that they currently hold. The Biodiversity Development Assessment Report prepared by Eco Logical Australia estimates that 309ha of land is required to generate the credits needed to fulfil the Project’s offset requirements.

Mitigation and Monitoring Measures

An 'avoid, mitigate and compensate' strategy was adopted throughout the Environmental Impact Assessment (EIA) process to address the Project's potential environmental impacts. Where achievable, design amendments informed by community consultation and technical expertise were implemented to avoid impact. These are described in Section 3.6 of the EIS.

Where it was unfeasible to avoid impacts through design modifications, the various technical reports prepared during the EIA process recommended management and monitoring measures to mitigate those impacts. **Annexure 5** provides a summary of the Project’s proposed mitigation and monitoring measures.

3. Project Justification

The following section outlines the strategic need and justification for the Project.

Reduce the Cost of Private and State Infrastructure Projects

The NSW Offshore Sand Review, undertaken in 2016, identified a shortage of local construction sand for the Sydney market. The Review notes that the Sydney region consumed approximately 7 million tonnes of construction sand in 2016, of which 1 million tonnes was imported from outside Greater Sydney.¹ This figure is anticipated to have grown given the significant infrastructure projects laid out in the State's Infrastructure Strategy and (the then) expected closure of Sydney's two most significant sources of construction sand at Kurnell and Penrith Lakes. Penrith Lake sand extraction ceased in 2015.²

Construction sand is a high-bulk low-unit cost commodity and is therefore highly sensitive to transport costs. The transport costs for sand sourced outside the Greater Sydney region can cost up to an additional \$14 per tonne compared to sand sourced from Maroota (see **Figure 4**).³ With the Project potentially meeting half of the 1 million tonnes of construction sand delivered from outside the Greater Sydney region in 2016, that represents a potential saving of up to \$7m per year – some \$190m across the Project's life.

Therefore, the Project's cost-efficient construction sand will reduce the cost of private and State infrastructure Projects within Sydney. In particular, the Project is well-positioned to provide construction sand to Western Sydney infrastructure projects, including the Western Sydney Airport and Metro line (see **Figure 4**). Access to affordable construction materials provides investment certainty for these projects and support jobs.

Revenue Stream to Enable Housing, Employment, Health, Education, Land Management and Cultural Programs and Projects

When considering the Project's social impacts, it is essential to note that DLALC, as an Aboriginal Land Council, is required to reinvest any profit to realise the objectives in their *Community Land & Business Plan (Annexure 2)*. Their objectives include the employment of a Family and Community Coordinator to promote community cohesion and interaction (Objective 8); cultural development programs (Objective 2); delivering social & community housing (Objective 12 & 28); and developing a scholarship fund to support primary, secondary, and tertiary Aboriginal students (Objective 15). Each project and program represents additional social, environmental and economic benefits, including post-Covid-19 and long-term employment opportunities (see **Figure 2**).

Suitable Location for an Extractive Industry

Since 1995, under *Sydney Regional Environmental Plan No.9 – Extractive Industry*, the Project Site has been identified as a location suitable for an extractive industry. The Hills Local Strategic Plan, released in 2020, further confirmed this point by identifying the Project Site as being located within an agricultural/extractive industry cluster. Therefore, the Project realises both the State and Local Government's economic vision for the currently unutilised Project Site and provides a local source of cost-sensitive construction sand to the Sydney market. Notably, the NSW Offshore Sand Review identifies Maroota as the last major source for construction within the Greater Sydney Region.

Post-Covid-19 & Long Term Employment

The Project will provide 16 full-time jobs operational jobs as well as construction jobs, 'flow-on' jobs and environmental management jobs. Importantly, these jobs build upon the established mining and extractive industry skillset within the Hills Shire economy.

¹ NSW Government Department of Trade and Investment, (2010), *NSW Offshore Sand Review*, NSW Government

² *Ibid*, pg. 5

³ *Ibid*, pg. 5

Leverage and Develop the Established Mining Skillset of the Hills Shire Economy

Extractive Industries are important employers and economic contributors to the Hills Shire economy. Mining, including extractive industries, contributed \$70.1M to the Hills economy in 2018.⁴ The Proponent is committed to leveraging and further developing this established strength of the Hills Shire economy by providing ongoing training and certification for their employees. The development of a further quarry is particularly important as it will provide employment opportunities with other extractive industries in the region nearing closure. Three nearby operations with a combined extraction output of 1 million tonnes per year are anticipated to close within ten years.

Appropriate Environmental Management

An 'avoid, mitigate and compensate' strategy was adopted throughout the EIA process to address the Project's potential environmental impacts. Where achievable, design amendments informed by community consultation and technical expertise have been implemented to avoid impact. These amendments are detailed in Section 3.6 of the EIS. The Project's various technical reports recommended management measures to mitigate impacts that could not be feasibly addressed through design modifications. **Annexure 5** outlines the Project's proposed management and monitoring measures and commitments. The Project's residual impacts are proposed to be compensated through established offsetting frameworks.

Rehabilitation of the Project Site

The Project incorporates a progressive rehabilitation plan. The proposed final land use will be a combination of native bushland and improved pasture for a post-mining grazing enterprise. This final land-use complements the vision of The Hills Shire Council Development Control Plan 2012⁵ and *Sydney Regional*

Environmental Plan No.9 – Extractive Industry that rehabilitated extractive industry sites at Maroota be used as productive agricultural lands.⁶ Like extractive industries, agricultural lands are compatible with the established character and the landscape and natural quality of the Maroota locality. Furthermore, the proposed final land use will continue to provide employment opportunities at the Project Site.

Protection, Management and Enhancement of 309ha of High-Quality Biodiversity Lands

The Proponent proposes to offset 309ha of 'like-for-like' high-quality biodiversity lands in a Biodiversity Stewardship Agreement to account for the Project's unavoidable biodiversity impacts. These lands will be protected, managed and enhanced for the benefit of future generations. Notably, the Proponent currently possesses the landholdings required for this offset. The management of these lands represents additional employment opportunities.

Enhance the NSW Governments Aboriginal Procurement Policy

The Aboriginal Procurement Policy aims to award 3% of total domestic contracts for goods and services issued by NSW Government agencies to Aboriginal-owned business by 2021.⁷ In 2019, the percentage of government contracts awarded to Aboriginal-owned business fell from 0.44% the previous year to 0.43%. This represents a shortfall of 86%.⁸ The Project can help address this shortfall by providing an Aboriginal-owned source of construction sand that can be procured as part of the NSW Government's planned \$107.1 billion worth of State infrastructure projects to 2022–23.

⁴ The Hills Shire Council, (2019), *Rural Strategy*, The Hills Shire Council

⁵ Hills Shire Council (2012), *Hills Development Control Plan 2012 Part B: Section 1–Rural*, Hills Shire Council, p.g. 28

⁶ *Sydney Regional Environmental Plan No 9—Extractive Industry (No 2—1995)* (NSW) S.11 Cl. 2(a) (Austl.).

⁷ NSW Government, (2018), *Aboriginal Procurement Policy*, NSW Government, <https://buy.nsw.gov.au/policy-library/policies/aboriginal-procurement-policy>

⁸ NSW Treasury, (2019), *Aboriginal Procurement Policy & Aboriginal Participation in Construction Policy 2019 Review*, NSW Government, https://buy.nsw.gov.au/_data/assets/pdf_file/0006/607821/app_apic_policy_2019_review_accessible_pdf_1.pdf

Proximity of the Maroota Sand Project to Western Sydney Infrastructure Projects Compared to Sydney's other sources of Construction Sand

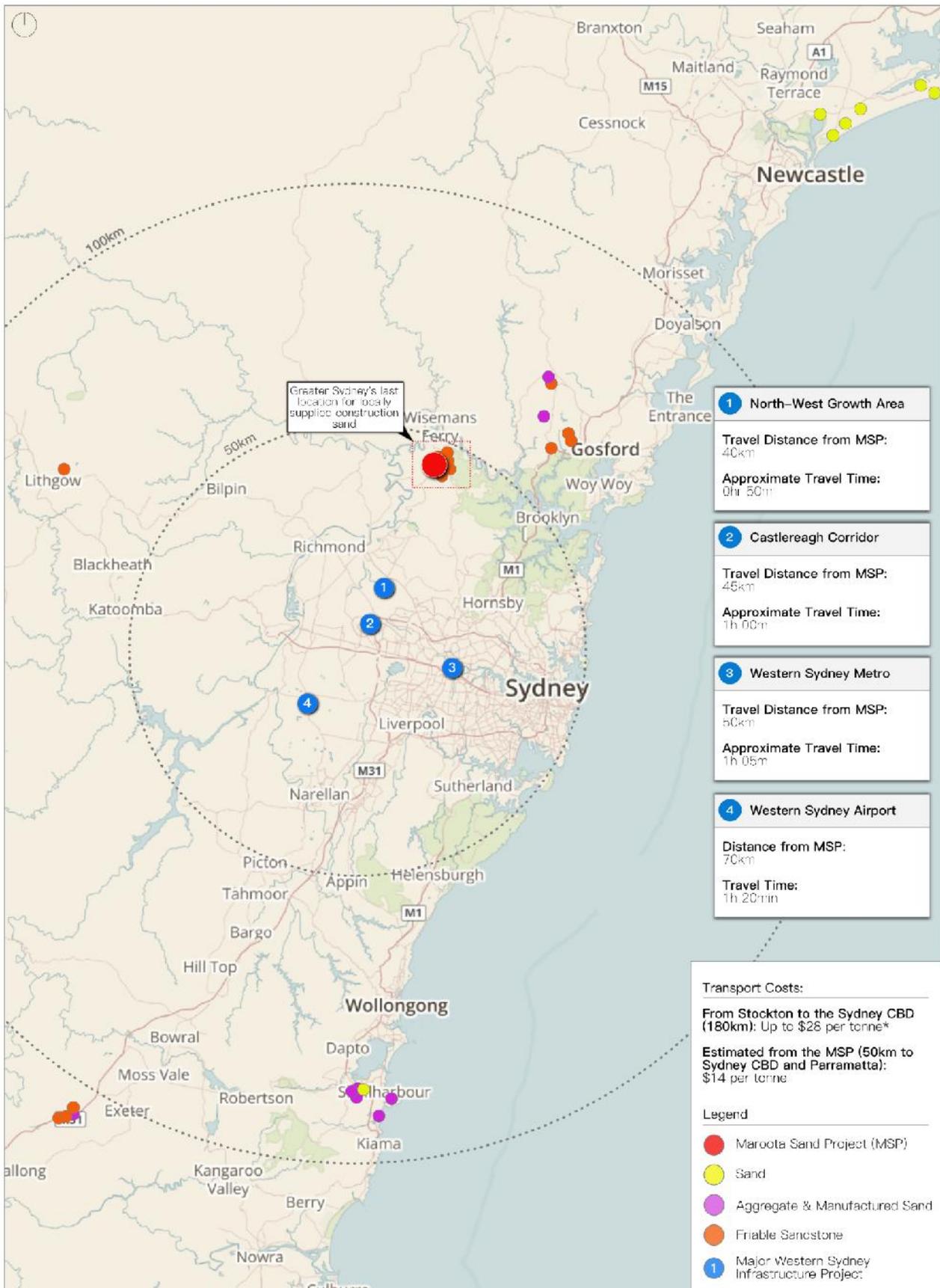


Figure 4: Sydney Sources of Construction Sand (*Information Source: NSW Governments Offshore Sand Review)

4. Strategic Context

The following section summarises the Project's compliance with relevant State and local strategic documents.

NSW Premiers Objectives

The Project will contribute to the strengthening and post-COVID-19 recovery of the NSW economy through the provision of employment and cost-efficient construction sand to the Sydney market to assist with the delivery of State infrastructure. The Project will also provide and enable training and education opportunities that allow Aboriginal people to reach their learning potential.

Greater Sydney Region Plan

The Project Site is located within the Metropolitan Rural Area of Greater Sydney. Extractive Industries are identified as a primary industry for this area. The Project meets the Greater Sydney Commission's intention to protect and support Sydney's agricultural and mineral resources. It proposes an extractive industry in a location that is identified in the *Hills LSPS*; the *District Plan*; and *Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2 – 1995) (SREP No.9)* as being suitable for an extractive industry.

Central City District Plan

The District Plan highlights the importance of maintaining local supplies of construction materials to support the Greater Sydney construction industry. The Project provides an opportunity to address the current and anticipated shortages of local construction sand for the Greater Sydney construction industry.

Hills Future 2036

The Project Site is located within an agricultural/mineral extraction cluster. Therefore, the site's proposed use as an extractive industry, and later, as agricultural lands highly complements the *Hills LSPS* vision for the Maroota locality.

The Project will contribute post-COVID 19 and long-term local employment and build upon the significant contribution that the mining/extractive industry makes to the Hills Shire economy (70.1M in 2018).

Future Transport 2036

A motorway and freight rail connection known as the 'Outer Sydney Orbital' is identified in the Future Transport Strategy 2056 as a corridor to be investigated in the long-term. The Project is well positioned to utilise the Outer Sydney Orbital to provide cost-efficient construction sand to the north-west and south-west growth areas of Sydney.

NSW Offshore Sand Review 2016

The Review notes that the Sydney Region consumes approximately 7 million tonnes of construction sand annually, an increasing portion of which is imported at a greater expense from outside the Sydney Region. The Review identifies Maroota as a strategic location for the provision of construction sand within the Sydney Region. The Project addresses Sydney's construction sand shortfall by providing 500,000 tonnes of locally sourced construction sand per year. This equates to approximately 7% of the market and 50% of sand imported from outside the Sydney region in 2016.

NSW Aboriginal Procurement Policy

The NSW Aboriginal Procurement Policy outlines a Government target for 3% of domestic goods and services contracts to be awarded to Government-owned business. In 2019, the percentage of government contracts awarded to Aboriginal-owned business fell from 0.44% the previous year to 0.43%. This represents a significant shortfall of 86%. The Project can help address this shortfall by providing an Aboriginal-owned source of construction sand that can be procured as part of the NSW Government's planned \$107.1 billion worth of State infrastructure projects to 2022-23.

5. Statutory Context

The following section provides a summary of the Project’s statutory context.

Definition

The Project is defined under the Standard Instrument as an **extractive industry**.

Declaration of State Significance

Section 4.36(2) of the *EP&A Act* states that:

(2) A State environmental planning policy may declare any development, or any class or description of development, to be State significant development.

Schedule 1 of the *State and Regional SEPP* identifies development for the purposes of an extractive industry that extract more than a total resource of 5 million tonnes to be State Significant Development. As the Project relates to a total resource of greater than 5 million tonnes, it is declared State Significant Development.

Approval and Assessment Pathway

Part 4, Division 4.7 of the *Environmental Planning & Assessment Act 1979* provides the State Significant Development approval and assessment pathway.

Environmental Impact Assessment (EIA) is the process by which the environmental impacts of a State Significant Development are assessed before a decision is made by the Minister for Planning or their delegate on

whether to approve the application. This process is displayed in **Figure 5** below.

Permissibility

The Project Site is zoned RU1 and RU2 under the *Hills Local Environmental Plan 2019*. **Extractive Industries** are permitted with consent in both these zones.

Approvals Required

The following approvals are required for the Project.

- Development Consent under the *Environmental Planning & Assessment Act 1979*.
- Controlled action approval under the *Environmental Protection and Biodiversity Conservation Act 1999*.
- Environmental Protection Licence under the *Protection of the Environment Operations Act 1997*.
- Water access licence under the *Water Management Act 2000*.
- Section 138 Approval under the *Roads Acts 1993*.



Figure 5: EIA Process (Source: DPIE 2019)

6. Engagement

Community and stakeholder engagement undertaken throughout the EIA was informed by ‘*Guideline 6 – Community and Stakeholder Engagement Guidelines*’ and ‘*Social Impact Assessment Guidelines*’ prepared by DPIE.

Consultation was carried out with nearby land occupiers, Government agencies, Aboriginal groups and other non-government stakeholders.

Consultation Methods

A range of consultation methods were used throughout the EIA process to engage community members and stakeholders. These include face-to-face meetings, teleconferences, letters, phone conversations and emails.

Consultation for the Project began with a Scoping meeting between the Proponent’s project management team and the Department of Planning, Industry and Environment (DPIE) to discuss the proposed approach to the EIA. Consultation subsequently occurred with community members and stakeholders to identify matters to assess in the EIS via a notification letter.

Following receipt of the Project’s Scoping Report, DPIE consulted with various regulatory authorities to inform the development of the Project SEARs

The Proponent distributed Information letters to community members and stakeholders during the preparation of the EIS. Those letters contained a Google Drive link that provided online access to a document that presented a detailed overview of the Project. Consultation continued with interested parties through letters, emails, and teleconferences as necessary.

Issues Raised

The key issues raised by community members and stakeholders included, noise impacts, visual impacts, dust and air quality impacts, increased traffic and safety concerns.

Section 6.3 of the EIS provides a detailed summary of the key issues raised during the preparation of the Scoping Report, SEARs and EIS. Section 6.3 also outlines where those issues are addressed in the EIS and provides comment on amendments made to the project design to address those issues raised, where relevant.

Response to Community Concerns

The following key operational and design mitigation measures were implemented to address concerns raised by the community.

- During the Scoping Report consultation phase, neighbours to the south of the Project Site raised concerns due to the Project's infrastructure area's close proximity. Therefore, the proposed sand plant, weighbridge and office area was relocated to the rear of the site to mitigate noise, dust and visual impacts for those neighbours.
- The sales haul road was relocated from the south to the north of the Project Site. This design provided a significant buffer between the road and neighbouring residences to the south of the Project.
- Despite the Project’s Air Quality Report demonstrating compliance with the relevant air quality goals, a range of dust mitigation measures are included in **Annexure 5**.
- The Proponent will establish a 24-hour complaints hotline to respond to community concerns relating to the Project’s operations. Where necessary, communication via letter, email, teleconference or face-to-face meetings will be undertaken to address community concerns

7. Environmental Assessment

The following section provides a summary of the various environmental assessments undertaken for the Project. Section 7 of the EIS provides a detail summary of each assessment.

Biodiversity

Eco Logical Australia was engaged to prepare a Biodiversity Development Assessment Report for the Project (**Annexure 8**).

Due to the location of Hawkesbury Sandstone at the Project Site, it is not possible to locate the Project in a location that avoids impacts to vegetation and habitat.

During the Project design phase, there were several disturbance area reduction design iterations that demonstrate that a process of avoiding and minimising impact was implemented (Section 3.6 of the EIS). These modifications reduced the Project’s disturbance area from 78ha to 51.49ha.

Mitigation and monitoring measures contained in **Annexure 5** will be implemented to contain direct biodiversity impacts within the Project’s development footprint. The following table outlines the Project’s impacts on native vegetation and threatened ecological communities, species, and species habitat.

Table 3 – Biodiversity Impacts	
Native Vegetation	
Plant Community Type ID	Direct impact
1081	25.71ha
1083	3.27ha
1328	14.34ha
1181	8.17ha
Threatened Ecological Communities	
1081	25.71ha
Threatened Species & Habitat	
Bynoe’s Wattle	1.64ha
Glossy Black Cockatoo	49.59ha
Eastern Pygmy–Possum	51.49ha
Giant Burrowing Frog	6.66ha

Broad-headed Snake	25.78ha
<i>Kunzea rupestris</i>	0.81ha
Southern Myotis	7.08ha
Squirrel Glider	51.49ha
<i>Pimelea curviflora var. curviflora</i>	0.91ha
Dural Land Snail	25.71ha
Red-crowned Toadlet	6.94ha
<i>Tetratheca glandulosa</i>	4.21ha

The *Biodiversity Conservation Act 2016* provides an offsetting scheme to compensate for unavoidable biodiversity impacts. Under that scheme, the Proponent proposes to offset approximately 309ha of ‘like-for-like’ high-quality biodiversity lands in a Biodiversity Stewardship Agreement. These lands will be protected, managed and enhanced for the benefit of future generations. Notably, the Proponent currently possesses the landholdings required for this offset.

The Project has a candidate for Serious and Irreversible Impacts. That being the Broad-headed Snake. 25.78ha of potential habitat for the Broad-headed Snake was surveyed across the development footprint. It is noted that this species was not observed during surveys, and no record exists for the species within 5km of the Project Site.

A Groundwater Dependent Ecosystem known as the *Maroota Sands Swamp Forest*, is present on the site. The Project design includes a 50m buffer from the edge of the extraction area to the Groundwater Dependent Ecosystem’s southern edge. The Project’s quarry depth is set to 2m above the observed wet weather high groundwater elevations. These measures will ameliorate potential adverse impacts to the Groundwater Dependent Ecosystem.

The Proponent will develop a Biodiversity Management Plan to guide biodiversity management during the Project’s operations. That Plan will include a Weed Management Plan, a Vegetation Management Plan and an Adaptive Management Strategy to monitor potential impacts to the Maroota Sands Swamp Forest.

Noise & Vibration

Muller Acoustic Consulting was engaged to prepare a Noise and Vibration Impact Assessment for the Project (**Annexure 9**).

Generally, the Project's operations satisfy the Project Noise Trigger Levels during the daytime and morning shoulder at all assessed receivers during calm conditions. Noise emissions from the Project can exceed the Project Noise Trigger Levels by up to 2dB at several receivers during noise enhancing conditions. These exceedances are considered 'negligible' under the *Noise Policy for Industry*.

During project Year 10, predicted noise levels might exceed the Project Noise Trigger Levels by 3dB at one receiver (R19) during noise enhancing conditions. This exceedance is considered 'marginal under the *Noise Policy for Industry*. Appropriate mitigation rights under Voluntary Land Acquisition and Mitigation Policy will be made available to this receiver.

Predicted noise levels from construction activities are expected to satisfy the Construction Noise Management Levels at all receivers. Sleep disturbance is not anticipated during the morning shoulder period as emissions from impact noise are predicted to remain below the Environmental Protection Agencies' maximum noise trigger levels. Predicted road traffic noise levels from the Project at receivers adjacent to either Wisemans Ferry Road or Old Northern Road are expected to comply with the relevant Road Noise Policy criteria.

A noise monitoring program will be developed as part of the Project's Noise Management Plan. The Program will comprise operator attended compliance monitoring, real-time meteorological data and a real-time noise monitoring terminal to allow proactive management of potential noise generated by project activities over the Project's life, particularly during noise enhancing conditions.

The Noise and Vibration Impact Assessment concludes that with the implementation of noise mitigation and

management measures, there are no noise-related issues preventing the Project's approval.

The major potential sources of vibration associated with the Project is the ripping of competent sandstone with a bulldozer. Generally, peak levels of vibration from ripping occur as the dozer takes off to commence the ripping process.

The minimum offset distance to the nearest residential receivers is approximately 280m during Project Year 10 operations. As the offset distance is greater than the minimum offset distance provided in the *British Standard BS 7385: Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2"* for even the largest item of plant equipment, vibration impacts are not expected at any dwelling.

Hazard

The Project Site is identified as 'bushfire prone land'. Potential ignition sources associated with the Project include:

- Sparks caused from machinery, vehicles, and handheld equipment such as chainsaws.
- Electrical faults and power failure.
- Inappropriate disposal of cigarettes.
- Inappropriate storage of batteries or hazardous material.
- Hot works, including the soldering of equipment for repairs.

The following management and design measures will be implemented to mitigate the risk of bushfire ignition and impacts.

- A minimum Asset Protection Zone of 10m will be provided to all Project infrastructure.
- An Inner Protection Area will be managed and maintained around the Project's site infrastructure area.
- Site access will be constructed and maintained in accordance with the design requirements of the Planning for Bushfire 2019 guideline.

- Water supply utilities will be provided to emergency services to assist with fire suppression.
- The Proponent will develop a comprehensive Bushfire Emergency and Management and Operations Plan that includes a Bush Fire Emergency Management and Evacuation Plan.

The Department of Planning, Industry and Environment provides a checklist and a risk screening procedure in their guideline Applying SEPP 33 to help determine whether a development proposal falls within the definition of potentially hazardous industry.

The screening procedure is based on the quantity of dangerous goods involved in the proposal and, in some cases, the distance of these materials from the site boundary.

Section 7.3.1 of the EIS provides the risk screening assessment for the Project and concludes that it is not classified as a potentially hazardous industry. Transportation, storage and handling of all chemical products will be undertaken in accordance with the relevant codes of practice, including *the Storage and Handling of Dangerous Goods Code of Practice 2005* and *National Work Health and Safety Act 2011*.

Water

EMM Australia was engaged to prepare a Water Assessment for the Project (**Annexure 10**).

The NSW Department of Primary Industries' *Aquifer Interference Policy* provides a minimal impact criteria of a 2m groundwater drawdown for surrounding 3rd party groundwater users. Modelling shows that groundwater abstraction at the Project's expected rate of 20ML/per year will not result in drawdown impacts of more than 2m at nearby groundwater works.

During operations (from year 5), the Project will reduce the contributing catchment area to an existing dam at the site by 13.7ha. PF Formation Sand and Concrete hold a surface water entitlement to extract up to 32 ML/year from this dam. However, this dam is a small storage dam, and its level is maintained by baseflow that is interpreted to discharge from the shallow aquifer, which would not

be impacted by the Project. Therefore, the reduction in runoff volume to the dam is not expected to reduce its water availability.

The Project's proposed erosion and sediment controls will effectively manage coarse and fine sediment entrained in dirty water runoff (**Annexure 5**). Hence, sedimentation impacts in downstream watercourses are not expected.

Overflows from the water management system will typically occur intermittently over several days during wet weather periods. On average, overflow events (i.e. overflows that occur for several days) will occur three times per year. Overflows are expected to cease shortly after the wet weather conditions end and runoff subsides. Overflows are only expected to occur when streamflow in receiving watercourses is naturally elevated.

Section 6.4 of the Water Assessment provides a detailed assessment of the Project against the typical water quality and river flow objectives for uncontrolled streams in other catchments in NSW.

Section 7.4.6 of the EIS provides the Project's proposed Water Management System. In addition, the Proponent will develop a Water Management Plan that will:

- Include a Water Monitoring and Response Plan that establishes an on-going groundwater and surface monitoring program and a trigger action framework to identify and rectify issues.
- Outline how water will be managed to achieve compliance with the Project's Development Consent and Environmental Protection Licence conditions; and establishes responsibilities and reporting requirements.

Traffic, Transport and Access

Transport & Urban Planning PTY LTD was engaged to prepare a Traffic Impact Assessment (**Annexure 11**).

The Project will result in the following increases in traffic using the road network on weekdays.

- 76 two-way vehicle movements per day including 60 heavy vehicle movements on Wisemans Ferry Road north of Patricia Fay Drive and on Old Northern Road south east of Wisemans Ferry Road; and
- 76 two-way vehicle movements per day including 62 heavy vehicle movements on Wisemans Ferry Road south of Patricia Fay Drive

Both Old Northern Road and Wisemans Ferry Road at Maroota carry relatively low traffic volumes. The Project's additional traffic will be easily accommodated on the road network with no change to the level of service.

Modelling undertaken by Transport & Urban Planning PTY LTD also demonstrates that:

- The intersection of Old Northern Road/Wisemans Ferry Road will continue to operate at a level of 'Service A' operation in the weekday AM and PM peak hours with minimal changes to delay at the intersection with the additional traffic from the Project; and
- The intersection of Wisemans Ferry Road/Patricia Fay Drive will operate at a level of 'Service B' operation with a small increase in vehicle delay. This represents a satisfactory to good operation.

SIDRA modelling was undertaken to determine cumulative 2030 traffic conditions. The results showed that both intersections will retain a good to a satisfactory level of operation in 2030.

A 'Stage 5 Road Safety Audit' was undertaken for the Project (**Annexure 23**). The audit findings identified that the existing right and left turning lanes from Wisemans Ferry Road do not meet the current Austroad Guidelines for the 80km/h speed limit and should be upgraded.

The Proponent, therefore, proposes to upgrade the intersection of Wisemans Ferry Road/Patricia Fay Drive to current Austroad guidelines to improve the left and right turn lanes from Wisemans Ferry Road into Patricia Fay Drive.

Visual

SLR Consulting was engaged to prepare a Landscape and Visual Impact Assessment for the Project (**Annexure 12**)

The Assessment determined that the Project would have a minor-moderate to minor impact on five key identified receptor viewpoints. Receptors located closer to the Project Site, particular those residents located immediately south of the Project Site, will have their views maintained due to the retention of 100m vegetation buffer along the Project's southern boundary.

There are very few viable public receptors that the proposed works would impact. Where the Project Site is visible, it has been determined that the Project will have a minor-moderate impact on the existing landscape character and values.

The Visual Assessment recommended the following mitigation measures, which have been incorporated into the design of the Project.

- Retain vegetation along the periphery of the site, particularly at its southern and eastern boundaries.
- Rehabilitate a native biodiversity corridor along the north-west boundary of the extraction pit.

Waste

The Project is anticipated to generate the following waste streams.

- Liquid waste.
- Hazardous waste.
- General Waste (putrescible).
- General Waste (non-putrescible).

An enviro-cycle sewerage system will be installed to recycle sewerage. This system diverts and treats wastewater in an underground unit before dispersing water to a prescribed vegetated area. Stormwater will be managed per the Water Management Strategy outlined in Section 7.4.6 of the EIS.

Greases and oils will be stored in a self-bunded tank and removed as necessary by a licensed contractor. Batteries will be stored in a designated space and disposed of by a licensed contractor and taken to a licensed waste management facility.

Food scraps will be stored in general waste bins at the site and disposed by a licensed contractor.

Scrap metal will be segregated and stored in metal bins to be collected and recycled offsite by a licensed contractor. Recyclable general waste will be separated from non-recyclable general waste, stored onsite in recycling bins, collected, and recycled offsite by a licensed contractor. Excess construction and demolition waste will be segregated and disposed of by a licensed contractor. Wooden pallets and other wood waste will be stored and disposed of by a local contractor.

Air Quality

Todoroski Air Science was engaged to prepare an Air Quality Impact Assessment for the Project (**Annexure 13**).

A dispersion model was used to predict emission levels at identified sensitive receivers resulting from the Project’s operations in isolation (incremental impact) and when combined with the existing ambient background levels (cumulative impacts) for the following potential emissions.

- Maximum 24-hours average PM_{2.5} and PM₁₀ concentrations.
- Annual average PM_{2.5}, PM₁₀ and Total Suspended Particulate concentrations.
- Annual average dust deposition rates.

The relevant air quality goals for each potential emission are displayed below.

Table 4 – NSW EPA Air Quality Impact Assessment Criteria			
Pollutant	Averaging Period	Impact	Criterion
Total Suspended Particulate	Annual	Total	90µm/m ³
	Annual	Total	25µm/m ³
PM ₁₀	24 hour	Total	50µm/m ³
	Annual	Total	8µm/m ³
PM _{2.5}	24 hour	Total	25µm/m ³
	Annual	Incremental	2g/m ² /month
Deposited Dust	Annual	Total	4g/m ² /month

The air dispersion modelling demonstrates that all sensitive receivers are predicted to experience particulate matter and dust deposition levels below the relevant criteria for each metric. The Air Quality Impact Assessment also concludes that the Project is anticipated not to increase the number of days above the 24-hour average PM_{2.5} and PM₁₀ criterion at any of the receptor locations surrounding the Project Site.

The Proponent will develop an Air Quality Management Plan that:

- Establishes an air quality monitoring program, including predictive metrological forecasting to guide operations.
- Outlines how air quality will be managed during the Project’s operations to comply with the Project’s Development Consent and Environmental Protection Licence. This includes the proposed management measures listed in **Annexure 5**.

Aboriginal Archaeology & Heritage

Kelleher Nightingale Consulting Pty Ltd was engaged to prepare an Aboriginal Cultural Heritage Assessment Report (**Annexure 14**) and undertake community consultation in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*.

A comprehensive field inspection of the Project Site was undertaken to record any Aboriginal archaeological sites or areas with the potential to contain Aboriginal objects.

24 Aboriginal archaeological sites and two potential archaeological deposit areas were identified within the Project Site. Most of these sites are closed context rock shelter sites featuring art, artefacts and/or potential archaeological deposit. The survey team identified a smaller number of open context artefact sites, grinding grooves and one modified tree.

As an organisation, DLALC is committed to protecting and preserving Aboriginal heritage. Objective 22 of their Community Land & Business Plan is to promote “*a holistic understanding of the landscape, especially its spiritual and cultural dimensions.*” This philosophy informed the Project’s design, with impact avoidance and appropriate management being fundamental considerations.

The potential archaeological deposit areas did not contain confirmed Aboriginal objects but display moderate potential for subsurface deposit. A staged excavation and testing program will be undertaken within the potential archaeological deposit areas to determine the presence/absence, nature and extent of any associated archaeological material. Initial test excavations will occur before any impact from the Project. If the testing determines that the Potential Archaeological Deposit is an archaeological site, any subsequent mitigation requirements and methodology will be determined based on archaeological significance and in consultation with DLALC.

The Project's extraction area was amended following the Aboriginal archaeological survey findings to provide a 35m minimum buffer to recorded shelters within the extraction area's proximity. This design approach ensures that all identified Aboriginal archaeological sites within the Project Site will be avoided, representing a strong positive conservation outcome.

Land Resource

SLR Consulting was engaged to prepare a Land Capability Assessment for the Project (**Annexure 15**).

One Soil Unit was identified during soil surveys, a Grey–Brown Kurosol with a subdominant soil type comprising a Yellow Kandosol.

The Land and Social Capability classes of the Project Site is presented below.

Table 5 – Land Capability Assessment		
Class	Capability Description	Area
	Moderate – Low Capability	24ha
Class 5	Land has high limitations for high–impact uses. Land use restricted to low–impact land uses such as grazing, some horticulture (orchards), forestry and nature conservation.	53% of the study area
	Low Land Capability	22ha
Class 6	Land has very high limitations for high–impact land uses. Land use restricted to low–impact land uses such as grazing, forestry and nature conservation.	47% of the study area

The Proponent will develop a Soil Management Plan and implement the Project’s Rehabilitation Strategy to guide management measures that mitigate soil erosion and protect and enhance land capability.

The Project is located entirely within native bushland and will not directly or indirectly impact land currently used for agricultural production. There are existing sand quarries located directly to the south, east and north of the proposed quarry. There are orchards and other small–scale horticulture to the south of the proposed quarry, which are separated by a minimum 100 metre buffer of native bushland.

Social & Economic

Design Collaborative prepared a Social and Economic Assessment for the Project (**Annexure 16**).

The Department of Planning, Industry and Environment’s scoping tool was used during the Project’s scoping phase to identify potential social impacts and receptors. This process and engagement with community members and stakeholders also assisted in identifying the Project’s area of social influence and potential impacts.

The Project's Social and Economic Assessment analysed each social impact's risk using the International Association for Impact Assessment's social risk matrix. The matrix determines a social impact's risk based on the following considerations:

- The **likelihood** of a social impact based on:
 - The findings of the various technical reports; and
 - The social baseline study.
- The **Consequence** of a social impact based on the duration, extent, severity and sensitivity of each impact.

The Social and Economic Assessment demonstrates that the risk of adverse social impacts is low to moderate provided the mitigation measures outlined in **Annexure 5** are implemented.

The Project's positive social impacts include both its immediate and direct benefits as well as the longer-term indirect economic, social and environmental benefits provided by the raft of DLALC projects and programs that it will enable (see **Figure 2**). Immediate positive social impacts include:

- The employment of approximately 8 full-time and 4 part-time staff to run the extractive industry's operations and the creation of approximately ten construction jobs. This provides post-Covid 19 and long-term employment for the local community. Importantly, these jobs build upon the established mining and extractive industry skillset within the Hills Shire economy.
- Ongoing training and certification for members of the local community and Aboriginal persons.
- Approximately 309ha hectares of bushland will be protected, managed and enhanced under a Biodiversity Stewardship Agreement for the benefit of future generations.

The Project's positive indirect social impacts will arise from the housing, education, employment, health and cultural programs and projects that it enables. Other DLALC projects and programs include:

- The adaptive re-use and repair of the historic Parramatta Gaol as a community facility.
- Developing a scholarship fund to support primary, secondary, and tertiary Aboriginal students.
- The employment of an Education and Employment Co-Ordinator to support DLALC's education and employment objectives.
- Social and affordable housing developments in Western Sydney.
- A depot at Cranebrook to support DLALC's land management operations.
- High intensity agri-businesses.
- Bio-certified lands managed by DLALC.
- A new Sydney cemetery in partnership with Rookwood for Western Sydney.

The Social and Economic Assessment also conducted a Cost Benefit Analysis to estimate and compare the total benefits and costs of the Project to the NSW community. The analysis found the Project is expected to result in a net benefit of \$19.29m for the NSW Community in present day value with a 7% discount rate. A sensitivity analysis was conducted, which confirmed that Project would continue to provide a net benefit to the NSW community, despite commodity fluctuations.



Environmental Impact Statement

Maroota Friable Sandstone Extraction Project



Deerubbin LALC

DESIGN
COLLABORATIVE



Statement of Validity

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Applicant's ABN: 41 303 129 586

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Declaration

I declare that this Environmental Impact Statement contains all information relevant to the Maroota Sands Project and that the information contained in this assessment is neither false nor misleading.

Signature:



Date: 17 February 2022

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Annexures			
Ref.	Title	Prepared by	Date
1.	SEARs	Design Collaborative Pty Ltd	–
	SEARs Compliance Table	Design Collaborative Pty Ltd	–
2.	Deerubbin Community Land and Business Plan	Deerubbin Local Aboriginal Land Council	–
3.	Crown Lands Owners Consent	Crown Lands NSW	19.03.2021
4.	'In Principle' Approval Crown Licence 618599	Crown Lands NSW	14.01.2021
5.	Mitigation and Monitoring Measures	Design Collaborative Pty Ltd	–
6.	Statutory Compliance Table	Design Collaborative Pty Ltd	–
7.	Geological Report	Graham LEE & Associates Pty Ltd	April 2017
8.	Biodiversity Development Assessment Report	Eco Logical Australia Pty Ltd	19.11.2021
9.	Noise & Vibration Assessment	Muller Acoustic Consulting	April 2021
10.	Water Assessment	EMM Consulting	May 2021
11.	Traffic Impact Assessment	Transport & Urban Planning Pty Ltd	21.04.2021
12.	Landscape and Visual Impact Assessment	SLR Consulting Australia Pty Ltd	11.05.2021
13.	Air Quality Assessment	Todoroski Air Sciences	19.04.2021
14.	Aboriginal Cultural Heritage Assessment	Kelleher Nightingale Consulting Pty Ltd	June 2021
15.	Land Capability Assessment	SLR Consulting Australia Pty Ltd	May 2021
16.	Social and Economic Assessment	Design Collaborative Pty Ltd	July 2021
17.	Rehabilitation Strategy	SLR Consulting Australia Pty Ltd	June 2021
18.	Extraction & Rehabilitation Plans	RPM Global	07.04.2021
19.	Stakeholder SEARs correspondence	Various Government Departments	Various Dates
20.	DPIE Correspondence Regarding Community Consultation	Department of Planning, Industry & Environment	07.04.2020
21.	Community Consultation Documents	Design Collaborative	Various Dates
22.	Development Control Plan Checklist	Design Collaborative	–
23.	Road Safety Audit	Transport & Urban Planning Pty Ltd	30.09.2020
24.	Groundwater ROI Approval	Department of Planning, Industry & Environment	20.10.2020
25.	Capital Value Investment Estimate	APLAS Group	18.03.2021

1. Introduction

This section introduces the Project, Applicant and Project team and provides the relevant background information and justification for the Project



Design Collaborative Pty Ltd has prepared this Environmental Impact Assessment (*EIS*) on behalf of the Deerubbin Local Aboriginal Land Council (*DLALC – the Applicant*) to accompany a State Significant Development Application. The Development Application seeks consent for a proposed friable sandstone extraction industry (*the Project*) located at Wiseman’s Ferry Road, Maroota (*the Project Site*). The Project is declared a State Significant Development under *State Environmental Planning Policy (State and Regional Development) 2011* because it comprises extraction of more than 5 million tonnes of resource across the Project’s life.

A request for the Secretary’s Environmental Assessment Requirements (*SEARs*), supported by a Scoping Report, was made to the Department of Planning, Industry and Environment (*DPIE*) on 9 December 2019. DPIE issued SEARs on 18 February 2020. The Project was referred to Commonwealth Department of Agriculture, Water and Environment (DAWE) and was determined a controlled action (EPBC 2021/89113) on 18 May 2021. DPIE issued a supplementary SEARs on 31 May 2021. The SEARs and the SEARs compliance table is included as **Annexure 1** that identifies where the SEARs have been addressed in the EIS.

The EIS has been prepared in accordance with Part 4, Division 4.7 – ‘State Significant Development’ of the *Environmental Planning and Assessment Act 1979 (EP&A Act)*, Schedule 2 of the *Environmental Planning and Assessment Regulations 2000 (EP&A Regulations)* and the draft Guidelines for State Significant Development issued by the DPIE. The EIS intends to inform stakeholders and the community about the Project, including its social, economic and environmental impacts, mitigation measures and benefits.

1.1 Proponent – Deerubbin Local Aboriginal Land Council

The Project's Proponent and Applicant is Deerubbin Local Aboriginal Land Council (*DLALC*) (ABN: 41 303 129 586) located at the Former Parramatta Correctional Centre at 73 O'Connell Street, North Parramatta. DLALC is a not-for-profit Aboriginal Land Council constituted under the *Aboriginal Land Rights Act 1983 (the ALR Act)*. The ALR Act provides land rights for Aboriginal persons through the transfer of unused Crown land to Land Councils. The land is used to support Aboriginal social, economic and cultural development.

DLALC is governed by a Board that is elected by local Aboriginal community members every two years. DLALC was established as the Local Aboriginal Land Council for a large part of Greater Western Sydney and the Blue Mountains. Its mission and commitment is to strengthen the confidence and self-reliance of Aboriginal people and families and to provide them with greater opportunities. Its functions include acquiring and managing land and providing community benefit schemes, including community housing, employment assistance, education and training, scholarships, cultural activities, funeral funds, child-care, and aged care services.

Historically, DLALC employed a small team focused on cultural heritage and acquiring land. Over time, DLALC has become the largest private landholder in the Penrith, Blue Mountains, Hills and Hawkesbury Shire LGAs. They also possess significant assets in Parramatta and Blacktown. DLALC has been actively working towards using its landholdings to realise its mission and functions by evolving and operating according to its Community Land and Business (CL&B) Plan (**Annexure 2**), which outlines its obligations, objectives, and strategies.

As part of this evolution, DLALC sold land at North Kellyville to provide seed funding for other aspects of their CL&B Plan, including the establishment of a reliable and ongoing revenue stream through the development of a sand extractive industry at Maroota (this Project). The presence of a State significant sandstone deposit at the Project Site presents an unparalleled opportunity for a long-term revenue stream to fund DLALC's envisioned programs and projects (see **Figure 1**). These include, but not limited to:

- The adaptive re-use and repair of the historic Parramatta Gaol as a community facility.
- Developing a scholarship fund to support primary, secondary, and tertiary Aboriginal students.
- The employment of an Education and Employment Co-Ordinator to support DLALC's education and employment objectives.
- Social and affordable housing developments in Western Sydney.
- A depot at Cranebrook to support DLALC's land management operations.
- High intensity agri-businesses.
- Bio-certified lands managed by DLALC.
- A new Sydney cemetery in partnership with Rookwood for Western Sydney.

Therefore, the Project's benefits are not only restricted to the immediate jobs and public benefit that it provides, but also the longer-term economic, social and environmental benefits provided by the projects and programs that it will enable.

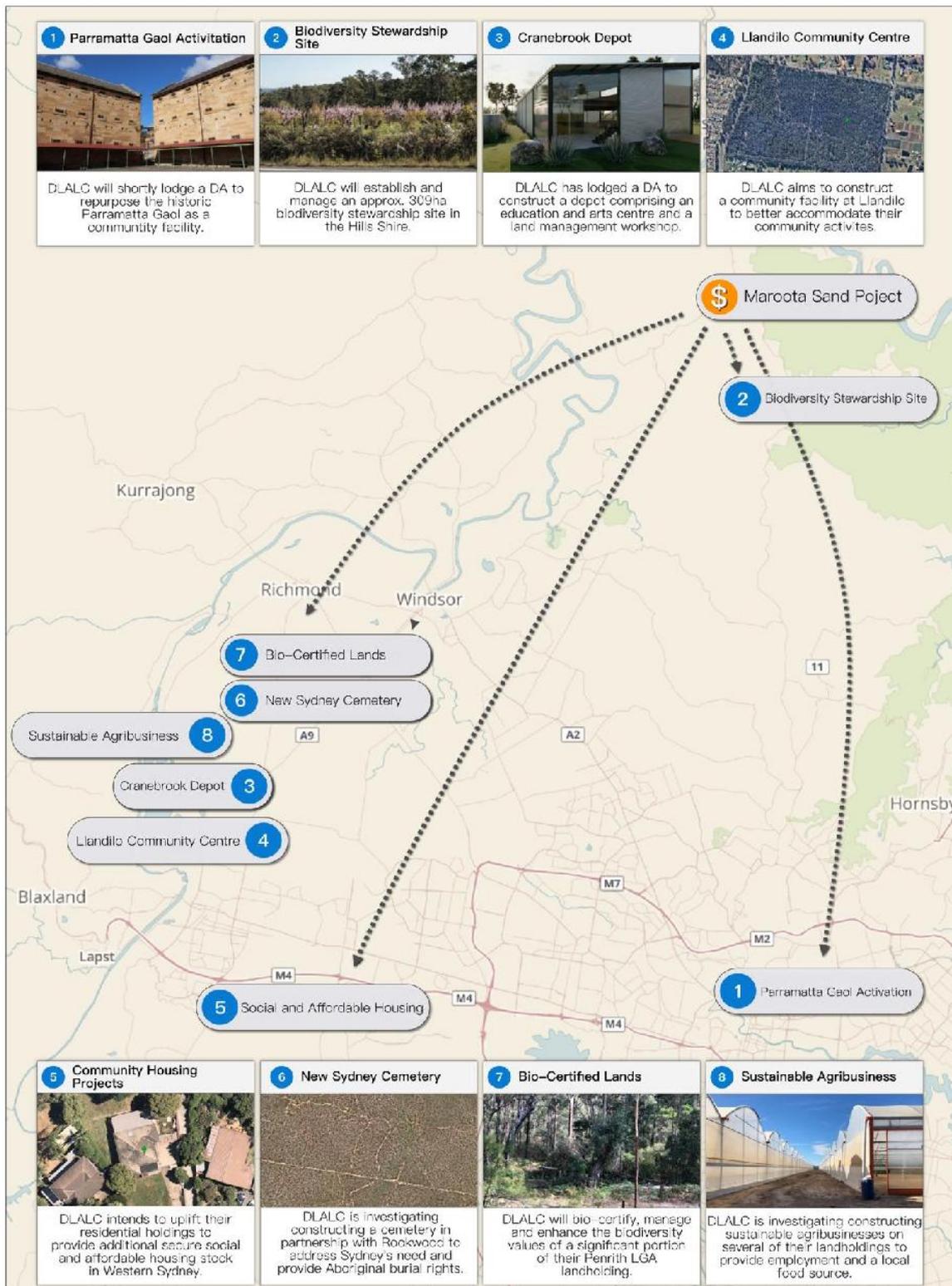


Figure 1: Project's & Programs Enabled by the Maroota Sand Project (Source: Maphub 2021; Nearmap 2021; SLR Consulting 2020)

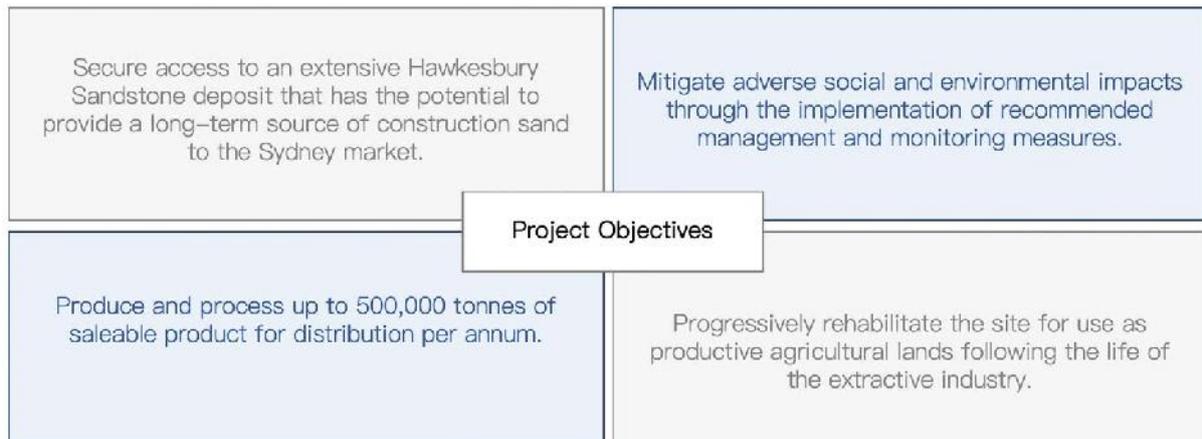
1.2 Project Site – Wisemans Ferry Road, Maroota

The Project Site comprises three parcels of land occupying some 180.7ha and described as Lot 7005 DP 1055724, Lot 202 DP 752025 and Lot 213 DP 752025. **Figure 2** provides an aerial photo of the Project Site, and **Figure 3** shows the site's location within its regional context. Geological studies indicate that approximately 20 million tonnes of readily exploitable sandstone are contained within the Project Site.



Figure 2: Aerial Photograph of the Project Site (Source: Nearmap, 18 March 2020)

1.3 Project Objectives



1.4 Project Summary

The Application seeks consent for the use of approximately 50ha of the Project Site for the extraction, processing and delivery of up to 500,000 tonnes of sand per annum over a period of 28 years to meet the increasing demands of the Sydney construction and building market. **Figure 4** below shows the proposed site layout of the Project. **Table 1** provides a summary of the Project.

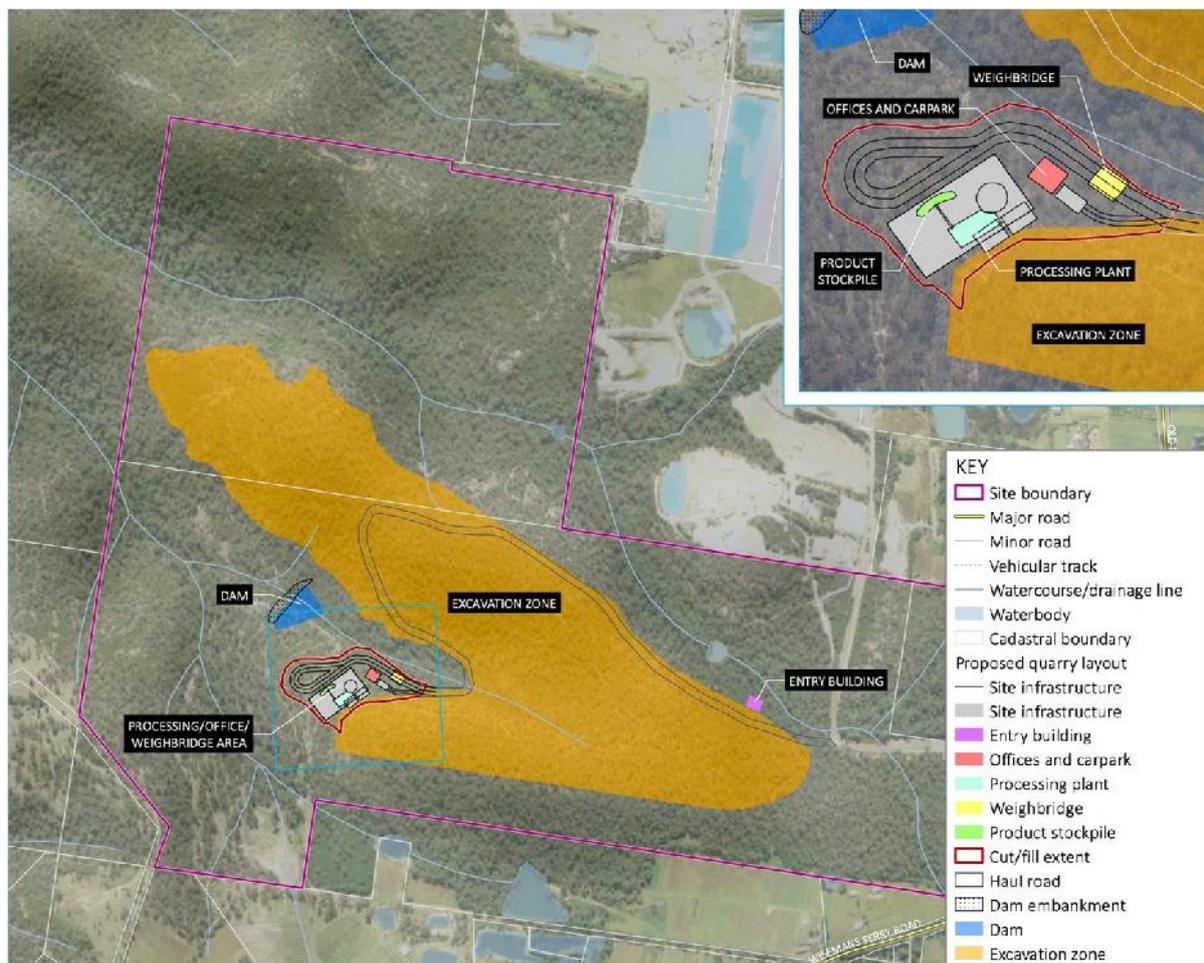


Figure 4: Proposed Site Layout (Source: RPM Global & EMM, 2021)

1. Introduction

Table 1 – Project Description

Key Element	Detail
Proposed Land Use	<i>Extractive Industry</i>
Extraction Method	Overburden Stripping & Raw Feed Extraction
Resource	Hawkesbury Sandstone, shale and clay
Processing Method	Processed into washed sand of various diameters including for use in concrete and road base, and other resource-based products as appropriate.
Quarry Life	Approximately 28 years. Approval sought for 30 years.
Groundwater Buffer	2m above the wet-weather groundwater levels
Disturbance Area	<ul style="list-style-type: none"> • 43.89 extraction area • 2.4ha site Infrastructure Area • 0.31 ha access haul road (outside the extraction area) • 0.2ha Surface water Dam Total: 47.2ha
Annual Production	500,000 tonnes
Total Resource Recovered	<ul style="list-style-type: none"> • 15.200 million tonnes of raw sandstone processed into 13.680 million tonnes of saleable product • 160 tonnes of shale • 370 tonnes of overburden
Management of Waste	Tailings will be press dried and incorporated with the overburden to form the final landforms. Other waste will be segregated and removed by a licensed contractor.
Plant & Equipment	<ul style="list-style-type: none"> • Relocatable sand processing plant • Weighbridge • Administration office and carpark • Water tank integrated within the production plant • Storage bins for dried tailings • Internal haul roads • Sales haul road • Electrical power supply • Potable water supply • Enviro-cycle sewage system • Machinery workshop and diesel storage tanks • Site fencing • Surface water dam • Groundwater bore
Truck movements	120 truck movements Monday to Friday 60 truck movements Saturday
Employment	<ul style="list-style-type: none"> • 1 full-time quarry manager • 1 full-time and 1 part-time weighbridge & sales • 1 full-time and 1 part-time excavator operator • 2 full-time articulated truck drivers • 2 full-time sales loaders • 1 part-time water cart driver • 1 full-time and 1 part-time sand plant operator • 15–20 privately contracted truck drivers.
Hours of Operation	<ul style="list-style-type: none"> • Sales – 6am to 6pm, Monday to Saturday • Quarry operations – 7am to 6pm, Monday to Saturday

The Application also seeks consent for the progressive rehabilitation of extracted areas, so that the site may be used as productive agricultural lands following the closure of the extractive industry.

1.5 Project Background

DLALC lodged Aboriginal Land Claim 3441 (ALC 3441) in 1989 over several parcels of land in Maroota, including the Lots that comprise the Project Site. On 24 December 2004, parts of the land claimed in ALC 3441 were granted to DLALC by the Minister for Lands. This included all of the land comprised in Lot 213 DP 752025 and the majority of Lot 202 DP 752025 and Lot 7005 DP 1055724 subject to specific exclusions, including an area covered by Crown Licence 19031 on which a private haul road known as Patricia Fay Drive is located. The remaining land being Lot 213 DP752025 has since been transferred to DLALC. As Crown Lands own the Project Site at the time of preparation, the EIS is accompanied by Crown Landowners Consent (**Annexure 3**).

50 shares of Sydney Basin Central Groundwater Source have been secured from the Natural Resources Access Regulator under the *Water Management Act 2000*. A further application to obtain a water access licence-controlled allocation is being prepared.

Patricia Fay Drive provides the most suitable access to the Project site, and as such, DLALC lodged crown licence application 618599 in April 2020 for shared use of that road. Crown Lands provided an ‘in principle’ approval for the licence on 14 January 2021, subject to the Project’s approval (**Annexure 4**).

DLALC commissioned initial studies examining the Project Site’s potential sand resource in 2008 and 2009. Drilling and a detailed investigation were undertaken in April 2017. Those investigations revealed Hawkesbury Sandstone in quantities sufficient to develop a viable sandstone extraction industry (**Annexure 7**).

Once the initial studies demonstrated commercial viability, DLALC identified the development of a sand extractive industry in their *Community Land & Business Plan* as a priority project. This is due to the Project’s opportunity to provide DLALC with a significant revenue stream to reinvest into community housing, education, employment, health, land management cultural programs and projects across the largest suite of privately held land in Sydney’s west.

1.6 Project Justification

The following section outlines the strategic need and justification for the Project.

Reduce the Cost of Private and State Infrastructure Projects

The NSW Offshore Sand Review, undertaken in 2016, identified an immediate shortage of local construction sand for the Sydney market. The Review notes that the Sydney region consumed approximately 7 million tonnes of construction sand in 2016, of which 1 million tonnes was imported from outside Greater Sydney.¹ This figure is anticipated to grow given the significant infrastructure projects laid out in the State’s Infrastructure Strategy and imminent closure of one of Sydney’s most significant sources of construction sand at Kurnell Peninsula. The Penrith Lakes Quarry, one of the largest sand quarry in Sydney, closed in September 2020 after being in use for more than 130 years, extracting over 160 million tonnes of aggregate across its life.

Construction sand is a high–bulk low–unit cost commodity and is therefore highly sensitive to transport costs. The transport costs for sand sourced outside the Greater Sydney region can cost up to an additional \$14 per tonne compared to sand sourced from Maroota.² With the Project potentially meeting half of the 1 million tonnes of construction sand presently delivered from outside the Greater Sydney region (see **Figure 5**), that represents a potential saving of up to \$7m per year – some \$190m across the Project’s life.

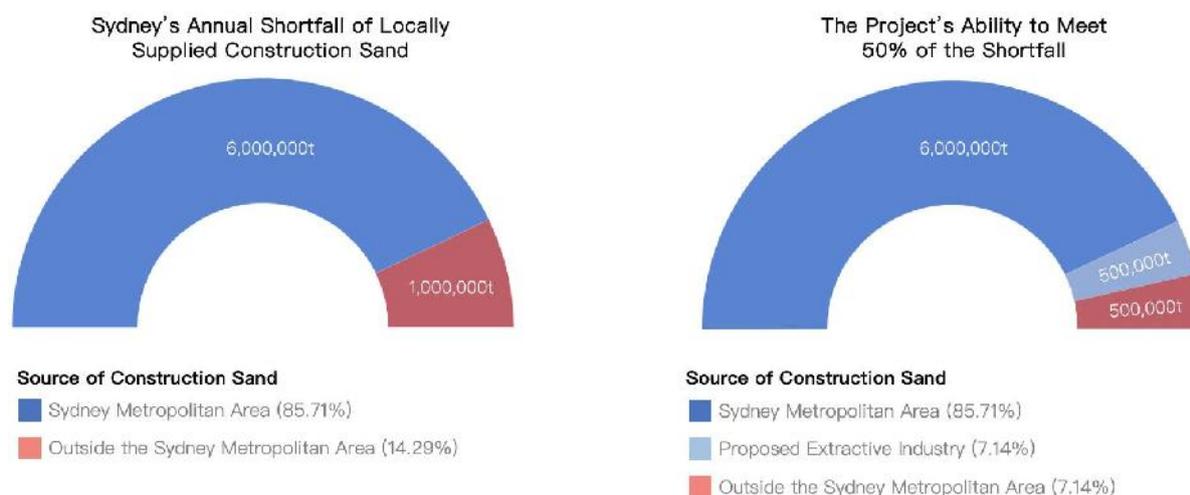


Figure 5: The Project's Ability to Meet the Sydney Market's Shortfall of Construction Sand

Therefore, the Project’s cost–efficient construction sand will reduce the cost of private and State infrastructure Projects within Sydney. In particular, the Project is well–positioned to provide construction sand to Western Sydney infrastructure projects, including the Western Sydney Airport and Metro line (see **Figure 6**). Access to affordable construction materials provides investment certainty for these projects and support jobs.

¹ NSW Government Department of Trade and Investment, (2010), *NSW Offshore Sand Review*, NSW Government.

² *Ibid*, pg. 5.

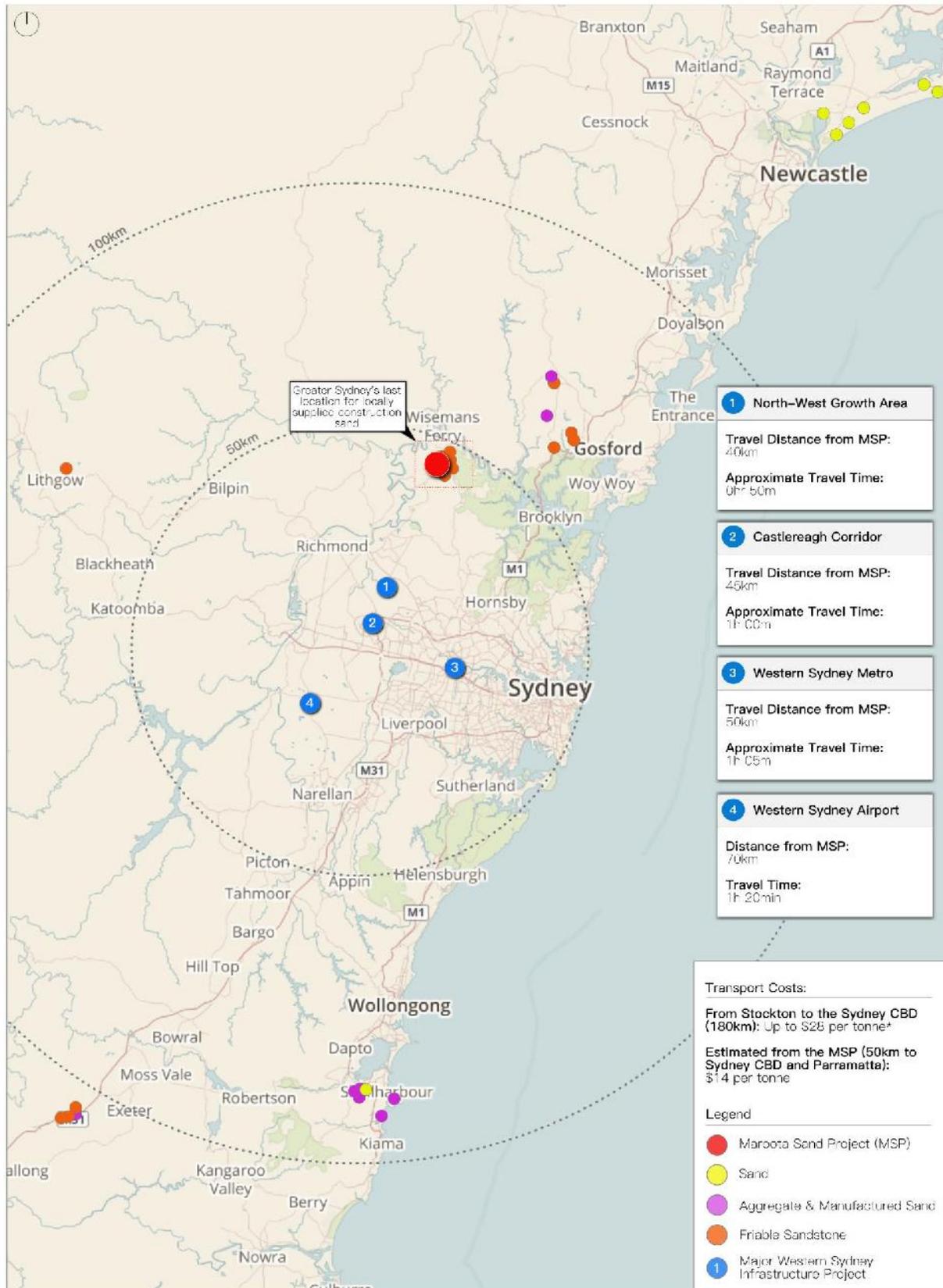


Figure 6: Proximity of the Project to Western Sydney Infrastructure Projects Compared to Sydney's Other Sources of Construction Sand (Source: Maphub, 2021) (*Information Source: NSW Governments Offshore Sand Review)

Revenue Stream to Enable Housing, Employment, Health, Education, Land Management and Cultural Programs and Projects

When considering the Project's social, economic and environmental impacts, it is essential to note that DLALC, as an Aboriginal Land Council, is required to reinvest any profit to fulfil its mission and functions. That mission is to strengthen the confidence and self-reliance of Aboriginal people and families and to provide them with greater opportunities. The organisation's functions include acquiring and managing land and providing community benefit schemes, including community housing, employment assistance, education and training, scholarships, cultural activities, funeral funds, child-care, and aged care services.

Over time, DLALC have become the largest private landholder in the Penrith, Blue Mountains, Hills and Hawkesbury Shire LGAs. DLALC has been actively working towards using its landholdings to realise its mission and functions by evolving and operating according to their CL&B Plan (**Annexure 2**), which outlines their legal obligations, objectives, and strategies. The CL&B business identifies the development of a sand extractive industry at the Project Site as a priority project due to the presence of a State significant sandstone deposit which presents an unparalleled opportunity for a revenue stream to fund DLALC's programs and projects (see **Figure 1**). These include, but not limited to:

- The adaptive re-use and repair of the historic Parramatta Gaol as a community facility.
- Developing a scholarship fund to support primary, secondary, and tertiary Aboriginal students.
- The employment of an Education and Employment Co-Ordinator to support DLALC's education and employment objectives.
- Social and affordable housing developments in Western Sydney.
- A depot at Cranebrook to support DLALC's land management operations.
- High intensity agri-businesses.
- Bio-certified lands managed by DLALC.
- A new Sydney cemetery in partnership with Rookwood for Western Sydney.

Therefore, the Project's benefits are not only restricted to the immediate jobs and public benefit that it provides, but also the longer-term economic, social and environmental benefits provided by the projects and programs that it will enable.

Suitable Location for an Extractive Industry

Since 1995, under the *Sydney Regional Environmental Plan No.9 – Extractive Industry*, the Project Site has been identified as a location suitable for an extractive industry. The Hills Local Strategic Plan, released in 2020, reconfirmed this, identifying the Project Site within an agricultural/extractive industry cluster. Therefore, the Project realises both the State and Local Government's economic vision for the currently unutilised Project Site and provides a local source of cost-sensitive construction sand to the Sydney market. Notably, the NSW Offshore Sand Review identifies Maroota as the last major source for construction sand within the Greater Sydney Region.

Post-Covid-19 & Long Term Employment

The Project will provide 8 full-time and 4 part-time jobs as well as construction jobs, ‘flow-on’ jobs and environmental management jobs. Importantly, these jobs build and rely upon the established mining and extractive industry skillset within the Hills Shire economy as other extractive industries reach the end of their life.

Leverage and Develop the Established Mining Skillset of the Hills Shire Economy

Extractive Industries are important employers and economic contributors to the Hills Shire economy. Mining, including extractive industries, contributed \$70.1M to the Hills economy in 2018.³ The Proponent is committed to leveraging and further developing this established strength of the Hills Shire economy by providing ongoing training and certification for their employees. The development of a further quarry is particularly important as it will provide employment opportunities with other extractive industries in the region nearing closure. Three nearby operations with a combined extraction output of 1 million tonnes per year are anticipated to close within ten years.

Appropriate Environmental Management

An ‘avoid, mitigate and compensate’ strategy was adopted throughout the EIA process to address the Project’s potential environmental impacts. Where achievable, design amendments informed by community consultation and technical expertise have been implemented to avoid impact. These amendments are detailed in Section 3.6 of the EIS. The Project’s various technical reports recommend management measures to mitigate impacts that could not be feasibly addressed through design modifications. **Annexure 5** outlines the Project’s proposed management and monitoring measures and commitments. The Project’s residual impacts are proposed to be compensated through established offsetting frameworks.

Rehabilitation of the Project Site

The Project incorporates a progressive rehabilitation plan. The proposed final land use will be a combination of native bushland and improved pasture for a post-mining grazing enterprise. This final land-use complements the vision of the Hills Shire Council Development Control Plan 2012⁴ and *Sydney Regional Environmental Plan No.9 – Extractive Industry* that rehabilitated extractive industry sites at Maroota be used as productive agricultural lands.⁵ Like extractive industries, agricultural lands are compatible with the established character and the landscape and natural quality of the Maroota locality. Furthermore, the proposed final land use will continue to provide employment opportunities at the Project Site.

Protection, Management and Enhancement of 306ha of High-Quality Biodiversity Lands

The Proponent proposes to offset 306ha of ‘like-for-like’ high-quality biodiversity lands in a Biodiversity Stewardship Agreement to account for the Project’s acceptable but unavoidable biodiversity impacts. These lands will be protected, managed and enhanced for the benefit of future generations. Notably, the Proponent currently possesses the landholdings required for this offset. The management of these lands represents additional employment opportunities for DLALC.

Enhance the NSW Governments Aboriginal Procurement Policy

³ The Hills Shire Council, (2019), *Rural Strategy*, The Hills Shire Council

⁴ Hills Shire Council (2012), *Hills Development Control Plan 2012 Part B: Section 1–Rural*, Hills Shire Council, p.g. 28

⁵ *Sydney Regional Environmental Plan No 9—Extractive Industry (No 2—1995)* (NSW) S.11 Cl. 2(a) (Austl.).

The Aboriginal Procurement Policy aims to award 3% of total domestic contracts for goods and services issued by NSW Government agencies to Aboriginal-owned business by 2021.⁶ In 2019, the percentage of government contracts awarded to Aboriginal-owned business fell from 0.44% the previous year to 0.43%. This represents a shortfall of 86%.⁷ The Project can help address this shortfall by providing an Aboriginal-owned source of construction sand that can be procured as part of the NSW Government's planned \$107.1 billion worth of State infrastructure projects to 2022–23.⁸

⁶ NSW Government, (2018), *Aboriginal Procurement Policy*, NSW Government, <https://buy.nsw.gov.au/policy-library/policies/aboriginal-procurement-policy>

⁷ NSW Treasury, (2019), *Aboriginal Procurement Policy & Aboriginal Participation in Construction Policy 2019 Review*, NSW Government, https://buy.nsw.gov.au/__data/assets/pdf_file/0006/607821/app_apic_policy_2019_review_accessible_pdf_1.pdf

⁸ NSW Treasury, (2021), *NSW Budget 2020–21: Building a Better NSW*, NSW Government <https://www.budget.nsw.gov.au/budget-detail/building-better-nsw>

1.7 EIS Structure

This EIS consists of a main report supported by annexures, and a stand-alone Executive Summary. This document provides the main report for the EIS organised under the following headings:

1. Introduction

This section Introduces the Project, Applicant and Project team and provides the relevant background information and justification for the Project

2. Site & Surrounding Area

This section describes the environmental context for the Project Site, including the quantity and nature of the extractable resource, site topography and hydrology and surrounding land uses.

3. Project Description

This section provides a detailed description of the Project including proposed facilities, the depth and location of extraction, the production process, hours of operation, quarry life, water and waste management and a rehabilitation plan and offset strategy.

4. Strategic Context

This section presents the relevant policies and plans that comprise the Project's strategic (non-statutory) planning context and evaluates the need for the Project within that context.

5. Statutory Context

This section presents the approval process for both State Significant Developments and other relevant statutory approval processes and describes how the Project aligns with the requirements of those approval processes.

6. Engagement

This section outlines community engagement undertaken, including community members and stakeholders engaged, engagement strategies utilised and the outcomes of consultation. Consultation strategies proposed to be relied upon during the construction and operation of the Project are also described.

7. Environmental Impact Assessment

This section assesses the Project's potential environmental, social and economic impacts and details proposed management, mitigation, and monitoring methods.

8. Evaluation of Merits

This section evaluates the Project's merit in light of its social, economic and environmental impacts and strategic context.

This main report is supported by annexures including a SEARs compliance table (**Annexure 1**), a summary of management and monitoring measures and commitments (**Annexure 5**), a statutory compliance table (**Annexure 6**) and the specialist reports presented in **Table 2** below.

1. Introduction

Table 2 – Project's Specialist Reports

Report	Prepared By	Prepared On	Annexure
Geological Report	Graham Lee & Associates Pty Ltd	April 2017	Annexure 7
Biodiversity Development Assessment Report	Eco Logical Australia Pty Ltd	June 2021	Annexure 8
Noise & Vibration Assessment	Muller Acoustic Consulting	April 2021	Annexure 9
Water Assessment	EMM Consulting	May 2021	Annexure 10
Traffic Impact Assessment	Transport & Urban Planning Pty Ltd	April 2021	Annexure 11
Landscape and Visual Impact Assessment	SLR Consulting Australia Pty Ltd	May 2021	Annexure 12
Air Quality Assessment	Todoroski Air Sciences	April 2021	Annexure 13
Aboriginal Cultural Heritage Assessment Report	Kelleher Nightingale Consulting Pty Ltd	June 2021	Annexure 14
Land Capability Assessment	SLR Consulting Australia Pty Ltd	May 2021	Annexure 15
Social and Economic Impact Assessment	Design Collaborative Pty Ltd	June 2021	Annexure 16
Rehabilitation Strategy	SLR Consulting Australia Pty Ltd	June 2021	Annexure 17

1.8 Project Team

The lead consultant for the Project and author of this EIS is Mr David Rippingill, Director of Design Collaborative Pty Ltd. He holds a Bachelor of Environmental Planning (WSU) and Juris Doctor (UNE). Design Collaborative was assisted by the following specialists who formed the Project team for the preparation of the EIS:

Table 3 – Project Team

Speciality	Organisation
Sand Quarry Specialists	Mr Peter McGhee & Mr Ian Stainton
Ecology	Eco Logical Australia Pty Ltd
Groundwater & Surface Water	EMM Consulting
Traffic & Transport	Transport & Urban Planning Pty Ltd
Geology	Graham Lee & Associates Pty Ltd
Air Quality	Todoroski Air Sciences
Noise & Vibration	Muller Acoustic Consulting
Geotechnical	SLR Consulting Australia Pty Ltd
Soils	SLR Consulting Australia Pty Ltd
Social & Economic Impact	Design Collaborative Pty Ltd
Aboriginal Archaeology	Kelleher Nightingale Consulting Pty Ltd
Rehabilitation & Visual	SLR Consulting Australia Pty Ltd

2. Site and Surrounding Area

This section describes the environmental context for the Project Site, including the quantity and nature of the extractable resource, site topography and hydrology and surrounding land uses.



2. Site & Surrounding Area

The Project Site comprises three parcels of land located at the northern end of Wiseman's Ferry Road in Maroota that occupy approximately 180.7ha of land (see **Figure 7**). Those parcels are described as:

- Lot 7005 DP 1055724;
- Lot 202 DP 752025; and
- Lot 213 DP 752025.

The Project Site is predominantly undeveloped with dense vegetation consisting of forest, woodland and heathland covering the majority of the site. Development is limited to a number of fire trails that traverse the site; an access road that bisects Lot 7005 DP1055724 known as 'Patricia Fay Drive' that connects Wiseman's Ferry Road to an adjoining sand operation to the north and a powerline and slurry pipeline that runs alongside Patricia Fay Drive.

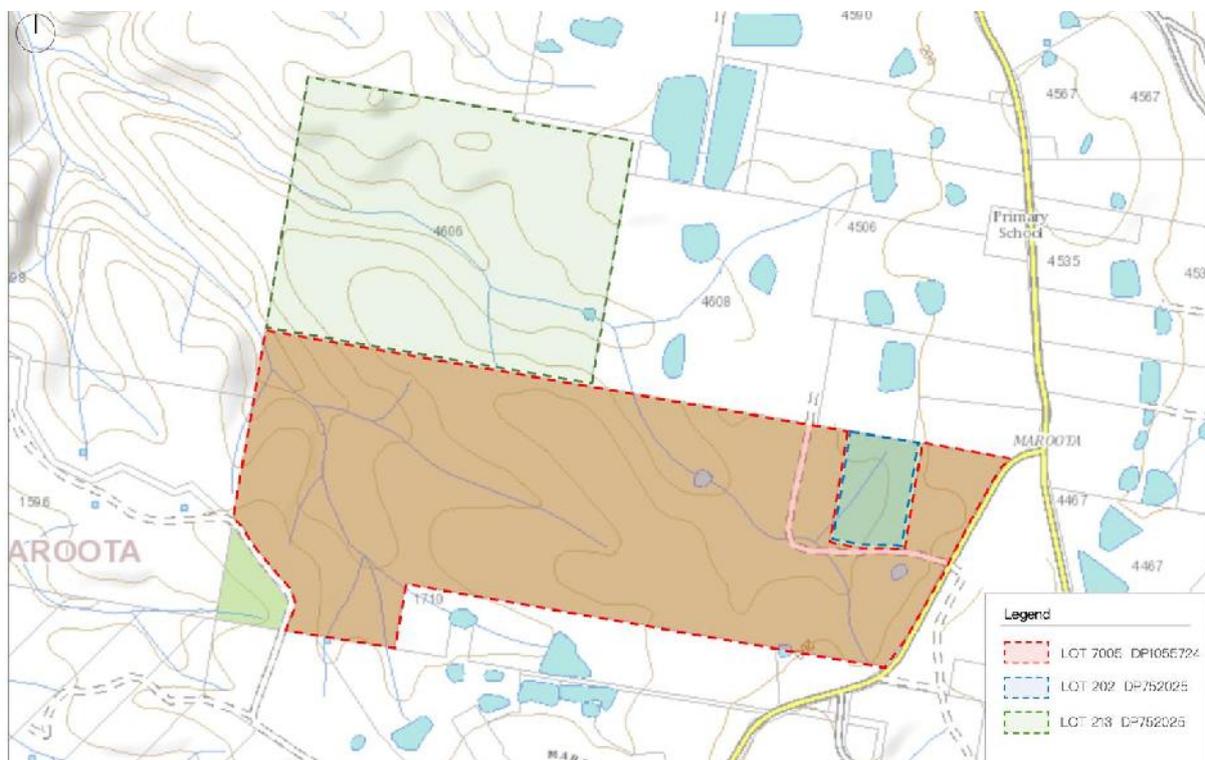


Figure 7: Project Site (Source, Sixmaps, 2020)

2.1 Site Topography & Hydrology

The largest sandstone ridge at the Project site runs in a southeast to northwest direction through the centre of the site and comprises the primary extraction area. The Project Site ranges in height from approximately 215m AHD on the ridge along the eastern boundary to 90 AHD in the major drainage lines, resulting in significant ridgelines and gullies. Several drainage lines occur within the site, generally in an east/west direction. Groundwater levels were recorded from a series of data loggers installed in groundwater bores at the site in March 2017. These loggers indicate that groundwater levels at the site range from 5m to 35 metres below ground level.

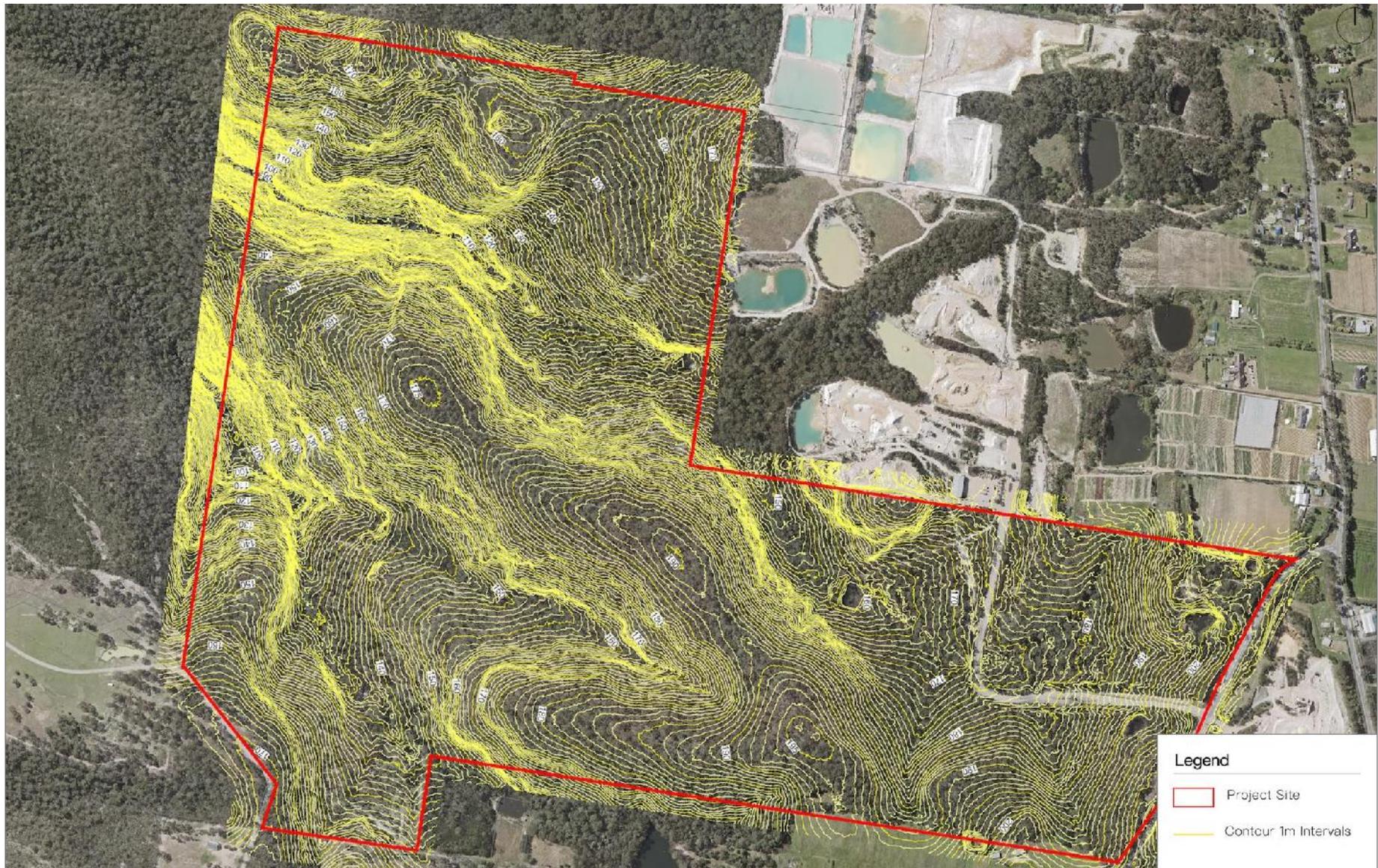


Figure 8: Site Topography (Base Image Source: AAM, 2016)

2.1.1 Surface Water

The Project Site is located within the catchment of Douglass Creek which covers an area of approximately 2,300ha and contributes to the Hawkesbury River catchment.

Surface runoff from the Project Site drains north-west to the Douglas Creek which is located approximately 2.5km from the Project Site. The Douglass Creek flows north-west for approximately 2km through a large wetland known as Jacksons Swamp to its confluence with the Hawkesbury River estuary at Lower Half Moon Bend and ultimately contributes to Broken Bay. The Project Site’s regional hydrological context is shown in Figure 9 below.

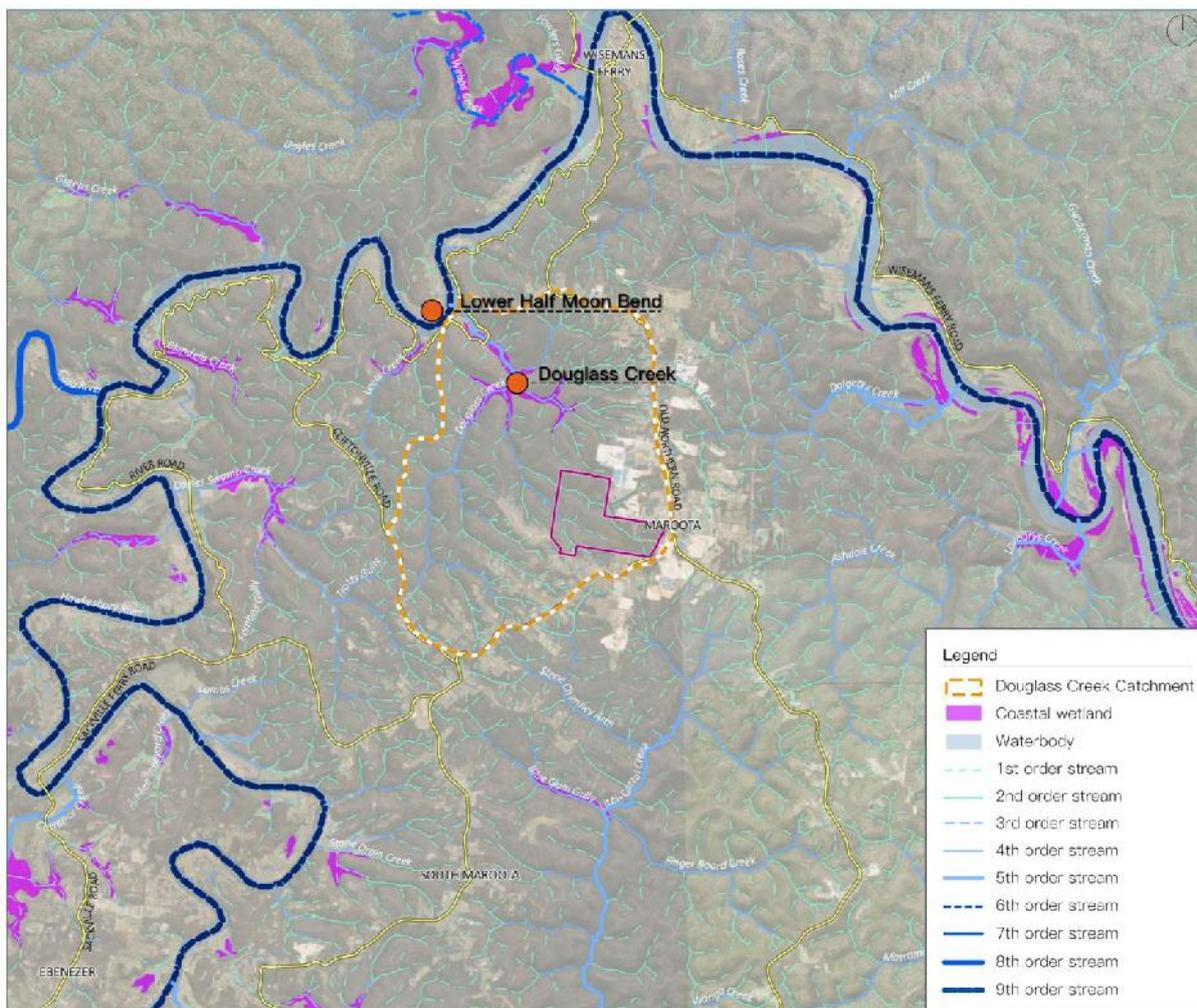


Figure 9: Regional Hydrological Context (Source: EMM, 2020; DPSI, 2017 & DPI, 2015)

Two unnamed watercourses transect the Project’s disturbance area. They are referred to as Watercourses A and B in Figure 10 below.

