GROUNDWORK plus

PEARLMAN QUARRY

ENVIRONMENTAL IMPACT STATEMENT

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Alan Pearlman

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TABLES

FIGURES

DRAWINGS

ATTACHMENTS

Executive Summary

Alan Pearlman (the proponent) proposes to establish a hard rock quarry at 1135 Croppa Creek Road, North Star, New South Wales on the land formally identified as Lot 5 and 17 DP755984 (the site). The site is approximately 10 kilometres south of North Star and 12km north of Croppa Creek. The site is owned by Alan Trevor Pearlman. A development consent has recently been granted for the Tikitere Quarry at the site which could produce up to 500,000 tonnes per annum. The Pearlman Quarry is approximately 850m to the east of the approved Tikitere Quarry. It is anticipated that the Inland Rail Project and associated road projects in the region could require up to 1,000,000 tonnes per annum. It is envisaged that the proposed Pearlman Quarry could provide additional capacity if the Tikitere Quarry annual extraction volume is exhausted or if the total Tikitere Quarry resource is exhausted before completion of these projects. The Inland Rail Project between Narrabri and North Star will pass the project site as the railway construction site passes through Lot 5 on DP755984.

The project is not classified as a State Significant Development (SSD), pursuant to the *State Environmental Planning Policy (State and Regional Development) 2011*, as the extraction volume is 490,000 tonnes per annum, the total available resources is less than 5 million tonnes and extraction will not occur from an environmentally sensitive area of State significance. The proposed development is 'Designated Development' as described in Part 1, Section 19 of Schedule 3 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) for 'Extractive Industries'. Therefore, under Part 4, Division 2 of the *Environmental Planning Act and Assessment Act 1979* (EP&A Act) development consent is required.

The proposed quarry will extract 490,000 tonnes of material per annum, consent is being sought for a period of up to ten (10) years, subject to the progress of the Inland Rail Project and associated road upgrade projects, not including any necessary time for completion of any rehabilitation works once the resource is exhausted. The quarry footprint including extraction, processing, stockpile and water management areas would equate to a total site area of 9.25 ha with vehicular access being obtained from Croppa Creek Road (refer **Figure 3 – Conceptual Quarry Layout**).

The proposed development will produce a number of products, suitable for the needs of the Inland Rail Project and associated road upgrade projects. Upon completion of supply of materials to the project, the operation of the quarry will be rehabilitated to a suitable landform for continuing the existing rural activities.

The project will also contribute to local employment and training opportunities through direct and indirect employment opportunities, including creation of new project specific positions, in addition to non-direct employment growth for local businesses supplying good and services to the Inland Rail Project.

Assessment of the project determined that archaeology and historic heritage, traffic, biodiversity, noise and air quality, vibration and surface water were key aspects of the project which could potentially cause environmental impacts. Accordingly, these matters were considered in further detail through a series of specialist assessment reports. The assessment of heritage, biodiversity, noise and air quality found that the project would either avoid areas of significance or would require only minimal management measures to minimise and mitigate the risk of potential impacts. The assessment of potential traffic impacts determined that the there is sufficient capacity in the local road network to accommodate the vehicle movements generated by the project subject to the ordinary contribution to road maintenance as required by Gwydir Shire Council.

This Environmental Impact Statement (EIS) has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued by the Secretary of the Department of Planning and Environment on 8th May 2019 (refer **Attachment 1 - Secretary's Environmental Assessment Requirements**). The preparation of the EIS has incorporated a process involving, assessment of the environmental values of the site, consultation with government agencies and community and completion of expert technical assessments.

Sufficient assessment of the project has been undertaken through the preparation of the EIS, and as such, it is recommended that the project be approved. The project will avoid and minimise potential impacts to a degree that will enable significant socio-economic benefits to the region through establishment of a quarry operation that can supply a range of products required by the Inland Rail Project.

Figure 1 – Site Location Plan

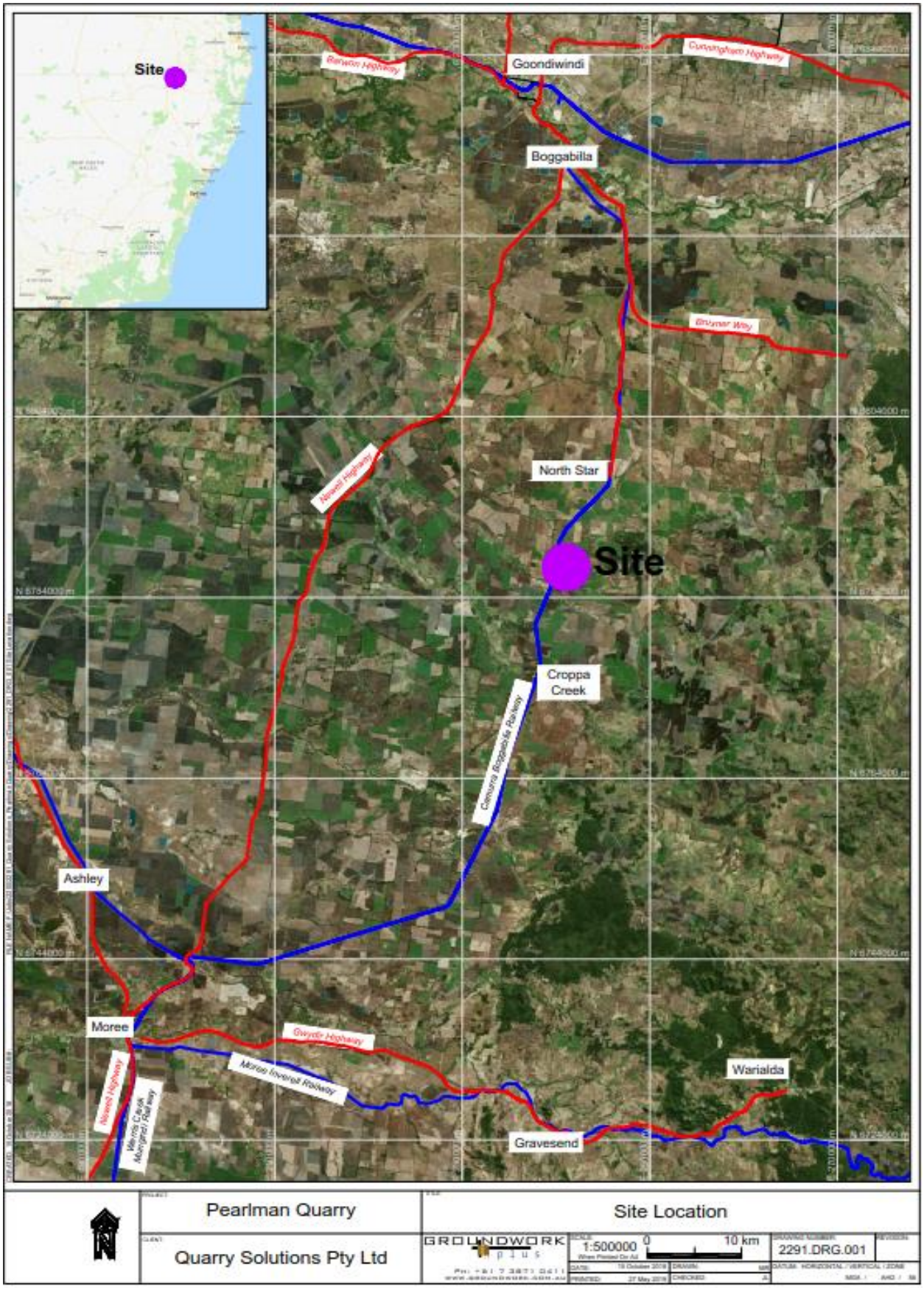


Figure 2 – Site and Surrounds

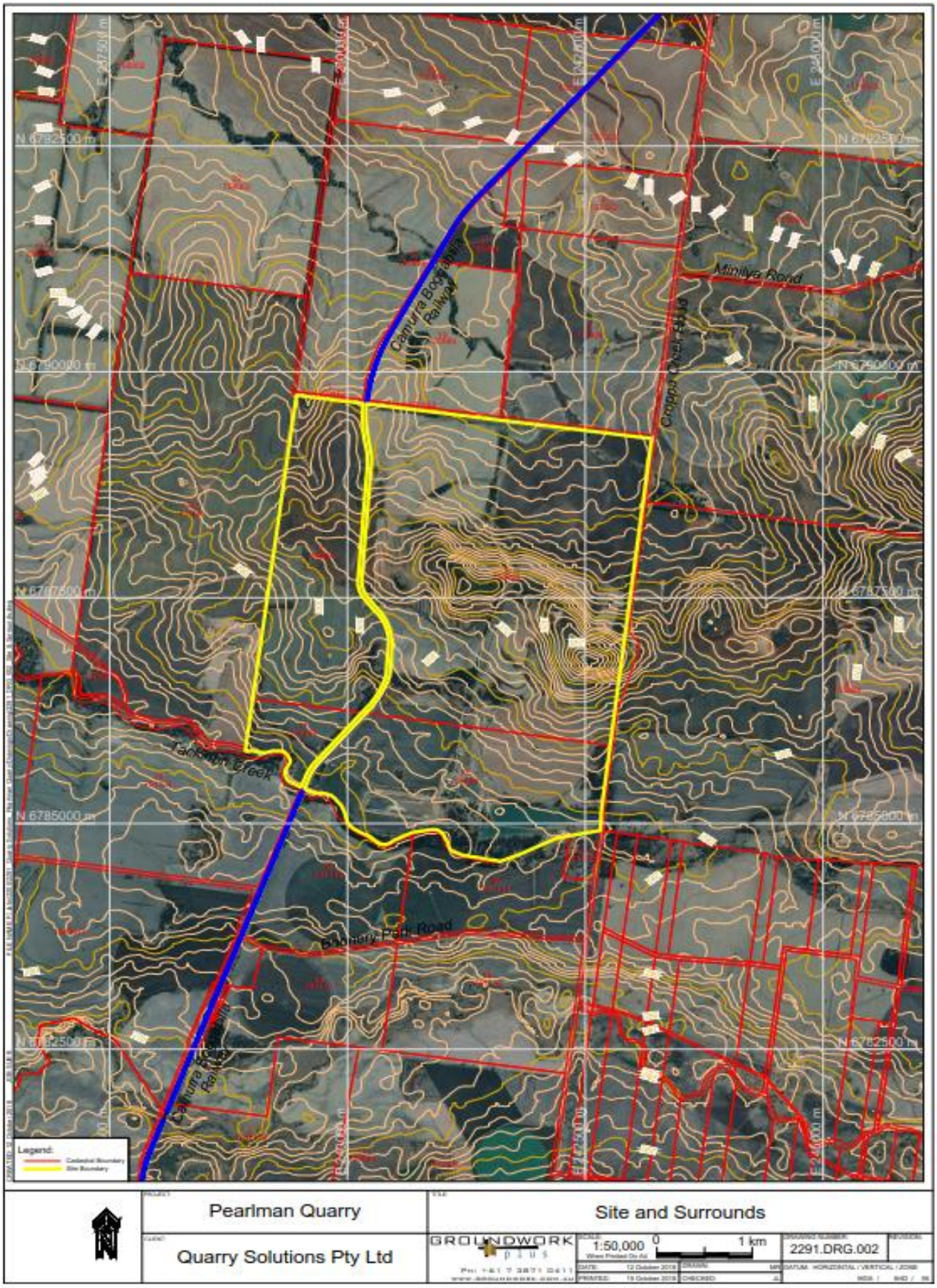


Figure 3 – Conceptual Quarry Layout

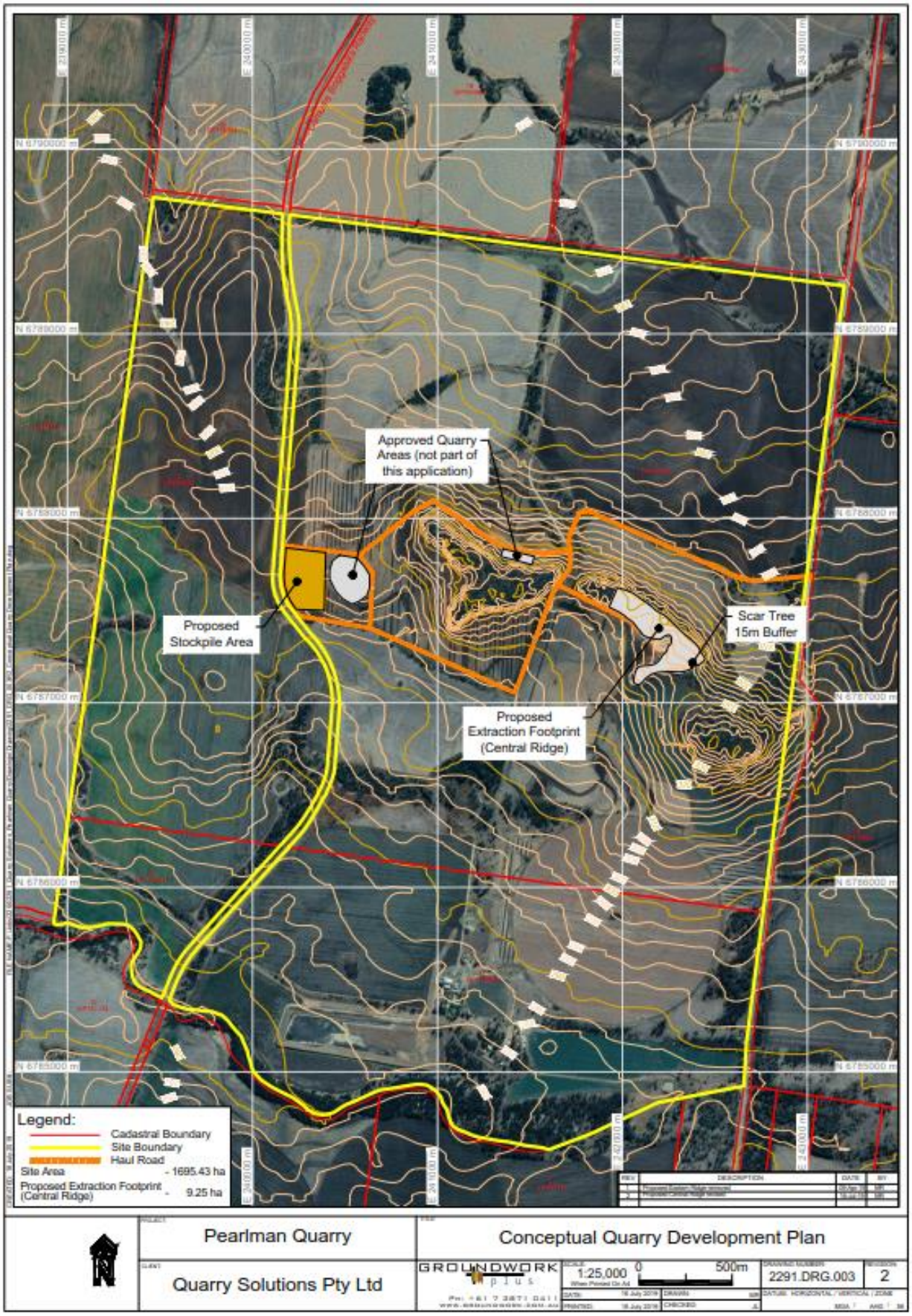
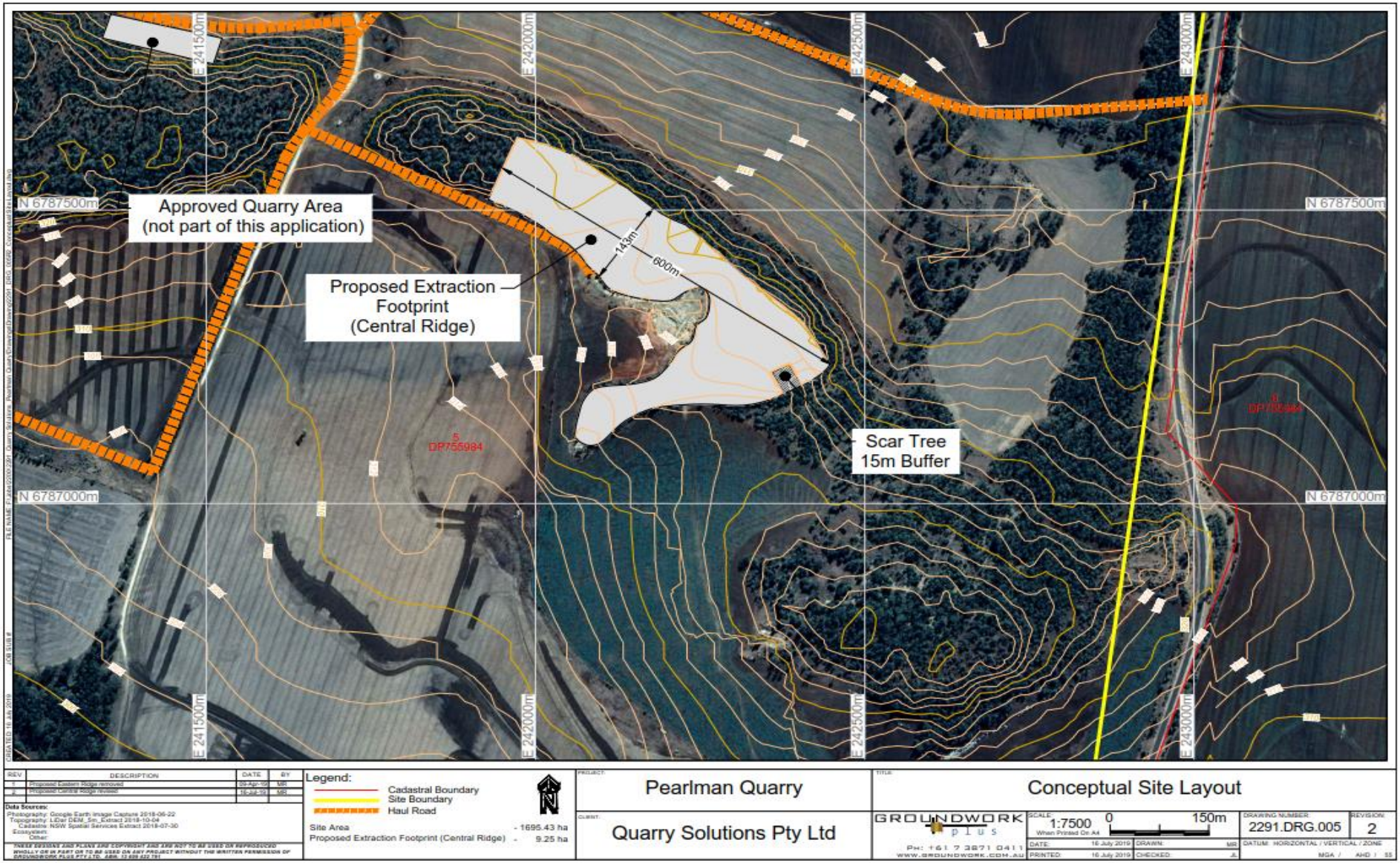


Figure 4 – Conceptual Site Layout



1. Introduction

Groundwork Plus has been commissioned to prepare this Environmental Impact Statement (EIS) for the Pearlman Quarry on behalf of Alan Pearlman (proponent). The EIS has been prepared for a Development Application to the Gwydir Shire Council to establish and operate a 490,000 tonne per annum hard rock quarry to supply the Australian Rail Track Corporation's Inland Rail Project (SSI 16_7474). Roads and Maritime Service (RMS) are also undertaking a number of road upgrades in the area in association with the Inland Rail project which the proposed quarry will also supply. The subject site is located at Croppa Creek Road, North Star, New South Wales on the land formally described as Lot 5 and 17 DP755984 (the site). The Pearlman Quarry is located on the same site, but approximately 850m east of the approved and recently commenced TIkitere Quarry.