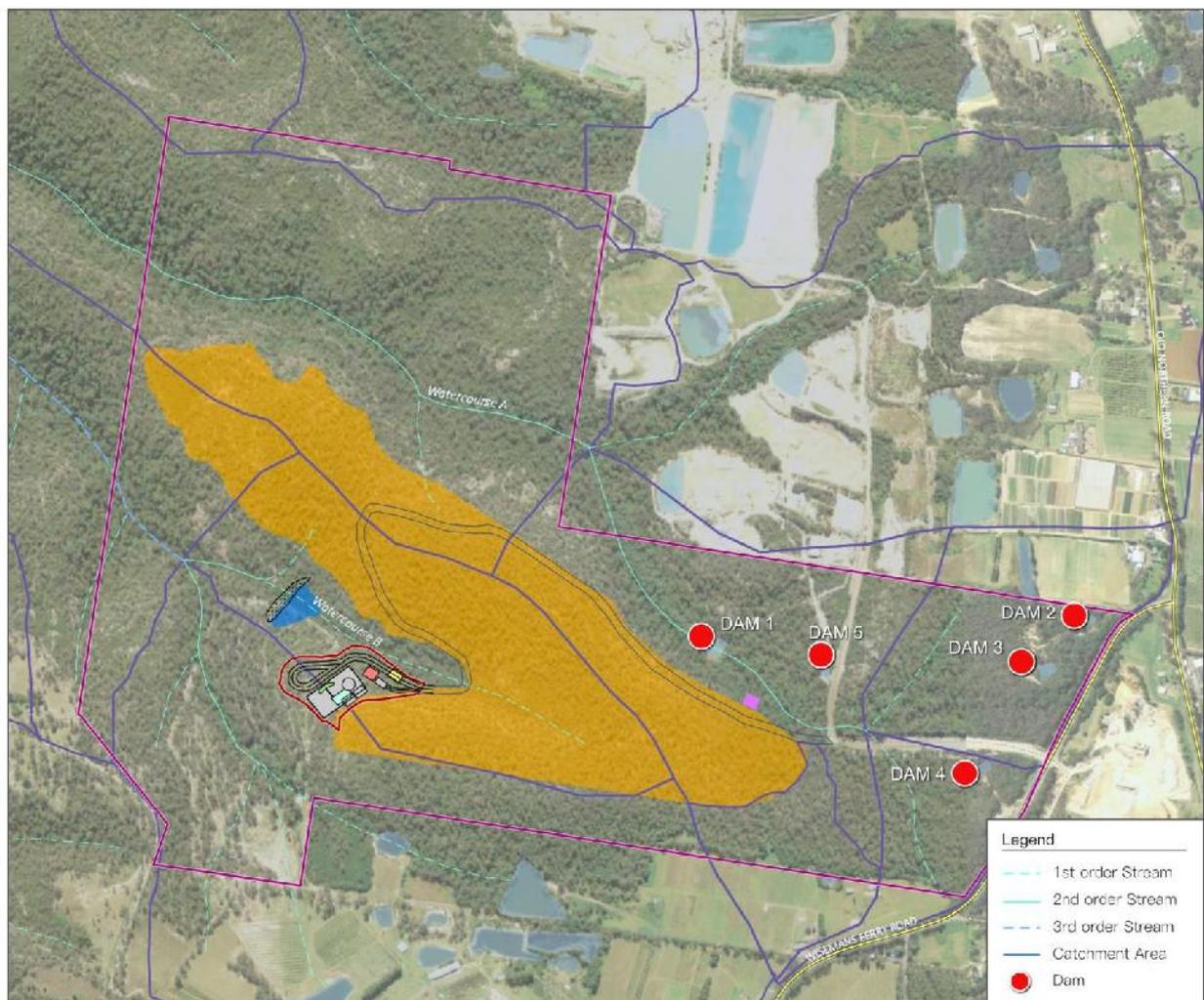


Figure 10: Project Site Hydrological Features (Source: EMM, 2021; DPSI, 2017 & DPI, 2015)

Watercourse A is a 2nd-order stream that flows in a north-westerly direction. It is interpreted to be groundwater-fed and has an intermittent flow regime. This means that during an average rainfall year streamflow will occur for most of the year but may cease for weeks or months, typically in late summer or early autumn. Streamflow would also cease for extended periods during dry periods.

Watercourse B is a 1st-order stream that flows to the north-west in a well-defined gully. It is interpreted to have an ephemeral flow regime meaning that streamflow only occurs for a short period after material rainfall. Watercourse B joins a larger watercourse immediately downstream of the proposed water management dam.

2.1.2 Dams

Five dams are in the eastern portion of the site. These dams are referred to as Dams 1 to 5 in **Figure 10** above. Dam 1 has been established on Watercourse A. PF Formation Sand and Concrete hold a surface water entitlement to extract up to 32 ML/year from Dam 1 (WAL 26168). EMM understands that this water is used to supply water to a sand quarry to the north of the Project Site. A search of the *NSW Water Register* indicates no other licensed surface water users rely on extraction from waterways that flow between the site and the Hawkesbury River.

2.1.3 Groundwater

Two groundwater systems are present at the Project Site and surrounds:

- **Shallow aquifer**, which is the saturated zone within the eluvial/weathered Hawkesbury Sandstone and the base of the Maroota Sand unit located at the eastern end of the Project Site.
- **Deep aquifer**, which is located within the consolidated Hawkesbury Sandstone below the weathered zone. It includes the regional water table and groundwater in the sandstone below it.

A detailed description of the Project Site’s existing hydrological environment is presented in Section 7.4 of this EIS and the Water Assessment prepared by EMM Consulting (**Annexure 10**).

2.2 Land Ownership & Permissive Occupancies

Aboriginal Land Claim 3441 was granted to DLALC in 2004 by the Minister for Lands for the land parcels shown in **Figure 11** below, including the Lots that comprise the Project Site. The land entitled to DLALC that is the subject of this Application will be transferred to DLALC following the Project’s determination. As Crown Lands presently retains formal control of the Project Site, the EIS is accompanied by Crown Landowners Consent for the Project (**Annexure 3**).

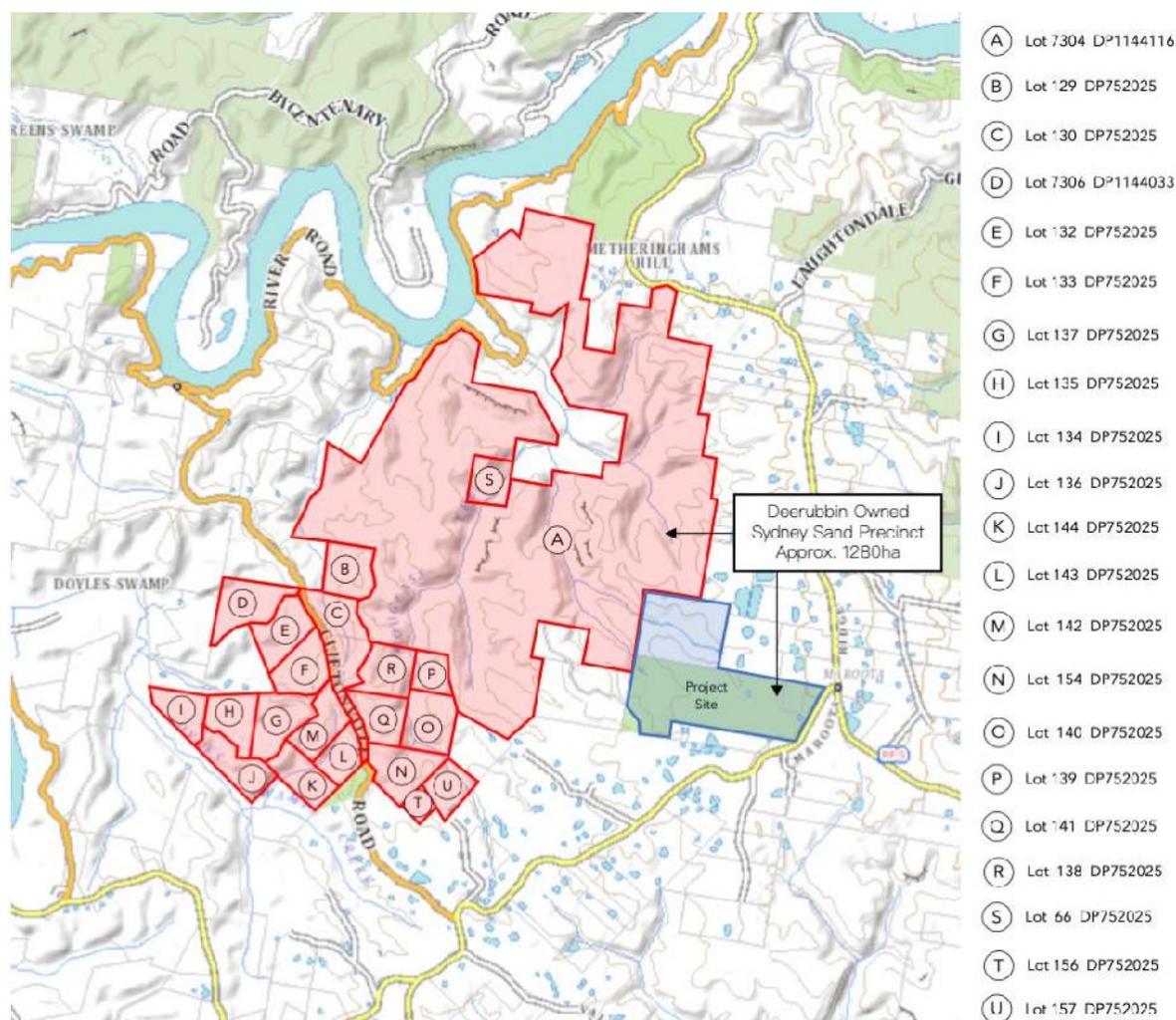


Figure 11: Sydney Sand Precinct – DLALC Landholdings (Source: Sixmaps, 2020)

All of the land comprised in Lot 213 DP 752025 was granted to DLALC. The land comprised in Lots 202 DP 752025 and Lot 7005 DP 1055724 was granted subject to certain exclusions, including an area covered by Crown License 19031 that contains Patricia Fay Drive.

Patricia Day Drive provides the most suitable access to the Project site, and as such, DLALC lodged crown licence application 618599 in April 2020 for shared use of that road. Crown Lands provided an ‘in principle’ approval for the licence on 14 January 2021, subject to the Project’s approval (**Annexure 4**).

2.3 Site Geology/Extent of Resource

Drilling and studies examining the potential sand resource on the Project Site were supervised by Grahame Lee & Associates in 2008, 2009 and April 2017 (**Annexure 7**). Those investigations uncovered two sand bearing deposits on the Project Site. These being:

- Maroota Sand in a small area in the eastern part of the site containing in the order of 30,000 tonnes; and
- Hawkesbury Sandstone occurring over the whole of the site, underlying the Maroota Sand. There is an estimated 19 million tonnes of raw sandstone within the proposed extraction area.

Hawkesbury Sandstone is the older of the geological units dating to the Triassic Period (195 to 225 million years ago). In some locations, Hawkesbury sandstone has lenses of pale to dark grey shale interbedded within the generally massive sandstone. Drilling revealed the Hawkesbury Sandstone located onsite to comprise variably to competent, fine to medium grained, variously pale–coloured sandstones and clayey sandstone.

The sandstone yield is anticipated to be 95.4% after allowing for the removal of ironstone and thin clay/shale and siltstone beds. Using this estimate, approximately 1.6 million tonnes of excess material, including topsoil would be extracted during the extraction of the 19 million tonne of Hawkesbury sandstone. These materials will form part of the fill used for site rehabilitation.

The younger Maroota sand resource accumulated along the former course of the Nepean River some 45 to 65 million years ago. These deposits overly the Hawkesbury and/or the shales of the Ashfield Shale unit. The Maroota sand deposit located in the eastern part of the site has been excluded from the Project due to the small size of the resource.

Particle swiz grading of three samples collected from Hawkesbury sandstone across the site indicated that the maximum particle size was less than 2.36mm, with at least 53% less than 0.6mm. According to these results, some of the sand can be expected to meet the requirements for fine–medium sand.

2.4 Regional Geology

Hawkesbury Sandstone is the predominant sandstone unit outcropping in the region surrounding Sydney. In the Maroota district some of the higher ridge lines are capped by shales of the Ashfield Shale which immediately overlies the Hawkesbury Sandstone, but the occurrence is restricted to the topographically higher areas.

Maroota sands are best observed in the extraction pits, such as PF Formation on the corner of Wisemans Ferry and Old Northern Roads, but parts of the unit also extend into the eastern part of the property along Wisemans Ferry Road.

2.5 Surrounding Land Uses

The Project Site and surrounds comprise a range of landscape types and visual catchments defined by localised highpoints and ridgelines. The character of the local landscape is predominately natural bushland and open to semi-open rural lands for pastoral and agricultural activities. Open undulating rural lands are typically located alongside Old Northern Road and Wisemans Ferry Road while bushland is visible in the middle and backgrounds. Extractive industries are scattered intermittently across the landscape.

Figure 12 depicts the area surrounding the Project Site. it contains a mix of land uses, including agriculture, extractive industries, rural residential and bushland areas.

Extractive Industries

Seven existing extractive industries are located in the Maroota Region (**Figure 12**). The below QR Code provides access to an interactive map that shows surrounding quarries' annual extraction rates and anticipated closure. Three nearby operations with a combined extraction output of 1 million tonnes per year are anticipated to cease within ten years.



The Project Site adjoins an existing sand extraction site operated by PF Formations to the north and land used for agricultural purposes to the south. Other sand extraction sites operated by Dixon Sand, Hodgson Family Trust and PF Formation are located in the larger area as illustrated in **Figure 12**.

Rural Residential & Agriculture

Rural residential properties are located north and south the Project Site along Wisemans Ferry Road and Old Northern Road. Agricultural uses in the surrounding area include orchards, market gardens and livestock grazing.

Bushland

DLALC owns a significant landholding of approximately 1,100ha of potentially extractable land to the west of the Project Site (**Figure 11**). This land provides long-term opportunities as a source of local, cost-efficient construction sand for the Sydney Metropolitan Region as other deposits become exhausted over time.

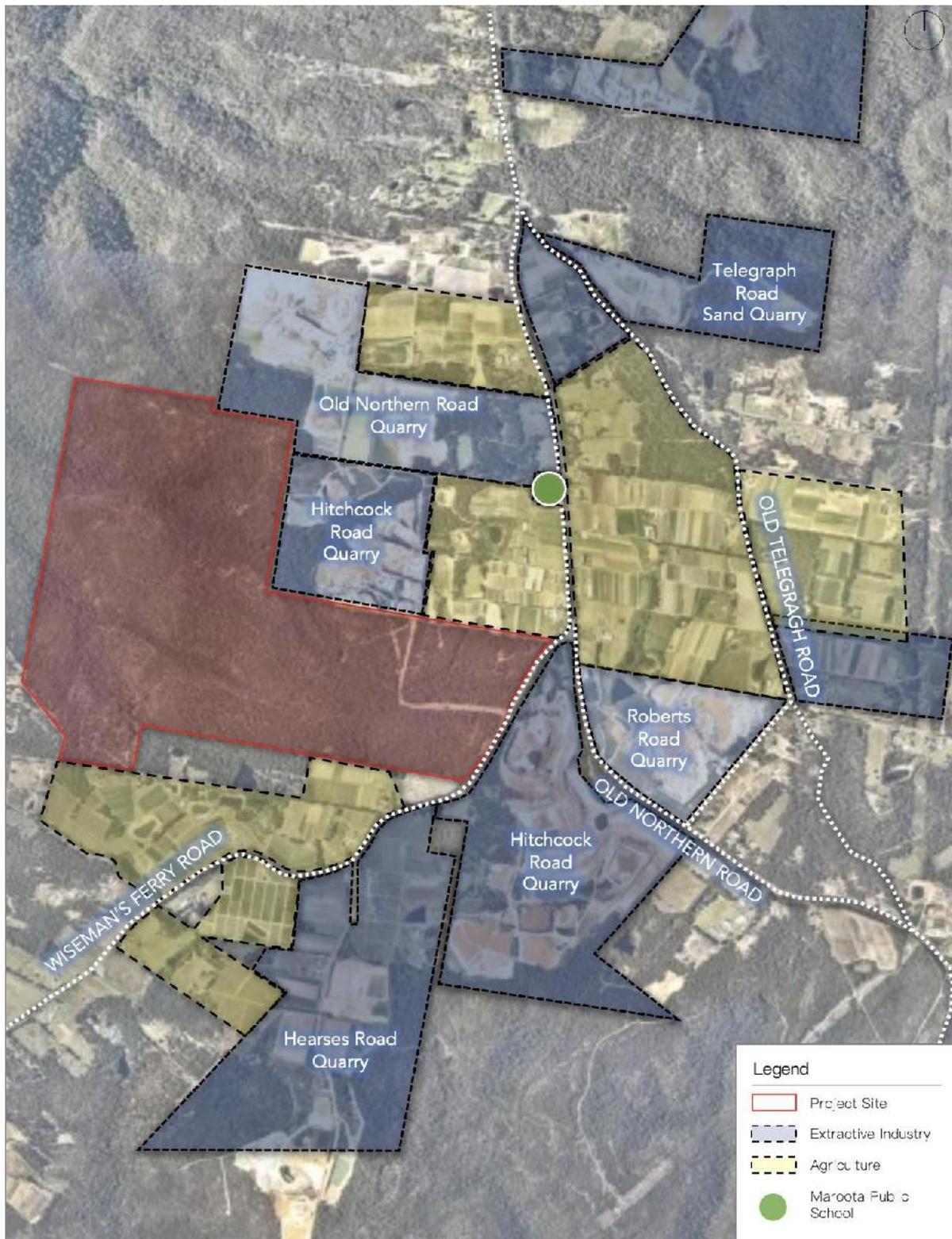


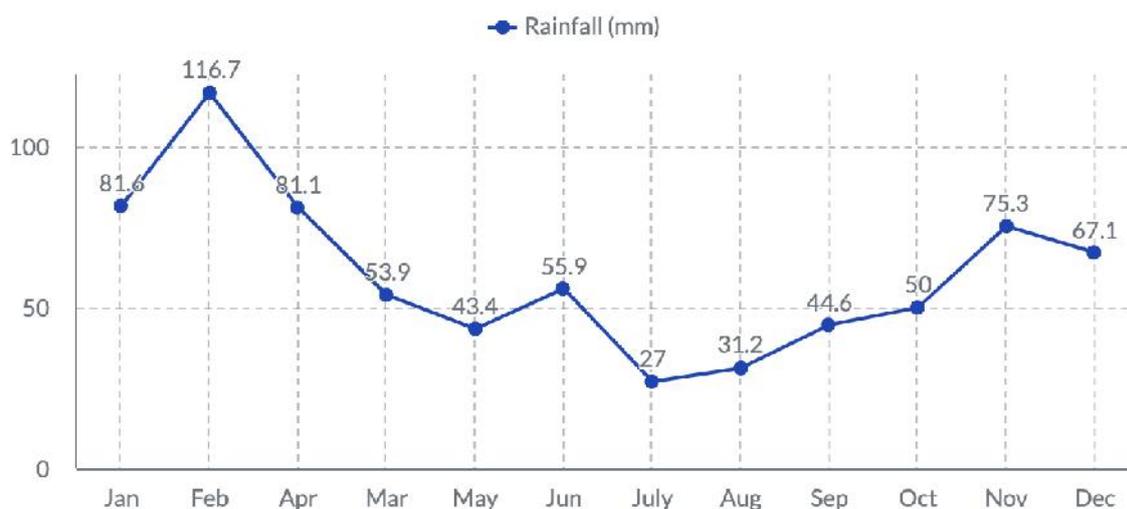
Figure 12: Project Context (Source: Nearmap, 18 March 2020)

2.6 Microclimate

Long-term climatic data was obtained from the Bureau of Metrological weather station located at the Richmond RAAF Base (site no. 067105) located 24.7km west of the Project Site (**Figure 13**). The following section provides a summary of climatic data recorded over a 16 to 27 year period.

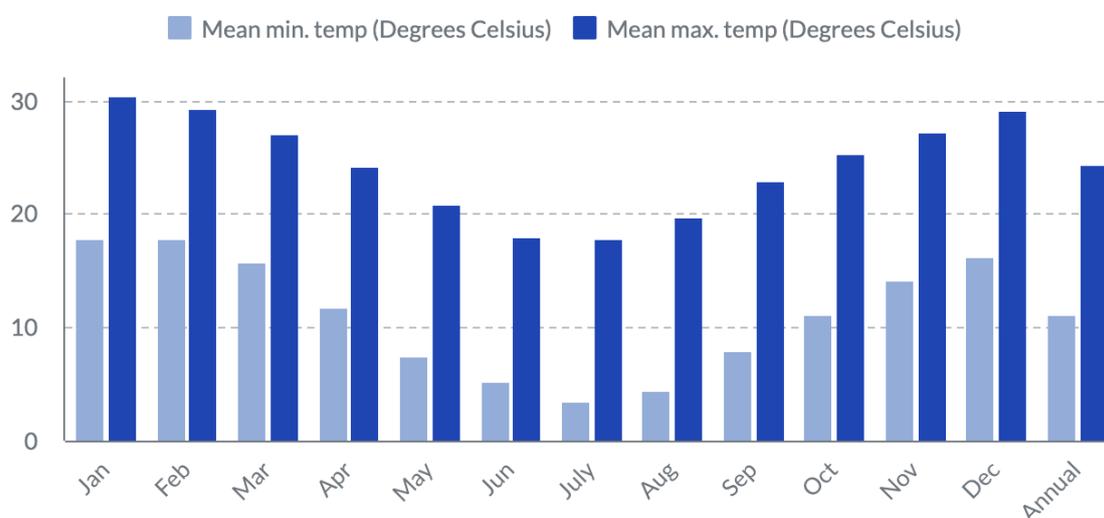
2.6.1 Rainfall

The below table provides monthly rainfall data recordings at the Richmond RAAF. Average annual rainfall is 719.9mm across 72 rainy days with the warmer months receiving higher amounts of rainfall.



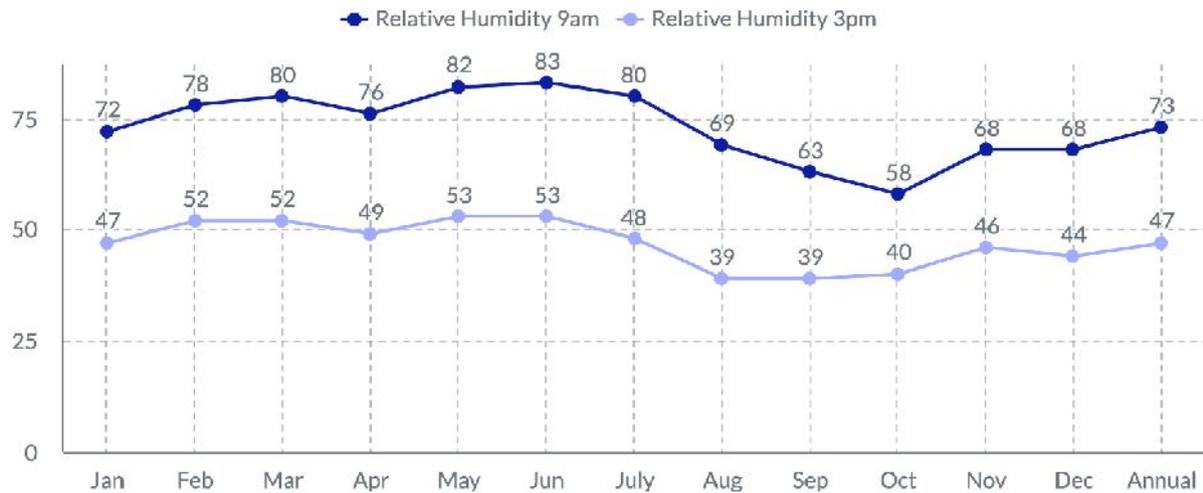
2.6.2 Temperature

The below table provides the mean minimum and maximum temperature recordings at the Richmond RAAF station. The data shows that January is the warmest month with a mean maximum temperature of 30.5°C and July is the coldest month with a mean minimum temperature of 3.5°C.



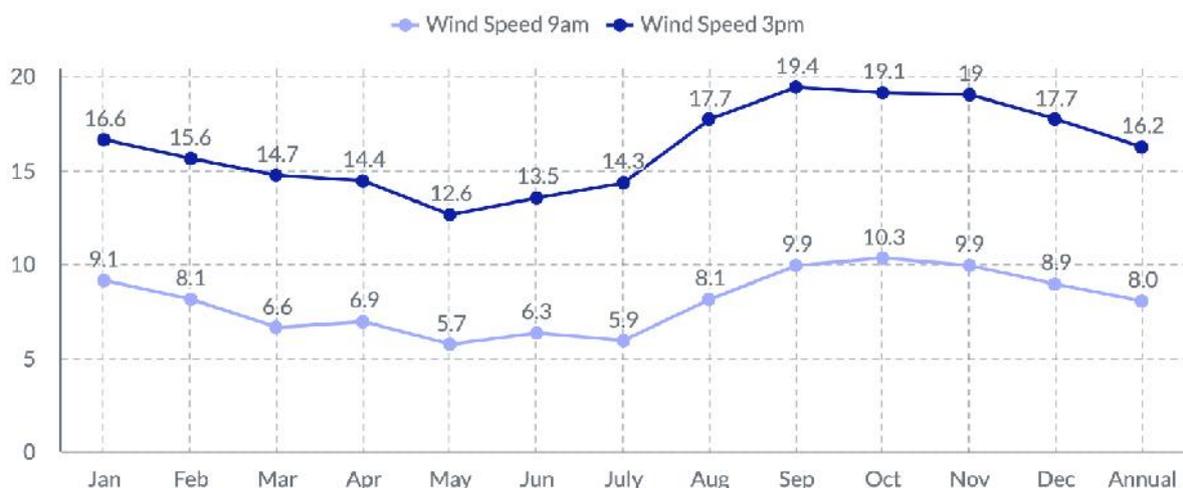
2.6.3 Relative Humidity

The below graph provides the mean monthly relative humidity recordings at the Richmond RAAF station at 9am and 3pm. The data shows that relative humidity levels exhibit variability over the day and seasonal fluctuations. Mean 9am relative humidity ranges from 58% in October to 83% in June. Mean 3pm relative humidity levels range from 39% in August and September to 53% in May and June.



2.6.4 Wind Direction & Speed

The below graph provides the mean monthly wind speed recordings at the Richmond RAAF Station at 9am and 3pm. The data shows that wind speeds exhibit seasonal variations with lower wind speed records for the first half of the year and higher observations for the latter. Mean 9am wind speeds range from 5.7 kilometres per hour (km/h) in May to 10.3km/h in October. Mean 3pm wind speeds range from 12.6km/h in May to 19.4km/h in September.



An analysis of annual and seasonal windroses for the Richmond RAAF during the 2017 calendar period are presented in the Project’s Air Quality Assessment (**Annexure 13**). That analysis shows that the wind directions are generally evenly distributed on an annual basis with winds greatest to the northeast and southwest. The

summer windrose shows a similar distribution pattern as the annual windrose. In Autumn, winds to the southwest are most frequent. During winter, winds to the west are most frequent. During spring, winds are predominately from the east and west.

2.7 Regional Context

The Project Site is located in the south-west outskirts of the Maroota Township. Maroota is around 40kms to the north of the Parramatta CBD, 50kms to the north-west of the Sydney CBD and some 8kms to the south of Wisemans Ferry. Old Northern Road and Wisemans Ferry Road provide main road links from the Project Site to the Sydney metropolitan area. Both are classified roads under the control of RMS. Old Northern Road links Baulkham Hills to Wisemans Ferry via Castle Hill, Dural, Glenorie and Maroota and provides access to the Sydney Motorway system. Wisemans Ferry Road provides a strategic link to Windsor to the south-west and then Penrith to the south.

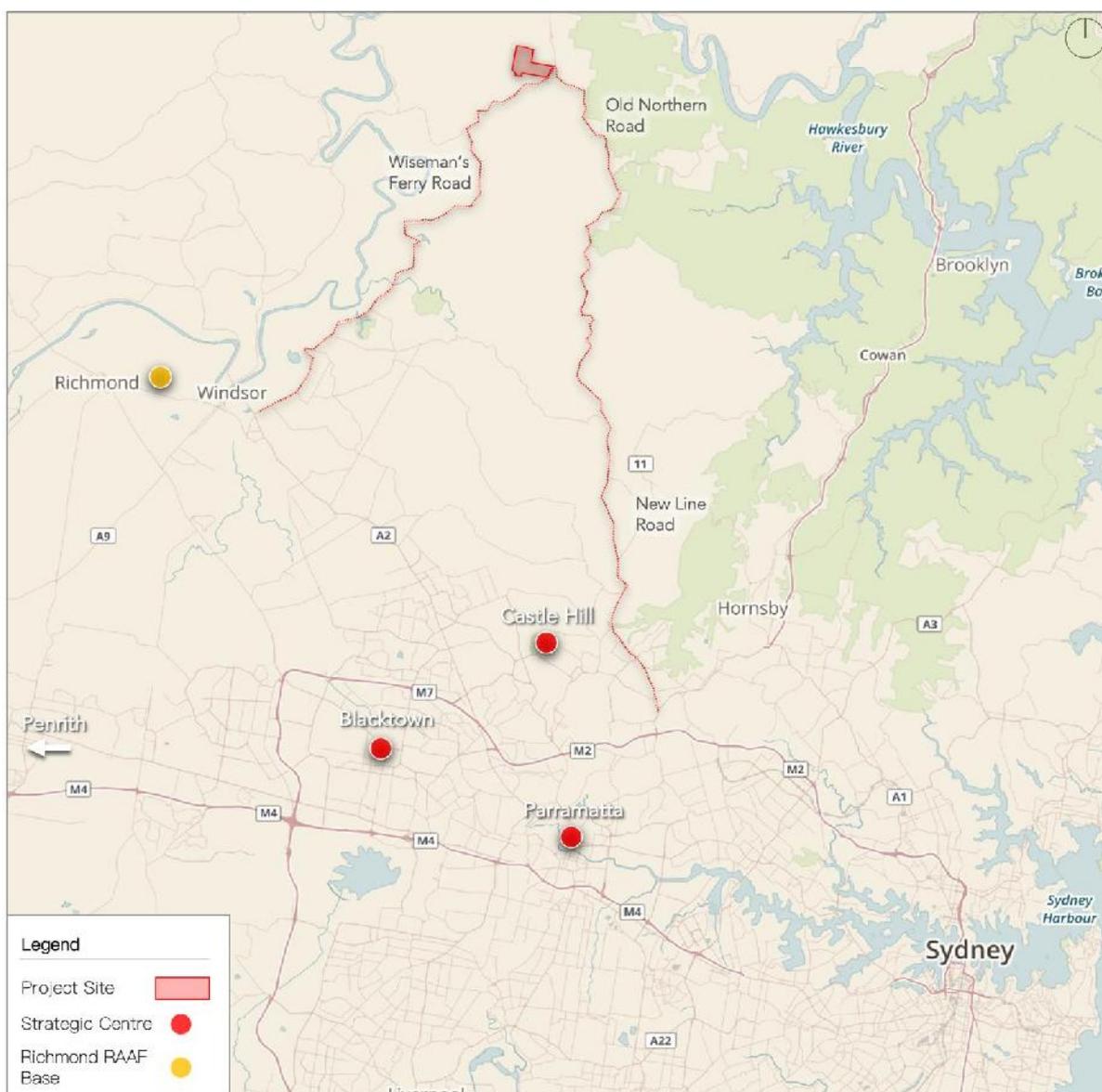
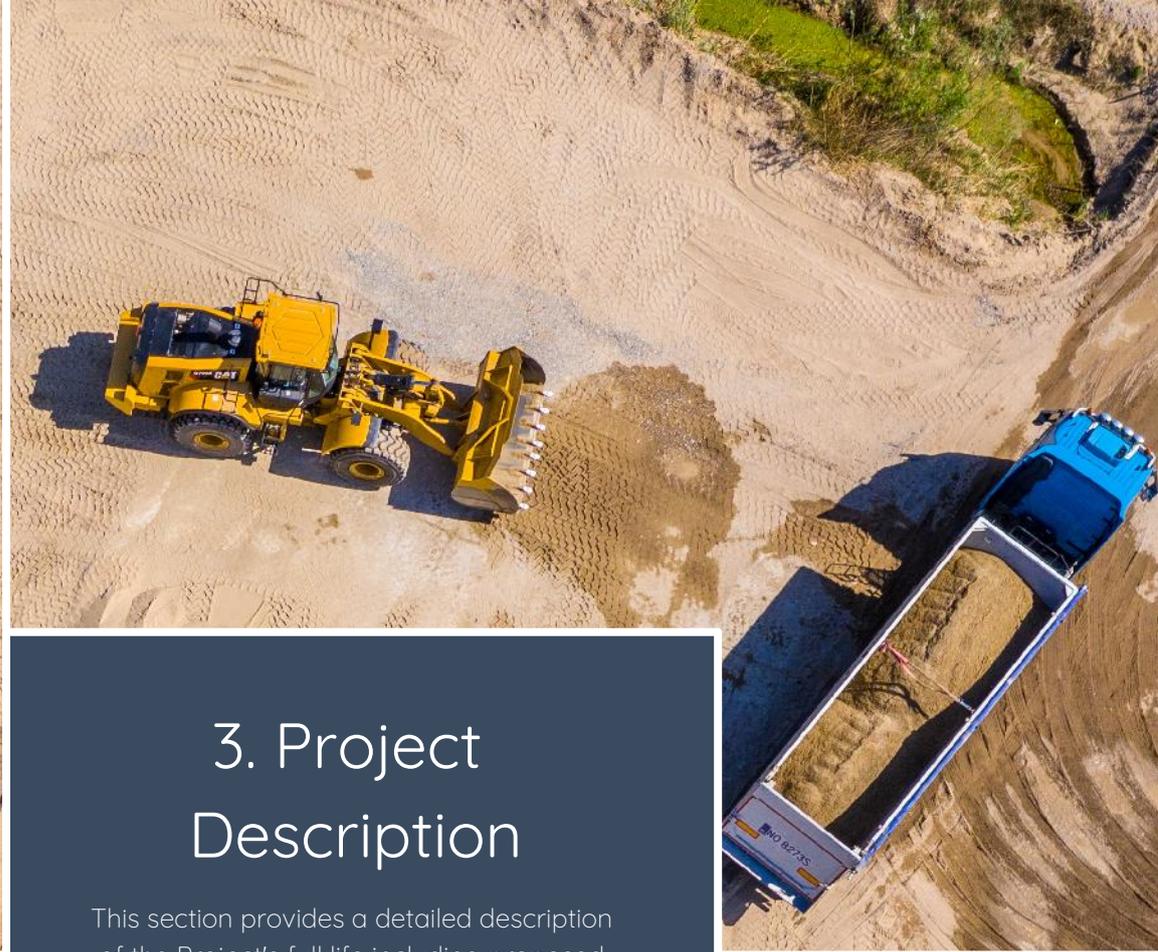
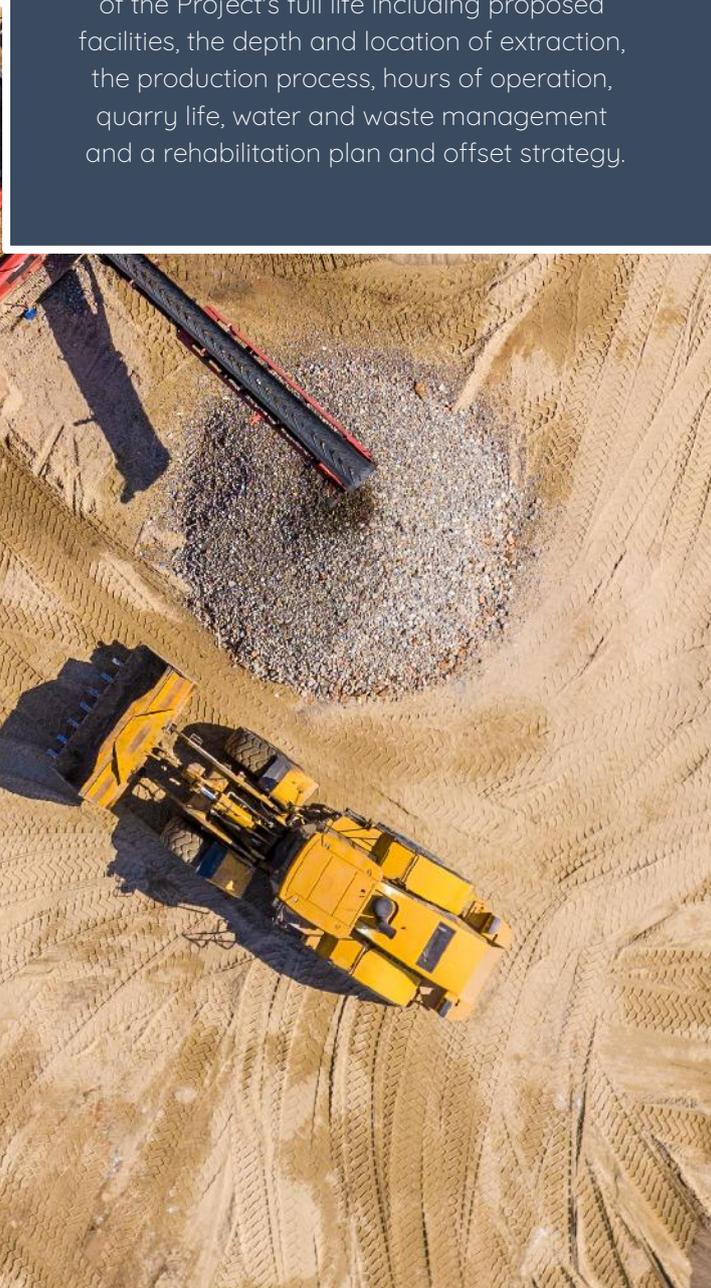


Figure 13: Regional Context (Source: OpenStreetMap, 2021)



3. Project Description

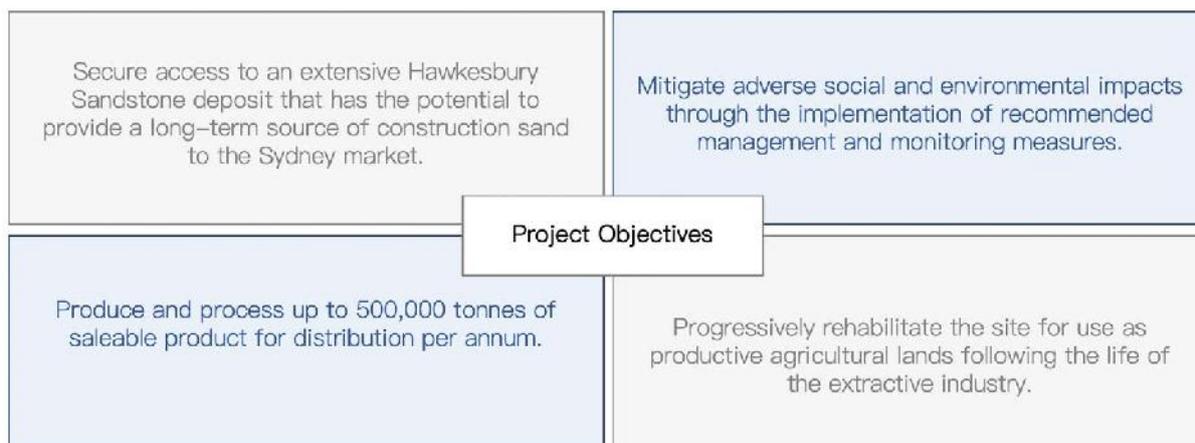
This section provides a detailed description of the Project's full life including proposed facilities, the depth and location of extraction, the production process, hours of operation, quarry life, water and waste management and a rehabilitation plan and offset strategy.



3.1 Project Overview

Development consent is sought under ‘Division 4.7 – Stage Significant Development’ of the *Environmental Planning and Assessment Act 1979 (the EP&A Act)* for the use of the Project Site as an **extractive industry**.⁹ The extracted material primarily comprises Hawkesbury Sandstone, shale and clays. Extracted material will be processed onsite, stockpiled and distributed by external contractors. The extracted material can be processed into a fine–medium graded sand with crushed sandstone, fine graded sand and a fine aggregate being produced as by–products.

The objectives of the Project are as follows:



The following table provides an overview of the Project.

Table 4 – Project Description	
Key Element	Detail
Proposed Land Use	<i>Extractive Industry</i>
Extraction Method	Overburden Stripping & Raw Feed Extraction
Resource	Hawkesbury Sandstone, shale and clay
Processing Method	Processed into washed sand of various diameters including for use in concrete and road base, and other resource–based products as appropriate.
Quarry Life	Approximately 28 years. Approval sought for 30 years.
Groundwater Buffer	2m above the wet–weather groundwater levels
Disturbance Area	<ul style="list-style-type: none"> • 43.89ha extraction area • 2.4ha site Infrastructure Area • 0.31 ha access haul road (outside the extraction area) • 0.2ha Surface water Dam

⁹ An **extractive industry** is defined under the Standard Instrument as “the winning or removal of extractive materials (otherwise than from a mine) by methods such as excavating, dredging, tunnelling or quarrying, including the storing, stockpiling or processing extractive materials by methods such as recycling, washing, crushing, sawing or separating”, but does not include turf farming”. Extractive material means “sand, soil, gravel, rock or similar substances that are not minerals within the meaning of the Mining Act 1992”.

Project Description

	Total: 47.2ha	
Annual Production	500,000 tonnes	
Total Resource Recovered	<ul style="list-style-type: none"> • 15.200 million tonnes of raw sandstone processed into 13.680 million tonnes of saleable product • 160 tonnes of shale • 370 tonnes of overburden 	
Management of Waste	Tailings will be press dried and incorporated with the overburden to form the final landforms. Other waste will be segregated and removed by a licensed contractor.	
Plant & Equipment	<ul style="list-style-type: none"> • Relocatable sand processing plant • Weighbridge • Administration office and carpark • Water tank integrated within the production plant • Storage bins for dried tailings • Internal haul roads • Sales haul road 	<ul style="list-style-type: none"> • Electrical power supply • Potable water supply • Enviro-cycle sewage system • Machinery workshop and diesel storage tanks • Site fencing • Surface water dam • Groundwater bore
Truck movements	120 truck movements Monday to Friday 60 truck movements Saturday	
Employment	<ul style="list-style-type: none"> • 1 full-time quarry manager • 1 full-time and 1 part-time weighbridge & sales • 1 full-time and 1 part-time excavator operator • 2 full-time articulated truck drivers 	<ul style="list-style-type: none"> • 2 full-time sales loaders • 1 part-time water cart driver • 1 full-time and 1 part-time sand plant operator • 15–20 privately contracted truck drivers.
Hours of Operation	<ul style="list-style-type: none"> • Sales – 6am to 6pm, Monday to Saturday • Quarry operations – 7am to 6pm, Monday to Saturday 	
Statutory Approvals Required (expanded upon in Section 5)	<ul style="list-style-type: none"> • Development Consent under the <i>Environmental Planning & Assessment Act 1979</i> (NSW) • Controlled action approval under the <i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cth) • Environmental Protection Licence under the <i>Protection of the Environment Operations Act 1997</i> (NSW) • Water access licence under the <i>Water Management Act 2000</i> (Cth) • Section 138 Approval under the <i>Roads Acts 1993</i> (Cth) 	

The proposed site layout is shown in **Figure 14**, and extraction sequence plans are displayed in **Figures 19 to 27** further below. The full suite of mining plans, including the final form plan and cross-sections are included in the Extraction and Rehabilitation Report prepared by RPM Global (**Annexure 18**).

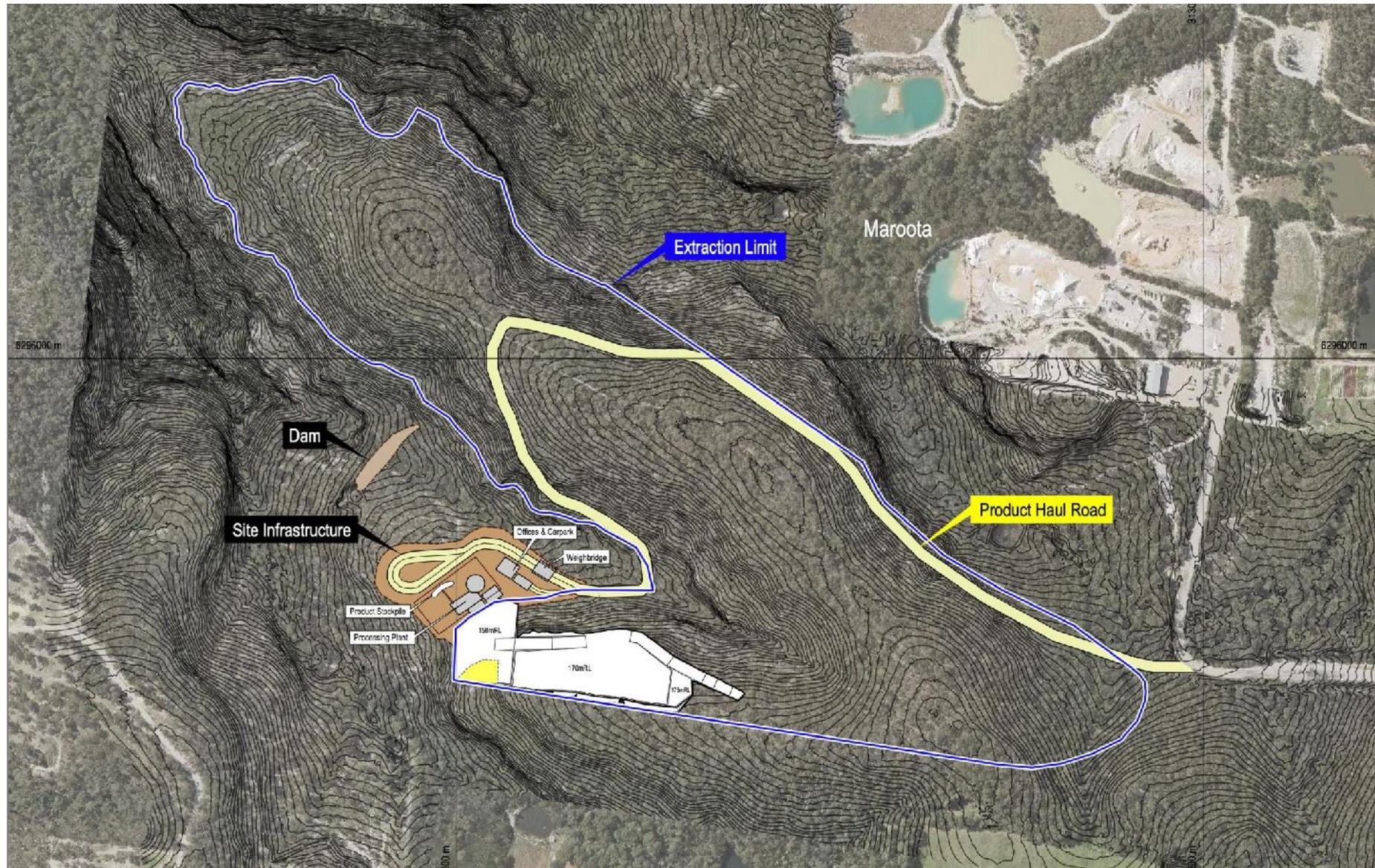


Figure 14: Site Layout Plan (Source: RPM Global, 2021)

3.2 Detailed Project Description

3.2.1 Pre-Operation Construction Activities & Site Preparation

The site is currently a greenfield site. The following works are required to enable quarry operations.

- Marking out the site locations that are to be cleared for site establishment and construction.
- Progressive pre-clearing of fauna before clearing vegetation to expose working surfaces for construction of the access haul road and intersection, site infrastructure, surface water dam and the initial cut of the extraction pit. The Proponent will work with the ecologist to remove fauna per their recommendations before clearing and grubbing.
- Initial removal of overburden to allow the construction of the access haul road and to provide exposure to raw material for the initial cut into the extraction area. Overburden will be used as fill to level the site infrastructure area to a height of 155 AHD. (13,000m³ of excess overburden will temporarily be stored within the extraction footprint during year 1 of the operation before being rehandled in year 2 to construct rehabilitated landforms in the extracted pit).
- Establishment of the processing plant and associated infrastructure including weighbridge, administration area, a water tank and storage bins for dry tailings in the site infrastructure area.
- Establishment of a surface water dam and groundwater bore to provide clean water supplies to the processing plant.

A six to 12-month timeframe is anticipated for the site preparation.

3.2.2 Site Access

Access to the Project Site is proposed via the construction of a haul road from Patricia Fay Drive to the site infrastructure area. Its proposed location is shown in **Figure 14** above. The route of the proposed haul road has been designed to achieve three objectives:

1. To complement the existing topography of the site.
2. To locate the access road away from southern neighbouring properties to mitigate noise, dust and visual impacts.
3. To contain the majority of the access road within the extraction footprint to minimise the Project's disturbance area.

3.2.2.1 Patricia Fay Drive Intersection

The access haul road is proposed to intersect with Patricia Fay Drive at its bend. This location maximises sight distances in both directions of Patricia Fay Drive. An existing 33kV power line and pole are located near the bend, and a pipeline runs alongside Patricia Fay Drive to the PF Formation sand operation to the north. The location of both of these constraints is shown in **Figure 15** below.



Figure 15: Constraints for Patricia Fay Drive / Sales Haul Road Intersection (Source: Nearmap, 2020)

A survey of Patricia Fay Drive and its surrounds and detailed engineering drawings of the proposed intersection will be prepared before the issuing of a construction certificate. The Proponent will construct this intersection to comply with the relevant Australian Standards and provide sufficient clearance from the power pole. The Proponent will construct a crossing over the PF Formation pipeline to ensure vehicles accessing the Project site do not damage the pipeline.

The access haul road will be approximately 15m in width, and its surface will consist of unsealed coarse sandstone and maintained by water cart operations.

As noted in Section 2.2 of this EIS, Patricia Fay Drive is subject to Crown Licence 19031. DLALC lodged Crown Licence application 618599 in April 2020 for shared use of that road. Crown Lands provided an 'in principle' approval for the licence on 14 January 2021, subject to the Project's approval (**Annexure 4**).

3.2.2.2 Wisemans Ferry Road/Patricia Fay Drive Intersection Upgrade

A Stage 5 Road Safety Audit was undertaken for the Project (**Annexure 23**). The audit findings identified that the existing CHR and AUL right and left turning lanes in Wisemans Ferry Road for the right and left turns into Patricia Fay Drive do not meet the current Austroad Guidelines for the 80km/h speed limit and should be upgraded.

The Applicant, therefore, proposes to upgrade the intersection of Wisemans Ferry Road/Patricia Fay Drive to current Austroad guidelines to improve the left and right turn lanes from Wisemans Ferry Road into Patricia Fay Drive. Concept plans of the proposed intersection upgrade are provided below.

3. Project Description



Figure 16 – Concept Plans of Proposed Intersection Upgrade Works Entry Turn Paths (Source: Transport & Urban Planning, 2020)

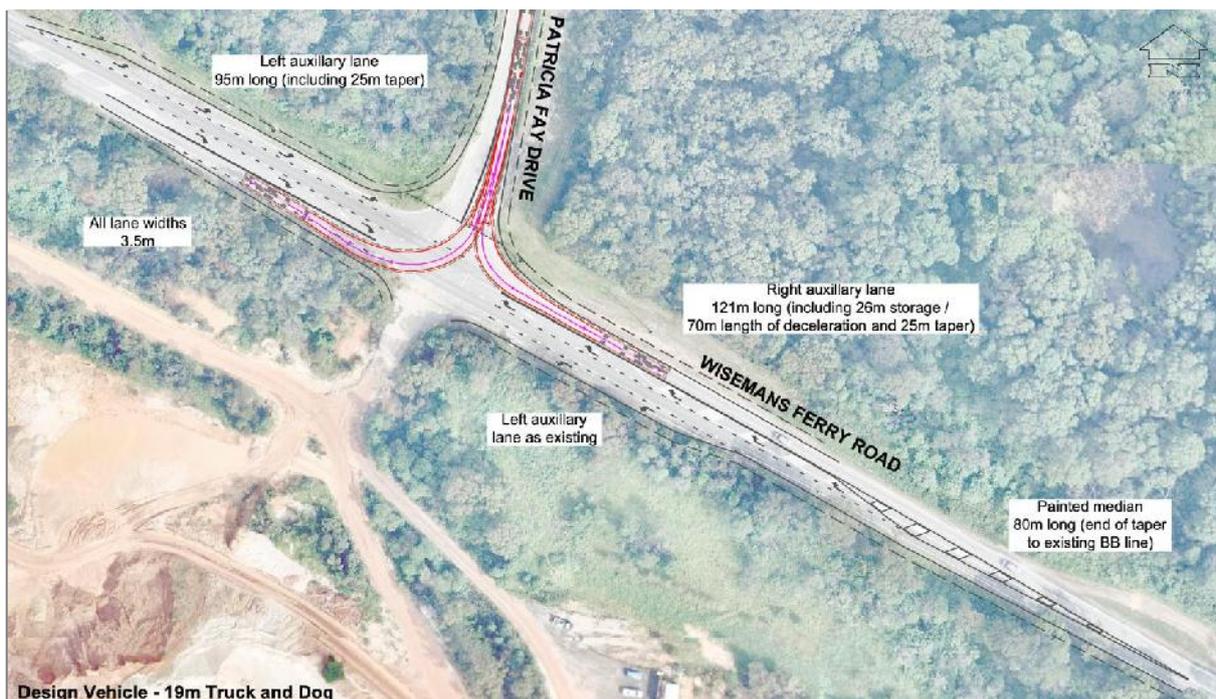


Figure 17 – Concept Plans of Proposed Intersection Upgrade Works Exit Turn Paths (Source: Transport & Urban Planning, 2020)

3.2.3 Internal Haul Roads

Internal haul roads will be constructed from the site infrastructure area to the extraction pit as the extraction area progresses. These roads will be regularly graded and watered to maintain their profile and running surface and minimise dust generation.

3.2.4 Extraction

3.2.4.1 Extraction Location

The proposed extraction area occupies approximately 43.98 ha of the Subject Site. The extraction area will be excavated to a floor elevation ranging between 148 AHD and 165 AHD. No extraction will occur within two metres of the wet-weather high groundwater levels or outside the proposed extraction area. The extent of the extraction area is shown in **Figure 18** below.

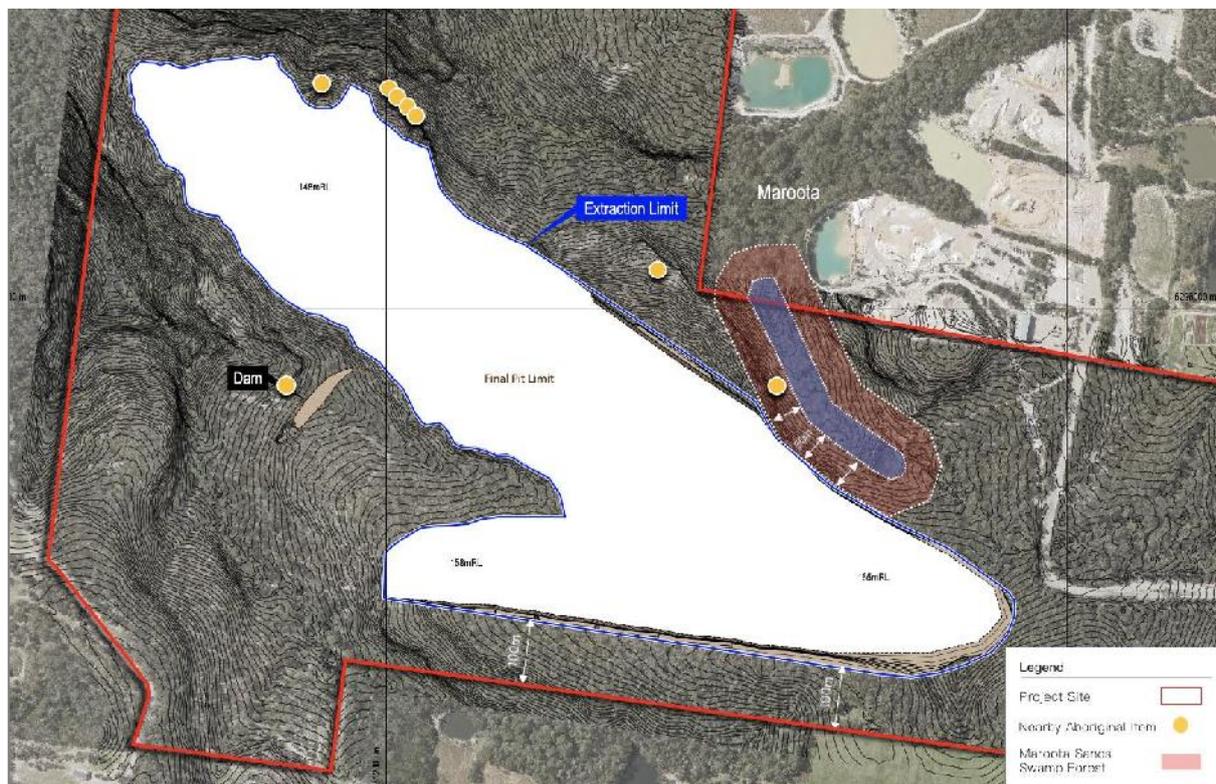


Figure 18: Extraction Area & Constraints (Base Image Source: RPM Global, 2020)

The following key constraints and objectives informed the design of the extraction area.

- Maximising access to the sandstone located under the site's two major ridgelines.
- Providing a 50m buffer to the endangered Groundwater Dependent Ecosystem known as the 'Maroota Sands Swamp Forest' situated in the north of the site.
- Maintaining a 100m biodiversity corridor and buffer to the neighbouring properties located south of the Project Site.
- Providing a minimum 35m buffer to significant Aboriginal artefacts.

3.2.4.2 Extraction Method

The sand operation will utilise conventional extraction methods. Generally, an excavator will be used to remove friable sandstone and load the raw material into an articulated truck. Where necessary, a bulldozer equipped with ripper bars will be used to rip stronger material before an excavator transfers the material. A rock breaker will likely be required for pockets of competent sandstone. Once loaded, articulated trucks will cart the raw material to the sand plant for processing. No blasting is proposed as part of the Application.

3.2.4.3 Extraction Stages

Extraction will be undertaken in six main stages over a 28-year period. The extraction area's progression is described and shown in the extraction sequence plans contained in the below table.

Initial Cut

The initial cut will be located immediately to the east of the site infrastructure area. Raw material stockpiles can be created by dozer push due to the close proximity of the initial cut to the infrastructure area site. This phase will generate 13,000m³ of excess overburden that will be temporarily stored before being rehandled in year 2 to create landforms.

Years 1-5

Year 1 expands the initial cut to the east and continues to utilise dozer push to create stockpiles near the sand plant. The mining operation will transition to loader and truck mining once working room is established in the extraction pit. Years 2–4 continues to expand the extraction pit east, and this exposes sufficient highwall to construct landforms using the 13,000m³ of excess overburden from the initial cut. Year 5 commences excavation of the south-western side of the quarry from a highpoint of bench 185 AHD.

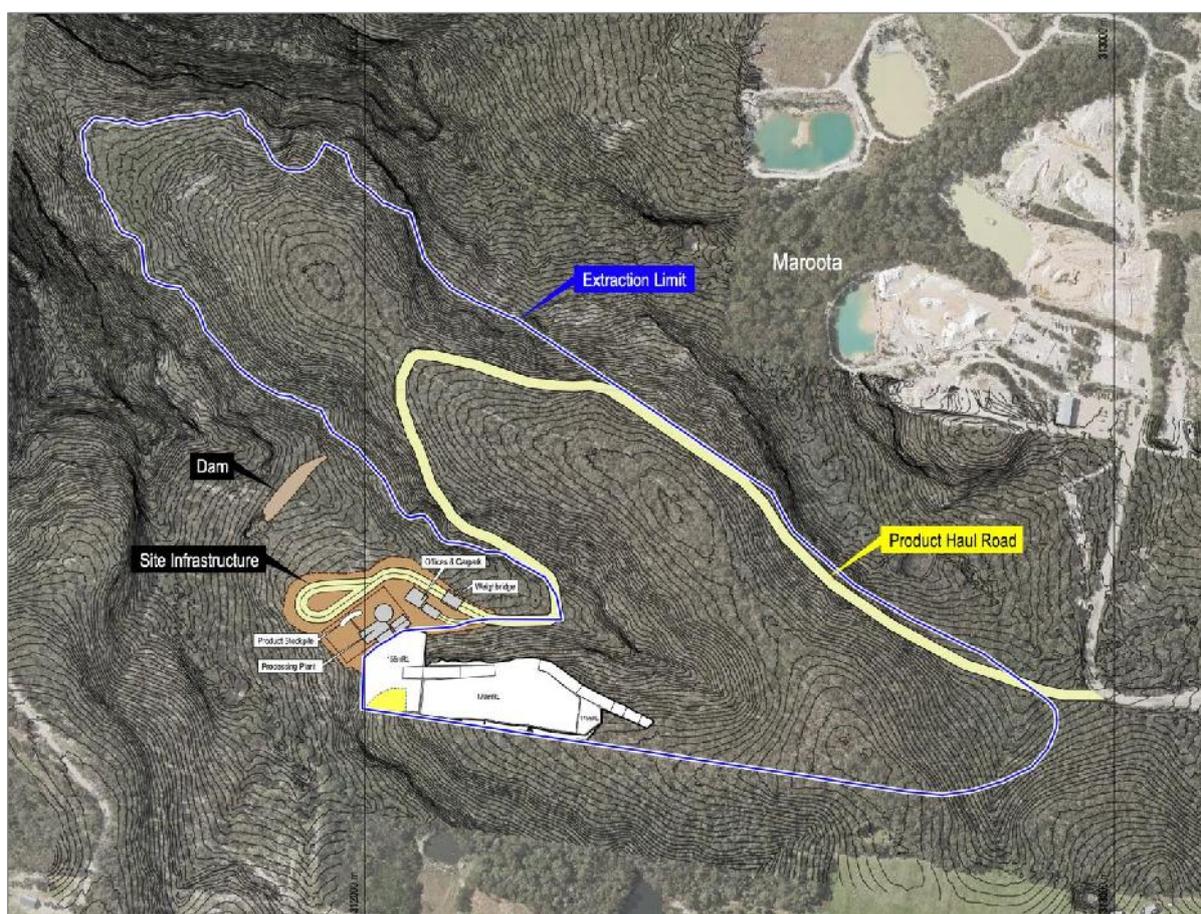


Figure 19: Extraction Sequence Plans Stage 1 – Year 1 (Source: RPM Global, 2021)

3. Project Description

Initial Cut

The initial cut will be located immediately to the east of the site infrastructure area. Raw material stockpiles can be created by dozer push due to the close proximity of the initial cut to the infrastructure area site. This phase will generate 13,000m³ of excess overburden that will be temporarily stored before being rehandled in year 2 to create landforms.

Years 1-5

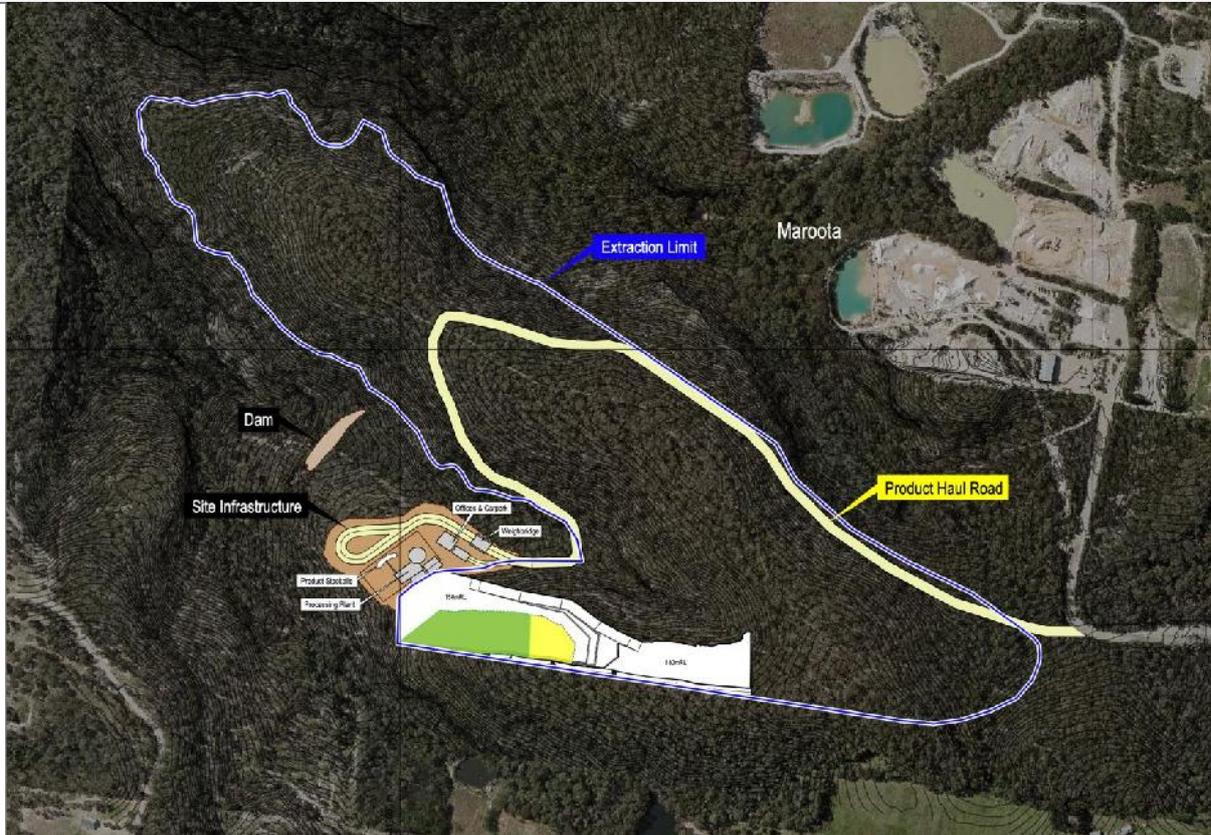


Figure 20: Extraction Sequence Plans Stage 1 – Year 2 (Source: RPM Global, 2021)

3. Project Description

Initial Cut

The initial cut will be located immediately to the east of the site infrastructure area. Raw material stockpiles can be created by dozer push due to the close proximity of the initial cut to the infrastructure area site. This phase will generate 13,000m³ of excess overburden that will be temporarily stored before being rehandled in year 2 to create landforms.

Years 1-5

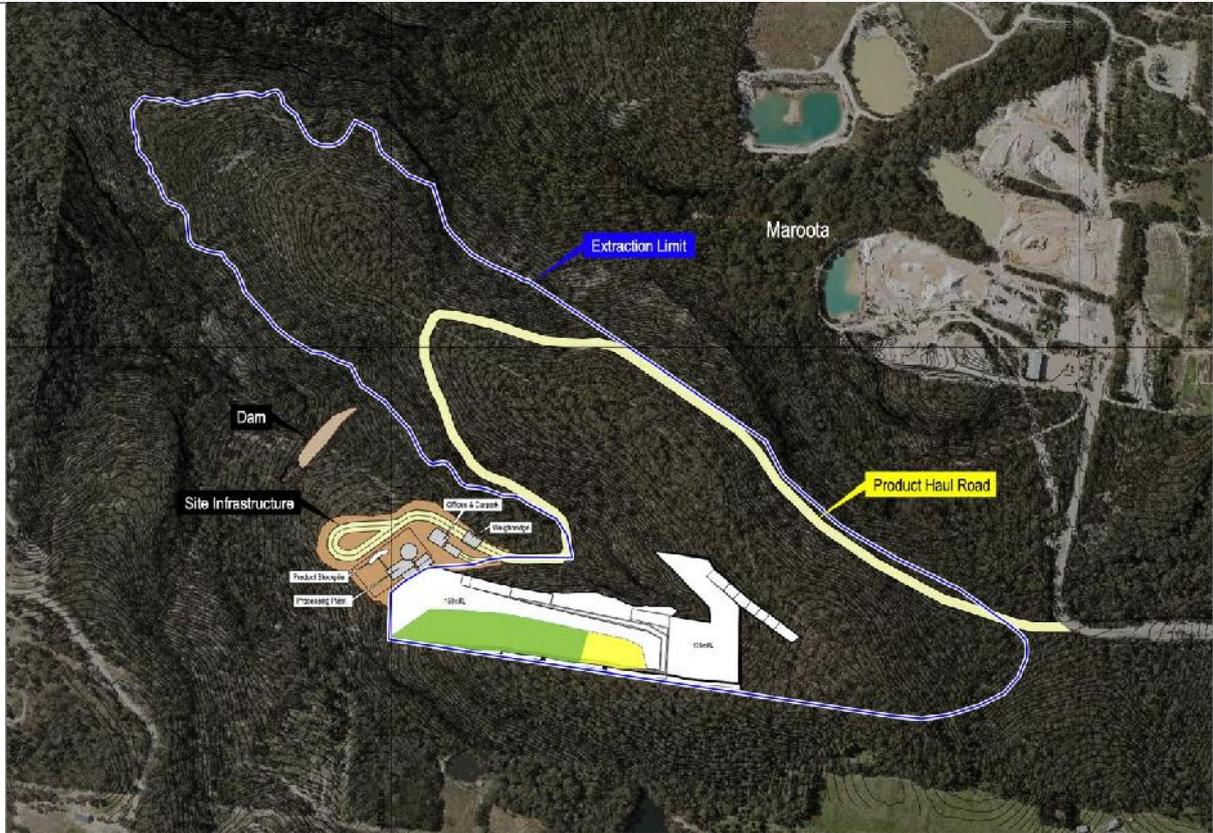


Figure 21: Extraction Sequence Plans Stage 1 – Year 3 (Source: RPM Global, 2021)

3. Project Description

Initial Cut

The initial cut will be located immediately to the east of the site infrastructure area. Raw material stockpiles can be created by dozer push due to the close proximity of the initial cut to the infrastructure area site. This phase will generate 13,000m³ of excess overburden that will be temporarily stored before being rehandled in year 2 to create landforms.

Years 1-5

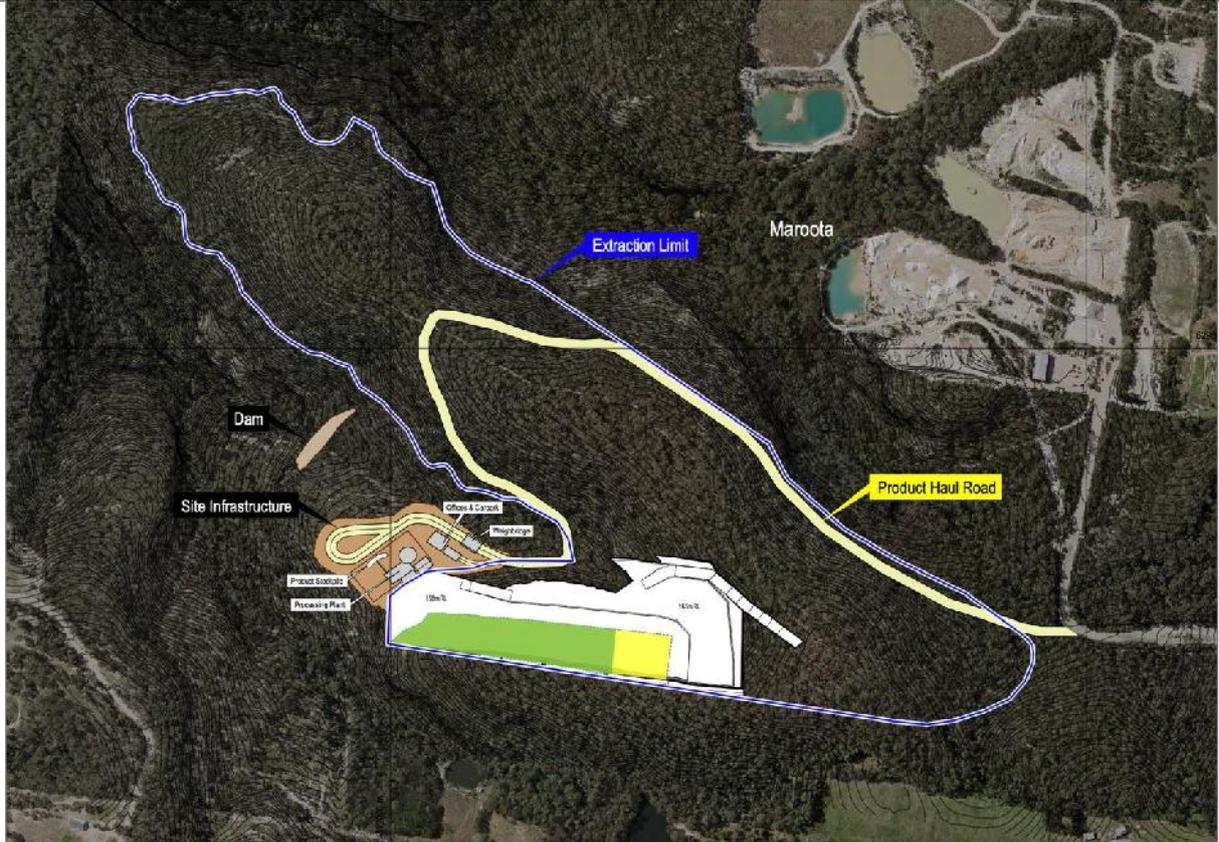


Figure 22: Extraction Sequence Plans Stage 1 – Year 4 (Source: RPM Global, 2021)

3. Project Description

Initial Cut

The initial cut will be located immediately to the east of the site infrastructure area. Raw material stockpiles can be created by dozer push due to the close proximity of the initial cut to the infrastructure area site. This phase will generate 13,000m³ of excess overburden that will be temporarily stored before being rehandled in year 2 to create landforms.

Years 1-5

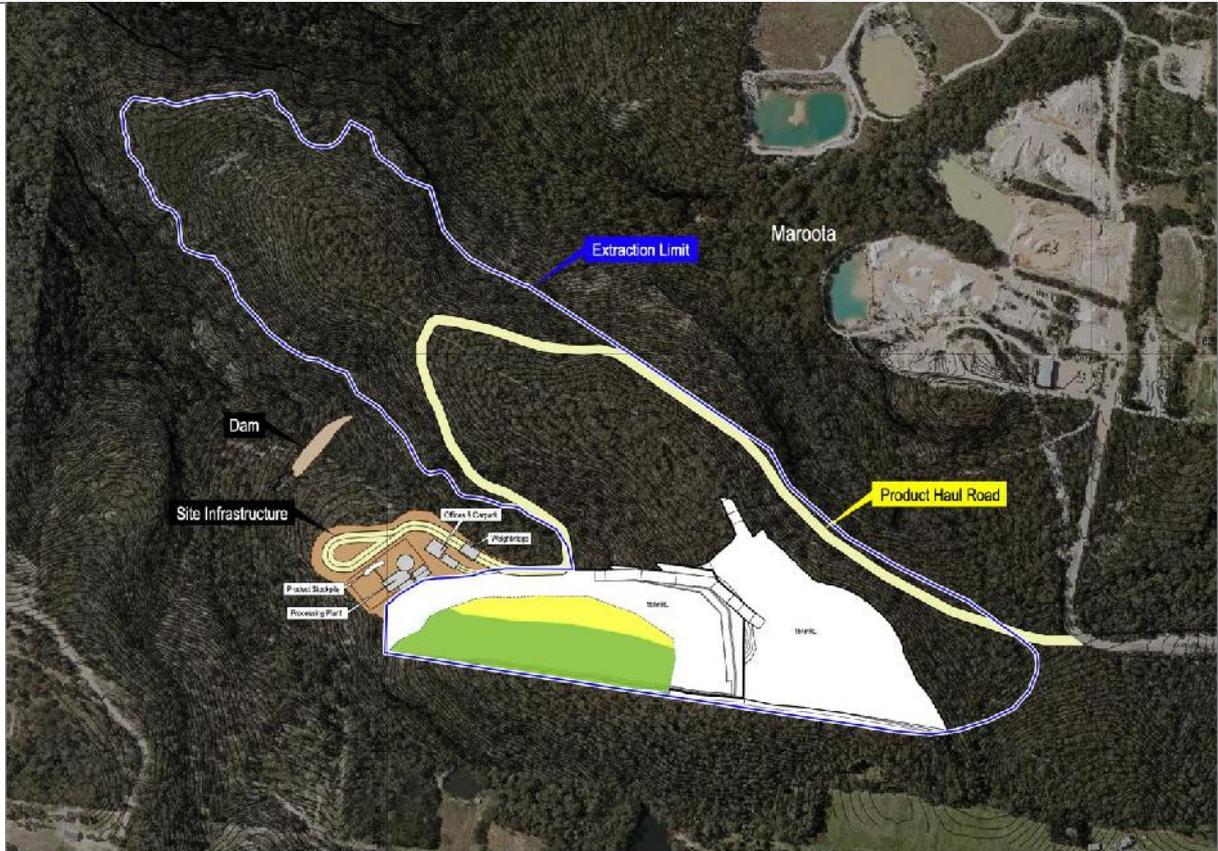


Figure 23: Extraction Sequence Plans Stage 1 – Year 5 (Source: RPM Global, 2021)

Years 6-10

Extraction continues in the large south-east section of the extraction pit with only the final bench remaining by the end of this period.

3. Project Description

Initial Cut

The initial cut will be located immediately to the east of the site infrastructure area. Raw material stockpiles can be created by dozer push due to the close proximity of the initial cut to the infrastructure area site. This phase will generate 13,000m³ of excess overburden that will be temporarily stored before being rehandled in year 2 to create landforms.

Years 1-5

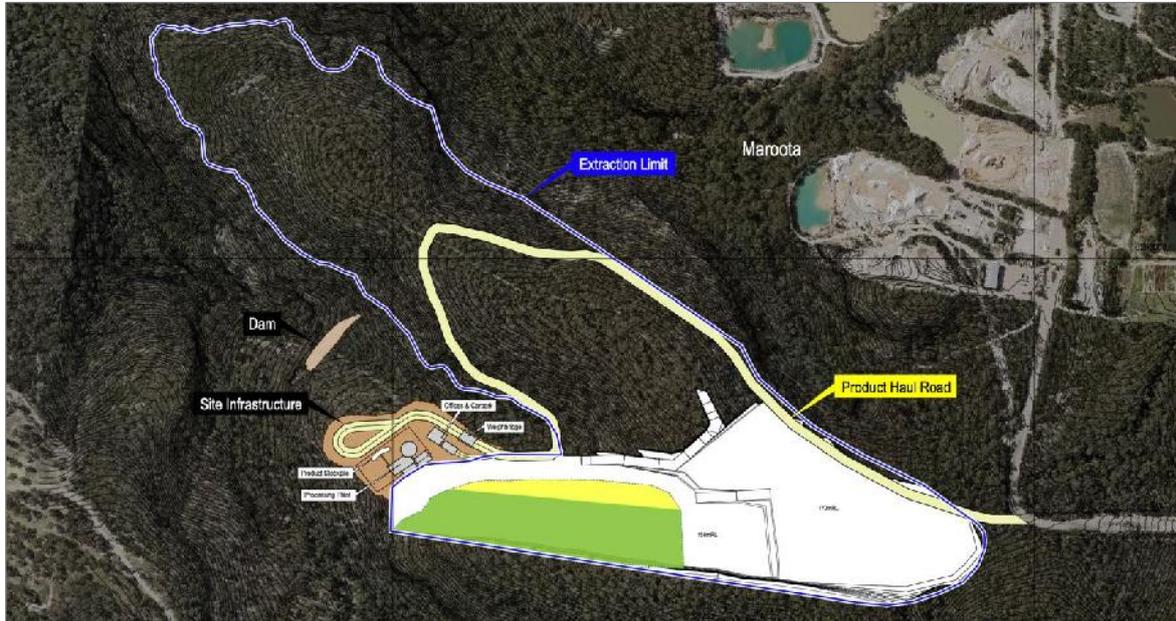


Figure 24: Extraction Sequence Plan Stage 2 (Source: RPM Global, 2021)

Years 11-15

The extraction pit will expand to the north–west along the central ridgeline. At year 15, the southern highwall will be fully exposed for the creation of rehabilitated landforms. An opportunity exists to relocate the processing plant after year 10 to the south–eastern side of the quarry to reduce product and tailings haul distances. The potential location for site infrastructure after year 10 is shown in Figure 25 below.

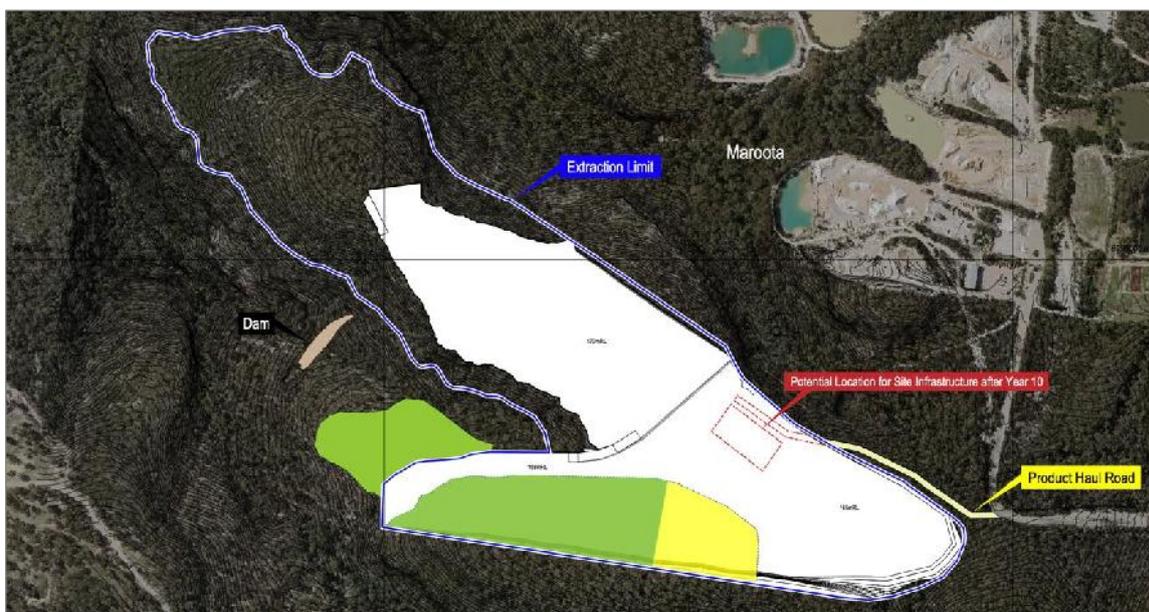


Figure 25: Extraction Sequence Plan Stage 3 (Source: RPM Global, 2021)

3. Project Description

Initial Cut

The initial cut will be located immediately to the east of the site infrastructure area. Raw material stockpiles can be created by dozer push due to the close proximity of the initial cut to the infrastructure area site. This phase will generate 13,000m³ of excess overburden that will be temporarily stored before being rehandled in year 2 to create landforms.

Years 1-5

Years 16-20

The quarry will continue to expand to the north-west. The last bench of stage 4 will be mined at the end of this period.