An EIS is required as the proposed development is 'Designated Development' as described in Part 1, Section 19 of Schedule 3 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) for 'Extractive Industries'. The proposed quarry will extract 490,000 tonnes of material per annum, and the quarry footprint including extraction, processing, stockpile and water management areas equating to 9.25 Ha of site area in addition to the vehicular access being obtained from Croppa Creek Road. The proposed Quarry will be located on the top of the hill in the Eastern corner of the site. The proposed quarry will provide a range of quarry products to the Inland Rail Project and associated road upgrade projects.

In accordance with Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) a development application will be lodged with Gwydir Shire Council. The application is classified as 'Regional Development' and will be determined by the relevant Joint Regional Planning Panel under the *State Environmental Planning Policy (State and Regional Development) 2011*. Consent is being sought for a period of up to ten (10) years, subject to the progress of the Inland Rail Project and associated road projects, not including any necessary time for completion of any rehabilitation works once the resource is exhausted.

Pursuant to Section 91 of the EP&A Act, the assessment is classified as 'Integrated Development' as approvals from other government agencies are required. As a 'land-based extractive activity', that involves the extraction, processing or storage of more than 30,000 tonnes per year of extractive materials, the proposed development is classified as a 'Scheduled Activity'. An Environment Protection Licence issued under the Protection of the Environment Operations Act 1997 (POEO Act) is required. The EIS addresses the environmental assessment requirements of the Secretary of the Department of Planning and Environment (the SEAR's), dated 8th May 2019. This EIS focuses on the key assessment requirements specified by the SEAR's and proposed mitigation measures where possible to reduce potential environmental impacts. It is supported by specialist technical reports.

1.1 The Applicant

The applicant for the proposed development is Alan Pearlman (applicant) who owns the land described as Lot 5 and 17 DP755984 (the Site). Quarry Solutions Pty Ltd will operate the proposed Pearlman Quarry on behalf of the applicant. Quarry Solutions are the current operators of the adjacent Tikitere Quarry located 850m to the east of the site.

1.2 Background

The Narrabri to North Star and North Star to Boarder section of the Inland Railway Project includes upgrade and refurbishment of the existing rail corridor. The Inland Railway corridor is located adjacent to the subject site such that construction materials can be delivered directly to the rail corridor or transported to other project areas along the corridor by public roads. The railway line is to be upgraded to enhance the movement of freight between Melbourne, NSW and Brisbane Ports. The construction materials requirements for the upgrade works are currently being quantified, however it is expected that an extensive amount of material will be required for roads to service the construction, rail pad formation and track ballast. Specifically, the materials required by the Inland Rail project will include structural fill, capping layers and ballast products. In parallel to the Inland Rail project RMS are undertaking are series of upgrade works to the Newell Highway under the fixing the country roads initiative. These projects are to enable improved access to the Inland Rail corridor and associated intermodal hubs located in a number of locations throughout the Gwydir Shire. Other road upgrades include heavy duty pavements, shoulder widening and additional overtaking lanes to be installed between Moree and Goondiwindi. It is noted that historical extraction of some of the resource has occurred as part of the agricultural use of the land i.e. treatment of

internal roads on the property. Additionally, the site also includes the existing Tikitere Quarry which is described in more detail in later sections of this report.

1.3 The Site

The proposed development site is located on Croppa Creek Road, North Star, adjacent to the proposed Inland Rail Project alignment. The site is approximately 10 kilometres South of North Star, 12 km North of Croppa Creek 70 kilometres north east of Moree, in north-east New South Wales. The site is predominantly used for agricultural purposes.

1.4 Property Description

The real property description of the land is Lot 5 and 17 DP755984. The site is located within the Local Government Area of Gwydir Shire Council and is approximately 1695 hectares in size. The land is currently zoned `RU1 'Primary Production' under the *Gwydir Local Environmental Plan 2013.*

1.5 Surrounding Land Uses

The adjoining properties are all zoned RU1 'Primary Production' and have historically been used for dryland farming. Croppa Creek and North Star are both small towns with a population of approximately 200 people, located within 12km kilometres of the subject site. Gwydir is a rich agricultural region known for its productivity in irrigated and dry land crops such as cotton, wheat, barley, oats and sorghum.

1.6 Services and Utilities

An internal access road will connect the proposed quarry to Croppa Creek Road. Croppa Creek Road is a sealed road maintained by the Gwydir Shire Council. The site is not serviced by town water or sewer. Mobile telecommunication reception is available. The site is not currently connected to the electricity network.

1.7 Required Approvals

Consideration was given to whether the Pearlman Quarry could progress as a modification to the approved Tikitere Quarry. However, it was considered that inclusion of a new resource area and producing an additional 490,000t per annum would not be substantially the same development. Therefore, the following approvals are required to construct and operate the proposed quarry:

- Development Approval for Regional Development – Extractive Industry from the Joint Regional Planning Panel (JRPP) under the *State Environmental Planning Policy (State and Regional Development) 2011.*
- Environmental Protection License from the NSW Environment Protection Authority issued under the *Protection of the Environment Operations Act (1997).*

1.8 Consultation

The integrity of the planning and assessment process is reliant on genuine and transparent stakeholder engagement. The proponent has committed to working with the community and being an active and responsible member of the local community. A project specific stakeholder engagement process has been undertaken as part of the environmental impact assessment process including engagement with relevant authorities, Gwydir Shire Council and the local community.

1.8.1 Secretary's Environmental Assessment Requirements

A request for SEARs was lodged with the Department of Planning and Environment (DPE) on Wednesday 9th April 2019. SEARs were supplied on 8th May 2019. Table 1 provides the nominated requirements of the EIS and the section in which these considerations were addressed.

Table 1 – Planning Secretary's Environmental Assessment Requirements

Requirements		Section of Report Requirement Addressed
General Requirements	The Environmental Impact Statement (EIS) for the development must comply with the requirements in Clauses 6 and 7 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000. In particular, the EIS must include: • an executive summary; • a comprehensive description of the development, including: - a detailed site description and history of any previous quarrying on the site, including a current survey plan; - identification of the resource, including the amount, type, composition; - the layout of the proposed works and components (including any existing infrastructure that would be used for the development); - an assessment of the potential impacts of the development, as well as any cumulative impacts, including the measures that would be used to minimise, manage or offset these impacts; - a detailed rehabilitation plan for the site; - any likely interactions between the development and any existing/approved developments and land uses in the area, paying particular attention to potential land use conflicts with nearby residential development; - a list of any other approvals that must be obtained before the development may commence; - the permissibility of the development, including identification of the land use zoning of the site; - identification of sensitive receivers likely to be affected by the development using clear maps/plans, including key landform areas, such as conservation areas and waterways; • a conclusion justifying why the development should be approved, taking into consideration: - alternatives; - the suitability of the site; - the biophysical, economic and social impacts of the project, having regard to the principles of ecologically sustainable development; and - whether the project is consistent with the objects of the Environmental Planning and Assessment Act 1979; and • a signed declaration from the author of the EIS, certifying that the information contained within the document is neither false nor misleading.	**1.3 -1.7 fig. (1-4)** **2.2** **1.6 - 2** **4 - 6** **4.3.3** **4.4** **1.7** **3.3.1** **4.4.1** **8** **8**
Consultation	In preparing the EIS for the development, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers and any surrounding landowners or Crown land stakeholders that may be impacted by the development. The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.	**1.8**

Requirements		Section of Report Requirement Addressed
Key Issues	The EIS must assess the potential impacts of the proposal at all stages of the development, including the establishment, operation and decommissioning of the development. The EIS must address the following specific issues: • **Noise** – including a quantitative assessment of potential: - construction and operational noise and off-site transport noise impacts of the development in accordance with the Interim Construction Noise Guideline, NSW Noise Policy for Industry and NSW Road Noise Policy respectively; - reasonable and feasible mitigation measures to minimise noise emissions; and - monitoring and management measures; • **Blasting & Vibration** – - proposed hours, frequency, methods and impacts; and - 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; • **Air** – including an assessment of the likely air quality impacts of the development in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW. The assessment is to give particular attention to potential dust impacts on any nearby private receivers due to construction activities, the operation of the quarry and/or road haulage; • **Water** – including: - a detailed site water balance and an assessment of any volumetric water licensing requirements, including a description of site water demands, water disposal methods (inclusive of volume and frequency of any water discharges), water supply infrastructure and water storage structures; - identification of any licensing requirements or other approvals required under the Water Act 1912 and/or Water Management Act 2000; - demonstration that water for the construction and operation of the development can be obtained from an appropriately authorised and reliable supply in accordance with the operating rules of any relevant Water Sharing Plan (WSP) - a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant Water Sharing Plan or water source embargo; - an assessment of activities that could cause erosion or sedimentation issues, and the proposed measures to prevent or control these impacts; - an assessment of any likely flooding impacts of the development; - an assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including a detailed assessment of proposed water discharge quantities and quality against receiving water quality and flow objectives, particularly surface water discharge into Tackinbri Creek, having regard to advice received from DoI Crown Lands (see Attachment 2); and	**4 and app. 2** **4.7** **4.6.2 & 4.7** **4.6** **4.8 & 4.9**