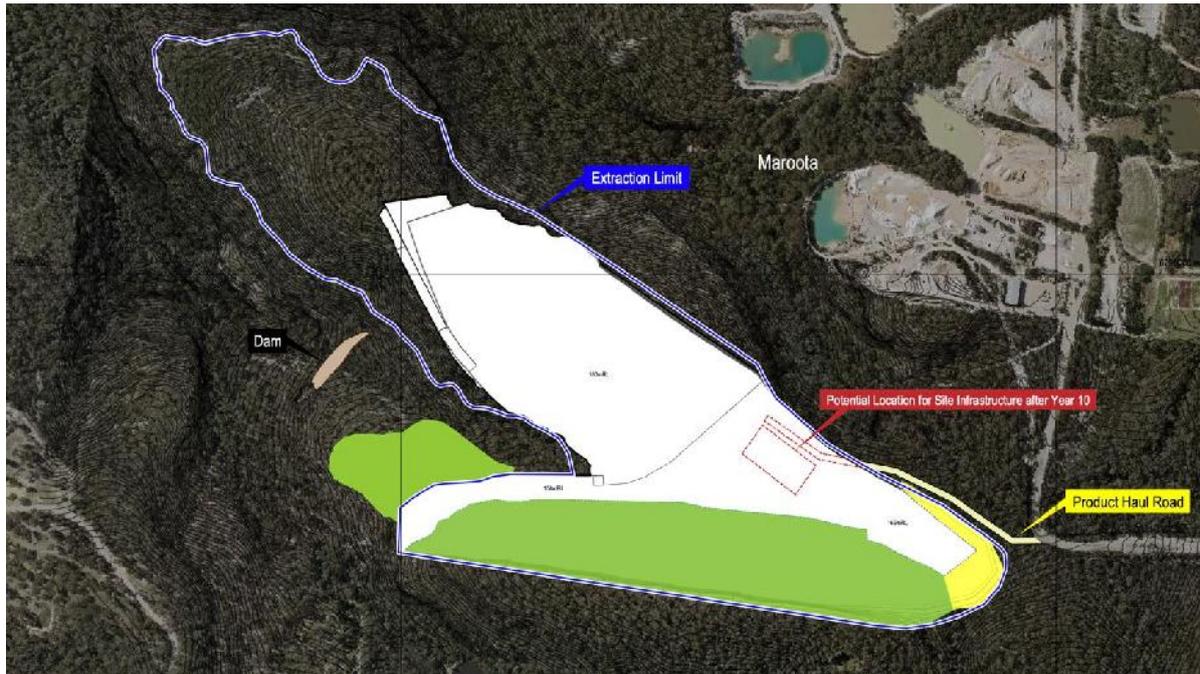


Figure 26: Extraction Sequence Plan Stage 4 (Source: RPM Global, 2021)

Years 21-28

The north-west extremities of the extraction pit will be mined between years 21 and 28. Figure 27 provides the final landform design for the Project following the end of its quarry life in year 28.

3. Project Description

Initial Cut

The initial cut will be located immediately to the east of the site infrastructure area. Raw material stockpiles can be created by dozer push due to the close proximity of the initial cut to the infrastructure area site. This phase will generate 13,000m³ of excess overburden that will be temporarily stored before being rehandled in year 2 to create landforms.

Years 1-5

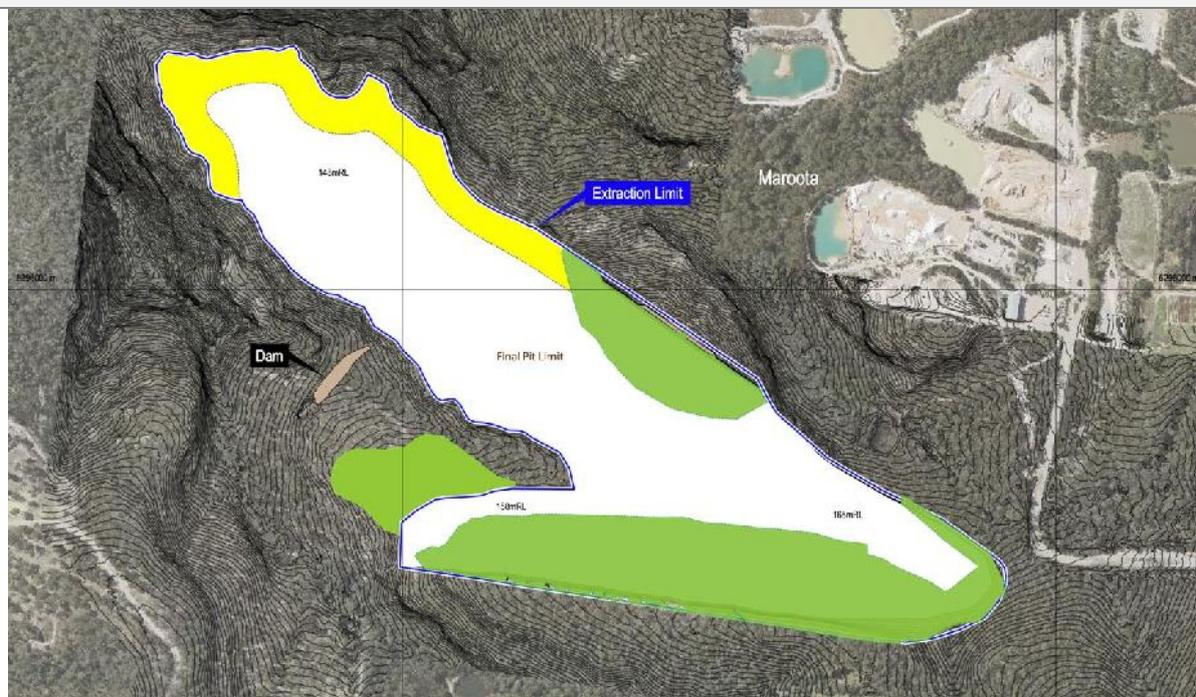


Figure 27: Extraction Sequence Plan Stage 5 (Source: RPM Global, 2021)

3.2.4.4 Quantities of Extracted Material

The volume of material extracted during each stage of the Project is presented below. In total, 15,200 million tonnes of sandstone will be extracted, and once processed, 13,680 million tonnes of saleable product will be produced across the life of the Project.

Table 5 – Extraction Stages					
Stage	Years	Sandstone	Shale	Overburden	Saleable Product
1	1	333,000t	0t	24,000t	300,000t
	2	555,000t	1,000t	25,000t	500,000t
	3	557,000t	66,000t	15,000t	500,000t
	4	555,000t	90,000t	6,000t	500,000t
	5	555,000t	3,000t	27,000t	500,000t
2	6–10	2,777,000t	0t	37,000t	2,499,000t
3	11–15	2,778,000t	0t	103,000t	2,500,000t
4	16–20	2,777,000t	0t	19,000t	2,499,000t

3. Project Description

Table 5 – Extraction Stages					
Stage	Years	Sandstone	Shale	Overburden	Saleable Product
5	21–28	4,313,000t	0t	115,000t	3,881,000t
Total	-	15,200,000t	160,000t	374,000t	13,680,000t

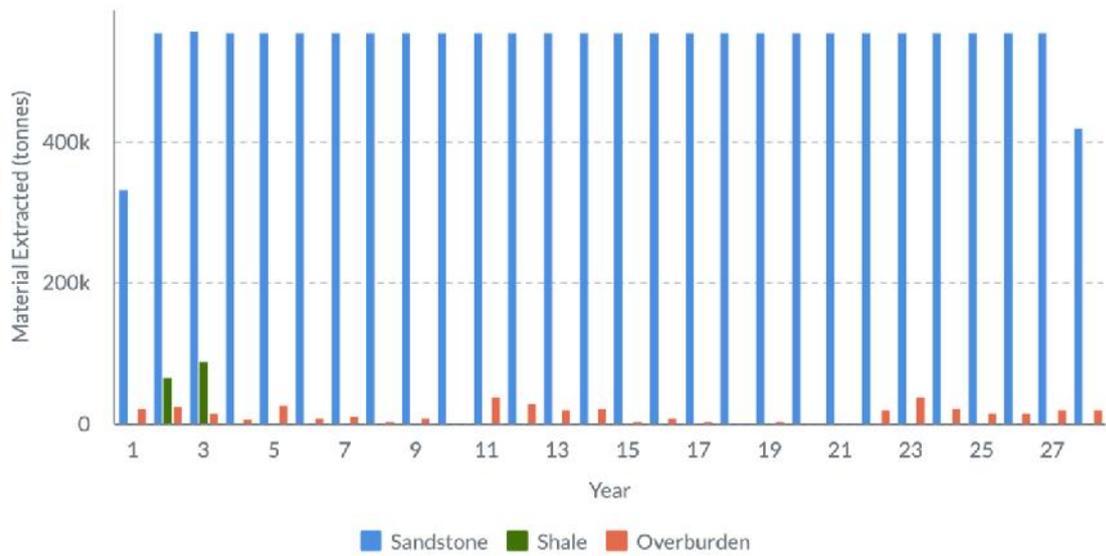


Figure 28: Annual Extraction Figures (Data Source: RPM Global, 2020)

3.2.5 Processing

The sand operation will produce washed sands of various dimensions for use in concrete and road base and crushed and fine aggregates as by-products.

3.2.5.1 Sand Processing Plant

The selected sand processing plant will be located within the site infrastructure area and is reconfigurable. Thus, the layout can be changed as necessary. **Figure 14** shows the location of the sand plant. **Figure 29** below displays the Sand Plant's components.

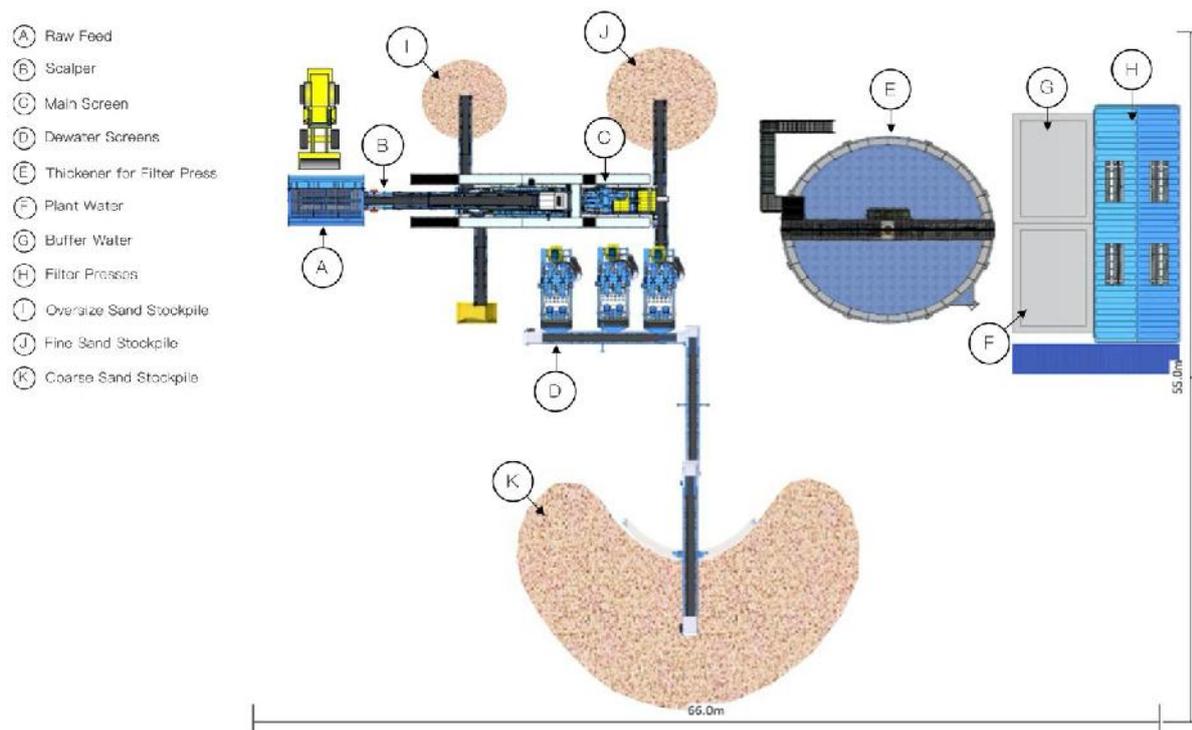


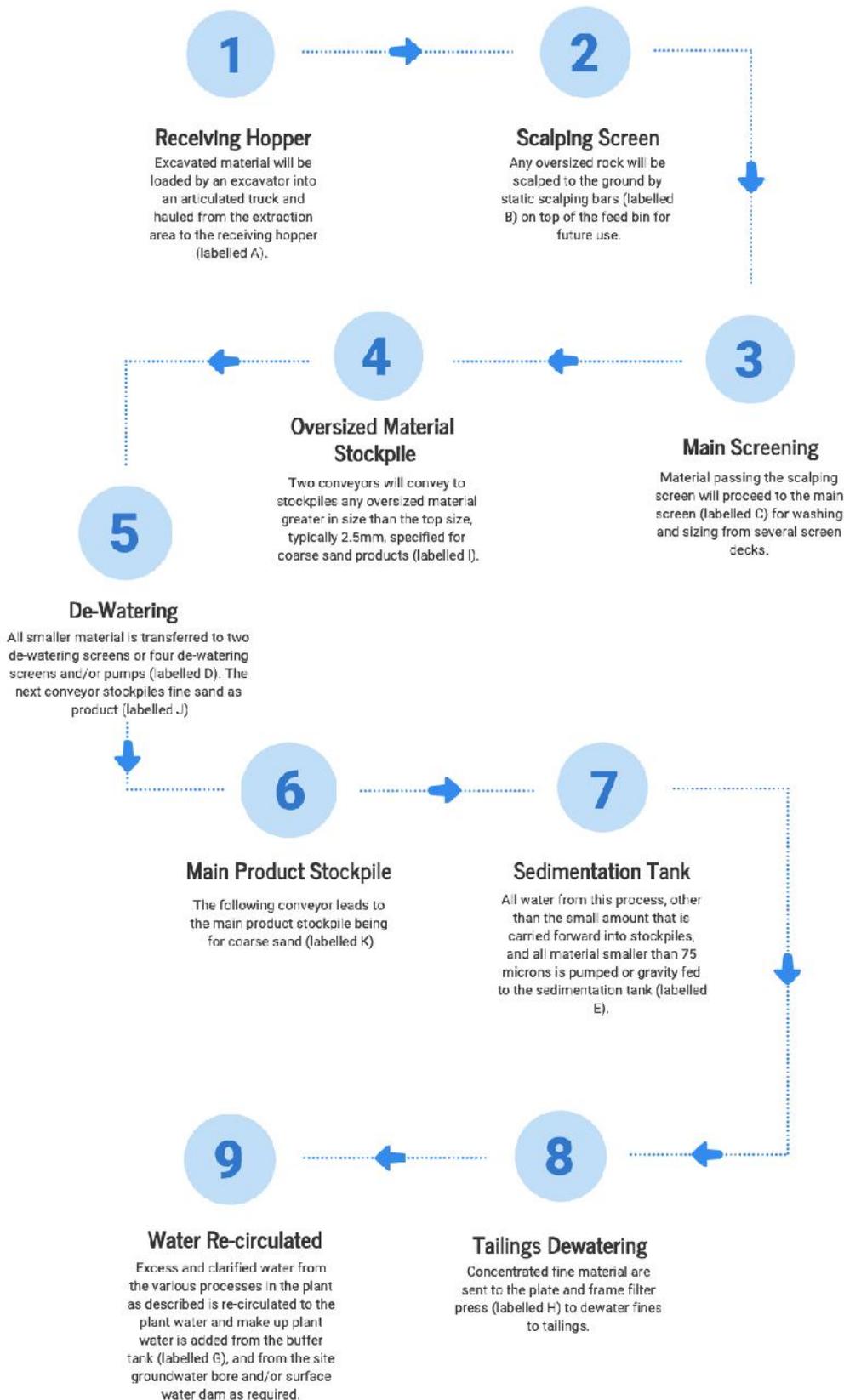
Figure 29: Sand Plant Layout

The main components of the proposed sand plant include:

- Raw feed hopper.
- Main Sand Screen and associated stockpile conveyors.
- Secondary sizing and dewatering screen and associated stockpile conveyors.
- Sedimentation/concentrator tank for preparation of fines for Filter Press.
- Concrete Filter Press Structure and associated Concrete Plant and Buffer Water Tanks supplied by recirculated plant water or 'makeup' water from site bore or water dam.

3.2.5.2 Sand Production Process

The production process is described below, with reference made to the various components of the sand plant shown in Figure 29.



3. Project Description

Tailings will be progressively stockpiled ready for combination with overburden and other waste rock into site rehabilitation material.

3.2.6 Water Supply

Section 5 of the Water Assessment by EMM Consulting provides a detailed overview of the site water balance and water management strategy for the Project (**Annexure 10**). The following section provides a summary of this information.

3.2.6.1 Site Water Balance

Water will be required for the processing plant, dust suppression, rehabilitation, human consumption and amenities. Anticipated water requirements and losses are shown in the table below.

Table 6 – Summary of Average Annual Water Balance Results			
	Year 1 (ML/year)	Year 10 (ML/year)	Year 28 (ML/year)
Inputs			
Rainfall and runoff	39.4	48.9	79.9
Groundwater bore supply	10.1	20.2	14.7
Total inputs	49.5	69.1	94.6
Outputs			
Evaporation	2.3	2.2	2.2
Moisture of products and tailings	22.5	37.5	37.5
Dust suppression	9.7	9.7	9.7
Water management dam seepage	1.8	1.8	1.8
System overflows	13.2	17.9	43.4
Total outputs	49.5	69.1	94.6
Balance			

The compression of tailings using the plate and frame filter press negates the need for tailings dams. This reduces the Project's overall annual water requirements by approximately 40ML pa. The Project's water requirements will primarily be supplied by rainfall and runoff captured and stored in a surface water dam and supplemented by groundwater.

Groundwater Supply

The groundwater bore will target the deep Hawkesbury Sandstone aquifer. Proposed drilling depths are between a minimum of 120m and a maximum of 200m. Based on historical drilling, it is assumed that production pump yields of 1–1.5L/s are achievable. Groundwater will provide between 31% to 43% of the Project's annual water requirements.

Several areas in the Project Site have been identified as suitable for groundwater supply. These areas are shown in **Figure 30** below and have been selected with consideration to the rules of the Sydney Basin Central Groundwater Source in the *Greater Metropolitan Region Groundwater Sources 2011 WSP*. The preference is to locate the groundwater bore within area 1.



Figure 30: Identified Areas for Groundwater Supply (Source: EMM, 2021; BOM, 2020; DFSI, 2017)

Section 5.4 of the Project’s Water Assessment (**Annexure 10**) provides drilling and design guidelines for the proposed groundwater bore.

Surface Water Supply

The surface water dam will be constructed downstream of the processing plant. The dam will have a total surface area of approximately 12,000m², and its embankment will be approximately 10m high. These measurements allow the dam to store approximately 11.6ML of water. The water management dam will provide between 57% and 69% of the Project annual water requirements.

Detailed engineering drawings of the surface water dam will be prepared prior to the issuing of a construction certificate. The water management dam will be designed and constructed in accordance with the methods in *Managing Urban Stormwater: Volume 1* (Landcom 2004) and *Volume 2E* (DECC 2008).

3.2.7 Tailings Management

The sand plant incorporates a thickener and plate & frame press to generate a tailings cake that can be handled with a front loader. The tailings will be collected and directed to fill areas for blending with the overburden. Therefore, no slurry/tailings dams are required, reducing the Project’s water consumption and disturbance area.

3.2.8 Sales and Truck Movements

Stockpiles of saleable product will be created by the radial arms and conveyor stackers of the sand plant. Sales road trucks entering the site will be weighed and then loop to stockpile loading points. These trucks will be loaded by a front-end loader and leave the site via the weighbridge to record the volume sold. Trucks will leave the site via Wisemans Ferry Road and proceed down that road or proceed south down Old Northern Road.

The following breakdown of truck movements is anticipated.

Table 7 – Sales Truck Movements		
Time	Monday to Friday	Saturday
6am – 8am	20	20
8am – 10am	25	15
10am – 12pm	25	15
12pm– 2pm	20	10
2pm – 4pm	16	–
4pm – 6pm	14	–
Total per day	120	60

3.2.9 Hours of Operation

The following sales and quarry operational hours are proposed:

- Sales – 6am to 6pm, Monday to Saturday.
- Quarry operations – 7am to 6pm, Monday to Saturday. The filter press will operate overnight to de-water tailings but will not be audible beyond the plant area boundaries.

No operation, other than the filter press, will be undertaken on Sundays or public holidays. Some servicing of equipment may be required outside these hours.

3.2.10 Services & Utilities

Sewerage

An enviro-cycle sewerage system will be installed to recycle sewerage. This system diverts and treats wastewater in an underground unit before dispersing water to a prescribed vegetated area. The Application proposes that the designated irrigation area be the area inside the haul road turning circle (shown in **Figure 14**).

Power

A powerline will be constructed along the proposed sales haul road to connect the processing plant, groundwater bore and administration building to mains power via the existing 33kV powerline located along Patricia Fay Drive.

Potable Water

The site is currently not serviced by potable water supply. The Project's potable water requirements for drinking and amenities will be purchased offsite and trucked to the site or sourced via rainwater tanks.

Communication

The Administration office, if available, will be serviced by a fixed line data connection; otherwise, it will be serviced by a fixed wireless connection. Two-way radios and mobile phones will be used for onsite communication.

Fuel

Two 20,000 Litre fuel diesel storage tank will be installed per Australian Standard 1940–2017 in the site infrastructure area. Vehicles will be refuelled within a designated area in the extraction pit.

3.2.11 Administration, Management & Employment

As shown in **Figure 14**, an administration area consisting of a small administration building and a car park is proposed to be constructed near the weighbridge and sand plant. The administration building will be of a prefabricated design and will include offices and staff and visitors' amenities. The building will be connected to mains power, potable water supply and the telecommunications network.

The administration area will serve as the entry point for visitors, and only authorised vehicles will be permitted beyond this area.

Construction Employment

It is estimated that 15 full-time positions jobs will be created during the site establishment and construction phase of the Project.

Operational Employment

Staff members required to run the operation comprise:

- 1 full-time quarry manager
- 1 full-time and 1 part-time weighbridge & sales
- 1 full-time and 1 part-time excavator operator
- 2 full-time articulated truck drivers
- 2 full-time sales loaders
- 1 part-time water cart driver
- 1 full-time and 1 part-time sand plant operator

In total, it is anticipated that the Applicant will employ eight full-time and four part-time staff to manage the operations of the Project. In addition, between 15 and 20 full-time privately contracted truck drivers will be required to deliver product from the site to the customer.

3.2.12 Waste

The Project will produce the following sources of waste.

- Tailings
- Overburden from site preparation and quarrying;
- Oils and greases;
- Sewage; and
- General domestic waste from the administration office.

Other than overburden and tailings, which will be stored and used for rehabilitation fill, the Project's waste will be segregated into the following categories and disposed of by licensed contractors.

- Domestic waste;
- Paper, cardboard and glass; and
- Metals.

A licensed contractor will collect these segregated waste streams as necessary. Waste oils will be stored in a self-bunded tank and removed as necessary by a licensed contractor. As noted above, sewerage will be treated using an enviro-cycle system.

3.3 Rehabilitation

The Project SEARs require the EIS to include a proposed rehabilitation strategy for the site having regard to the key principles in the *Strategic Framework for Mine Closure*, including:

- *rehabilitation objectives, methodology, monitoring programs, performance standards and proposed completion criteria;*
- *nominated final land use, having regard to any relevant strategic land use planning or resource management plans or policies; and*
- *the potential for integrating this strategy with any other rehabilitation and/or offset strategies in the region.*

Annexure 18 contains the Project's rehabilitation plans, and **Annexure 17** contains the Project's Rehabilitation Strategy prepared by SLR Consulting. The Rehabilitation Strategy has been prepared in accordance with the SEARs and Chapter 10 (Part B Section 1 – Rural, Part 2: Extractive Industries) of the Hills Development Control Plan. This section provides a summary of the proposed rehabilitation approach for the Project.

3.3.1 Rehabilitation Objectives & Nominated Final Land Use

The proposed final land use will be a combination of native bushland and improved pasture for a post-mining grazing enterprise. A native bushland corridor, approximately 50m wide, will be incorporated around the reshaped landform's perimeter to assist in the integration of the impacts of the tree removal from the Project's viewpoints and from the west. The below figure provides the proposed final landform for the Project.

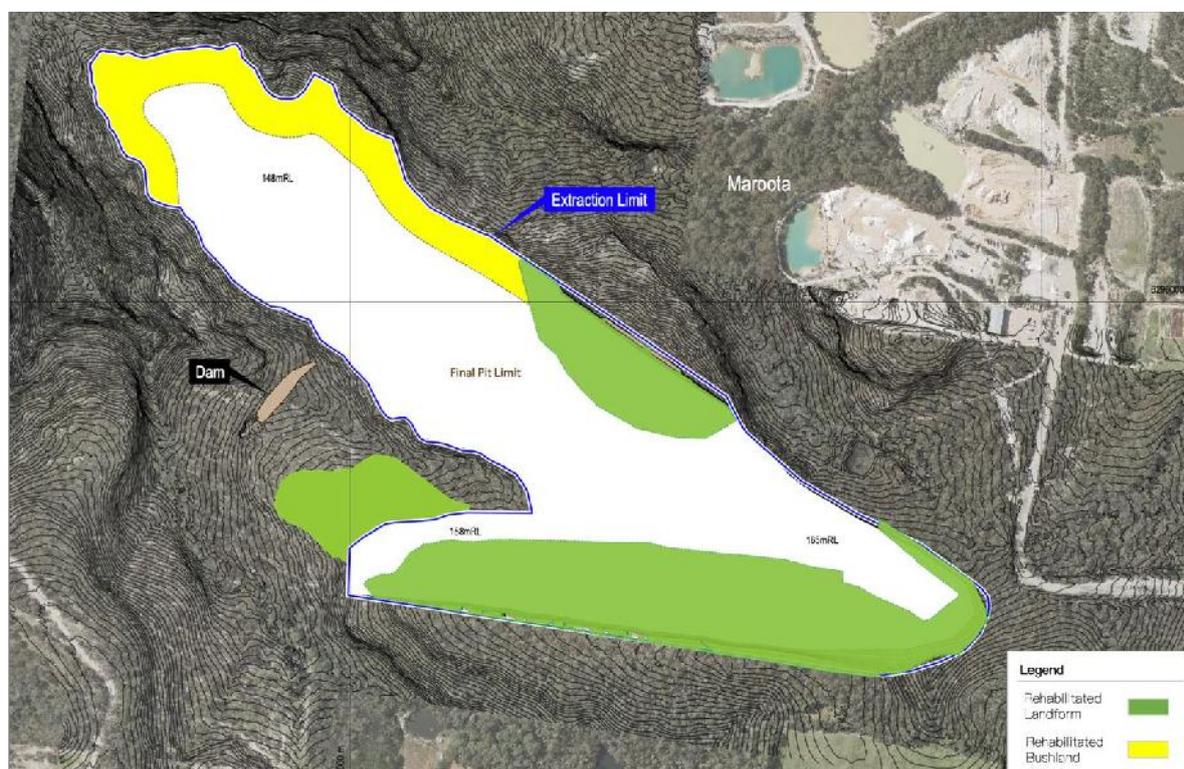


Figure 31: Proposed Final Rehabilitated Landform (RPM, 2021)

3. Project Description

The ultimate rehabilitation objective for the Project is to create a safe, stable, and sustainable landform that allows the operation of the agreed final land use. The rehabilitation objectives for the Project are displayed in the table below.

Table 8 – Rehabilitation Objectives	
Feature	Objective
All Areas affected by the landfill	<ul style="list-style-type: none">• Safe• Hydraulically and geotechnically stable• Non-polluting• Fit for the intended post-construction land use(s)
Areas proposed for native ecosystem re-establishment	Establish self-sustaining ecosystems comprising flora species selected to re-establish and complement local and regional biodiversity.
Other areas affected by the Landfill	Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of local native plant species for the intended post rehabilitation land use(s).
Surface infrastructure	Decommissioned and removed unless further approval is obtained for their retention and post-Landfill use.
Final landform	<ul style="list-style-type: none">• Consistent with surrounding topography to minimise visual impacts.• Incorporate relief patterns and design principles consistent with natural drainage.
Rehabilitation materials	Soil and vegetable materials from areas disturbed (including topsoils, substrates, and seeds) are recovered, managed and used as rehabilitation resources.
Water quality	<ul style="list-style-type: none">• Water retained on site is fit for the intended post-quarry use.• Water management is consistent with regional catchment management. strategy and the site-specific in-stream water quality objectives.
Community	<ul style="list-style-type: none">• No additional risk to public safety than prior to grant of the consent.• Minimise adverse socio-economic effects associated with completion of works.

3.3.2 Rehabilitation Schedule

Rehabilitated landforms will be constructed progressively using a combination of overburden, shale, pressed tailings and mulched vegetation. RPM Global have estimated that the volume of excavated overburden and pressed tailings approximately balances the quantity of material required to construct rehabilitated landforms throughout the life of the sand operation.

The Rehabilitation Strategy comprises seven key phases. These are described below.



Phase 1: Active

Activities are undertaken before and during construction to enhance rehabilitation. These activities include eliminating access to and disturbance of watercourses, installing sediment and erosion controls before any surface disturbance, stripping and stockpiling topsoil and mulching vegetation for later use reconstructing landforms according to the existing soil profile.



Phase 2: Decommissioning

Following construction, all non-permanent infrastructure and associated facilities will be decommissioned and removed appropriately. This includes decommissioning construction infrastructure and fencing, hazardous and contaminated materials, mobile equipment and concrete footing, pads and pavements.



Phase 3: Landform Establishment

Safe, stable and non-polluting landforms will be progressively formed as the extraction pit is excavated. The rehabilitation plans contained in Annexure 16 show the development stages of final landforms over the quarry life. Slope stabilisation, water management and erosion and sediment control activities will be undertaken during landform establishment.



Phase 4: Growth Medium Development

Processes will be implemented to ensure that rehabilitated landforms will be capable of supporting sustainable vegetation communities. This includes measuring the quality of topsoil and applying fertiliser, ameliorants and lime as required to support the final land-use objective. Topsoil will be seeded to stabilise slopes and mitigate wind and water erosion.



Phase 5: Land Use Establishment

The land use establishment phase constitutes the activities required to establish rehabilitated vegetation. This includes vegetation plantings in the correct season to optimise plant growth. As noted, in Section 3.4.1, a 50m perimeter area of native bushland will be established along the north-west boundary of the extraction pit. A program to manage weeds and feral animals will also be developed and implemented.



Phase 6: Land Use Development

Management techniques to manage and develop final landforms towards the desired land-use objective will be implemented. Maintenance will be ongoing and include weed and pest control, managing bushfire risks, minor earthworks to remediate erosion features, additional seeding and maintaining erosion and sediment controls. A Rehabilitation Trigger Action Response Plan will be developed to assist with rehabilitation monitoring.



Phase 7: Rehabilitation Completion

The Rehabilitation Strategy includes a completion criteria that comprises a variety of indicators that can be measured against to demonstrate progress and ultimate success of rehabilitation. The criteria is also described in Section 3.4.3. Once sand operations cease, and the completion criterion is met, the land will be determined suitable for a post-mining grazing enterprise.

3.3.3 Rehabilitation Monitoring Process

A dedicated monitoring system is critical for assessing the Rehabilitation Strategy's effectiveness and identifying the need for corrective action as soon as required. A rehabilitation monitoring program will be prepared to track the progress of rehabilitated areas towards completion. The program will incorporate the appropriate indicators and methods that:

- Provide a measure of completion criteria to be assessed per the defined rehabilitation objectives;
- Are reproducible;
- Utilise scientific recognised techniques; and
- Are cost-effective.

Monitoring will be conducted by independent, suitably skilled and qualified persons. Monitoring results, any required maintenance activities and any refinements of rehabilitation techniques will be reported as required by approval conditions.

The monitoring program will be continued until it can be demonstrated that rehabilitation has satisfied the closure criteria. Information from this monitoring program will also be used to refine the closure criteria as required.

The Rehabilitation Strategy contains a conceptual Trigger Action Response Plan that identifies required management actions if rehabilitation outcomes are not achieved in an acceptable timeframe. The Trigger Action Response Plan will be further developed, reviewed and revised throughout the Project life as site-specific threats to rehabilitation are identified.

3.3.4 Rehabilitation Completion Criteria

The Rehabilitation Strategy includes an indicative completion criteria that comprises objective target levels or values assigned to a variety of indicators. These indicators will demonstrate the progress and the ultimate success of rehabilitation. As such, they provide a defined endpoint at which time rehabilitation can be deemed successful. Objectives and performance indicators are provided for each of the seven rehabilitation phases. The indicative completion criteria will be further developed per the relevant project approvals.

3.4 Biodiversity Offsets

To fulfil their biodiversity offset requirements (described in Section 7.1.4.4 of the EIS), the Proponent intends to deliver a viable and ecological function offset by establishing a Biodiversity Stewardship Site on land that they currently hold. The Biodiversity Development Assessment Report prepared by Eco Logical Australia estimates that 306ha of land is required to generate the credits needed to fulfil the Project's offset requirements. The purchase cost of the credits would be over \$11m without access to these lands.

Figure 32 below shows the location of the land on which the Applicant intends to establish the Biodiversity Stewardship Site. Ecological surveys will be undertaken on these landholdings before establishing the Stewardship Site to determine 'like for like' credit numbers. Desktop investigations suggest that the required type of credits are available. The offset scheme costs are anticipated to be less than \$500,000 to set up.

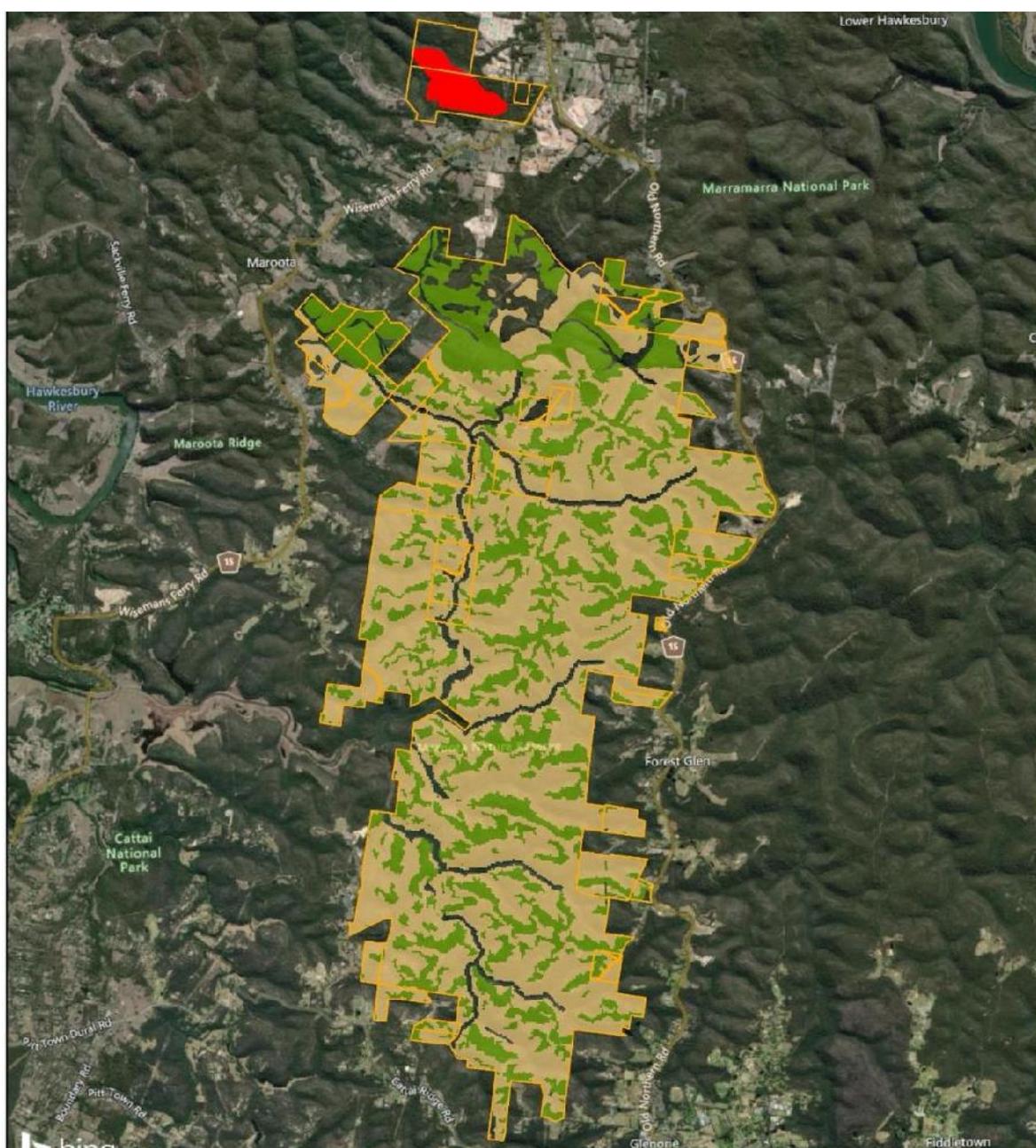


Figure 32: DLALC Owned Potential Biodiversity Offset Lands (Source: Eco Logical, 2020)

3.5 Scope for Future Applications

3.5.1 Glass Sand

Glass can be recycled and processed to produce a sand-like product that can be used in concrete and road materials. The ACT Government recently approved the use of 'glass sand' for local infrastructure projects.¹⁰ The use of glass sand is environmentally beneficial and can reduce infrastructure costs. If its use becomes standardised in NSW, the Proponent may consider lodging a future application to recycle glass at the Project site.

¹⁰ Meddemem, Danielle (2020), *'ACT paving the way' with recycled glass sand*, Canberra Weekly

3.6 Project Design Development – Impact Avoidance & Mitigation

An ‘avoid, mitigate and compensate’ strategy was adopted throughout the Environmental Impact Assessment process to address the Project’s potential environmental impacts. Where achievable, design amendments informed by community consultation and technical expertise were implemented to avoid impact. The following section chronicles the Project’s design revisions intended to avoid and mitigate adverse impacts.

3.6.1 Initial Design

Objective: Identify a commercially viable extraction area and avoid impacts to the *Maroota Sand Swamp Forest*.

Following the two initial reviews by Graham Lee of potential sand and sandstone resources at the Project Site in 2008 and 2009, DLALC commissioned a feasibility study in 2011 to determine the commercial merits of constructing an extractive industry. Those investigations revealed Hawkesbury Sandstone in quantities sufficient to develop a viable sandstone extraction industry (see the green outline in **Figure 33** below).

Graham Lee’s further detailed review of sand & sandstone resources at the site in 2017 revealed a suitable extraction area to exploit the sizeable Hawkesbury Sandstone resource (see the orange outline in **Figure 33** below).

Using this extraction area and based on a preliminary understanding of the Project Site’s environmental constraints, a preliminary site design was included in the Scoping Report that accompanied the proponent’s SEARs request (**Figure 33**). The preliminary design provided a buffer to the endangered *Maroota Sands Swamp Forest* located to the north of the extraction area.

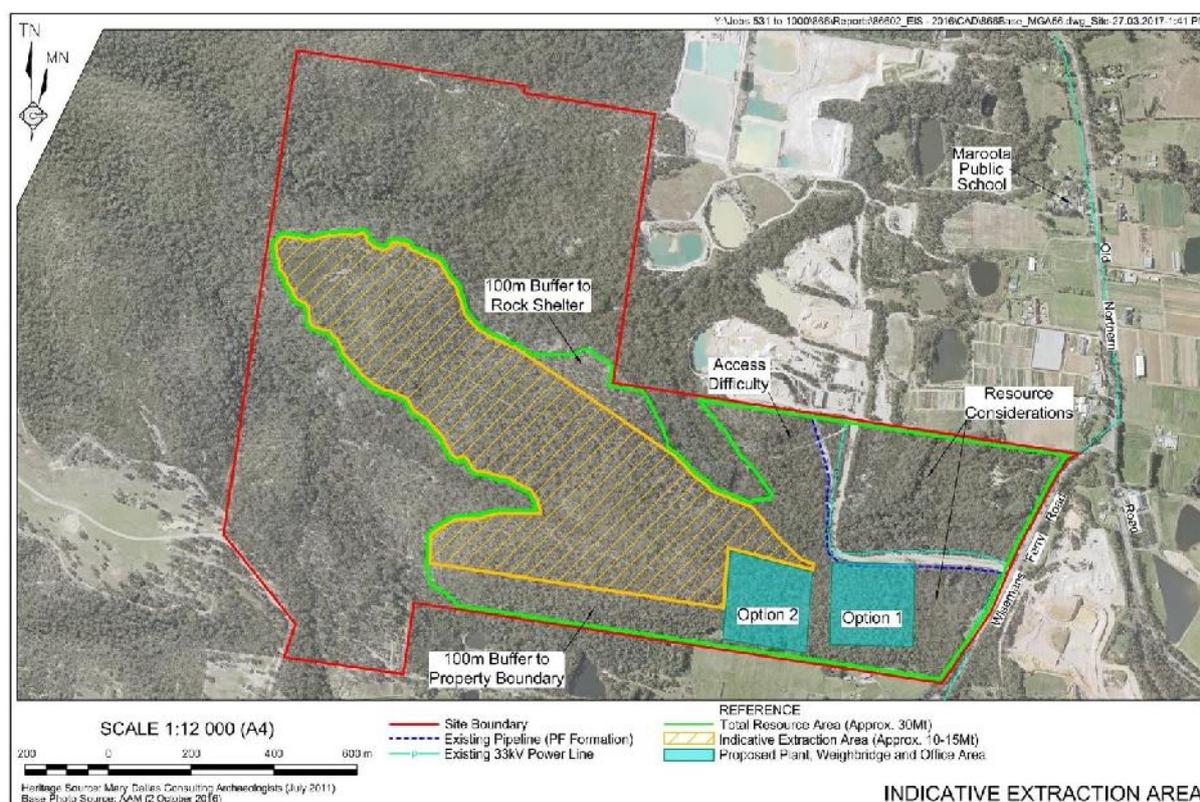


Figure 33: Preliminary Project Design (Source: RW Corkery, 2017)

3.6.2 Revision A – Relocation of Plant Equipment

Objective: Relocate the Project's plant equipment to remove it from neighbours to the south of the Project Site.

During the Scoping Report consultation phase, neighbours to the south of the Project Site raised concerns due to the Project's infrastructure area's close proximity. Therefore, the first design revision following the issuing of SEARs was to relocate the proposed plant, weighbridge and office area to the rear of the site to mitigate noise, dust and visual impacts for those neighbours. The Project's ecologist also confirmed that this relocation would reduce the Project's impact on the threatened *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* (PCT 1081). The relocation also avoided impacts to a first order creek line that flows to the creek line feeding the endangered *Maroota Sands Swamp Forest*.

Figure 34 provides a design sketch that illustrates this redesign. Tailings and overburden storage, and a surface water dam were to be located at the southwest corner of the project site. A site access road was also intended to run along the southern boundary of the extraction area from Wiseman's Ferry Site to the plant, weighbridge and administration area.

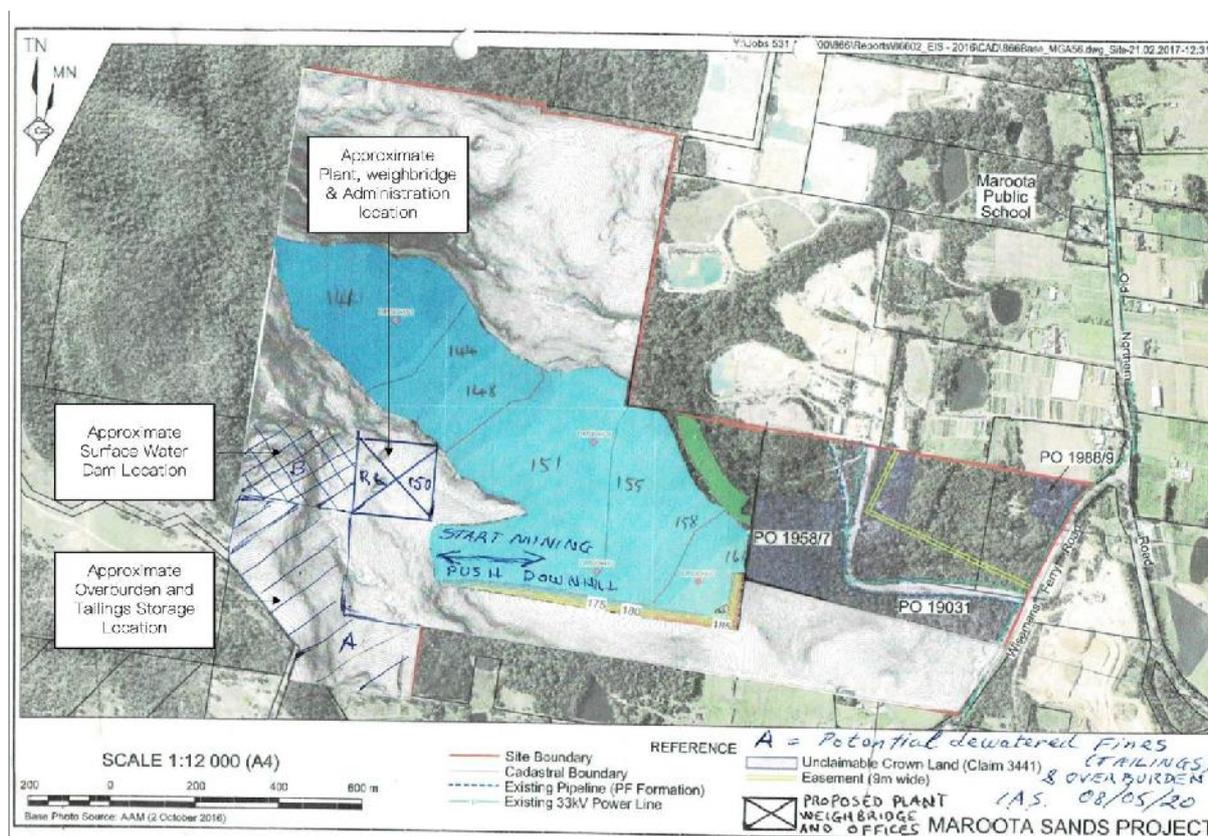


Figure 34: Project Design Revision A (Source: McGhee Development Solutions, 2020)

3.6.3 Revision B – Relocation of Overburden Storage and Removal of Tailings Dams

Objective: Minimise the Project's disturbance area

The Project design team sought opportunities to minimise the Project's disturbance area and resulting environmental impact throughout the Environmental Impact Assessment process. One such opportunity was relocating the temporary storage area for overburden and tailings to sit within the proposed extraction pit. A

3. Project Description

sand processing plant was also selected that allows the generation of dry cake tailings. This equipment removed the need for large tailings ponds, which further reduced the area of disturbance and minimised impacts to the watercourses that flow through the south-west corner of the Project Site. This redesign is shown in Figure 35 below.

The Project's water storage dam was initially to be located at the intersection of a 3rd order watercourse. This location is shown in the below sketch.

The Project's disturbance area was ultimately reduced from 78ha to 50.95ha across the Project's design revisions. Figure 38 further below displays this reduction.

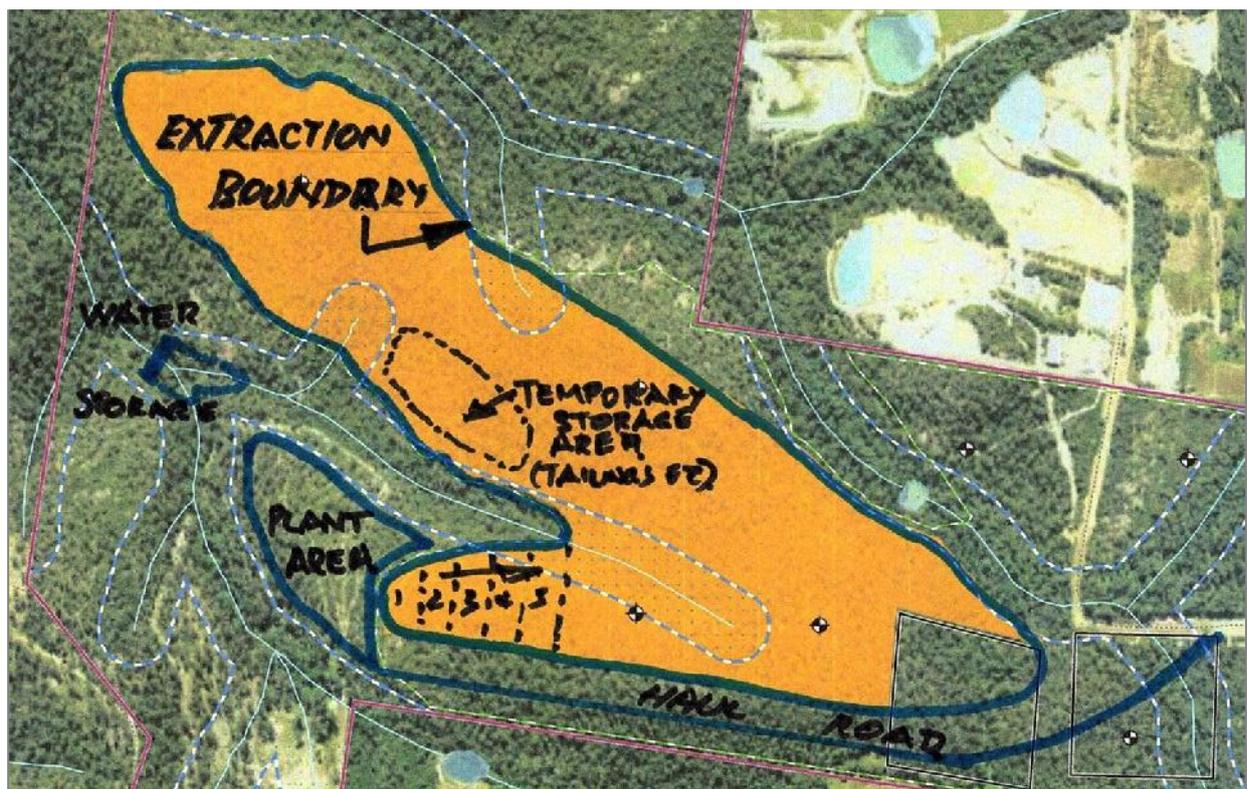


Figure 35: Project Design Revision C (Source: McGhee Development Solutions, 2020)

3.6.4 Revision C – Relocation of the Surface Water Dam

Objective: Avoid impacting a 3rd order watercourse

The surface water dam was relocated further east onto a 2nd order watercourse to avoid impacts to the 3rd order watercourse, thus reducing impacts to riparian corridors. A 3rd order watercourse is defined as a major stream under the *Water Management Act 2000*, and so a potentially inappropriate location.

3.6.5 Revision D – Relocation of Site Access Roads

Objective: Retain and protect a 100m vegetated buffer and biodiversity corridor along the Project Site's southern boundary

The Project's access road was intended to run along the Project Site's southern boundary per Revision A. However, the Project design team noted that this road would be near residents and inhibit the retention of a vegetated buffer and biodiversity corridor.

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Therefore, the design team amended the project design to incorporate a temporary access road that runs through the extraction area's centre. The access road was proposed for use until the southern section of the quarry was excavated. At this point, operators would have relocated the access road to run within the extraction area's southern boundary.

The redesign allowed the access road to sit within the extraction area, below the original landform, allowing both a visual and acoustic buffer to those neighbours located immediately south of the project site. Additionally, the redesign reduced the Project's disturbance area and increased the buffer between the access road and the neighbouring properties.

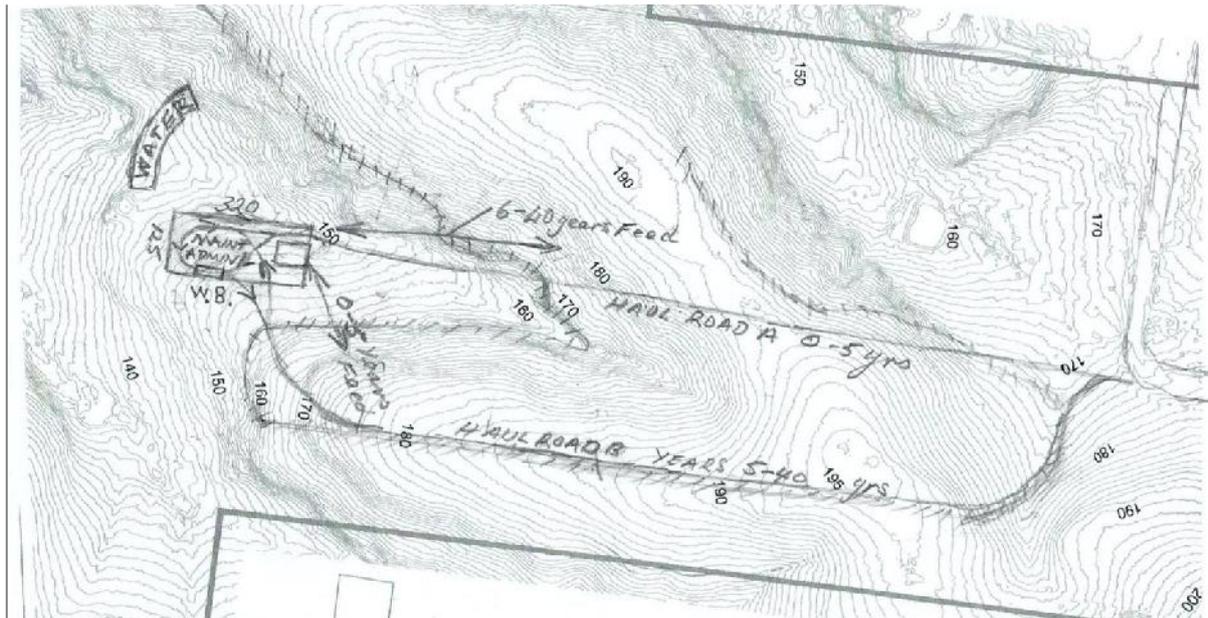


Figure 36: Project Design Revision D (Source: McGhee Development Solution, 2020)

3.6.6 Revision E – Final Design

Objective: Avoid impacts to Aboriginal Archaeological items

The finalised plan, shown in **Figure 37** below, replaced the proposed two haul roads with a single haul for the quarry's life. The haul road route was designed to complement the Project's existing topography, unlike those roads included in revision D. The road runs along the northern boundary of the extraction pit. This design provides a significant buffer between the road and neighbouring residences to the south of the Project.

The extraction pit was also amended to provide a 35m buffer to Aboriginal archaeological items identified during field surveys near the northern extraction boundary. The Project's archaeologist's recommendations informed the design of the buffers. This design amendment ensures that all identified Aboriginal archaeological sites within the Project Site will be avoided, representing a strong positive conservation outcome.

The finalised plan also consolidated and located the site infrastructure area in a suitable location based on the Project site's topography. The proposed surface water dam's location remains at the same location as that identified in Revision C.

3. Project Description

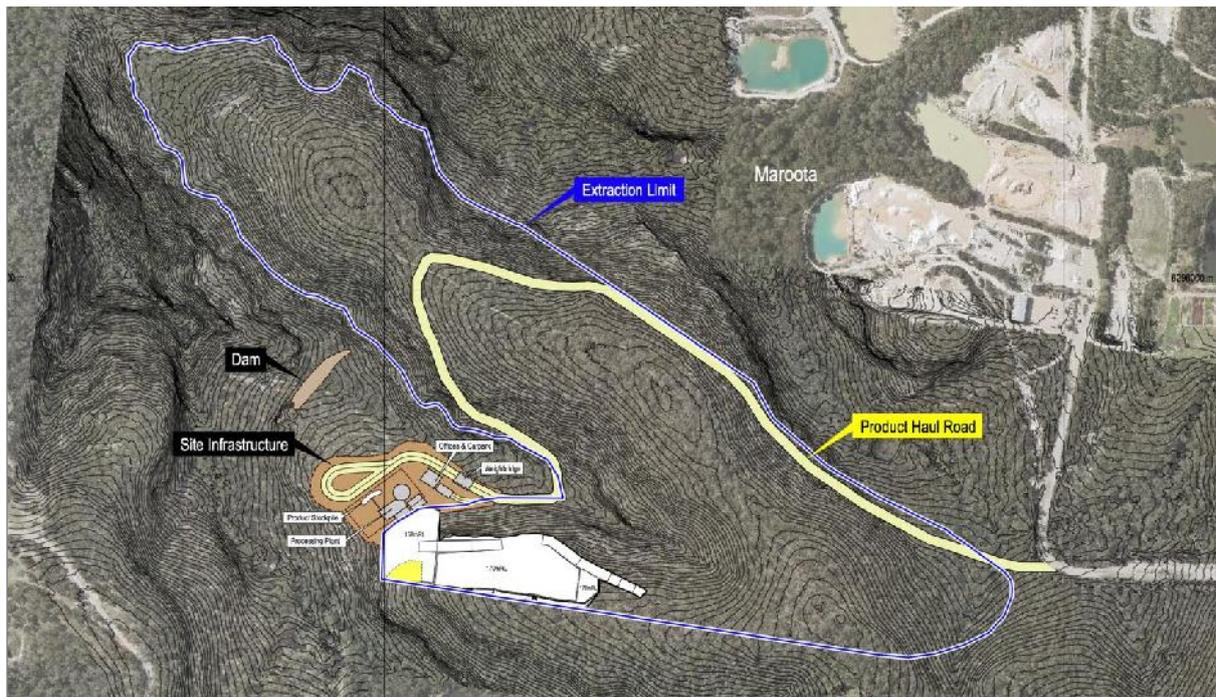


Figure 37: Finalised Site Layout (RPM Global, 2020)

Figure 38 below displays the reduction of the disturbance area across the project's design revisions.

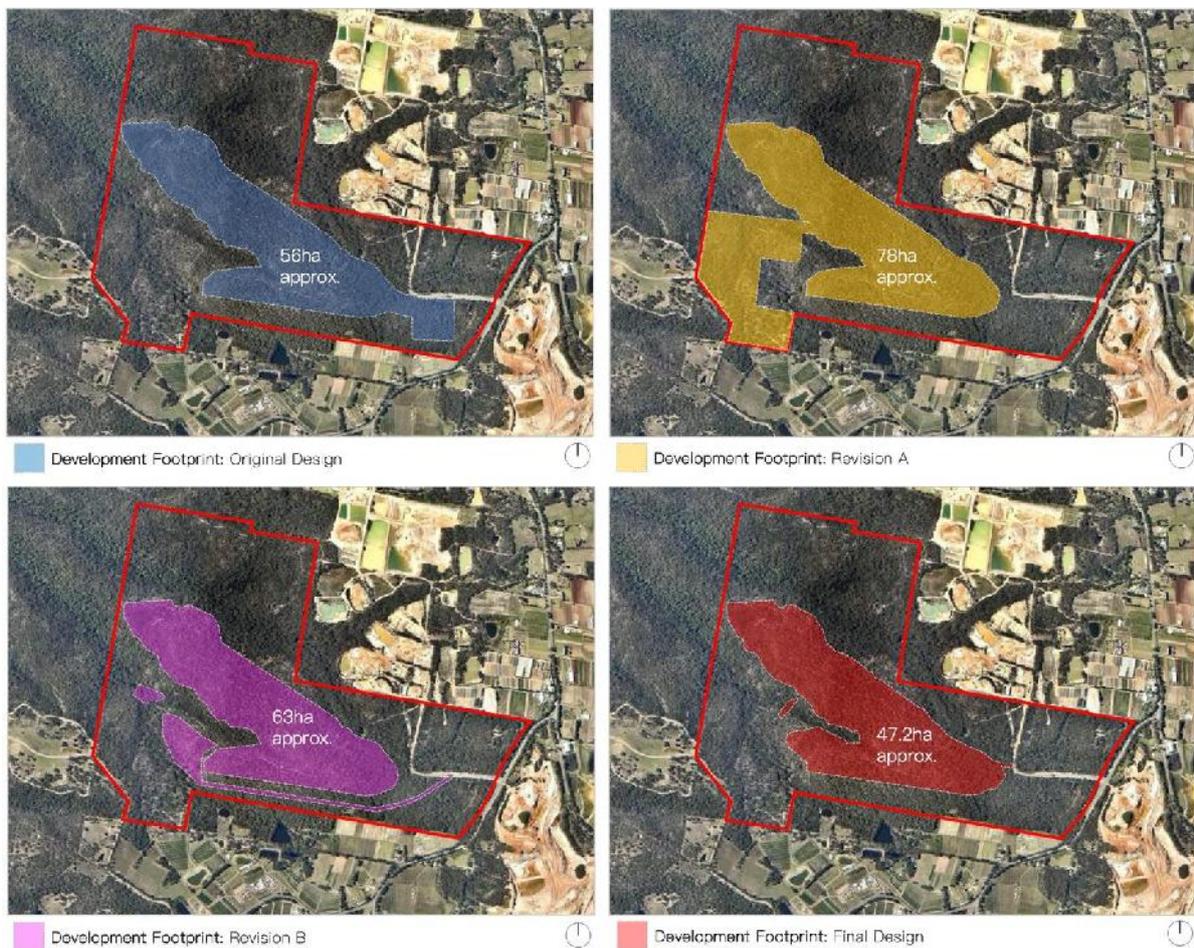
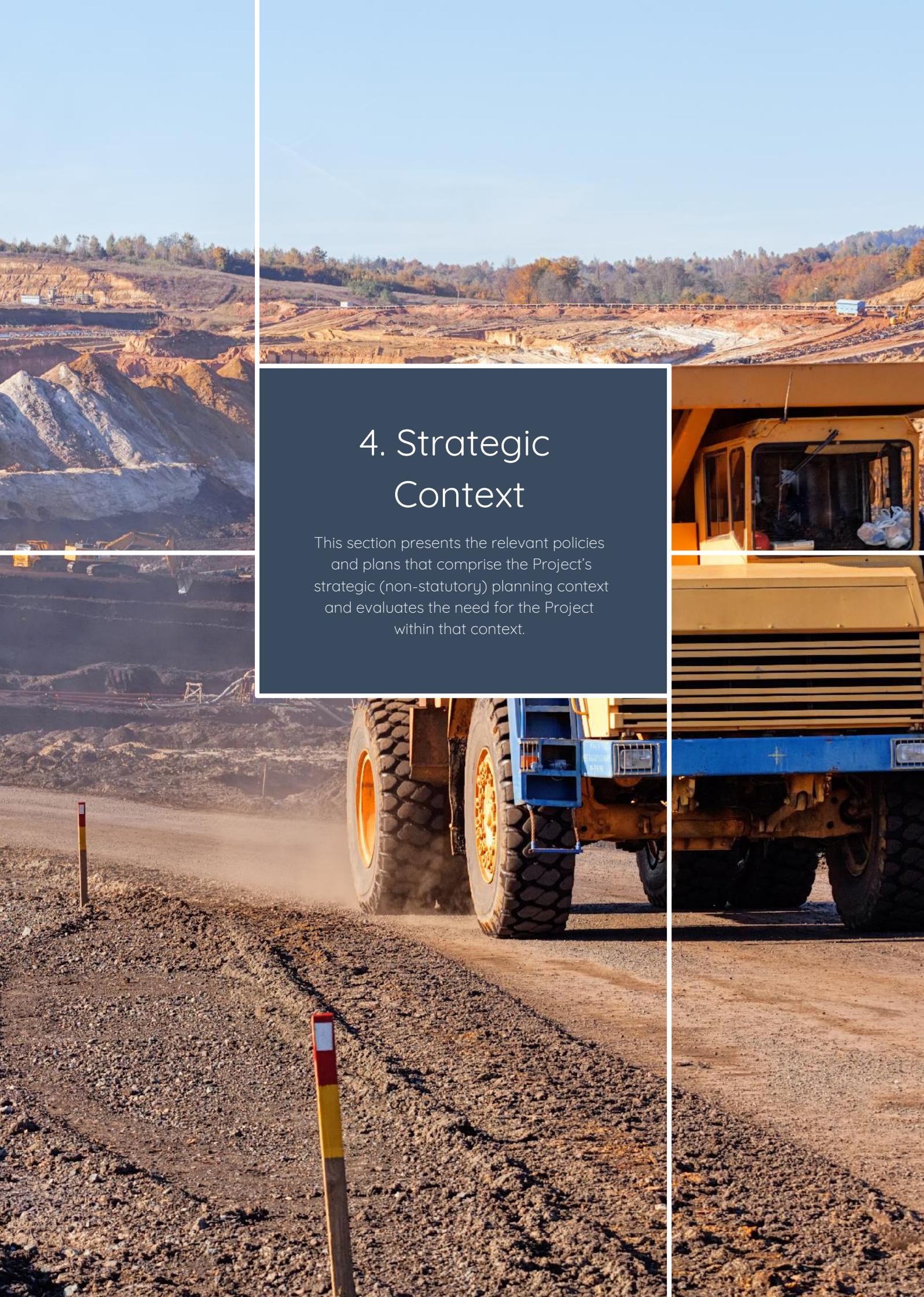


Figure 38: Project's Disturbance Area (Base Image Source: Nearmap, 2020)



4. Strategic Context

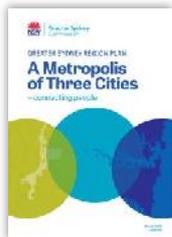
This section presents the relevant policies and plans that comprise the Project's strategic (non-statutory) planning context and evaluates the need for the Project within that context.

4. Strategic Context

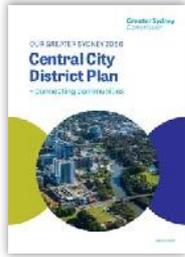
The following table outlines the Government plans, policies and guidelines relevant to the strategic context of the Project.

Table 9 – Government Strategic Plan, Policies and Guidelines Relevant to Strategic Context	
Document	Abbreviation
<i>NSW Premier Priorities</i>	
<i>Greater Sydney Region Plan – A Metropolis of Three Cities 2018</i>	<i>Regional Plan</i>
<i>Central City District Plan</i>	<i>District Plan</i>
<i>Hills Local Strategic Planning Statement – Hills Future 2036 supported by the Hills Rural Strategy</i>	<i>Hills LSPS</i>
<i>Future Transport Strategy 2056</i>	
<i>NSW Offshore Sand Review 2016</i>	
<i>NSW Aboriginal Procurement Policy</i>	

The following table summarises the Project’s compliance with the relevant sections of the abovementioned strategic documents. Additional detail regarding each strategic document and the Project’s compliance is provided in the subsequent headings.

Table 10 – Summary of the Project’s Strategic Compliance	
Document	Project’s Merit
<p>NSW Premier Priorities</p> 	<p>The Project meets the Premier’s policy objective and priority to provide a stronger NSW economy and to increase the number of Aboriginal people reaching their learning potential by:</p> <ul style="list-style-type: none"> • Providing 8 full-time and 4 part-time operational jobs as well as construction jobs, environmental management jobs and flow-on employment. • Assisting in meeting the shortage of local cost-efficient construction sand for the Sydney market. Access to affordable construction materials provides investment certainty for these projects and support jobs. • Providing a revenue stream to fund DLALC’s housing, employment, health, education land management and cultural programs and projects.
<p>Greater Sydney Region Plan – A Metropolis of Three Cities</p> 	<ul style="list-style-type: none"> • The Project Site is located within the Metropolitan Rural Area of Greater Sydney. Extractive Industries are identified as a primary rural industry for this area. • The Project meets the GSC’s intention to protect and support Sydney’s agricultural and mineral resources as it proposes an extractive industry in a location that is identified in the <i>Hills LSPS</i>; the <i>District Plan</i>; and <i>Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2 – 1995) (SREP No.9)</i> as being suitable for an extractive industry. The proposed rehabilitated use of the site as agricultural lands is also consistent with the GSC’s vision. • The Project will protect and enhance approximately 3ha of bushland in a Biodiversity Stewardship Agreement. Where achievable, management measures have been designed to protect biodiversity and scenic landscapes. These are described in Annexure 5.

Central City District Plan



- The District Plan highlights the importance of maintaining local supplies of construction materials to support the Greater Sydney construction industry. The Project provides an opportunity to address the current and anticipated shortages of local, cost-efficient construction sand for the Greater Sydney construction industry.
- Action 73 of the District Plan seeks to maintain or enhance the values of the Metropolitan Rural Area using place-based planning to deliver targeted environmental, social and economic outcomes. The Project and its proposed rehabilitated land use as agricultural lands enhance and protect the Maroota rural area's economic value and limit urban development. The management measures contained in the **Annexure 5** have been designed to mitigate adverse environmental and social outcomes and enhance positive outcomes.

Hills Future 2036



- The Project Site is located within an agricultural/mineral extraction cluster. Therefore, the site's proposed use as an extractive industry, and later, as agricultural lands highly complements the *Hills LSPS* vision for the Maroota locality.
- The Project will contribute post-COVID 19 and long-term local employment and build upon the significant contribution that the mining/extractive industry makes to the Hills Shire economy (70.1M in 2018).
- The Project's Rehabilitation Strategy proposes productive agriculture as the Project Site's rehabilitated land use. This complements the Rural Strategy's intention for extractive industries to be rehabilitated as productive agricultural lands.
- 306ha of biodiversity offset lands will be retained and enhanced within the Hills LGA under a Biodiversity Stewardship Agreement. This offset, coupled with the biodiversity management measures in **Annexure 5** will help protect areas of high environmental value and significance in the LGA.

Future Transport Strategy 2056



- A motorway and freight rail connection known as the 'Outer Sydney Orbital' is identified in the Future Transport Strategy 2056 as a corridor to be investigated in the long-term. The orbital would provide a significant transport link between the north-west and south-west growth areas of Sydney and through to the Central Coast.
- The Project is well positioned to utilise the Outer Sydney Orbital to provide cost-efficient construction sand to the north-west and south-west growth areas of Sydney, including the Western Sydney Metropolis.

NSW Offshore Sand Review 2016



- The Review notes that the Sydney Region consumes approximately 7 million tonnes of construction sand annually, an increasing portion of which is cost-inefficiently imported from outside the Greater Sydney Region. The Review identifies Maroota as a strategic location for the provision of construction sand within the Sydney Region.
- The Project addresses Sydney's construction sand shortfall by providing 500,000 tonnes of locally sourced construction sand per year. This equates to approximately 7% of the market and 50% of the sand imported from outside the Sydney region. Penrith Lakes, previously a significant construction sand supplier, has ceased operations since the Review. The shortfall of local construction sand to Sydney Market is therefore likely higher.

NSW Aboriginal Procurement Policy

- The NSW Aboriginal Procurement Policy outlines a Government target for 3% of domestic goods and services contracts to be awarded to Government-owned business.
- The Project provides Aboriginal-owned construction sand that can be procured for the anticipated \$107 billion worth of State infrastructure projects outlined in the NSW Budget 2020-2021.

4.1 NSW Premiers Priorities

The NSW Premiers Priorities identify 14 key policy priorities and five key policy objectives that intend to make a significant difference in enhancing the quality of life of the people of NSW.¹¹ One objective and one policy priority are relevant to the Project.

Objective 1 – A strong economy

The Project will contribute to the strengthening and post COVID-19 recovery of the NSW economy for the following reasons.

- The Project will provide eight full time and four part-time operational jobs, 15–20 jobs for contracted drivers as well as construction jobs, environmental management jobs and flow-on employment. Importantly, these jobs build upon the established mining and extractive industry skillset within the Hills Shire economy.
- The Project will assist in meeting the shortage of local cost-efficient construction sand for the Sydney market. In particular, the Project is well-positioned to provide construction sand to Western Sydney infrastructure projects, including the Western Sydney Airport and Metro line. Access to affordable construction materials provides investment certainty for these projects and support jobs.
- Transport costs from Maroota are approximately \$14 per tonne compared with \$28 per tonne from Stockton.¹² With the Project potentially meeting half of the 1 million tonnes of construction sand presently delivered from outside the Greater Sydney Region, that represents a potential saving of up to \$7m per year – some \$190m across the Project's life. These savings can be invested in other economically productive infrastructure projects.

Policy 2 – Increasing the number of Aboriginal young people reaching their learning potential

The NSW Government seeks to increase the proportion of Aboriginal students reaching their learning potential. The Project will be owned by an Aboriginal Land Council who will train Aboriginal persons to operate the proposed extractive industry. The Project will also provide DLALC with a revenue stream to fund the education-related objectives contained in its CL&B Plan. These objectives include developing a scholarship fund to support primary, secondary, and tertiary Aboriginal students and employing an Education and Employment Co-Ordinator. Therefore, the Project will increase the number of Aboriginal young people reaching their learning potential.

¹¹ NSW Government (2020), *Premier's Priorities*, NSW Government, accessed at: <https://www.nsw.gov.au/premiers-priorities>.

¹² NSW Government Department of Trade and Investment, (2016), *NSW Offshore Sand Review*, NSW Government, pg. 5.

4.2 Greater Sydney Region Plan – A Metropolis of Three Cities

The Greater Sydney Region Plan, *A Metropolis of Three Cities (Regional Plan)* was released by the Greater Sydney Commission in March 2018 to provide a 40-year vision and establish a 20-year plan to manage growth for Greater Sydney. It envisions Sydney as a '30-minute City'. The Greater Sydney region is further divided into five districts. The Project is located to the north of the Central Sydney District.

The Regional Plan includes a geographical depiction of the 40-year vision for the Greater Sydney Region (Figure 39). In that plan, the Project Site is located in the Metropolitan Rural Area to the north of Greater Parramatta. The Plan notes that “the main rural industries of the Metropolitan Rural Area are intensive agricultural production on relatively small land parcels and resource extraction in the Western Parkland City with some activity in the North District”.¹³ The Project Site’s proposed use for resource extraction is therefore consistent with the 40-year vision for Sydney.

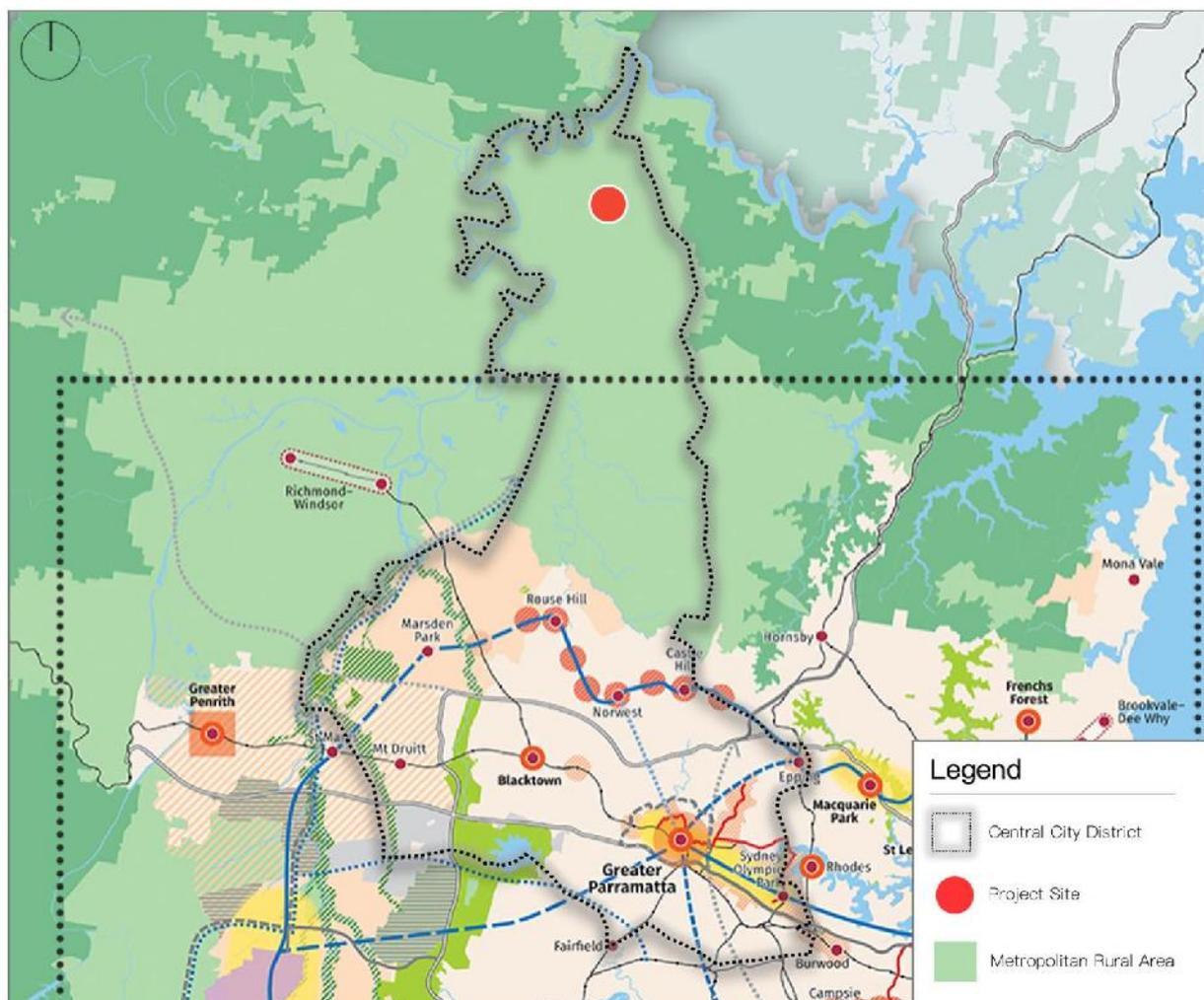


Figure 39: Project’s Location in the Greater Sydney Structure Plan (Greater Sydney Commission, 2018)

¹³ Greater Sydney Commission, (2018), *Greater Sydney Region Plan – A Metropolis of Three Cities*, NSW Government, p.g. 140.

4.2.1 Planning Priorities for the Greater Sydney Region

The Regional Plan outlines objectives and strategies to realise the Greater Sydney 40-year under the headings of Productivity, Sustainability and Liveability. Relevant strategies and objectives are addressed below.

Table 11 – Regional Plan Strategies and Actions (Source: Greater Sydney Commission 2018)		
Direction	Strategy & Objective	Project’s Merit
<p>Jobs & Skills for the City</p> 	<p>Objective 24 Economic sectors are targeted for success</p> <p>Strategy 24.3 Protect and support agricultural production and mineral resources (in particular construction materials) by preventing inappropriately dispersed urban activities in rural areas.</p>	<ul style="list-style-type: none"> The Project meets the strategy by providing a source of construction sand for the Sydney market in a location where extractive industries have existed for some 25 years. The proposed rehabilitated land use of the Project Site for agricultural production further achieves the long-term economic aim for the land.
	<p>Objective 27 Biodiversity is protected; urban bushland and remnant vegetation is enhanced.</p> <p>Strategy 27.1 Protect and enhance biodiversity by:</p> <ul style="list-style-type: none"> supporting landscape-scale biodiversity conservation and the restoration of bushland corridors managing urban bushland and remnant vegetation as green infrastructure managing urban development and urban bushland to reduce edge-effect impacts. 	<ul style="list-style-type: none"> The biodiversity management measures outlined in Annexure 5 have been designed to mitigate biodiversity impact. Design modifications, including providing a 50m buffer to the Groundwater Dependent Ecosystem onsite and the retention of a 100m wide biodiversity corridor, have been implemented to avoid impact where feasible. Approximately 306ha of bushland is proposed to be offset in a Biodiversity Stewardship Agreement to account for unavoidable biodiversity impacts. These offset lands will be protected, managed and enhanced through land care practices.
<p>A City in its Landscape</p> 	<p>Objective 28 Scenic and cultural landscapes are protected.</p> <p>Strategy 28.1 Identify and protect scenic and cultural landscapes.</p> <p>Strategy 28.2 Enhance and protect views of scenic and cultural landscapes from the public realm.</p>	<ul style="list-style-type: none"> The Landscape and Visual Impact Assessment prepared by SLR Consulting (Annexure 12) notes that there are few viable public receptors that would be impacted by the proposed works. Where the Project Site is visible, it has been determined that the Project will have minor-moderate impact on the existing landscape character and values. The Project’s Rehabilitation Strategy incorporates the rehabilitation of a 50m bushland corridor to enhance and protect views.
	<p>Objective 29 Environmental, social and economic values in rural areas are protected and enhanced.</p>	<ul style="list-style-type: none"> The Project will deliver economic and social benefits by providing local cost-efficient sand to the Sydney market and

Strategy 29.1

Maintain or enhance the values of the Metropolitan Rural Area using place-based planning to deliver targeted environmental, social and economic outcomes.

Strategy 29.2

Limit urban development to within the Urban Area, except for the investigation areas at Horsley Park, Orchard Hills, and east of The Northern Road, Luddenham.

post-COVID 19 and long-term employment opportunities.

- The Project is appropriately located within a locality in which sand quarries have operated for 25-years. The Project Site has been identified since 1995, under *Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2 – 1995)*, as a suitable location for an extractive industry.
 - The proposed rehabilitated land use for the Project Site as agricultural lands continues to protect the Maroota Rural Area's economic value and limits urban development.
-

4.3 Central City District Plan

The *Central City District Plan (District Plan)* was released by the Greater Sydney Commission in March 2018. It is a 20-year plan that builds on the directions, objectives, strategies and actions contained in the Regional Plan to identify planning priorities and actions at the district level to achieve the 40-year vision for Greater Sydney.

The location of the Project Site within the Central River City District and context of the Greater Sydney Structure Plan is shown in **Figure 39** above.

The District Plan echoes the Regional Plan regarding the importance of mineral extraction and agriculture within the Metropolitan Rural Area. The District Plan further notes that mineral and extractive resources are located at Maroota and that “*maintaining local supplies of construction materials will support the growth of the District and Greater Sydney*”.¹⁴

4.3.1 Planning Priorities for the Central River City

Planning priorities and actions in the District Plan relevant to the Project are addressed in the below table.

Table 12 – District Plan Priorities and Actions (Source Greater Sydney Commission, 2018)		
Direction	Planning Priorities & Actions	Project’s Merit
<p>Jobs & Skills for the City</p> 	<p>Planning Priority C12</p> <p>Supporting growth of targeted industry sectors.</p> <p>Action 56</p> <p>Protect and support agricultural production and mineral resources (in particular construction materials) by preventing inappropriately dispersed urban activities in rural areas.</p>	<ul style="list-style-type: none"> The Project meets this action by providing a source of construction sand for the Sydney market in a location where extractive industries have existed for some 25 years. The proposed rehabilitated land use for the Project Site as agricultural lands further complements the District Plan’s economic vision for rural lands.
	<p>Planning Priority C15</p> <p>Protecting and enhancing bushland, biodiversity and scenic and cultural landscapes</p> <p>Action 65</p> <p>Protect and enhance biodiversity by:</p> <ol style="list-style-type: none"> supporting landscape-scale biodiversity conservation and the restoration of bushland corridors managing urban bushland and remnant vegetation as green infrastructure managing urban development and urban bushland to reduce edge effect impacts. 	<ul style="list-style-type: none"> The biodiversity management measures outlined in Annexure 5 have been designed to mitigate biodiversity impact. Design modifications, including providing a 50m buffer to the Groundwater Dependent Ecosystem onsite and the retention of a 100m wide biodiversity corridor, have been implemented to avoid impact where feasible. Approximately 306ha of bushland is proposed to be offset in a Biodiversity Stewardship Agreement to account for unavoidable biodiversity impacts. These
<p>A City in its Landscape</p> 		

¹⁴ Greater Sydney Commission, (2018), *Central City District Plan*, NSW Government, pg. 114.

<p>Action 66</p> <p>Identify and protect scenic and cultural landscapes.</p>	<p>offset lands will be protected, managed and enhanced through land care practices.</p>
<p>Action 67</p> <p>Enhance and protect views of scenic and cultural landscapes from the public realm.</p>	
<p>Planning Priority C18</p> <p>Better managing rural areas.</p>	<ul style="list-style-type: none"> • The Project will deliver economic and social benefits by providing local cost-efficient sand to the Sydney market and post-COVID 19 and long-term employment opportunities. • The Project is appropriately located within a locality in which sand quarries have operated for 25-years. The Project Site has been identified since 1995, under <i>Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2 – 1995)</i>, as a suitable location for an extractive industry. • The proposed rehabilitated land use for the Project Site as agricultural lands continues to protect the Maroota Rural Area’s economic value and limits urban development.
<p>Action 73</p> <p>Maintain or enhance the values of the Metropolitan Rural Area using place-based planning to deliver targeted environmental, social and economic outcomes.</p>	
<p>Action 74</p> <p>Limit urban development to within the Urban Area.</p>	

4.4 The Hills Local Strategic Planning Statement

The Hills Shire is a rapidly growing Local Government Area. The Shire’s population is anticipated to increase by 80% between 2016 and 2036, growing by 128,400 people. An additional 38,000 dwellings and 32,200 jobs are required to accommodate this growth.¹⁵

The Hills Local Strategic Planning Statement titled ‘*Hills Future 2036*’ (*Hills LSPS*) is a 20-year plan for the Hills LGA that realises the aims and objectives of the Metropolitan and District Plans. It seeks to shape exceptional living, working and leisure places in which expected growth brings vibrancy, diversity, liveability and prosperity. The Rural Strategy accompanies the Hills LSPS and provides the basis for strategic planning of rural lands in the Shire.

Figure 40 below shows that the Project Site is located within an area identified in the Hills LSPS as an agricultural and extractive cluster. Therefore, the Project complements the Hills Shire Council’s strategic vision for Maroota and the Shire more broadly.

¹⁵ The Hills Shire Council, (2020), *Hills Future 2036*, The Hills Shire Council, pg. 7–9

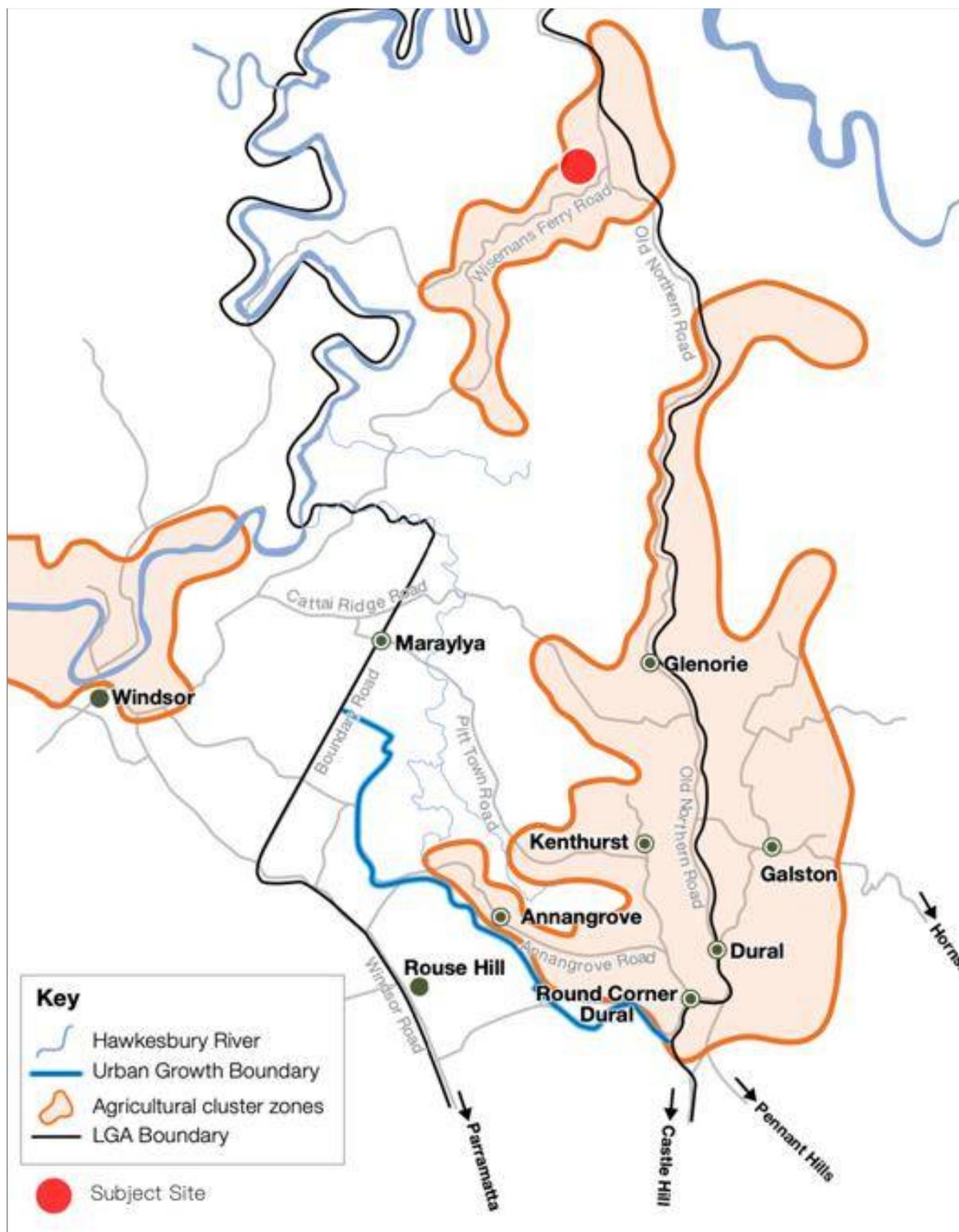


Figure 40: Agricultural Cluster (Hills Council, 2019)

The Rural Strategy and the Hills LSPS both recognise the important contribution of the agricultural and mining/extractive industries to the Hills' economy. They also identify Maroota as a strategic location for extractive industries. The Rural Strategy notes, "Extractive industries are located in Maroota in the north of the Shire and produce sand and materials for the construction and landscape supply industries." and that

4. Strategic Context

“Land used for extractive industries has increased, reflecting the need for construction materials to satisfy the demands of Sydney’s construction industry.”¹⁶

As shown in **Figure 41**, mining, including extractive industries, contributed \$70.1M to the Hills economy in 2018. This contribution is a near three-fold increase from 2013–14. Since 2015 the mining industry has provided a steadily growing source of employment within the Hills LGA (**Figure 42**). The Project will further increase the contribution of mining/extractive industries to the Hills economy and provide additional post-COVID-19 and long-term jobs.

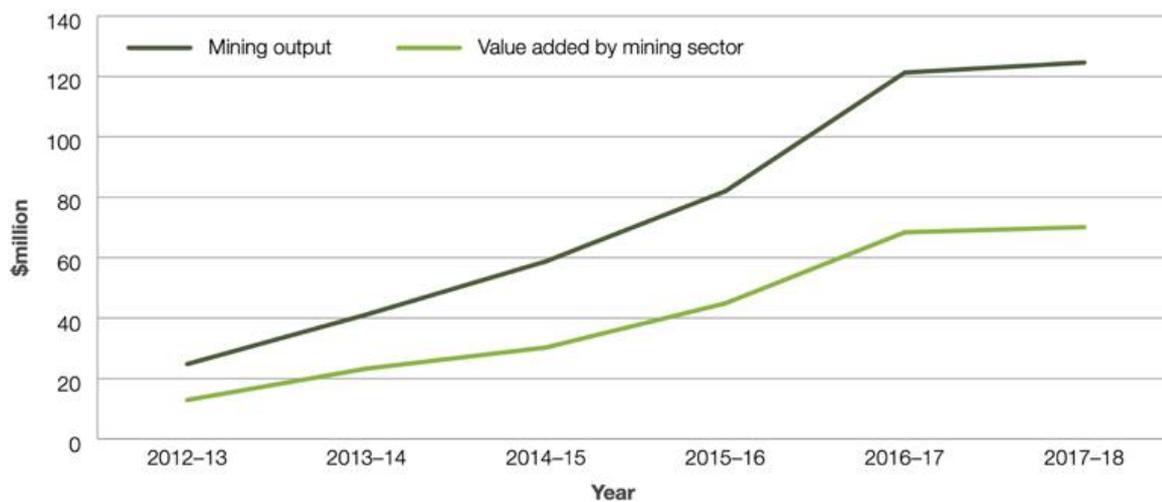


Figure 41: Mining Output (\$ Value) and Value-Added contribution to the Hills Economy (source: Hills Rural Strategy, 2019)

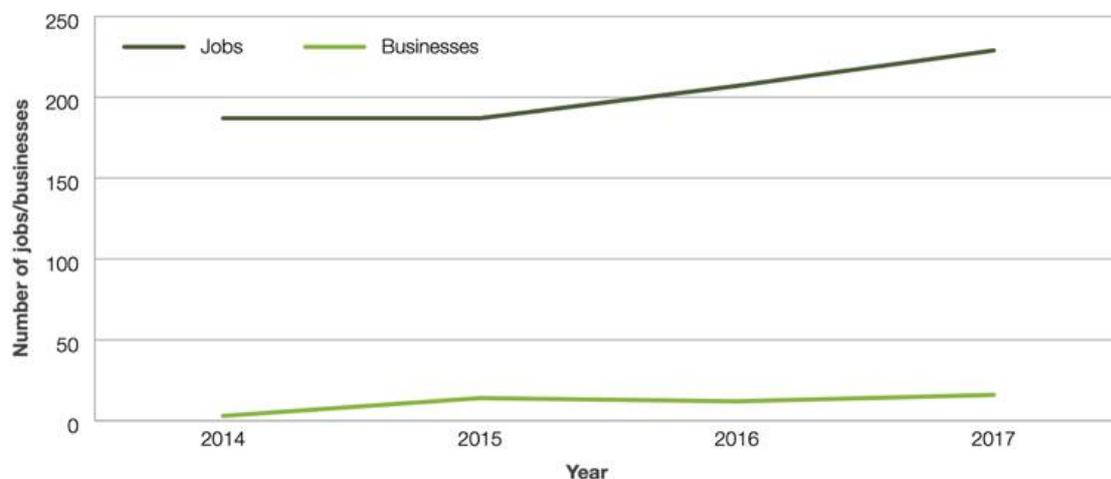


Figure 42: Hills Shire Jobs and Businesses in the Mining/Extractive Industry (Source: Hills Rural Strategy, 2019)

The Hills Rural Strategy notes that *“land in the north of the Shire currently used for extractive purposes will be rehabilitated and, depending on the resulting condition of the land, may be able to be used for productive agricultural purposes.”¹⁷* The Rural Strategy indicates that productive agriculture is the preferred land-use for rehabilitated extractive industry sites. The Rehabilitation Strategy that accompanies the EIS (**Annexure 17**) complements this vision by proposing productive agriculture as the rehabilitated land-use for the Project Site.

¹⁶ The Hills Shire Council, (2019), *Rural Strategy*, The Hills Shire Council, pg. 13 & 25.

¹⁷ The Hills Shire Council (2019), *Rural Strategy*, The Hills Shire Council, p.g. 18.

4.4.1 Planning Priorities for the Hills LGA

The Hills LSPS sets out the planning priorities to guide planning decisions in the Hills LGA over the next 5 years. Those planning priorities relevant to the Project are tabled and addressed below.

Table 13 – Hills LSPS Planning Priorities (Source: Hills Shire Council, 2019)		
Theme	Planning Priorities	Project’s Merit
Economy 	Planning Priority 1 Plan for sufficient jobs, targeted to suit the skills of the workforce	<ul style="list-style-type: none"> The Project provides post-COVID 19 and long-term jobs within the mining/extractive industry, an established industry with an established workforce in the Hills LGA. The Project builds upon the established productive capacity of extractive industries located at Maroota, in an area identified as an ideal location for primary production and extractive industry. The proposed rehabilitated land-use for the Project Site as agricultural lands ensures that the site’s productive capacity is maintained in the long term.
	Planning Priority 4 Retain and manage the Shire’s rural productive capacity.	
Infrastructure 	Planning Priority 14 Plan for a safe and efficient road network.	<ul style="list-style-type: none"> Planning priority 14 acknowledges the benefit of the planned Outer Sydney Orbital for opening up markets and facilitating the growth of the Hills’ extractive industries sector. The Project would utilise this significant piece of State infrastructure to deliver needed construction materials to the Sydney market.
	Planning Priority 17 Protect high environmental value and significance.	
Environment 	Planning Priority 19 Manage natural resources and waste responsibly.	<ul style="list-style-type: none"> The biodiversity management measures outlined in Annexure 5 have been designed to mitigate biodiversity impact. Design modifications, including providing a 50m buffer to the Groundwater Dependent Ecosystem onsite and the retention of a 100m wide biodiversity corridor, have been implemented to avoid impact where feasible. Approximately 306ha of bushland is proposed to be offset in a Biodiversity Stewardship Agreement to account for unavoidable biodiversity impacts. These offset lands will be protected, managed and enhanced through land care practices.

4.5 Future Transport Strategy 2056

Future Transport Strategy 2056 is the NSW Government’s overarching 40-year transport strategy for NSW. It provides a framework for planning and investment and aims to harness rapid change and innovation to support a modern, innovative transport network.¹⁸

¹⁸ NSW Government (2018), *Future Transport 2056*, NSW Government, accessible at: https://future.transport.nsw.gov.au/sites/default/files/media/documents/2018/Future_Transport_2056_Strategy.pdf.

4. Strategic Context

The Strategy identifies transport and freight corridors to investigate over the short term (0–10 years), medium-term (10–20 years) and long term (20 years +). A motorway and freight rail connection known as the 'Outer Sydney Orbital' was identified as a corridor to investigate in the long-term. As shown in the below figure, the orbital would provide a significant transport link between the north-west and south-west growth areas of Sydney, including the Western Sydney Aerotropolis. The Project would be well-positioned to use this significant piece of infrastructure to provide construction materials to Sydney's growth areas, further reducing transport costs.

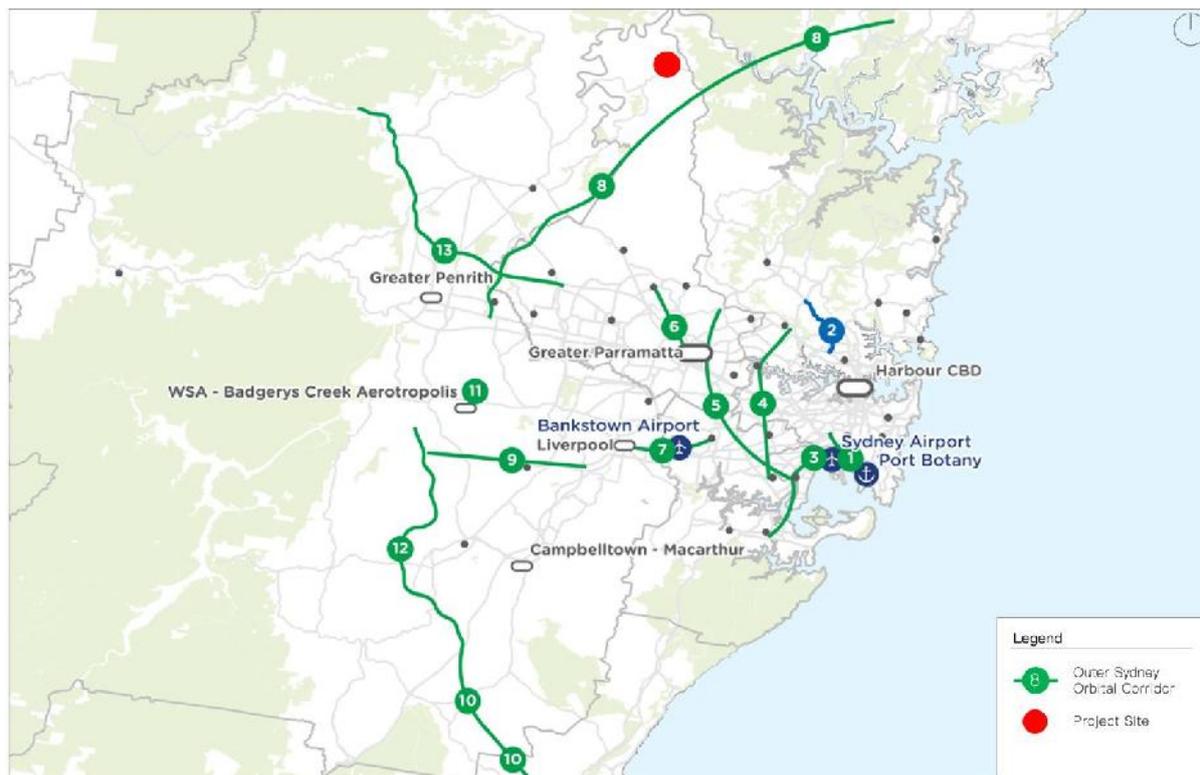


Figure 43: Greater Sydney Transport Investigation Initiatives – Years 20+ (Source: Future Transport 2056, 2018)

4.6 NSW Offshore Sand Review 2016

The NSW Offshore Sand Review (*the Review*) was completed in 2016 on behalf of the NSW Department of Trade and Investment to explore offshore solutions to the current and anticipated shortages of construction sand for the Sydney market. The Review provides an overview of the Sydney sand market and highlights the need for local sources of construction sand.

The last major study into Sydney's supply of sand estimated that the region consumes approximately 7 million tonnes of construction sand annually, of which 1 million tonnes was imported from outside Greater Sydney.¹⁹ This figure is anticipated to grow given the significant infrastructure projects laid out in the State's Infrastructure Strategy and imminent closure of one of Sydney's most significant sources of construction sand at Kurnell Peninsula. The Penrith Lakes Quarry, one of the largest sand quarry in Sydney, closed in September 2020 after being in use for more than 130 years, extracting over 160 million tonnes of aggregate across its

¹⁹ NSW Trade & Investment (2016), *NSW Offshore Sand Review*, NSW Government, pg. 4.

4. Strategic Context

life. Furthermore, the Review notes that land–use constraints within the Greater Sydney Region have increasingly made establishing new extractive industries challenging. The Review highlights the importance of increasing production from existing local sources, as construction sand is a high–bulk low–unit cost commodity that is highly sensitive to transport costs. It states, “*Transporting sand from outside the [Sydney] region significantly adds to its costs*”.²⁰

The Review identifies Maroota as Sydney’s last major source of construction sand within the Greater Sydney Region. Transport costs to the Sydney CBD from Maroota are estimated to be approximately \$14 per tonne compared with \$28 per tonne from Stockton.²¹ With the Project potentially meeting half (50%) of the 1 million tonnes of construction sand presently delivered from outside the Greater Sydney Region (see **Figure 44**), that is a saving of \$7m per year – some \$190m across the Project’s life.

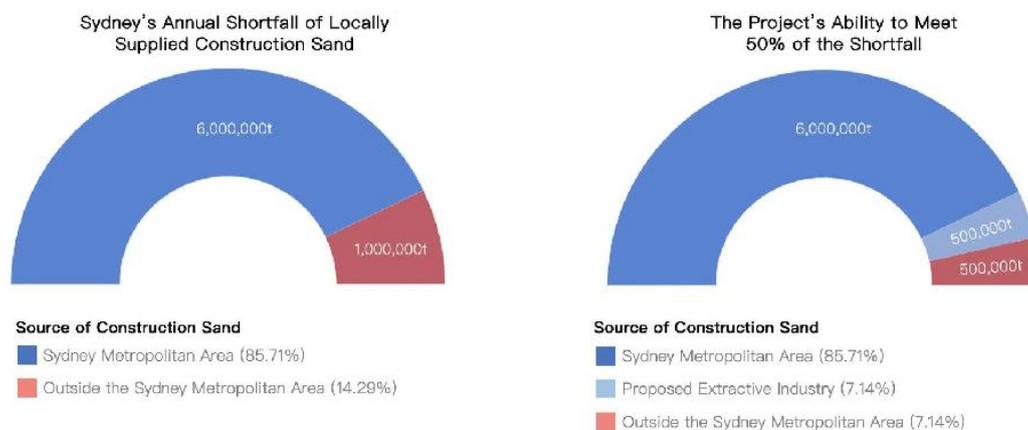


Figure 44: The Project’s Potential Impact on Sydney’s Sources of Construction Sand

4.7 NSW Aboriginal Procurement Policy

The NSW Government Aboriginal Procurement Policy seeks to increase Aboriginal skills and economic participation in the development of NSW by leveraging the NSW Governments procurement capacity to support Aboriginal–owned businesses. The Policy aims to award 3% of total domestic contracts for goods and services issued by NSW Government agencies to Aboriginal–owned business by 2021.²² In 2019, the percentage of government contracts awarded to Aboriginal–owned business fell from 0.44% the previous year to 0.43%. This represents a shortfall of 86%.²³ The Project can help address this shortfall by providing an Aboriginal–owned source of construction sand will be procured as part of the NSW Government’s planned \$107.1 billion worth of State infrastructure projects to 2022–23.²⁴

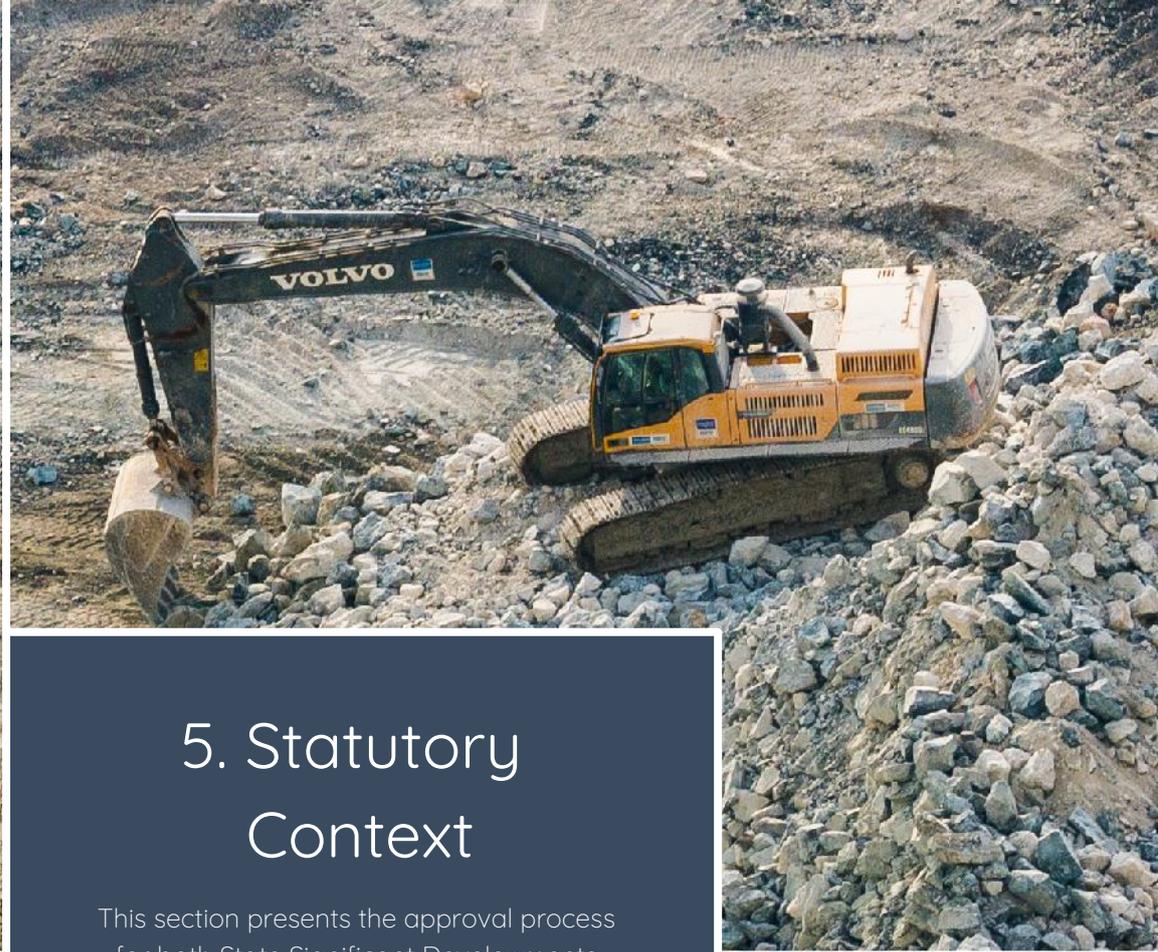
²⁰ NSW Trade & Investment (2016), *NSW Offshore Sand Review*, NSW Government, pg. 5.

²¹ *Ibid.*, pg. 5.

²² NSW Government, (2018), *Aboriginal Procurement Policy*, NSW Government, <https://buy.nsw.gov.au/policy-library/policies/aboriginal-procurement-policy>.

²³ NSW Treasury, (2019), *Aboriginal Procurement Policy & Aboriginal Participation in Construction Policy 2019 Review*, NSW Government, https://buy.nsw.gov.au/_data/assets/pdf_file/0006/607821/app_apic_policy_2019_review_accessible_pdf_1.pdf.

²⁴ NSW Treasury, (2021), *NSW Budget 2020–21: Building a Better NSW*, NSW Government <https://www.budget.nsw.gov.au/budget-detail/building-better-nsw>



5. Statutory Context

This section presents the approval process for both State Significant Developments and other relevant statutory approval processes and describes how the Project aligns with the requirements of those approval processes.



5. Statutory Context

State Significant Development approval is being sought for the Project under the State Significant Development provisions of Part 4 of the *Environmental Planning & Assessment Act 1979*. This Section outlines the statutory context for the Project under the following section headings. An explanation of each heading is also provided.

Section 5.1 Definition

This section provide a definition of an *extractive industry* under NSW legislation.

Section 5.2 & 5.3 Deceleration of State Significant Infrastructure & Legal Pathway for Approval

These sections outlines the legal declaration of the Project as a State Significant Development, and the pathway for Development Approval under the following pieces of legislation.

Table 14 – Legislation List: Legal Pathway for Development Approval	
Legislation	Abbreviation
<i>Environmental Planning & Assessment Act 1979</i>	<i>EP&A Act</i>
<i>State Environmental Planning Policy (State and Regional Development) 2011</i>	<i>State and Regional SEPP</i>

Section 5.4 Permissibility

This section outlines the relevant provisions the affecting the permissibility of the Project under the following instruments.

Table 15 – Legislation List: Permissibility	
Legislation	Abbreviation
<i>The Hills Local Environmental Plan 2019</i>	<i>Hills LEP 2019</i>
<i>Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2 – 1995)</i>	<i>SREP No.9</i>

Section 5.5 Legislative Approvals

This section provides the Project approvals that are required under following pieces of legislation and instrument.

Table 16 – Legislation List: Legislative Approvals	
Legislation	Abbreviation
<i>Environmental Planning & Assessment Act 1979</i>	<i>EP&A Act</i>
<i>State Environmental Planning Policy (State and Regional Development 2011)</i>	<i>State and Regional SEPP</i>
<i>Environmental Protection and Biodiversity Conservation Act 1999</i>	<i>EPBC Act</i>
<i>Biodiversity Conservation Act 2016</i>	<i>Conservation Act</i>
<i>Protection of the Environment Operations Act 1997</i>	<i>POEO Act</i>
<i>Water Management Act 2000</i>	<i>WM Act</i>
<i>National Parks and Wildlife Act 1974</i>	<i>NP&W Act</i>
<i>Roads Act 1993</i>	–
<i>Rural Fires Act 1997</i>	–

Section 5.6 Pre-Conditions to an Approval

This section outlines the pre-conditions that the consent authority is required to consider and the legislative steps it is required to undertake before granting approval for the Project under the following pieces of legislation.

Table 17 – Legislation List: Pre-conditions to Granting Consent	
Legislation	Abbreviation
<i>State Environmental Planning Policy (Infrastructure) 2007</i>	<i>SEPP Infrastructure</i>
<i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i>	<i>Extractive Industries SEPP</i>

Section 5.7 Relevant Matters for Assessment

This section outlines the relevant matters that the consent authority is required to consider when deciding whether to grant a development approval under the legislation listed below. Matters for consideration differ from pre-conditions. They refer to issues that the consent authority must consider when making a merit-based decision to grant an approval as opposed to administrative steps that the consent authority is required to undertake before making a decision.

Table 18 – Legislation List: Relevant Matters for Assessment	
Legislation	Abbreviation
<i>Environmental Planning & Assessment Act 1979</i>	<i>EP&A Act</i>
<i>State Environmental Planning Policy (Infrastructure) 2007</i>	<i>SEPP Infrastructure</i>
<i>Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2 – 1995)</i>	<i>SREP No.9</i>
<i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i>	<i>Extractive Industries SEPP</i>
<i>Sydney Regional Environmental Plan – Hawkesbury–Nepean River (No. 20 – 1997)</i>	<i>SREP No. 20</i>
<i>State Environmental Planning Policy 33 – Hazardous and Offensive Development</i>	<i>SEPP Hazardous Development</i>
<i>State Environmental Planning Policy No.55 – Remediation of Land</i>	<i>SEPP No.55</i>
<i>The Hills Local Environmental Plan 2019</i>	<i>Hills LEP 2019</i>
<i>Environmental Protection and Biodiversity Conservation Act 1999</i>	<i>EPBC Act</i>

5.1 Definition

The Project is defined under the Standard Instrument as an **extractive industry** which means:

“the winning or removal of extractive materials (otherwise than from a mine) by methods such as excavating, dredging, tunnelling or quarrying, including the storing, stockpiling or processing extractive materials by methods such as recycling, washing, crushing, sawing or separating, but does not include turf farming”.

Extractive material means *“sand, soil, gravel, rock or similar substances that are not minerals within the meaning of the Mining Act 1992”.*

5.2 Declaration of State Significant Development

Section 4.36(2) of the *EP&A Act* states that:

(2) A State environmental planning policy may declare any development, or any class or description of development, to be State significant development.

Schedule 1 of the *State and Regional SEPP* lists development that is State Significant Development. Clause 8 of Schedule 1 states:

(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 million tonnes, or*
- (c) extracts from an environmentally sensitive area of State significance.*

As the Project relates to a total resource of greater than 5 million tonnes, it is declared State Significant Development. Part 4, Division 4.7 of the *Environmental Planning & Assessment Act 1979* provides the State Significant Development approval and assessment pathway. This is addressed in Section 5.3 below.

5.3 Legal Pathway for Approval – State Significant Development

Legislation relevant to the State Significant Development approval process are:

- *Environmental Planning and Assessment Act 1979*;
- *Environmental Planning and Assessment Regulation 2000*; and
- *State Environmental Planning Policy (State and Regional Development) 2011*.

The principal approval that is required for the Project is a development consent under the *EP&A Act*. As noted in Section 5.2 above, the Project is declared to be a State Significant Development. Division 4.7 of the *EP&A Act* provides the approval process for a State Significant Development which is described below.

5.3.1 Environmental Impact Assessment & Environmental Impact Statement

Environmental Impact Assessment (EIA) is the process by which the environmental impacts of a State Significant Development are assessed before a decision is made by the Minister or their delegate on whether to approve an application. This process is displayed in the figure below.

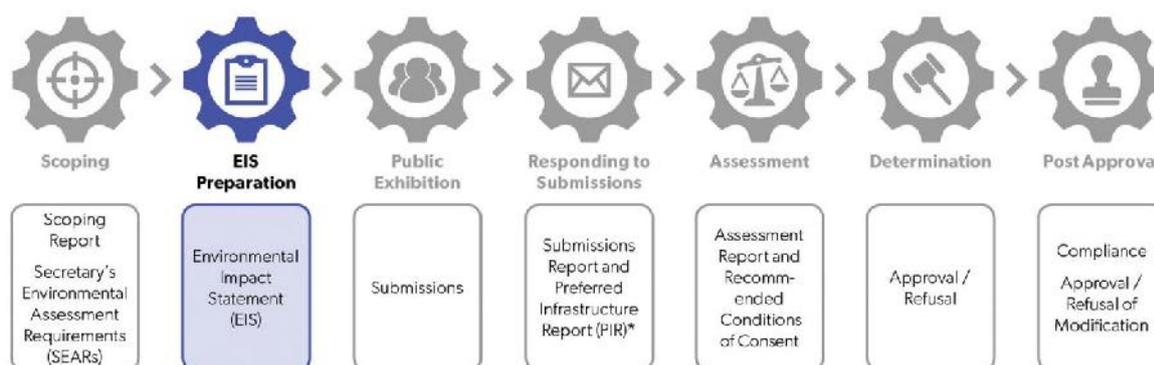


Figure 45: Environmental Impact Assessment Process (Source: DPIE, 2017)

An Environmental Impact Statement (*EIS*) is the principal document by which environmental impacts are assessed. Section 4.12(8) of the *EP&A Act* provides that a development application for State Significant Development is to be accompanied by an EIS, while Schedule 2 of the Regulations set out requirements for an EIS. Those requirements are shown in the below table.

Table 19 – EIS Requirements under the EP&A Regulations

Requirement	EIS Section
-------------	-------------

6. Form of the environmental impact statement

An environmental impact statement must contain the following information:

a) Name, address and professional qualifications of the person(s) who prepared the EIS	Section 1.8
b) The name and address of the responsible person (Applicant)	Section 1.1
c) The address of the land:	Section 1

5. Statutory Context

<ul style="list-style-type: none"> o In respect of which the development application is to be made, or o On which the activity or infrastructure to which the statement relates is to be carried out 	
d) A description of the development, activity or infrastructure to which the statement relates	Section 3
e) An assessment by the person by whom the statement is prepared of the environmental impact of the development, activity or infrastructure to which the statement relates	Sections 7 & 8
f) A declaration by the person whom this statement is prepared to the effect that: <ul style="list-style-type: none"> o The statement has been prepared in accordance with this Schedule, and o The statement contains all information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates, and o That the information contained in the statement is neither false nor misleading 	Quality Assurance

7. Content of environmental impact statement

An environmental impact statement must also include each of the following:

a) Summary of the environmental impact statement	Executive Summary
b) Statement of the objectives of the development, activity or infrastructure	Section 3.1
c) An analysis of any feasible alternatives to the carrying out of the development, having regard to its objectives, including the consequences of not carrying out the development	Section 8.3
d) an analysis of the development, activity or infrastructure, including: <ul style="list-style-type: none"> o A full description of the development o a general description of the environment likely to be affected by the development, activity or infrastructure, together with a detailed description of those aspects of the environment that are likely to be significantly affected, and o the likely impact on the environment of the development, activity or infrastructure, and o a full description of the measures proposed to mitigate any adverse effects of the development, activity or infrastructure on the environment, and o a list of any approvals that must be obtained under any other Act or law before the development, activity or infrastructure may lawfully be carried out, 	Section 3
	Section 2
	Sections 7 & 8
	Section 7 Annexure 8-15, 17
	Sections 5.4 & 5.5
e) A compilation of the measures proposed to mitigate any adverse effects of the development	Annexure 5
f) The reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development.	Section 8

5.3.2 Secretary's Environmental Assessment Requirements

Clause 3 of the *Environmental Planning & Assessment Regulations 2000* requires a proponent for a State Significant Development to make a written application to the Planning Secretary requesting the Secretary's Environmental Assessment Requirements (SEARs) for a Project. The proponent is required to prepare the EIS in accordance with the SEARs.

A request for SEARs, supported by a Scoping Report, was made to the DPIE on 9 December 2019. The DPIE issued SEARs on 18 February 2020. The EIS has been prepared in accordance with the Project's SEARs in addition to the requirements set out in **Table 19** above. **Annexure 1** outlines the Project's SEARs and where in the EIS those requirements are addressed.

5.3.3 Consent Authority

Section 4.5 of the *EP&A Act* and Section 8A of the *State and Regional SEPP* stipulate that the consent authority for State significant development is the Minister of Planning or the Independent Planning Commission.

5.4 Permissibility

Two pieces of legislation relate to the permissibility of the Project Site. Those are:

- *The Hills Local Environmental Plan 2019; and*
- *Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2 – 1995)*

Section 4.38 of the *EP&A Act* stipulates that development consent may not be granted for a State Significant Development that is **wholly** prohibited by an Environmental Planning Instrument, but consent may be granted despite the development being **partly** prohibited by an Environmental Planning Instrument. As discussed below, the Project is partly permissible under *SREP No.9* and wholly permissible under *The Hills LEP 2019*.

5.4.1 Sydney Regional Environmental Plan No.9 – Extractive Industry

SREP No. 9 aims to facilitate the development of extractive industries within proximity to the population of the Sydney Metropolitan Area by identifying land which contains extractive material of regional significance. Clause 7(2) permits **Extractive Industries** with consent on those lands identified under Schedule 1 or 2 of *SREP No. 9*; viz:

7 Extractive industries permissible with consent

(1) This clause applies to land described in Schedule 1 or 2.

(2) A person may, with the consent of the council, carry out development for the purpose of an extractive industry on land to which this clause applies.

The Project Site's eastern part is identified under Schedule 2 (see **Figure 46**). Therefore, per Section 4.38 of the *EP&A Act*, the construction of a State Significant **extractive industry** on the Project Site is permissible.

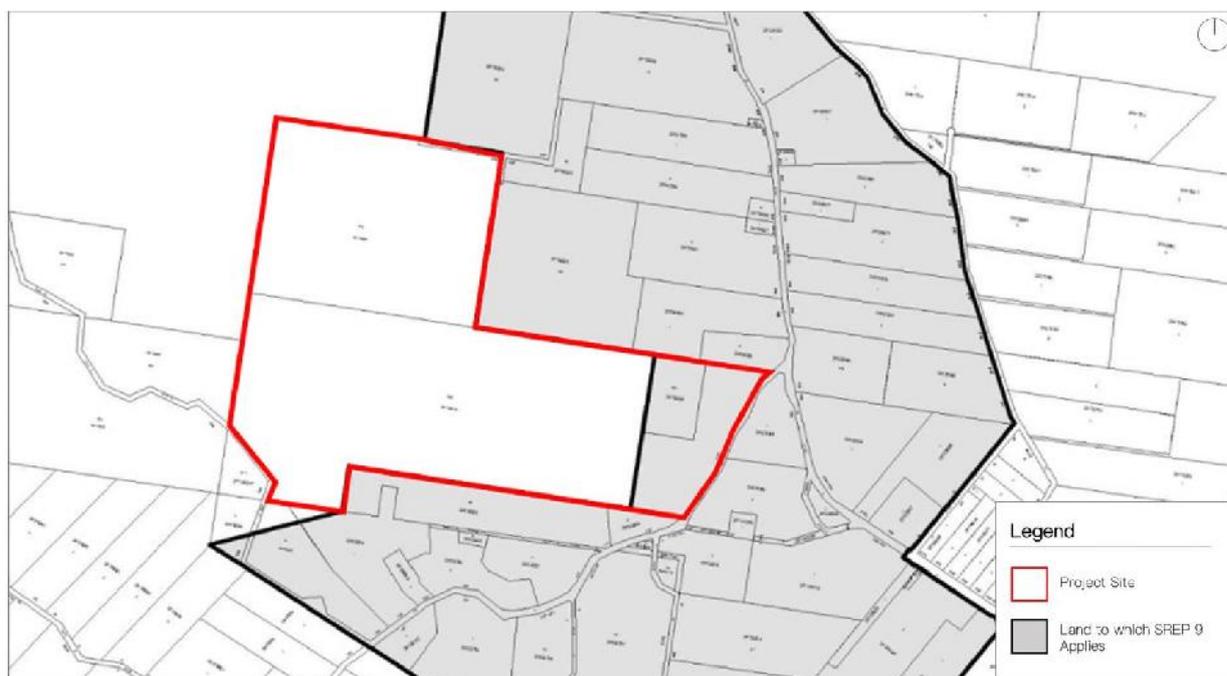


Figure 46: SREP No.9 Identified Lands for Extractive Industries

5.4.2 Hills Local Environmental Plan 2019

The Project Site is located within the Hills LGA. The *Hills LEP 2019* is the principal environmental planning instrument that regulates land-use for the entirety of the Project Site.

As shown in the below figure, the Project Site is zoned RU1 and RU2 under the *Hills LEP 2019*. **Extractive Industries** are permitted with consent in both these zones. A detailed assessment of the Project against these zones' objectives is presented in Section 8.2.2.1 of the EIS.

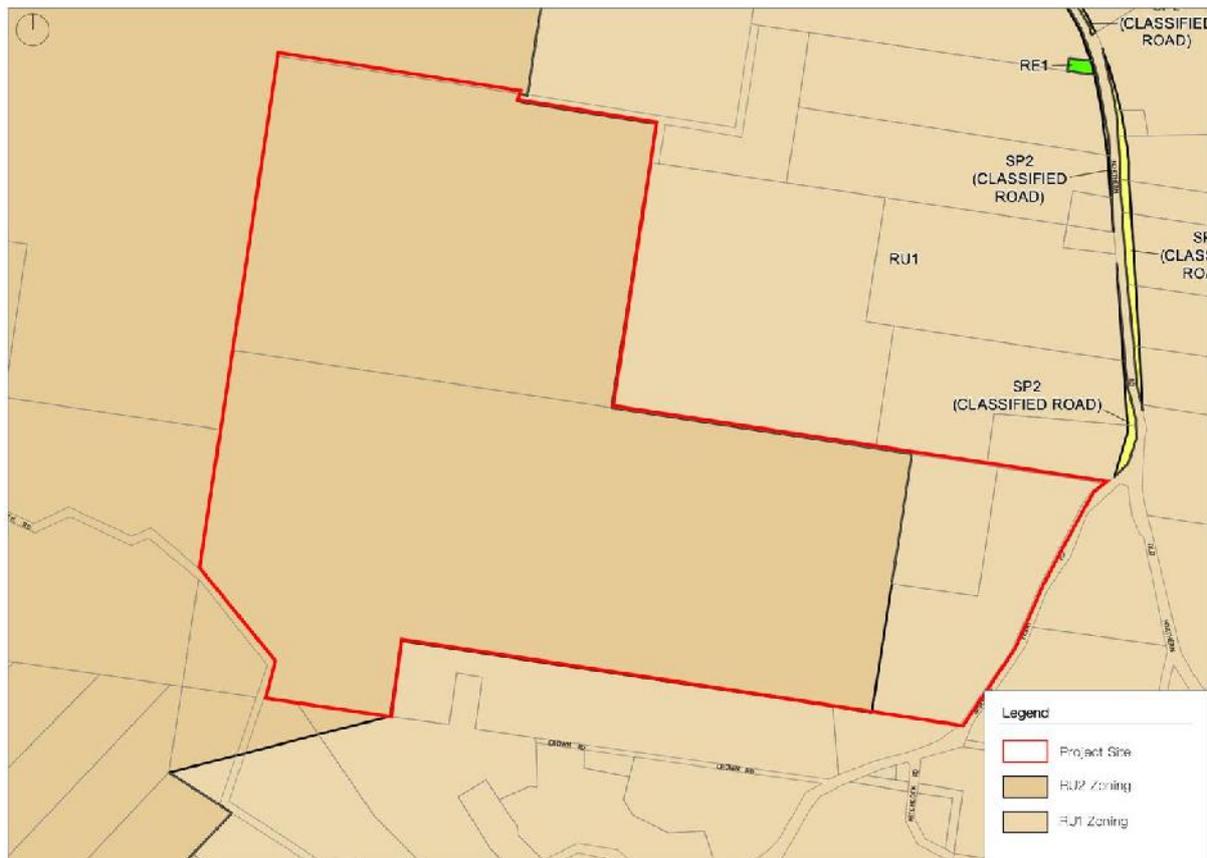


Figure 47: LEP Zoning Map (Source: The Hills Shire Local Environmental Plan, 2019)

Therefore, the development of an **Extractive Industry** at the Project Site is permissible under *SREP No.9* and the *Hills LEP 2019*.

5.5 Other Legislative Approvals

5.5.1 Commonwealth Approval – Controlled Action Under the Environmental Protection and Biodiversity Act 1999

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places. These are known as Matters of National Environmental Significance. If the proposed development will, or is likely, to have an impact on a matter of National Environmental Significance, then it is required to be referred to the Commonwealth Department of the Environment for assessment to determine if it constitutes a ‘controlled action’ requiring approval.

Presently, a bilateral agreement allows the Commonwealth Minister for the Environment to rely on the NSW environmental assessment processes when assessing a controlled action under the EPBC Act.

As outlined in the Biodiversity Development Assessment Report that accompanies the Application (**Annexure 8**) Biodiversity, the Project will impact threatened species and ecological communities listed under the Act. The Project was therefore referred to the Federal Department of Environment. On 18 May 2021 the Department declared that the Project is a controlled action and that the assessment process take place via the bilateral agreement.

5.5.2 Approvals not Required for State Significant Development

Section 4.41 of the EP&A Act stipulates that certain authorisations are not required for a State Significant Development authorised by a development consent under Division 4.7 of the Act. The following table lists legislative approvals that would otherwise be required for the Project if were not State Significant.

Approval & Legislation	Description & Relevance to the Project
<ul style="list-style-type: none"> • Water Use Approval • Water Management Work Approval; or • Activity Approval (other than an aquifer interference approval) <p>Under Section 89, 90 and 91 of the <i>Water Management Act 2000</i>.</p>	<p>The objects of the <i>WM Act</i> are to provide for the sustainable and integrated management of the water sources of the state for the benefit of both present and future generations.</p> <p>Water sharing plans are prepared under the <i>WM Act</i>. They include rules for protecting the environment and administering water licencing and trading.</p> <p>The Project involves the abstraction of 50ML per year from the Sydney Groundwater Basin. The Project’s licencing requirements are discussed in Section 7.4.2 of this EIS.</p>

5.5.3 Integrated Approvals – Approvals to be Applied Consistently

Section 4.41 of the EP&A Act stipulates that certain authorisations cannot be refused if they are required for a State Significant Development authorised by a development consent under Division 4.7 of the Act. The following table lists legislative approvals that are required for the Project and cannot be refused.

Table 21 – Legislative Approvals That must be Applied Consistently	
Approval & Legislation	Description
<p>Environmental Protection Licence</p> <p>Under Chapter 3 of the <i>Protection of the Environment Operations Act 1997</i> for any purposes referred to in Section 48 of the Act.</p>	<p>The <i>POEO Act</i> provides a single licensing arrangement to replace the different licences and approvals under existing separate Acts relating to air pollution, water pollution, noise pollution and waste management.</p> <p>The <i>POEO Act</i> aims to protect, restore, and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development.</p> <p>S. 48 of the <i>POEO Act</i> requires an Environmental Protection Licence for any scheduled activities listed in Schedule 1 of the Act. Schedule 1, Clause 19 lists extractive activity involving extraction, processing, or storage of more than 30,000 tonnes of materials per annum as a scheduled activity.</p> <p>Therefore, the Project will require licensing under the <i>POEO Act</i>.</p>
<p>Consent to carry out work on a Public Road</p> <p>Under Section 138 of the Roads Act</p>	<p>Section 138 of the Roads Act requires consent from the appropriate roads authority for any works carried out in, on or over a public road. The Project proposes upgrading the Patricia Fay Drive/Wisemans Ferry Road intersection to comply with the relevant standards. Therefore, a Section 138 approval is required.</p>

5.5.4 Other Legislative Approvals Required

Other legislative approvals required for the Project that are listed in the below table.

Table 22 – Other Legislative Approvals	
Legislation	Description
<p>Development Consent</p> <p>Under the <i>Environmental Planning and Assessment Act 1979</i></p>	<p>The <i>EP&A Act</i> is the principal planning legislation for NSW. Part 4 of the Act outlines development that requires consent and provides for the assessment of those developments. Division 4.7 of the EP&A Act establishes an approval regime for development that is declared to be State Significant Development. This approval regime is outlined in Section 5.2 and 5.3 above.</p> <p>The principal approval required for the Project is a development consent under the <i>EP&A Act</i>.</p>
<p>Water Access Licence</p> <p>Under the <i>Water Management Act 2000</i>.</p>	<p>A Water Access Licence is required for the abstraction of 50ML per year from the Sydney Groundwater Basin. The Project's licensing requirements are discussed in Section 7.4.2 of this EIS.</p>

5.6 Pre-Conditions to Exercising the Power to Grant Approvals

The following table identifies preconditions to be fulfilled by the consent authority prior to them exercising their power to grant approval for the Project. It also lists, where relevant, those sections of the EIS that address these preconditions.

Table 23 – Pre-Conditions		
Pre-Condition	Relevance	EIS Section
Biodiversity Conservation Act 2016		
Under Section 7.9 of the <i>Conservation Act</i> , a development application for a State Significant Development is required to be accompanied by a Biodiversity Development Assessment Report (BDAR).	The Application is State Significant Development and is therefore required to be accompanied by a BDAR.	Annexure 8
State Environmental Planning Policy (Infrastructure) 2007		
Clause 104(3) requires the consent authority to provide the RMS with written notice of the Development Application for those developments considered a ‘traffic generating activity’	The Project is considered a ‘traffic generating activity’. Therefore, the RMS must be provided with written notice of the Application.	N/A
45 Determination of development applications—other development <i>(2) Before determining a development application (or an application for modification of a consent) for development to which this clause applies, the consent authority must—</i> <i>(a) give written notice to the electricity supply authority for the area in which the development is to be carried out, inviting comments about potential safety risks, and</i> <i>(b) take into consideration any response to the notice that is received within 21 days after the notice is given.</i>	The Department must give written consent to the electric supply authority for the Project Site.	N/A
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007		
Under Section 16 of the <i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i> , Before granting consent for the purposes of mining or extractive industry, the consent authority must <ul style="list-style-type: none"> • if the consent authority considers that the development involves the transport of materials on a public road, the consent authority must, within 7 days after receiving the development application, provide a copy of the application to the relevant road’s authority • must not determine the application until it has taken into consideration any submissions that it receives in response 	The Project involves the transportation of material on public roads. Therefore, the Department must provide the application to the relevant road authority and considers any submission it receives from that authority when making a determination.	N/A

Table 23 – Pre-Conditions

Pre-Condition	Relevance	EIS Section
from any road's authority or the Roads and Traffic Authority within 21 days after they were provided with a copy of the application and must provide them with a copy of the determination.		

5.7 Mandatory Matters for Consideration

The following table summarises those matters that the consent authority is required to consider in deciding whether to grant approval. It also lists, where relevant, those sections of the EIS that assess the Project against these matters for consideration. **Annexure 6** provides a statutory compliance table that outlines the statutory requirements of the Project and refers to where those statutory requirements are addressed in the EIS.

Table 24 – Mandatory Matters for Considerations

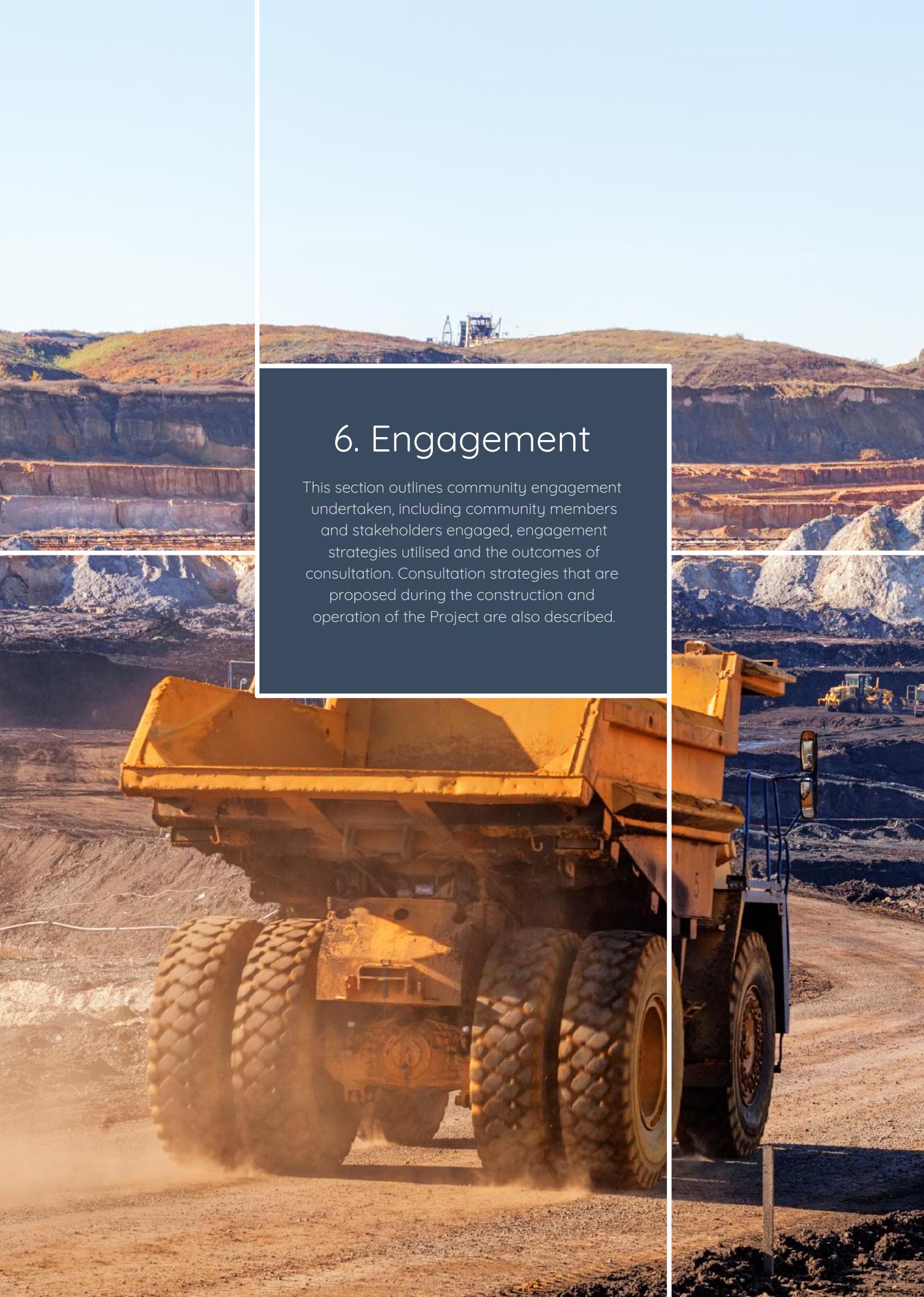
Statutory Reference	Mandatory Consideration	EIS Section
Environmental Planning & Assessment Act 1979		
	Relevant objects of the Act	
Section 1.3	<p>(a) <i>to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources;</i></p> <p>(b) <i>to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment;</i></p> <p>(c) <i>to promote the orderly and economic use and development of land;</i></p> <p>(e) <i>to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,</i></p> <p>(f) <i>to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),</i></p> <p>(j) <i>to provide increased opportunity for community participation in environmental planning and assessments</i></p>	Section 8.1 of the EIS assesses the Application against the objectives of the EP&A Act.
Section 4.15	<p>(a) <i>the provisions of</i></p> <p><i>i. Environmental Planning Instruments</i></p> <ul style="list-style-type: none"> • State Environmental Planning Policy (Infrastructure) 2007 (see further detail below) • Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2 – 1995) (see further detail below) 	<p>Section 3.3 of Annexure 6 outlines the relevant matters of consideration under the <i>SEPP Infrastructure</i> and where in the EIS those matters have been addressed.</p> <p>Section 3.2 of Annexure 6 outlines the mandatory matters of consideration under <i>SREP No. 9</i> and</p>

Table 24 – Mandatory Matters for Considerations		
Statutory Reference	Mandatory Consideration	EIS Section
		where in the EIS those matters have been addressed.
	<ul style="list-style-type: none"> State Environmental Planning Policies Mining and Extractive Industries (2007) (see further detail below) 	Section 3.4 of Annexure 6 outlines the mandatory matters of consideration under <i>the Extractive Industries SEPP</i> and where in the EIS those matters have been addressed.
	<ul style="list-style-type: none"> Sydney Regional Environmental Plan – Hawkesbury–Nepean River (No. 20 – 1997) (see further detail below) 	Section 3.5 of Annexure 6 outlines the mandatory matters of consideration under <i>the SREP No. 20</i> and where in the EIS those matters have been addressed.
	<ul style="list-style-type: none"> Hills Local Environmental Plan 2019 (see further detail below) 	Section 3.1 of Annexure 6 outlines the mandatory matters of consideration under <i>the Hills LEP</i> and where in the EIS those matters have been addressed. Section 8.2.2.1 assesses the Application against the objectives of the RU1 & RU2 land-use zones.
Section 4.15 (continued)	<ul style="list-style-type: none"> State Environmental Planning Policy 33 – Hazardous and Offensive Development 	Section 3.6 of Annexure 6 outlines the mandatory matters of consideration under the <i>SEPP Hazardous Development</i> and where in the EIS those matters have been addressed.
	<ul style="list-style-type: none"> State Environmental Planning Policy No.55 – Remediation of Land 	Section 3.7 of Annexure 6 outlines the mandatory matters of consideration under <i>State Environmental Planning Policy No.55 – Remediation of Land</i> and where in the EIS those matters have been addressed.
	<p><i>iii. Development Control Plans</i></p> <ul style="list-style-type: none"> Hills Development Control Plan 2012 	Annexure 22 provides and assessment of the Application against the relevant provisions of <i>the Hills DCP</i> .
	<i>(b) The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality</i>	Section 8.2.6 of this provides an assessment of the likely impacts of the Application. That section is informed by the Environment Impact

5. Statutory Context

Table 24 – Mandatory Matters for Considerations		
Statutory Reference	Mandatory Consideration	EIS Section
		Assessment provided in Section 7 of the EIS
	<i>(c) the suitability of the site for the development</i>	Section 8.2.7 of the EIS provides an assessment of the suitability of the site for the Project.
	<i>(d) any submissions made in accordance with this Act or the regulations,</i>	Section 8.2.8 of the EIS.
	<i>(e) the public interest</i>	Section 8.2.9 considers the public interest benefits of the Application.
Mandatory Considerations Under EPI' s		
<i>SEPP Infrastructure</i>	The <i>SEPP Infrastructure</i> applies to the Project Site as it has frontage to a classified road (Wisemans Ferry Road) and is therefore subject to the requirements of Clause 101 relating to effective and ongoing operations and function of classified roads.	Section 3.3 of Annexure 6 outlines the relevant matters of consideration under the <i>SEPP Infrastructure</i> and where in the EIS those matters have been addressed.
<i>SREP No. 9</i>	SREP 9 aims in part to “ <i>facilitate the development of extractive resources in proximity to the population of the Sydney Metropolitan Area by identifying land which contains extractive material of regional significant</i> ”. Part of the Project Site is identified in Schedule 2 of SREP 9, being the eastern part of the land with frontage to Wisemans Ferry Road zoned RU1. Therefore, the matters for consideration listed in Clause 7 and 11 of SREP 9 apply to the Project.	Section 3.2 of Annexure 6 outlines the mandatory matters of consideration under <i>SREP No. 9</i> and where in the EIS those matters have been addressed.
<i>Extractive Industries SEPP</i>	The <i>Extractive Industries SEPP</i> recognises the importance of mining and extractive industries to New South Wales and provides for the orderly and economic use of land for such purposes. It seeks to establish planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management of the development of extractive industries. This SEPP contains matters for consideration in Part 3 that are relevant to the Project	Section 3.4 of Annexure 6 outlines the mandatory matters of consideration under <i>the Extractive Industries SEPP</i> and where in the EIS those matters have been addressed.
<i>SREP No. 20</i>	<i>SREP No.20</i> applies to the Hawkesbury–Nepean catchment. It contains planning considerations, policies, and strategies for development within the catchment which are required to be taken into consideration in relation to development proposals.	Section 3.5 of Annexure 6 outlines the mandatory matters of consideration under <i>the SREP No. 20</i> and where in the EIS those matters have been addressed.
<i>SEPP No.55</i>	State Environmental Planning Policy No 55 – Remediation of Land aims to provide a state-wide planning approach to the	Section 3.7 of Annexure 6 outlines the mandatory matters of

Table 24 – Mandatory Matters for Considerations		
Statutory Reference	Mandatory Consideration	EIS Section
	remediation of contaminated land to reduce the risk of harm to human health.	consideration under <i>State Environmental Planning Policy No.55 – Remediation of Land</i> and where in the EIS those matters have been addressed.
<i>SEPP Hazardous Development</i>	<i>SEPP Hazardous Development</i> presents a systematic approach to planning and assessing proposals for potentially hazardous and offensive development for the purpose of industry or storage. The Project is not considered a potentially hazardous development.	Section 3.6 of Annexure 6 outlines the mandatory matters of consideration under the <i>SEPP Hazardous Development</i> and where in the EIS those matters have been addressed.
<i>Hills LEP</i>	<ul style="list-style-type: none"> Objectives and land use for RU1 and RU2 zones Part 4 – principal development standards Section 7.2 – Earthworks Section 7.4 – Terrestrial Biodiversity 	<p>Section 3.1 of Annexure 6 outlines the mandatory matters of consideration under <i>the Hills LEP</i> and where in the EIS those matters have been addressed.</p> <p>Section 8.2.1.1 assesses the Application against the objectives of the RU1 & RU2 land–use zones.</p>
Consideration under other Acts & Regulations		
<i>Conservation Act</i>	Section 7.14 of the <i>Conservation Act</i> requires the Consent Authority to take into consideration the likely impact of the proposed development on biodiversity values as assessed in the Biodiversity development Assessment Report. The Consent Authority may further consider under the Act the likely impact of the proposed development on biodiversity values.	Annexure 8 provides the Biodiversity Development Assessment Report for the Project and Section 7.1 provides a summary of that assessment.
Development Control Plans		
Hills Development Control Plan 2012	<ul style="list-style-type: none"> Part B Section 1 – Rural <p>Clause 11 of the <i>State and Regional SEPP</i> states that development control plans do not apply to a State Significant Development. However, an assessment has been included of ‘Part B Section 1 – Rural’ at the request of the Hills Shire Council.</p>	Annexure 22 provides and assessment of the Application against the relevant provisions of <i>the Hills DCP</i> .
Contributions Plan		
Contribution Plan No.6 Extractive Industries	Should consent be granted to the application, the Project would be subject to contributions under the Hills Shire Contributions Plan No.6 – Extractive Industries.	



6. Engagement

This section outlines community engagement undertaken, including community members and stakeholders engaged, engagement strategies utilised and the outcomes of consultation. Consultation strategies that are proposed during the construction and operation of the Project are also described.

6.1 SEARs Consultation Requirements

The Project SEARs relating to consultation stated that the EIS must:

- *describe the consultation process used and demonstrate that effective consultation has occurred;* (Section 6.2 of the EIS)
- *describe the issues raised; and* (Section 6.3 of the EIS)
- *identify where the design of the development has been amended and/or mitigation proposed to address issues raised; and otherwise demonstrate that issues raised have been appropriately addressed in the assessment* (Section 6.3 of the EIS)

Each of the above matters in addressed in this section.

6.2 Consultation Process

6.2.1 Consultation Objectives

Community and Stakeholder engagement undertaken throughout the EIA was informed by the ‘*Guideline 6 – Community and Stakeholder Engagement Guidelines*’ and the ‘*Social Impact Assessment Guidelines*’ prepared by the DPIE.

A Community Engagement Strategy (CES) was prepared to accompany the Scoping Report. That strategy outlined the intended approach to community consultation during preparation of the EIS and established consultation outcome aims. These aims are described below. They provided a clear benchmark to inform the design and evaluation of the consultation process.



Identify and inform affected community and other stakeholders, including those that are hard to reach to seek their perspectives and remove barriers to participation.



Inform the Community and other Stakeholders about the Project.



Inform the community and other stakeholders about the approach to the assessment and how the SEARs will be addressed.



Seek the community and Other stakeholder feedback.



Inform the community and other stakeholders about the cumulative impacts and other concerns that have been identified.



Seek feedback from the community and other stakeholders on the planned responses to issues.

6.2.2 Identification of Community Members and Stakeholders

A comprehensive list of community members and stakeholders to consult throughout the EIA process was developed through:

- The identification of neighbours who would be impacted by the Project unless mitigation measures were implemented,
- The identification of stakeholders who would have a particular interest in the Project.
- The identification of stakeholders who would have information of value to the Project, for example, Aboriginal groups with cultural knowledge relating to the Project site.
- Consultation with the DPIE. This included the community members and stakeholders listed in the Project's SEARs that the Applicant was required to consult.

The below table lists community members and stakeholders identified for consultation using the above methodology and outlines at what stage these groups were consulted during the EIA process. The table also identifies those groups that were identified for consultation in the Project's SEARs

Community Member / Stakeholder	Scoping Report Preparation	EIS Preparation	SEARs Requirement
Department of Planning, Industry and Environment	●	●	●
<ul style="list-style-type: none"> • Crown Lands 	●	●	●
<ul style="list-style-type: none"> • Department of Primary Industry – Water 	●	●	●
<ul style="list-style-type: none"> • Biodiversity Conservation Division 	●		
<ul style="list-style-type: none"> • Department of Primary Industries – Agriculture, NSW Forestry & Fisheries 	●	●	●
<ul style="list-style-type: none"> • Natural Resource Access Regulator 	●	●	●
<ul style="list-style-type: none"> • Division of Resources and Geoscience 		●	●
<ul style="list-style-type: none"> • Energy Environment and Science 		●	●
NSW Environment Protection Authority	●	●	●
Hills Shire Council	●	●	●
Hornsby Shire Council	●		
Maroota Public School	●	●	
Department of Education	●	●	●
Maroota Land Group	●		
Landowners adjoining the Project site	●	●	●

Community Member / Stakeholder	Scoping Report Preparation	EIS Preparation	SEARs Requirement
All Landowners within 1km of the Project Site		●	●
Greater Sydney Local Land Service		●	●
NSW Health		●	●
Water NSW		●	●
NSW Rural Fire Service		●	●
Transport for NSW		●	●
Roads and Maritime Service		●	●

6.2.3 Consultation Methods

A range of consultation methods were used throughout the EIA process to engage community members and stakeholders. These include face to face meetings, teleconferences, letters, phone conversations and emails.

Scoping Report

Consultation for the Project began with a Scoping meeting between the Proponent's project management team and DPIE to discuss the proposed approach to the EIA. Consultation subsequently occurred with community members and stakeholders listed in **Table 25** during the preparation of the Scoping Report to identify matters to assess in the EIS. A copy of the Scoping notification letter provided to community members and stakeholders is provided in **Annexure 21**.

Preparation of SEARs

Following receipt of the Project's Scoping Report, DPIE consulted with various regulatory authorities to inform the development of the Project SEARs. **Annexure 19** provides a copy of the submissions provided to DPIE by the various regulatory authorities.

Preparation of EIS

Information letters were distributed to community members and stakeholders listed in **Table 25** above, during the preparation of the EIS. Those letters contained a Google Drive link that provided online access to a document that presented a detailed overview of the Project. A copy of the EIS notification letter and Google Drive document are provided in **Annexure 21**. Consultation continued with interested parties through letters, emails, and teleconferences as necessary.

The figure on the subsequent page provides an overview of the consultation process undertaken. Section 6.3 of this EIS outlines the different issues that were raised during each phase of consultation and how these issues were addressed.

Consultation Technique	Stakeholder	Consultation Aim Realised
Stage 1: Scoping Meeting		
The Proponent & Project Management Team met with representatives from DPIE to discuss the proposed approach to the EIA including community consultation.		
Stage 2: Preparation of Scoping Report		
Community members and stakeholders with an immediate interest in the Project were engaged to assist with the identification of matters to assess in the EIS.		
<p>Scoping letter of notification that:</p> <ul style="list-style-type: none"> Introduced the Project and the EIA Process. Provided a rationale for the Project; Identified matter of consideration to be assessed in the FIS. Invited feedback. 	<ul style="list-style-type: none"> DPIE & Relevant Divisions NSW EPA Hills Shire Council Hornsby Council Maroota Public School Department of Education Maroota Land Group Landowners adjoining the site 	<ul style="list-style-type: none">  Identify and inform affected community & other stakeholders  Seek feedback  Inform about cumulative impacts and other concerns
<p>Follow up phone conversations occurred, and letters were provided to stakeholders who had queries and raised matters to be assessed in the EIS.</p>	<p>Landowners adjoining the Project Site.</p>	<ul style="list-style-type: none">  Seek feedback
Stage 3: Preparation of SEARs		
DPIE consulted several government agencies during the preparation of SEARs. Their submissions, included as Annexure 19 , informed the matters to assess listed in the SFARs.		
Stage 4: Preparation of EIS		
Community members and stakeholders identified in the Project SFARs were engaged during the preparation of the FIS to assist in the assessment of impacts and design of mitigation measures.		
<p>EIS notification letter was distributed which included a link to a google drive that provided:</p> <ul style="list-style-type: none"> An overview of the Project and EIA process. A rationale for the Project. An overview of key proposed mitigation and monitoring measures Contact details to provide feedback <p>A copy of the EIS notification letter a google link document is provided in Annexure 21.</p>	<ul style="list-style-type: none"> All landowners within 1km DPIE & its Relevant Divisions Maroota Public School Department of Education Greater Sydney Local Land Service NSW Health Water NSW NSW Rural Fire Service Roads and Maritime Service Hills Shire Council NSW EPA Transport for NSW 	<ul style="list-style-type: none">  Inform about the approach to the assessment & meeting the SEARs  Inform about the Project.  Seek feedback  Seek feedback on the planned responses to issues.  Inform about cumulative impacts and other concerns
<p>Ongoing teleconferences, letters and emails with groups that raised concerns or provided feedback</p>	<p>Landowners adjoining the Project Site.</p>	<ul style="list-style-type: none">  Seek feedback about the planned responses to issues.

6.2.4 COVID–19 Implications

One of the SEARs relating to consultation stated that the Applicant was to:

“establish a Community Consultative Committee for the project in accordance with the Community Consultative Committee Guidelines for State Significant Projects, and consult with the committee during the preparation of the EIS;”

The establishment of a Community Consultative Committee involves the selection and meeting of an independent chairperson, up to seven community and stakeholder representatives, a Council representative and up to three representatives of the proponent. The formation and meeting of this twelve–person committee was unfeasible due to Covid–19 restrictions. An email outlining this view was sent to the DPIE who agreed that the establishment Community Consultative Committee was unachievable while social distancing measures are enforced, and that the establishment of a Community Consultation Committee could instead occur by way of a condition of consent. **Annexure 20** provides a copy of the correspondence with DPIE.

6.3 Issues Raised by Stakeholders and the Community

The following table outlines the key issues/matters raised by community members and stakeholders during the preparation of the Scoping Report, SEARs and EIS. The table also outlines where those issues are addressed in the EIS and provides comment on amendments made to the project design to address those issues raised, where relevant. Section 3.6 of the EIS details the revisions of the Project’s design in response to environmental constraints and the outcomes of consultations.

Table 26 – Issues Raised			
Issue Raised	Raised by	Phase	Comment/Design Amendment
Noise			
Noise Impacts on adjoining properties	<ul style="list-style-type: none"> Residents 	Scoping EIS	<ul style="list-style-type: none"> Sand Plant relocated to the rear of the Project Site to remove it from residents to the south. Sales haul road relocated to the north of the site to provide a 100m buffer to residents to the south
Preparation of a Noise Impact Assessment	<ul style="list-style-type: none"> Hills Council Department of Primary Industry NSW EPA DPIE – Environment, Energy & Science Group 	SEARs	A Noise and Vibration Assessment is included as Annexure 9 and is summarised in Section 7.2.
Visual			
Visual Impacts on adjoining properties	<ul style="list-style-type: none"> Residents 	Scoping EIS	Sand Plant relocated to the rear of the Project Site to remove it from residents to the south.
Preparation of a Visual Impact Assessment	<ul style="list-style-type: none"> Hills Council 		A Landscape and Visual Impact Assessment is included as Annexure 12 and is summarised in Section 7.6.

Table 26 – Issues Raised			
Issue Raised	Raised by	Phase	Comment/Design Amendment
Dust			
Dust Impacts on adjoining properties	<ul style="list-style-type: none"> Residents 	EIS Scoping	Proposed dust mitigation measures are provided in Annexure 5 . They include: <ul style="list-style-type: none"> Dampen materials when excessively dusty during handling; Covering or watering of stockpiles; and Regular watering of haul roads.
Preparation of an Air Quality Assessment	<ul style="list-style-type: none"> Hills Council NSW EPA DPIE – Environment, Energy & Science Group 	SEARs	<ul style="list-style-type: none"> An Air Quality Assessment is included as Annexure 13 and is summarised in Section 7.8.
Traffic			
Road Vehicle Safety	<ul style="list-style-type: none"> DPIE – Environment, Energy & Science Group Residents Neighbouring quarry 	Scoping SEARs EIS	The Proponent is proposing to upgrade the Patricia Fay Drive/Wisemans Ferry Road intersection to comply with the relevant standards.
Preparation of a Traffic Impact Assessment	<ul style="list-style-type: none"> Hills Council Transport for NSW 	SEARs	An Traffic Impact Assessment is included as Annexure 11 and is summarised in Section 7.5.
Biodiversity			
Preparation of a comprehensive Biodiversity Development Assessment Report	<ul style="list-style-type: none"> DPIE – Environment, Energy & Science Group Hills Council 	SEARs	An Biodiversity Development Assessment Report is included as Annexure 8 and is summarised in Section 7.1.
Assessment of Riparian Corridor impacts	<ul style="list-style-type: none"> DPIE – Environment, Energy & Science Group 	SEARs	The Biodiversity Development Assessment Report (Annexure 8) includes an assessment of impacts on Riparian corridors .
Rehabilitation & Staging			
Preparation of a rehabilitation strategy and program	<ul style="list-style-type: none"> Hills Council Department of Primary Industries 	SEARs	A Rehabilitation Strategy is included as Annexure 17 and is summarised in Section 3.3. Annexure 18 includes rehabilitation plans.
Preparation of a comprehensive quarry staging plan	<ul style="list-style-type: none"> Hills Council 	SEARs	Comprehensive quarry staging plans are included in Annexure 18 and are described in Section 3.3.
Aboriginal Archaeology			
Preparation of an Archaeological Survey / Assessment Report	<ul style="list-style-type: none"> DPIE – Environment, Energy & Science Group Hills Council 	SEARs	An Aboriginal Cultural Heritage Assessment Report is included as

Table 26 – Issues Raised			
Issue Raised	Raised by	Phase	Comment/Design Amendment
Annexure 14 and is summarised in Section 7.9.			
Water			
Water supply, demand, and availability	<ul style="list-style-type: none"> Department of Primary Industries 	SEARs	<ul style="list-style-type: none"> The Project's water demand is described in Section 3.3.6 and the Water Assessment (Annexure 10). The Water Assessment and Section 7.4 of this EIS demonstrate that there is sufficient water available for the Project.
Surface and Groundwater Impacts	<ul style="list-style-type: none"> Department of Primary Industries 	SEARs	A comprehensive Water Assessment that assesses surface and groundwater impacts is included as Annexure 10 and is summarised in Section 7.4.
Land Capability			
Impact on agricultural resource and land	<ul style="list-style-type: none"> Department of Primary Industries 	SEARs	A Land Capability Assessment that assesses the impact of the Project on surrounding agricultural resources and land is included as Annexure 15 and is summarised in Section 7.10.
Site suitability and development details	<ul style="list-style-type: none"> Department of Primary Industries 	SEARs	<ul style="list-style-type: none"> The Land Capability Statement assessed the suitability of the Project Site against Clause 12 of the <i>Extractive Industries SEPP</i>. A summary of the site's suitability is provided in Section 8.2.7
Bushfire			
Preparation of a Bushfire Impact Report	<ul style="list-style-type: none"> Hills Council 	SEARs	An assessment of bushfire impacts is provided in Section 7.3.
Other Matters			
Establishment of a complaints register	<ul style="list-style-type: none"> Department of Primary Industries NSW EPA Residents 	SEARs EIS	The establishment of a complaints register and hotline has been included in Annexure 5 .
Identification of maximum yearly extraction rates and timeframe for the completion of rehabilitation works	<ul style="list-style-type: none"> Department of Primary Industries Hills Council 	SEARs	As outlined in Section 3.1, the maximum yearly extraction rate for the quarry is 500,000 tonnes of product per year. The expected quarry life is 28 years with an additional two years required for rehabilitation works.
Project's compliance with the <i>Extractive Industries SEPP</i> , <i>Hills Council DCP Section 1</i>	<ul style="list-style-type: none"> Hills Council 	SEARs	Annexure 6 provides a Statutory Compliance Table that outlines the relevant provisions of the <i>Extractive Industries SEPP</i> , <i>SREP No. 09</i> , <i>SREP No. 20</i> and the

Table 26 – Issues Raised

Issue Raised	Raised by	Phase	Comment/Design Amendment
– Rural, SREP No. 09, SREP No. 20 and the Hills LEP			Hills LEP and where those provisions are addressed in the EIS. Annexure 22 provides an assessment of the Application against the Hills DCP Section 1 – Rural.

6.4 Aboriginal Community Consultation

Consultation was undertaken with Aboriginal groups during the preparation of the Aboriginal Cultural Heritage Assessment in accordance with the ‘*Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*’ and the requirements of Clause 60 of the *National Parks and Wildlife Regulation 2019*.

The aim of the consultation process was to integrate cultural and archaeological knowledge and ensure registered Aboriginal stakeholders have information to make decisions on Aboriginal cultural heritage. The Aboriginal consultation process involved the following stages:

- Stage 1 – Notification & Registration of Interest
- Stage 2 – Presentation of Project Information
- Stage 3 – Gathering Information about Cultural Significance
- Stage 4 – Review of Draft Cultural Heritage Assessment

A summary of the Aboriginal consultation process is provided below. Additional details regarding the consultation process is provided in the Aboriginal Cultural Heritage Assessment (**Annexure 14**).

6.4.1 Stage 1: Notification & Registration of Interest

Aboriginal people who hold knowledge relevant to determining the cultural heritage significance of Aboriginal objects and Aboriginal places in the study area were invited to register an interest in a process of community consultation. Nineteen Aboriginal community individuals and groups registered.

6.4.2 Stage 2: Presentation of Project Information

Information regarding the proposed development and study area location was provided to registered Aboriginal stakeholder groups in a letter dated 28/08/2020. Information included an outline of the proposal, location of the study area and an invitation to consult during the assessment.

Stakeholders were provided with the proposed assessment methodology for the Cultural Heritage Assessment Report on 21/09/2020, and invited to review and provide feedback (review period of 28 days, closing on 19/10/2020). An invitation was extended for Aboriginal cultural knowledge holders and stakeholders to provide comments on the proposed cultural heritage assessment methodology, including any protocols regarding the gathering of information and any matters such as issues/areas of cultural significance that might affect, inform or refine the assessment methodology.

Responses to the proposed assessment methodology were received from seven Registered Aboriginal Parties, each of which supported the recommended methodology.

6.4.3 Stage 3: Gathering Information about Cultural Significance

An unpaid site visit was organised to provide stakeholders with an opportunity to visit the study area and inspect some of the identified Aboriginal archaeological sites. The site visit was organised for Friday 28 May 2021 and was attended by representatives from registered stakeholder groups.

General discussion among attendees confirmed the importance of avoiding impact to the rock shelters and grinding groove sites, and the high cultural value of the area. It was agreed that avoidance of impacts represented a positive outcome for Aboriginal heritage.

6.4.4 Stage 4: Review of Draft Aboriginal Cultural Heritage Assessment

The draft Aboriginal Cultural Heritage Assessment Report was provided to registered Aboriginal stakeholders for review and comment. All registered Aboriginal stakeholders will be provided with a 28-day period for review. Comments received from the stakeholders during this period are attached to Appendix C of the Aboriginal Cultural Heritage Assessment Report (**Annexure 14**).

One response to the draft Aboriginal Cultural Heritage Assessment Report was received, from a stakeholder who chose to withhold their details and correspondence. This stakeholder stated they agreed with the findings of the draft Aboriginal Cultural Heritage Assessment Report.

6.5 Operational Public Engagement

The Proponent is committed to ongoing community consultation following the submission of the EIS. This includes during the exhibition and assessment of the Project, and if approved, following a determination.

6.5.1 Exhibition & Assessment

Following its submission, DPIE will exhibit the EIS on the Major Projects NSW Website and invite submissions from government agencies and the public. Once the exhibition period is complete, DPIE may require the Proponent to prepare a Submissions Report in response to issues raised. The Proponent will continue to liaise with DPIE, community members and stakeholders during the Project's assessment to address any queries that arise.

6.5.2 Post Approval

If approved, the DPIE will issue the Conditions of Consent for the Project which will include requirements for community and stakeholder consultation throughout the life of the sand operation. The Proponent will implement the following post-approval community and stakeholder consultation strategies in addition to the Conditions of Consent requirements.

Table 27 – Post Approval Consultation Strategies

Consultation Strategy	Description
 <p>Public Information Website</p>	<p>The Proponent will commission a publicly accessible website. That website will include:</p> <ul style="list-style-type: none"> • A description of the Project. • The Project's Environmental Management Strategy and monitoring reports. • Meeting minutes for the Project's Community Consultation Committee. • Contact details.
 <p>Community Consultation Committee</p>	<p>As noted in Section 6.2.4, DLALC will establish a Community Consultation Committee for the Project in accordance with the <i>Community Consultative Committee Guidelines for State Significant Projects</i>. That committee will consist of:</p> <ul style="list-style-type: none"> • An independent chairperson; • Up to seven community and stakeholder representatives; • A council representative; and • Up to three representatives of the proponent. <p>That committee will meet during the construction and operation of the Project.</p>
 <p>Complaints Hotline</p>	<p>A 24-hour complaints hotline will be established to respond to community concerns relating to the Project's operations. Where necessary, communication via letter, email, teleconference or person to person meetings will be undertaken to address community concerns.</p>



7. Environmental Impact Assessment

This section assesses the potential environmental, social and economic impacts of the Project and details proposed management, mitigation and monitoring methods.

The Project SEARs require the EIS to include an assessment of the likely impacts of the development on the environment, focusing on the key issues identified in the SEARs. That assessment is to include:

- *a description of the existing environment likely to be affected by the development, using sufficient baseline data;*
- *an assessment of the likely impacts of all stages of the development, including any cumulative impacts, taking into consideration any relevant laws, environmental planning instruments, guidelines, policies, plans and industry codes of practice;*
- *a description of the measures that would be implemented to avoid, minimise, mitigate and/or offset the likely impacts of the development, and an assessment of:*
 - *whether these measures are consistent with industry best practice, and represent the full range of reasonable and feasible mitigation measures that could be implemented;*
 - *the likely effectiveness of these measures; and*
 - *whether contingency measures would be necessary to manage any residual risks; and*
- *a description of the measures that would be implemented to monitor and report on the environmental performance of the development.*

The following table details the key matters/issues for assessment identified through the SEARs and community consultation. It also identifies where that matter has been addressed in the EIS and, if applicable, the accompanying technical study.

Table 28 – Environmental Impact Assessment Matters		
Matter	Section	Technical Study
Biodiversity	Section 7.1	Biodiversity Development Assessment Report (Annexure 8)
Noise	Section 7.2	Noise & Vibration Assessment (Annexure 9)
Hazards	Section 7.3	
Water	Section 7.4	Water Assessment (Annexure 10)
Traffic, Transport & Access	Section 7.5	Traffic Impact Assessment (Annexure 11)
Visual	Section 7.6	Landscape and Visual Impact Assessment (Annexure 12)
Waste	Section 7.7	
Air Quality	Section 7.8	Air Quality Assessment (Annexure 13)
Aboriginal Archaeology & Heritage	Section 7.9	Aboriginal Cultural Heritage Assessment (Annexure 14)
Land Resource	Section 7.10	Land Capability Assessment (Annexure 15)
Social and Economic	Section 7.11	Social and Economic Impact Assessment (Annexure 16)
Blasting & Vibration	Section 7.12	Noise & Vibration Assessment (Annexure 9)

Annexure 5 provides a consolidated summary of all the proposed environmental management and monitoring measures.



Biodiversity

The Project's SEARs require the EIS to address the following key issues relating to biodiversity:

Table 29 – SEARs Biodiversity

Requirement	Addressed at EIS Section
Accurate predictions of any vegetation to be cleared on site	Section 7.1.2 Annexure 8
A detailed assessment of the likely biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems, undertaken in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report;	Section 7.1.3 Annexure 8
A strategy to offset any residual impacts of the development in accordance with the offset rules under the Biodiversity Conservation Act 2016	Section 3.4 Annexure 8

Eco Logical Australia was engaged to prepare a Biodiversity Development Assessment Report (*BDAR*) that provides an accurate prediction of any vegetation to be cleared on site, a detailed assessment of the Project's biodiversity impacts, and a proposed biodiversity offset strategy in accordance with the NSW biodiversity offset framework. The BDAR is included as **Annexure 8**.

The following section provides a summary of the BDAR, including proposed mitigation measures.

Key Biodiversity Definitions

Biodiversity Assessment Method (BAM)	The BAM is a scientific document that provides a method for the assessment of biodiversity values on land proposed for development. It also guides how a proponent can avoid and minimise potential biodiversity impacts and outlines the number and class of biodiversity credits required to offset the impact of a project.
Development Footprint	The area of land that is directly impacted by a proposed development. The Project's development footprint is 50.95ha. Biodiversity credits are calculated for the development footprint.
Development Site	The development site comprises the development footprint and the following indirect impact buffer areas. The Project's development site is 62.3ha. indirect impact buffer areas will be subject to mitigation measures.
Plant Community Types	A Plant Community Type is a collection of species within a geographical unit that share a characteristic habitat.
Threatened Ecological Communities	A threatened ecological community is either listed as endangered or vulnerable under the <i>Biodiversity Conservation Act</i> .
bioregion	Bioregions are relatively large land areas characterised by broad, landscape-scale natural features and environmental processes that influence the functions of entire ecosystems.
Endangered	A species is suspected to have undergone or is likely to undergo a severe reduction in the immediate future and the total number of mature individuals is low or very low.
Vulnerable	A species is suspected to have undergone or is likely to undergo a substantial reduction in the immediate future and the total number of mature individuals is limited or low.
Groundwater Dependent Ecosystems	Groundwater Dependent Ecosystems are ecosystems whose current species, structure and function are reliant on a supply of groundwater.
Home Range	An animal's home range is the area in which it lives and conducts its daily activities
Biodiversity Offset Credit	Biodiversity credits are generated from management actions that improve biodiversity values and are used to offset the loss of biodiversity values on development sites.

7.1.1 Assessment Methodology

The BDAR has been prepared in accordance with the *Biodiversity Assessment Method 2020 (BAM)* established by the Minister under Section 6.7 of the *Biodiversity Conservation Act 2016 (Conservation Act)*. The following section describes the assessment methodology utilised for the preparation of the BDAR.

7.1.1.1 Defining the Development Footprint – Direct Impacts

A project's development footprint is used to assess its direct impact on biodiversity, and the biodiversity credits required to offset those impacts. The BAM defines the Project's development footprint as *"the area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials. The term development footprint is also taken to include clearing footprint."*

The Project's development footprint includes the extraction area, plant and administration area, water storage dam, haul roads and selected areas of vegetation which will be heavily affected by the development. It also includes the following direct impact buffers:

- A 10m buffer around the edge of the extraction area;
- A 5m buffer surrounding the plant infrastructure area and dam;
- A 2m buffer either side of the sales haul road; and
- The area of retained vegetation located between the infrastructure area and the extraction area to the north.

Using the above definition and calculations, the direct impact development footprint for the Project is 50.95ha. Biodiversity credits are calculated for the development footprint. **Figure 48** below shows the extent of the Project's development footprint.

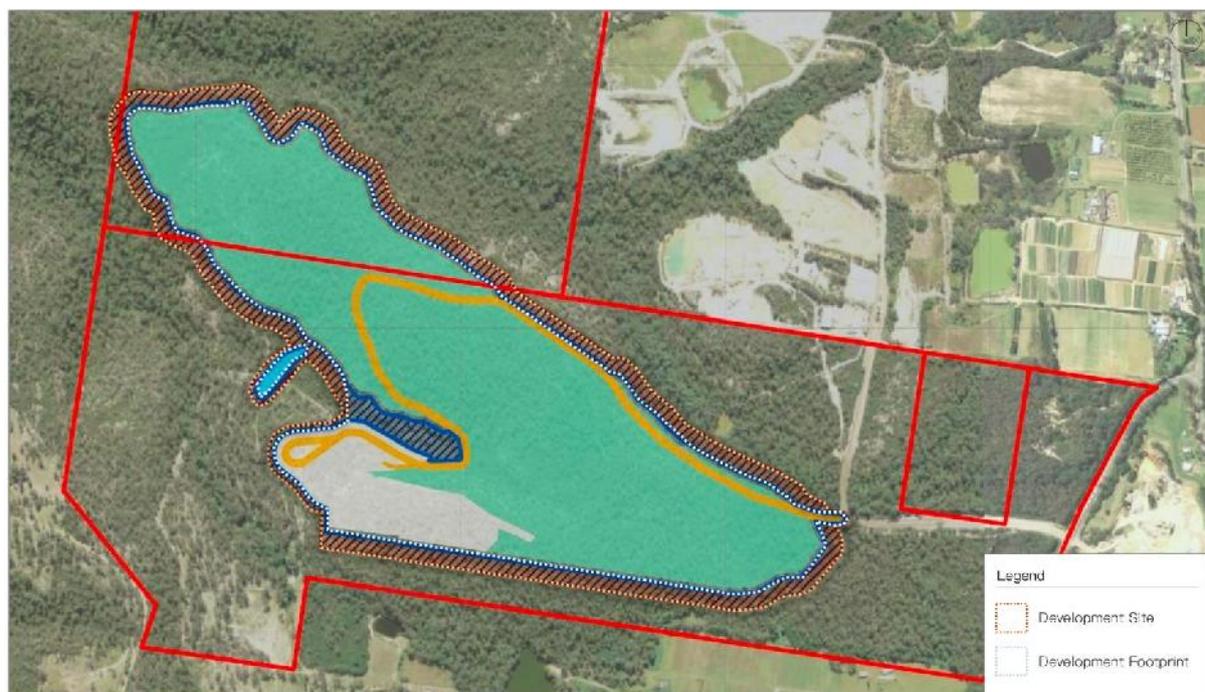


Figure 48: Development Footprint & Site (Base Image Source: Eco Logical, 2021)

7.1.1.2 Defining the Development Site – Indirect Impacts

The BAM defines the development site as “*an area of land that is subject to a proposed development application, application for approval, or activity within the meaning of Part 5 of the Environmental Planning and Assessment Act*”. The development site comprises the development footprint and the following indirect impact buffer areas:

- extraction area – 30m additional buffer around the edge of the 10m direct impact area buffer;
- plant area – 10m additional buffer around the edge of the 5m direct impact area buffer; and
- sales haul road – 5m additional buffer on the outside edges of the 2m direct impact buffer.