Requirements		Section of Report Requirement Addressed
	- a detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts;	
	• **Biodiversity** – including: - accurate predictions of any vegetation clearing on site; including the location and amount of clearing and types of communities and species affected; - an assessment of the potential biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems undertaken in accordance with Sections 7.2 and 7.7 of the Biodiversity Conservation Act 2016, having regard to advice received from OEH and Council (see Attachment 2); and - a detailed description of the proposed measures to maintain or improve the biodiversity values of the site in the medium to long term, as relevant.	**4.10** **4.10.3**
	• **Heritage** – including: - an assessment of the potential impacts on Aboriginal heritage (cultural and archaeological), having regard to OEH advice (see Attachment 2); and - identification of Historic heritage in the vicinity of the development and an - assessment of the likelihood and significance of impacts on heritage items, having regard to the relevant policies and guidelines listed in Attachment 1;	**4.11**
	• **Traffic &Transport** – including: - accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products; - an assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road networks, detailing the nature of the traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads; - a description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network (particularly the proposed transport routes) over the life of the development, including consideration of cumulative road network impacts from operation of Tikitere and Pearlman Quarries, having regard to advice received from RMS (see Attachment 2); - evidence of any consultation with relevant roads authorities, regarding the establishment of agreed contributions towards road upgrades or maintenance; and - a description of access roads, specifically in relation to nearby Crown roads and fire trails.	**4.13**
	• **Land Resources**– including an assessment of:	**4.3 & 4.16**

Requirements		Section of Report Requirement Addressed
	- an assessment of potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management and remedial measures (as appropriate); - an assessment of potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds etc); - consideration of Crown Land assets located to the south of the proposed quarry, having regard to advice received from DoI Crown Lands (see Attachment 2); and - consideration of the compatibility of the development with other land uses in the vicinity of the development, in accordance with the requirements of Clause 12 of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007, including surrounding pastoral lands;	**4.14**
	• **Waste** – including estimates of the quantity and nature of the waste streams that would be generated or received by the development and any measures that would be implemented to minimise, manage or dispose of these waste streams;	
	• **Hazards** – including an assessment of the likely risks to public safety, paying particular attention to potential bushfire risks and the transport, storage, handling and use of any hazardous or dangerous goods;	**4.12**
	• **Visual** – including an assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, including with respect to any new landforms;	**4.5**
	• **Social & Economic** – an assessment of the likely social and economic impacts of the development, including consideration of both the significance of the resource and the costs and benefits of the project; and	**4.17**
	• **Rehabilitation** – including: - a detailed description of the proposed rehabilitation measures that would be undertaken throughout the development and during quarry closure; - a detailed rehabilitation strategy for the site, including justification for the proposed final landform and consideration of the objectives of any relevant strategic land use plans or policies; and - the measures that would be undertaken to ensure sufficient financial resources are available to implement the proposed rehabilitation strategy, recognising that a rehabilitation bond will likely be required as a condition of any future development consent.	**4.3 and 4.10**

Requirements		Section of Report Requirement Addressed
Environmental Planning Instruments	The EIS must take into account all relevant State Government environmental planning instruments, guidelines, policies, and plans. While not exhaustive, Attachment 1 contains a list of some of the environmental planning instruments, guidelines, policies and plans that may be relevant to the environmental assessment of this development. During the preparation of the EIS you must also consult the Department's EIS Guideline – Extractive Industries – Quarries. This guideline is available at http://www.planning.nsw.gov.au/~/media/Files/DPE/Guidelines/extractive-industries-quarries-eis-guideline-1996-10.ashx.In addition, the EIS must assess the development against the Gwydir Local Environmental Plan (LEP) 2013 and any relevant development control plans/strategies.	**3**

1.8.2 Government Agency Consultation

On the 11 April 2019 the following agencies were consulted by DPE as part of preparation of the SEARs:

- Gwydir Shire Council;
- NSW Department of Primary Industries (NSW DPI) Agriculture;
- NSW Department of Planning & Environment – Division of Resources & Geoscience, Geological Survey of New South Wales (GSNSW);
- Environment Protection Authority (EPA);
- NSW Roads and Maritime Services (RMS);
- NSW Office of Environment & Heritage (OEH); and
- NSW Rural Fire Service (RFS)

Department of Planning and Environment (DPE)
On the 16th of April 2019 DPE were consulted in relation to the Environmental Assessment and Planning Regulation 2000 definition of a development consent modification. It was agreed that a new development application would be required for the Pearlman site and that the aspects souring the licensing should be resolved with the Environmental Protection Authority.

NSW Environmental Protection Authority (EPA)
On Thursday 9th of May 2019 the EPA was consulted in relation to the licensing aspects of the Pearlman site. It was agreed that both the Tikitere and Pearlman site would be spatially defined to ensure that an Environmental Protection License (EPL) could be granted to each quarry being located on the same site.

Gwydir Shire Council
The local council has been consulted on a number of occasions in relation to the content of the application, the development assessment processes, other quarries located in the shire that may or may not result in cumulative impacts and also the contribution fees associated with heavy haulage in the local government area.

1.8.3 Surrounding Landholders

The applicants land extends 2.9km to the South and West, 1.9km to the North and 595m to the East. Beyond these distances each boundary is adjoined by private landownership in all directions. The applicant has consulted with the surrounding land holders. This has included providing an overview of the propose development the likely impacts and where to find information about the development proposal. Feedback was also recorded, and a project hotline provided to the landholders to call in the event of any operational concerns during the project lifecycle.

2. Proposed Development

The following sections describe the proposed development.

2.1 Objectives

The primary objective is to establish a hard rock quarry that meets the requirements for materials and products to be used for the Inland Rail Project and associated road projects. The quarry will meet or exceed current best practice in terms of environmental performance and environmental guidelines. This objective will be met by:

- Undertaking and managing all activities in a manner that minimises impacts on the site's biodiversity, water, soil, air and cultural and other values.
- Developing and implementing environmental management systems that incorporates robust monitoring and review processes consistent with current best practice standards.
- Developing and implementing sustainable waste management procedures in all activities.

As part of this application a Quarry Environmental Management Plan (QEMP) has been developed to ensure that these objectives are achieved as the project transitions into the operational phases of the project (refer **Attachment 2 - Quarry Environmental Management Plan**).

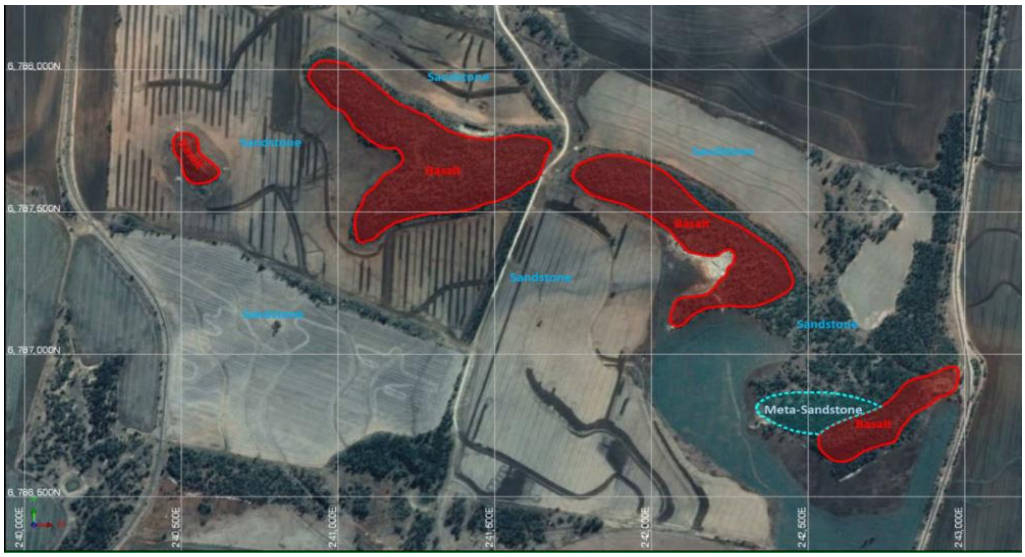
2.2 Resource Description

The geology of the site comprises ridgelines of remnant undifferentiated Tertiary basalt flows which overlie Jurassic sandstones and siltstones of the Warialda Sandstone. The site of the proposed Pearlman Quarry occupies a relatively thin but laterally extensive basalt ridge considered to be a remnant flow, possibly sourced from the nearby vent at Tikitere Quarry.

The basalt is consistent, sparsely vesicular with no observable amygdule or significant hosted smectite-chlorite segregations. As such it is predicted to produce a broad range of quarry products including fill, pavements, sealing and asphalt aggregate and ballast. Tests carried out on samples from the Pearlman Quarry investigation indicate the basalt meets and exceeds specifications for rail ballast and other construction products.

The figure below (refer figure 5 – Geological Resources) shows the extent of the geological boundaries of the Basalt and sandstone geological resources across the site. A full copy of the resource report is provided as part of this assessment (refer **Attachment 10 - Resource Report**).

Figure 5 – Geological Resources



2.3 Description of Proposal

This Development Application seeks consent to establish a hard rock quarry (the Pearlman Quarry) to produce a maximum of 490,000 tonnes of quarry material per year for supply to the Inland Rail Project and associated road projects. The proposed development on the subject site is depicted in **Figure 4 – Conceptual Site Layout Plan**. The total size of the resource available on site has been calculated as 3,480,000 tonnes. The material extracted from the quarry is a basalt resource that will compromise overburden and hard rock, which will be processed through a mobile crushing and screening plant before being stockpiled.