The development site is 61.92ha in size according to the above criteria. Biodiversity credits have not been calculated for these indirect impact buffer areas. Instead, these areas will be subject to mitigation measures. **Figure 48** above shows the extent of the development site.

7.1.1.3 Desktop Assessment

A desktop assessment was undertaken to develop a comprehensive understanding of the local environment including landscape features. The following information sources were reviewed.

- BioNet Vegetation Classification.
- Threatened Biodiversity Data Collection.
- BioNet / Atlas of NSW Wildlife 5 km database search.
- Groundwater Dependent Ecosystems Atlas.
- *EPBC* Protected Matters Search Tool 5 km database search.
- NSW Government Biodiversity Values Map and Threshold.
- Aerial mapping.
- Additional geographic information system datasets including soil, topography, geology, and drainage; and
- *Wisemans Ferry Road, Maroota Due Diligence Ecology Report for Deerubbin Local Aboriginal Land Council* May 2011 Draft Report prepared by Cumberland Ecology.

7.1.1.4 Vegetation Mapping & BAM Plots

A total of 20 full-floristic and vegetation integrity plots were surveyed over eight site visits from 14 January 2020 to 7 July 2020 to identify Plant Community Types (PCT's) and Threatened Ecological Communities (TEC's) within and adjacent to the development site. All field data collected at full-floristic and vegetation integrity plots is included in the BDAR's appendices.

7.1.1.5 Targeted Flora and Fauna Survey's

During vegetation survey and site assessments, habitat features for threatened fauna were identified and mapped within the development site. This informed the methodology for targeted surveys. Targeted flora and fauna methodology were also undertaken in accordance with the following documents:

- ‘Species credit’ threatened bats and their habitats.
- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft.*
- *Surveying Threatened Plant and their Habitats – NSW Survey Guide for the Biodiversity Assessment Method.*
- *A review of koala tree use across New South Wales.*

The following table details the targeted fauna survey’s undertaken, including survey methodology, species targeted and survey duration.

Table 30 – Targeted Fauna Surveys		
Survey & Survey Method	Species targeted	Duration
<p>Microbat Survey</p> <p>Microbat surveys were undertaken using four Anabat Swift ultrasonic detectors set over four nights.</p>	<ul style="list-style-type: none"> • Southern Myotis • Large-eared Pied Bat • Eastern Cave Bat 	<p>24 Feb –</p> <p>28 Feb 2020</p>
<p>Koala Survey</p> <p>Suitable habitat was searched for scats and scratch marks using techniques taken from the Spot Assessment Technique and parallel field traverses.</p>	<ul style="list-style-type: none"> • Koala 	<p>22 & 29 July 2020</p>
<p>Dural Land Snail survey</p> <p>Surveys were undertaken in areas of vegetation identified as Plant Community Type 1081 within the development site for Dural Land Snail shells or live individuals. This involved overturning leaf litter and logs across parallel field traverses.</p>	<ul style="list-style-type: none"> • Dural Land Snail 	<p>22 & 29 July 2020</p>
<p>Forest owl and arboreal mammal nocturnal surveys- spotlighting and call playback</p> <p>Survey involved an initial listening period of 10 to 15 minutes, followed by a spotlight search for 10 minutes, call playback for 5 minutes, followed by another 10-minute listening period.</p>	<ul style="list-style-type: none"> • Squirrel Glider • Brush-tailed Phascogale • Koala • Powerful, Barking & Powerful Owl 	<p>Eight nights in</p> <p>June & July 2020</p>
<p>Cockatoo Survey</p> <p>Survey involved opportunistic Stagwatching for potential nesting hollows or areas of activity</p>	<ul style="list-style-type: none"> • Gang-gang Cockatoo • Glossy Black Cockatoo 	<p>16 Jan & 7 July 2020</p>

Where suitable habitat was identified for candidate threatened flora species, Eco Logical undertook targeted flora surveys in accordance with *NSW Guide to Surveying Threatened Plants* (DPIE 2020) and within the seasonal requirements outlined in the BAM Calculator and Threatened Biodiversity Data Collection. Targeted flora surveys involved parallel field traverses with a separation width of approximately 10m within areas of open vegetation and 5m in areas of dense vegetation. Targeted flora survey’s occurred on 1 May 2020 and 1 June 2020.

7.1.2 Existing Ecological Condition of the Development Site

7.1.2.1 Bioregion & Subregion

The development site falls entirely within the Sydney Basin bioregion and the Yengo subregion.

7.1.2.2 Native Vegetation

The development site is located wholly within good condition remnant native vegetation. The development site has been subject to past clearing and disturbance in places, however degraded areas are limited to the study area boundaries to the south and east on the fringes of urban development.

A total of four Plant Community Types were identified within the development site, and six were identified across the Project site. **Figure 49** shows the location of these Plant Community Types while the below table lists the Plant Community Types located within the development site.

Plant Community Type	Threatened Ecological Community	Area
Plant Community Type 1081		
Red Bloodwood – Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion	Cth EPBC Act	25.71ha
Plant Community Type 1083		
Red Bloodwood – scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion	–	3.27ha
Plant Community Type 1328		
Yellow Bloodwood – Narrow-leaved Apple heathy woodland on hinterland plateaux of the Central Coast, Sydney Basin Bioregion	–	13.8ha
Plant Community Type 1181		
Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion	–	8.17ha
Total		50.95ha

Plant Community Types 1081 is listed as a Threatened Ecological Community under the Commonwealth EPBC Act: *Shale Sandstone Transition Forest of the Sydney Basin Bioregion*.

Plant Community Types 923, which is located outside the development site, is listed as a Threatened Ecological Community under the State *Conservation Act: Maroota Sands Swamp Forest*. The location of this Plant Community Type is shown in **Figure 49** below. Mitigation measures, described in Section 7.1.4, will be implemented to mitigate adverse impacts on this community.

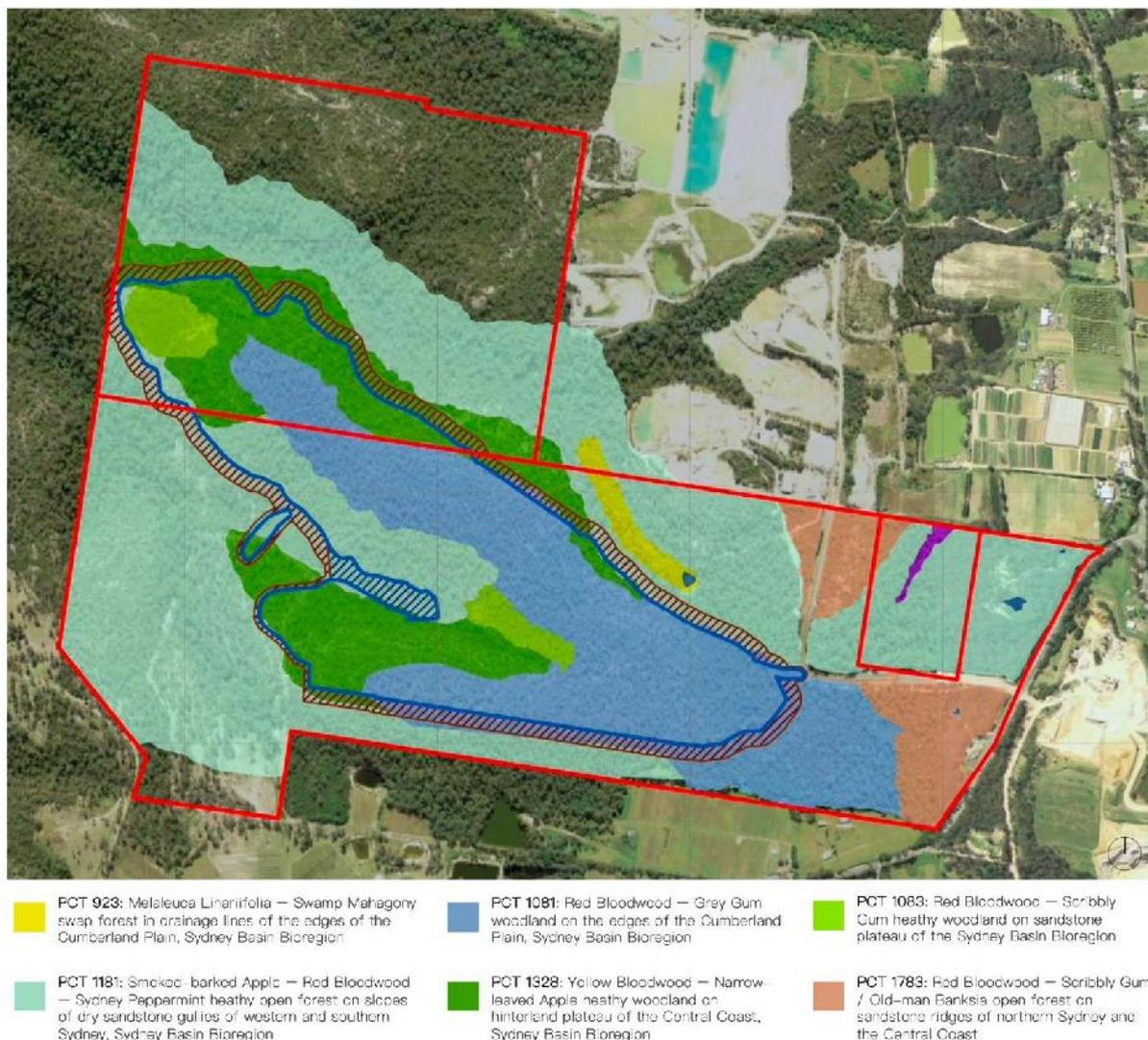


Figure 49: Plant Community Type's (Base Image Source: Eco Logical, 2021)

7.1.2.3 Groundwater Dependiant Ecosystem

Groundwater Dependiant Ecosystems are ecosystems whose current species, structure and function are reliant on a supply of groundwater. A Groundwater Dependiant Ecosystems known as the *Maroota Sands Swamp Forest*, is present on the site. Its location is shown as PCT 923 in Figure 49 above. This community is located outside the direct and indirect impact areas of the development site.

The *Maroota Sands Swamp Forest* is listed as endangered under the *Conservation Act*. Therefore, management measures, outlined in Section 7.1.3.3 and Section 7.1.4, are proposed to mitigate impact to this ecosystem.

7.1.2.4 Threatened Flora & Fauna Species

Table 32 lists the threatened flora and fauna species that were located at the development site during targeted surveys. The location of each threatened species is also shown in Figure 50 and Figure 51 further below.

Project time constraints did not allow flora and fauna surveys to occur for certain species during their allocated BAM survey period. Instead, the highest presence of certain species has been assumed based upon habitat within the development site. Table 32 also lists the threatened flora and fauna species that are assumed to

be located within the development site. Section 1.7.4 of the BDAR provides a justification for the inclusion of each species. These species have been included in the BAM credit calculations.

Table 32 – Flora and Fauna Surveyed & Assumed at the Development Site				
Scientific Name	Common name	Surveyed / Assumed	NSW Status	EPBC Status
Fauna				
<i>Calyptorhynchus lathami</i>	Glossy Black Cockatoo	Surveyed	V	–
<i>Myotis macropus</i>	Southern Myotis	Surveyed	V	–
<i>Ninox strenua</i>	Powerful Owl	Surveyed	V	–
<i>Petaurus norfolcensis</i>	Squirrel Glider	Surveyed	V	–
<i>Pommerhelix duralensis</i>	Dural Land Snail	Surveyed	E	E
<i>Pseudophryne australis</i>	Red-crowned Toadlet	Surveyed	V	–
<i>Cercartetus nanus</i>	Eastern Pygmy Possum	Assumed	V	–
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	Assumed	E	V
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	Assumed	V	V
Flora				
<i>Acacia bynoeana</i>	Bynoe's Wattle	Surveyed	E	V
<i>Kunzea rupestris</i>	–	Surveyed	V	V
<i>Pimelea curviflora</i> var. <i>curviflora</i>	–	Surveyed	V	V
<i>Tetratheca glandulosa</i>	–	Surveyed	V	–

E: Endangered

A species is suspected to have undergone or is likely to undergo a severe reduction in the immediate future and the total number of mature individuals is low or very low

Threatened Species Scientific Community

V: Vulnerable

A species is suspected to have undergone or is likely to undergo a substantial reduction in the immediate future and the total number of mature individuals is limited or low

Threatened Species Scientific Community

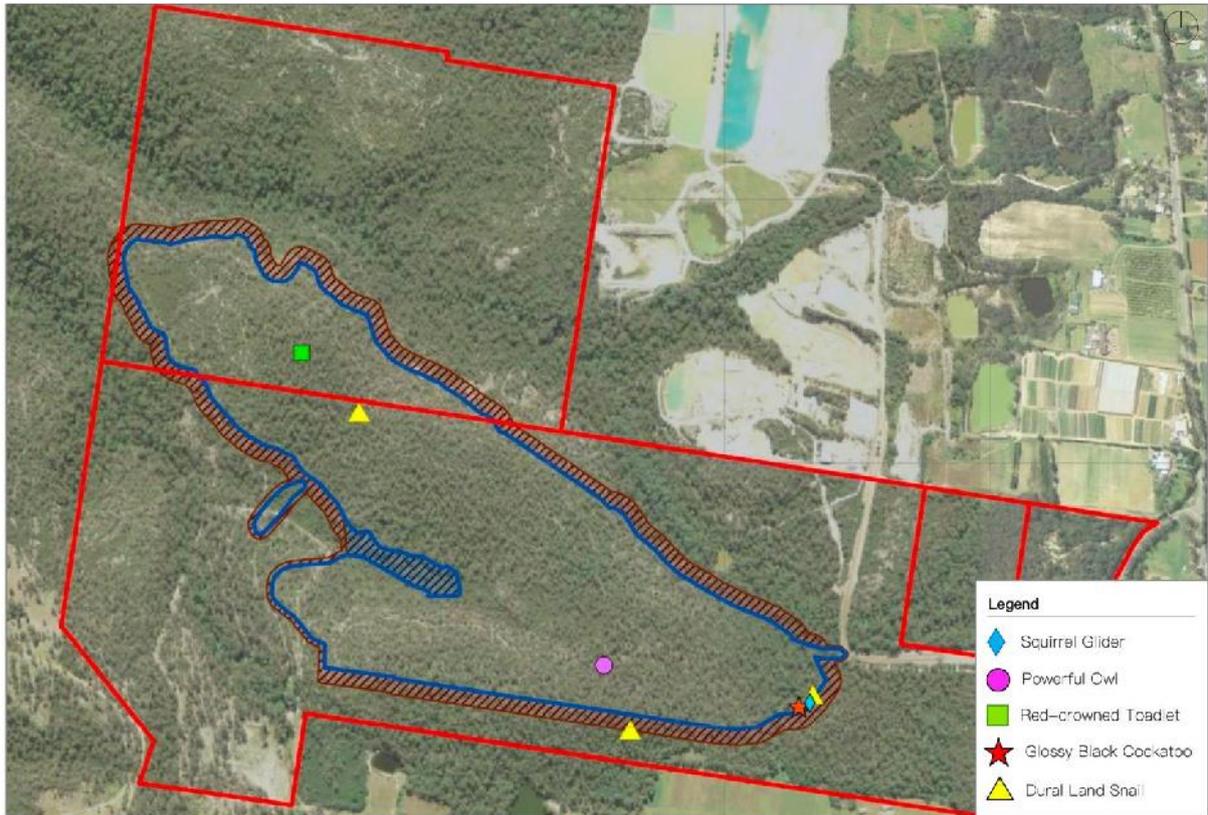


Figure 50: Location of Threatened Fauna Species (Base Image: Ecological, 2021)

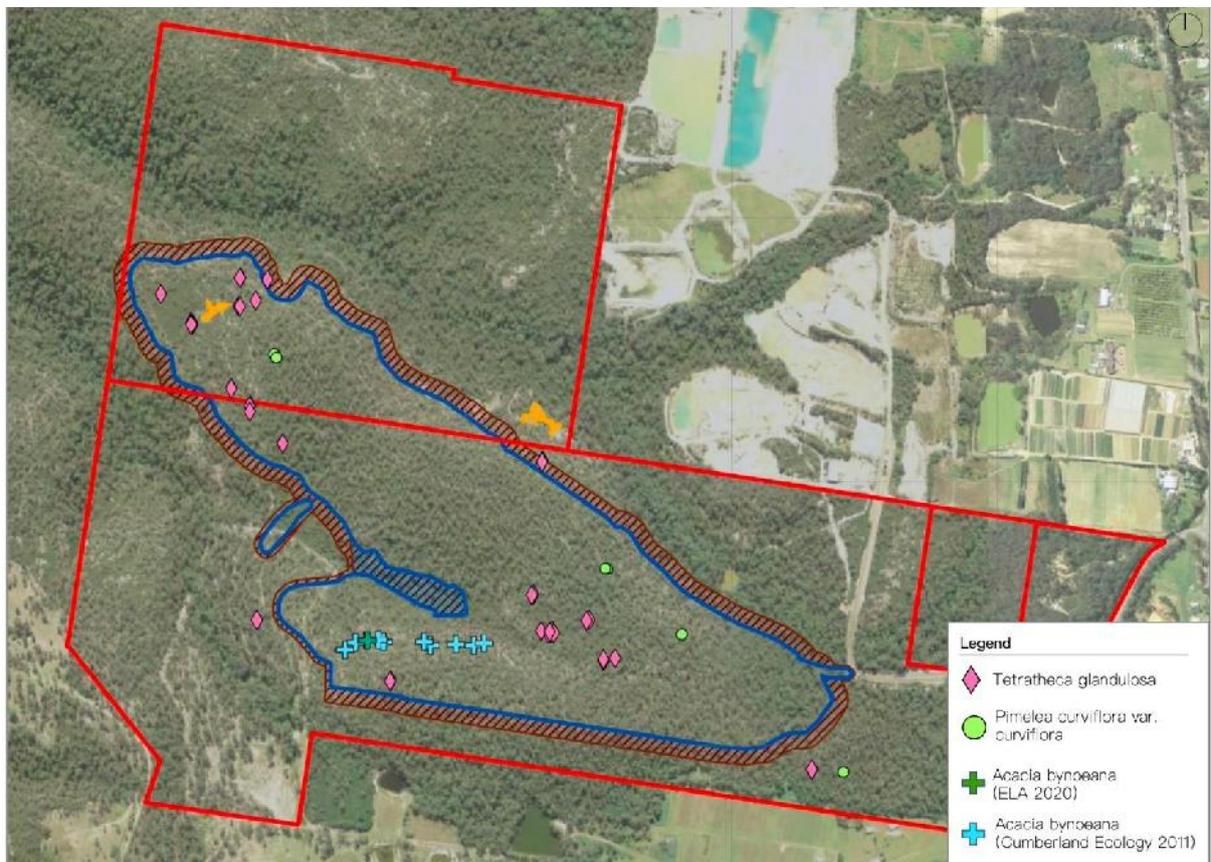


Figure 51: Location of Threatened Flora Species (Base Image: Ecological, 2021)

7.1.3 Impact Assessment

7.1.3.1 Direct Impacts

Direct Impacts for the Project are contained to the 50.95ha Development footprint described above in Section 7.1.1 of the EIS. The following table outlines direct impacts to native vegetation and threatened ecological communities, species, and species habitat.

Table 33 – Direct Impacts				
Native Vegetation				
PCT ID	PCT Name	Direct impact		
1081	Red Bloodwood – Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion	25.71ha		
1083	Red Bloodwood – scribbly gum heathy woodland on sandstone plateau of the Sydney Basin Bioregion	3.27ha		
1328	Yellow Bloodwood – Narrow-leaved Apple heathy woodland on hinterland plateau of the Central Coast, Sydney Basin Bioregion	13.8ha		
1181	Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion	8.17ha		
Threatened Ecological Communities				
PCT ID	Name	NSW Status	EPBC Status	Direct Impacts
1081	Shale Sandstone Transition Forest of the Sydney Basin Bioregion	–	CEEC	25.71ha
Threatened Species and Habitat				
Species	Common Name	NSW Status	EPBC Status	Direct Impacts
<i>Acacia bynoeana</i>	Bynoe's Wattle	E	V	1.64ha
<i>Calyptorhynchus lathami</i>	Glossy Black Cockatoo	V	–	49.04ha
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	–	50.95ha
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	50.95ha
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	E	V	25.24ha
<i>Kunzea rupestris</i>		V	V	0.81ha
<i>Myotis macropus</i>	Southern Myotis	V	–	7.08ha
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	–	50.95ha
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	0.91ha
<i>Pommerhelix duralensis</i>	Dural Land Snail	E	E	25.71ha
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V	–	24.50ha
<i>Tetratheca glandulosa</i>		V	–	4.13ha

7.1.3.2 Serious and Irreversible Impacts

The Project has a candidate for Serious and Irreversible Impacts. That being the Broad-headed Snake as it is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not considered replaceable. Table 43 of the BDAR provides a detailed assessment of the Project's impact on the candidate species.

Eco Logical surveyed 25.24ha of potential habitat for the Broad-headed Snake across the development footprint. It is noted that this species was not observed during surveys and no BioNet record exists for the species within 5km of the Project Site. The home range for this species, which is the area in which an animal lives and conducts its daily activities, is approximately 3.43ha. The Broad-headed Snake is unlikely to move into unoccupied habitat due to short dispersal distances of both adults and juvenile snakes. Approximately ten home ranges will be affected, and 30 home ranges will be preserved at the Project site.

Populations of the Broad-headed Snake exist outside the Maroota area. Suitable sandstone habitat for the Broad-headed Snake extends to within an approximate 200 km radius of Sydney.

The Proponent is proposing to establish an offset site in the same bioregion and subregion and in similar habitat to the development site to account for the loss of the Broad-headed Snake habitat.

7.1.3.3 Groundwater Dependent Ecosystem

The *Maroota Sands Swamp Forest* is dependent on both groundwater inflow and external sources from two 1st order creek lines that flow in from the east. It therefore relies upon surface water as well as groundwater to sustain its ecosystem.

The Project design includes a 50m buffer from the edge of the extraction area to the southern edge of the Groundwater Dependent Ecosystem. The Project is also an above water table quarry operation, with the quarry depth set to 2m above the observed wet weather high groundwater elevations. These measures will ameliorate potential adverse impacts to the Groundwater Dependent Ecosystem.

An ongoing groundwater monitoring program will be implemented near the Groundwater Dependent Ecosystem to ensure that sufficient water levels are maintained to support it. In addition, heavy-duty fencing will be constructed to separate development site from surrounding vegetation, including the Groundwater Dependent Ecosystem. 'No Go' signage will also be installed near the ecosystem.

7.1.3.4 Indirect Impacts

Indirect impacts are described in the BAM as *“development related activities not associated with clearing for the development footprint. Examples include increased noise, dust, light spill, weeds and pathogens and edge effects that can be reasonably attributed to the development. Indirect impacts often occur beyond the development footprint or even the development site, have a lower or variable intensity of impact compared to direct impacts, may be harder to predict spatially and temporally, may have unclear boundaries of responsibility.”*

Primary potential indirect impacts include:

- Sedimentation and contaminated and/or nutrient rich run-off;

- Noise, dust or light spill;
- Inadvertent impacts on adjacent habitat or vegetation;
- Transport of weeds and pathogens from the site to adjacent vegetation;
- Vehicle strike;
- Trampling of threatened flora species;
- Rubbish dumping;
- Wood collection;
- Bush rock removal and disturbance;
- Increase in predatory species and pest populations; and
- Increased risk of fire.

Management and monitoring measures have been designed to mitigate the above listed potential indirect impacts. Those measures are described in Section 7.1.4 of the EIS.

7.1.4 Management and Monitoring Measures

Biodiversity management measures proposed for the Project have been designed to meet the following principles. These principles are ordered in a hierarchy.



7.1.4.1 Impact Avoidance & Minimisation

Due to the location of Hawkesbury Sandstone at the Project Site, it is not feasible to locate the Project in a location that wholly avoids impacts to vegetation and habitat. However, during the Project design phase, there were a number of footprint iterations which demonstrate that a process of avoiding and minimising impact was implemented. Section 3.6 describes these design iterations. The key amendments to the Project's design to avoid impacts to biodiversity values included:

- Relocating the Project's site infrastructure area from the east to the west of the Project site. This reduced the Project's impact on the threatened *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* (PCT 1081);
- Locating the Project's sales haul road within the extraction footprint to minimise the Project's area of disturbance;
- The provision of a 50m buffer to the endangered *Maroota Sands Swamp Forest*;
- Maintaining a 100m biodiversity corridor along the southern boundary of the Project site;
- Selecting a sand plant that allows the generation of dry cake tailings, thus removing the need for extensive tailings dams that increase the Project's area of disturbance; and
- Relocating the Project's surface water dam from a 3rd order watercourse to a 2nd order watercourse to reduce impacts to riparian corridors.

The below figure chronicles the reduction of the Project's development footprint, and thus the area of disturbance across the various design iterations.

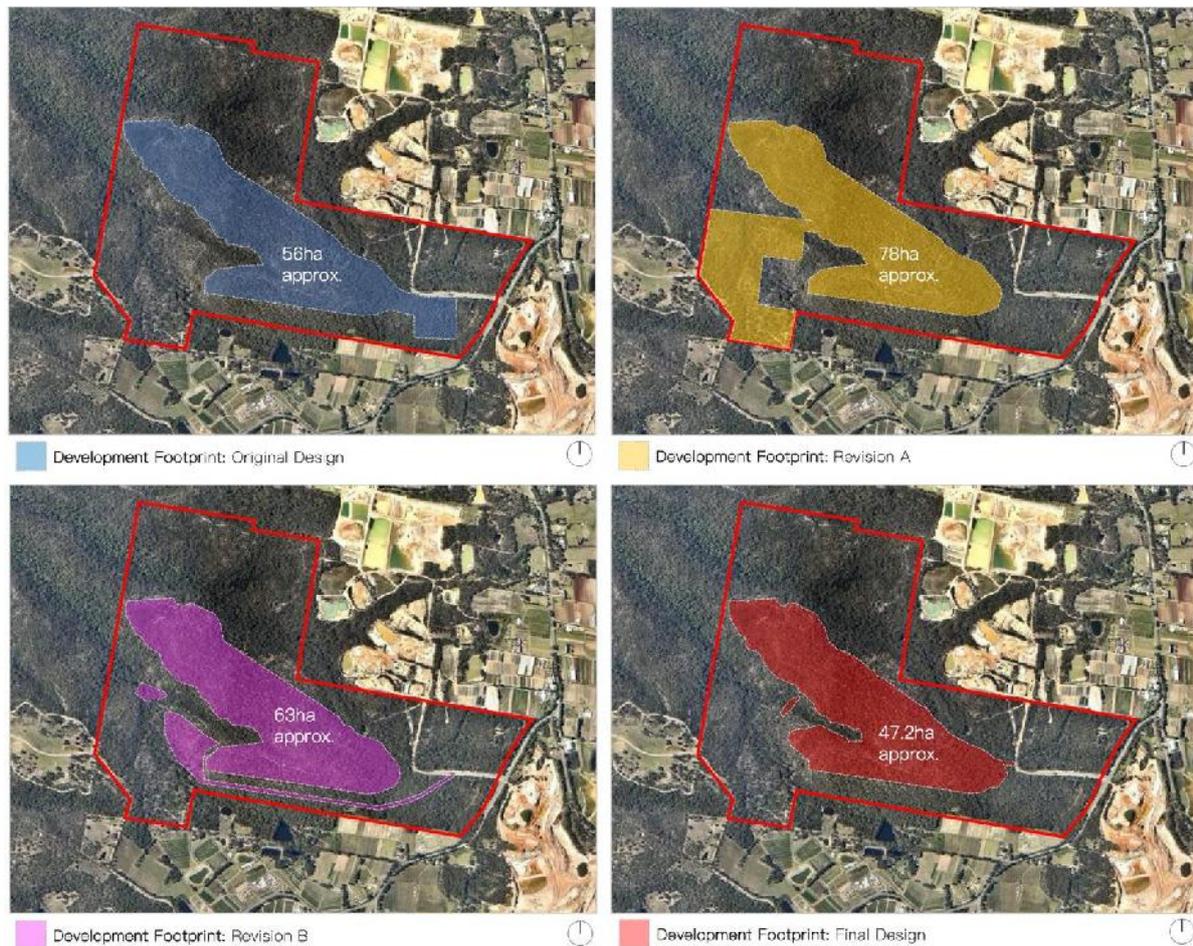


Figure 52: Reduction of Project's Development Footprint (Excludes Buffers) (Base Image Source: Nearthmap, 2020)

7.1.4.2 Mitigation Measures and Monitoring

The following management and monitoring measures will be implemented to mitigate adverse impacts to biodiversity. These measures have been included in Annexure 5.

Table 34 — Biodiversity Management Measures	
Measure	Action Items
Timing works to avoid critical life cycle events such as breeding or nursing.	<ul style="list-style-type: none"> Where achievable, felling of hollowing bearing trees is to be undertaken outside spring and summer. If this is not possible, strict pre-clearing protocols must be observed when removing tree hollows.
A trained ecologist or licensed wildlife handler is to be present during clearing events.	<ul style="list-style-type: none"> Pre-clearance and clearance surveys are to be undertaken by a suitably qualified ecologist to relocate fauna. Clearing areas are to be surveyed in detail for the Dural Land Snail. Live snails are to be relocated to the retained vegetation (PCT1081) in the east of the Project Site.

Installing artificial habitats for fauna in adjacent retained vegetation to encourage animals to move from the impacted site.	<ul style="list-style-type: none"> Removed hollows are to be retained and reused. A nest box and retained hollow plan is to be prepared and implemented. Nest boxes are to be selected that match the likely target species of each hollow and installed before construction. Boxes are to be maintained and monitored for a period of five years.
Lighting is to be designed to minimise impacts to nocturnal and diurnal fauna.	<ul style="list-style-type: none"> Limiting the duration of spotlight illumination. Installation of shield fixtures to reduce light scattering. Narrow-spectrum light sources are to be used to reduce the wavelengths likely to interfere with animal behaviour.
Clearing protocols to identify vegetation to retain, prevent inadvertent damage and reduce soil disturbance.	<ul style="list-style-type: none"> The boundaries of proposed clearance areas are to be clearly delineated with heavy duty fencing. Installation of 'no go' signage for retained areas of high value, particularly adjacent to the <i>Maroota Sand Swamp Forest</i>.
Areas of <i>Kunzea rupestris</i> to be protected by fencing	<ul style="list-style-type: none"> Areas containing retained <i>Kunzea rupestris</i> plus a 30m buffer in the indirect impact area in the north of the development site are to be protected by permanent fencing.
Installation of sediment barriers or ponds to control the quality of water realised from the site.	<ul style="list-style-type: none"> Install permanent sediment barriers and erosion control during and post construction to prevent runoff into adjacent creek lines and downstream into the Maroota Sand Swamp Forest.
Strategic daily timing of construction activities to reduce noise impacts.	<ul style="list-style-type: none"> Daily timing of construction activities is recommended in accordance with table 1 of Interim Noise Guidelines (2009).
Strategic daily timing of construction activities to reduce light spill impacts.	<ul style="list-style-type: none"> Conduct construction works during daylight hours.
Adaptive dust monitoring program	<ul style="list-style-type: none"> Dust management controls are to be implemented per the recommendations of the Air Quality Report.
On site water management	<ul style="list-style-type: none"> All water used onsite is to be managed in accordance with the Project's water management plan.
Programming construction activities to avoid impacts	<ul style="list-style-type: none"> Impacts to vegetation during the Spring and Summer breeding period should be minimised to avoid disrupting the breeding cycles of threatened species.
Temporary fencing to protect significant environmental features	<ul style="list-style-type: none"> Temporary fencing and signage are to be installed at the edge of the development site to prevent entry into the adjacent retained vegetation.
Hygiene protocols to prevent the spread of weeds or pathogens	<ul style="list-style-type: none"> Phytophthora control measures are to be undertaken in accordance with the Commonwealth Department of Agriculture, Water and Environment Guidelines. Vehicle, machinery and building refuse is to remain within the development site and disposed appropriately.
Staff training and briefings to protect environmental features	<ul style="list-style-type: none"> All staff working on the project are to undertake an environmental induction that outlines site environmental procedures, threatened species and communities, what to do in the event of an environmental emergency, key contact and what to do if a threatened species or fauna is found.

Provisions for ecological restoration and maintenance of adjoining native vegetation	<ul style="list-style-type: none"> • A Vegetation Management Plan is to be prepared for retained bushland. • The Project's Rehabilitation Strategy (Annexure 17) is to be implemented. This includes the restoration native bushland corridor, approximately 50m wide along the north–west boundary of the extraction area.
Groundwater monitoring adjacent to Maroota Sands Swamp Forest Groundwater Dependent Ecosystem and riparian area.	<ul style="list-style-type: none"> • An ongoing groundwater monitoring program is to be implemented to monitor groundwater levels to avoid any direct and indirect impacts to the Maroota Sands Swamp Forest Groundwater Dependent Ecosystem and riparian areas.

7.1.4.3 Adaptive Management Strategy

Some impacts are difficult to predict or assess before the commencement of operations. An adaptive management strategy is therefore required. Adaptive management is an adjustment of action based on the results of monitoring to achieve a certain outcome.

For this Project, an adaptive management strategy will be prepared to monitor potential impacts to the *Maroota Sands Swamp Forest* and associated creek lines and the creek line that feeds the water storage area.

7.1.4.4 Credit Offsets

The BAM provides that the retirement of biodiversity credits may be used to mitigate the biodiversity impacts of the Project on native vegetation, threatened species and their habitat. The following table outlines the number of ecosystems credits required under the BAM to offset unavoidable biodiversity impacts of the Project.

Table 35 – Offset Credits required		
Native Vegetation		
PCT ID	PCT Name	Credits Required
1081	Red Bloodwood – Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion	536
1083	Red Bloodwood – scribbly gum heathy woodland on sandstone plateau of the Sydney Basin Bioregion	66
1328	Yellow Bloodwood – Narrow-leaved Apple heathy woodland on hinterland plateaux of the Central Coast, Sydney Basin Bioregion	286
1181	Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion	182
Total		1,070
Species		
Species/Common Name		Credits Required
Bynoe's Wattle		43

Glossy Black Cockatoo	1380
Eastern Pygmy-possum	1427
Giant Burrowing Frog	1070
Broad-headed Snake	1068
Kunzea rupetris	20
Southern Myotis	195
Squirrel Glider	1427
Pimelea curviflora var. curviflora	25
Dural Land Snail	714
Red-crowned Toadlet	519
Tetratheca glandulosa	116
Total	8,004

To fulfil the above-listed offset obligation, the Proponent will deliver a viable and ecologically functioning Biodiversity Stewardship Site (refer to Section 3.4). It estimated that 306ha of land is required to generate the credits required to fulfil their obligations. This equates to the Proponent offsetting, protecting, and enhancing 6ha of biodiversity lands for each 1ha of land directly impacted by the Project. The Proponent possesses landholding within the same IBRA region that can meet this requirement.

7.1.5 Statutory Compliance

7.1.5.1 Environmental Protection Biodiversity Conservation Act 1999

The EPBC Act establishes a process for assessing the impacts of activities and developments where Matters of National Significance may be affected. Under the EPBC Act, any action which “has, will have, or is likely to have a significant impact on Matters of National Significance” is defined as a “controlled action”, and requires approval from the Commonwealth Department of Agriculture, Water and the Environment.

The following Matters of National Significance were assessed as either having the potential to occur within the development site, likely to occur or known from the development site:

Table 36 – Matters of National Significance

PCT Or Scientific Name	Common Name
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	–
<i>Acacia bynoeana</i>	Bynoe’s Wattle
<i>Kunzea rupestris</i>	–
<i>Pimelea curviflora</i> var. <i>curviflora</i>	–
<i>Heleioporus australiacus</i>	Giant Burrowing Frog
<i>Anthochaera phrygia</i>	Regent Honeyeater
<i>Lathamus discolor</i>	Swift Parrot

<i>Pommerhelix duralensis</i>	Dural Land Snail
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll
<i>Phascolarctos cinereus</i>	Koala
<i>Pseudomys novaehollandiae</i>	New Holland Mouse
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake

Section 2.6.2 of the BDAR provides an assessment for each of the above in accordance with the *EPBC Act Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (Department of Environment 2009). The assessment determined that the Project will have or is likely to have a significant impact on the *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* and *Pommerhelix duralensis* (Dural Land Snail).

Therefore, the Project was referred to the Federal Department of Agriculture, Water & the Environment. On 18 May 2021 the Project was declared a ‘controlled action’ to be assessed under bilateral agreements between the Commonwealth and NSW Government.

7.1.5.2 Hills Local Environmental Plan 2019

As shown in **Figure 53** below, the development site is subject to the Terrestrial Biodiversity overlay in the Hills LEP which requires consideration of Part 7 Clause 7.4 Terrestrial Biodiversity.



Figure 53: Hills LEP Terrestrial Biodiversity Mapping (Source: Hills LEP, 2020)

A detailed assessment of the Project against the provisions of Clause 7.4 of the Hills LEP is provided in Table 50 of the BDAR. A summary of that assessment is provided below.

Table 37 — Assessment against Clause 7.4 of the Hills LEP

Clause	Assessment
7.4 Terrestrial biodiversity	
<i>(3) In deciding whether to grant development consent for development on land to which this clause applies, the consent authority must consider—</i>	
<i>(a) whether the development is likely to have—</i>	Due to the Project's nature, the development will directly impact biodiversity, including fauna, flora and native vegetation. These impacts will arise through the removal of 50.95 ha of native vegetation, which provides habitat for threatened and non-threatened species. Section 7.1.3 of the EIS details the biodiversity impacts of the Project.
<i>(i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and</i>	
<i>(ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and</i>	
<i>(iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and</i>	
<i>(iv) any adverse impact on the habitat elements providing connectivity on the land, and</i>	
<i>(b) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.</i>	The Project has undergone significant design modifications to avoid impacts, and a comprehensive suite of management measures have been developed to ameliorate biodiversity impacts. These are described in Section 7.1.4 above and summarised in Annexure 5 . Unavoidable impacts will be offset by a Biodiversity Stewardship Agreement site of approximately 306ha.
<i>(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that—</i>	
<i>(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or</i>	Section 7.1.4.1 of the EIS outlines the design amendments implemented to avoid and minimise adverse environmental impact.
<i>(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or</i>	Section 7.1.4.2 of the EIS outlines the proposed management strategies to minimise biodiversity impacts that cannot be avoided.
<i>(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.</i>	Sections 7.1.4.4 and 3.4 of the EIS outlines the Project's proposed biodiversity offset strategy to account for residual impacts.

7.1.6 Conclusion

It is demonstrated that where achievable, the Project design has been amended to avoid and minimise impacts to biodiversity. Where there are unavoidable impacts, they are to be offset with viable and ecological functioning Biodiversity Stewardship Site of approximately 306ha.

7.2 Noise

The Project's SEARs require the EIS to address the following key issues relating to Noise and Vibration:

Requirement	Addressed at EIS Section
A detailed assessment of the likely construction, operational, cumulative and off-site transport noise impacts of the development in accordance with the <i>Interim Construction Noise Guideline</i> , <i>NSW Noise Policy for Industry</i> and the <i>NSW Road Noise Policy</i> respectively and having regard to the <i>Voluntary Land Acquisition and Mitigation Policy</i> .	Section 7.2.6 Annexure 9

Muller Acoustic Consulting was engaged to prepare a comprehensive Noise and Vibration Impact Assessment for the Project. The full assessment is provided as **Annexure 9**.

The Noise and Vibration Impact Assessment quantifies the potential noise impacts associated with the Project's construction, operations and transportation activities on the surrounding environment. The vibration component of the Noise and Vibration Impact Assessment is addressed in Section 7.12 of the EIS.

The Noise Assessment was prepared in accordance with the following policy documents.

- *Interim Construction Noise Guideline* is the principal policy document that guides the assessment of construction noise impacts.
- *Noise Policy for Industry* is the principal policy document that guides the assessment of operational noise impacts.
- *NSW Road Noise Policy* is the principal policy document that guides the assessment of road traffic noise from the Project.
- *Voluntary Land Acquisition and Mitigation Policy* describes the NSW Government's policy for voluntary mitigation and land acquisition action to address noise impacts from State significant mining, petroleum and extractive industry development.

The following section provides a summary of the noise component of the Noise and Vibration Impact Assessment, including proposed mitigation measures.

Key Noise Definitions

Receiver	A surrounding land use that may be impacted by a change in the existing acoustic environment.
Rating Background Level (RBL)	An overall single figure representing the background level for each assessment period over a monitoring period.
LAeq	The summation of average noise levels over a selected period of time.
Sound Power Level	Represents the average noise energy or equivalent sound pressure level over a given period. Sound Power Levels are expressed in decibels.
Project Amenity Noise Level (PNAL)	The <i>Noise Policy for Industry</i> recommended amenity noise levels for a specific land use (i.e., rural residential) minus 5dBA.
Project Intrusiveness Noise Level (PINL)	The noise level at a receiver when adding +5dBA to the Rating Background Level.
Project Noise Trigger Level (PNTL)	Project Noise Trigger levels provide the operational noise criteria for the Project.
Construction Noise Management Level	The construction noise criteria for the Project.
Residual Noise Impacts	Where noise levels exceed the Project Noise Trigger Levels after the implementation of feasible and reasonable mitigation measures.
Morning Shoulder	The morning shoulder period relevant to the Project is between 6am and 7am.

7.2.1 Receivers

The Project is located in a rural setting with nearby land uses including residential, future residential, industrial and educational establishment. **Figure 54** below shows the location of nearby receivers that were identified for the Noise and Vibration Impact Assessment.

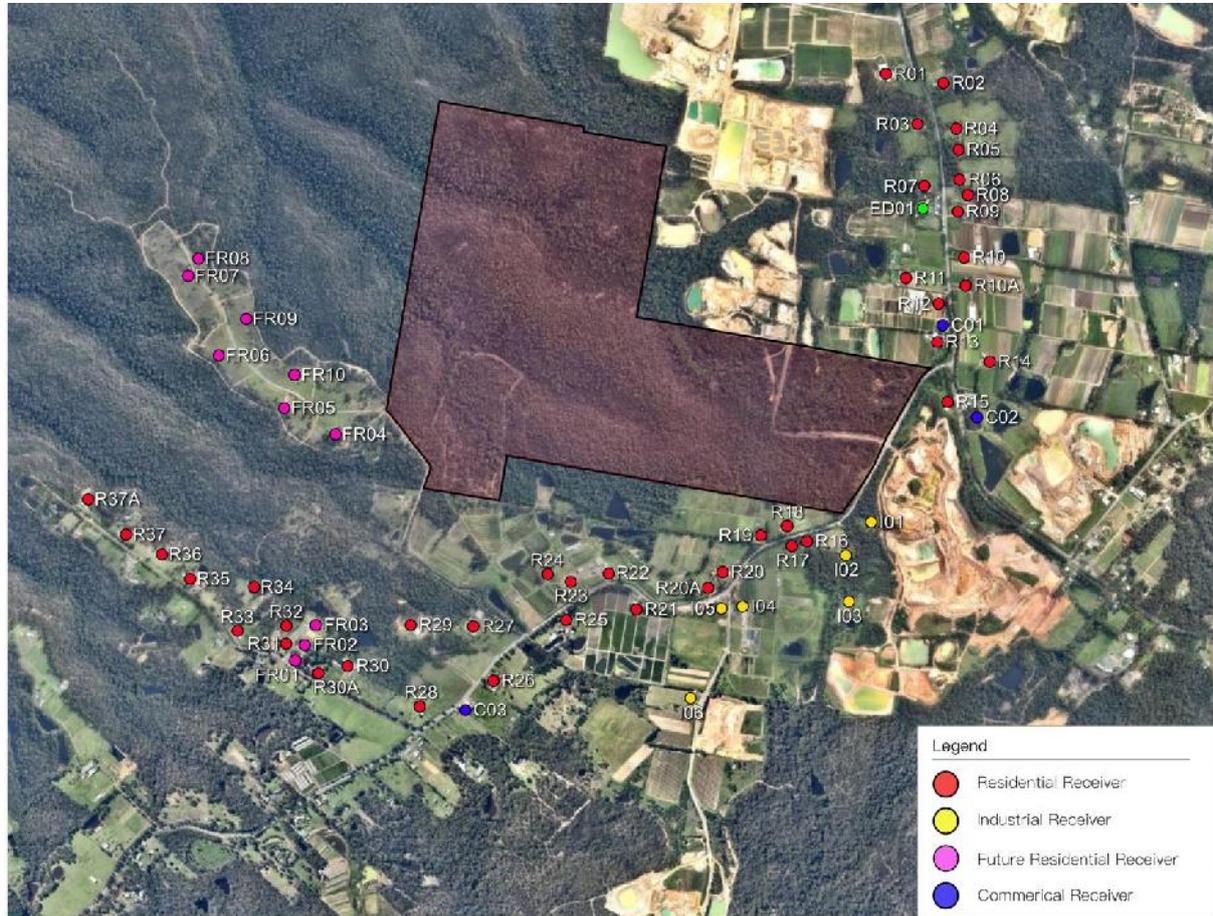


Figure 54: Acoustic Receivers (Source: Nearemap, 2020; Muller Acoustics, 2020)

7.2.2 Noise Assessment Criteria

7.2.2.1 Project Construction Noise Criteria

Unattended noise monitoring was conducted at three locations to determine the existing Rating Background Levels at each receiver. In general, the *Interim Construction Noise Guideline* requires that the Construction Noise Management Levels are the Rating Background Levels +10dBA. The Project-specific Construction Noise Management Levels at each receiver are presented in the below table.

Receivers	Assessment Period	Adopted Rating Background Level (dBA LA ₉₀)	Noise Management Level (dBA LA _{eq} (15min))
R29 – R37A FR1 – FR10	Standard Hours	35	45
R16 – R28	Standard Hours	35	45
R1 – R15	Standard Hours	40	50
C1 – C3	When in Use	N/A	70 (external)
I1 – 16	When in Use	N/A	75 (external)
ED1 Maroota Public School	When in Use	N/A	45 (internal) 55 (external)

Standard construction hours: Monday to Friday 7am to 6pm; Saturday 8am to 1pm; No work on Sundays or public holidays.

7.2.2.1 Project Operational Noise Criteria

The Project Noise Trigger Level is a level that, if exceeded, would indicate a potential noise impact on the community, and so ‘trigger’ a management response. A Project Noise Trigger Level for a receiver location is the lower of either the Project Intrusiveness Noise Level or Project Amenity Noise Level. The below table provides the Project Noise Trigger Level at each receiver.

Receiver	Period	Project Intrusiveness Noise Level	Project Amenity Noise Level	Project Noise Trigger Level
R29 – R37A & FR1 – FR10	Day	40	48	40
	Evening	35	43	35
	Night	35	38	35
	Morning Shoulder	35	N/A	35
R16 – R28	Day	40	48	40
	Evening	38	43	38
	Night	35	38	35
	Morning Shoulder	36	N/A	36
R1 – R15	Day	45	48	45
	Evening	35	43	35
	Night	35	41	35
	Morning Shoulder	40	N/A	40
C1 – C3	When in Use	N/A	63	N/A
I1 – 16	When in use	N/A	68	N/A
ED1 Maroota Public School	Noisiest 1 hour	N/A	43 (external noise level)	N/A

7.2.2.3 Road Traffic Noise Criteria

The below table provides the road traffic noise assessment criteria relevant to Project from the *Road Noise Policy*.

Road Category	Type of Project/Development	Assessment Criteria	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on freeways/arterial/sub-arterial roads generated by land use developments	60dB LAeq(15hr)	55dB LAeq(9hr)
Local roads	Existing residences affected by additional traffic on local roads generated by land use developments	55dB LAeq(1hr)	50dB LAeq(1hr)
Open space (active use)	Proposed road projects and traffic generating developments	60dB LAeq(1hr)	N/A
Open space (passive use)		55dB LAeq(1hr)	N/A

7.2.2.4 Residual Impacts

A residual noise impact exists where the predicted noise levels at a receiver are above the Project Noise Trigger Levels once feasible and reasonable mitigation measures have been applied. The below table presents the significance of residual noise impacts as described in table 4.1 of the *Noise Policy for Industry*.

Noise Exceedance	Total Cumulative Industrial Noise Level is:	Impact Significance
0–2dBA	N/A	Negligible
3–5dBA	< recommended amenity noise level; or > recommended amenity noise level, but the increase in total cumulative industrial noise level resulting from the development is less than or equal to 1dB	Marginal
3–5dBA	> recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is more than 1 dB	Moderate
>5dBA	Less than recommended amenity noise levels	Moderate
>5dBA	> recommended amenity noise level	Significant

7.2.3 Feasible and Reasonable Noise Mitigation Measures

The following best management practices, best available technology economically achievable and reasonable and feasible measures were adopted for the Project.

- Siting of the plant such that there is a 3m to 5m bund on the southern and eastern boundaries of the processing area to reduce overall offsite noise emissions.
- Location of the tree mulcher at RL 156m or lower to reduce overall offsite noise emissions.
- Installation of a mulcher barrier to minimise noise propagation.
- Application of aftermarket exhaust mufflers to excavators and dozers to reduce overall sound power levels and offsite noise emissions from mobile equipment.
- Development of the extraction pit behind a 5m minimum working face to reduce overall offsite noise emissions for the proposed extraction stages.
- Installation of a permanent Noise Management Terminal to alert operators when noise levels exceed trigger levels.
- Installation of a permanent weather station that will integrate with the Noise Management Terminal and alert operators when noise enhancing weather conditions (prevailing winds) are present. During noise enhancing conditions, clearing activities and tree mulching will be suspended.

An assessment of these measures against the decision-making matrix provided in table 3.1 of the *Noise Policy for Industry* is presented in 6.3 of the Noise & Vibration Impact Assessment (**Annexure 9**).

7.2.4 Noise Modelling Scenarios

DGMR (iNoise, Version 2021) noise modelling software was used to quantify the Project’s noise emissions at neighbouring receivers resulting from typical construction activities and operations.

7.2.4.1 Construction Scenarios

The south-western section of the Project Site will be cleared first to provide a pad for the site infrastructure area. Clearing of the extraction Stage 1, part of Stage 2 and the internal access road will be completed by the end of the six-month construction phase. Trees from clearing will be taken to the mulcher to be processed. The noise impacts of these construction works were modelled for months 1, 3 and 6.

7.2.4.2 Operational Scenarios

The anticipated quarry life for the Project is 28 years. Six operational scenarios were modelled across the life of the Project (years 1, 5, 10, 15, 20 and 25). The below figure illustrates the Project’s extraction stages.

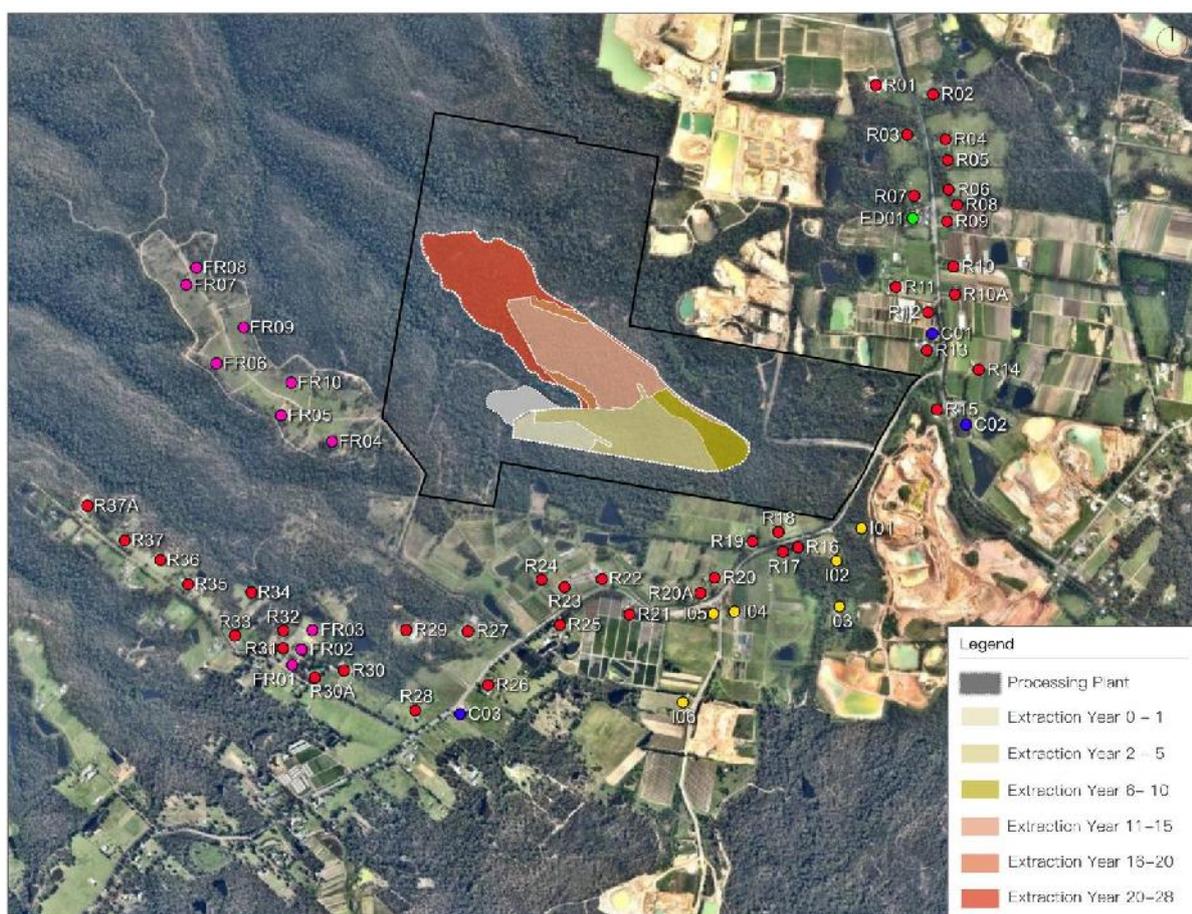


Figure 55: Project Extraction Stages (Source: Nearmap, 2020)

7.2.5 Noise Modelling Results

Predicted noise levels for the Project are presented in Section 7 of the Noise and Vibration Impact Assessment. All feasible and reasonable noise mitigation measures described in Section 7.2.3 above were incorporated in the modelling results. The following section provides a description of these results and highlights residual impacts.

7.2.5.1 Construction Noise Results

Predicted noise levels from construction activities are expected to satisfy the Construction Noise Management Levels at all receivers.

7.2.5.2 Operational Noise Results: Calm Weather Conditions

Noise levels from the Project have been calculated at existing and potential future receiver locations for two operational modes:

- “ **All Operations**’ — clearing, extraction, haulage, processing, and product transport occurring concurrently.
- ‘**Typical Operations**’ — extraction, haulage, processing and product transport occurring concurrently (no clearing activities).

Predicted noise levels from ‘Typical Operations’ during calm conditions are predicted to comply with all Project Noise Trigger Levels throughout the project’s life.

Predicted noise levels from all operations during calm conditions are predicted to comply with the Project Noise Trigger Levels throughout the Project’s life for the majority of receivers. Exceedances are presented in the table below.

Receiver	Y1		Y5		Y10		Y15		Y20		Y25		Project Noise Trigger Level	
	Day	MS	Day	MS										
R18	-	-	-	-	+1	-	-	-	-	-	-	-	40	36
R19	-	-	-	-	+1	-	-	-	-	-	-	-	40	36
R20	+1	-	-	-	-	-	-	-	-	-	-	-	40	36
R22	+1	-	-	-	-	-	-	-	-	-	-	-	40	36
R23	+1	-	-	-	-	-	-	-	-	-	-	-	40	36
R25	+2	-	-	-	-	-	-	-	-	-	-	-	40	36

Each of the above exceedances is defined as ‘negligible’ under the *Noise Policy for Industry* (exceedance of 1–2dBA). This means that the average listener would not discern these exceedances. These negligible impacts will be managed through the proposed Noise Management Plan described in Section 7.2.6 below.

7.2.5.3 Operational Noise Results: Noise Enhancing Weather Conditions

Predicted noise levels from ‘Typical Operations’ during noise enhancing weather conditions are predicted to comply with the Project Noise Trigger Levels throughout the Project’s life for the majority of receivers. Exceedances are presented in the table below.

Receiver	Y1		Y5		Y10		Y15		Y20		Y25		Project Noise Trigger Level	
	Day	MS	Day	MS										
R18	-	-	-	-	+2	+1	+2	-	+1	-	-	-	40	36
R19	-	-	-	-	+3	+2	+1	+1	-	-	-	-	40	36
R25	+1	-	+1	-	-	-	+1	-	-	-	-	-	40	36
FR10	-	-	-	-	-	-	+1	-	+2	-	+2	-	40	35

All but one exceedance presented above is defined as negligible. One receiver has the potential to experience noise impacts that are described as ‘marginal’ under the *Noise Policy for Industry* (exceedance of 3–5dBA).

Predicted noise levels for ‘All Operations’ were not calculated as clearing activities will not occur during noise enhancing weather. A Noise Management Plan that incorporates meteorological and real-time noise monitoring will be implemented to guide this management approach. That plan is described in Section 7.2.6 further below.

7.2.5.4 Sleep Disturbance Assessment

The potential for sleep disturbance from maximum noise level events associated with the Project during the night-time period was also considered. The predicted maximum noise levels from the Project satisfies *Noise Policy for Industry’s* night-time noise criteria during noise enhancing and calm weather conditions. Quarry operations will not occur during the night-time.

7.2.5.5 Road Traffic Noise Assessment

The main offsite haul route for the transportation of sales product is via Wisemans Ferry Road and or Old Northern Road. As shown in the below table, traffic noise levels resulting from the Project are predicted to comply with the *NSW Road Noise Policy* criteria.

Offset	Period	Criteria (dBA)	Projected Noise Levels	Compliant
15m	Day	60 LAeq(15hr)	53	Yes
15m	Night	55 LAeq(9hr)	46	Yes

7.2.5.6 Voluntary Land Acquisition and Mitigation Policy Assessment

An assessment of the Project’s residual impacts against the *Voluntary Land Acquisition and Mitigation Policy* shows that the Wisemans Ferry Road noise catchment area is expected to experience negligible Impacts. During Year 10 there will be one receiver (R19) that may experience Marginal Impacts. Therefore, appropriate mitigation rights will be made available to this receiver.

7.2.6 Noise Management Plan

As noted in Section 7.2.5 of the EIS, the Project is predicted to meet the Project Noise Trigger Levels or result in impacts that are considered negligible during calm weather conditions. It is only during noise-enhancing weather conditions that the Project is predicted to result in marginal impacts at one receiver. In addition to the feasible and reasonable noise mitigation measures outlined in Section 7.2.3 of the EIS, a Noise Management Plan will be prepared to guide, manage, quantify, and control noise emissions from the Project. The key features of the Noise Management Plan are described below.

7.2.6.1 Weather Monitoring

A real-time weather monitoring system will be installed at the Project Site to identify noise enhancing weather conditions. Clearing activities will not occur when noise-enhancing conditions are present.

7.2.6.2 Real-Time Noise Monitoring

A real-time noise monitoring terminal will be installed that is representative of the closest private receiver. Data from the real-time terminal will be transmitted to the onsite office to allow for reactive management practices. Monitoring positions will be selected based on:

- Weather conditions such as rain and wind, insect noise;
- The location and direction of any noise sources
- The most sensitive position at the affected receiver; and
- The need to avoid reflecting surfaces where possible.

In the event of an exceedance of the Project's noise criteria, meteorological conditions at the time of the exceedance and plant operating data shall be documented. This information would then be forwarded to the relevant environmental personnel for their appropriate response. A combination of comprehensive noise mitigation treatments (i.e. noise barriers, equipment enclosures, silencers, regular equipment maintenance, etc.) and consultation with the local community will be considered on a case by case basis to manage exceedances. Ongoing compliance reports will be prepared and submitted to the relevant environmental personnel as part of a noise monitoring program.

7.2.6.3 Equipment Selection & Maintenance

The Noise Management Plan will require the selection and procurement of equipment to meet the sound power levels specified in the Noise and Vibration Impact Assessment. Procured equipment will be appropriately maintained equipment and regularly tested to ensure that they meet their specified sound power levels.

7.2.6.4 Complaints Handling

The Noise Management Plan will include measures for complaint handling and reporting. A readily accessible complaints hotline will be made available to the public. Complaints shall be recorded in a complaints register and allocated to the relevant company representative to facilitate the implementation of corrective actions.

7.2.7 Conclusion

Generally, the Project's operations satisfy the Project Noise Trigger Levels during the daytime and morning shoulder at all assessed receivers during calm conditions. Noise emissions from the Project can exceed the Project Noise Trigger Levels by up to 2dB. These exceedances are considered negligible Impacts per *Noise Policy for Industry* methodology. During project Year 10, predicted noise levels might exceed the Project Noise Trigger Levels by 3dB at one receiver (R19) during noise enhancing conditions. Appropriate mitigation rights under Voluntary Land Acquisition and Mitigation Policy will be made available to this receiver.

Predicted noise levels from construction activities are expected to satisfy the Construction Noise Management Levels at all receivers. Sleep disturbance is not anticipated during the morning shoulder period as emissions from impact noise are predicted to remain below the Environmental Protection Agencies' maximum noise trigger levels. Predicted road traffic noise levels from the Project at receivers adjacent to either Wisemans Ferry Road or Old Northern Road are expected to comply with the relevant RNP criteria.

A noise monitoring program will be developed as part of the Project's Noise Management Plan. The Program will comprise operator attended compliance monitoring, real-time meteorological data and a real-time noise monitoring terminal to allow proactive management of potential noise generated by project activities over the Project's life, particularly during noise enhancing conditions.

The Noise and Vibration Impact Assessment concludes that with the implementation of noise mitigation and management measures, there are no noise-related issues preventing the Project's approval.



Hazard

The Project's SEARs require the EIS to address the following key issues relating to hazard:

Table 46 – SEARs Hazard

Requirement	EIS Section
An assessment of the likely risks to public safety, paying particular attention to potential bushfire risks and the transport, handling and use of any hazardous or dangerous goods;	Section 7.3

The following section provides an assessment of the potential hazards and risks associated with the Project, including bushfire risk and the transport, handling and use of hazardous goods and provides management measures to manage these risks. This section also considers if the Project is a potentially hazardous or offensive development under *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33)*.

Key Hazard Definitions

Class	Means the classification number assigned to a dangerous good to indicate its most significant type of risk.
Hazardous Material	Substances falling within the classification of the Australian Code for Transportation of Dangerous Goods by Road and Rail (Dangerous Goods Code)
Subsidiary Risk	The classification number(s) indicating other significant types of risk(s) in addition to the primary classification of a substance.
Assets Protection Zone	A buffer zone between a bush fire hazard and buildings. The Assets Protection Zone is managed to minimise fuel loads and reduce potential radiant heat levels, flame, localised smoke and ember attack.

7.3.1 State Environmental Planning Policy No.33—Hazardous and Offensive Development

SEPP 33 presents a systematic approach for the assessment of proposals for potentially hazardous and offensive industry or storage. SEPP 33 applies to any proposals which fall under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'. The Department of Planning, Industry and Environment provides a checklist and a risk screening procedure in their guideline *Applying SEPP 33* to help determine whether a development proposal falls within the definition of potentially hazardous industry.

The screening procedure is based on the quantity of dangerous goods involved in the proposal and, in some cases, the distance of these materials from the site boundary. A 'hazardous industry' under SEPP 33 is one which, when all locational, technical, operational and organisational safeguards are employed, continues to pose a significant risk. A Preliminary Hazard Analysis must be submitted with the development application if a development is determined to be a 'hazardous industry'.

7.3.2.1 Dangerous Goods & Hazardous Substances

The following table provides the following information as required by the *Applying SEPP 33* guidelines:

- The quantity of all hazardous materials to be used at the Project.
- The dangerous good classification for each material.
- The mode of storage used and the maximum quantity stored onsite.
- The distance of the stored material from the Project Site boundary.
- The average number of annual and weekly road movements of each material to and from the Project.

Table 47 — Dangerous Goods & Hazardous Substances

Name	Class	Storage	Quantity	Distance from site boundary	Transportation
Diesel Fuel ¹	Class 3	2 x 20,000 Litre fuel diesel storage tank per AS1940–2017.	40,000L	250m	15 deliveries per year
Greases & Oils	Class 3	Greases and oils will be stored in a self-bunded tank	600L	250m	Greases and oils will be removed by a licensed contractor as needed – no more than 12 removals per year.

¹ Diesel is not classified as a dangerous good under the ADG Code if the flash point is more than 60 Celsius and the substance is not offered for transport at a temperature above its flash point.

Based on the dangerous goods screening test, the development is not classified as potentially hazardous. Transportation, storage and handling of all chemical products will be undertaken in accordance with the relevant codes of practice, including the *Storage and Handling of Dangerous Goods Code of Practice 2005* and *National Work Health and Safety Act 2011*.

Diesel fuel, greases and oils will be each stored in self bunded tanks designed and constructed in accordance with the relevant Australian Standards.

7.3.2 Bushfire

7.3.2.1 Potential Bushfire Impacts

Potential ignition sources associated with Project include:

- Sparks caused from machinery, vehicles and handheld equipment such chainsaws.
- Electrical faults and power failure.
- Inappropriate disposal of cigarettes.
- Inappropriate storage of batteries or hazardous material.
- Hot works, including the soldering of equipment for repairs.

The following sections outline proposed design and management measures to mitigate the risk of bushfire ignition and impacts.

7.3.2.2 Planning for Bushfire 2019

Under section 10.3 of the *Environmental Planning Assessment Act 1979*, the identification of bushfire prone land is required for all Local Government Areas. The Hills Shire Council Bushfire Prone Land Map identifies the majority of the Project Site as 'Category 1–High Risk'. A Vegetation Buffer is also identified alongside Patricia Fay Drive.

Section 4.14(1) of the Environmental Planning Assessment Act 1979 stipulates that development consent cannot be granted for the carrying out of development for any purpose on bush fire prone land unless the consent authority is:

- Satisfied that the development conforms to the specifications and requirements of the version of the document entitled Planning for Bush Fire Protection prepared by the NSW Rural Fire Service; and
- Has been provided with a certificate by a person whom the NSW Rural Fire Service recognises as a qualified consultant in bush fire risk assessment stating that the development conforms to the relevant specifications and requirements.

However, Section 4.14(1A) stipulates that the above requirements do not apply to State Significant Development. Nevertheless, the following section assesses the Project against the aims provided in *Planning for Bushfire 2019*.

7.3.2.3 Aims

An assessment of the Project against the aims of the *Planning for Bushfire Protection 2019* guidelines are provided below.

1. *Afford buildings and their occupants protection from exposure to a bush fire.*

The following bushfire controls will be implemented to protect buildings and their occupants.

- A minimum Asset Protection Zone of 10m will be provided to all Project infrastructure.
- An Inner Protection Area will be managed and maintained around the Project's site infrastructure area
- Site access will be constructed and maintained in accordance with the design requirements of the *Planning for Bushfire 2019* guideline.
- Water supply utilities will be provided to emergency services to assist with fire suppression.
- The Proponent will develop a comprehensive Bushfire Emergency and Management and Operations Plan that includes a Bush Fire Emergency Management and Evacuation Plan.

2. *Provide for a defensible space to be located around buildings.*

Defendable space is an area within the Inner Protection Area of an Asset Project Zone adjoining a building. This space provides a safe working environment in which efforts can be undertaken to defend the structure before and after the passage of a bush fire. A minimum Asset Protection Zone of 10m will be provided to all Project infrastructure as noted above. An Inner Protection Area will be managed and maintained surrounding the site infrastructure area (see the red line in **Figure 56** below). Vegetation within this area will be kept to a minimum level, and litter fuels will be kept below 1cm in height and be discontinuous.

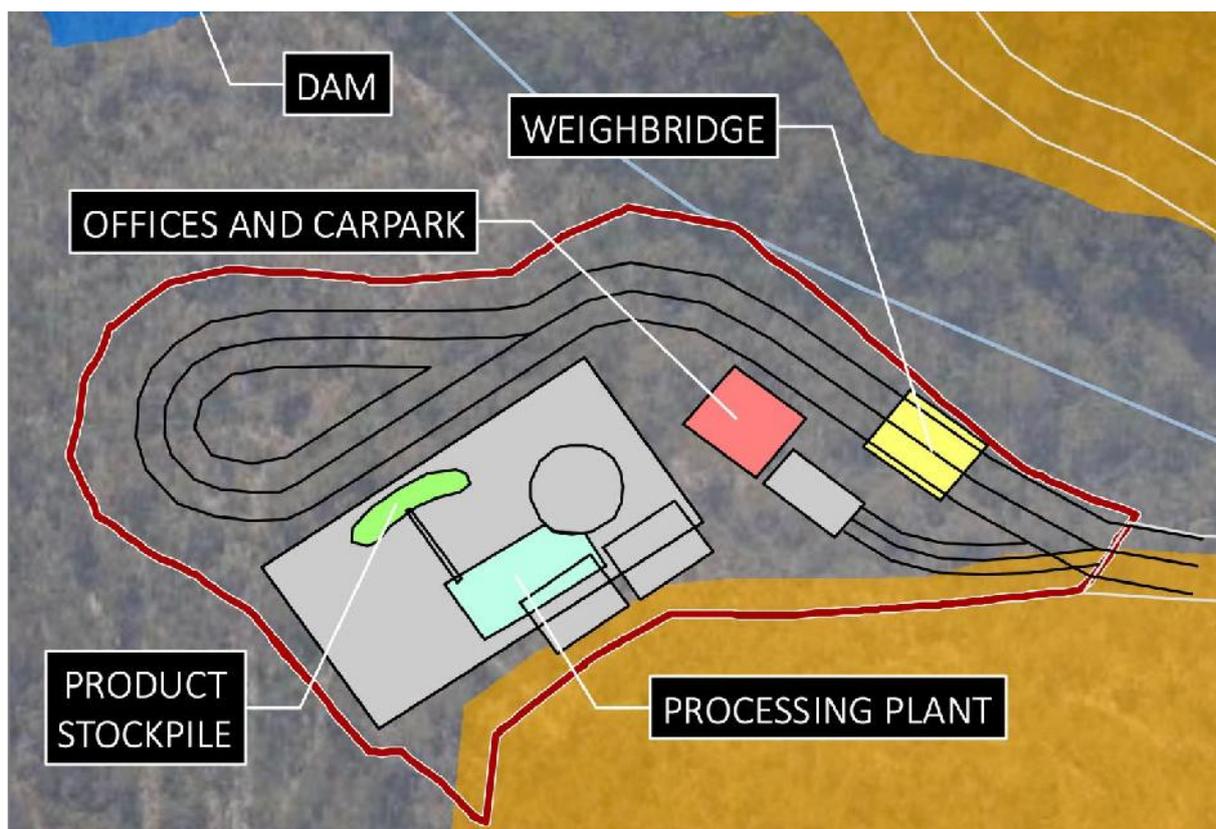


Figure 56: Inner Protection Area (Source: EMM & RPM Global, 2020)

3. *Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings.*

A minimum 10m Asset Protection Zone is provided 10m to all Project infrastructure, and an Inner Protection Area will be managed and maintained.

4. *Ensure that appropriate operational access and egress for emergency service personnel and occupants is available.*

The proposed site access road complies with the design requirements outlined in the *Planning for Bushfire 2019* guidelines. A minimum 4m unobstructed clearance height will be maintained above the site access road. Appropriate access is therefore provided for emergency services to access the site.

5. *Provide for ongoing management and maintenance of Bushfire Protection Measures*

The proposed Bushfire Emergency and Management and Operations Plan will provide ongoing measures to maintain Asset Protection Zones, the Inner Protection Area, site access and water supply and utilities.

6. *Ensure that utility services are adequate to meet the needs of firefighters.*

Water from the Project's surface water dam and groundwater bore will be available for use by firefighters. In addition, the Project's water cart will be available for use if required.

7.3.2.4 Bushfire Protection Measures

The *Planning for Bushfire 2019* guideline does not provide specific provisions that apply to extractive industries. However, section 8.3.6 of the guideline does recommend that a minimum 10m Asset Protection Zone should be provided around any infrastructure associated with mining production. This recommendation has been adopted for the Project, with a minimum 10m Asset Protection Zone provided to all Project infrastructure.

Section 8.3.6 also recommends the preparation of a Bushfire Emergency and Management and Operations Plan that details:

- Asset Protection Zone locations and management details.
- Landscaping requirements including indicative design layout and vegetation density thresholds.
- Access provisions such as locations, passing bays and alternate emergency access.
- Water supplies and bush fire suppression systems.
- Details regarding the Bush Fire Emergency Management and Evacuation Plan; and
- Any other essential bush fire safety requirements.

The Proponent is committed to preparing such a plan. These measures are included in **Annexure 5**.

7.4

Water

The Project's SEARs require the EIS to address the following key issues relating to water:

Table 48 – SEARs Water	
Requirement	EIS Section
A detailed site water balance, including a description of site water demands, water disposal methods (inclusive of volume and frequency of any water discharges), water supply infrastructure and water storage structures;	Section 3.2.6 Annexure 10
Identification of any licensing requirements or other approvals under the Water Act 1912 and/or Water Management Act 2000;	Section 7.4.2 Annexure 10
Demonstration that water for the construction and operation of the development can be obtained from an appropriately authorised and reliable supply in accordance with the operating rules of any relevant Water Sharing Plan (WSP);	Section 3.2.6 Annexure 10
A description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant WSP or water source embargo;	Section 3.2.6 & 7.4.6 Annexure 5 & 10
An assessment of any likely flooding impacts of the development;	Section 7.4.7 Annexure 10
A detailed assessment of any need to maintain an adequate buffer between excavations and the highest predicted or recorded regional groundwater table	Section 7.4.7 Annexure 10
An assessment of the likely impacts on the quality and quantity of existing surface and ground water resources, including a detailed assessment of proposed water discharge quantities and quality against receiving water quality and flow objectives	Section 7.4.7 Annexure 10
An assessment of the likely impacts of the development on aquifers, watercourses, riparian land, water-related infrastructure, and other water users;	Section 7.4.7 Annexure 10
A detailed description of the proposed water management system (including sewage), water monitoring program and other measures to mitigate surface and groundwater impacts	Section 7.4.6 Annexure 5

EMM Australia were engaged to prepare a Water Assessment for the Project that addresses the SEARs requirements. The Water Assessment addresses both surface water and groundwater. The objectives of the Water Assessment are to:

- Describe and characterise the existing surface water and groundwater environment.
- Describe the proposed water management approach and infrastructure requirements.
- Identify and assess the Project's impacts to surface water and groundwater.
- Identify water licensing requirements.
- Develop management and mitigation measures to minimise the Project's impact to groundwater and surface water.

The Water Assessment is included as **Annexure 10** and is summarised in the following section.

Key Water Definitions	
Source–Pathway–Receptor	An analytical model that evaluates the risk to a receptor, such as surrounding groundwater works and groundwater dependant ecosystem, from a source, meaning the development/activity that poses a threat to water. The pathway refers to the water environment between a source and a receptor.
Water Affecting Activities	Activities that directly or indirectly impact the existing water environment and nearby receptors. The Project’s water affecting activities include groundwater abstraction and changes to the Project Site’s hydrological regimes.
Watercourse	A watercourse is a channel that a flowing body of water follows.
Stream Orders	‘Stream order’ is used to describe the hierarchy of streams from the top to the bottom of a catchment. A 1 st order stream has no other streams following into it, while a 2 nd order stream has two 1 st order streams flowing into it. The higher a stream’s order so is its significance.
Physicochemical Field Parameters	Physicochemical field parameters are those physical and chemical parameters, such as pH and dissolved metal concentrations, measured to determine water quality.
Aquifer	A groundwater system that is sufficiently permeable to allow water to move within it, and which can yield productive volumes of groundwater.
Hydraulic Conductivity	Hydraulic conductivity refers to the ability of fluid to pass through pores and fractured rock. It is symbolically represented as <i>K</i> .
Groundwater Dependant Ecosystem	Groundwater Dependent Ecosystems are ecosystems whose current species, structure, and function rely on a supply of groundwater.
Major Ion	Major ions are positively and negatively charged ions present in groundwater. They contribute to the salinity of water.
Salinity	Salinity refers to the saltiness of a body of water.
Alkalinity	Alkalinity is the capacity of water resist acidification. pH is a figure expressing the acidity or alkalinity of a solution on a logarithmic scale on which 7 is neutral.
Abstraction	Abstraction is the process of taking water from any source.
Storativity	Storativity is a measure of the volume of water that will be discharged from an aquifer per unit area of the aquifer and per unit reduction in hydraulic head.
Theis Method	An analytic solution for the drawdown for non–steady groundwater flow and assumes radial flow towards an abstraction point

7.4.1 Assessment Methodology & Statutory Framework

7.4.1.1 Assessment Methodology

The Water Assessment identifies the Project's potential impacts on existing groundwater and surface water resources. Management measures are recommended to mitigate identified potential impacts.

The National Water Commission mining risk framework was adopted for the Water Assessment. The framework applies a source–receptor–pathway analysis that describes how water–affecting activities might impact sensitive water receptors. The Water Assessment identifies the risk from the Project's water–affecting activities and assess the actual consequences arising from these in terms of direct effects (altered water resource condition) and indirect effects (such as reduced water access for other users).

Direct Effects

Direct effects are changes to physical and/or quality aspects of groundwater and surface water, or changes to the physical characteristics of water resources because of an activity or change to the existing environment. Examples include changes in water levels, water quality changes, or changes in aquifers' hydraulic properties.

Indirect Effects

Indirect effects of water–affecting activities arise in response to direct effects and typically relate to the potential for impact on sensitive receptors. Potential indirect effects include a reduction in available surface water and groundwater for 3rd party groundwater and surface water users.

7.4.1.2 Statutory Context & Guidelines

Water Management Act 2000

The NSW *Water Management Act 2000* (WM Act) is based on the principles of ecologically sustainable development and the need to share and manage water resources for future generations. The WM Act provides for water sharing between different water users, including environmental, basic landholder rights and licence holders. The licensing provisions of the WM Act apply to those areas where a Water Sharing Plan has commenced.

Water Sharing Plans

Water Sharing Plans are statutory documents that apply to one or more water resources. They define the rules for sharing and managing water resources within water source areas. The Water Sharing Plans relevant to the Project are:

- **Surface Water:** *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011*; and
- **Groundwater:** *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011*.

The Water Assessment has been prepared with consideration to both these statutory documents.

NSW Aquifer Interface Policy

Projects that intercept groundwater need to consider the *NSW Aquifer Interference Policy*. The *Aquifer Interference Policy* provides the regime for protecting and managing the impacts of aquifer interference activities on NSW's water resources. The policy requires an assessment of a Project's impacts against minimal impact considerations regarding changes to the water table, water pressure and water quality.

Where impacts are predicted to be 'greater than minimal impact' but additional studies show that impacts, although greater than 'minimal' do not prevent the long-term viability of the relevant water dependent asset, then the impacts will be defined as 'acceptable'. Where impacts are predicted to be 'greater than minimal impact' and the long-term viability of the water dependent asset is compromised, then the impact is subject to 'make good' provisions.

An assessment of the Project's impacts against these minimal impact considerations is provided in Section 6.3 of the Water Assessment and a summary is provided in Section 7.4.7.5 of this EIS.

NSW Water Quality & River Flow Objectives

The *NSW Water Quality and River Flow Objectives* provides environmental values and long-term targets for water quality and river flow in each catchment in NSW. The Project Site is located within the Hawkesbury–Nepean catchment. Although there are no specified objectives for this catchment, the Project has been assessed against the typical water quality and river flow objectives for uncontrolled streams in other catchments in NSW. That assessment is provided in Section 6.4 of the Water Assessment and a summary is provided in Section 7.4.7.6 of this EIS.

Australian and New Zealand Guidelines for Fresh and Marine Water Quality

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018) provides guidance on monitoring, assessing and managing ambient water quality in a wide range of water resource types and according to specified environmental values, such as aquatic ecosystems, primary industries, recreation and drinking water. The guidelines provide a framework for:

- establishing water quality objectives;
- assessing and managing water quality for environmental values (such as, irrigation, recreational use and aquatic ecosystems); and
- establishing protection levels, water quality indicators and trigger values.

7.4.2 Water Licensing

The Project is required to hold Water Approval Licences to account for any surface water and groundwater take during quarry operations.

7.4.2.1 Groundwater

A groundwater Water Approval Licence can be purchased either by a Controlled Allocation or from a current water holder in the same groundwater source. The Proponent submitted a Registration of Interest for a groundwater allocation from the Sydney Basin Central Groundwater Source via the 2020 Controlled allocation order for a 50 ML/year water entitlement. The Registration of Interest was deemed successful on 20 October 2020 (**Annexure 24**).

7.4.2.2 Surface Water

Water Take

Dams with the following characteristics are considered to be excluded works under Schedule 1, item 3 of the NSW Water Management (General) Regulation 2018.

- solely for the capture, containment or recirculation of drainage;
- consistent with best management practice to prevent the contamination of a water source; and
- located on a minor stream.

The proposed surface water dam's primary use is for water quality control by capturing sediment-laden runoff and retaining sediment to prevent pollution of the downstream receiving environment. Additionally, the dam is located on a first-order watercourse which is a minor stream. Therefore, the proposed dam is an excluded work per the above definition. Water stored within the water management dam is also proposed to be reused for dust suppression activities and supply the sand processing plant. The take of water from the water management dam is exempt from requiring a licence under Schedule 4, item 12 of the NSW Water Management (General) Regulation 2018.

Harvestable Water Rights

Under Section 53 of the *Water Management Act*, owners or occupiers of a landholding are entitled to collect a proportion of runoff from their property in one or more dams located on a minor stream or unmapped stream. The property owner/occupier can use that water without a licence or water supply work or water use approvals. In the Central and Eastern Divisions of NSW (where the project is located), landholders may capture, store and use up to 10% of the average regional runoff for their property.

DLALC's current landholdings within or adjacent to the project site is 1,296 ha (see Section 2 of the EIS). This area excludes the parcel of land in the north-eastern corner of the project site, subject to a permissive occupancy. EMM used the Maximum Harvestable Right Calculator provided by WaterNSW to determine the maximum harvestable right for the Project Site of 103 ML. The predicted maximum volume of clean catchment runoff captured by the water management dam in an average year is 26 ML/year. This occurs in year 10 of the quarry schedule when the clean water catchment area is greatest. As this volume is within the calculated maximum harvestable rights, there is no licensing required to capture or use clean runoff at the site.

Two unnamed watercourses transect or are located near the Project's disturbance area. They are referred to as Watercourses A and B in **Figure 58** below.