Amenities will be provided onsite including a small demountable site office including staff amenities. Front end loaders with calibrated scales will be used for loading of material into road trucks and as such a weighbridge is not anticipated to be required as part of the operation. Chemical storage may include a bunded lockable container for oils and lubricants for minor servicing. Any chemical / hydrocarbon storage areas will comply with relevant Australian Standards. The new stormwater management infrastructure will be established within the proposed quarry footprint which will also be used as a supply of water for dust mitigation. Upon completion of supply of materials to the project, the quarry will be rehabilitated to a suitable landform for continuing rural activities. The extraction activities on the site are standard for the industry and will include the following:

- Removal of overburden and storage of overburden and topsoil for rehabilitation;
- Extraction of hard rock;
- Transportation of material to mobile crushing and screening plant;
- Operation of mobile crushing and screening plant to size and screen the material;
- Stockpile of finished material for loading into trucks;
- Transport from the quarry to the construction project site; and
- Rehabilitation of the site to a landform capable of supporting ongoing rural activities.

2.4 Hours of Operation and Staff Employment

The hours of operation are anticipated to be 6:00am to 6:00pm Monday to Saturdays with no operation on Sundays and Public Holidays. Blasting if required, will generally be limited to 9:00am and 3:00pm Monday to Friday. On occasion when the ARTC project is subject to rail possessions or high priority works activities such as crushing, loading and haulage activities will be required to occur outside the nominated hours. On such occasion's notification and approval from Gwydir Shire and EPA will be sought. The quarry operation will directly employ between 5 and 10 staff who will be accommodated in nearby townships of Croppa Creek or North Star.

2.5 Traffic

Construction traffic generated for the commissioning and decommissioning of the quarry site will be minimal and consisting of vehicle movements for floating plant and equipment to and from the site.

The operational traffic generation is based on the proposed hours of operation the of the quarry and the demand for quarry resources from the Inland Rail project and associated road projects. Assuming demand is evenly spread across each day and week in a year this could equate to an average of 9800t of material moved per week by an average of 47 laden trucks per day exiting the quarry. However, quarries do not work on an average basis and must meet demand which fluctuates outside of the control of the quarry operator. This is specifically the case where a quarry may supply large infrastructure projects such as the Inland Rail project and associated road projects.

The delivery program for construction activity in the area has not been confirmed. It is expected that the demand for construction materials will fluctuate as required. Quarry Solutions has advised that demand for construction materials might reach up to 5000t per day. Therefore, during peak demand periods it is possible that up to 11 truck movements per hour would be required if all of the product is dispatched via the road network. Quarry Solutions have advised that the peak demand periods are unlikely to occur on a prolonged basis, but flexibility is required in operating conditions so that the requirements of construction projects during peak demand periods can be met. The peak periods will be offset by wet weather days and lower demand periods which may generate less material deliveries.

Quarry products will either be distributed to the project site by railway or the surrounding road network. It is proposed that 80% of the quarry products will be distrusted via road and the remaining 20% via the railway. The road haulage aspect involves transportation of material both north and south form the site. The northern haulage route will include trucks exiting the quarry to head north along Croppa Creek Road for approximately 9.5 kilometres. Trucks will then head along I.B Bore Road for approximately 22 kilometres until they reach the Newell Highway. The southern haulage route will include trucks exiting the site traveling south along Croppa Creek Rd until Croppa Moree Rd has been reached. Trucks will then head south on this road for 40km until the Newel Highway is reached. A rail siding exists halfway along this stretch of road where quarry products will also be hauled to.

In order to account for the additional heavy haulage on public roads the consultation has taken place with both affected Councils. Quarry Solutions the quarry operator, has put forward an offer of Gwydir Shire Council of 80c/tonne and Moree Plain Shire Council of 50c/tonne to account for the additional heavy haulage on the public road network in each of the local government areas. A full traffic and road condition assessment has been undertaken in later section of this assessment (refer **Attachment 9 – Traffic Impact Assessment**). Based on the findings of the traffic assessment a number of road improvements and maintenance will be implemented, along with a driver technology and traffic management plans.

2.6 Water Supply and Surface Water Management

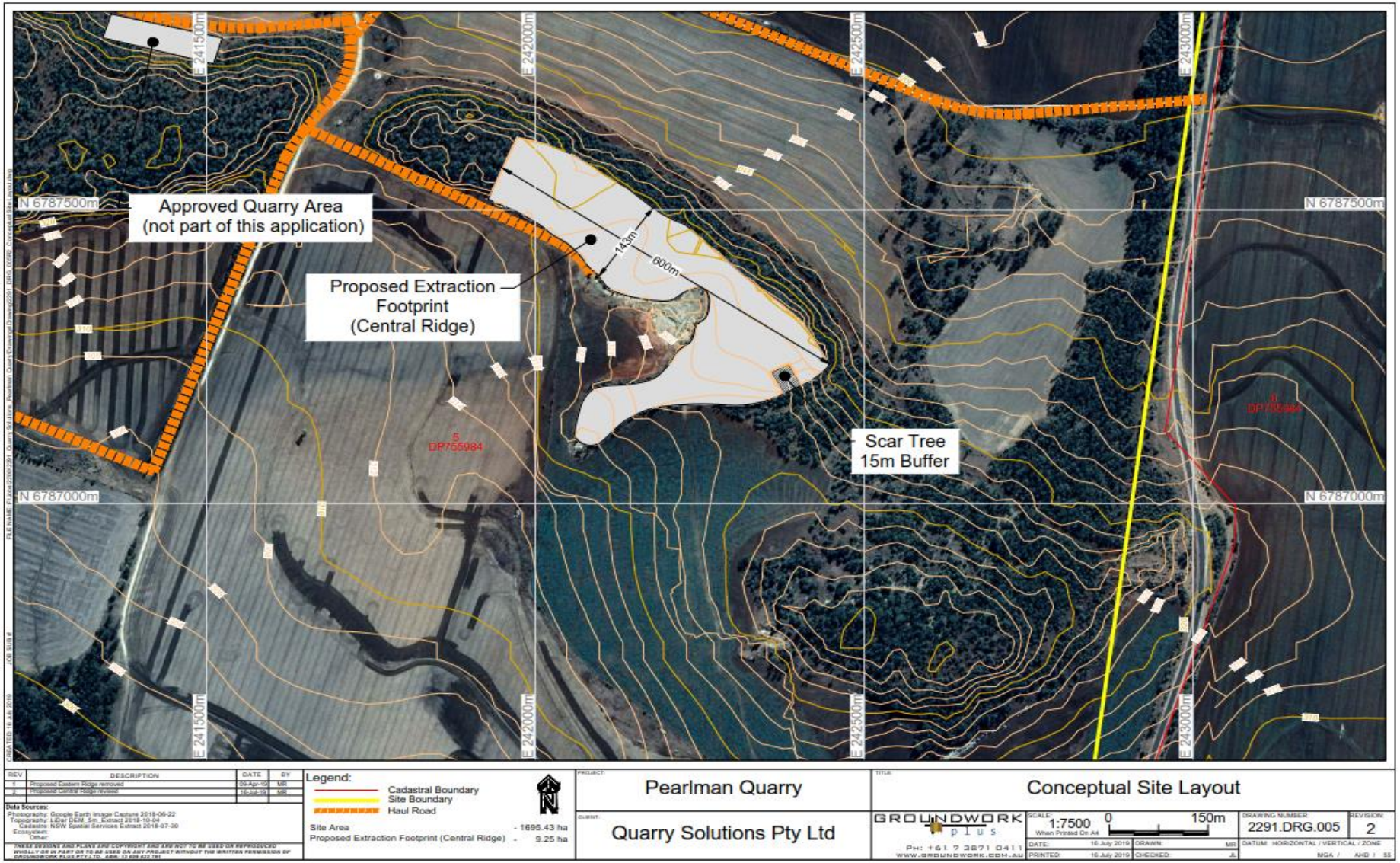
Water can be drawn from a number of sources at the Pearlman site. According to the Water NSW harvestable right calculator the site itself has a harvestable right of 84.7 ML. It is expected that water will be required to be sourced from external licensed water suppliers to meet the anticipated shortfalls for quarry operations. As outlined in the water balance assessment results, up to 47.6ML per annum is expected to be required in a drier than average year. The quarry will be responsible to ensure that any licensing requirements and other approvals required under the Water Act 1912 and/or Water Management Act 2000 are obtained. It is expected that the quarry will be moderately self-sufficient in water supply, hence construction and operation of the development can be undertaken with any additional water requirements being reasonably obtained from an appropriately authorised licensed water supplier.

A series of sediment basins are proposed for the site which is are to be designed, constructed and operated to retain the runoff from the disturbed catchment at the site in accordance with DECC (2008) Managing Urban Stormwater - Soils and Construction (Volume 2E). Majority of the water captured on-site will be used in dust suppression expect where storm events exceed the design criteria of the sediment basin.

2.7 Capital Investment Value

The proposed development is expected to require a capital investment of $23,440. This investment includes the works to establish the site such as the earthworks associated with the construction of the sediment pond system, road upgrades and rehabilitation costs. All plant and equipment associated with the quarry have a lifecycle beyond the operational life of the quarry and will be redeployed from the site once the construction projects in the region are complete.

Figure 6 – Conceptual Site Layout Plan



3. Legislation

The proposed development is 'Designated Development' and 'Integrated Development' under Part 4 of the *Environmental Planning Assessment Act, 1979.* The following section of the report describes how the proposed development will address and/or comply with the local planning policies; state and federal legislation and relevant guidelines. The applicable policy and/or objects of each piece of legislation is provided, followed by a statement outlining how the development will address and/or comply with the planning policies; and state and federal legislation.