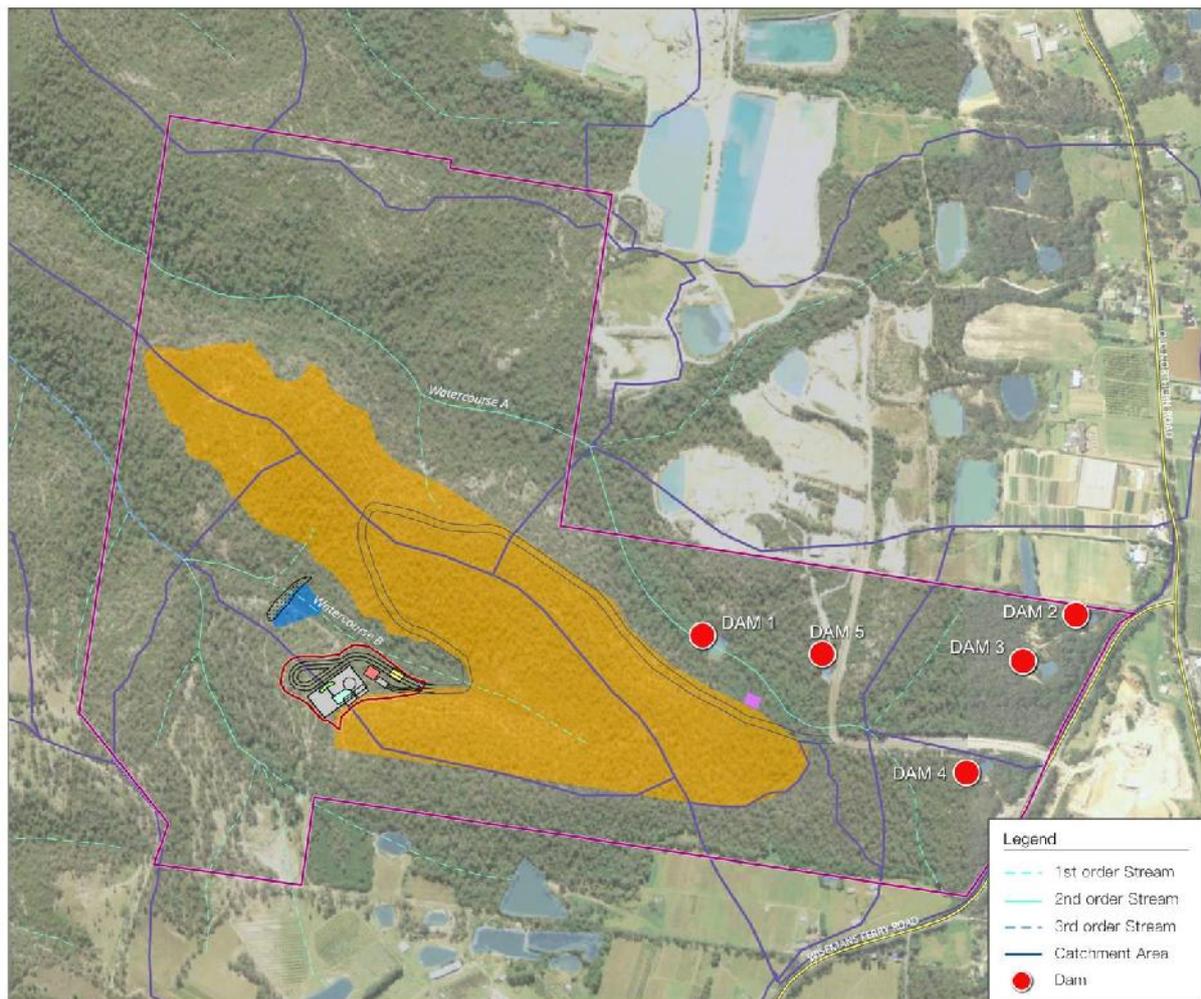


Figure 58: Project Site Hydrological Features (Source: EMM, 2021; DPSI, 2017 & DPI, 2015)

Watercourse A is a 2nd-order stream that flows in a north-westerly direction. It is interpreted to be groundwater-fed and has an intermittent flow regime. This means that during an average rainfall year streamflow will occur for most of the year but may cease for weeks or months, typically in late summer or early autumn. Streamflow would also cease for extended periods during dry periods.

Watercourse B is a 1st-order stream that flows to the north-west in a well-defined gully. It is interpreted to have an ephemeral flow regime meaning that streamflow only occurs for a short period after material rainfall. Watercourse B joins a larger watercourse immediately downstream of the proposed water management dam.

7.4.3.2 Dams & Existing Licences

Five dams are in the eastern portion of the site. These dams are referred to as Dams 1 to 5 in **Figure 58** above. Dam 1 has been established on Watercourse A. PF Formation Sand and Concrete hold a surface water entitlement to extract up to 32 ML/year from Dam 1 (WAL 26168). EMM understands that this water is used to supply water to a sand quarry to the north of the project site. A search of the *NSW Water Register* indicates no other licensed surface water users rely on extraction from waterways that flow between the site and the Hawkesbury River.

7.4.3.3 Existing Surface Water Quality

EMM undertook a water quality characterisation program to inform the Water Assessment. The program consisted of on-site sampling on three occasions at all accessible groundwater monitoring bores and surface water dams 1, 2, 3 and 4. Water samples were analysed by Australian Laboratory Services.

A summary of the average surface water quality results is presented in table 3.12 of the Water Assessment. Laboratory reports are provided in Appendix D of the Water Assessment. Water quality monitoring results were compared with the default guideline values recommended for the protection of aquatic ecosystems in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Key surface water observations are provided below.

- Sampled water was generally fresh.
- pH was mildly acidic, with all samples below the lower default guideline of 6.5.
- Nitrogen-based nutrient concentrations were elevated, particularly for ammonia and nitrate which were consistently observed to exceed the relevant default guideline value.
- Elevated nitrogen concentrations at Dam 3 correlate with groundwater quality results from the shallow aquifer and may be associated with the turf farm located immediately to the north of the site.
- Dissolved metal concentrations were generally below the laboratory limiting of reporting, with slight exceedances of the relevant default guideline values for cobalt and zinc.

7.4.4 Existing Groundwater Environment

7.4.4.1 Aquifers

Two groundwater systems are present at the Project Site and surrounds:

- **Shallow aquifer**, which is the saturated zone within the eluvial/weathered Hawkesbury Sandstone and the base of the Maroota Sand unit located at the eastern end of the Project Site.
- **Deep aquifer**, which is located within the consolidated Hawkesbury Sandstone below the weathered zone. It includes the regional water table and groundwater in the sandstone below it. Based on a review of observed high yielding groundwater zones, it is reasonable to assume production pumping yields of 1–1.5 L/s could be achievable from a bore sunk into the deep aquifer.

7.4.4.2 Groundwater Monitoring Network

A groundwater monitoring network was installed at the Project Site in 2017 to monitor groundwater levels and water quality. The network comprises 11 groundwater monitoring bores mostly targeting the deep aquifer's upper section. **Figure 59** below shows the eleven groundwater monitoring bores' location at the site.

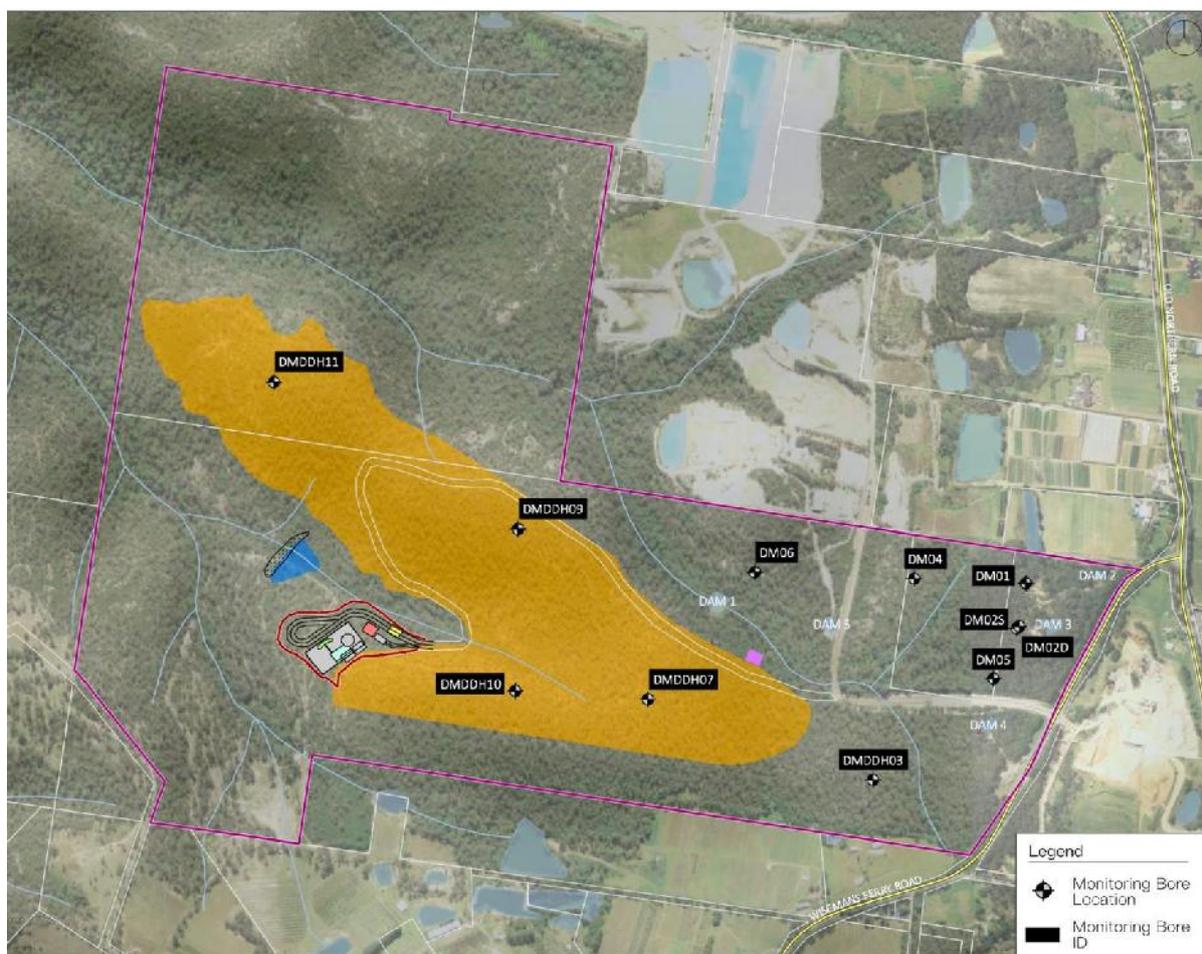


Figure 59: Groundwater Monitoring Network (Source: EMM, 2021; DPSI, 2017)

7.4.4.3 Groundwater Levels

Groundwater levels were recorded from March 2017 to August 2020. Observed groundwater depths at each groundwater monitoring bore are presented in the table below. Section 3.6.3 and Appendix B of the Water Assessment provides the groundwater hydrographs for each monitoring bore.

Bore ID	Aquifer	Observed depth to groundwater (metres below ground level)			Groundwater Elevation (M AHD)
		Minimum	Maximum	Average	Highest Elevation
DM01	Shallow	9.6	11.5	10.4	194.9
DM02S	Shallow	8.7	10.1	9.1	192.4
DM02D	Deep	22.1	25.8	23.6	178.0
DMDDH03	Deep	20.6	23.5	22.3	172.1
DM04	Deep	10.7	13.0	12.0	174.8
DM05	Deep	7.3	10.6	9.3	184.7
DM06	Shallow	3.5	8.2	5.9	161.6
DMDDH07	Deep	34.2	44.8	35.1	159.0
DMDDH09	Deep	36.5	43.8	37.8	151.3
DMDDH10	Deep	21.5	22.1	21.7	153.0
DMDDH11	Deep	28.3	34.7	32.5	143.9

7.4.4.4 Groundwater Recharge and Discharge

The rate of infiltration into an aquifer is dependent on rainfall intensity, the initial moisture of the soil and the hydraulic conductivity of the aquifer.

Slug tests were undertaken at two bores (DMDDH03 & DMDDH10) in 2017 to determine hydraulic conductivity measurements for the Hawkesbury Sandstone. The results of those tests are presented below. These results are consistent with the numerous tests that have been conducted in the surrounding area that show horizontal hydraulic conductivity ranging from 0.01–0.3 m/day.

Bore ID	K Value	Aquifer	Comment
DMDDH03	0.36m/day	Deep aquifer (Hawkesbury Sandstone)	Slug test undertaken in 2017
DMDDH10	0.09m/day	Deep aquifer (Hawkesbury Sandstone)	Slug test undertaken in 2017

Both the shallow and deep aquifers are recharged via the infiltration of rainfall. The shallow aquifers respond directly to rainfall recharge, while there is a more gradual response in the deep Hawkesbury Sandstone. Recharge rates for the deep aquifer of around 6% of average annual rainfall that falls on the site have been adopted for the deep aquifer for planning purposes.

The infiltration rate into the soil depends on the rainfall intensity, the soil's initial moisture condition, and the soils' hydraulic characteristics. Rainfall that exceeds the soil's infiltration capacity flows overland as surface

runoff. The Project Site is considered to have a low to moderate runoff potential, with relatively well-drained soils.

7.4.4.5 Groundwater Dependent Ecosystem

As noted in Section 7.1.2.3 of the EIS, there is one known groundwater dependant ecosystem at the Project Site known as the *Maroota Sand Sands Swamp Forest*. The groundwater dependant ecosystem is likely maintained by shallow groundwater beneath Watercourse A. It was observed during site observations that Dam 1, located immediately upstream of the ecosystem, was leaking on the downslope edge of its embankment. This supply of water may also contribute to the health of the ecosystem.

7.4.4.6 Existing Groundwater Users

A review of the *Australia Groundwater Explorer 2020* identified 110 groundwater works within a 3km radius of the Project Site. These results were cross-checked with the *NSW Water Register* to identify the use and type of each groundwater work. The below table presents these results.

Type	Current	Unknown	Suspended	Total
Commercial and Industrial	8	–	–	8
Irrigation	8	3	1	12
Monitoring	16	37	–	53
Other	2	–	–	2
Stock and Domestic	1	–	–	1
Unknown	3	–	–	3
Water supply	28	3	–	31
Total	66	43	1	110

Figure 60 below provides the location of surrounding groundwater works.

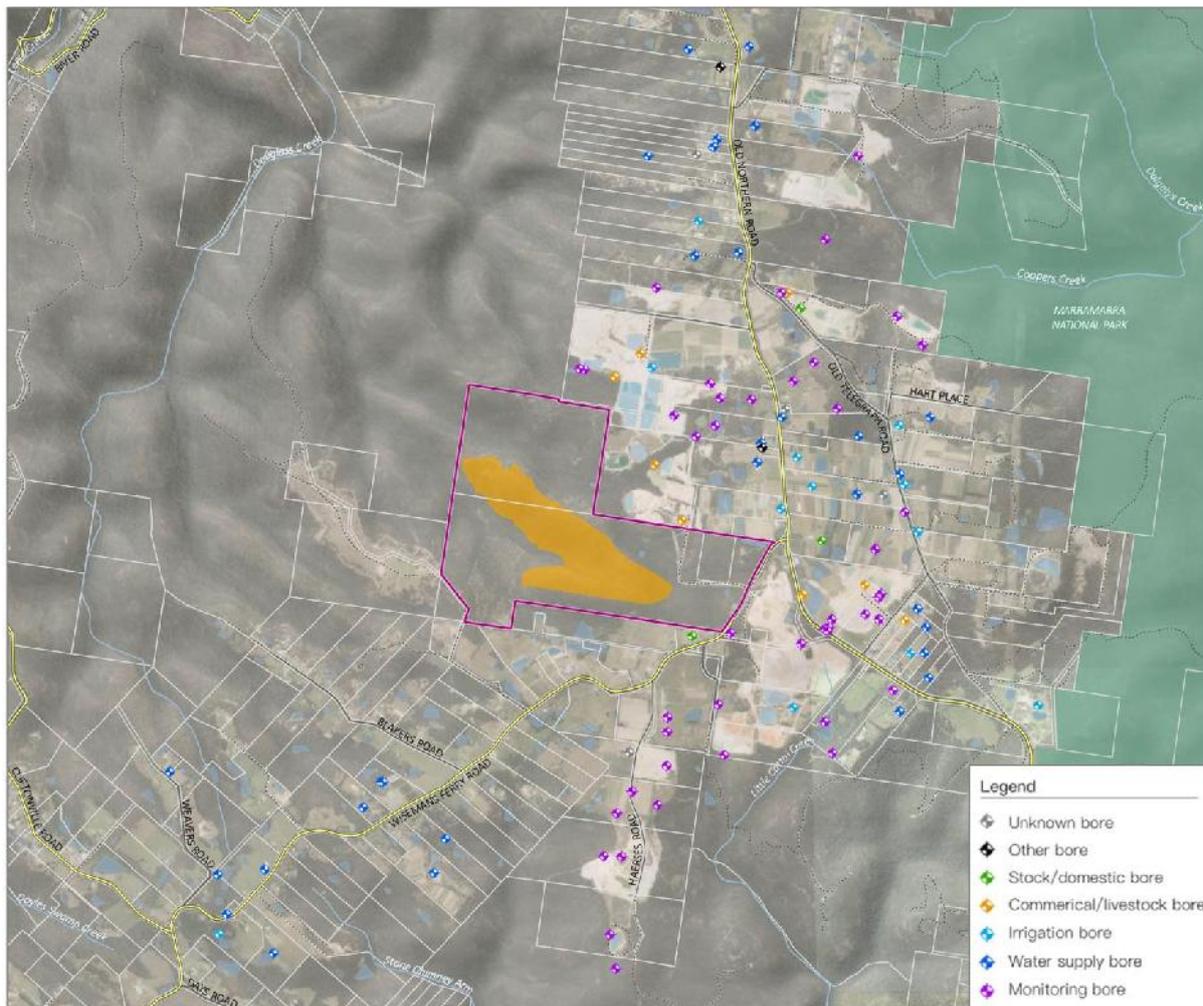


Figure 60: Surrounding Groundwater Works (Source: EMM, 2021)

7.4.4.7 Existing Groundwater Quality

Groundwater quality from the site monitoring network was reviewed to characterise background physiochemical, major ion and dissolved metal concentrations. A summary table and the laboratory reports are provided in Appendix D of the Water Assessment. The lab results show that:

- The groundwater contained in the shallow aquifer has low salinity, and the pH is mildly acidic.
- The groundwater is a Na–Ca–Cl–HCO₃ water type.
- Alkalinity is low.
- Major ion results are low.
- Dissolved metal results were typically below the laboratory limits of reporting, with the exception of barium, zinc and manganese.

7.4.5 Conceptual Site Model

EMM consolidated their understanding of the Project Site’s groundwater and surface water systems’ key processes into the conceptual models presented below. The models provide an illustrative representation of the Project Site’s groundwater systems, surface water systems, flow paths, recharge and discharge mechanisms and the interaction between these various hydrological components and geological units.

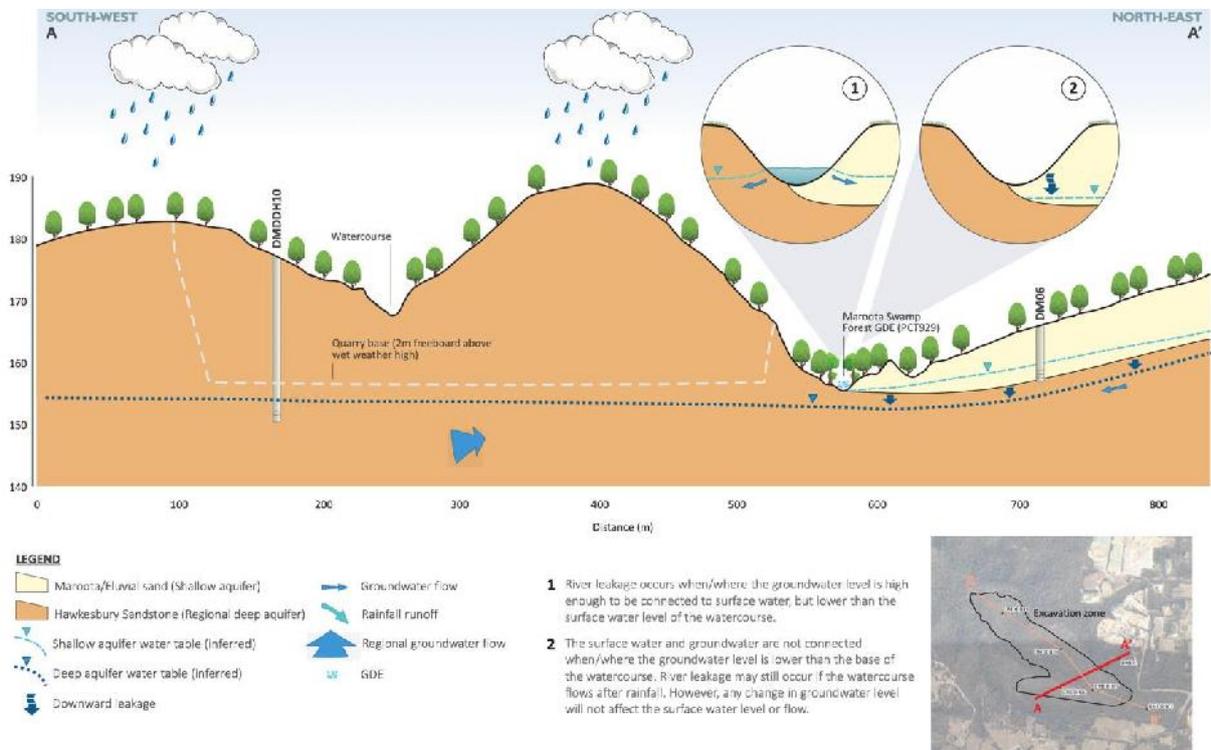


Figure 61: Conceptual Hydrological Model A (Source: EMM, 2021)

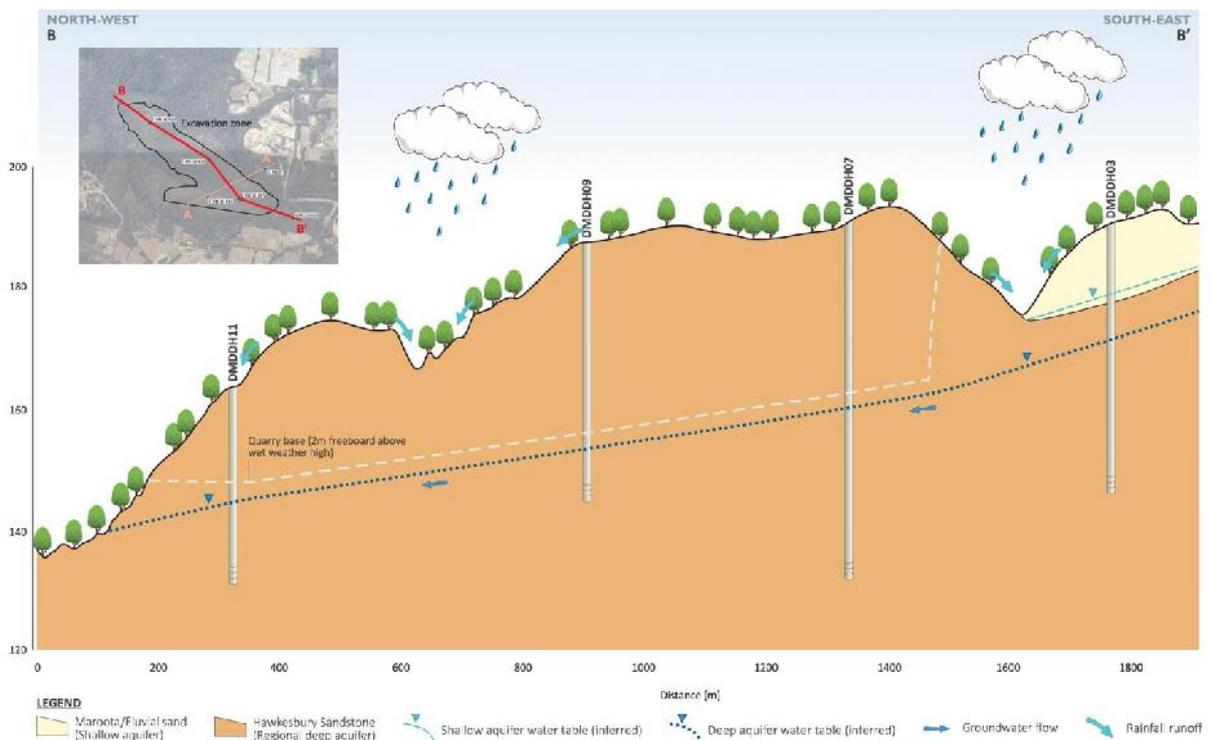


Figure 62: Conceptual Hydrological Model B (Source: EMM, 2021)

7.4.6 Water Management

7.4.6.1 Water Management Objectives

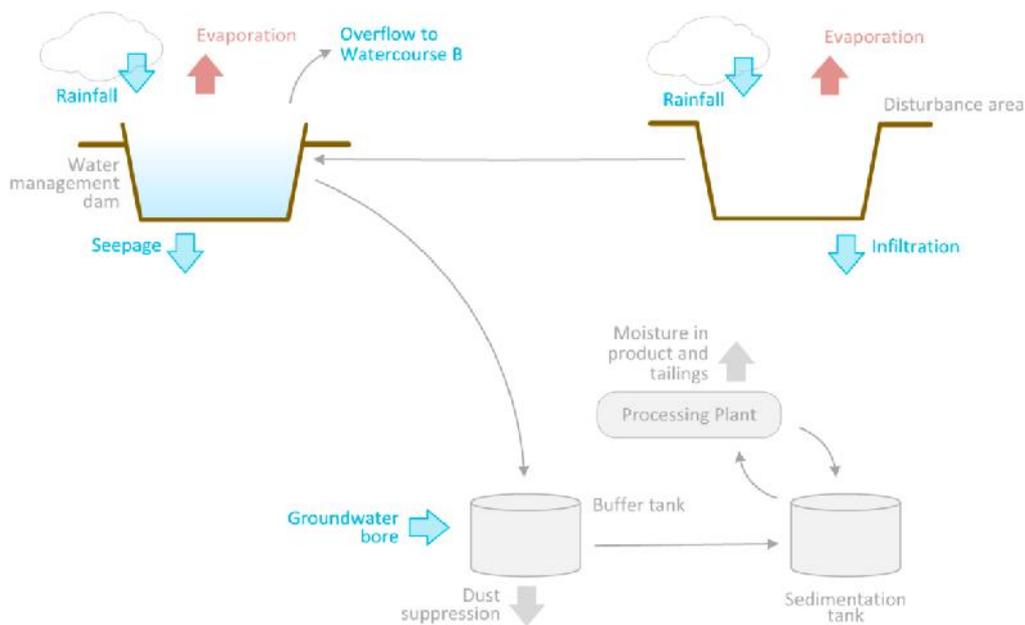
EMM designed a Water Management Strategy for the Project. The strategy's objectives and key actions to realise each objective is presented in the table below.

Table 52 – Water Management Objectives & Approach

Action No.	Action
Objective 1: Avoid Aquifer Interception	
Action 1	The pit floor will maintain a 2 m buffer above the wet-weather high regional water table.
Objective 2: Provide surface water controls that are consistent with industry best practice.	
Action 2	Where practical, clean water will be diverted around disturbed areas.
Action 3	Dirty water runoff will be managed by erosion and sediment controls that will be designed, constructed and maintained in accordance with the methods recommended in <i>Managing Urban Stormwater: Volume 1</i> (Landcom 2004) and <i>Volume 2E</i> (Department of Environment and Climate Change 2008).
Action 4	Water used in the sand processing plant will be managed in a closed loop system that will not discharge into either the dirty water system or offsite.
Action 5	Water captured in the water management dam will be used for sand processing and dust suppression to reduce overflow volumes.
Action 6	Chemical and hydrocarbon products will be stored in bunded areas in accordance with relevant Australian Standard AS1940:2004 and guidelines in Section 2.3.5.
Objective 3: Apply water efficiency measures to minimise water use	
Action 7	The sand processing plant will include a filter and plate press system to maximise water recovery and minimise system losses.
Action 8	Groundwater will be extracted as needed to minimise losses associated with storage.
Objective 4: Establish a secure non-rainfall dependant source of water	
Action 9	A groundwater supply system that can meet the full project water demand will be established as a non-rainfall dependant water source.

7.4.6.2 Water Management System Overview

The below figure provides a conceptual schematic that shows the functionality of the proposed water management system.



Dirty Water Management & Surface Water Dam

Dirty water runoff within the Project's dirty water areas will primarily be conveyed to the proposed surface water management dam located on Watercourse B via gravity drains. However, when the quarry pit's western side is extracted, dirty water will be collected in a sump and pumped into the dam.

The proposed dam will be designed and constructed per the methods in *Managing Urban Stormwater: Volume 1* (Landcom 2004) and *Volume 2E* (Department of Environment and Climate Change 2008). The dam's primary function will be to capture dirty water runoff for future onsite use. The dam has a minimum conceptual design volume of 15.3 ML.

Project Water Supply

Project water demand is estimated to be 47 ML/year, comprising of 37.5 ML/year for the sand processing system and 10 ML/year for dust suppression. Water will be preferentially sourced from rainfall captured in the water management dam when available. A groundwater supply system that can meet the full project water demand will be established as a non-rainfall dependant water source.

Section 3.2.6 of this EIS provides an overview of the Project's site water balance. Section 5.3 of the Water Assessment provides additional detail regarding the Project's site water balance. Modelling shows that the water management dam will supply 57–69% of the Project's water requirements during average conditions, with groundwater supplying the balance (31–43%). However, during dry conditions the groundwater supply system will be capable of providing close to 100% of water requirements.

7.4.6.3 Water Management System Layout

Figures 63 to 65 below show the Project’s proposed Water Management System for years 1, 10 and 28. Each figure shows the catchment extents, the alignment of major drains, site discharge locations and the location of the water management dam and other infrastructure.

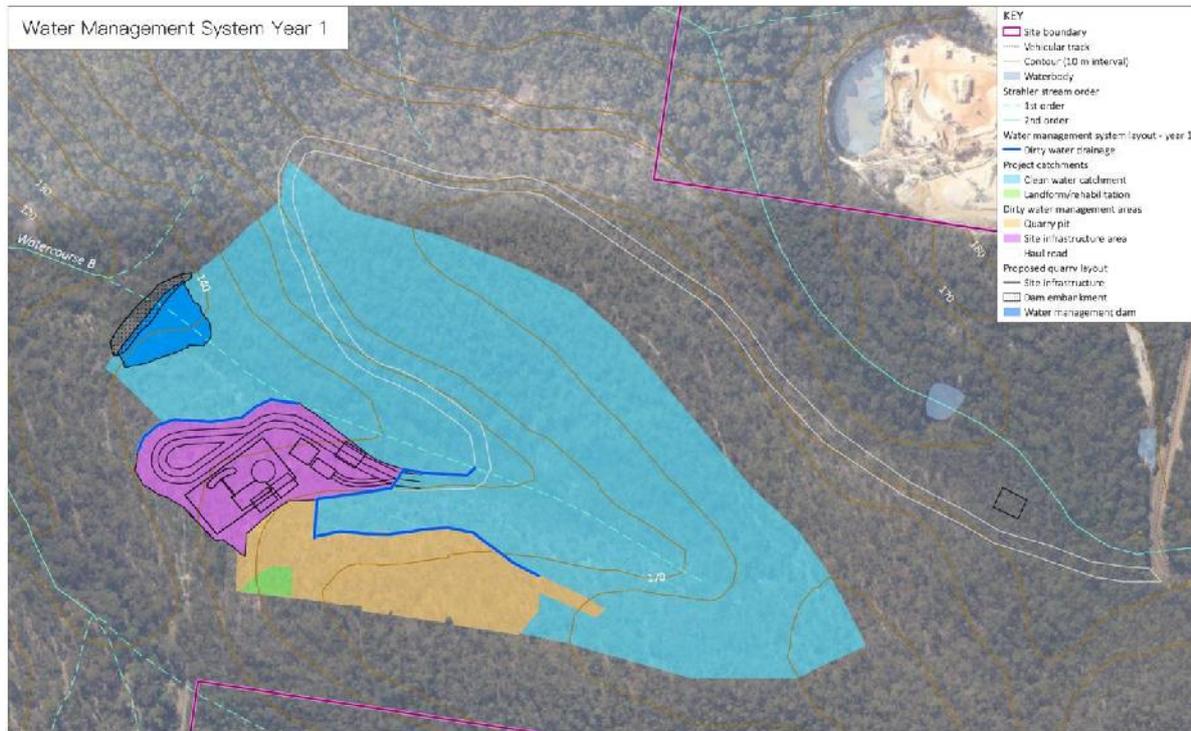


Figure 63: Water Management System Year 1 (Source: EMM, 2020)

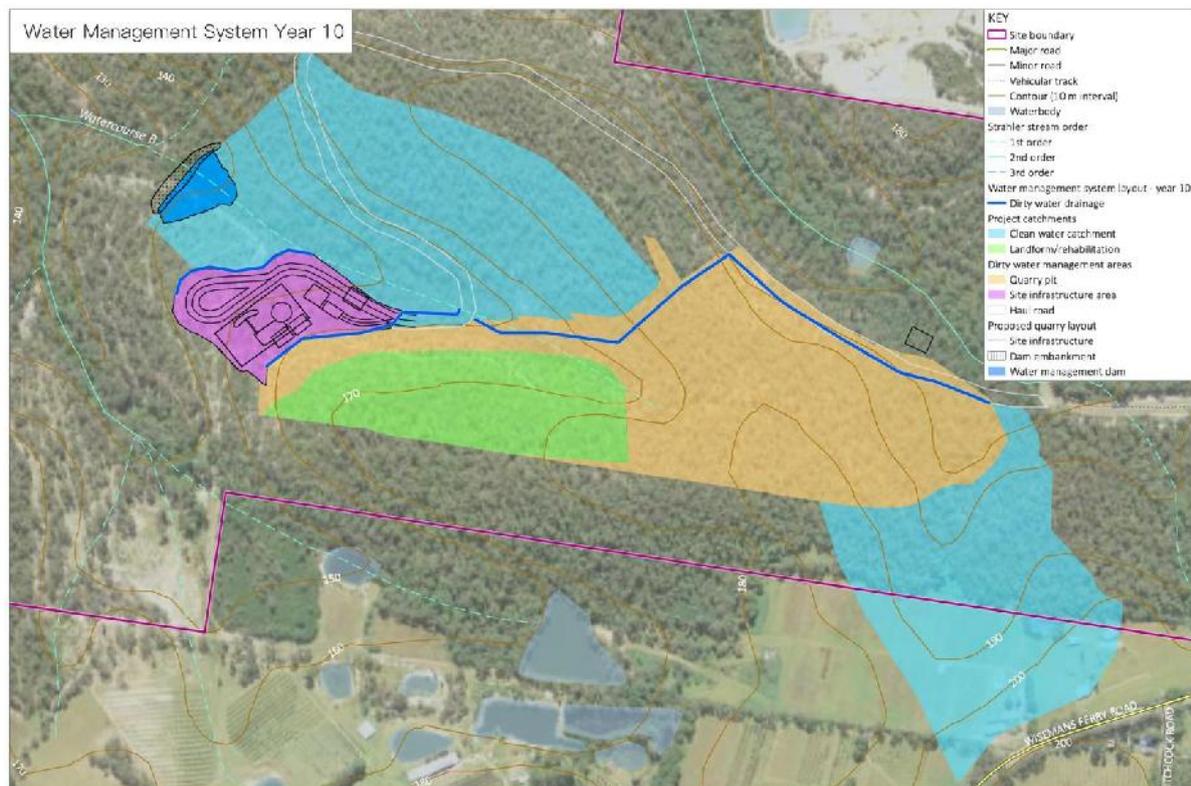


Figure 64: Water Management System Year 10 (Source: EMM, 2020)

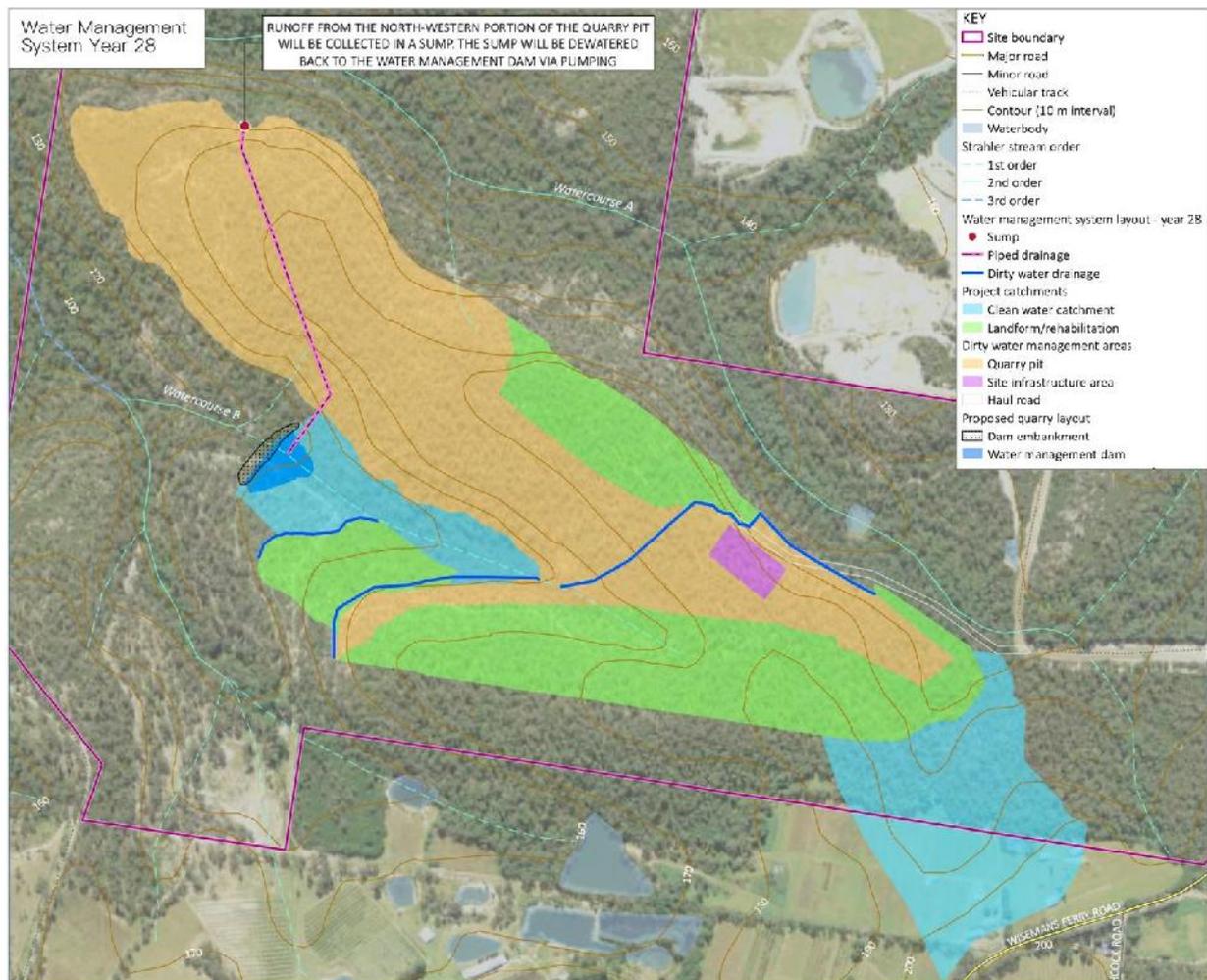


Figure 65: Water Management System Year 28 (Source: EMM, 2020)

7.4.6.4 Quarry Extraction Limit

The Project's extraction depth is limited to 2m above the observed wet-weather high water table to avoid aquifer interception. This objective was applied to the quarry design using available groundwater level data from the 2017 – 2020 period.

7.4.6.5 Post-Assessment Recommendations

The following monitoring and management plans will be prepared post development approval:

- A **Water Monitoring and Response Plan** that will establish an on-going groundwater monitoring program, an on-going surface water monitoring program and a trigger action framework to identify and rectify issues.
- A **Water Management Plan** that outlines how water will be managed to achieve compliance with the Development Consent and EPL licence conditions; and establishes responsibilities and reporting requirements.

7.4.7 Water Impact Assessment

7.4.7.1 Groundwater Drawdown – Theis Analytical Model

The ‘Theis Method’ is an analytic solution for the drawdown for non-steady groundwater flow and assumes radial flow towards an abstraction point. EMM utilised this method to assess the drawdown potential at nearby groundwater works in the regional deep aquifer, the nearby shallow aquifer and the Maroota Sands Swamp Forest Groundwater Dependent Ecosystem.

Groundwater Abstraction Scenarios

The Project’s groundwater supply system will meet the Project’s total operational water demand approximately 40% of the time. This is equivalent to a long-term average abstraction rate of 20 ML/year. However, higher abstraction rates (up to the total project water requirement of 47 ML/year) may be required during dry periods when there is minimal surface water available. Two groundwater abstraction scenarios were, therefore assessed. These are described below

Expected Scenario	20 ML/year (0.6 L/s) abstraction rate which is equivalent to groundwater supplying 40% of the total operational water demand over an extended period
Conservative	50 ML/year (1.5 L/s) – this is a conservative scenario that assumes no water is sourced from the water management dam in the event of prolonged drought conditions.

Theis Model Parameters

The below table outlines the Theis model’s parameters and notes the source of the adopted parameters.

Parameter	Adopted Value	Source
Hydraulic Conductivity	0.1 m/day	Maroota groundwater study – Technical status report
Storativity	0.0045	Maroota groundwater study – Technical status report
Aquifer Thickness	150m	Groundwater elevation at proposed groundwater supply locations
Pumping Rate	20ML/Year; and 50ML/ Year	–
Duration of abstraction	28 years	–

Model Results

The predicted drawdown at all groundwater works within 3km of the Project’s extraction pit is provided in Appendix G of the Water Assessment table. The following table summarises the Project’s drawdown impacts at each of the nearby deep aquifer groundwater users.

Table 54 – Groundwater Drawdown at Nearby Groundwater Works

Bore ID	Distance from Project Bore	Years to >2m Drawdown (50ML)	Final Drawdown (50ML)	Final Drawdown (20ML)	Bore ID	Distance from Project Bore	Years to >2m Drawdown (50ML)	Final Drawdown (50ML)	Final Drawdown (20ML)
GW101527	1041m	6.2	-3.1m	-1.2m	GW107004	2362m	-	-1.9m	-0.8
GW101528	1056m	6.2	-3.1m	-1.2m	GW038147	2391m	-	-1.9m	-0.8
GW100864	1189m	7.9	-2.9m	-1.2m	GW059742	2431m	-	-1.9m	-0.8
GW105044	1295m	9.3	-2.8m	-1.1m	GW059118	2445m	-	-1.9m	-0.8
GW105943	1465m	11.9	-2.6m	-1.0m	GW109326	2473m	-	-1.9m	-0.7
GW105047	1498m	12.4	-2.6m	-1.0m	GW110585	2489m	-	-1.9m	-0.7
GW057460	1606m	14.4	-2.5m	-1.0m	GW033197	2509m	-	-1.8m	-0.7
GW072780	1612m	14.4	-2.5m	-1.0m	GW053898	2511m	-	-1.8m	-0.7
GW108133	1676m	15.6	-2.4m	-1.0m	GW103570	2639m	-	-1.8m	-0.7
GW034628	1683m	15.8	-2.4m	-1.0m	GW102587	2685m	-	-1.8m	-0.7
GW105067	1786m	17.8	-2.3m	-0.9m	GW101839	2754m	-	-1.7m	-0.7
GW102451	1788m	17.8	-2.3m	-0.9m	GW102634	2833m	-	-1.7m	-0.7
GW072980	1807m	18.1	-2.3m	-0.9m	GW108136	2845m	-	-1.7m	-0.7
GW048741	1866m	19.5	-2.3m	-0.9m	GW100185	2868m	-	-1.7m	-0.7
GW016348	1888m	19.8	-2.2m	-0.9m	GW104105	2898m	-	-1.6m	-0.7
GW106261	1910m	20.4	-2.2m	-0.9m	GW037738	2961m	-	-1.6m	-0.6
GW109927	2010m	22.3	-2.2m	-0.9m	GW101212	3079m	-	-1.6m	-0.6
GW072274	2146m	25.7	-2.1m	-0.8m	GW071883	3317m	-	-1.5m	-0.6
GW060051	2192m	26.6	-2.0m	-0.8m	GW104348	3348m	-	-1.5m	-0.6
GW104460	2254m	-	-2.0m	-0.8m	GW060147	3351m	-	-1.5m	-0.6
GW055962	2354m	-	-1.9m	-0.8m	GW015051	3503m	-	-1.4m	-0.6
GW113253	2357m	-	-1.9	-0.8m					

The Aquifer Interface Policy provides a minimal impact criteria of a 2m groundwater drawdown for a surrounding 3rd party groundwater user.

The model results show that groundwater abstraction at the expected rate of 20ML/per year will not result in drawdown impacts of more than 2m at nearby groundwater works. The conservative scenario (50 ML/year abstraction) indicates that a maximum drawdown of 3.2m at the closest groundwater work could occur. However, more than six years of continuous pumping at 50ML/year would be required before a drawdown impact of greater than 2m occurs. As a typical dry period will last 2–3 years, this analysis demonstrates that short-term abstraction at up to 50 ML/year rates can occur without resulting in a drawdown impact of greater than 2m at nearby groundwater works.

7.4.7.2 Groundwater Dependant Ecosystem Impacts

The Maroota Sands Swamp Forest Groundwater Dependent Ecosystem is maintained by shallow groundwater beneath Watercourse A. Abstraction from the deep aquifer is not expected to impact the shallow aquifer. Hence, no impacts to the Groundwater Dependent Ecosystem are expected.

7.4.7.3 Hydrologic Regimes Impacts

Watercourse A

During operations (from year 5), the Project will reduce the contributing catchment area to Dam 1 by 13.7ha. This is equivalent to 24% of the existing catchment and could result in a commensurate reduction in streamflow that originates from surface water runoff. (PF Formation Sand and Concrete hold a surface water entitlement to extract up to 32 ML/year from Dam 1.)

Dam 1 is maintained by baseflow that is interpreted to discharge from the shallow aquifer, which is not predicted to be impacted by the Project. Therefore, the reduction in runoff volume to Dam 1 is not expected to reduce its water availability.

Watercourse B

During operations runoff from the Watercourse B catchment will be captured in the water management dam, which will occasionally overflow. It is expected that the streamflow regime in the 200m long watercourse reach downstream of the dam will be materially impacted. Approximately 200m downstream of the dam, Watercourse B joins a larger 2nd order watercourse. The water management dam will impact approximately 21% of this larger watercourse's contributing catchment area. Further downstream, this ratio will diminish as the catchment area increases.

7.4.7.4 Water Quality Impacts

The proposed erosion/sediment controls will effectively manage coarse and fine sediment entrained in dirty water runoff. Hence, sedimentation impacts in downstream watercourses are not expected. Overflows from the water management system will typically occur intermittently over several days during wet weather periods. On average, overflow events (i.e. overflows that occur for several days) will occur three times per year. Overflows are expected to cease shortly after the wet weather conditions end and runoff subsides. Importantly, overflows are only expected to occur when streamflow in receiving watercourses is naturally elevated.

The water quality of overflows from the water management system will be progressively monitored. Further measures, such as water treatment could be implemented if monitoring indicates that overflows are resulting in non-trivial degradation of receiving water quality.

7.4.7.5 Assessment against the Aquifer Interface Policy

The Aquifer Interface Policy outlines the requirements for obtaining water licences for 'aquifer interference activities. It also outlines the 'minimal impact considerations' for assessing groundwater impacts in NSW. Section 6.3 of the Water Assessment provides an assessment of the Project against the 'minimal impact considerations' of the Aquifer Interface Policy. That assessment demonstrates that the Project does not exceed Level 1 impact considerations for changes to the water table, water pressure and water quality which is an acceptable outcome.

7.4.7.6 Assessment against the NSW Water Quality and River Flow Objectives

The Project has been assessed against the typical water quality and river flow objectives for uncontrolled streams in other catchments in NSW. The full assessment is found in Section 6.4 of the Water Assessment. A summary of that assessment is provided in the below table.

Table 55 — Assessment of water quality and river flow objectives

Environmental Value	Objective	Application to Project
Water Quality Objectives		
Aquatic ecosystems	Maintaining or improving the ecological condition of water bodies and their riparian zones over the long term.	The water quality of water management system overflows will be progressively monitored. Further measures, such as water treatment could be implemented if required.
Visual amenity	Aesthetic qualities of waters.	Overflows will occur for short periods and will not have elevated levels of visual amenity impacting pollutants. Therefore, no material impacts to the visual amenity of receiving waters are expected.
Secondary contact recreation	Maintaining or improving water quality for activities such as boating or wading, where there is a low probability of water being swallowed.	Overflows will occur occasionally for short periods and are not expected to have elevated nutrients or concentrations of coliforms, enterococci or protozoans. Therefore, no material impacts the potential for secondary and primary contact recreation in receiving waters is expected.
Primary contact recreation	Maintaining or improving water quality for activities such as swimming in which there is a high probability of water being swallowed.	
Livestock water supply	Protecting water quality to maximise the production of healthy livestock.	The water quality of water management system overflows is expected to be suitable for both livestock consumption and irrigation.
Irrigation water supply	Protecting the quality of waters applied to crops or pasture.	
Homestead water supply	Protecting water quality for domestic use in homesteads, including drinking, cooking and bathing.	It is unlikely that any downstream users extract from downstream waterways for homestead water supply
Drinking water at point of supply — disinfection only	These objectives apply to all current and future licensed offtake points for town water supply and to specific sections of rivers that contribute to drinking water storages or immediately upstream of town water supply offtake points. The objectives also apply to sub-catchments or groundwater used for town water supplies.	Town water supply in the region is provided by Sydney Water. The site is not located within Sydney's drinking water catchment. No water is extracted from downstream of the site for town water supply.
Drinking water at point of supply — clarification and disinfection		
Drinking water at point of supply — groundwater		
Aquatic foods (cooked)	Refers to protecting water quality so that it is suitable for the production of aquatic foods for human consumption and aquaculture activities.	The required level of protection will be provided by addressing the objective for aquatic ecosystems.

Changes to hydrologic regimes in downstream watercourses are described further above and in Section 6.2 of the Water Assessment.

7.5 Traffic, Transport and Access

The Project's SEARs require the EIS to address the following key issues relating to traffic and transport:

Table 56 –SEARs Traffic, Transport & Access

Requirement	EIS Section
Accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products	Section 7.5.6.1 Annexure 11
A detailed assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road network (as identified above), including a road safety audit	Section 7.5.6 Annexure 11
A description of the measures that would be implemented to mitigate any impacts	Section 7.5.7 Annexure 5 & 11
A detailed assessment of the cumulative traffic impacts on the local road network, having regard for the existing, approved and proposed developments in the Maroota Area	Section 7.5.6.4 Annexure 11

Transport & Urban Planning PTY LTD (Transport & Urban Planning) was engaged by Design Collaborative to prepare a Traffic Impact Assessment (TIA) that assesses the traffic impacts of the Project, including cumulative impacts until the year 2030 (**Annexure 11**). The Assessment includes accurate predictions of the road traffic generated by the construction and operation of the development and recommends measures to mitigate adverse traffic impacts. Transport & Urban Planning were also engaged to prepare a Road Safety Audit (**Annexure 23**).

The TIA was prepared in accordance with the requirements of the Transport for NSW *Guide to Generating Developments October 2002*. Other technical standards/publications referenced in this assessment include:

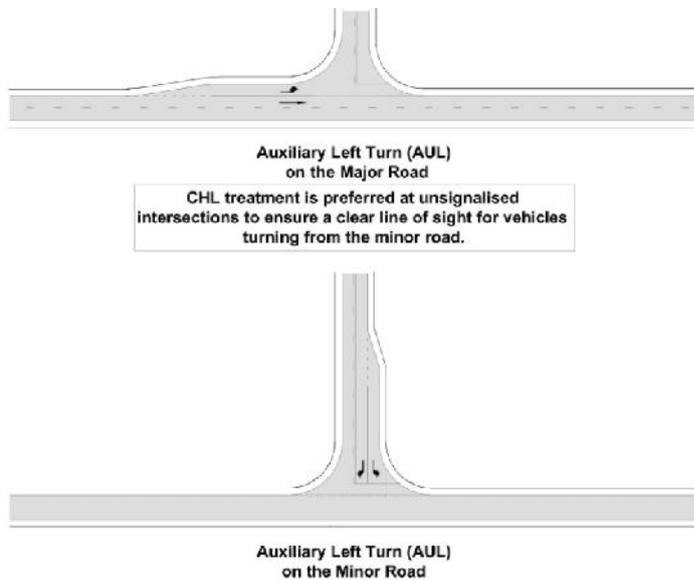
- *Austroads Guide to Road Design and RMS [now Transport for NSW] supplements.*
- *Austroads Guide to Traffic Management and RMS [now Transport for NSW] supplements.*
- *Austroads Guide to Traffic Management Part 12. Traffic Impacts of Developments.*

The following section provides a summary of the TIA, including proposed management measures.

Key Traffic Definitions

B Double An articulated vehicle with a second semi-trailer attached to the rear of the first.

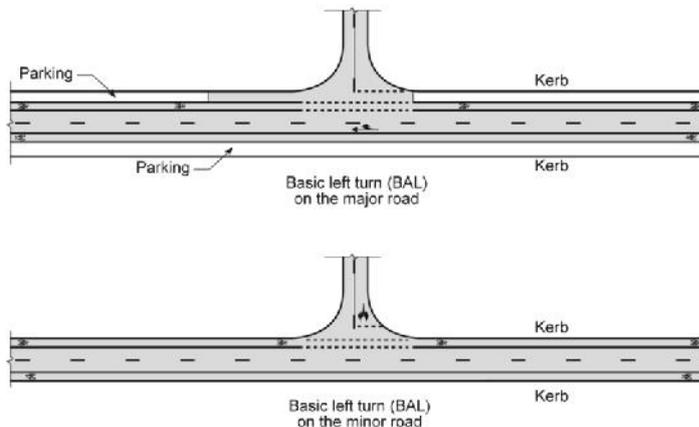
AUL AUL is a turn treatment that provides an ancillary left-turn lane.



CHR CHR is a channelised intersection treatment to protect right-turners.



BAL BAL is a turn treatment for basic left-turns.



Level of Service Level of Service is a basic performance parameter used to describe the operation of an intersection. Levels of Service range from A (indicating good intersection operation) to F (indicating over saturated conditions with long delays and queues).

Degree of Saturation Degree of Saturation is the ratio of demand flow to capacity, and therefore has no unit. As it approaches 1.0, extensive queues and delays could be expected. For a satisfactory situation, Degree of Saturation should be less than the nominated practical degree of saturation, usually 0.9.

Average Vehicle Delay Delay is the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle.

7.5.1 Existing Road Network

There are two main transport routes to the Project Site from Greater Sydney, these being:

- Patricia Fay Drive and Wisemans Ferry Road/Cattai Road/Pitt Town Road towards Pitt Town; and
- Patricia Fay Drive, Wisemans Ferry Road, Old Northern Road towards Castle Hill.

The location of both these routes is shown in the below figure.

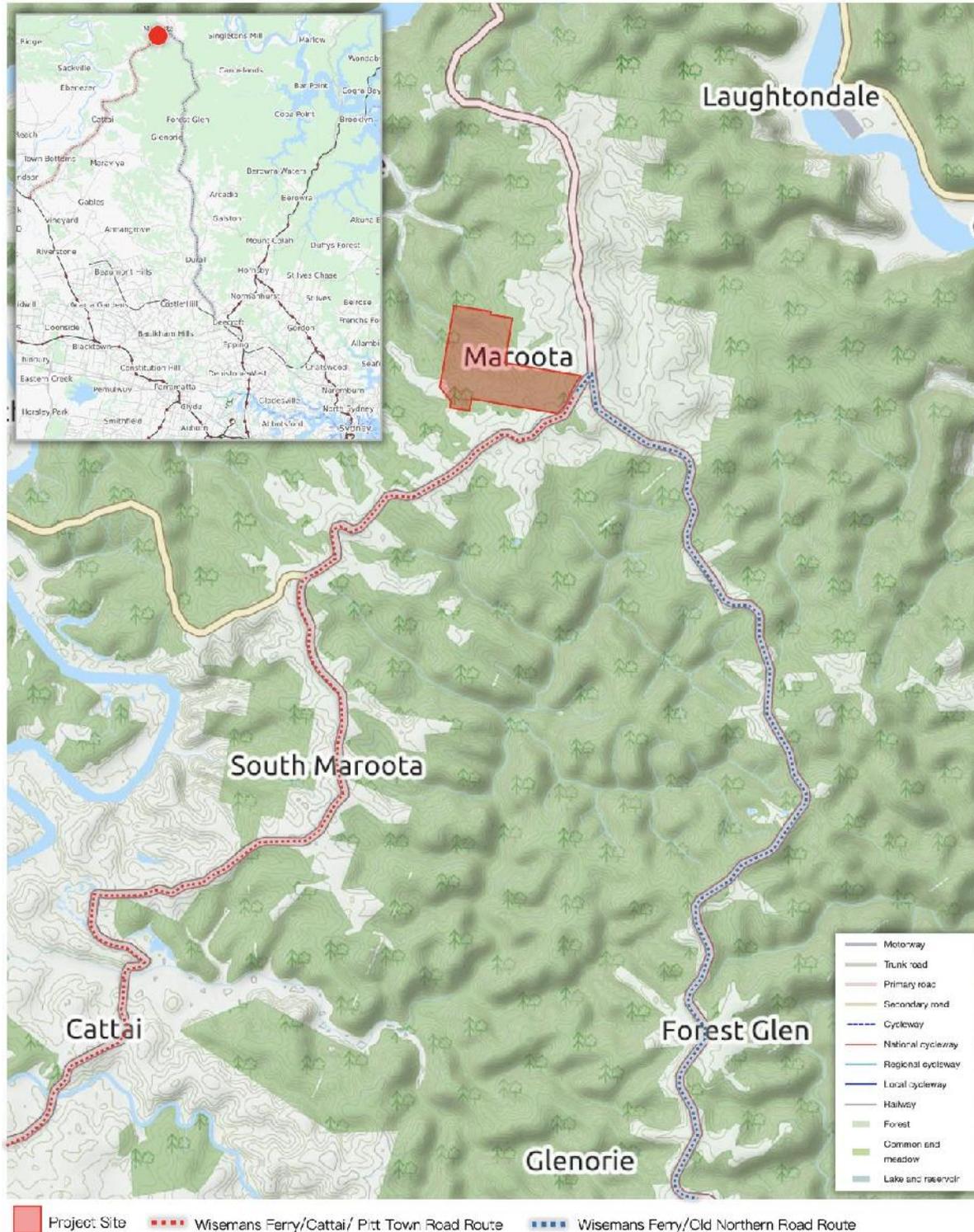


Figure 66: Transport Routes (Source: Openmaps, 2020)

7.5.1.1 Description of Roads

Patricia Fay Drive

Patricia Fay Drive is a local road that serves PF Formations Sand. It is a two-lane road with a 90-degree bend which is mostly unsealed, with a short-sealed road section approximately 190 metres long at the intersection with Wisemans Ferry Road. Patricia Fay Drive forms a cross junction intersection with Wisemans Ferry Road, some 400 metres south of Old Northern Road. As outlined in Section 3.2.2 of this EIS, the proposed quarry's haul road will form a T junction intersection with Patricia Fay Drive at the 90-degree bend, which is some 200 metres west of Wisemans Ferry Road. **Figure 67** below shows the location of Patricia Fay Drive.



Figure 67: Patricia Fay Drive (Source: Nearthmaps, 2020)

Wisemans Ferry Road

Wisemans Ferry Road is a State road under the control of Transport for NSW (TfNSW). The northern section of the road is predominantly a two-lane rural road which passes through a rural/semi-rural environment. Land uses adjacent to the road in the Maroota area adjacent are sand quarries and agricultural uses. The southern section at Pitt Town passes through urban development.

The road is an approved 25m/26m B Double route and has a high level of traffic management including centreline, edgeline marking, guideposts and reflectors. The speed limit on the Wisemans Ferry Road route is predominantly 80km/h with a 60km/h section in the built-up area of Pitt Town.

Old Northern Road

Old Northern Road links Wisemans Ferry and Baulkham Hills and is a State road under the control of TfNSW. Old Northern Road between Maroota and Baulkham Hills is an approved 25m–26m B Double route. The road passes through Glenorie, Dural and Castle Hill.

Old Northern Road between Maroota and Dural is predominantly a two-lane road with a high level of traffic management which includes centreline and edgeline marking, sealed shoulders, curve and other warning signs, guidepost and reflectors and auxiliary lanes at principal intersections.

The section between Castle Hill Road and Windsor Road at Baulkham Hills is a four-lane divided road with principal intersections controlled by traffic signals.

Speed limits vary along the route as follows.

- 60km/h at Maroota and 80km/h and 90km/h in the rural and semi-rural areas.
- 60km/h through the villages of Glenorie, Middle Dural and Dural and the urban area south of Dural.

There are a number of school zones along Old Northern Road including the Maroota Public School which is located north of the Project site. This school zone is not located on the main transport routes that head south.

7.5.1.2 Description of Key Intersections

The two key intersection utilised by vehicles associated with the Project are:

- Wisemans Ferry Road/Patricia Fay Drive; and
- Old Northern Road/Wisemans Ferry Road.

Wisemans Ferry Road/Patricia Fay Drive Intersection

This intersection will provide direct access to the proposed quarry via Patricia Day Drive. It is located 400m south of the Old Northern Road/Wisemans Ferry Road intersection. **Figure 68** below provides an aerial image of the intersection. Existing traffic management at the intersection includes:

- A cross junction intersection with a small length of kerb and guttering at the intersection on the western side.
- A CHR (right turn) lane treatment and an AUL (auxiliary left turn) lane treatment in the northern approach of Wisemans Ferry Road.
- A CHR (right turn) lane treatment and an AUL (auxiliary left turn) lane treatment in the southern approach of Wisemans Ferry Road.
- Patricia Fay Drive is sealed for the first 190 metres from the intersection with a sealed pavement width of 8–9 metres and flaring at the intersection, with Stop Sign Control.

The AUL left turn lane into Patricia Fay Drive from the southern approach of Wisemans Ferry Road is short (approximately 60 metres long including taper) and narrow (2.0–2.2 metres) and does not meet current Austroad Guidelines.

Similarly, the CHR (right turn) lane in the northern approach of Wisemans Ferry Road for the right turn into Patricia Fay Drive is also short (approximately 55 metres long including taper). The Applicant proposes to upgrade the intersection to meet the current Austroad Guidelines.



XX: Number of Vehicles AM or PM peak hours (X): Number of heavy vehicles AM or PM peak hours



Figure 68: Wisemans Ferry Road/Patricia Fay Drive (Source: Nearmaps, 2020)

Wisemans Ferry Road/Old Northern Road Intersection

This intersection is located 400m north of the Wisemans Ferry Road/Patricia Fay Drive Intersection. Figure 69 below provides a photo of the intersection. Existing traffic management includes:

- Single lane approach and departure lanes in the northern and southern legs of Old Northern Road, together with a basic BAL (left turn) treatment in the southern approach of Old Northern Road for the left turn into Wisemans Ferry Road; and a
- Single lane approach and departure lanes in Wisemans Ferry Road, together with a Basic BAL (left turn) lane treatment for the left turn from Wisemans Ferry Road into Old Northern Road.



XX: Number of Vehicles AM or PM peak hours (X): Number of heavy vehicles AM or PM peak hours



Figure 69: Wisemans Ferry Road/Old Northern Road Intersection (Source: Nearmaps, 2020)

7.5.2 Existing Traffic Volumes

Traffic counts were unable to occur in early/mid 2020 due to COVID-19 restrictions that disrupted traffic patterns on the road network. Therefore, traffic counts that were undertaken in 2017 have been relied upon for the TIA. These counts were compared to 2019 counts undertaken by Seca Solutions for the Haerses Road Quarry Modification 3. That comparison shows similar results.

Daily volume counts were undertaken for Old Northern Road and Wiseman Ferry Road near the Project Site. Intersection counts were also undertaken on Wednesday 22 March 2017 during the AM period for the Old Northern Road/Wisemans Ferry Road and Wisemans Ferry Road/Patricia Fay Drive intersections.

The below table provides average traffic volumes on Wisemans Ferry Road and Old Northern Road.

7.5.2.1 Average Traffic Volumes – Wisemans Ferry Road and Old Northern Road

Table 57 – Two Way 5- & 7-day Average Traffic Volumes						
Location	5 Day Average (Weekday) Volumes			7 Day Average Volumes		
	Total Vehicles	Heavy Vehicles	% Heavy Vehicles ¹	Total Vehicles	Heavy Vehicles	% Heavy Vehicles
Old Northern Road, north of Wisemans Ferry Road	2346	460	19.6%	2464	377	15.3%
Old Northern Road, south east of Roberts Road	2043	357	17.5%	2118	314	14.8%
Wisemans Ferry Road, south of Old Northern Road	2006	428	21.3%	1977	348	17.6%
Wisemans Ferry Road, south of Patricia Fay Drive	2039	430	21.1%	2002	336	16.8%
Wisemans Ferry Road, south west of Haerses Road	2008	448	22.3%	1984	357	18.0%

¹ Austroad Class 3-12

7.5.2.1 Peak Hour Volumes – Wisemans Ferry Road and Old Northern Road

The below table provides peak hour volumes for Old Northern Road, south-east of Roberts Road, Wisemans Ferry Road, south of Old Northern Road and Wisemans Ferry Road, south of Patricia Fay Drive.

Table 58 – Two-Way Peak Hourly Volumes				
Location	Morning Peak	Afternoon Peak	Morning Peak	Afternoon Peak
	(5-day average)	(5-day average)	(7-day average)	(7-day average)
Old Northern Road, south east of Roberts Road	169	181	141	185
Wisemans Ferry Road, south of Old Northern Road	148	165	135	161
Wisemans Ferry Road, south of Patricia Fay Drive	153	169	137	166

7.5.2.3 Peak Hour Volumes – Key Intersections

The below tables show the existing AM (8.15am – 9.15am) and PM (3.30pm – 4.30pm) peak hours traffic volumes at the key intersections of Old Northern Road/Wisemans Ferry Road and Wisemans Ferry Road/Patricia Fay Drive. These volumes are also visualised in **Figure 68** and **69**.

Wisemans Ferry Road/Old Northern Road Intersection

Table 59 – Peak Traffic Volumes Wisemans Ferry Road/ Old Northern Road

Contributing Roadway	Vehicles	Heavy	Vehicles	Heavy
	AM	Vehicles AM	PM	Vehicles PM
Wisemans Ferry Road left turn onto Old Northern Road	53	18	57	6
Wisemans Ferry Road right turn onto Old Northern Road	45	12	18	2
Old Northern Road left turn onto Wisemans Ferry Road	22	7	58	9
Old Northern Road right turn onto Wiseman’s Ferry Road	59	11	49	9
Continue Northbound on Old Northern Road	28	4	60	8
Continue Southbound on Old Northern Road	60	3	45	8

Wisemans Ferry Road/Patricia Fay Drive Intersection

Table 60 – Peak Traffic Volumes Wisemans Ferry Road/Patricia Fay Drive

Contributing Roadway	Vehicles	Heavy	Vehicles	Heavy
	AM	Vehicles AM	PM	Vehicles PM
Patricia Fay Drive left turn onto Wisemans Ferry Road	8	8	2	0
Patricia Fay Drive right turn onto Wisemans Ferry Road	4	3	6	2
Wisemans Ferry Road left turn onto Patricia Fay Drive	5	5	1	1
Wisemans Ferry Road right turn onto Patricia Fay Drive	4	4	1	1
Continue Northbound on Wisemans Ferry Road	88	21	72	9
Continue Southbound on Wisemans Ferry Road	78	13	105	17

7.5.3 Road Safety

Road crash data were obtained from TfNSW for the 3–year period from 1 October 2016 to 30 September 2019 for Old Northern Road and Wisemans Ferry Road at Maroota. There were two non–injury crashes on Old Northern Road between Old Telegraph Road and Caneolands Road comprising:

- One mid–block rear end crash east of Roberts Road; and
- One rear end intersection crash involving two southbound vehicles, one of which was turning right into Wisemans Ferry Road.

There were six crashes on Wisemans Ferry Road between Old Northern Road and Cliftonville Road Road, four of which were injury crashes. These crashes comprised:

- Five run–off the road type crashes involving a single vehicle (truck, car, and motorcycle); and
- One rear end crash adjacent to the Shell Service Station, north east of Bakers Road.

There were no reported crashes at the intersection of Wiseman's Ferry Road and Patricia Fay Drive.

7.5.4 Public Transport

The 672-bus service operates between Wisemans Ferry Road and Windsor, via Pitt Town and Oakville. It is a loop service that operates along Wisemans Ferry Road and the section of Old Northern Road, west of Wisemans Ferry Road. This is a limited bus service that runs on weekdays and Saturdays. There are also school bus services that operate along Wisemans Ferry Road and sections of Old North Road at and near Maroota.

7.5.5 Assessment of Existing Traffic Conditions

As part of the review of traffic conditions on the road network, the operational capacity of the principal intersections on the road network has been assessed using the SIDRA 8 traffic model. Criteria for interpreting the operation of an intersection are Level of Service (LS), Degree of Saturation (DS) and Average Vehicle Delay (AVD). The table below provides an explanation of the various levels of service for intersections. A Level of Service D or better is generally considered to be a minimum design requirement for intersections.

Table 61 – Level of Service Criteria for Intersections

Level of Service	Average Delay Per Vehicle (sec/veh)	Traffic signals, roundabouts	Give Way & Stop Signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and requires other control modes
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control modes
F	>70	Intersection is oversaturated	Oversaturated, requires other control modes

The following table provides the SIDRA modelling results for the Old Northern Road/Wisemans Ferry Road and Wisemans Ferry Road/Patricia Fay Drive Intersections. The results demonstrate that both these intersections have good levels (Level A & B) of operation.

Table 62 – Current Key Intersection Performance

Intersection (All Approaches)	AM Peak				PM Peak			
	DS	AVD	LS	95 th % Queue Length	DS	AVD	LS	95 th % Queue Length
Old Northern Road/Wisemans Ferry Road	0.086	4.1	A	3.7	0.066	3.8	A	2.6
Wisemans Ferry Road/Patricia Fay Drive	0.052	1.4	B	2.0	0.060	0.8	A	0.7

7.5.6 Impact Assessment

7.5.6.1 Traffic Generation

The following table provides an hourly and daily breakdown of sales truck movements for the Project.

Time	Monday to Friday	Saturday
6am – 8am	20	20
8am – 10am	25	15
10am – 12pm	25	15
12pm– 2pm	20	10
2pm – 4pm	16	–
4pm – 6pm	14	–
Total per day	120	60

In addition to the above sales truck movements, up to 30 light vehicle movements and two heavy vehicle movements may occur at the Project site per day. The Traffic Impact Assessment modelled a worst-case scenario that up to 30 two-way truck movement may occur during a busy hour.

It is anticipated that heavy vehicle trips generated by the Project will be evenly split between Wisemans Ferry Road towards Pitt Town and Old Northern Road towards Castle Hill.

7.5.6.2 Impact on the Road Network

The Project would result in the following increases in traffic using the road network on weekdays.

- 76 two-way vehicle movements per day including 60 heavy vehicle movements in Wisemans Ferry Road north of Patricia Fay Drive and in Old Northern Road south east of Wisemans Ferry Road; and
- 76 two-way vehicle movements per day including 62 heavy vehicle movements in Wisemans Ferry Road south of Patricia Fay Drive

Both Old Northern Road and Wisemans Ferry Road at Maroota carry relatively low traffic volumes, and the additional traffic generated by the Project will be easily accommodated on the road network with no change to the level of service.

7.5.6.3 Impacts on Key Intersections

The Project may generate up to 30 two-way heavy vehicle trips (15 in/15 out) per hour associated with product transport. The SIDRA modelling presented in **Table 62** was updated to account for the additional volumes of traffic associated with the Project. The results are presented below.

Table 64 – Key Intersection Performance with Project Approval

Intersection (All Approaches)	AM Peak				PM Peak			
	DS	AVD	LS	95 th % Queue Length	DS	AVD	LS	95 th % Queue Length
Old Northern Road/Wisemans Ferry Road	0.096	4.3	A	4.4	0.072	4.0	A	2.6
Wisemans Ferry Road/Patricia Fay Drive	0.067	2.7	B	5.4	0.060	2.3	B	3.9

The above results demonstrate that:

- The intersection of Old Northern Road/Wisemans Ferry Road will continue to operate at a Level of Service A operation in the weekday AM and PM peak hours with minimal changes to delay at the intersection with the additional traffic from the Project; and
- The intersection of Wisemans Ferry Road/Patricia Fay Drive will operate at a Level of Service B operation with a small increase in vehicle delay. This represents a satisfactory to good operation.

7.5.6.4 Cumulative Impacts

The cumulative impacts of the Project at the principal intersections have been examined for the year 2030, based on a 4% lineal increase per year in traffic volumes using Old Northern Road and Wisemans Ferry Road (i.e. 52% increase since 2017). This assumes a high traffic growth scenario to 2030.

The additional traffic from Haerses Road Quarry Modification 3 proposal has also been included at both intersections.

SIDRA modelling was undertaken using the above 2030 traffic conditions. The results are presented in the table below. The results show that both intersections will retain a good to a satisfactory level of operation in 2030.

Table 65 – Key Intersection Performance 2030

Intersection (All Approaches)	AM Peak				PM Peak			
	DS	AVD	LS	95 th % Queue Length	DS	AVD	LS	95 th % Queue Length
Old Northern Road/Wisemans Ferry Road	0.170	4.7	A	8.3	0.120	4.8	A	4.8
Wisemans Ferry Road/Patricia Fay Drive	0.090	2.2	B	7.0	0.099	1.8	B	5.1

7.5.6.5 Construction Impacts

The site establishment phase of the Project will take between 6 to 12 months. Vehicle trips to and from the site during this phase include:

- Up to 30 light vehicle trips per day; and

- An estimated 20 heavy vehicle deliveries (40 movements) per month. A maximum of 10 heavy vehicles deliveries (20 movements) will access the site per day. A proportion of these may be oversized vehicles. These vehicles will have the appropriate permits.

The traffic impacts during the site establishment phase will be less than the impacts for the operational phase, due to the lower traffic generation.

7.5.7 Management and Monitoring Measures

7.5.7.1 Wisemans Ferry Road/Patricia Fay Drive Intersection Upgrade

A Stage 5 Road Safety Audit was undertaken for the Project (**Annexure 23**). The audit examined the existing road alignment, cross-sections, road shoulders, intersections, delineation/signage, bridges and culverts, pavement, provision for heavy vehicles and other miscellaneous matters and assessed these against current road practice guidelines and standard, with the objective of identifying any real or potential road safety hazards.

The audit findings identified that the existing CHR and AUL right and left turning lanes in Wisemans Ferry Road for the right and left turns into Patricia Fay Drive do not meet the current Austroad Guidelines for the 80km/h speed limit and should be upgraded.

The Applicant, therefore, proposes to upgrade the intersection of Wisemans Ferry Road/Patricia Fay Drive to current Austroad guidelines to improve the left and right turn lanes from Wisemans Ferry Road into Patricia Fay Drive. Concept plans of the proposed intersection upgrade is provided in Section 3.3.2 of the EIS.



Figure 70 – Concept Plans of Proposed Intersection Upgrade Works Entry Turn Paths (Source: Transport & Urban Planning, 2020)

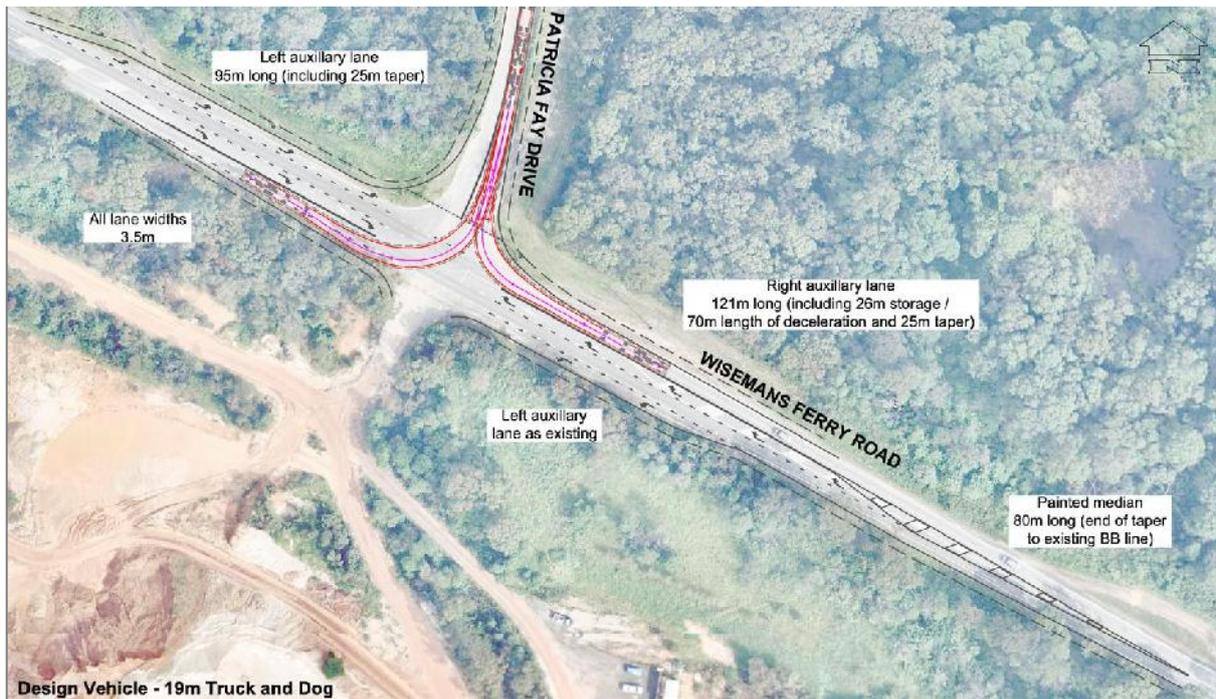


Figure 71 – Concept Plans of Proposed Intersection Upgrade Works Exit Turn Paths (Source: Transport & Urban Planning, 2020)

Following approval, a separate Construction Traffic Management Plan will be prepared to manage the impacts of the construction works at the intersection. The Construction Traffic Management Plan will detail any staging and will include Traffic Control Plans to manage traffic during the intersection upgrade works.



7.6 Visual

The Project's SEARs require the EIS to address the following key issues relating to visual impacts:

Table 66 – SEARs Visual

Requirement	EIS Section
A detailed assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, paying particular attention to any new landforms	Section 7.6.4 Annexure 12

SLR Consulting was engaged to prepare a Landscape and Visual Impact Assessment (LVIA) to identify the character of the existing visual landscape, assess the impacts of the Project on the visual amenity of the surrounding area and to recommend mitigation measures. The following section provides a summary of the LVIA.

Key Visual Definitions

Receiver	A surrounding land use, user (or groups of users) that may be impacted by a change in the existing visual environment. A sensitive receiver is particularly susceptible to a change in the visual environment.
Theoretical Visual Catchment	Is the area within which a project can theoretically be seen at eye level above ground. Its extent will usually be defined by a combination of landform, vegetation and built elements.
Photomontage Analysis	A photomontage analysis visualises the appearance of the Project Site before and after works.

7.6.1 Assessment Methodology

The LVIA utilises the assessment methodology outlined in the ‘*Guidelines for Landscape and Visual Impact Assessment, Third Edition*’ (2013) prepared by The Landscape Institute and the Institute for Environmental Management and Assessment (UK). The assessment methodology involved:

- Analysing the existing visual character of the Project Site and surrounds.
- Reviewing the proposed development.
- Mapping the Project’s theoretical visual catchment, visual receptors, and sensitive receptor groups.
- Assessing the Project’s potential visual impacts on key receptors according to their sensitivity and the magnitude of change.
- Designing mitigation measures to ameliorate impacts to meet planning requirements and community expectations.

The LVIA relied upon existing visual baseline data, aerial photography, and GIS modelling. SLR Consulting also undertook a detailed site investigation and analysis in July 2020.

7.6.2 Baseline Visual Data

The following section outlines the key visual characteristics of the Project Site and surrounds. Section 2 of the EIS provides additional detail regarding the Project Site and its surrounds.

7.6.2.2 Topography & Landform

As detailed in Section 2.1 of the EIS, the Project Site ranges in height from approximately 215m AHD on the ridge along the eastern boundary to 90 AHD in the major drainage lines at the western boundary, resulting in significant ridgelines and gullies. The site is generally situated on two existing ridgelines that fall east to west:

- **Ridge 1 (Major Ridgeline):** traverses the centre of the site slopes down towards the north–west. Its height ranges from 195 AHD to 140 AHD. This ridge is the most prominent landform on the site.
- **Ridge 2 (Secondary Ridgeline):** traverses the southern side of the site and originates at approximately the same location as ridge 1. Its height ranges from 195 AHD to 120 AHD where it adjoins a local creek line.

These two ridgelines comprise the majority of the proposed extraction area. The Project Site is lower in height than the surrounding ridge on which Maroota is located. Several creek and gully lines carve through the site in a roughly northeast direction to the west, although these are not highly visible from public and private viewpoints.

7.6.2.2 Vegetation

The Project Site currently displays an established landscape character of vegetated ridgelines that define local viewsheds. The existing vegetation is an important element that defines the character of the site and the broader regional context.

7.6.2.3 Structures & Infrastructure

There are no structures present on the site. Structures on surrounding lands include residential buildings, agricultural and pastoral related structures, and extractive industry structures.

7.6.2.4 Roads

Wisemans Ferry Road located along the eastern frontage of the Project Site, and Old Northern Road located to the north of the Project site are the two most significant public roads located near the site. Visibility to the Project Site from Wisemans Ferry Road is limited by alignment and visual obstructions. Views and visibility from Old Northern Road to the surrounding landscape are like that of Wisemans Ferry Road.

There is one access point currently located on the Project Site known as Patricia Fay Drive, and a series of smaller tracks cascade through the site.

7.6.2.5 Surrounding Land Uses

The site shares boundaries with adjoining rural residential, and extraction land uses. A number of cleared private rural agricultural properties slope down towards the site from the south.

7.6.2.6 Landscape Character Summary

The Project Site and surrounds comprise a limited range of landscape types and visual catchments defined by localised highpoints and ridgelines. The character of the local landscape is predominantly natural bushland and open to semi-open rural lands for pastoral and agricultural activities. Open undulating rural lands are typically located alongside Old Northern Road and Wisemans Ferry Road while bushland is visible in the middle and backgrounds. Extractive industries are scattered intermittently across the landscape.

7.6.3 Receptor Viewpoints

SLR Consulting utilised 3D modelling of the proposed development, existing surrounding buildings (where appropriate) and topography to map a zone of theoretical visibility. The map identified locations in the surrounding area from where the Project Site is likely visible. This assisted in identifying visual receiver viewpoint locations that were later confirmed during the site visit. **Figure 72** below shows the areas at which the site is theoretically visible.

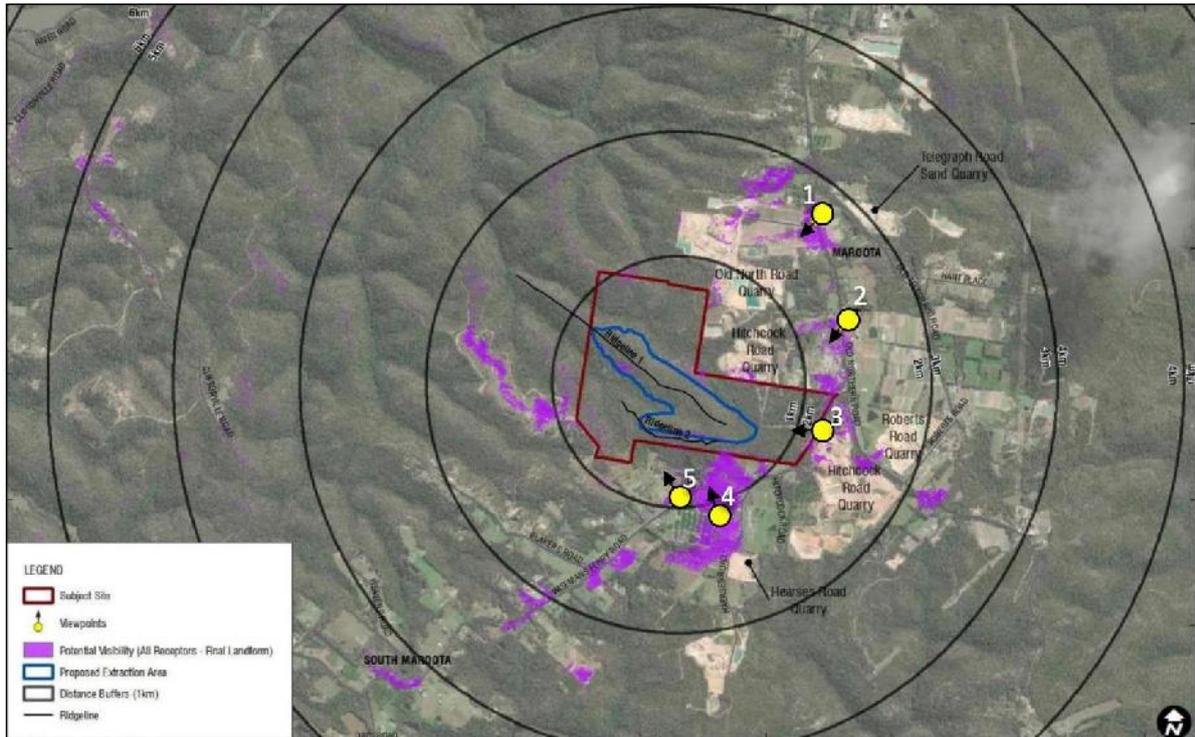


Figure 72: Project's Zone of Theoretical Visibility (Source: SLR Consulting, 2020)

Based on the above imagery, five viewpoint reception locations were selected for photomontage analysis to assist in the visual assessment process. SLR Consulting 3D modelled the proposed development in 3DS MAX and created digital viewpoints to match photographic viewpoints to provide a high degree of accuracy in ascertaining the final appearance of the development from each viewpoint. The photomontage analysis visualises the appearance of the Project Site before and after works.

7.6.4 Impact Assessment

The following section summarises the Landscape and Visual Impact Assessment for each identified receptor group described in Section 7.6.3 above.

7.6.4.1 Impact Assessment Criteria

The sensitivity and magnitude of landscape change for each viewpoint was assessed. These two measures are used to determine the visual impact significance of the proposed development on the landscape character from each viewpoint. Each of these measures are described below.