3.1 Commonwealth Legislation

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

Under the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), referral is required to the Australian Government for proposed actions that have the potential to significantly impact on Matters of National Environmental Significance (MNES) or the environment of Commonwealth land. The assessment of the proposal's impact on MNES and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant MNES or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of the Environment and Energy (DoEE) under the EPBC Act.

3.2 State Legislation

3.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* provides the framework for NSW Planning Legislation. Under this Act, local councils prepare Local Environment Plan (LEPs) that specify planning controls for specific parcels of land. The Act also provides for State Environmental Planning Policies (SEPPs) and Regional Environmental Plans (REPs). Applicable SEPPs are discussed in the section below.

Development consent is required for the proposal pursuant to Part 4 of the EP& A Act. The proposal is classified as Regional Development and will be determined by the Joint Regional Planning Panel (JRPP) under the provisions of the *State Environmental Planning Policy (State and Regional Development) 2011.*

Pursuant to Section 4.10 of the Act and Schedule 3(1)(19) of the *Environmental Planning and Assessment Regulation 2000,* the proposal is identified as 'Designated Development' as a land based extractive industry which seeks to extract, process or store more than 30,000m^3 of extractive material per year and will disturb a total surface area of more than 2ha of land.

The proposed development is also classified as 'Integrated Development' pursuant to Section 4.46 of the Act as approval from the NSW Environmental Protection Authority is required.

The EIS has been prepared in accordance with the requirements of the EP&A Act. It provides an environmental impact assessment and details of how the Quarry will be developed and operated to protect the environment, the community and provide for ecologically sustainable development.

The site already includes the recently approved Tikitere Quarry for 500,000 tonne per annum pursuant to the *Environmental Planning and Assessment Act 1979 (as amended)*. We are of the view that the Pearlman Quarry could not be added to the Tikitere Quarry approval through a modification because it would not remain "*substantially the same*" based on the scale of the impacts. Therefore, a new development application has been prepared for the Pearlman Quarry.

3.2.2 Protection of the Environment Operations Act 1997

Pursuant to Schedule 1(1)(19) of the *Protection of the Environment Operations Act 1997* (POEO Act), the proposed development is identified as a 'Scheduled Activity' as a land based extractive activity involving the extraction, processing or storage of more than 30,000 tonnes per year of extractive materials. The proposal therefore requires an Environmental Protection License (EPL) under Section 48 of the POEO Act. The Environment Protection Authority (EPA) administers the management of EPLs. A license will be applied for once development consent is granted.

3.2.3 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act 2016) provides a framework for the management of flora and fauna on lands within NSW. Under this Act the principles of ecologically sustainable development are used to achieve the conservation and protection of biodiversity values. In conjunction with this the BC Act 2016 the Biodiversity Assessment Method (BAM) is a model for undertaking biodiversity assessments on all major projects. The BAM provides a classification and credit system to ensure that there is no net loss of biodiversity values across the state. As the proposed clearing is above the thresholds under clause 7.23 of the *Biodiversity Conservation Regulation 2017* a full assessment has been conducted against the relevant provisions of the BAM. This assessment has calculated the biodiversity offset requirements to ensure the project will not have a net impact to the biodiversity values of NSW.

3.2.4 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (the NPW Act) aims to conserve and manage natural resources and aboriginal heritage. The proposal has been prepared in accordance with the requirements of this Act. There are no national parks, nature reserves, regional parks, state conservation areas, historic sites, karst conservation areas or Aboriginal areas within the subject area.

3.2.5 The Heritage Act 1977

The *Heritage Act 1977* (the Heritage Act) aims to conserve and manage the States Heritage, whether they are places, buildings, works, relics, movable objects or precincts of Local or State Heritage significance. A property is a heritage item if it is listed in the heritage schedule of the Local Council's Local Environmental Plan or on the State Heritage Register, a register of places and items of particular importance to the people of NSW. If an item of heritage value was identified, then consultation would be undertaken with Gwydir Shire Council and an assessment undertaken in accordance with OEH guidelines for Assessing Heritage Significance (Heritage Office 2001). The heritage statement is the basis for policies and management structures that will affect an item's future. As part of this assessment the relevant data base searches have been performed that revealed no known heritage items present at the subject site, however a scar tree linked to aboriginal origin was identified. Measures to avoid harm to this site are explained in later sections of this report.

3.2.6 Water Management Act 2000

The objective of the *Water Management Act 2000* is the sustainable and integrated management of the State's water sources for the benefit of both present and future generations by applying the principles of ecologically sustainable development to protect, enhance and restore water sources and their associated ecosystems, ecological processes and biological diversity and their water quality. The objectives of this Act were considered throughout the planning and design phases of this development. A quarry requires a secure and reliable water supply to operate. The watercourses and groundwater in the vicinity of the property will be protected through rigorous design and management practices, including diversion banks and sediment traps. Appropriate buffers are to be maintained in order to minimise the risk of stream pollution.

3.2.7 State Environmental Planning Policy – State and Regional Development 2011

The State and Regional Development SEPP identifies significant development and infrastructure and confer functions on Joint Regional Planning panels to determine development applications. The proposal is classified as 'Regional development' and will be assessed by the Gwydir Shire Council and determined by the Joint Regional Planning Panel under the State Environmental Planning Policy (State and Regional Development) 2011. The *SEPP (State and Regional Development) 2011* designates certain development as State Significant Development (SSD). The relevant sections of the *SEPP (State and Regional Development) 2011* are provided below:

> *Section 8 Declaration of State significant development: section 4.36*
> *(1) Development is declared to be State significant development for the purposes of the Act if:*
> *(a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and*
> *(b) the development is specified in Schedule 1 or 2.*
>
> *Schedule 1 State Significant Development – General (7) Extractive Industry*
> *(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.

Pursuant to Schedule 1 of *SEPP (State and Regional Development) 2011*, the proposed extractive industry operation does not constitute a State Significant Development as:

1. No more than 490,000 tonnes of extractive material will be extracted per year.
2. Site geological assessments and regional geology mapping estimates that approximately 3.48 million tonnes.
3. The extraction will not be from an environmentally sensitive area of State significance (Table 2 below).

Table 2 - Environmentally sensitive area of State significance

Criteria	Response
(a) coastal waters of the State, or	The site does not comprise coastal waters of the State.
(b) land to which State Environmental Planning Policy No 14—Coastal Wetlands or State Environmental Planning Policy No 26—Littoral Rainforests applies, or	The State Environmental Planning Policy No 14—Coastal Wetlands or State Environmental Planning Policy No 26—Littoral Rainforests does not apply.
(c) land reserved as an aquatic reserve under the Fisheries Management Act 1994 or as a marine park under the Marine Parks Act 1997, or	The site does not contain aquatic reserves or marine parks.
(d) a declared Ramsar wetland within the meaning of the Environment Protection and Biodiversity Conservation Act 1999 of the Commonwealth, or	The site does not contain a declared Ramsar wetland.
(e) a declared World Heritage property within the meaning of the Environment Protection and Biodiversity Conservation Act 1999 of the Commonwealth, or	The site is not a declared World Heritage property.
(f) land identified in an environmental planning instrument as being of high Aboriginal cultural significance or high biodiversity significance, or	The site is not identified as containing high Aboriginal cultural significance or high biodiversity significance.
(g) land reserved as a state conservation area under the National Parks and Wildlife Act 1974, or	The site does not contain a state conservation area.
(h) land, places, buildings or structures listed on the State Heritage Register under the Heritage Act 1977, or	No heritage sites are listed for the site.
(i) land reserved or dedicated under the Crown Lands Act 1989 for the preservation of flora, fauna, geological formations or for other environmental protection purposes, or	The site is not reserved or dedicated under the *Crown Lands Act 1989.*
(j) land identified as being critical habitat under the Threatened Species Conservation Act 1995 or Part 7A of the Fisheries Management Act 1994.	The site does not contain critical habitat.

3.2.8 State Environmental Planning Policy – Mining, Petroleum Production and Extractive Industries 2007

The Mining, Petroleum Production and Extractive Industries SEPP recognises the importance of mining, petroleum production and extractive industries to the NSW region and aims to provide for the proper management and the orderly development of land containing minerals, petroleum products and extractive materials. The SEPP aims to establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment and sustainable management of these resources.

Section 12 of the SEPP provides several matters that a consent authority must consider before determining a development application. These matters are similar but different to the relevant matters identified in the Gwydir Local Environmental Plan 2013 which have been considered in section 3 of this report.

Section 13 of the SEPP requires Council to consider the compatibility of development proposals on land in the vicinity of existing mines etc. or of land containing mineral or extractive resources. This provision is to ensure that these resources are not sterilised by incompatible development on surrounding land and is a matter for Council to consider. The proposed development involves a long-term plan to maintain access to the available geological resource.

Section 14 of the SEPP requires the consent authority to consider whether or not consent should be issued subject to conditions aimed to ensure the development is undertaken in an environmentally responsible manner. The conditions issued must ensure the following:

(a) That impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable,
(b) That impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable,
(c) That greenhouse gas emissions are minimised to the greatest extent practicable.

Section 15 of the SEPP requires the consent authority to consider whether the proposed resource recovery is efficient. Modern equipment and best practice management principles will be used in the operation of the proposed quarry to ensure recovery is efficient and economically viable.

Section 16(1) of the SEPP requires the consent authority to consider whether a consent should contain conditions to:

(a) Require that some or all of the transport materials in connection with the development is not to be by public road,
(b) Limit to preclude truck movements, in connection with the development, that occur on roads in residential areas or on roads near to schools,
(c) Require the preparation and implementation, in relation to the development, of a code of conduct relating to the transport of materials on public roads.

Section 16(2) of the SEPP requires the consent authority to provide a copy of the development application to each roads authority for the road used and the Roads and traffic Authority within 7 days of receiving the application. This is a matter for Council. Section 16(3) of the SEPP outlines that the consent authority must not determine the development application until it has taken into consideration any submissions received from any road authorities or the Roads and Traffic Authority within 21 days after they were provided with a copy of the application. This is a matter for Council. Section 17 of the SEPP requires that the consent authority must consider whether or not the consent should be issued subject to conditions requiring rehabilitation of the land affected by the development. This is a matter for Gwydir Shire Council.

3.2.9 State Environmental Planning Policy No. 44 – Koala Habitat

The SEPP 44 encourages the conservation and management of areas of natural vegetation that provide habitat for koalas, to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline. Schedule 1 identifies the local government areas (LGA) subject to assessment under the policy of which Gwydir LGA is included, making assessment for koala habitat a requirement for the proposed development. An assessment of potential koala habitat on site was conducted in accordance with SEPP 44 as part of the ecological impact assessment carried out by Advitech. Accordingly, the assessment concludes that the proposed development does not include core koala habitat.

3.2.10 State Environmental Planning Policy N. 55 – Remediation of Land

The SEPP 55 promotes the remediation of contaminated land for the purpose of reducing the risk of harm to human health or other aspects of the environment. SEPP 55 requires consideration of whether there have been activities carried out on the land in the past that may have resulted in contamination. If contamination may be present, the proponent is required to undertake suitable investigation and, if necessary, remediation works. On 20th of February 2019 a search of the NSW contaminated land register was undertaken. The proposed development site is not considered as contaminated land as it has not historically been subjected to any contaminating activities. Upon the cessation of resource extraction, the proposal will involve full rehabilitation of the site.

3.2.11 State Environmental Planning Policy – Infrastructure 2007

The infrastructure SEPP provides a consistent planning regime for infrastructure and the provision of services and public works across NSW, along with providing for consultation with relevant public authorities during the assessment process. The proposed development is not identified in Schedule 3 of the SEPP as traffic generating development to be referred to the Roads and Maritime Services. The proposed development is therefore taken to be 'Any other purpose' under Schedule 3 and it will not generate 200 or more motor vehicle movements per hour.

3.3 Local Planning Instruments

3.3.1 Gwydir Local Environmental Plan 2013

The site is located in the Gwydir local government area. The Gwydir Local Environmental Plan 2013 (GLEP) is the current local government planning policy for land administered by Moree Plain Shire Council. The site is located in the RU1 'Primary Production' zone which permits an extractive industry with consent. The proposed development is consistent with the objectives of the zone RU1, which are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To permit development for certain purposes if it can be demonstrated that suitable land or premises are not available elsewhere.

The proposed development is for extractive industry, which is permissible, with development consent, within the RU1 Primary Production zone. The protection of natural resources and places has been fully taken into consideration in the planning for this development. The continued utilisation of the land will minimise fragmentation and alienation. The proposal is not considered to conflict with the adjoining land uses. The proposed development is therefore considered to be both compatible and consistent with the surrounding land uses and meets the objectives of the RU1 Primary Production zone.

The proposed land use is defined as 'extractive industry' under the GLEP:

> ***"extractive industry** 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 of extractive materials by methods such as recycling, washing, crushing, sawing or separating, but does not include turf farming"*

An extractive industry land uses within the RU1 Primary Production zone is a permissible land use with development consent.

3.4 Meteorological and Climatic Data

Understanding climate data is essential for planning for environmental management of quarry sites, most importantly for air quality, stormwater, noise and site rehabilitation works. To this end, a review of available meteorological and climate data has been undertaken to inform subsequent management measures required for the Pearlman Quarry. The Pearlman Quarry is located within the Gwydir River catchment which is characterised by a temperate to sub-tropical climate, with a considerable gradient from east (cooler and wetter) to west (hotter and drier). Average rainfall ranges from 1,000 mm per year in the east to around 500 mm in the west. Annual rainfall at Moree totals around 600 mm (DPI Water, October 2017 https://www.industry.nsw.gov.au/__data/assets/pdf_file/0006/145392/Gwydir-SW.pdf)

For the site specifically, the following information has been sourced from the Bureau of Meteorology (BOM) information for the Bellata Post Office (Station: 53003), which is the closest BOM station that could provide comprehensive rainfall data. This weather station has been operational since 1912. The weather station is located approximately 10 km south east of the site and is considered suitable for use in understanding the expectant rainfall conditions at the site. Rainfall data for the area is summarised below in **Table 3 – Rainfall Summary – Bellata Post Office 53003** (1912-present) below.

Table 3 – Rainfall Summary – Bellata Post Office 53003 (1912-present)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Rainfall	84.2	68.3	45.2	34.9	39.6	41.5	42.2	34.3	35.6	48.8	62.0	67.1
Median	64.2	52.6	35.6	22.1	28.6	32.2	33.9	27.2	25.6	36.1	47.8	57.1
Highest Daily	164.4	173.0	76.2	85.6	100.3	77.8	64.4	49.8	112.0	76.2	86.6	164.0

Rainfall statistics show a mean average rainfall at Bellata Post Office of 603.7 mm per annum, which accords with the characteristics with the Gwydir River catchment with the majority of total rainfall occurring in the summer months. Based on an annual average evaporation of 2000 mm (DPI Water, October 2017) and an annual average rainfall of 603.7 mm, the site generally has a moisture deficit on an annualised basis of >1300 mm. The closest weather station to provide comprehensive climate data is the Moree Aero BOM sire (Station: 53115). The weather station has been operational since 1995 and is located approximately 40 km north of the site. Salient weather statistics from this weather station is provided below in **Table 4 - Climatic Information – Moree Aero 53115** (1995-present).

Table 4 - Climatic Information – Moree Aero 53115 (1995-present)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Av. Max Temp (°C)	34.0	33.2	31.1	27.3	22.6	19.0	18.1	20.4	24.5	27.1	30.8	32.7	26.8
Av. Min Temp (°C)	20.2	19.7	17.3	12.8	8.2	6.0	4.5	5.2	8.9	12.7	16.4	18.5	12.5
Mean No. Rain Days	7.2	6.8	6.1	4.1	4.9	6.6	6.0	4.6	5.3	6.7	8.0	8.7	75.0
Mean No. Rain Days > 10 mm	2.5	1.9	1.7	0.8	1.3	1.3	1.2	0.9	1.3	1.5	2.4	2.1	18.9
Mean No. Rain Days > 25 mm	0.7	0.8	0.5	0.2	0.1	0.3	0.3	0.1	0.3	0.4	0.7	0.6	5.0

It can be seen from the above, that the number of high rainfall days (> 25 mm) is on average less than once per month. This is not to say that high rainfall events do not occur, rather it is the case that they are infrequent in nature. Predictably the summer months yield the most rainfall days, with a reduction over the drier winter periods. Wind roses have been sourced from the BoM for Moree Aero Station, these are provided below as **Figure 6** to **Figure 10,** which show both the annual and seasonal wind characteristics. Wind roses summarise the occurrence of winds at a location, showing their strength, direction and frequency. These are particularly important when planning for potentially high dust generating activities, and selection of appropriate mitigation measures.