Table 67 – Visual Assessment Criteria	
Criteria	Definition
Receptor Sensitivity	<p>Receptor sensitivity is a measure of how critical a change to the existing visual landscape is from a particular viewpoint. A receptors sensitivity is based on the receptors interest in the visual environment, viewing opportunities, number of viewers and their distance/angle of view and extent of screening/filtering of view.</p> <p>A receptors sensitivity is measures as either high, medium, low, or negligible.</p>
Magnitude of Landscape Change	<p>The ‘magnitude of change to landscape’ is a measure of the extent to which a proposed development changes an area’s existing landscape character based on the nature, scale, intensity, extent, and duration of the Project.</p> <p>The magnitude of landscape change is measured as either high, medium, low, or negligible.</p>
Impact Significance on the Landscape Character	<p>The visual impact of the Project on the existing landscape character is evaluated using a qualitative assessment of a receptors sensitivity and the magnitude of landscape change.</p> <p>The below matrix demonstrates the relationship between sensitivity, magnitude of change and the level of visual impact.</p>

		Magnitude of Change in Landscape			
		High	Medium	Low	Negligible
Sensitivity	High	High	Moderate – High	Moderate	Minor – Moderate
	Medium	Moderate – High	Moderate	Minor – Moderate	Minor
	Low	Moderate	Minor – Moderate	Minor	Minor – Negligible
	Negligible	Minor – Moderate	Minor	Minor – Negligible	Negligible

7.6.4.2 Viewpoint Assessments

Table 68 – Visual Assessment Viewpoint 1	
Viewpoint 1 (see Figure 72)	
Viewpoint Location	Old Northern Road – travelling southbound approximately 1.8km north of Patricia Day Drive. Potential receptors are vehicular users/travellers.
View Description	Glimpses and views of a vegetated ridgeline on the Project Site are moderately visible in the middle ground for drivers travelling south on Old Northern Road. Open, very gently undulating rural lands are visible in the middle and foreground and glimpses of existing extraction industries scattered among vegetation are visible in the backdrop.
Sensitivity Rating:	Medium This viewpoint represents a visual experience of the Hills rural landscape and vegetated undulating hills for those travelling along Old Northern Road. Views from this point would be short term, and the Project Site would likely be perceived as a minor landscape element.
Impact Magnitude Rating:	Low Views from this location encompass a range of natural, agricultural, and disturbed landscapes, and therefore, the landscape is considered to have a high degree of resilience. The extraction of the moderately visible ridgeline 1 would expose another vegetated ridgeline in the background.
Impact Significance	Minor – Moderate

Existing and Rehabilitation Works Photomontage



Table 69 – Visual Assessment Viewpoint 2

Viewpoint 2 (see Figure 72)	
Viewpoint Location	Old Northern Road – Travelling southbound approximately 1km north of Patricia Fay Drive and opposite the Maroota Public School. Potential receptors are vehicular users and school pedestrians.
View Description	Two structures and electrical infrastructure are visible in the foreground among open, gently sloping rural lands. Moderately visible views are available of ridgeline 1 in the middle ground, although structures and vegetation in the foreground encumber these views.
Sensitivity Rating:	Medium This viewpoint represents a visual experience of the Hills rural landscape and vegetated undulating hills for those travelling along Old Northern Road. Views from this point would be short to medium term although a driver’s attention would predominantly be focused on the school zone.
Impact Magnitude Rating:	Low The existing vegetated character of the Project Site is moderately visible, although structures in the foreground obscure views. The retention of vegetation in the foreground of the Project Site and the rehabilitation of a native bushland corridor along the north–western boundary of the extraction pit will maintain the existing visual character.
Impact Significance	Minor – Moderate

Existing and Rehabilitation Works Photomontage

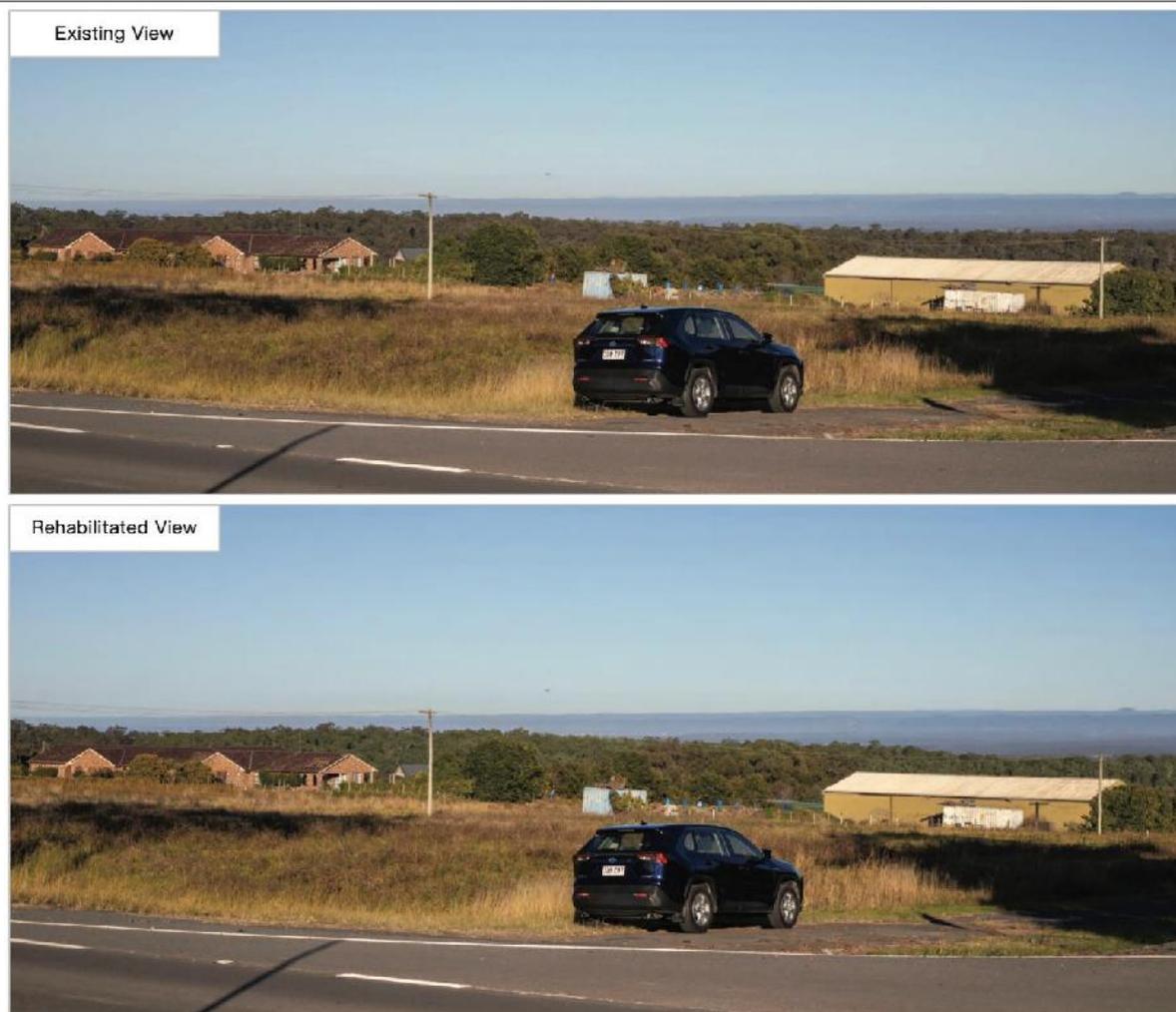


Table 70 – Visual Assessment Viewpoint 3	
Viewpoint 3 (see Figure 72)	
Viewpoint Location	Wisemans Ferry Road – View down Patricia Fay Drive. Potential receptors are vehicular users travelling along Wisemans Ferry Road and entering Patricia Fay Drive.
View Description	The view down Patricia Fay Drive is dominated by the sealed component of the access track flanked by vegetation and electrical infrastructure. Distant views of the broader Hawkesbury–Nepean vegetated catchment are visible in the backdrop.
Sensitivity Rating:	Low This viewpoint represents a visual experience of the vegetated undulating hills of the Hawkesbury–Nepean catchment for quarry employees and commuters. For most road users, this view would be fleeting.
Impact Magnitude Rating:	Low Existing vegetation along the eastern side of the Project Site is highly visible. The Project will not remove vegetation from the eastern part of the site, and as such, the vegetation that is visible from this viewpoint would be retained. Proposed works would also be hidden behind retained vegetation.
Impact Significance	Minor
Existing and Rehabilitation Works Photomontage	



Table 71 –Visual Assessment Viewpoint 4

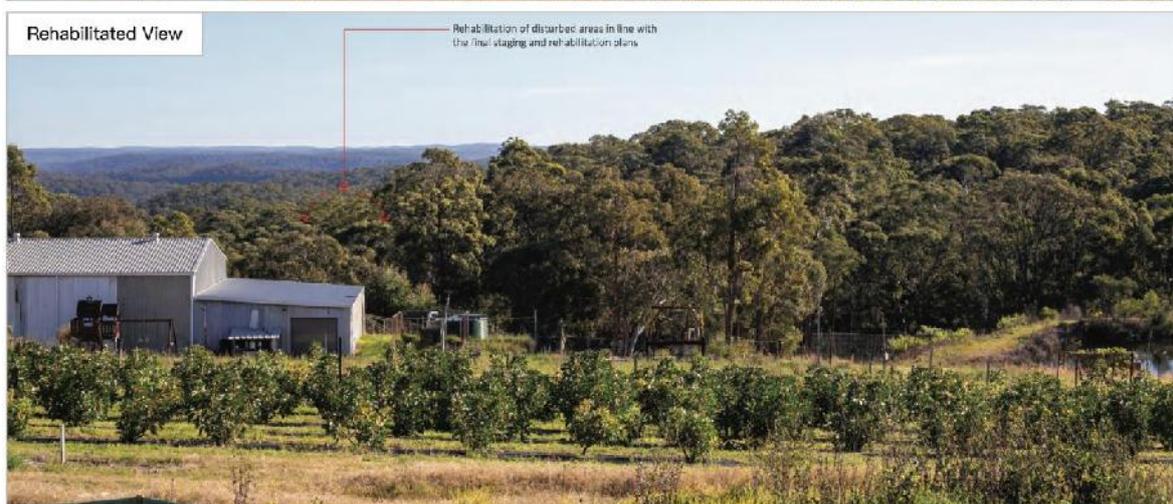
Viewpoint 4 (see Figure 72)	
Viewpoint Location	Wisemans Ferry Road— travelling north or south approximately 1km south of Patricia Day Drive. Potential receptors are described as vehicular users/travellers.
View Description	The foreground is dominated by agricultural uses behind low regrowth (ferns and bracken) along the verge. Ridgeline 2 at the Project Site is visible in the middle ground as well as mature trees located along the southern boundary of the site.
Sensitivity Rating:	Medium This viewpoint represents a visual experience of the Hills rural landscape and bushland for those travelling along Wisemans Ferry Road. The Project Site is a prominent landscape feature from this viewpoint. View are anticipated to be short term.
Impact Magnitude Rating:	Low The retention of a 100m native vegetation buffer along the southern boundary of the Project Site ensures that the ridgeline vegetation and appearance would remain largely intact from this viewpoint except for a few taller specimens.
Impact Significance	Minor

Existing and Rehabilitation Works Photomontage



Table 72 – Visual Assessment Viewpoint 5	
Viewpoint 5 (see Figure 72)	
Viewpoint Location	Private Residence at 1638 Wisemans Ferry Road – south of the Project Site. Potential receptors are described as private residents.
View Description	The foreground is a typical open rural landscape with vineyards, rural structures, and a dam. Ridgeline 2 at the Project Site is visible in the middle ground, and the densely vegetated Hawkesbury–Nepean Catchment dominates the backdrop. The topography slopes away from this viewpoint towards the west and provides a highpoint for viewing the Project Site.
Sensitivity Rating:	Medium This viewpoint represents a visual experience of the Hills rural landscape and vegetated undulating hills for private residents. Views from this point would be long term, and a small number of viewers will be affected.
Impact Magnitude Rating:	Low The existing vegetated character of the Project Site is highly visible from this viewpoint. The vegetation along ridgeline 2 at the southern side is to be retained. As this is the most visible portion of the Project Site from this viewpoint, works are unlikely to be visible behind retained vegetation.
Impact Significance	Minor – Moderate

Existing and Rehabilitation Works Photomontage



7.6.4.3 Impact Assessment Summary

The visual assessment above determined that the Project will have a minor–moderate to minor impact on the five key identified receptor viewpoints based on the LVIA. Receptors located closer to the Project Site, particular those residents located immediately south of the Project Site will have their views maintained due to the retention of 100m vegetation buffer along the Project’s southern boundary. However, those impacts are best described as negligible if the viewpoint assessment is accurate.

In summary, there are very few viable public receptors that would be impacted by the proposed works. Where the Project Site is visible, it has been determined that the Project will have minor–moderate impact on the existing landscape character and values. Mitigation measures, outlined in Section 7.6.5 below, have been recommended to further ameliorate visual impacts.

7.6.5 Management and Monitoring Measures

The LVIA recommended the following mitigation measures which have been incorporated into the design of the Project.

- Retain vegetation along the periphery of the site, particularly at its southern and eastern boundaries;
- Rehabilitate a native biodiversity corridor along the north–west boundary of the extraction pit; and
- Implement stringent management measures to ensure that the vegetation that is intended to be retained is protected. The Biodiversity Development Assessment Report prepared by Eco Logical (**Annexure 8**) contains management measures to protect retained vegetation. These are included in the Project’s mitigation and monitoring measures (**Annexure 5**).

In addition, the Project site will be progressively rehabilitated throughout the life the Project to soften the already moderate to minor visual impacts.



Waste

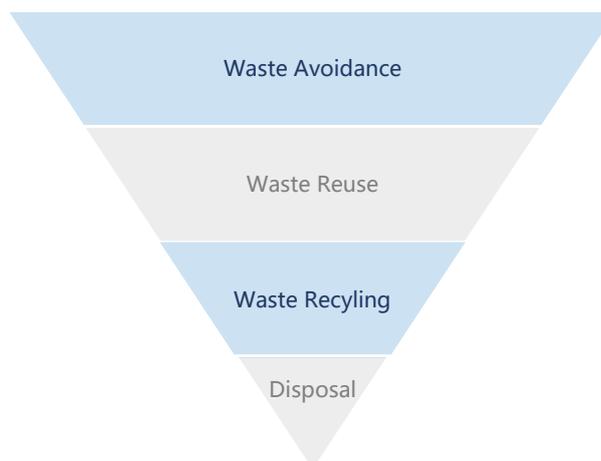
The Project's SEARs require the EIS to address the following key issues relating to waste:

Requirement	EIS Section
Estimates of the quantity and nature of the waste streams that would be generated or received by the development and any measures that would be implemented to minimise, manage or dispose of these waste streams	Section 7.7

The following section provides an estimate of the quantity and nature of waste streams resulting from the Project and outlines measures to minimise, manage and dispose of waste. This section is informed by the NSW EPA's *Waste Classification Guidelines* (Waste Guidelines). A detailed Waste Management Plan will be prepared following a determination in accordance with the *Protection of the Environment Operations Act 1997* and the *Waste Avoidance and Resource Recovery Act 2001*.

7.7.1 Waste Management Objectives

The following hierarchy of waste management principles that are informed by the objectives of the *Waste Avoidance and Resource Recovery Act 2001* will guide waste management for the Project.



The above hierarchy will inform the procurement of materials and consideration of their waste streams, staff education about appropriate waste avoidance, recycling, reuse and disposal practices and the engagement of licensed contractors and disposal, recycling and reuse methods utilised.

7.7.2 Waste Streams

The EPA’s Waste Guidelines classify waste into six categories. Four categories of waste are relevant to the Project. These are described below.

Liquid Waste	Hazardous Waste	General Waste (putrescible)	Waste (non-putrescible)
<p>Characteristics</p> <ul style="list-style-type: none"> • Has an angle of repose of less than 5 degrees above horizontal • Becomes free flowing at or below 60°C • Generally not capable of being picked up by a spade. <p>Examples Sewerage, wastewater</p>	<p>Characteristics</p> <p>Waste that has properties that make them hazardous or potentially harmful to human health or the environment.</p> <p>Examples Batteries, oils and grease, lead paint waste, coal tar or tar pitch waste and containers that have contained a Class 1,3,4,5 or 8 substance under the <i>Transport of Dangerous Good Code</i>.</p>	<p>Characteristics</p> <p>General waste other than liquid and hazardous waste that is liable to rapid decay by micro-organism.</p> <p>Examples Food waste, animal waste, manure and night soil, household waste the contains putrescible organics, waste from litter bins collected by or on behalf of Council.</p>	<p>Characteristics</p> <p>General waste other than liquid and hazardous waste that is not capable of being readily decomposed</p> <p>Examples Glass, plastic, rubber, plasterboard, ceramics, bricks, concrete, metals, paper, cardboard, household waste that does not contain food waste, garden waste, wood waste, non-putrescible vegetative waste, building and demolition waste</p>

7.7.3 Waste Quantities & Management

The following table provides the estimated quantities of waste that will be generated across the life of the Project and details how each item will be disposed of and managed.

Waste Stream	Waste Item	Project Stage	Quantities	Proposed Management
Liquid Waste	Sewerage	Throughout	5000L / month	An enviro-cycle sewerage system will be installed to recycle sewerage. This system diverts and treats wastewater in an underground unit before dispersing water to a prescribed vegetated area.
	Stormwater	Throughout	–	Stormwater will be managed per the Water Management Strategy outlined in Section 7.4.6 of the EIS.
Hazardous Waste	Greases & Oils	Maintenance	600L / year	Greases and oils will be stored in a self-bunded tank and removed as necessary by a licensed contractor.
	Batteries	Maintenance	–	Batteries will be stored in a designated space and disposed of by a licensed contractor and taken to a licensed waste management facility.

General Waste (putrescible)	Food Scraps	Office operations	500kg / year	Food scraps will be stored in general waste bins at the site and disposed by a licensed contractor or composted.
	Scrap metal	Construction & throughout	3t / year	Scrap metal will be segregated and stored in metal bins to be collected and recycled offsite by a licensed contractor.
	Paper, cardboard, plastics, glass	Office operations	1.5t / year	Recyclable general waste will be separated by non-recyclable general waste, stored onsite in recycling bins and collected and recycled offsite by a licensed contractor.
General Waste (Non-Putrescible)	Aluminium and steel cans	Office operations		
	Construction and demolition waste	Construction	Varies	Excess construction and demolition waste will be segregated and disposed of by a licensed contractor.
	Wooden Pallets	Throughout	1t / year	Wooden pallets and other wood waste will be stored and disposed of by a local contractor.

7.7.4 Onsite Recovery

During the site establishment phase, cleared vegetation will be mulched and stockpiled along with overburden. The Project's sand plant incorporates a thickener and plate & frame press to generate a tailings cake that can be handled with a front loader. The tailings will be collected and blended with the overburden and mulch for use in progressively rehabilitating the Project Site.

RPM Global have estimated that the volume of excavated overburden and pressed tailings approximately balances the quantity of material required to construct rehabilitated landforms throughout the life of the sand operation.



Air Quality

The Project's SEARs require the EIS to address the following key issues relating to Air Quality:

Table 75 – SEARs Air Quality

Requirement	EIS Section
A detailed assessment of potential construction and operational impacts, in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, and with a particular focus on dust emissions including PM2.5 and PM10, and having regard to the Voluntary Land Acquisition and Mitigation Policy	Section 7.8.5 Annexure 13

Todoroski Air Science was engaged by Design Collaborative to prepare an Air Quality Impact Assessment (Air Quality Report) in accordance with the NSW Protection Authority (EPA) document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*. The report describes the assessment criteria relevant to the Project, identifies air emission sources, outlines modelling methods and results and provides mitigation recommendations.

The following section provides a summary of the Air Quality Report and lists its recommended mitigation measures.

Key Air Quality Definitions

Receiver	A surrounding land use that may be impacted by a change in the existing air quality environment. A sensitive receiver is particularly susceptible to a change in the acoustic environment (for example, residential or hospitals).
Particulate Matter	Particulate matter is an air pollutant that is generated from a range of activities, including activities associated with extractive industries.
Total Suspended Particulate	Total Suspended Particulate matter is the total mass of particles suspended in the atmosphere and is used as a measure for air quality goals.
Crystalline Silica	Crystalline silica is a naturally occurring and widely abundant mineral that is found in soils, sand, stone, concrete, and mortar.
Deposited Dust	Particulate matter that settles from the atmosphere and deposits on surfaces is characterised as deposited dust.
CALPUFF Modelling System	The CALPUFF model is an advanced air dispersion model. It predicts the dispersion of pollutants from the Project at sensitive receivers.

7.8.1 Potential Emissions

7.8.1.1 Particulate Matter (PM₁₀ & PM_{2.5})

Particulate matter is an air pollutant that is generated from a range of activities, including activities associated with extractive industries. Particulate matter is a complex mixture of extremely small particulars and liquid droplets found in the air. Particulate matter from extractive industries generally consists of dust particles of varying size and composition.

Total Suspended Particulate matter is the total mass of particles suspended in the atmosphere and is used as a measure for air quality goals. The upper size range for Total Suspended Particulate is normally taken to be 30 micrometres (µm) as in practice particles larger than 30 to 50µm will settle out of the atmosphere too quickly to be regarded as air pollutants.

Total Suspended Particulate is typically divided into two subclasses:

- **Particulate Matter 10 (PM₁₀):** particulate matter with aerodynamic diameters of 10µm or less; and
- **Particulate Matter 2.5 (PM_{2.5}):** particulate matter with aerodynamic diameters of 2.5µm or less.

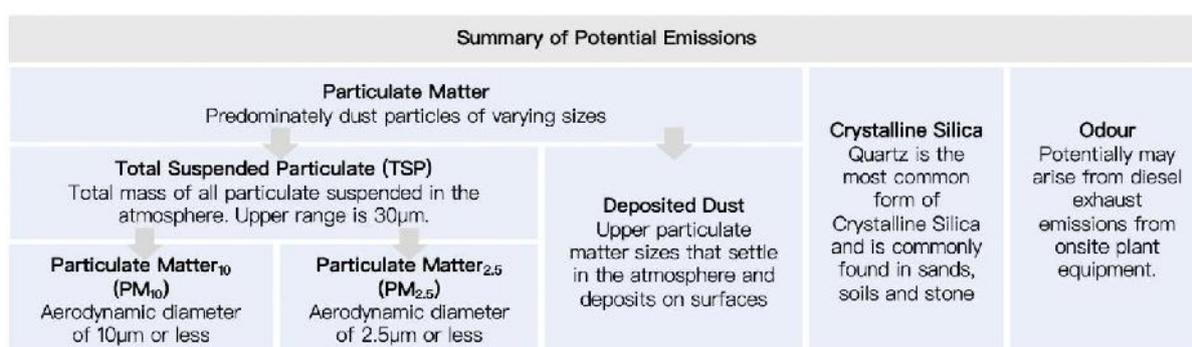
Particulate matter in the upper size range that settles from the atmosphere and deposits on surfaces is characterised as deposited dust.

7.8.1.2 Crystalline Silica

Crystalline silica is a naturally occurring and widely abundant mineral that is found in soils, sand, stone, concrete, and mortar.²⁵ Quartz is the most common form of crystalline silica, and the crystalline form of silica has the potential to cause adverse health effects in humans.

7.8.1.3 Odour emissions

Odour emissions have some potential to arise from the diesel exhaust emission of on-site plant equipment. These odorous emissions are considered to be too low to generate any significant off-site pollutant concentrations and have not been assessed further.



²⁵ Safe Work Australia, (2020), *Crystalline silica and silicosis*, Safe Work Australia, <https://www.safeworkaustralia.gov.au/silica>.

7.8.2 Existing Conditions & Baseline Data

7.8.2.1 Meteorological & Climatic Data

Environmental conditions influence the dispersion and therefore, the impact of emissions on nearby sensitive receivers. Of particular importance is local climatic and meteorological conditions, including temperature, rainfall, wind speed and relative humidity. Section 2.6 of the EIS provides detailed climatic data from the Richmond RAAF weather station.

7.8.2.2 Background Air Quality Data

The main sources of air pollutants in the surrounding area include emissions from active extraction operations, agricultural activities, and other anthropogenic activities such as various commercial activities and motor vehicle exhaust.

A detailed review of available monitoring data was undertaken to determine the existing levels of particulate matter concentration and dust deposition in the surrounding area. Baseline air quality data was collected from the Maroota Public School TOEOM and the Haerses Quarry D08 and D10 air quality monitoring stations. Ambient PM₁₀ and PM_{2.5} data were also collected from the Richmond RAFF for comparison.

The detailed review of local air quality monitoring data is provided in Section 5.3 of **Annexure 13**. The below table provides the estimated background air quality levels applied in the Air Quality Report based on the review of surrounding air quality data.

Pollutant	Averaging Period	Background Level
Total Suspended Particulate	Annual	46.4µm/m ³
PM ₁₀	Annual	12.9µm/m ³
	24 hour	–
PM _{2.5}	Annual	7.0µm/m ³
	24 hour	–
Deposited Dust	Annual	0.6 g/m ² /month

Existing levels are well within the NSW EPA guidelines that are detailed in **Table 77** below.

7.8.3 Air Quality Impact Criteria

7.8.3.1 Particulate Matter

The NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* outlines air quality goals for Particulate Matter and deposited dust. These goals are benchmarks set by the NSW Government to protect the health and amenity of the community. They relate to the total pollutant burden in the air and not just pollutant contributions from the Project. The below table summarises the relevant air quality goals for the Project.

Pollutant	Averaging Period	Impact	Criterion
Total Suspended Particulate	Annual	Total	90µm/m ³
PM ₁₀	Annual	Total	25µm/m ³
	24 hour	Total	50µm/m ³
PM _{2.5}	Annual	Total	8µm/m ³
	24 hour	Total	25µm/m ³
Deposited Dust	Annual	Incremental	2g/m ² /month
		Total	4g/m ² /month

7.8.3.2 Crystalline Silica

Various jurisdictions have developed criteria for acceptable levels of crystalline silica. There is no criterion in NSW. Instead, the Victorian criterion (that is adopted from Californian reference exposure level values and occupational standards) is utilised in the Air Quality Report and presented in the table below.

Pollutant	Organisation	Averaging period	Criterion
Respirable Crystalline Silica	Victorian EPA	Total	3µm/m ³

7.8.4 Assessment Methodology

7.8.4.1 Air Quality Modelling

Modelling was undertaken in the Air Quality Assessment using a combination of the NSW EPA approved CALPUFF modelling system and The Air Pollution Model (TAPM) to predict the dispersion of pollutants generated by the Project at sensitive receivers.

The CALPUFF model is an advanced air dispersion model which can deal with the effects of complex local terrain on the dispersion meteorology over the modelling domain in a three-dimensional, hourly varying time step.

The assessment considers one indicative quarry plan scenario to represent the potential worst case impacts with regard to the quantity of material extracted and handled in each year, the location of the activity and the potential to generate dust at the receptor locations. The scenario selected for the Air Quality Report was the quarry plan years 6 to 10.

7.8.4.2 Emissions Estimation

Anticipated dust emissions from each operational activity of the Project were represented by a series of volume sources and were included in the CALPUFF model. Meteorological conditions associated with dust generation, such as wind, and levels of dust-generating activity were also considered in calculating the varying hourly emission rate for each operational source. The significant dust generating activities associated with operation of the Project are identified as:

- The loading/unloading of material;
- Vehicles travelling on-site and off-site;
- Crushing and screening processes;
- Windblown dust from exposed areas and stockpiles; and
- The vehicle and plant equipment also have the potential to generate particulate emissions from the diesel exhaust.

A summary of the estimated annual Total Suspended Particulate, PM₁₀ and PM_{2.5} generated by the Project is presented below. A detailed breakdown of these annual figures is provided in Section 6.5 of the Air Quality Assessment (**Annexure 13**)

Table 79 – Summary of Estimates Dust Emissions (Kilograms / Year)

Total Suspended Particulate	PM ₁₀	PM _{2.5}
104,321kg	29,653kg	6,261kg

In addition to the emissions from the Project, background data from the Maroota Public School monitoring station has been utilised to factor in the cumulative emissions generated by the existing sand operations surrounding the Project Site.

7.8.4.3 Sensitive Receivers

As noted above, the dispersion modelling assesses the impact of the Project on emission levels at sensitive receivers. The below figure shows the location of identified sensitive receivers that were assessed as being potentially impacted by the Project and therefore included in the assessment.



Figure 73: Air Quality Sensitive Receivers (Source: Todoroski Air Sciences, 2020)

7.8.5 Air Quality Impacts

7.8.5.1 Particulate Matter

The dispersion model described in Section 7.8.4 above predicted the following emission levels at identified sensitive receivers resulting from the Project's operations in isolation (incremental impact) and when combined with the existing ambient background levels (cumulative impacts):

- Maximum 24-hours average $PM_{2.5}$ and PM_{10} concentrations;
- Annual average $PM_{2.5}$, PM_{10} and Total Suspended Particulate concentrations; and
- Annual average dust deposition rates.

The predicted cumulative and incremental average Total Suspended Particulate (TSP), $PM_{2.5}$, PM_{10} and dust deposition levels at each sensitive receiver is presented below.

Receptor ID	PM _{2.5} (µg/m ³)		PM ₁₀ (µg/m ³)		TSP (µg/m ³)	DD* (g/m ² /mth)	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	TSP (µg/m ³)	DD* (g/m ² /mth)	
	Incremental						Cumulative				
	24-hr Avg.	Ann. Avg.	24-hr Avg.	Ann. Avg.	Annual Average	Ann. Avg.	Ann. Avg.	Ann. Avg.	Ann. Avg.	Annual Average	
	Air quality impact criteria										
-	-	-	-	-	-	2	8	25	90	4	
ED01	2.1	0.1	8.7	0.5	0.9	<0.1	7.1	13.4	47.3	0.6	
FR01	1.2	0.1	5.0	0.4	0.7	<0.1	7.1	13.3	47.1	0.6	
FR02	1.2	0.1	4.9	0.4	0.7	<0.1	7.1	13.3	47.1	0.6	
FR03	1.1	0.1	4.5	0.4	0.8	<0.1	7.1	13.3	47.2	0.6	
FR04	3.5	0.2	15.8	1.0	2.1	<0.1	7.2	13.9	48.5	0.7	
FR05	1.8	0.1	8.4	0.6	1.2	<0.1	7.1	13.5	47.6	0.6	
FR06	1.0	0.1	4.8	0.4	0.7	<0.1	7.1	13.3	47.1	0.6	
FR07	0.6	0.1	2.7	0.2	0.5	<0.1	7.1	13.1	46.9	0.6	
FR08	0.6	0.1	2.8	0.2	0.5	<0.1	7.1	13.1	46.9	0.6	
FR09	0.9	0.1	4.5	0.4	0.7	<0.1	7.1	13.3	47.1	0.6	
FR10	2.2	0.2	10.3	0.7	1.5	<0.1	7.2	13.6	47.9	0.7	
R01	1.7	0.1	7.1	0.4	0.7	<0.1	7.1	13.3	47.1	0.6	
R02	1.5	0.1	6.4	0.3	0.6	<0.1	7.1	13.2	47.0	0.6	
R03	1.7	0.1	7.2	0.4	0.7	<0.1	7.1	13.3	47.1	0.6	
R04	1.7	0.1	7.0	0.4	0.7	<0.1	7.1	13.3	47.1	0.6	
R05	1.8	0.1	7.4	0.4	0.7	<0.1	7.1	13.3	47.1	0.6	
R06	1.9	0.1	7.8	0.4	0.7	<0.1	7.1	13.3	47.1	0.6	
R07	2.0	0.1	8.4	0.5	0.9	<0.1	7.1	13.4	47.3	0.6	
R08	1.9	0.1	7.8	0.4	0.7	<0.1	7.1	13.3	47.1	0.6	
R09	1.9	0.1	7.8	0.4	0.8	<0.1	7.1	13.3	47.2	0.6	
R10	1.8	0.1	7.3	0.4	0.8	<0.1	7.1	13.3	47.2	0.6	
R10-A	1.6	0.1	6.5	0.5	0.9	<0.1	7.1	13.4	47.3	0.6	
R11	2.2	0.1	9.2	0.6	1.2	<0.1	7.1	13.5	47.6	0.6	
R12	1.7	0.1	7.2	0.5	1.0	<0.1	7.1	13.4	47.4	0.6	
R13	1.6	0.1	7.4	0.6	1.1	<0.1	7.1	13.5	47.5	0.6	
R14	1.4	0.1	6.6	0.4	0.8	<0.1	7.1	13.3	47.2	0.6	
R15	1.9	0.1	8.7	0.5	1.0	<0.1	7.1	13.4	47.4	0.6	
R16	2.6	0.2	11.7	0.7	1.4	<0.1	7.2	13.6	47.8	0.6	
R17	3.2	0.2	14.0	0.8	1.6	<0.1	7.2	13.7	48.0	0.6	
R18	3.0	0.2	12.5	0.7	1.3	<0.1	7.2	13.6	47.7	0.6	
R19	4.2	0.2	17.9	1.1	2.2	<0.1	7.2	14.0	48.6	0.7	
R20	4.4	0.3	18.7	1.1	2.3	<0.1	7.3	14.0	48.7	0.7	
R21	4.9	0.3	20.9	1.4	2.8	<0.1	7.3	14.3	49.2	0.7	
R22	5.6	0.3	22.6	1.5	3.1	<0.1	7.3	14.4	49.5	0.7	
R23	5.7	0.4	21.4	1.5	3.1	<0.1	7.4	14.4	49.5	0.7	
R23A	5.0	0.3	18.5	1.4	2.8	<0.1	7.3	14.3	49.2	0.7	
R24	4.5	0.3	17.0	1.2	2.4	<0.1	7.3	14.1	48.8	0.6	
R25	4.4	0.3	16.7	1.1	2.3	<0.1	7.3	14.0	48.7	0.6	
R25A	3.5	0.2	13.1	0.9	1.7	<0.1	7.2	13.8	48.1	0.6	
R26	2.1	0.1	8.3	0.5	0.9	<0.1	7.1	13.4	47.3	0.6	
R27	3.0	0.2	11.5	0.8	1.5	<0.1	7.2	13.7	47.9	0.6	

R28	4.7	0.4	17.1	1.4	2.9	<0.1	7.4	14.3	49.3	0.7
R29	5.3	0.5	19.5	1.8	3.8	<0.1	7.5	14.7	50.2	0.7
R30	4.5	0.4	16.3	1.6	3.3	<0.1	7.4	14.5	49.7	0.7
R31	3.6	0.3	13.5	1.2	2.4	<0.1	7.3	14.1	48.8	0.7
R32	4.4	0.4	16.4	1.6	3.3	<0.1	7.4	14.5	49.7	0.7
R33	2.2	0.2	8.8	0.7	1.3	<0.1	7.2	13.6	47.7	0.6
R34	2.3	0.2	9.6	0.8	1.7	<0.1	7.2	13.7	48.1	0.6
R35	2.1	0.2	7.8	0.7	1.3	<0.1	7.2	13.6	47.7	0.6
R36	1.3	0.1	5.5	0.4	0.8	<0.1	7.1	13.3	47.2	0.6
R37	1.2	0.1	4.9	0.4	0.8	<0.1	7.1	13.3	47.2	0.6
R37A	1.2	0.1	4.8	0.4	0.7	<0.1	7.1	13.3	47.1	0.6
R38	1.2	0.1	5.0	0.4	0.7	<0.1	7.1	13.3	47.1	0.6
R39	1.2	0.1	4.9	0.4	0.7	<0.1	7.1	13.3	47.1	0.6
R40	1.2	0.1	5.0	0.3	0.6	<0.1	7.1	13.2	47.0	0.6
R41	0.7	0.1	3.3	0.3	0.6	<0.1	7.1	13.2	47.0	0.6
R42	0.9	0.1	4.3	0.3	0.6	<0.1	7.1	13.2	47.0	0.6
R43	0.8	0.1	3.8	0.3	0.5	<0.1	7.1	13.2	46.9	0.6
R44	0.6	0.1	2.5	0.2	0.4	<0.1	7.1	13.1	46.8	0.6
R44A	0.4	<0.1	1.8	0.2	0.4	<0.1	7.0	13.1	46.8	0.6

The above table demonstrates that all sensitive receivers are predicted to experience particulate matter and dust deposition levels below the relevant criteria for each metric. The Air Quality Report also concludes that the Project is anticipated not to increase the number of days above the 24-hour average PM_{2.5} and PM₁₀ criterion at any of the receptor locations surrounding the Project Site.

7.8.5.2 Crystalline Silica

The assessment results show that the most affected residential receptor (R29) has a total maximum predicted incremental annual average PM_{2.5} concentration level of less than 0.5µg/m³. This level is due to the total dust from the site, and only a small portion of this dust would contain silica.

As the total level is over six times below the applicable VIC EPA criteria of 3µg/m³ for respirable crystalline silica, the predicted level from the Project is significantly below the criteria. Thus, the Project would not result in an unacceptable level of respirable crystalline silica in the ambient air at residential receptors.

7.8.6 Management & Monitoring Measures

The Air Quality Report recommends the following dust management measures to minimise (from the activities associated with the Project) impact on the surrounding environment, including residential receptors. These measures have been included in **Annexure 5**, which provides a summary of the Project's mitigation and monitoring measures.

Table 80 – Proposed Management Measures.	
Source	Management Measure
General	<ul style="list-style-type: none"> • Activities are to be assessed during adverse weather conditions and modified as required. • Weather forecast to be checked prior to undertaking material handling or processing. • Engines of on-site vehicles and plant to be switched off when not in use. • Vehicles and plant equipment are to be fitted with pollution reduction devices where practicable. • Vehicles are to be maintained and serviced according to manufacturer's specifications. • Visual monitoring of activities is to be undertaken to identify dust generation.
Exposed Areas & Stockpiles	<ul style="list-style-type: none"> • The extent of exposed surfaces and stockpiles is to be kept to a minimum. • Exposed areas and stockpiles are either to be covered or are to be dampened with water as far as is practicable if dust emissions are visible, or there is potential for dust emissions outside operating hours. • Minimise dust generation by undertaking rehabilitation earthworks when topsoil and subsoil stockpiles are moist and/or wind speed is below 10 m/s. • Grassing of constructed landforms.
Material Handling	<ul style="list-style-type: none"> • Reduce drop heights from loading and handling equipment where practical. • Dampen material when excessively dusty during handling.
Hauling Activities	<ul style="list-style-type: none"> • Haul roads should be watered using water carts such that the road surface has sufficient moisture to minimise on-road dust generation but not so much as to cause mud/dirt track out to occur. • Regularly inspect haul roads and maintain surfaces to remove potholes or depressions. • Driveways and hardstand areas to be swept/cleaned regularly as required etc. • Vehicle traffic is to be restricted to designated routes. • Speed limits are to be enforced. • Vehicle loads are to be covered when travelling off-site. • Wheel wash for vehicles leaving the site.



Aboriginal Archaeology & Heritage

The Project's SEARs require the EIS to address the following key issues relating to heritage:

Table 81 – Aboriginal Archaeology & Heritage SEARs

Requirement	EIS Section
An assessment of the potential impacts on Aboriginal heritage (cultural and archaeological), including evidence of appropriate consultation with relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage	Section 6.4 & 7.9.4 Annexure 14
Identification of historic heritage in the vicinity of the development and an assessment of the likelihood and significance of impacts on heritage items	Section 7.9.6

Design Collaborative engaged Kelleher Nightingale Consulting Pty Ltd to prepare an Aboriginal Cultural Heritage Assessment Report for the Project. The Report was prepared per the SEARs, Heritage NSW's *Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales*, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* and *Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW*.

The Aboriginal Cultural Heritage Assessment Report provides the landscape, ethnographic and archaeological context for the Project Site and the Aboriginal community consultation process outcomes. This research, coupled with the findings of a comprehensive Aboriginal archaeological survey effort, allowed for the assessment of the Project Site's cultural heritage values and the Project's impact on those values. Mitigation measures were also provided to avoid and mitigate harm.

The following section provides a summary of the Aboriginal Cultural Heritage Assessment Report.

Key Heritage Definitions

Aboriginal Object

A statutory term, meaning: ‘... any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains’ (s.5 *National Parks and Wildlife Act 1974*).

Aboriginal Places

A statutory term, meaning any place declared to be an Aboriginal place by the Minister administering the *National Parks and Wildlife Act 1974*, by order published in the NSW Government Gazette, because the Minister is of the opinion that the place is or was of special significance with respect to Aboriginal culture. It may or may not contain Aboriginal objects.

An Aboriginal place can also refer to an area of cultural value to Aboriginal people in the area (whether or not it is an Aboriginal place declared under s.84 of the *National Parks and Wildlife Act 1974*).

Registered Aboriginal Party

Aboriginal people, Aboriginal organisations or their representatives who have registered an interest in being consulted.

Culturally Modified Tree

Means a tree that has been scarred, carved or modified by an Aboriginal person by:

- (a) the deliberate removal, by traditional methods, of bark or wood from the tree, or
- (b) the deliberate modification, by traditional methods, of the wood of the tree.

Ethnographic

Relates to the scientific description of peoples and cultures with their customs, habits, and mutual differences.

Potential Archaeological Deposit

An area where sub-surface stone artefacts and/or other cultural materials are likely to occur.

7.9.1 Assessment Methodology

7.9.1.1 Desktop Review

A comprehensive desktop assessment was undertaken, which included:

- A review of the ethnohistoric and landscape context of the Project Site and surrounds.
- An Aboriginal Heritage Information Management System search to identify registered known Aboriginal sites or declared Aboriginal places within or adjacent to the study area. The Aboriginal Heritage Information Management System contains information and records related to registered Aboriginal archaeological sites and declared Aboriginal places in NSW.
- A search of the following statutory and non-statutory heritage registers for Aboriginal heritage items:
 - The Hills Local Environmental Plan 2019
 - State Heritage Register and State Heritage Inventory
 - NSW Heritage and Conservation Register
 - National Heritage List
 - Commonwealth Heritage List
 - Australian Heritage Database
 - Australian Heritage Places Inventory
 - Register of the National Estate – (Non-statutory archive)

A number of previous archaeological investigations have been undertaken in the surrounding area, primarily due to surrounding extractive industry projects. These were reviewed to gain an understanding of the Aboriginal cultural values of the area.

7.9.1.2 Aboriginal Stakeholder Consultation

Consultation with Aboriginal people was undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* and the requirements of Clause 60 of the *National Parks and Wildlife Regulation 2019*. The consultation process aims to integrate cultural and archaeological knowledge and ensure registered Aboriginal stakeholders have information to make decisions on Aboriginal cultural heritage.

Section 6.4 of the EIS and Section 2 of the Aboriginal Cultural Heritage Assessment Report provides a detailed overview of the consultation process.

7.9.1.3 Aboriginal Archaeological Survey

A comprehensive field inspection of the Project Site was undertaken to record any Aboriginal archaeological sites or areas with the potential to contain Aboriginal objects. The site was inspected across ten days between September 2020 and February 2021 by Kelleher Nightingale Consulting Senior Archaeologist Mark Rawson and DLALC Aboriginal Cultural Heritage Officers Steve Randall and Kayne Moreton.

The survey effort intended to provide a complete coverage survey of the Project's disturbance area to ensure appropriate management recommendations could be made. The adjoining areas of the disturbance area were also assessed to identify and characterise the nature and significance of any nearby Aboriginal archaeological sites.

The survey focused on the main ridge spur where extraction is proposed and the adjoining slopes and creek gullies. The survey also closely inspected any areas of outcropping sandstone for engravings or grinding grooves and checked overhangs for potential shelter sites based on the archaeological background and landform context of the study area.

The survey team were equipped with high-resolution aerial photography and topographic maps showing the Project Site and the proposed extraction area. A non-differential GPS receiver was used for spatial recordings. The survey team compiled detailed notes on the Project Site's condition. Those notes included assessments of surface visibility, vegetation coverage, modern disturbance, and current land use.

7.9.2 Existing Environment

Data sourced from historical/ethnographic resources, Aboriginal community consultation, landscape evaluation, background archaeological context and the archaeological field survey provided an insight into how the landscape around the Project Site was used and what sort of events took place in the past.

24 Aboriginal archaeological sites and two potential archaeological deposit areas were identified within the Project Site. The potential archaeological deposit areas do not contain confirmed Aboriginal objects but displays moderate potential for subsurface deposit. Six Potential Habitation Shelters were also recorded but are not considered to be Aboriginal archaeological sites.

A description of each site is provided in **Table 82** below, and its location is shown in **Figure 74** further below.

Table 82 – Identified Aboriginal Archaeology Sites

Site Name	Features
DM01	Shelter with Art
DM02	Artefact Scatter
Maroota Shelter 1 PAD	Shelter with Potential Archaeological Deposit
Maroota Shelter 2 PAD	Shelter with Potential Archaeological Deposit
Maroota TRE 1	Modified Tree
Maroota Shelter 3 PAD	Shelter with Potential Archaeological Deposit
Maroota Shelter 4 PAD	Shelter with Potential Archaeological Deposit
Maroota Shelter 5 ART+AFT	Shelter with Art and Artefacts
Maroota Shelter 6 ART	Shelter with Art
Maroota Shelter 7 ART+PAD	Shelter with Art and Potential Archaeological Deposit
Maroota Shelter 8 ART+AFT	Shelter with Art and Artefact
Maroota GDG 1	Grinding Groove
Maroota Shelter 9 PAD	Shelter with Potential Archaeological Deposit
Maroota GDG 2	Grinding Groove
Maroota GDG 3	Grinding Groove
Maroota Shelter 10 PAD	Shelter with Potential Archaeological Deposit
Maroota IF 1	Isolated Artefact
Maroota AFT 1	Artefact Scatter
Maroota Shelter 11 ART+PAD	Shelter with Art and Potential Archaeological Deposit
Maroota Shelter 12 PAD	Shelter with Potential Archaeological Deposit
Maroota Shelter 13 AFT	Shelter with Artefact
Maroota AFT 2	Artefact Scatter
Maroota Shelter 14 PAD	Shelter with Potential Archaeological Deposit
Maroota Shelter 15 PAD	Shelter with Potential Archaeological Deposit
Maroota PAD 1	Potential Archaeological Deposit
Maroota PHS 1	Potential Habitation Shelter (not a site)
Maroota PHS 2	Potential Habitation Shelter (not a site)
Maroota PHS 3	Potential Habitation Shelter (not a site)
Maroota PHS 4	Potential Habitation Shelter (not a site)
Maroota PHS 5	Potential Habitation Shelter (not a site)
Maroota PHS 6	Potential Habitation Shelter (not a site)

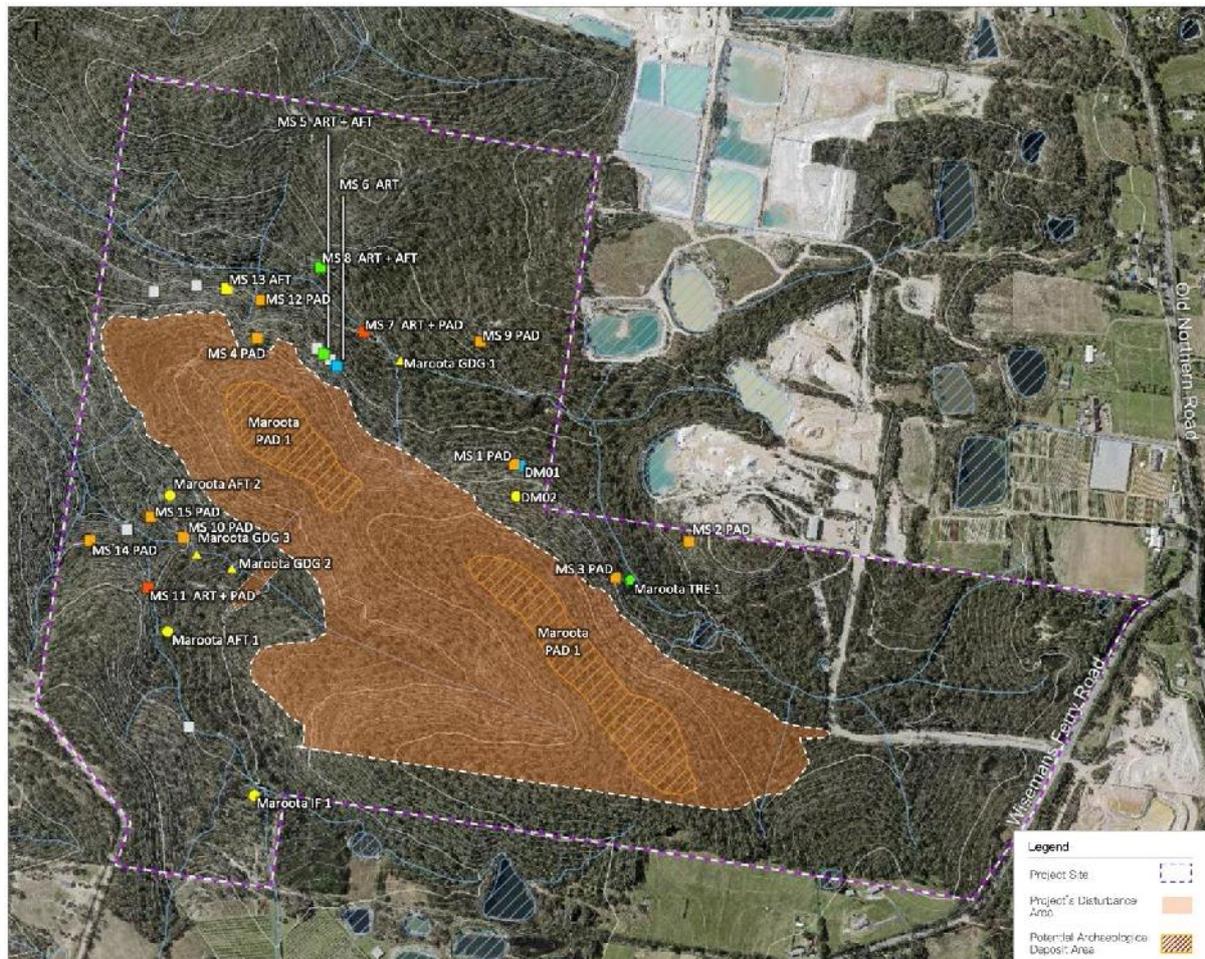


Figure 74: Identified Aboriginal Sites (Base Image Source: Kelleher Nightingale Consulting Pty Ltd, 2021)

7.9.3 Cultural Heritage Values and Assessment of Significance

The assessment of significance is a key step in the process of impact assessment for a proposed activity. The significance or value of an object, site or place is reflected in recommendations for conservation, management or mitigation. The *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (OEH 2010a) requires significance assessment according to criteria established in the Australia ICOMOS Burra Charter.

Guidelines to the Burra Charter set out four criteria for the assessment of cultural significance:

- **Aesthetic Value:** relates to the sense of the beauty of a place, object, site or item.
- **Historic Value:** relates to the association of a place, object, site or item with historical events, people, activities or periods.
- **Scientific value:** scientific (or research) value relates to the importance of the data available for a place, object, site or item, based on its rarity, quality or representativeness, as well as on the degree to which the place (object, site or item) may contribute further substantial information.

- **Social value:** relates to the qualities for which a place, object, site or item has become a focus of spiritual, political, national or other cultural sentiments to a group of people.

7.9.3.1 Statement of Significance

The Project Site contains 24 identified Aboriginal archaeological sites and two potential archaeological deposit areas. The majority of these sites comprise closed context rock shelter sites (67%) featuring art, artefacts and/or potential archaeological deposit. The survey team identified a smaller number of open context artefact sites, grinding grooves and one modified tree.

The archaeological sensitivity of the Project Site is strongly linked to geology and topography/landform. Aboriginal grinding grooves and rock shelter sites occur where suitable sandstone outcrops and overhangs on the slopes off the main ridge spur crest. These site types are typical and representative of what is expected based on regional archaeological models and previous recordings.

The native bushland and low levels of development within the Project Site enhances the Aboriginal archaeological sites' natural landscape context and the connectivity between them. When considered both individually and as a body, the archaeological sites display a demonstrable value to express the Aboriginal cultural landscape still present within the area.

Together, the identified archaeological sites express the Aboriginal cultural heritage of the area and form part of an archaeological continuum leading up to the main ridgeline. Several archaeological sites occur in close spatial proximity and may be considered part of interrelated site complexes. The Aboriginal cultural heritage and history of the region are displayed physically through these sites.

Aboriginal stakeholders identify closed context archaeological sites as having particular Aboriginal cultural heritage value, especially where they contain art. Existing damage and disturbance to shelters within the Project Site is primarily absent or minor and does not detract from their cultural heritage significance. Those archaeological sites containing artefacts or potential archaeological deposits generally display moderate to high archaeological research potential due to their ability to inform on Aboriginal landscape use.

Grinding groove sites mark the actual places people worked in the past. Rock marking sites (engravings, paintings and grinding grooves) are fixed points in the landscape and represent hard connections with the past. The spatially discrete nature of these site types often assists in site management and protection, given they usually have clearly defined boundaries.

The majority of the open context artefact sites display low archaeological potential due to their location on exposed bedrock sandstone platforms or in a disturbed context. They are typical of the region in terms of artefact raw materials, types and low densities. Research potential and archaeological value are increased where the site is associated with a stable, low gradient landform and associated subsurface deposit potential. This is also true of the identified potential archaeological deposit areas (labelled Maroota PAD 1 in **Figure 67**) along the main ridge.

The following levels of significance were ascribed to Aboriginal sites located within the study area based on the above-described value assessment.

Table 83 – Assessed Significance of Identified Aboriginal Archaeology Sites

Site Name	Significance
DM01	High
DM02	Low
Maroota Shelter 1 PAD	High
Maroota Shelter 2 PAD	High
Maroota TRE 1	Moderate
Maroota Shelter 3 PAD	High
Maroota Shelter 4 PAD	High
Maroota Shelter 5 ART+AFT	High
Maroota Shelter 6 ART	High
Maroota Shelter 7 ART+PAD	High
Maroota Shelter 8 ART+AFT	High
Maroota GDG 1	Moderate
Maroota Shelter 9 PAD	High
Maroota GDG 2	Moderate
Maroota GDG 3	Moderate
Maroota Shelter 10 PAD	High
Maroota IF 1	Moderate
Maroota AFT 1	Moderate
Maroota Shelter 11 ART+PAD	High
Maroota Shelter 12 PAD	High
Maroota Shelter 13 AFT	High
Maroota AFT 2	Low
Maroota Shelter 14 PAD	High
Maroota Shelter 15 PAD	High
Maroota PAD 1	Moderate potential

7.9.4 Impact Assessment

7.9.4.1 Avoiding Harm

As an organisation, DLALC is committed to protecting and preserving Aboriginal heritage. Objective 22 of their Community Land & Business Plan is to promote “*a holistic understanding of the landscape, especially its spiritual and cultural dimensions.*” This philosophy informed the Project’s design, with impact avoidance and appropriate management being fundamental considerations.

The Project’s extraction area is focused on the main ridge spur, which avoids the more archaeologically sensitive slopes and creek gullies below, where significant sites have been identified. The Project’s archaeologist identified and assessed Aboriginal heritage sites early to allow for their avoidance. As detailed in Section 3.6, the Project’s extraction area was amended following the Aboriginal archaeological survey findings to provide a 35m minimum buffer to recorded shelters within the extraction area’s proximity. Thus, this design approach ensures that all identified Aboriginal archaeological sites within the Project Site will be avoided. This represents a strong positive conservation outcome.

7.9.4.2 Direct Impact

The Project will directly impact the potential archaeological deposit areas identified along the main ridge (labelled Maroota PAD 1 in **Figure 74**). This area does not contain confirmed Aboriginal objects but displays moderate potential for subsurface deposit. Appropriate mitigation measures, described in Section 7.9.5 below, have been developed for these areas. Impacts on this area are unavoidable due to the area’s central location within the extraction resource.

7.9.4.3 Indirect Impacts

Potential indirect impacts, including those impacts arising from vibrations and changes in hydrological regimes, were considered in the Aboriginal Cultural Heritage Assessment Report.

The Report concluded that the Project’s proposed extraction methods are unlikely to cause potentially shelter-damaging vibration effects, especially as they will not be undertaken within the proposed buffer zones. Management measures, described in Section 7.9.5 below, are also recommended to ensure that water impacts and sediment runoff from the extraction operation does not result in deposition or scouring over the grinding groove sites or rock shelter floors downgradient of the extraction area.

Based on the impact assessment and implementation of the proposed buffer zones, proposed impacts to sites identified within the study area are detailed in the table below.

Table 84 – Assessed Impact on Identified Aboriginal Archaeology Sites

Site Name	Assessed Significance	Type/Degree of Harm	Consequence of Harm
DM01	High	None	No loss of value
DM02	Low	None	No loss of value
Maroota Shelter 1 PAD	High	None	No loss of value
Maroota Shelter 2 PAD	High	None	No loss of value
Maroota TRE 1	Moderate	None	No loss of value
Maroota Shelter 3 PAD	High	None	No loss of value
Maroota Shelter 4 PAD	High	None	No loss of value
Maroota Shelter 5 ART+AFT	High	None	No loss of value
Maroota Shelter 6 ART	High	None	No loss of value
Maroota Shelter 7 ART+PAD	High	None	No loss of value
Maroota Shelter 8 ART+AFT	High	None	No loss of value
Maroota GDG 1	Moderate	None	No loss of value
Maroota Shelter 9 PAD	High	None	No loss of value
Maroota GDG 2	Moderate	None	No loss of value
Maroota GDG 3	Moderate	None	No loss of value
Maroota Shelter 10 PAD	High	None	No loss of value
Maroota IF 1	Moderate	None	No loss of value
Maroota AFT 1	Moderate	None	No loss of value
Maroota Shelter 11 ART+PAD	High	None	No loss of value
Maroota Shelter 12 PAD	High	None	No loss of value
Maroota Shelter 13 AFT	High	None	No loss of value
Maroota AFT 2	Low	None	No loss of value
Maroota Shelter 14 PAD	High	None	No loss of value
Maroota Shelter 15 PAD	High	None	No loss of value
Maroota PAD 1	Moderate potential	Direct / Total	Total loss of value

7.9.5 Management and Monitoring Measures

7.9.5.1 Active Protection of Archaeological Sites

Identified Aboriginal archaeological sites in proximity to the Project's disturbance area require active protection measures. Accordingly, a 35m minimum buffer is provided to all recorded shelters within proximity of the extraction area.

Aboriginal archaeological sites will also be identified in the Project's Construction Environmental Management Plan and the buffer areas marked as 'no go' zones. Clear demarcation will be installed around the edge of the buffer 'no go' zones before construction activities to prevent accidental access or impact.

7.9.5.2 Potential Archaeological Deposit Area Management

A staged excavation program will be undertaken within the Potential Archaeological Deposit area (labelled Maroota PAD 1 in **Figure 74**) to determine the presence/absence, nature and extent of any associated archaeological material. Initial test excavations will occur before any impact from the Project.

Testing will be undertaken in accordance with the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW*. If the testing determines that the Potential Archaeological Deposit is an archaeological site, any subsequent mitigation requirements and methodology will be determined on the basis of archaeological significance and in consultation with DLALC. If the site is of moderate or higher archaeological significance, mitigative salvage excavation will be required.

The scientific value of archaeological sites is linked to the physical information the sites contain. The information from both testing (and, if required, salvage excavation) will increase our understanding, strengthen our interpretations and improve ongoing and future management of Aboriginal heritage in the surrounding area. The spatial extent, presence of archaeological deposits and activities related to Aboriginal occupation at open context archaeological sites in the surrounding area, are not yet fully understood due to the relative rarity of this site type on the elevated sandstone country and limited excavation data.

In this light, the Project offers an opportunity to advance the interpretation and management of Aboriginal heritage of the surrounding area by contributing to the baseline of information available to future heritage assessments.

7.9.5.3 Site Monitoring

Periodic site monitoring will be undertaken during the Project's life to ensure sites remain protected. Inspections will be undertaken by a qualified archaeologist and a representative from DLALC.

Site monitoring will also ensure that management measures relating to the prevention of water impacts and sediment runoff from the extraction operation are sufficient to protect the identified sites and that no unanticipated impacts occur.

7.9.5.4 Management Plan

Section 13 of the Aboriginal Cultural Heritage Assessment Report provides an Aboriginal Heritage Management Plan for the Project. The management plan includes measures relating to:

- The delegation of responsibility for compliance with the management plan.
- Preconstruction and pre-mining heritage protection measures.
- The protection of identified heritage sites via buffer zones and the maintenance of these zones.
- The handling of human remains if identified at the site.
- The management of Aboriginal objects, including procedures for handling unexpected Aboriginal objects.
- Ongoing reporting, including the completion of a written archaeological report documenting the excavation program described in Section 7.9.5.1 above and Aboriginal Site Impact Recording Form.
- Procedures for proposed changes to the approved project.
- Ongoing consultation with Aboriginal stakeholders.

Annexure 5 includes the mitigation and monitoring measures proposed in the Aboriginal Cultural Heritage Assessment Report.

7.9.6 Historic Heritage

The following databases were searched to identify registered non-Aboriginal heritage items within proximity of the Project's disturbance area.

- Hills Local Environmental Plan 2019.
- National Heritage Register under the Commonwealth *EPBC Act*.
- Commonwealth Heritage Register.
- State Heritage Register under the NSW *Heritage Act 1977*.
- Heritage and Conservation Register under the *Heritage Act 1977*.
- State Heritage Inventory.

That search identified the following heritage items.

Item Name	Significance	Item No.	Address	Distance from Disturbance Area
Convict Built Road (Mr Sharps Track)	Local	A14	2275 and 2277–2349 River Road	3.3km northwest
Stonehouse Grove	Local	I80	1365 Wisemans Ferry Road	2.8km southwest
Great drain and stone cut foundations	State	A25	Stone Drain Reserve, 274 Pacific Park Road	7.2km southwest
Bypassed section of Old Northern Road	Local	A18	4050 Old Northern Road	4km southeast
McFarland Grave	Local	I141	4m from the centreline of Old Northern Road and 368m north of its intersection with Wisemans Ferry Road	800m northeast
Original Section of Old Northern Road	Local	A15	3952–4006 Old Northern Road	4km southeast
Old Northern Road	Local	A12	Old Northern Road between Dural and Wisemans Ferry	720m northeast
Original Section of Old Northern Road	Local	A16	4132 Old Northern Road	3.2km southeast
Great drain and two house site	State	01402	Wisemans Ferry Road	7.2km southwest

No historical heritage items are located within the Project's disturbance area nor within the Project Site. The nearest heritage item is located some 720m from the Project's disturbance area. This provides a sufficient buffer to mitigate potential indirect impacts associated with the Project, including vibration impacts. As such, the Project will not impact historic historical items.



7.10 Land Resource

The Project SEARs require the EIS to include a detailed assessment of the following key issues relating to Land Resources:

Table 86 – SEARs Land Resources: Soils & Land Compatibility	
Requirement	Addressed at EIS Section
<i>potential impacts on soils and land capability (including potential erosion and land contamination);</i>	Section 7.10.3 Annexure 15
<i>potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds etc).</i>	Section 7.10.3 Annexure 15
<i>the compatibility of the development with other land uses in the vicinity of the development in accordance with the requirements in Clause 12 of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (SEPP Mining and Extractive Industry), paying particular attention to the agricultural land use in the region;</i>	Section 7.10.3 Annexure 15

SLR Consulting was engaged to prepare a Land Capability Assessment. That assessment is included as **Annexure 15**.

Key Land Resource Definitions

Soil Landscape Units	Areas of land that have recognisable and specific topographies and soils that can be presented on maps and described by concise statements.
Calcareous	An adjective meaning "mostly or partly composed of calcium carbonate", in other words, containing lime or being chalky.
A Horizon	The A horizon is the top layer of the mineral soil horizons, often referred to as "topsoil".
B Horizon	The B horizon is commonly referred to as "subsoil".
Podzols	An infertile acidic soil characterized by a white or grey subsurface layer resembling ash, from which minerals have been leached into a lower dark-coloured stratum. It typically occurs under temperate coniferous woodland.
Gleyed Soils	A sticky waterlogged soil lacking in oxygen.
Siliceous Sands	Granular material that contains quartz and minute amounts of coal, clay and other minerals.
Lithosols (Rudosols)	A group of shallow soils lacking well-defined horizons, especially an entisol consisting of partially weathered rock fragments, usually on steep slopes.
Tenosols	Soils with limited B horizon development (less than 15% clay content) but more development than the most rudimentary soils (i.e. Rudosols), including possible bleached layers and colour changes.
Kurosols	Soils that display a strong texture contrast between surface (A) horizons and subsoil (B) horizons.
Chromosols	Soils that display a strong texture contrast between surface (A) horizons and subsoil (B) horizons.
Kandosols	Kandosols are red, yellow and grey massive earths. They generally have a sandy to loamy-surface soil, grading to porous sandy-clay subsoils with low fertility and poor water-holding capacity.

7.10.1 Existing Condition

7.10.1.1 Soil Landscape Units

Soils landscape units are described as “areas of land that have recognisable and specific topographies and soils that can be presented on maps and described by concise statements”. Soils landscape mapping of the Project site was undertaken by the former NSW Department of Land and Water Conservation on the *Soils Landscapes of the St Albans 1:100 000 Sheet*. That mapping identifies five soil landscape units occurring in the site, shown in **Figure 75** below. **Table 87** further below describes each of these units.

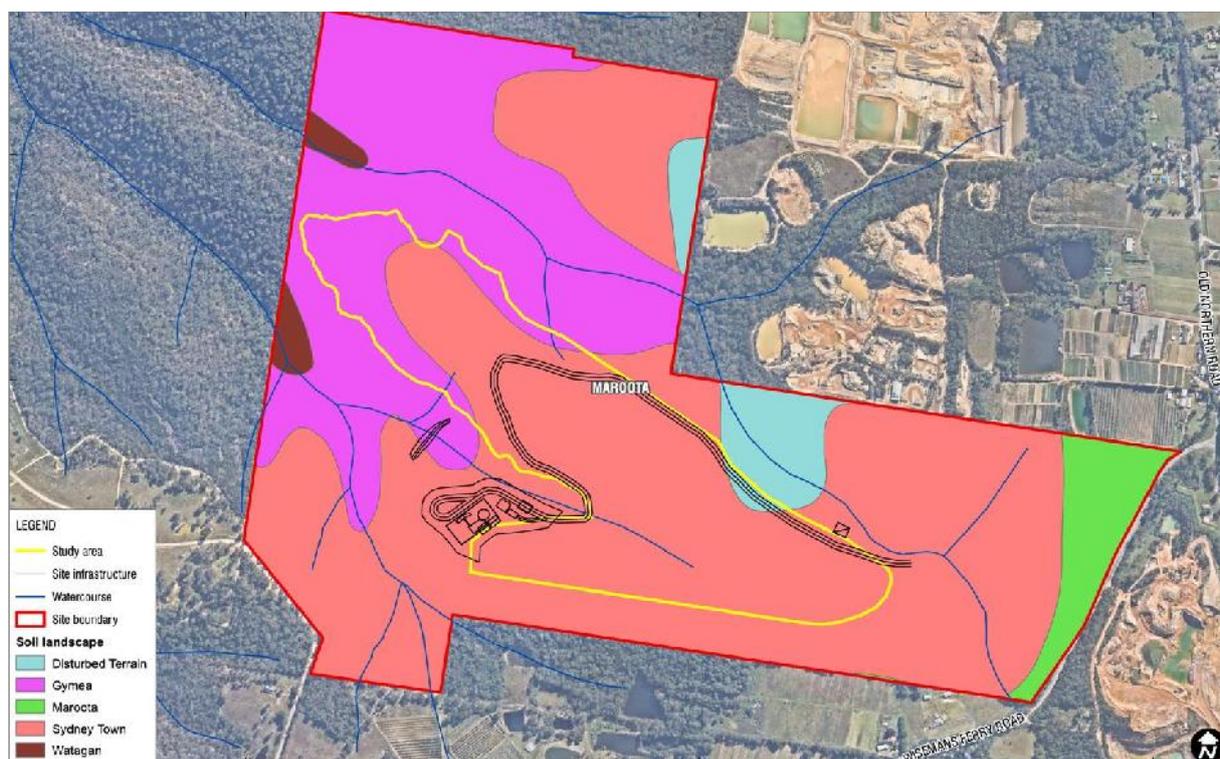


Figure 75: Soil Landscapes (Source: SLR Consulting, 2021; Base Image Source: Nearmap, March 2020)

Table 87 – Soil Landscape Units		
Name	Description	Land Capability Limitations
Maroota	<p>Consists of gently undulating rises on elevated alluvial sediments.</p> <p>Main soils include:</p> <ul style="list-style-type: none"> Moderately deep to deep Yellow Earths on crests and slopes; Podzols at heads of drainage lines; and Deep Gleyed Podzolic Soils associated with clay deposits. 	<p>High erosions hazard;</p> <p>Localised seasonal waterlogging; Highly permeable; and Strongly acidic soils with low fertility.</p>
Sydney Town	<p>Consists of undulating to rolling low hills and moderately inclined slopes.</p> <p>Main soils include:</p> <ul style="list-style-type: none"> Shallow and deep, well to imperfect Yellow Earths and Earthy Sands; Some rapidly drained Siliceous Sands on Crests and Slopes; Shallow to deep poorly drained Siliceous Sands, Leached Sands and Grey Earths in poorly drained areas and drainage lines; Moderately deep to deep imperfectly drained Yellow Podzolic Soils; and 	<p>Very high erosion hazard;</p> <p>Localised permanent waterlogging; Highly permeable; Strongly acidic; and</p> <p>Sodic/dispersive soils with low fertility.</p>

	<ul style="list-style-type: none"> Poorly drained Gleyed Podzolic Soils associated with shale lenses. 	
Gynea	<p>Consists of undulating to rolling hills with more than 25% outcrop.</p> <p>Main Soils include:</p> <ul style="list-style-type: none"> Shallow Siliceous Sands and Lithosols (Rudosols) associated with rock outcrop on leading edges of benches; Shallow to moderately deep Earthy Sands (Tenosols) and Yellow Earths (Tenosols) on crests and insides of benches; Yellow Podzolic Soils and Yellow Earths (Chromosols and Kurosols) on inside of benches; Localised Yellow Podzolic Soils (Chromosols and Kurosols) and Red Podzolic Soils (Dermosols) on shale lenses; and Shallow to moderately deep Siliceous Sands, Leached Sands (Rudosols) and Earthy Sands (Tenosols) along drainage lines. 	<p>Soils erosion hazard; Rock outcrop; Localised rockfall hazard; Steep slopes; Shallow; Stony; Highly permeable; and Strongly acidic soils of very low fertility.</p>
Disturbed Terrain	<p>The Disturbed Soil Landscape occurs within other landscapes and consists of level plains to hummocky terrain which have been disturbed by humans. The soils surface has been cleared of the original vegetation.</p>	<p>Mass movement hazards; Steep slopes; Foundation hazard; Unconsolidated low wet bearing strength materials; Impermeable soils; Poor drainage; Low fertility; and Toxic materials</p>
Watagan	<p>Consists of rolling to very steep hills on fine–grade Narrabeen Group Sediments. Main soils include:</p> <ul style="list-style-type: none"> Shallow Lithosols / Siliceous Sands (Rudosols) and Yellow Earths (Kandosols) on coarse sandstones; Shallow to deep Yellow and Red Podzolic Soils (Kurosols, Chromosols) on fine–graded bedrock; Deep sandstone colluvial deposits, Yellow Earths (Kandosols), Yellow Podzolic Soils (Kurosols Chromosols & Alluvial Soils (Rudosols) along drainage lines. 	<p>Mass movement hazards; Steep slopes; Soils erosion hazards; Foundation hazards; Occasional rock outcrops; and seasonal waterlogging (localised). The rural land capability is deemed to have severe limitations to both cropping and grazing.</p>

7.10.1.2 Soil Survey Results

Using the *Soils Landscapes of the St Albans 1:100 000 Sheet* as a base reference, field survey work was undertaken to build on this soil data and confirm soils boundaries within the study area. Soil profiles were observed at six locations across the study area.

In addition to detailed observations, eight samples' soils samples from three locations at the Project site were dispatched to the Environmental Analysis Laboratory to classify soil taxonomic classes, determine land and soils capability classes and determine the suitability of soils as topdressing material.

As shown in **Figure 76** below, one Soil Unit was identified during the soil survey, a Grey–Brown Kurosol with a subdominant soil type comprising a Yellow Kandosol.

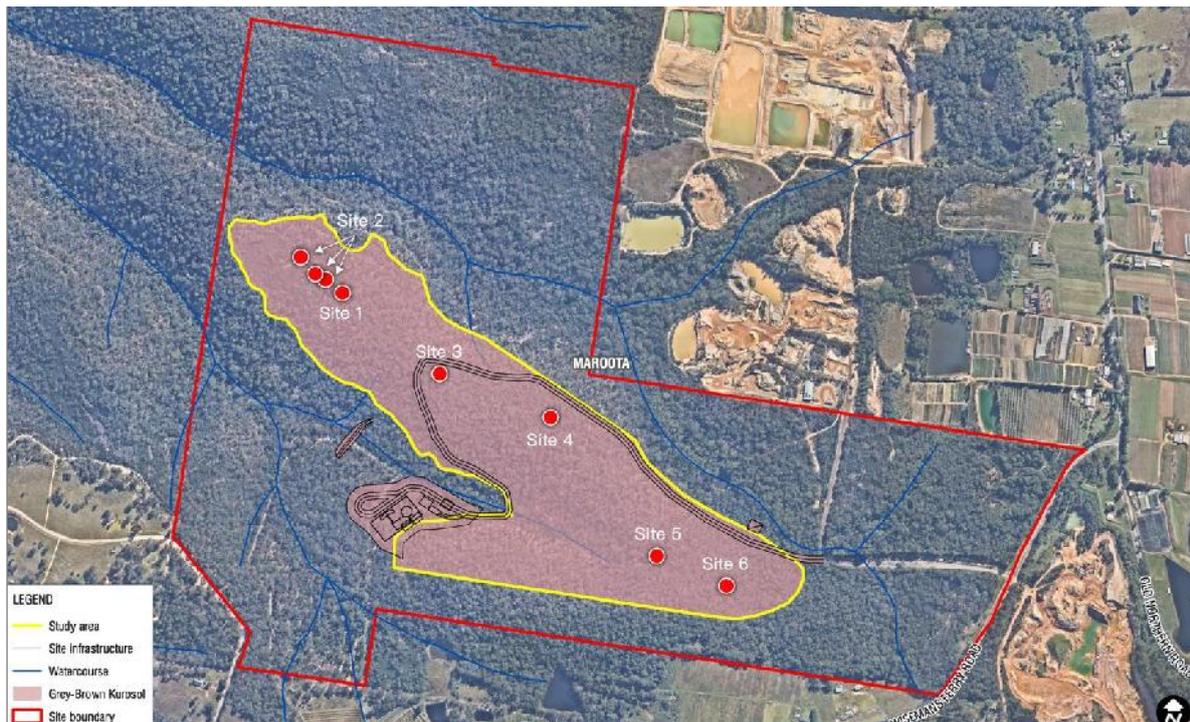


Figure 76: Soils Types (Source: SLR Consulting, 2021; Base Image Source: Nearmap, 2020) (

Dominate Soil Type: Grey – Brown Kurosol

Kurosol are soils with a strong texture contrast between the A horizons and a strongly acidic B Horizons. Kurosol dominate the study area representing five of the six profiles assessed in the soil survey. The Australian Soils Classification and location for each dominate soil type is listed below.

- Dystrophic Brown Kurosol – Site 1
- Brown Kurosol – Site 2
- Brown Kurosol – Site 3
- Magnesian Grey Kurosol – Site 4
- Grey Kurosol – Site 5

Sub-dominate Soils Type: Yellow Kandosol

Kandosols are soils which lack strong texture contrast between the A and B horizons, have massive or weakly structured B horizons and are not calcareous throughout. Kandosols have a maximum clay content in part of the B Horizon which exceeds 15%. The Australian Soils Classification and location for the sub dominate soil type is listed below.

- Mesotrophic Yellow Kandosol – Site 6

7.10.2 Land Capability

Land capability is the inherent physical capability of land to sustain a range of land uses without degradation to soil, land, air and water resources.

The land and soils capability of the Project Site was assessed using the Office of Heritage and Environment guideline, “*The Land and Soils Capability Assessment Scheme; Second Approximation*”. The following table provides the Land and Soil Capability Classes for land within the study area.

Table 88 – Land Capability Assessment			
Class	Capability Description	Soil types	Area
Class 5	Moderate - Low Capability	<ul style="list-style-type: none"> Dystrophic Brown Kurosol Brown Kurosol at both site 2 and 3 Magnesian Grey Kurosol Grey Kurosol 	25.5ha
	Land has high limitations for high-impact uses. Land use restricted to low-impact land uses such as grazing, some horticulture (orchards), forestry and nature conservation.		54% of the study area
Class 6	Low Land Capability	<ul style="list-style-type: none"> Mesotrophic Yellow Kandosol 	21.4ha
	Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation.		46% of the study area

The below figure shows the location of Class 5 and Class 6 land within the study area.

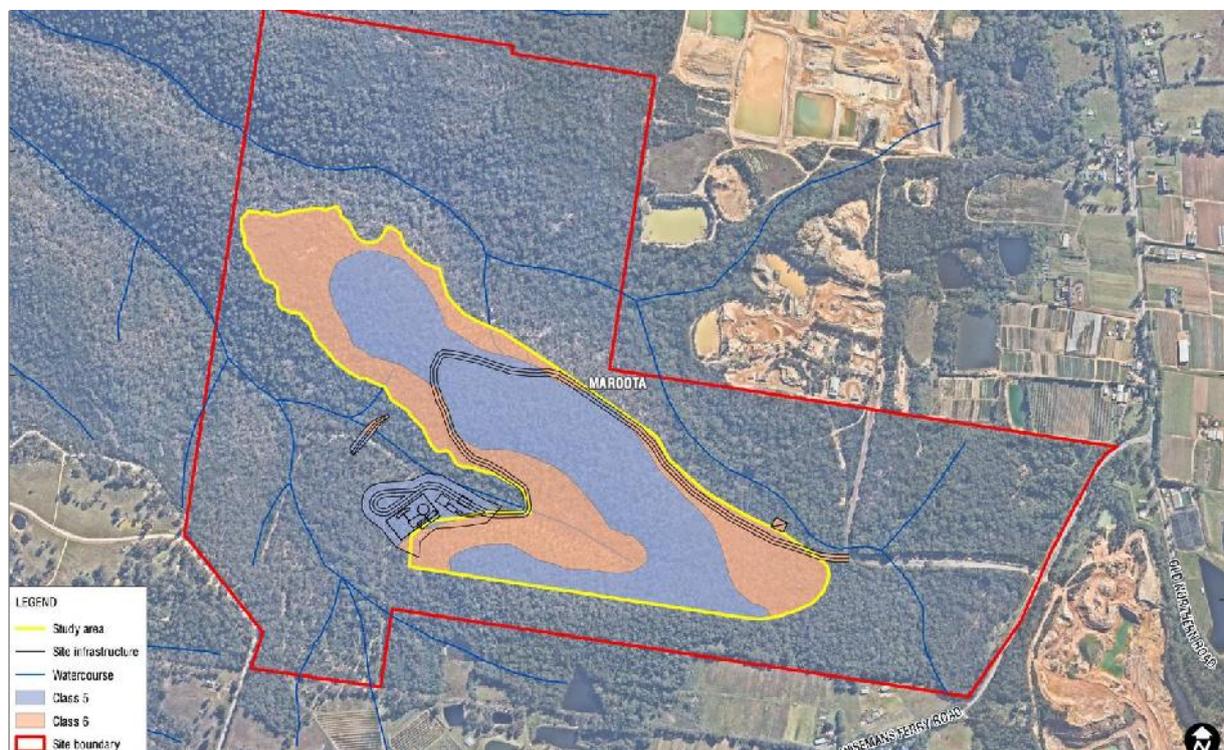


Figure 77: LSC Classes (Source: SLR Consulting, 2021; Base Image Source: Nearmap, March 2020)

7.10.3 Impact Assessment

Activities that may impact the Project Site's existing landforms, soils and land capability, include:

- Excavation of soils (Grey–Brown Kurosols) to access the sandstone resource and construct the Project's infrastructure;
- Extraction of the sandstone resource;
- Storage of overburden in stockpiles;
- Construction of rehabilitated landforms; and
- Contamination of soils from fuels and chemicals associated with the Project's operations.

Adherence to the management measures outlined in the section below will improve the land capability of the Project Site. Therefore, allowing the site to be used as productive agricultural lands following the casement of the Project's operations. The Project will not directly or indirectly impact the soil quality of the surrounding land currently used for agricultural production.

7.10.4 Compatibility of the Development with Surrounding Land Uses

Clause 12 of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* stipulates the following:

12 Compatibility of proposed mine, petroleum production or extractive industry with other land uses

Before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must—

a) consider—

- i. the existing uses and approved uses of land in the vicinity of the development, and*
- ii. whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and*
- iii. any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and*

b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a)(i) and (ii), and

c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a)(iii).

The Project is located entirely within native bushland and will not directly or indirectly impact land currently used for agricultural production. There are existing sand quarries located directly to the south, east and north

of the proposed quarry. There are orchards and other small-scale horticulture to the south of the proposed quarry which are separated by a minimum 100 metre buffer of native bushland.

7.10.5 Mitigation & Monitoring Measures

A Soils Management Plan will be prepared for the Project. The Soils Management Plan and the Project's Rehabilitation Strategy (**Annexure 17**) will be implemented to mitigate the risk of adverse soil erosion and contamination impacts. Management measures are presented in the table below.

Table 89 – Land Resource Management Measures	
Aspect	Measures
Erosion	<ul style="list-style-type: none"> • Appropriate erosion and sediment control devices shall be installed prior to any surface disturbance to minimise erosion potential. Erosion and sediment control devices will be designed and installed per the specifications contained in <i>Managing Urban Stormwater – Soils and Construction, Volume 1, 4th edition</i> (Landcom, 2004), <i>Volume 2E Mines and Quarries</i> (DECC, 2008a). • Erosion and sediment control structures will remain in place and be maintained until new vegetation is established and provides sufficient ground cover. • The surface of topsoil stockpiles should be left in as coarsely structured a condition as possible in order to promote infiltration, prevent anaerobic zones forming and minimise erosion until vegetation is established. • Topsoil will be spread, treated with fertiliser and seeded in an integrated operation. This strategy will allow mitigation of the potential for topsoil loss to wind and water erosion.
Land Contamination	<ul style="list-style-type: none"> • Soil should preferably be stripped in a slightly moist condition. • Wherever practicable, stripped material should be placed directly onto areas to be rehabilitated and spread immediately to avoid the requirement for stockpiling. • Prior to re-spreading stockpiled topsoil, an assessment of weed infestation on stockpiles shall be undertaken to determine if stockpiles require herbicide application and/or “scalping” of weed species. • Sampling and analysis of topsoil and subsoil resources shall be undertaken prior to respreading. Understanding soil characteristics will assist in estimating required rates of fertiliser or ameliorants and may also assist in blending specific soil types to achieve enhanced outcomes. • If obvious signs of contamination such as discoloured soils or odorous soils are encountered, work shall stop in the vicinity of the area until appropriately treated. • Fuels, lubricants and chemicals must be stored and, where practicable, used within areas designed to prevent the escape of spilt substances to the surrounding environment. • Spill response material to be kept on site.
Stability of landforms	<ul style="list-style-type: none"> • Topsoil should be stockpiled to a maximum height of 2.5m; • Where long-term stockpiling is planned (i.e. greater than 12 months), seed and fertilise stockpiles as soon as possible. • An maximum angle of repose of 32° should be used for overburden stockpiles on the Project Site. Overburden stockpiles should also not exceed 10m in height. • The edge of a stockpile shall be located at minimum distance of 30m from any excavation crest to mitigate slope stability risks. • Ensure that water drains away from any overburden dump on the Project Site.



Social and Economic

The Project's SEARs require the EIS to address the following key issues relating to social and economic:

Table 90 – SEARs Social & Economic	
Requirement	EIS Section
A detailed assessment of the potential social impacts of the development that builds on the findings of the Social Impact Assessment Scoping Report, in accordance with the <i>Social impact assessment guideline for State significant mining, petroleum production and extractive industry development</i> , paying particular consideration to:	Section 7.11.3 Annexure 16
<ul style="list-style-type: none"> how the development might affect people's way of life, community, access to and use of infrastructure, services and facilities, culture, health and wellbeing, surroundings, personal and property rights, decision-making systems, and fears and aspirations; 	Section 7.11.3 Annexure 16
<ul style="list-style-type: none"> the principles in Section 1.3 of the guideline; 	Annexure 16
<ul style="list-style-type: none"> the review questions in Appendix D of the guideline; and 	Annexure 16
<ul style="list-style-type: none"> the recommendations made in Attachment 3. 	Annexure 16
A detailed assessment of the likely economic impacts of the development, paying particular attention to:	Annexure 16
<ul style="list-style-type: none"> the significance of the resource; 	Section 7.11.6.1 Annexure 16
<ul style="list-style-type: none"> the costs and benefits of the project; identifying whether the development as a whole would result in a net benefit to NSW, including consideration of fluctuation in commodity markets and exchange rates; and 	Section 7.11.6.3 Annexure 16
<ul style="list-style-type: none"> the demand on local infrastructure and services. 	Section 7.11.6.5 Annexure 16

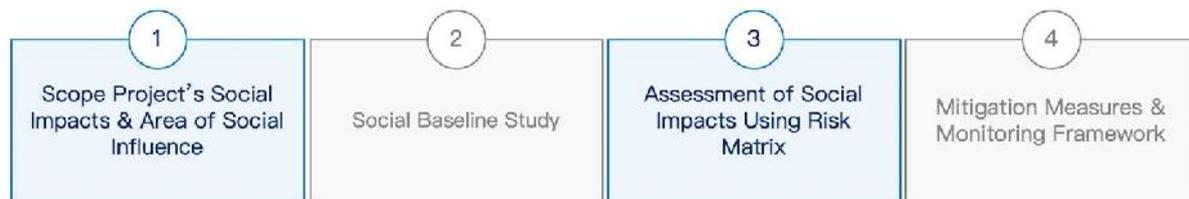
Design Collaborative prepared a Social and Economic Impact Assessment (SEIA) to address the above SEARs requirements (**Annexure 16**). That Assessment was prepared in accordance with the Department of Planning, Industry and Environment's *Social impact assessment guideline for State significant mining, petroleum production and extractive industry development*. The SEIA:

- Defined social impact and outlined a methodology for determining the Project's social impact;
- Established social and economic baseline statistics for the Project's surrounding community;
- Outlined the outcomes of consultation and research for determining the community's existing way of life, culture, fears and aspirations;
- Assessed the Project's social impacts using a social risk assessment matrix;
- Evaluated the Project's economic impacts using a Cost Benefit Analysis and Local Effects Analysis; and
- Recommended measures to enhance positive impacts and mitigate adverse impacts.

The following section provides a summary of the SEIA

7.11.1 Social Impact Assessment Methodology

The Social Impact methodology used for the purposes of the SEIA was informed by the International Association for Impact Assessment's *Social Impact Assessment Guidance*. The methodology is presented in the below flow chart and discussed under the heading below.



Area of Social Influence

A project's 'area of social influence' refers to those residents or stakeholders who are potentially impacted by the project. Social impacts are rarely contained in a predefined geographical area as people are connected by complex linkages and networks.

The Department of Planning, Industry and Environment's scoping tool was used during the Project's scoping phase to identify potential impacts and receptors. This process and engagement with community members and stakeholders also assisted in identifying the Project's area of social influence.

The SEIA identified four areas of social influence:

1. **Immediate Vicinity** – landowners and occupiers within 1km of the Project Site. These community members are most sensitive to potential amenity impacts such as noise, vibration and dust.
2. **Local Community** – The State suburb of Maroota, in which the Project Site is located.
3. **Broader Community** – The Hills Shire Local Government Area. Broader impacts, such as economic and heritage impacts are potentially significant to this community.
4. **Other Stakeholders** – Stakeholders that have an interest in the Project, despite being located outside Maroota and the Hills Shire Local Government Area. These stakeholders include Aboriginal groups, the NSW Environmental Protection Agency and the Hornsby Shire Council.

Social Baseline Study

A 'social baseline study' documents the existing social environment, conditions, and trends relevant to the Project's potential social impacts. A range of data sources was used to formulate quantitative indicators and qualitative descriptors relevant to each potential social impact. These indicators provide a point of comparison against which the Project's potential impacts can be measured.

Assessment of Social Impact

Using the social baseline study, the SEIA predicted, described and analysed the potential for social impacts. For each potential social impact, the SEIA:

- Identified the receptors likely to be impacted.

- Identified the duration²⁶, severity²⁷ and sensitivity²⁸ of each impact.
- Analysed each social impact's risk using the International Association for Impact Assessment's social risk matrix (see **Figure 78**). The matrix determines a social impact's risk based on the following considerations:
 - The **likelihood** of a social impact based on:
 - The findings of the various technical reports; and
 - The social baseline study
 - The **Consequence** of a social impact based on the duration, extent, severity and sensitivity of each impact:

		Consequence Level				
		1	2	3	4	5
Likelihood Level	Descriptor	Insignificant	Minor	Moderate	Major	Catastrophic
A	Almost certain	A1	A2	A3	A4	A5
B	Likely	B1	B2	B3	B4	B5
C	Possible	C1	C2	C3	C4	C5
D	Unlikely	D1	D2	D3	D4	D5
E	Rare	E1	E2	E3	E4	E5

Figure 78: Social Risk Matrix (Vanclay, Esteves, Aucamp & Franks, 2015) Green – Low Risk; Yellow – Moderate Risk; Amber – High Risk ; Red – Extreme Risk

Mitigation and Monitoring Measures

Where appropriate, the SEIA recommended management measures to mitigate the risk of certain social impacts. The SEIA also recommended measures to enhance positive social impacts.

²⁶ Duration – Timeframe during which an impact occurs.

²⁷ Severity – Scale or degree of change caused by a particular social impact.

²⁸ Sensitivity – Susceptibility or vulnerability of a receiver to a social impact.

7.11.2 Social Baseline Study

Section 4 of the SEIA provides the social baseline study for the Project's area of social influence. Key findings from that study are presented below.

- The unemployment rate in Maroota (2%) and the Hills Shire (4.6%) is significantly lower than the NSW State (6.3%)
- Mineral sand mining is the third-largest industry of employment (5%) within Maroota.
- There are significantly fewer professionals in Maroota (7.6%) when compared to the Hills Shire (29%) and the State (23.6%).
- 0% of the Maroota population travel to work by public transport.
- The proportion of residents who identify as Aboriginal or Torres Strait Islander in Maroota (1.8%) and the Hills Shire (0.5%) is lower than the NSW State (2.9%).
- The majority of households in Maroota are families (80.2%).
- Asthma and respiratory hospitalisations are lower in the Hills Shire LGA compared to the NSW average.
- Maroota is more socio-economically advantaged than 65% of all suburbs in NSW,
- The Hills Shire LGA is more socio-economically advantaged than 98% of all LGA's in NSW.
- The majority of key infrastructure, such as health facilities, emergency services, community centres, childcare facilities, and schools, are located outside Maroota.

7.11.3 Social Impact Assessment

The SEIA identified and analysed the Project's potential and perceived social impacts based on:

- The outcomes of community consultation (described in Section 6 of this EIS).
- The findings of the various technical reports.
- The social baseline study.
- An analysis of other extractive industries.

Table 91 on the following pages presents the Project's potential and perceived social impacts. The table also outlines the social risk of each impact using the risk matrix described in Section 7.11.1 above.

Table 91 – Social Impact Assessment Summary

Matter	Potential Social Impact	Theme	Receptors impacted	Duration	Severity	Sensitivity	Likelihood	Consequence	Social Risk w/o mitigation	Social Risk w/ mitigation
Amenity	Dust impacts disrupting surrounding residents' way of life.	<ul style="list-style-type: none"> Way of life Health & wellbeing Fears and aspirations 	<ul style="list-style-type: none"> Surrounding Residents 	Project construction and operation	Low	High	Rare	Moderate	Low	Low
	Change to the visual character of the Project Site and surrounds.	<ul style="list-style-type: none"> Way of life Community Surroundings Fears and aspirations 	<ul style="list-style-type: none"> Surrounding Residents Tourists Old Northern Road and Wisemans Ferry Road Drivers 	Project construction, operation and rehabilitation	Low	Moderate	Possible	Minor	Moderate	Low
	Noise impacts from the Project's operations disrupting surrounding residents' way of life.	<ul style="list-style-type: none"> Way of life Fears and aspirations Health and Wellbeing 	<ul style="list-style-type: none"> Surrounding Residents 	Project construction and operation	Moderate	High	Possible	Moderate	High	Moderate
	Noise impacts from truck movements disrupting surrounding residents' way of life.	<ul style="list-style-type: none"> Way of life Fears and aspirations Health and Wellbeing 	<ul style="list-style-type: none"> Surrounding Residents Haul route residents 	Project construction and operation	Moderate	High	Unlikely	Minor	Low	Low
	Vibration impacts from the Project's operations disrupting surrounding residents' way of life.	<ul style="list-style-type: none"> Way of life Health & wellbeing 	<ul style="list-style-type: none"> Surrounding residents 	Project construction and operation	Low	High	Rare	Minor	NIL	NIL
	Increased waste from construction and daily operation	<ul style="list-style-type: none"> Way of life Health & wellbeing 	<ul style="list-style-type: none"> N/A 	Project construction, Operation	Moderate	Moderate	Almost Certain	High	Low	NIL
Heritage	Destruction of European heritage items	<ul style="list-style-type: none"> Culture 	<ul style="list-style-type: none"> Surrounding Residents Broader Community State of NSW 	Project construction	Low	Moderate	Rare	Minor	Low	Low
	Destruction of Aboriginal cultural heritage items	<ul style="list-style-type: none"> Culture 	<ul style="list-style-type: none"> Surrounding Residents Broader Community State of NSW Aboriginal Groups 	Project construction	Moderate	High	Possible	Moderate	High	Low

Matter	Potential Social Impact	Theme	Receptors impacted	Duration	Severity	Sensitivity	Likelihood	Consequence	Social Risk w/o mitigation	Social Risk w/ mitigation
Community	Change to the established character of the Maroota locality.	<ul style="list-style-type: none"> Way of life Community Culture Surroundings 	<ul style="list-style-type: none"> Surrounding Residents Broader Community 	Project construction, operation and rehabilitation	Low	Moderate	Unlikely	Minor	Low	Low
	Lack of participation in the Project's design and decision making processes.	<ul style="list-style-type: none"> Decision-making systems 	<ul style="list-style-type: none"> Surrounding Residents Broader Community Other Stakeholders 	Project assessment and operation	Low	High	Unlikely	Minor	Low	Low
Health & Safety	Public safety issues associated with increased truck movements Wisemans Ferry Road and Old Northern Road.	<ul style="list-style-type: none"> Access to and use of infrastructure Health & wellbeing 	<ul style="list-style-type: none"> Surrounding Residents Broader Community Haul route users 	Project construction, operation and rehabilitation	Moderate	Moderate	Possible	Moderate	Moderate	Low
Economic	Access to employment that complements the skillsets of the Maroota community.	<ul style="list-style-type: none"> Way of life Community Fears and aspirations 	<ul style="list-style-type: none"> Surrounding Residents Broader Community 		-	-	Almost Certain	-	High Positive Social Impact	High Positive Social Impact
	On-going training and certification for the Maroota workforce.	<ul style="list-style-type: none"> Way of life Fears and aspirations 	<ul style="list-style-type: none"> Surrounding Residents Broader Community 		-	-	Likely	-	Moderate Positive Social Impact	High Positive Social Impact
Biodiversity	Removal of bushland and disturbance of flora and fauna.	<ul style="list-style-type: none"> Surrounding 	<ul style="list-style-type: none"> Surrounding Residents, Broader Community, State of NSW 	Project Construction	High	High	Almost Certain	High	High	Moderate
	Establishment of a 306ha Biodiversity Stewardship Site.	<ul style="list-style-type: none"> Surroundings 	<ul style="list-style-type: none"> Surrounding Residents Broader Community State of NSW 	In perpetuity	-	-	Almost Certain	-	High Positive Social Impact	High Positive Social Impact
Land	Impacts to the land capability of surrounding land.	<ul style="list-style-type: none"> Way of life Surroundings Personal and property rights 	<ul style="list-style-type: none"> Surrounding Residents 	Project construction, operation and rehabilitation	Low	High	Rare	Moderate	Moderate	Low
Water	Reduction in groundwater and surface water available for surrounding users.	<ul style="list-style-type: none"> Personal and property rights 	<ul style="list-style-type: none"> Surrounding Residents 	Project operations	Low	Moderate	Unlikely	Minor	Moderate	Low

7.11.4 Social Impact Mitigation and Enhancement

The following measures are proposed to mitigate adverse social impacts and enhance social impacts described in **Table 91** above. These measures are also included in **Annexure 5** which provides a summary of the Project's proposed mitigation and monitoring measures.

Table 92 – Social Mitigation and Enhancement Measures		
Aspect	Social Impact	Mitigation or Enhancement Measures
Amenity	Dust impacts disrupting surrounding residents' way of life.	<p>The Proponent will develop an Air Quality Management Plan that:</p> <ul style="list-style-type: none"> Establishes an air quality monitoring program, including predictive metrological forecasting to guide operations; and Outlines how air quality will be managed during the Project's operations to comply with the Project's Development Consent and Environmental Protection Licence. This includes the management measures recommended in the Project's Air Quality Report.
	Change to the visual character of the Project Site and surrounds.	<ul style="list-style-type: none"> Vegetation shall be retained along the periphery of the site, particularly at its southern and eastern boundaries.
	Noise impacts from the Project's operations disrupting surrounding residents' way of life.	<p>A Noise Management Plan will be developed to guide, manage, quantify, and control the Project's noise emissions to achieve compliance with the Development Consent. The key features of the Noise Management Plan are described below:</p> <ul style="list-style-type: none"> A weather monitoring system will be installed at the Project Site to identify noise enhancing weather conditions; and A real-time noise monitoring terminal will be installed that is representative of the closest private receiver. Data from the real-time terminal will be transmitted to the onsite office to confirm compliance with the relevant noise criteria. <p>The Noise Management Plan will include a Trigger Action Response Plan to guide actions in response to a noise exceedance.</p>
	Noise impacts from truck movements disrupting surrounding residents' way of life.	<ul style="list-style-type: none"> Vehicles shall be maintained according to their manufacturing specifications.
	Vibration impacts from the Project's operations disrupting surrounding residents' way of life.	<ul style="list-style-type: none"> No blasting shall occur at the Project Site.
Heritage	Destruction of European heritage items.	<ul style="list-style-type: none"> The nearest European heritage item is located some 720m from the Project's disturbance area. This provides a sufficient buffer to mitigate potential indirect impacts associated with the Project, including vibration impacts. As such, the Project will not impact historic historical items.

	Destruction of Aboriginal cultural heritage items.	<ul style="list-style-type: none"> A 35m minimum buffer is provided to all recorded shelters within proximity of the extraction area.
	Change to the established character of the Maroota locality.	<ul style="list-style-type: none"> The Rehabilitation Strategy contained in Annexure 17 shall be implemented. The rehabilitated topography and proposed final land-use have been designed to complement Maroota's established character.
Community	Lack of participation in the Project's design and decision making process.	<ul style="list-style-type: none"> A comprehensive community consultation process was undertaken to incorporate the views of the community in the Project's design (see Section 6 of the EIS). The Proponent will establish a Community Consultation Committee, publicly accessible website and 24-hour complaints hotline.
Health & Safety	Public safety issues associated with increased truck movements Wisemans Ferry Road and Old Northern Road.	<ul style="list-style-type: none"> The Proponent proposes to upgrade the intersection of Wisemans Ferry Road/Patricia Fay Drive to current Austroad guidelines to improve the left and right turn lanes from Wisemans Ferry Road into Patricia Fay Drive. A Drivers Code of Conduct will be developed and implemented.
	Dust impact exacerbating underlying health issues.	<p>The Proponent will develop an Air Quality Management Plan that:</p> <ul style="list-style-type: none"> Establishes an air quality monitoring program, including predictive meteorological forecasting to guide operations. Outlines how air quality will be managed during the Project's operations to comply with the Project's Development Consent and Environmental Protection Licence. This includes the management measures recommended in the Project's Air Quality Report.
Economic	Access to employment that complements the skillsets of the Maroota community.	<ul style="list-style-type: none"> A participation strategy will be implemented to provide for the upskilling and training of employees.
	On-going training and certification for the Maroota workforce.	<ul style="list-style-type: none"> A participation strategy will be implemented to provide for the upskilling and training of employees.
Biodiversity	Establishment of a 306ha Biodiversity Stewardship Site.	<ul style="list-style-type: none"> The Proponent will deliver a viable and ecologically functioning Biodiversity Stewardship Site (refer to Section 3.4 of the EIS). It estimated that 306ha of land is required to generate the credits required to fulfil their obligations.
Land	Impacts to the land capability of surrounding land.	<ul style="list-style-type: none"> The Proponent will develop a Soils Management Plan to guide management measures that mitigate soil erosion and protect and enhance land capability of the site and surrounds.
Water	Reduction in groundwater and surface water available for surrounding users.	<ul style="list-style-type: none"> The Proponent will develop a Water Management Plan that includes a Water Monitoring and Response Plan that establishes an on-going groundwater and surface monitoring program (storage and quality) and a trigger action framework to identify and rectify issues.

7.11.5 Positive Social Impacts

Revenue Stream to Enable Housing, Employment, Health, Education, Land Management and Cultural Programs and Projects

When considering the Project's social impacts, it is essential to note that DLALC, as an Aboriginal Land Council, is required to reinvest any profit to fulfil its mission and functions. That mission is to strengthen the confidence and self-reliance of Aboriginal people and families and to provide them with greater opportunities. The organisation's functions include acquiring and managing land and providing community benefit schemes, including community housing, employment assistance, education and training, scholarships, cultural activities, funeral funds, child-care, and aged care services.

DLALC has been actively working towards using its landholdings to realise their mission and functions by evolving and operating according to their Community Land and Business (CL&B) Plan, which outlines their legal obligations, objectives, and strategies. The CL&B business identifies the development of a sand extractive industry at the Project Site as a priority project due to the presence of a State significant sandstone deposit which presents an unparalleled opportunity for a revenue stream to fund DLALC's programs and. These include, but not limited to:

- The adaptive re-use and repair of the historic Parramatta Gaol as a community facility.
- Developing a scholarship fund to support primary, secondary, and tertiary Aboriginal students.
- The employment of an Education and Employment Co-Ordinator to support DLALC's education and employment objectives.
- Social and affordable housing developments in Western Sydney.
- A depot at Cranebrook to support DLALC's land management operations.
- High intensity agri-businesses.
- Bio-certified lands managed by DLALC.
- A new Sydney cemetery in partnership with Rookwood for Western Sydney.

Each of these projects represents additional long-term employment opportunities and economic activity for the NSW State as it recovers from economic impacts of Covid-19. Therefore, the Project's positive social impacts include both its immediate and direct benefits as well as the longer-term indirect economic, social and environmental benefits provided by the projects and programs that it will enable.

Post-Covid 19 and Long-Term Employment

The Project will provide 8 full-time and 4 part-time jobs associated with the extractive industry's operation, construction jobs, 'flow-on' jobs and environmental management jobs. Importantly, these jobs build upon the established mining and extractive industry skillset within the Hills Shire economy.

Protection, Management and Enhancement of 306ha of High-Quality Biodiversity Lands

The Proponent proposes to offset 306ha of 'like-for-like' high-quality biodiversity lands in a Biodiversity Stewardship Agreement to account for the Project's unavoidable biodiversity impacts. These lands will be protected, managed and enhanced for the benefit of future generations. Notably, the Proponent currently possesses the landholdings required for this offset. The management of these lands represents additional employment opportunities.

Rehabilitation of the Project Site

The Project incorporates a progressive rehabilitation plan. The proposed final land use will be a combination of native bushland and improved pasture for a post-mining grazing enterprise. This final land-use complements the vision of the Hills Shire Council and *Sydney Regional Environmental Plan No.9 – Extractive Industry* that rehabilitated extractive industry sites at Maroota be used as productive agricultural lands. Like extractive industries, agricultural lands are compatible with the established character, landscape and natural quality of the Maroota locality. Furthermore, the proposed final land use will continue to provide employment opportunities at the Project Site.

Ongoing Training and Certification

Extractive Industries are important employers and economic contributors to the Hills Shire economy. Mining, including extractive industries, contributed \$70.1M to the Hills economy in 2018.²⁹ The Proponent is committed to leveraging and further developing this established strength of the Hills Shire economy by providing ongoing training and certification for their employees. The development of a further quarry is particularly important as it will provide employment opportunities with other extractive industries in the region nearing closure

²⁹ The Hills Shire Council, (2019), *Rural Strategy*, The Hills Shire Council

7.11.6 Economic Impact Assessment

The SEIA considered the significance of the resource that the Project seeks to extract and performed a Cost Benefit Analysis to determine the Project's net benefit to the NSW community.

7.11.6.1 Significance of the Subject Resource

The *Sydney Regional Environmental Plan No 9 – Extractive Industry (No 2 – 1995)* identifies the resource that the Project seeks to extract as a 'material of regional significance'. As construction sand is a high-bulk low-unit cost commodity that is highly sensitive to transport costs, it is important to provide local sources of construction sand for the Sydney construction market.

The NSW Offshore Sand Review 2016 identified a shortage of local construction sand for the Sydney market. The Report notes that the Sydney region consumed approximately 7 million tonnes of construction sand in 2016, of which 1 million tonnes was imported from outside Greater Sydney. This figure is anticipated to grow given the significant infrastructure projects laid out in the State's Infrastructure Strategy and imminent closure of one of Sydney's most significant sources of construction sand at Kurnell Peninsula. The Penrith Lakes Quarry, one of the largest sand quarry in Sydney, closed in September 2020 after being in use for more than 130 years, extracting over 160 million tonnes of aggregate across its life.

The anticipated transport costs from Maroota are approximately \$14 per tonne compared with \$28 per tonne from Stockton.³⁰ With the Project potentially meeting half of the 1 million tonnes of construction sand presently delivered from outside the Greater Sydney Region, that is a potential saving of \$7m per year – some \$190m across the Project's life.

The resource also provides a significant opportunity to enhance the NSW Government's Aboriginal Procurement Policy. That Policy seeks to increase Aboriginal economic participation in the development of NSW by leveraging the NSW Governments procurement capacity to support Aboriginal-owned businesses. The Policy aims to award 3% of total domestic contracts for goods and services issued by NSW Government agencies to Aboriginal-owned business by 2021.³¹ In 2019, the percentage of government contracts awarded to Aboriginal-owned business fell from 0.44% the previous year to 0.43%. This represents a shortfall of 2.57%.³² The Project help address this shortfall by providing an Aboriginal-owned source of construction sand that can be procured as part of the NSW Government's planned \$107.1 billion worth of State infrastructure projects to 2022–23.³³ Thus, the subject resource is significant to the NSW community.

³⁰ NSW Government Department of Trade and Investment, (2016), *NSW Offshore Sand Review*, NSW Government, pg. 5.

³¹ NSW Government, (2018), Aboriginal Procurement Policy, NSW Government, <https://buy.nsw.gov.au/policy-library/policies/aboriginal-procurement-policy>

³² NSW Treasury, (2019), Aboriginal Procurement Policy & Aboriginal Participation in Construction Policy 2019 Review, NSW Government, https://buy.nsw.gov.au/__data/assets/pdf_file/0006/607821/app_apic_policy_2019_review_accessible_pdf_1.pdf

³³ NSW Treasury, (2021), *NSW Budget 2020–21: Building a Better NSW*, NSW Government <https://www.budget.nsw.gov.au/budget-detail/building-better-nsw>

7.11.6.2 Existing Base Case – Maroota Construction Sand Production

Identification of the base case scenario is required to assess the potential economic, social and environmental impacts of changes due to the project. The calculation below has assumed 2023 as Year 1 of the Project.

Under the base case scenario, the existing seven Maroota quarries will produce an anticipated combined output of approximately 2.04 million tonnes of saleable product in Year 1 (2023). This total output will gradually decrease as licences lapse, or resource deposits are exhausted. By 2032, the combined total output of saleable product in Maroota will halve compared to the year 1 production rate. The total output of the Maroota locality will reduce to 0 at Year 24 (2047) based on current approvals.

In the Project Case Scenario, the seven existing quarries and the proposed Project will produce an anticipated combined output of 2.54 million tonnes of saleable product by Year 2 (2024). The Project will be the only operational quarry post-2047 based on current approvals. It is not anticipated that the Project will adversely impact surrounding quarry operations due to the high demand for construction sand within the Sydney construction market and the shortfall of locally supplied construction sand.

7.11.6.3 Cost Benefit Analysis

The Cost Benefit Analysis methodology involves quantifying the Project's potential positive and negative economic, social or environmental impacts as Australian dollars in current day prices, referred to as the Net Present Value. Benefits are then compared against costs to provide the Project's net benefit to the State of NSW. The SEIA relied on the Cost Benefit Analysis process outlined in the *NSW Government Guidelines for the economic assessment of mining and coal seam gas proposal*.

The Project's quantified costs and benefits in present day values (with a 7% discount rate), is presented in the table below.

Table 93 – Benefits and Costs to NSW (NPV)				
Item	Total Value	Proportion Attributable to NSW	Value for NSW (Undiscounted)	Value for NSW (Present Value) 7% Discount Rate
Benefit				
Net Producer Surplus	\$205.9 million	32%	\$65.89m	\$27.34m
Total			\$68.89m	\$27.34m
Cost				
Noise Impact	\$100,000	100%	\$0.1m	\$0.09m
Biodiversity	\$11.6 million	100%	\$11.6m	\$10.84m
Heritage and Archaeology	\$200,000	100%	\$0.2m	\$0.12m
Total			\$11.9m	\$11.05m

As an Aboriginal Land Council, DLALC is a not-for-profit that is exempt from Company Income Tax. Instead, they are required to reinvest any profit to realise their mission and commitment to strengthen the confidence and self-reliance of Aboriginal people and families and to provide them with greater opportunities. DLALC's functions include acquiring and managing land and providing community benefit schemes, including community housing, employment assistance, education and training, scholarships, cultural activities, funeral funds, child-care, and aged care services. Therefore, company income tax is excluded in the Cost Benefit Analysis.

The below table compares the quantified benefits and costs presented in **Table 93** and demonstrates that the Project will result in a net benefit of approximately \$16.29m (with a 7% discount rate) to the NSW community.

Net Benefits	Net Cost	Net Present Value
\$27.34m	\$11.05m	\$16.29m

7.11.6.4 Sensitivity Analysis

Sensitivity analysis is a standard practice to account for the uncertainty surrounding the estimates of costs and benefits, particularly values inferred from market behaviour. A sensitivity analysis involves testing different scenarios in which:

- A discount rate of 4%, 7% & 10% is applied; and
- The cost and benefit inputs are varied to account for potential risk and market behaviour.

The SEIA conducted a sensitivity analysis that considered the following scenarios.

- Value of saleable product – Increase and decrease 20%
- Development costs – Increase and decrease 20%
- Environmental costs – Increase and decrease 20%
- Operating costs – Increase and decrease 20%
- Production levels & operating costs – decrease 20%

The results of the sensitivity analysis are presented in the table below. They demonstrate that Project will continue to provide a net benefit to the NSW community, despite commodity fluctuations.

Table 95 – Sensitivity Analysis (Net Present Value Attributable to NSW Under Different scenarios)			
Parameters	4% Discount Rate	7% Discount Rate	10% Discount Rate
Anticipated Scenario	\$26.92m	\$16.29m	\$9.76m
Increased Costs & Benefits			
Value of Saleable Product – Increase 20%	\$42.15m	\$27.1m	\$17.84m
Development Costs – Increase 20%	\$26.10m	\$15.66m	\$9.26m
Environmental Costs – Increase 20%	\$24.64m	\$14.10m	\$7.62m
Operating Costs – Increase 20%	\$20.09m	\$11.38m	\$6.05m
Decreased Costs & Benefits			
Value of Saleable Product – decrease 20%	\$11.60m	\$5.32m	\$1.51m
Development Costs – decrease 20%	\$27.65m	\$16.77m	\$10.09m
Environmental Costs – decrease 20%	\$29.20m	\$18.50m	\$11.91m
Operating Costs – decrease 20%	\$33.65m	\$21.05m	\$13.30m
Production levels & operating costs – decrease 20%	\$18.38m	\$10.16m	\$5.13m

7.11.6.5 Local Economic Effects

A Local Effects Analysis complements the Cost Benefit Analysis by translating the economic effects estimated at the State level to economic effects anticipated on the local community. The SEIA performed a Local Effects Analysis to determine the Project's impact on local employment and incomes, flow-on economic benefits and economic impact on other local industries.

The local community will benefit from additional employment opportunities and flow-on economic benefits as those employees spend their income in the local community. The Project is anticipated to create approximately 15 full-time positions during its site establishment and construction phase and eight full-time and four part-time positions (equivalent to 10 full-time positions) during its operational phase. It is estimated that approximately 35% of these positions (3.5 full-time operational positions) will be filled by locals who reside in the Dural-Wisemans Ferry area. As shown in the below table, these workers will experience an increase in labour earnings compared to the average income for the local community.

Table 96 – Analysis of Net Income Increase	
Item	Workers residing in locality
A) Direct Employment during operation phase	3.5
B) Average net income in the extractive industry sector (\$ per year)	\$98,350 ¹
C) Median Total Income in the Dural – Wisemans Ferry SA3 (\$ per year)	\$52,258 ²
D) Average increase in net income per employee (b–c)	\$46,092
E) Increase in net income per year due to direct employment (a*d)	\$161,322

F) Full Time Employment Equivalent (e/b)	1.64
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¹Based on a review of current advertisements for positions in extractive industries in NSW.

²ABS, 2018, Region Summary: Dural – Wisemans Ferry, <https://dbr.abs.gov.au/region.html?lyr=sa3&rgn=11502>

The total increase in net income within the local community is calculated to be \$161,322, equivalent to an increase of 1.64 full-time positions within the community. In addition to employment, the other significant economic benefit results from Project (non-labour) expenditure within the local community. The following table outlines the Project's anticipated per year spend within and outside the locality.

Table 97 – Analysis of Net Income Increase			
Item	In Locality	Outside Locality	Total
Total Direct Expenditure	\$0.9 million	\$2.9 million	\$3.8 million

The Project is unlikely to impact choices by external parties such as tourism and other nearby businesses. It is also unlikely that the Project will result in temporary shortages within the local food and housing market. The Project is not a large scale project. The Project will employ eight full time and four part-time quarry workers and 15 to 20 contracted drivers at peak operation. Maroota is also not located within a remote area, being located 40 minutes from Richmond and one hour from the Parramatta CBD and Sydney CBD. Therefore, the Project is easily accessible for workers should they prefer to stay at their existing residences within Metropolitan Sydney.

7.12 Blasting & Vibration

The Project's SEARs require the EIS to address the following key issues relating to blasting and vibration:

Requirement	EIS Section
Proposed hours, frequency, methods and impacts (of blasting); and	N/A – no blasting proposed
An assessment of the likely blasting and vibration impacts of the development, having regard to the relevant ANZEC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features.	Section 7.12 Annexure 9

The Noise and Vibration Impact Assessment prepared by Muller Acoustic Consulting includes an assessment of vibration impacts on surrounding infrastructure and people. It is noted that no blasting is proposed as part of the Project. The Vibration Assessment was prepared with regard to the then Department of Environment and Conservation's *Assessing Vibration: A Technical Guideline*.

The following section provides a summary of the vibration component of the Noise and Vibration Impact Assessment.

Key Vibration Definitions

Continuous Vibration	Ongoing vibration resulting a continuous activity. For example, machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).
Impulsive Vibration	Infrequent vibration from activities that create up to three distinct vibration events in an assessment period. For example, the occasional dropping of heavy equipment, occasional loading and unloading.
Intermittent Vibration	Infrequent vibration from activities where the number of vibration events in an assessment period is more than three. For example, trains, intermittent nearby construction activity, passing heavy vehicles, forging machines, impact pile driving, jackhammers.
kN	kN is the symbol for Kilonewton, a unit of force. One Kilonewton is the equivalent of 100kg of load under the Earth's gravity.

7.12.1 Vibration Assessment Criteria

Assessing Vibration: A Technical Guideline outlines preferred and maximum vibration values for assessing human response to vibration and provides recommendations for measurement and evaluation techniques. The guideline defines three vibration types and provides direction for assessing and evaluating the applicable criteria. These three vibration types are continuous, impulsive and intermittent vibrations.

British Standard BS 7385: Part 2–1993 “Evaluation and measurement for vibration in buildings Part 2”, provides guidance on the levels of vibration which infrastructure could be damaged.

Table 99 below provides the minimum working distances to nearby receivers for the use of vibration intensive quarry equipment to meet the criteria for cosmetic damage to infrastructure and human comfort.

Table 99 – Minimum Working Distances			
Plant Item	Plant Item Rating/Description	Minimum Working Distance	
		Cosmetic Damage to Infrastructure ¹	Human Comfort ²
Vibratory Roller	<50kN (Typically 1–2 tonnes)	5m	15m to 20m
	<100kN (Typically 2–4 tonnes)	6m	20m
	<200kN (Typically 4–6 tonnes)	12m	40m
	<300kN (Typically 7–13 tonnes)	15m	100m
	>300kN (Typically 13–18 tonnes)	20m	100m
	>300kN (Typically >18 tonnes)	25m	100m
Small Hydraulic Hammer	(300 kg – 5 to 12t excavator)	2m	7m
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	7m	23m
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	22m	73m
Vibratory Pile Driver	Sheet Piles	2m to 20m	20m
Pile Boring	≤ 800 mm	2m (nominal)	4m
Jackhammer	Handheld	1m (nominal)	2m

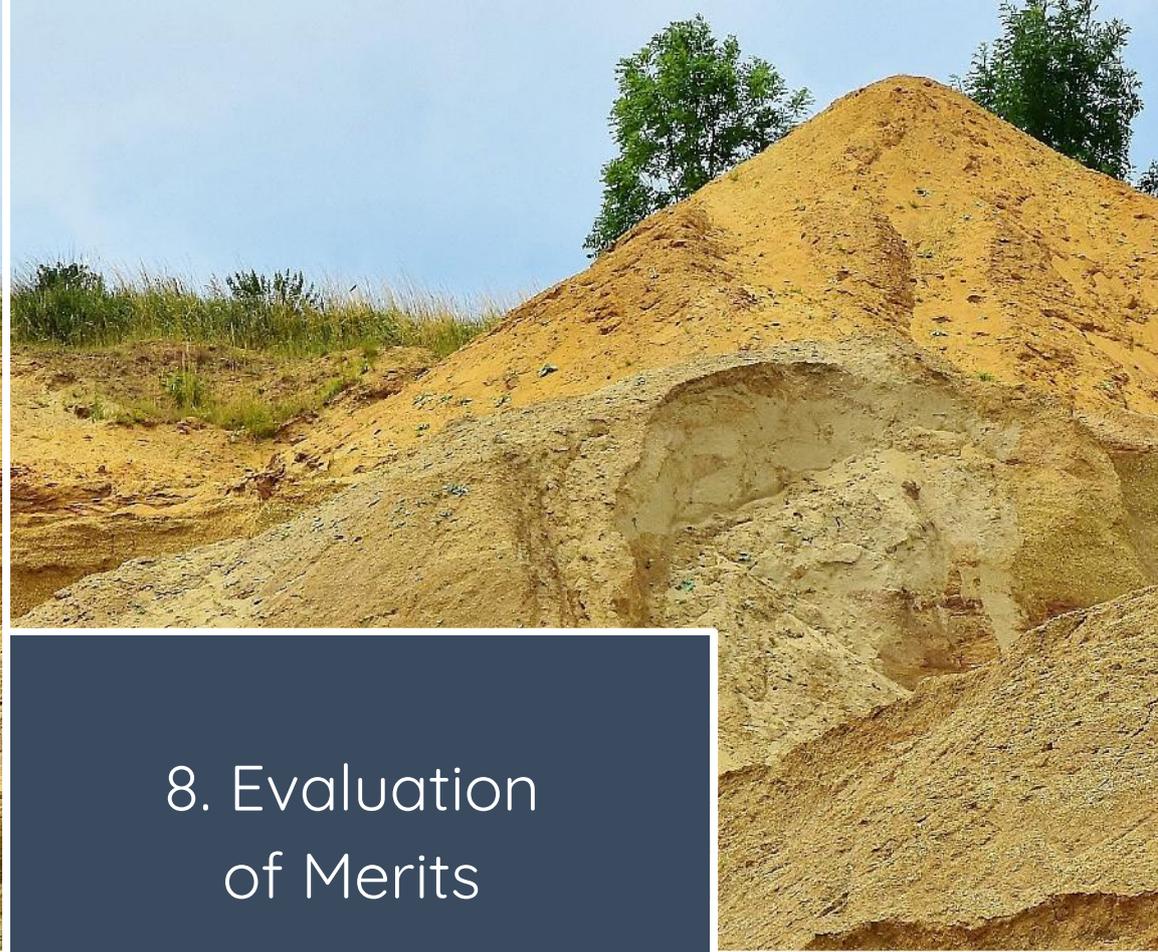
¹ Derived from *British Standard BS 7385: Part 2–1993 “Evaluation and measurement for vibration in buildings Part 2”*

² Derived from *Assessing Vibration: A Technical Guideline*

7.12.2 Vibration Impact Assessment

The major potential sources of vibration associated with the Project is the ripping of competent sandstone with a bulldozer. Generally, peak levels of vibration from ripping occur as the dozer takes off to commence the ripping process.

The minimum offset distance to the nearest residential receivers from the extraction area is approximately 280m during Project Year 10 operations. As the offset distance is greater than the minimum offset distance for even the largest item of plant equipment, vibration impacts are not expected at any dwelling.



8. Evaluation of Merits

This section evaluates the Project's merits balancing its social, economic and environmental outcomes and strategic context.

8. Evaluation of Merits

The Project's SEARs require the EIS to outline why the development should be approved having regard to:

- *The relevant matters for consideration under the Environmental Planning and Assessment Act 1979, including the objects of the Act;*
- *The biophysical, economic and social impacts of the Project, including the principles of ecologically sustainable development;*
- *The suitability of the site with respect to its potential land use conflicts with future and surrounding land uses; and*
- *Feasible alternatives to the development (and its key components), including the consequences of not carrying out the development.*

These following sections assess the Project's merit against these considerations.

8.1 Objects of the Environmental Planning & Assessment Act 1979

(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.

As outlined in the Social and Economic Impact Assessment (**Annexure 16**), the Project promotes the social and economic welfare of the local community and the State for the following reasons.

- The Project utilises a State significant sand resource to provide a local source of construction sand to meet Sydney's construction industry's growing shortages. The Project is anticipated to meet approximately 7% of Sydney's annual market needs and an estimated 50% of sand presently sourced outside the Greater Sydney Region (See **Figure 79**) saving NSW some \$190m over the Project's life. Access to local construction materials will reduce costs for private development and the planned \$107 billion of State Infrastructure Projects.

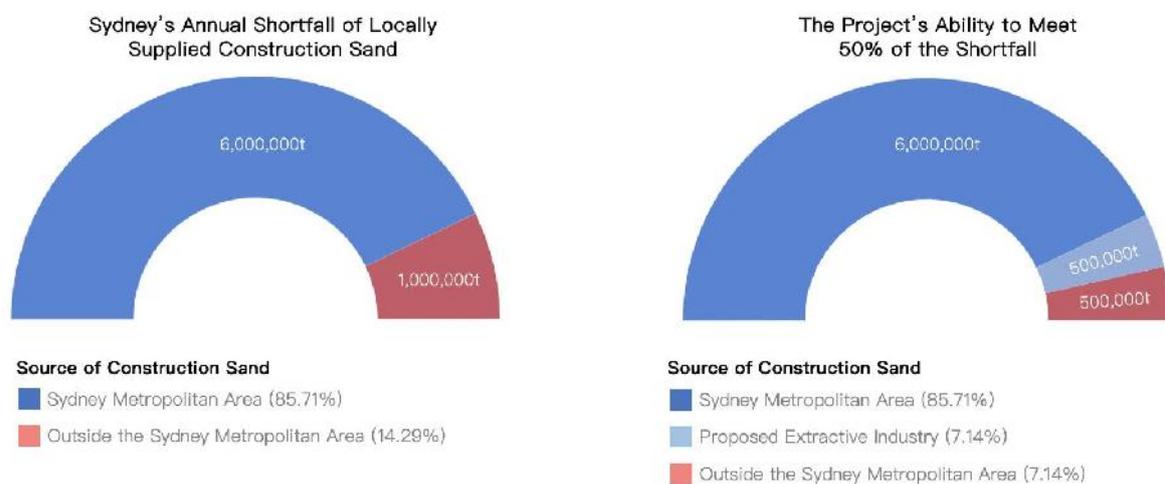


Figure 79: The Project's Potential Impact on Sydney's Sources of Construction Sand

- The Project will establish a revenue stream for DLALC that allows them to fund a range of health, housing, education, cultural and land management projects and programs that offer social benefits and long-term employment opportunities for the State (see **Figure 80**): These include:
 - The adaptive re-use and repair of the historic Parramatta Gaol as a community facility;
 - Developing a scholarship fund to support primary, secondary, and tertiary Aboriginal students;
 - The employment of an Education and Employment Co-Ordinator to support DLALC's education and employment objectives;
 - Social and affordable housing developments in Western Sydney;
 - A depot at Cranebrook to support DLALC's land management operations;
 - High intensity agri-businesses;

- Bio-certified lands managed by DLALC; and
- A new Sydney cemetery in partnership with Rookwood for Western Sydney, including opportunities to create culturally significant services for the local Aboriginal population that do not currently exist.

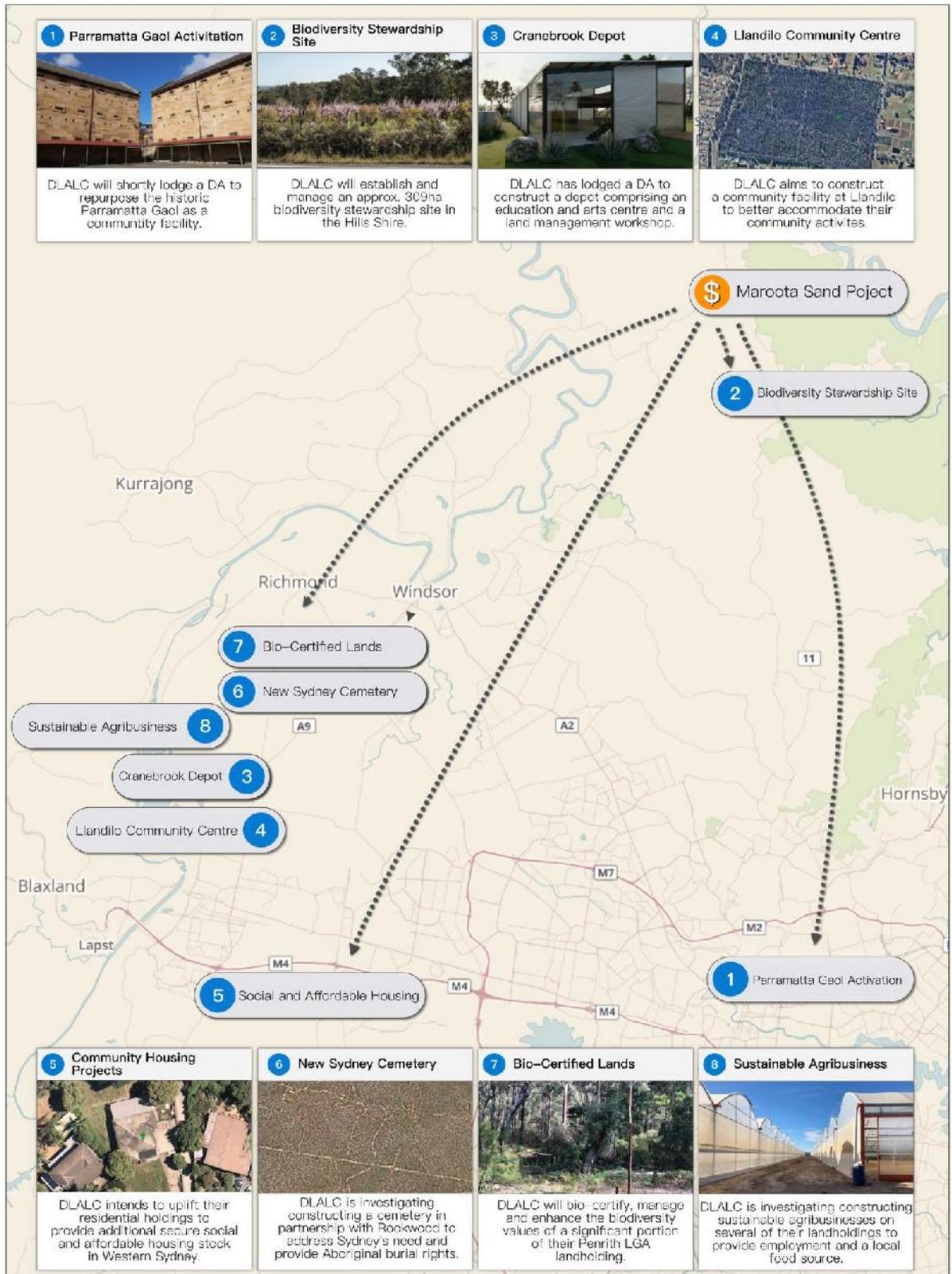


Figure 80: Project's & Programs Enabled by the Maroota Sand Project (Source: Maphub 2021; Nearmap 2021; SLR Consulting 2020)

- The Project will provide post-Covid-19 and long-term employment opportunities for the local community.

8. Evaluation of Merits

- The Project supports the objectives of Aboriginal Procurement Policy by providing an Aboriginal-owned source of construction sand that can be procured as part of the NSW Government's planned \$107 billion worth of State infrastructure projects.
- The management and monitoring measures outlined in **Annexure 5** have been designed in consultation with community members, stakeholders and technical specialists throughout the EIA process to ensure that the Project's potential adverse social and environmental impacts are appropriately avoided, mitigated or compensated having regard to statutorily mandated outcomes.
- The Rehabilitation Strategy, outlined in **Annexure 17**, ensures that the Project Site will remain productive and a source of local employment following its use as an extractive industry.
- The Project will result in the protection, management and enhancement of 306ha of high-quality biodiversity lands. (see Section 3.4 of the EIS). These offsets are proposed to compensate for direct impacts to approximately 50.95ha of the Project Site per the offsetting requirements of the *Biodiversity Conservation Act 2016*.

Therefore, through appropriate management, the Project will facilitate the responsible extraction of a State significant resource that delivers social, economic and environmental benefits to the community, whilst mitigating potential adverse impacts.

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

The principles of ecologically sustainable development are outlined in Section 6(2) of the *Protection of the Environment Administration Act 1991* and Schedule 2, Section 7, Clause 4 of the *EP&A Regulations*. Those principles are displayed in the table below.

Table 100 – Principles of Ecologically Sustainable Development	
Principle	Description
The precautionary principle	If there is a threat of serious irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
Inter-generational equity	The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.
Conservation of biological diversity and ecological integrity	Conservation of biological diversity and ecological integrity should be a fundamental consideration.
Improved valuation, pricing and incentive mechanisms	Environmental factors should be included in the valuation of assets and services.

Precautionary Principle

The environmental studies undertaken as part of the EIS process provide a complete scientific understanding of the Project's impacts. As such, they were able to recommend appropriate mitigation measures. Those

measures are summarised in **Annexure 5**. Each of these environmental studies relied upon relevant the best–available scientific data informed by government policies and scientific modelling recommended by the DPIE. The Project and its management measures have therefore been carefully designed to avoid, where practical, serious and irreversible environmental damage.

Inter–Generational Equity

The Project’s Rehabilitation Strategy (**Annexure 17**) outlines the works required to make the Project Site suitable for use as productive agricultural lands following the extractive industry’s closure. This final land–use is encouraged in strategic document and provides future generations with a source of employment beyond the life of the Project. Further, the extractive industry will provide locally sourced construction materials to infrastructure projects that will benefit current and future generations.

Where there are unavoidable ecological impacts, the Proponent is proposing to offset approximately 306ha of high–quality biodiversity lands that they own to the south–west of the Project Site. While other developments may offset their biodiversity impacts via a cash payment into the Biodiversity Conservation Fund, the Proponent is positioned to establish a Biodiversity Stewardship Site on their current landholdings which ensures a ‘like–for–like’ compensation of the Project’s biodiversity impacts. These lands will be protected, managed and enhanced for the benefit of future generations.

Therefore, the Project promotes inter–generational equity by ensuring that the Project Site remains productive, and where there are unavoidable ecological impacts, that those impacts are appropriately offset.

Conservation of Biological Diversity

The conservation of biological and ecological integration was a fundamental consideration when designing the Project and management measures. Accordingly, the Project incorporates the following design and management strategies to conserve biological diversity.

- The protection of the threatened groundwater dependant Maroota Sands Swap Forest through a 50m buffer and the extraction of no material within 2m of the wet–weather high groundwater level.
- The Proponent is proposing to protect and manage 306ha of high–quality biodiversity lands to the south–west of the Project Site to offset unavoidable ecological impacts.
- The Project maintains a 100m biodiversity corridor along the southern boundary of the Project Site.
- The site infrastructure area was relocated from the east to the west of the Project Site. This reduced the Project’s impact on the threatened *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* (PCT 1081).
- A trained ecologist or licensed wildlife handler will be present during clearing events, and artificial habitats for fauna in adjacent retained vegetation will be installed to encourage animals to move from the impacted site.
- A sand processing plant was also selected that allows the generation of dry cake tailings. A front–end loader can move these tailings. This equipment removed the need for large tailings ponds, which further

8. Evaluation of Merits

reduced the area of disturbance and minimised impacts to the watercourses that flow through the south-west corner of the Project Site.

Improved Valuation, Pricing and Incentive Mechanisms

Where there are manageable or unavoidable impacts, those costs have been internalised by the proponent in the following methods.

- The management measures listed in **Annexure 5**, will be implemented at a cost to the proponent to manage short and long-term ecological impacts.
- Where there are unavoidable ecological impacts, those impacts are to be offset under the NSW biodiversity offset framework at an approximate ratio of 6:1.

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

Section 4 of the EIS outlines the strategic history of the Project Site. The site has been identified as an appropriate location for an extractive industry in the *Hills Local Strategic Planning Statement* and the *Sydney Regional Environmental Plan No 9 – Extractive Industry (No 2 – 1995)*. Therefore, the Project realises the State Government and Hills Council’s intended economic use for the Project Site. In addition, the Project will:

- Provide post-Covid-19 and long-term employment opportunities;
- Support the objectives of the NSW Aboriginal Procurement Policy; and
- Provide a local supply of cost-efficient construction sand to the Sydney construction market, thus reducing the cost of private development and the planned \$107 billion of State Infrastructure projects.

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

Cumberland Ecology prepared a preliminary environmental impact study to inform the initial design of the extractive industry. A threatened groundwater-dependent ecosystem known as the *Maroota Sands Swamp Forest* was located onsite, and the proposed extraction area was designed to avoid this area.

Further design refinements, outlined in Section 3.6 of the EIS, were implemented throughout the EIA process to minimise the ecological impact of the Project. Those refinements were influenced by the Biodiversity Development Assessment Report (BDAR) prepared by Eco Logical Australia (**Annexure 8**). Refinement included maintaining a 100m biodiversity corridor along the Project Site’s southern boundary and relocating the site infrastructure area to reduce impact on the threatened *Shale Sandstone Transition Forest of the Sydney Basin Bioregion*.

Additionally, the BDAR Report recommended a raft management measures to avoid or mitigate biodiversity impacts. These measures are presented in **Annexure 5** and are discussed in the BDAR and Section 7.1.4 of this EIS.

The *Biodiversity Conservation Act 2016* provides an offsetting scheme to compensate for unavoidable biodiversity impacts. In lieu of cash payments, the Proponent may offset approximately 306ha to compensate

for the 50.95ha of direct impacts to the Project Site under that scheme. The Proponent proposes to offset 306ha of high-quality biodiversity lands that they own in a Biodiversity Stewardship Agreement (see Section 3.4 of the EIS). Whilst the Proponent is permitted to offset their biodiversity impacts via a cash payment into the Biodiversity Conservation Fund, this does not guarantee 'like-for-like' compensation and conservation is dependent on the availability of land. A Biodiversity Stewardship Agreement ensures 'like-for-like' compensation and immediate conservation.

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

As an organisation, DLALC is committed to protecting and preserving Aboriginal heritage. Objective 22 of its Community Land & Business Plan is to promote “*a holistic understanding of the landscape, especially its spiritual and cultural dimensions.*” This philosophy informed the Project’s design, with impact avoidance and appropriate management being fundamental considerations.

The Project’s extraction area is focused on the main ridge spur, which avoids the more archaeologically sensitive slopes and creek gullies below, where significant sites have been identified. The Project’s archaeologist identified and assessed Aboriginal heritage sites early to allow for their avoidance. As detailed in Section 3.6, the Project’s extraction area was amended following the Aboriginal archaeological survey findings to provide a 35m minimum buffer to recorded shelters within the extraction area’s proximity. This design approach ensures that all identified Aboriginal archaeological sites within the Project Site will be avoided. The Aboriginal Cultural Heritage Assessment Report prepared by Kelleher Nightingale Consulting Pty Ltd concludes that this design approach represents a strong positive conservation outcome.

An assessment of the Project’s impact on historical heritage items was undertaken in Section 7.9 of this EIS. That assessment concluded that there would be no adverse impacts due to the absence of European heritage items near the Project’s disturbance area.

(j) to provide increased opportunity for community participation in environmental planning and assessments

Section 6 of the EIS outlines the comprehensive community participation process utilised throughout the EIA. That process was informed by DPIE guideline ‘*Community and Stakeholder Engagement*’ and the Project’s SEARs. The Proponent engaged in two rounds of consultation with the community and relevant stakeholders, which involved letterbox drop-offs and ongoing phone and email correspondence. Consultation was also undertaken with Aboriginal groups during the preparation of the Aboriginal Cultural Heritage Assessment in accordance with the ‘*Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*’ and the requirements of Clause 60 of the *National Parks and Wildlife Regulation 2019*.

Section 6 demonstrates that community participation influenced the matters assessed in the EIS, the design of the Project and management measures implemented. Following its lodgement, DPIE will exhibit the Development Application, including the EIS, for a period of 28 days per their Community Participation Plan. If approved, the Proponent will continue to engage with the community by establishing a Community Consultation Committee and maintaining a community hotline.

8.2 Matters for Consideration – Environmental Planning & Assessment Act

The following section assesses the Application against the relevant heads of consideration listed in Section 4.15 of the Environmental Planning & Assessment Act.

8.2.1 Environmental Planning Instruments

The following Environmental Planning Instruments are relevant to the determination of the Project's Development Application:

- The *Hills Local Environmental Plan 2019 (Hills LEP 2019)*
- *Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2 – 1995)*
- *State Environmental Planning Policies Mining and Extractive Industries (2007)*
- *Sydney Regional Environmental Plan – Hawkesbury–Nepean River (No. 20 – 1997)*
- *State Environmental Planning Policy (Infrastructure) 2007*

The Project's Statutory Compliance Table (**Annexure 6**) outlines the relevant statutory requirements of each Environmental Planning Instruments and the location in the EIS where those requirements have been addressed.

The objects and provisions of the Hills Local Environmental Plan are addressed below.

8.2.2.1 Hills Local Environmental Plan 2019

Part 2 – Permitted or Prohibited Development

The Project Site is zoned RU1 and RU2 under the *Hills LEP 2019*. In these zones ***extractive industries*** are permissible with consent. The objectives of both these zones is displayed below.

Table 101 – Objectives of RU1 and RU2 Zoning	
RU1 – Primary Production	RU2 – Rural Landscape
<ul style="list-style-type: none"> • <i>To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.</i> • <i>To encourage diversity in primary industry enterprises and systems appropriate for the area.</i> • <i>To minimise the fragmentation and alienation of resource lands.</i> • <i>To minimise conflict between land uses within this zone and land uses within adjoining zones.</i> • <i>To facilitate the economic extraction of materials from land and the subsequent rehabilitation of that land.</i> 	<ul style="list-style-type: none"> • <i>To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.</i> • <i>To maintain the rural landscape character of the land.</i> • <i>To provide for a range of compatible land uses, including extensive agriculture.</i> • <i>To encourage innovative and sustainable tourist development, sustainable agriculture and the provision of farm produce directly to the public.</i>

The Project meets the above objectives for the following reasons.

- The Project provides an extractive industry that will result in the economic extraction of materials from a site that has been identified as being suitable for an extractive industry since 1995.
- The Project proposes that the rehabilitated site be used for productive agricultural purposes. This complements existing land-uses to the south and north of the Project Site, maintains the land's rural landscape character as utilises the site's improved land capability as a result of the Project.
- The Project is located in an area with an established extractive industry presence. Therefore, the Project will not lead to the fragmentation and alienation of resource lands.
- The Project's design, and mitigation measures listed in **Annexure 5**, mitigate adverse impacts on surrounding rural residential developments.

8.2.2 Draft Environmental Planning Instrument

There is no draft Environmental Planning Instrument relevant to the Project Site or to the proposed development.

8.2.3 Development Control Plan

Under Part 2, Clause 11 of SEPP (State and Regional Development) 2011, Development Control Plans do not apply to State significant development applications. Nevertheless, at the request of Council, **Annexure 22** provides an assessment of the Project against 'Part B: Section 1 – Rural' of the *Hills Development Control Plan 2012*. That assessment demonstrates that the Project complies with the provisions of the Hills Development Control Plan.

8.2.4 Any Planning Agreement or Draft Planning Agreement

There is no Planning Agreement that has been entered into under s. 7.4 of the EP&A Act, nor is there any Draft Planning Agreement that the applicant is offering to enter.

8.2.5 The Regulations

There is no matter prescribed by the Regulation for the purpose of Section 4.15(1)(a)(iv) of the *EP&A Act* that are relevant to the evaluation of the Project.

8.2.6 Likely Impacts

8.2.6.1 Biophysical Impacts

An 'avoid, mitigate and compensate' strategy was adopted throughout the EIA process to address the Project's biophysical impacts. Where achievable, design amendments were implemented to avoid impact (see Section 3.6 of the EIS). Where it was unfeasible to avoid impacts through design modifications, management measures were implemented to mitigate those impacts (**Annexure 5**). Residual impacts of the Project were then compensated through an offsetting framework (see Section 3.4 of the EIS).

The Biodiversity Development Assessment Report (**Annexure 8**) prepared by Eco Logical Australia provides a comprehensive assessment of the Project's biodiversity impacts.

8. Evaluation of Merits

Where achievable, the Project design has been amended to avoid biodiversity impact. Design amendments, which are listed in detail in Section 3.6, include:

- Minimising the Project's disturbance area by containing the sales access road within the proposed extraction area and selecting a sand plant that allows the generation of dry cake tailings, thus removing the need for extensive tailings dams. **Figure 81** displays the reduction of the disturbance area across the project's design revisions.

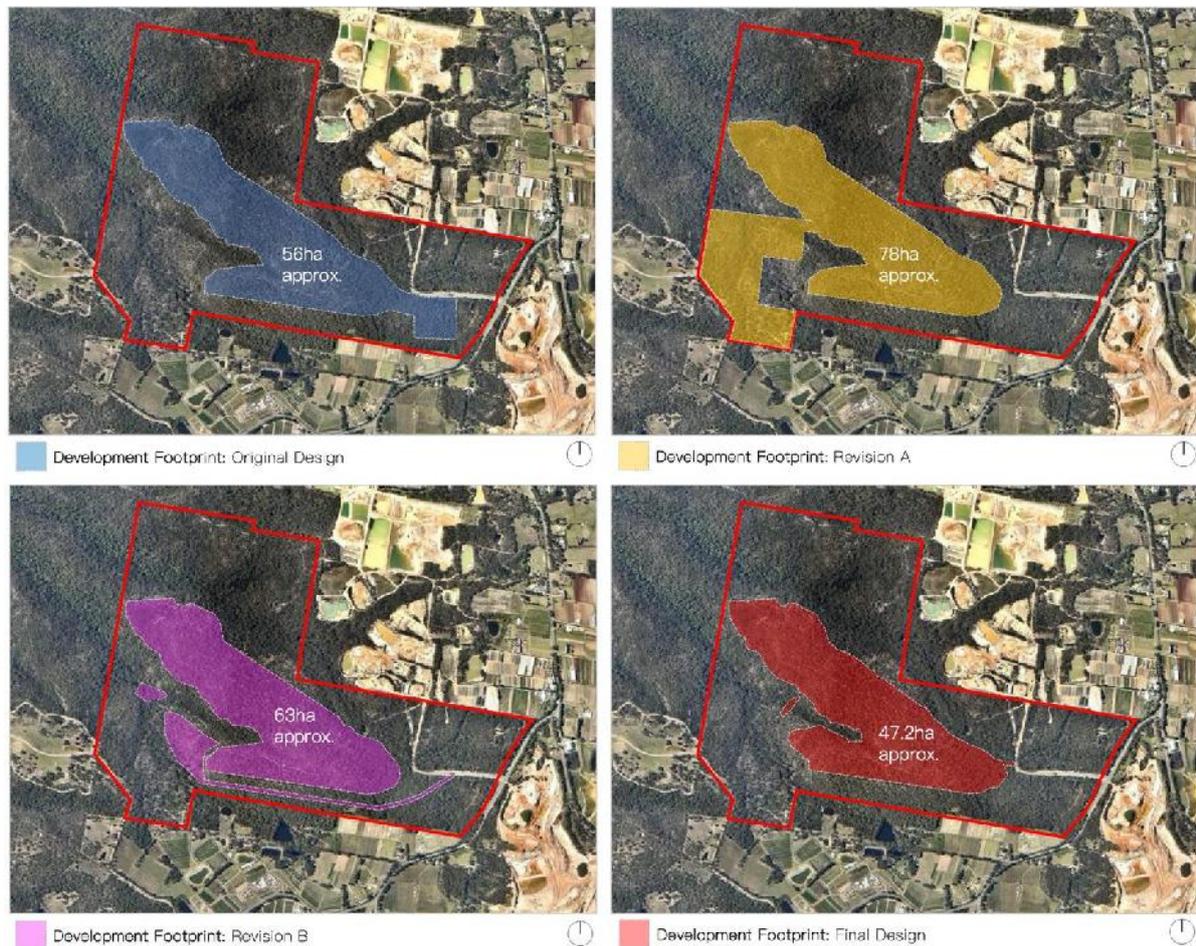


Figure 81: Reduction of Project's Development Footprint (Base Image Source: Nearmap, 2020)

- Amending the proposed extraction pit area to provide a 50m buffer to the groundwater dependent *Maroota Sands Swamp Forest*.
- Relocating the site infrastructure area from the east to the west of the Project Site. This reduced the Project's impact on the threatened *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* (PCT 1081).
- Maintaining a 100m biodiversity corridor along the Project Site's southern property boundary.

As well as these design amendments, management measures are proposed to further mitigate or avoid biodiversity impact. These include:

- Extraction depths are limited to 2m above the wet-weather high groundwater levels.

- Pre-clearance and clearance surveys are to be undertaken by a suitably qualified ecologist to relocate fauna.
- Installation of artificial habitats for fauna in adjacent retained vegetation to encourage animals to move from the impacted site.
- Installation of ‘no go’ signage for retained areas of high value, particularly adjacent to the *Maroota Sand Swamp Forest*.
- Areas containing retained *Kunzea rupestris* plus a 30m buffer in the indirect impact area in the north of the development site are to be protected by permanent fencing.
- All staff working on the project are to undertake an environmental induction that outlines site environmental procedures, threatened species and communities, what to do in the event of an environmental emergency, key contact and what to do if a threatened species or fauna is found.

The above management measures will contain the Project’s direct biodiversity impacts to the Project’s 47.2ha development footprint and direct impact buffers (50.95ha total). The *Biodiversity Conservation Act 2016* provides an offsetting scheme to compensate for unavoidable biodiversity impacts. Under that scheme, the Proponent proposes to offset 306ha of ‘like-for-like’ high-quality biodiversity lands in a Biodiversity Stewardship Agreement. These lands will be protected, managed and enhanced for the benefit of future generations. The Proponent possesses the landholdings required for this offset.

The Air Quality Assessment (**Annexure 13**) prepared by Todoroski Air Sciences found that the Project can comply with the relevant air quality criteria goals.

The Noise & Vibration Assessment prepared by Muller Acoustic Consulting found that the Project is predicted to meet the Project Noise Trigger Levels or result in impacts that are considered negligible during calm weather conditions (**Annexure 9**). The potential for marginal impacts is limited to periods of noise enhancing conditions, namely enhancing winds from source to a receiver. Therefore, the Proponent will develop a comprehensive Noise Management Plan supported by a meteorological monitoring and noise monitoring program. Where noise enhancing weather conditions are predicted, the Project’s operations will be scaled back by separating clearing and extraction activities. The strategy will be verified via a real-time noise monitoring terminal. The Noise and Vibration Impact Assessment demonstrates that separation of these activities during noise-enhancing conditions alleviates the potential for marginal impacts.

Therefore, the Project has been designed, and management measures proposed to avoid and mitigate adverse biophysical impacts where achievable. Biodiversity, air quality, noise & vibration and hydro management measures are contained in **Annexure 5**. Where biodiversity impacts are unavoidable, they will be appropriately compensated under the NSW Biodiversity Offset Scheme.

8.2.6.2 Social Impacts

When considering the Project’s social impacts it is essential to note that DLALC, as an Aboriginal Land Council, is required to reinvest any profit to fulfil its mission and functions. That mission is to strengthen the confidence and self-reliance of Aboriginal people and families and to provide them with greater opportunities. The organisation’s functions include acquiring and managing land and providing community benefit schemes,

including community housing, employment assistance, education and training, scholarships, cultural activities, funeral funds, child-care, and aged care services.

Over time, DLALC have become the largest private landholder in the Penrith, Blue Mountains, Hills and Hawkesbury Shire LGAs. DLALC has been actively working towards using its landholdings to realise its mission and functions by evolving and operating according to their CL&B Plan (**Annexure 2**), which outlines their legal obligations, objectives, and strategies. The CL&B business identifies the development of a sand extractive industry at the Project Site as a priority project due to the presence of a State significant sandstone deposit which presents an unparalleled opportunity for a revenue stream to fund DLALC's programs and projects (see **Figure 80**).

Therefore, the Project's positive social impacts include both its immediate and direct benefits as well as the longer-term indirect economic, social and environmental benefits provided by the projects and programs that it will enable. Immediate positive social impacts include:

- The employment of approximately 8 full-time and 4 part-time staff to run the extractive industry's operations and the creation of approximately 15 construction jobs. This provides post-Covid 19 and long-term employment for the local community. Importantly, these jobs build upon the established mining and extractive industry skillset within the Hills Shire economy;
- Ongoing training and certification for members of the local community and Aboriginal persons; and
- Approximately 306ha hectares of bushland will be protected, managed and enhanced under a Biodiversity Stewardship Agreement for the benefit of future generations.

The Project's positive indirect social impacts will arise from the housing, education, employment, health and cultural programs and projects that it enables. These include:

- The adaptive re-use and repair of the historic Parramatta Gaol as a community facility;
- Developing a scholarship fund to support primary, secondary, and tertiary Aboriginal students;
- The employment of an Education and Employment Co-Ordinator to support DLALC's education and employment objectives;
- Social and affordable housing developments in Western Sydney;
- A depot at Cranebrook to support DLALC's land management operations;
- High intensity agri-businesses;
- Bio-certified lands managed by DLALC; and
- A new Sydney cemetery in partnership with Rookwood for Western Sydney, including opportunities to create culturally significant services for the local Aboriginal population that do not currently exist.

Each of these projects represents additional long-term employment opportunities and economic activity for the NSW State as it recovers from economic impacts of Covid-19.

8.2.6.3 Economic Impacts

Reduce the Cost of Private and State Infrastructure Projects

The NSW Offshore Sand Review, undertaken in 2016, identified a shortage of local construction sand for the Sydney market. The Review notes that the Sydney region consumed approximately 7 million tonnes of construction sand in 2016, of which 1 million tonnes was imported from outside Greater Sydney. This figure is anticipated to grow given the significant infrastructure projects laid out in the State's Infrastructure Strategy and imminent closure of one of Sydney's most significant sources of construction sand at Kurnell Peninsula. The Penrith Lakes Quarry, one of the largest sand quarry in Sydney, closed in September 2020 after being in use for more than 130 years, extracting over 160 million tonnes of aggregate across its life.

The Review acknowledges the importance of increasing production from existing local sources, including operations at Maroota, as the cost of construction sand is highly sensitive to transport costs. It states, "Transporting sand from outside the [Sydney] region significantly adds to its costs"³⁴ For example, it is anticipated transport costs from Maroota are approximately \$14 per tonne compared with \$28 per tonne from Stockton.³⁵ With the Project potentially meeting half of the 1 million tonnes of construction sand presently delivered from outside the Greater Sydney Region (see **Figure 82**), that represents a potential saving of up to \$7m per year – some \$190m across the Project's life.

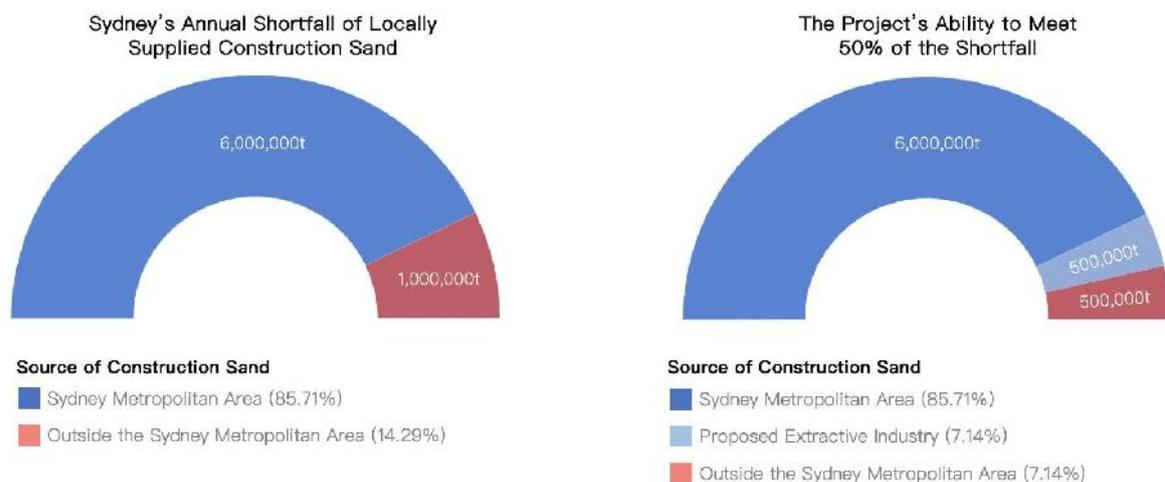


Figure 82: The Project's Potential Impact on Sydney's Sources of Construction Sand

The Project's cost-efficient construction sand will reduce the cost of private and State infrastructure projects within Sydney. In particular, the Project is well-positioned to provide construction sand to Western Sydney infrastructure projects, including the Parramatta Powerhouse, Western Sydney Metro line, health and education infrastructure and Western Sydney Airport and its motorways (see **Figure 83**). Access to affordable construction materials provides investment certainty for these projects and support jobs.

³⁴ NSW Government Department of Trade and Investment, (2016), *NSW Offshore Sand Review*, NSW Government, pg. 5.

³⁵ NSW Government Department of Trade and Investment, (2016), *NSW Offshore Sand Review*, NSW Government, pg. 5.

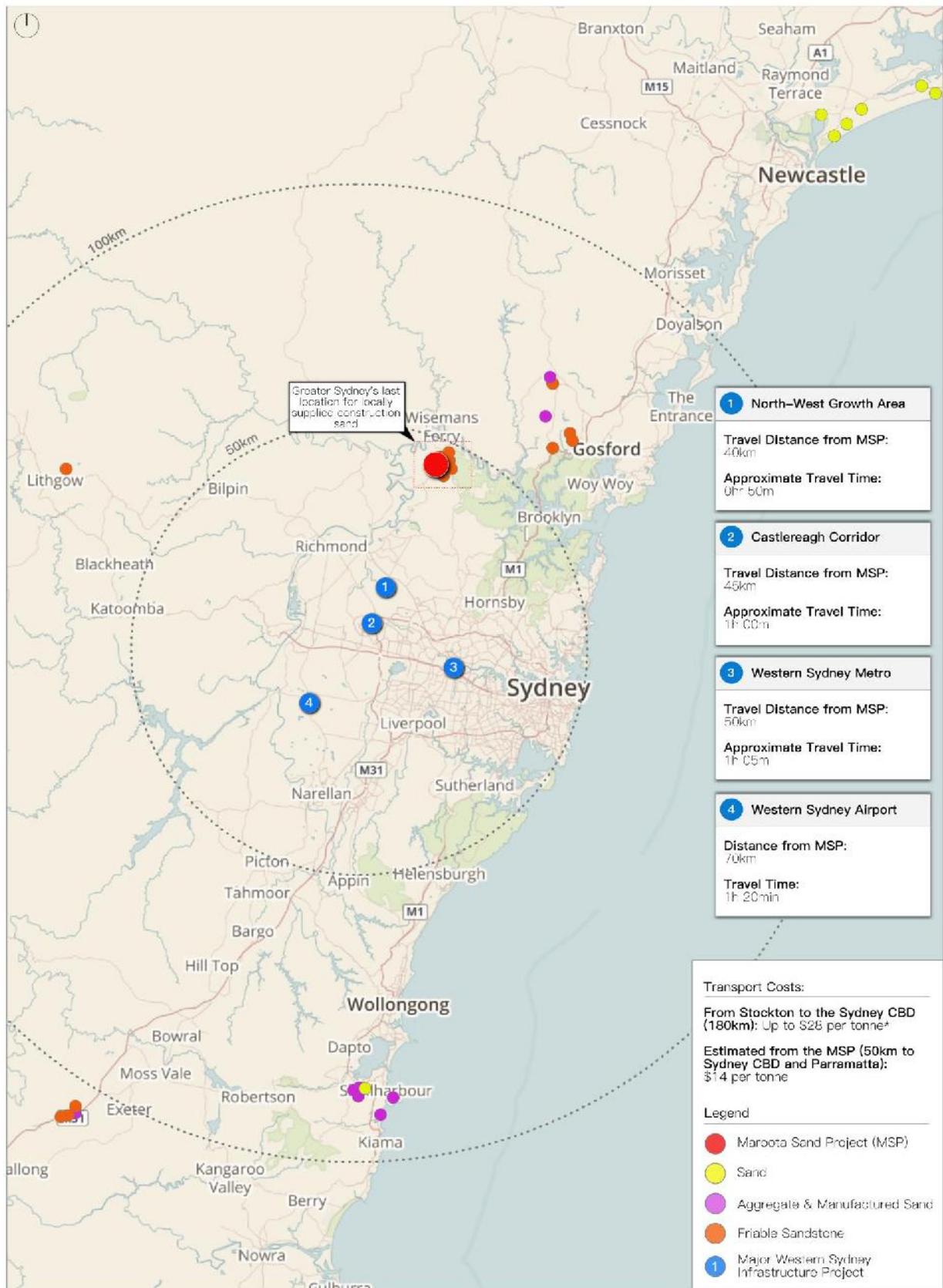


Figure 83: Proximity of the Project to Western Sydney Infrastructure Projects Compared to Sydney's Other Sources of Construction Sand (Source: Maphub, 2021) (*Information Source: NSW Governments Offshore Sand Review)

Since 1995, under the *Sydney Regional Environmental Plan No.9 – Extractive Industry*, the Project Site has been identified as a location suitable for an extractive industry. The Hills Local Strategic Plan, released in 2020, further confirmed this point by identifying the Project Site as being located within an agricultural/extractive industry cluster. Therefore, the Project realises both the State and Local Government’s economic vision for the currently unutilised Project Site and provides a local source of cost-sensitive construction sand to the Sydney market.

Post-Covid 19 and Long-Term Employment

The Project will provide 8 full-time and 4 part-time jobs associated with the extractive industry’s operations as well as construction jobs, ‘flow-on’ jobs and environmental management jobs. Importantly, these jobs build upon the established mining and extractive industry skillset within the Hills Shire economy.

The below QR Code provides access to an interactive map that shows surrounding quarries’ locations, annual extraction rates and anticipated closure. The map shows the three nearby operations with a combined extraction output of 1 million tonnes per year are anticipated to cease within ten years. Therefore, the development of a further quarry is particularly important as it will provide employment opportunities with other extractive industries in the region near the end of their operations.



As noted above, the Project will provide a revenue stream for DLALC to invest in housing, education, cultural, health and employment programs and projects. Each of the programs and projects represents post-Covid 19 and long-term employment opportunities.

Enhance the NSW Government’s Aboriginal Procurement Policy

The NSW Government Aboriginal Procurement Policy seeks to increase Aboriginal skills and economic participation in the development of NSW. The Policy seeks to achieve this by leveraging the NSW Governments procurement capacity to support Aboriginal employment opportunities and the growth of Aboriginal-owned businesses.

The Policy aims to award 3% of total domestic contracts for goods and services issued by NSW Government agencies to Aboriginal-owned business by 2021.³⁶ In 2019, the percentage of government contracts awarded to Aboriginal-owned business fell from 0.44% the previous year to 0.43%. This represents a significant shortfall of 86%.³⁷ The Project can help address this shortfall by providing an Aboriginal-owned source of

³⁶ NSW Government, (2018), *Aboriginal Procurement Policy*, NSW Government, <https://buy.nsw.gov.au/policy-library/policies/aboriginal-procurement-policy>

³⁷ NSW Treasury, (2019), *Aboriginal Procurement Policy & Aboriginal Participation in Construction Policy 2019 Review*, NSW Government, https://buy.nsw.gov.au/_data/assets/pdf_file/0006/607821/app_apic_policy_2019_review_accessible_pdf_1.pdf

construction sand that can be procured as part of the NSW Government's planned \$107.1 billion worth of State infrastructure projects to 2022–23.³⁸

8.2.7 Suitability of the Site for Development

Sydney Regional Environmental Plan No 9—Extractive Industry (No 2—1995) was legislated in 1995 to “facilitate the development of extractive resources in proximity to the population of NSW by identifying land which contains extractive material of regional significance.”³⁹ The Project Site's eastern portion was identified in that Environmental Planning Instrument as containing a regionally significant extractive resource. Therefore, the suitability of developing an extractive industry at the Project Site has been identified for near 25 years. Furthermore, the Hills LEP 2019 permits the construction of an extractive industry at the Project Site.

The NSW Offshore Sand Review identifies Maroota as Greater Sydney's last major location to extract construction sand. The Project Site is strategically located to deliver construction materials across the Greater Sydney region, particularly to infrastructure projects in Sydney's West. Wiseman's Ferry Road provides an efficient route to Richmond and Penrith, while Old Northern Road provides an efficient route to Parramatta and the broader Sydney motorway network. Penrith, Parramatta and the Western Sydney Parklands are all accessible within an hour and ten minutes from the Project Site.

The Land Capability Assessment prepared by SLR consulting assessed the Project's compatibility with surrounding land uses. That assessment concluded that as the Project is located entirely within native bushland, it will not directly or indirectly impact land currently used for agricultural production. There are existing sand quarries located directly to the south, east and north of the proposed quarry. There are orchards and other small-scale horticulture to the south of the proposed quarry. These properties are separated by a minimum 100-metre buffer of native bushland. There is nothing at the Project Site that physically militates against the Project.

8.2.8 Any Submissions Made

Public consultation is expected to be carried out by the DPIE on the submitted development application and accompanying documentation during the 28 day exhibition period per the Department's Community Participation Plan. Any submissions received as a result are for DPIE's consideration in its assessment of the application against applicable plans and policies.

8.2.9 Public Interest

The Project will deliver the following benefits that are in the public interest.

Employment

The Project will provide 8 full-time and 4 part-time jobs associated with the extractive industry's operation, construction jobs, 'flow-on' jobs and environmental management jobs. Importantly, these jobs build upon the established mining and extractive industry skillset within the Hills Shire economy.

³⁸ NSW Treasury, (2021), *NSW Budget 2020–21: Building a Better NSW*, NSW Government <https://www.budget.nsw.gov.au/budget-detail/building-better-nsw>

³⁹ *Sydney Regional Environmental Plan No 9—Extractive Industry (No 2—1995)* (NSW) S. 2(e)

Reduce the Cost of Private and State Infrastructure Projects

Construction sand is high-bulk low-unit cost commodity and is therefore highly sensitive to transport costs. The Sydney Construction Industry's annual demand for construction sand is approximately 7 million tonnes, an increasing proportion of which is sourced from outside the Greater Sydney region. The transport costs for sand sourced outside the Greater Sydney region can cost up to an additional \$14 per tonne compared to sand sourced from Maroota. With the Project potentially meeting half of the 1 million tonnes of construction sand presently delivered from outside the Greater Sydney region, that is a saving of \$7m per year – some \$190m across the Project's life. Affordable construction materials provide investment certainty and support jobs.

Therefore, leveraging State-significant sand resources within the Greater Sydney region is crucial for Sydney's construction. Notably, the NSW Offshore Sand Review identifies Maroota as the last major source for construction within the Greater Sydney Region (see **Figure 83**).

Revenue Stream to Enable Housing, Employment, Health, Education, Land Management and Cultural Programs and Projects

DLALC is required to reinvest any profit to fulfil its mission and functions. That mission is to strengthen the confidence and self-reliance of Aboriginal people and families and to provide them with greater opportunities. The organisation's functions include acquiring and managing land and providing community benefit schemes, including community housing, employment assistance, education and training, scholarships, cultural activities, funeral funds, child-care, and aged care services.

The DLALC CL&B Plan identifies the development of a sand extractive industry at the Project Site as a priority project due to the presence of a State significant sandstone deposit which presents an unparalleled opportunity for a revenue stream to fund DLALC's programs and projects (see **Figure 80**). These include, but not limited to:

- The adaptive re-use and repair of the historic Parramatta Gaol as a community facility.
- Developing a scholarship fund to support primary, secondary, and tertiary Aboriginal students.
- The employment of an Education and Employment Co-Ordinator to support DLALC's education and employment objectives.
- Social and affordable housing developments in Western Sydney.
- A depot at Cranebrook to support DLALC's land management operations.
- High intensity agri-businesses.
- Bio-certified lands managed by DLALC.
- A new Sydney cemetery in partnership with Rookwood for Western Sydney.

Therefore, the Project's public benefits are not only restricted to the immediate benefits that it provides, but also the longer-term economic, social and environmental benefits provided by the projects and programs that it will enable.

Leverage and Develop the Established Mining Skillset of the Hills Shire Economy

Extractive Industries are important employers and economic contributors to the Hills Shire economy. Mining, including extractive industries, contributed \$70.1M to the Hills economy in 2018.⁴⁰ The Proponent is committed to leveraging and further developing this established strength of the Hills Shire economy by providing ongoing training and certification for their employees. The development of a further quarry is particularly important as it will provide employment opportunities with other extractive industries in the region near the end of their operations.

Where Achievable, Adverse Impacts are Avoided

Section 3.6 of this EIS details the rigorous review process the Project underwent to avoid adverse impacts where feasible. Design modification were informed by the recommendations of environmental specialists and the community. Modifications included:

- Amending and reducing the extent of the Project's disturbance footprint to:
 - Provide a 50m buffer to the protect the threatened *Maroota Sands Swamp Forest*.
 - Relocate the sand processing plant away from residents to the south of the Project Site and reduce impact on the threatened *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* (PCT 1081).
 - Maintain a 100m biodiversity buffer along the Project Site's southern boundary.
 - Avoid impacts to a 3rd order water course.
 - Provide a minimum 35m buffer to Aboriginal heritage items.

Comprehensive Environmental Management Strategy

The environmental management and measures proposed in the Project's environmental technical reports have been compiled in **Annexure 5**. These measures rely upon a range of scientific analytic techniques informed by various government guidelines, policies and plans. The Proponent is proposing to operate in accordance with these measures and developing additional supporting management and monitoring plans, post-approval. The Proponent will also establish a Community Consultation Committee and community hotline so that it can work with the community to monitor the effectiveness of the Project's environmental management strategies.

Rehabilitation of the Project Site

The Project incorporates a progressive rehabilitation plan. The proposed final land use will be a combination of native bushland and improved pasture for a post-mining grazing enterprise. This final land-use complements the vision of the Hills Shire Council and *Sydney Regional Environmental Plan No.9 – Extractive Industry* that rehabilitated extractive industry sites at Maroota be used as productive agricultural lands. Like extractive industries, agricultural lands are compatible with the established character, landscape and natural quality of the Maroota locality. Furthermore, the proposed final land use will continue to provide employment opportunities at the Project Site.

Protection, Management and Enhancement of 306ha of High-Quality Biodiversity Lands

⁴⁰ The Hills Shire Council, (2019), *Rural Strategy*, The Hills Shire Council

The Proponent proposes to offset 306ha of ‘like-for-like’ high-quality biodiversity lands in a Biodiversity Stewardship Agreement to account for the Project’s unavoidable biodiversity impacts. These lands will be protected, managed and enhanced for the benefit of future generations. Notably, the Proponent currently possesses the landholdings required for this offset. The management of these lands represents additional employment opportunities.

Enhance the NSW Governments Aboriginal Procurement Policy

The Aboriginal Procurement Policy aims to award 3% of total domestic contracts for goods and services issued by NSW Government agencies to Aboriginal-owned business by 2021.⁴¹ In 2019, the percentage of government contracts awarded to Aboriginal-owned business fell from 0.44% the previous year to 0.43%. This represents a shortfall of 86%.⁴² The Project help address this shortfall by providing an Aboriginal-owned source of construction sand that can be procured as part of the NSW Government’s planned \$107.1 billion worth of State infrastructure projects to 2022–23.⁴³

8.3 Feasible Alternatives & Consequences of not Carrying out the Development

Two operational scenarios were considered when developing the design of the extractive industry, those being:

- An annual production capacity of 500,000 tonne of saleable product; and
- An annual production capacity of 2,000,000 tonne of saleable product.

From a strategic perspective, the development of an extractive industry that produces 2,000,000 of product would address Sydney’s anticipated long-term shortfall of construction sand. However, while other operations continue in the Maroota region, and given the Sydney market’s current mechanics, a production capacity of 500,000 tonnes per year was determined to be more appropriate.

If the Project does not proceed, the Project Site will remain unutilised bushland. The consequences of this are as follows:

- This denies the extraction of a State significant sand resource that has been identified since 1995 in the *State Regional Environmental Plan No.9 – Extractive Industry* as an appropriate location for an extractive industry.
- The State will forfeit the opportunity to address Sydney’s growing construction sand shortage with a local supply of cost-efficient construction sand. If refused, transportation cost savings of up to \$190m across

⁴¹ NSW Government, (2018), *Aboriginal Procurement Policy*, NSW Government, <https://buy.nsw.gov.au/policy-library/policies/aboriginal-procurement-policy>

⁴² NSW Treasury, (2019), *Aboriginal Procurement Policy & Aboriginal Participation in Construction Policy 2019 Review*, NSW Government, https://buy.nsw.gov.au/__data/assets/pdf_file/0006/607821/app_apic_policy_2019_review_accessible_pdf_1.pdf

⁴³ NSW Treasury, (2021), *NSW Budget 2020–21: Building a Better NSW*, NSW Government <https://www.budget.nsw.gov.au/budget-detail/building-better-nsw>

the Project's life would be forfeit. Given the significant pipeline of infrastructure, those costs would likely fall to the NSW Government.

- Opportunity cost — the forfeit \$190m could have been used as investment and down payments towards additional infrastructure projects.
- Refusal would prevent the conservation, and protection of approximately 306ha of high-quality biodiversity lands under a Biodiversity Stewardship Agreement. This land would be permanently protected and maintained according to a biodiversity management plan to enhance its biodiversity value. If the Project were refused, while approximately 54ha of bushland would be retained on the Project Site, it is essential to note that this land would not be subject to a biodiversity management plan.
- A source of post-Covid-19 and long-term jobs will be lost. As other extractive industries reach the end of their life in the Maroota region, it will be important to have sources of employment for this established workforce.
- The opportunity to rehabilitate the site for use as agricultural lands that provide long-term additional employment, and a local source of food production will be lost.
- DLALC will lose an unparalleled opportunity to establish a revenue source to manage their other landholdings and implement housing, employment, health, education, and cultural development programs and projects. The social, economic and environmental benefits of these projects and program will either be lost or lessened.

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