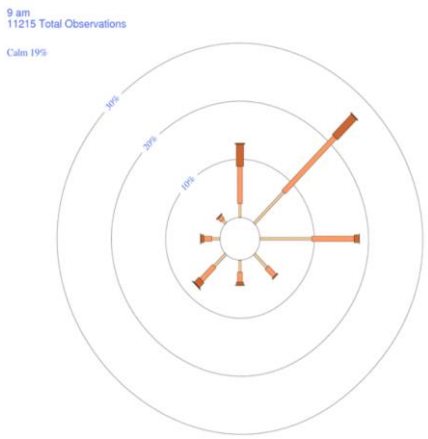


Figure 7 – Annual – Calm 19%

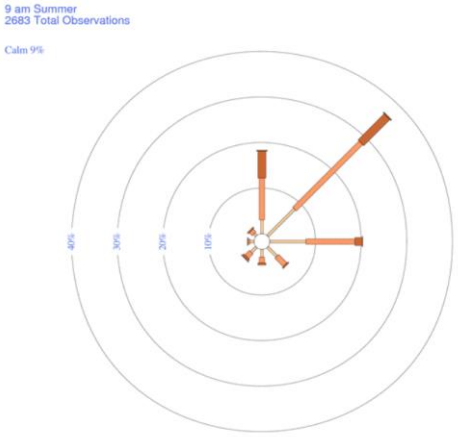


Figure 8 – Summer – Calm 9%

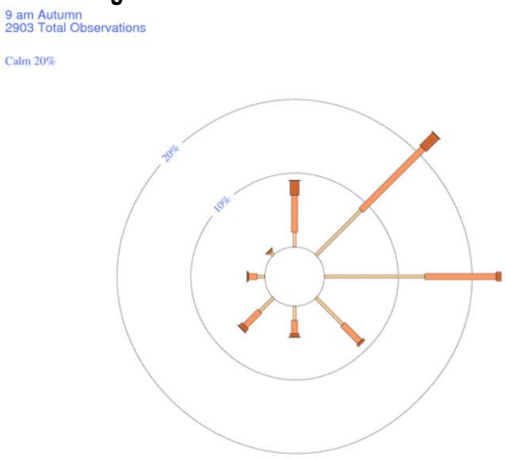


Figure 9 – Autumn – Calm 20%

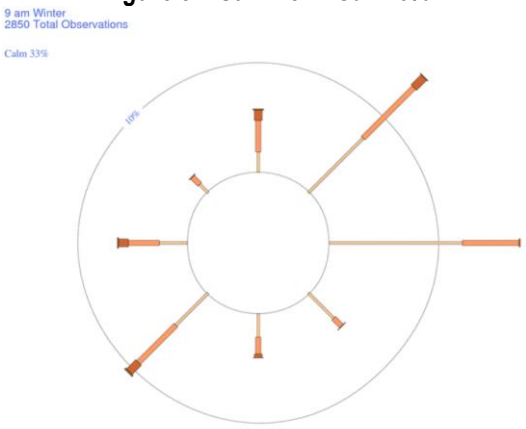


Figure 10 – Winter – Calm 30%

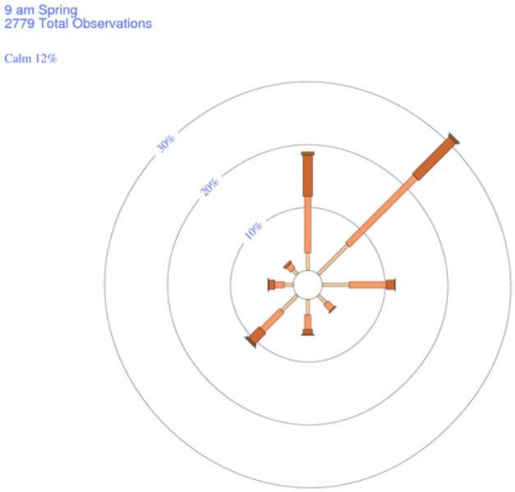
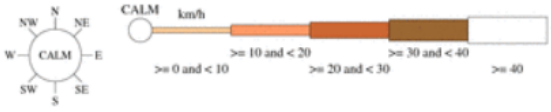


Figure 11 – Spring – Calm 12%



The wind rose data shows that Winter has the highest proportion of calm conditions, the highest wind speeds are over the Winter period and the predominant wind direction over the annual period is from the north east.

Climatic data detailed above, forms a basis for environmental management, particularly with regard to air, water, noise and land management. Mitigation measures for each of these is detailed in their respective sections of this EIS.

3.5 Topography, Soils and Geology

3.5.1 Existing Environment – Topography

The proposed Pearlman Quarry site does have some historical clearing in the form of track and fence lines, however remnant vegetation is present surrounding the proposed quarry footprint. The site is located on what is locally referred to as Death Adder Hill, at approximately 328 m AHD at its peak. The landform is based on a ridgeline which extends from the south east to the north west, forming a watershed.

The proposed quarry operations area will be on the central and eastern area of the hill resulting in drainage from the site ranging from the south west to the north east aspects. Given this, the site currently drains overland to lower order ephemeral drainage lines which connect through cropping land to Tackinbri Creek.

Cross sections as depicted in **Figures 11-13** for the site have been prepared below, sourced from Google Earth, to provide an appreciation of the current condition of the site with respect to existing topographical characteristics.

Cross Section A shows the cross section in a north east to south west direction. The maximum slope in this area is 11.1 % and the slope of this aspect will drain towards the north east in the direction of agricultural farmlands.

Cross Section B shows the cross section in a north west to south east direction. The maximum slope in this area is 8.2 %, associated also with the northerly aspect with drainage to towards the direction of Tackenbri Creek. The areas towards the southern portion of the site has a similar fall in the southern direction.

Figure 12 – Cross Sections

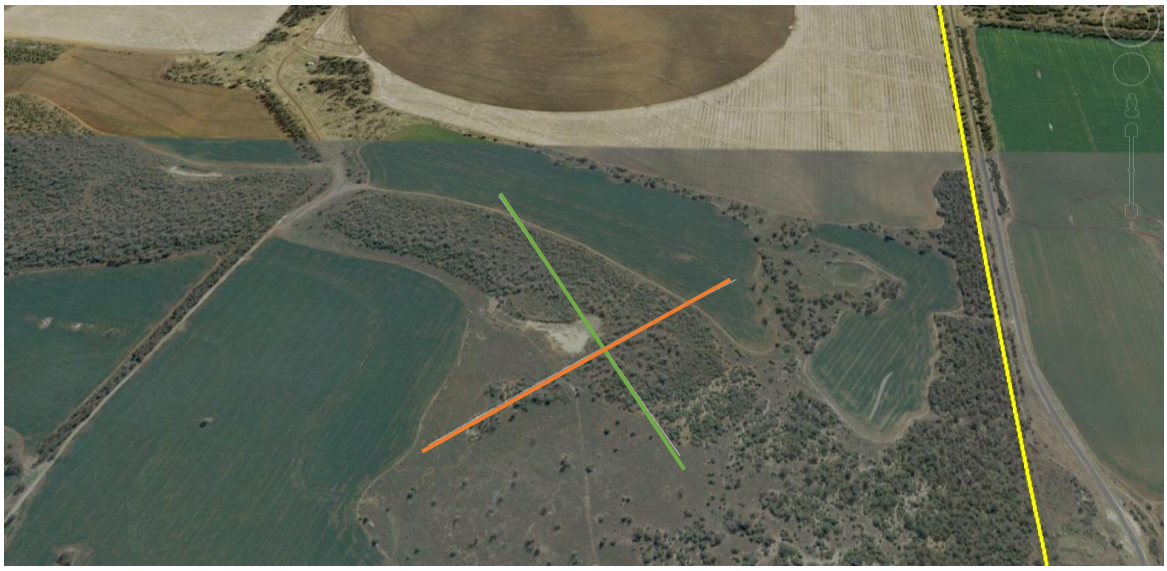


Figure 13 – Pearlman Quarry Cross Section A (North East to South West)

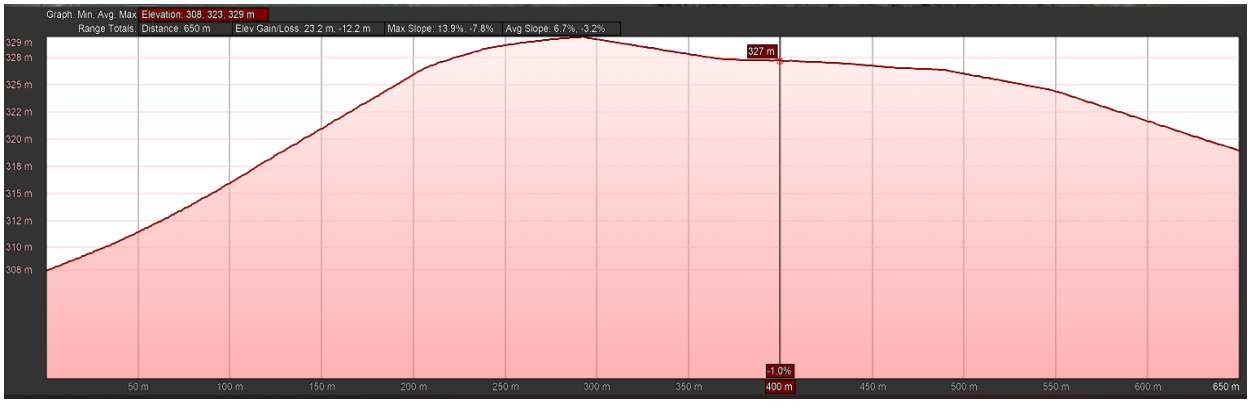
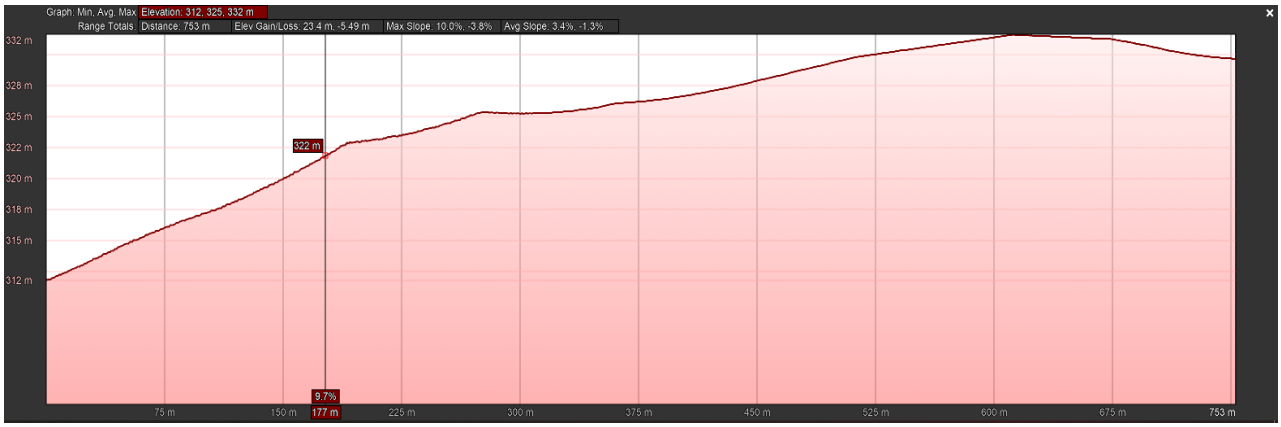


Figure 14 – Pearlman Quarry Cross Section B (North West to South East)



3.5.2 Existing Environment – Soils

A review of available mapping, and information from site visits and resource investigations have been used to inform the description of the existing soils of the site. The NSW Soil and Land Information Database, eSPADE, managed by the NSW Office of Environment and Heritage, has been referred to for assessing the likely soil conditions for the site: The soil distribution for the site is provided below, along with a summary of the main soil characteristics and their limitations.

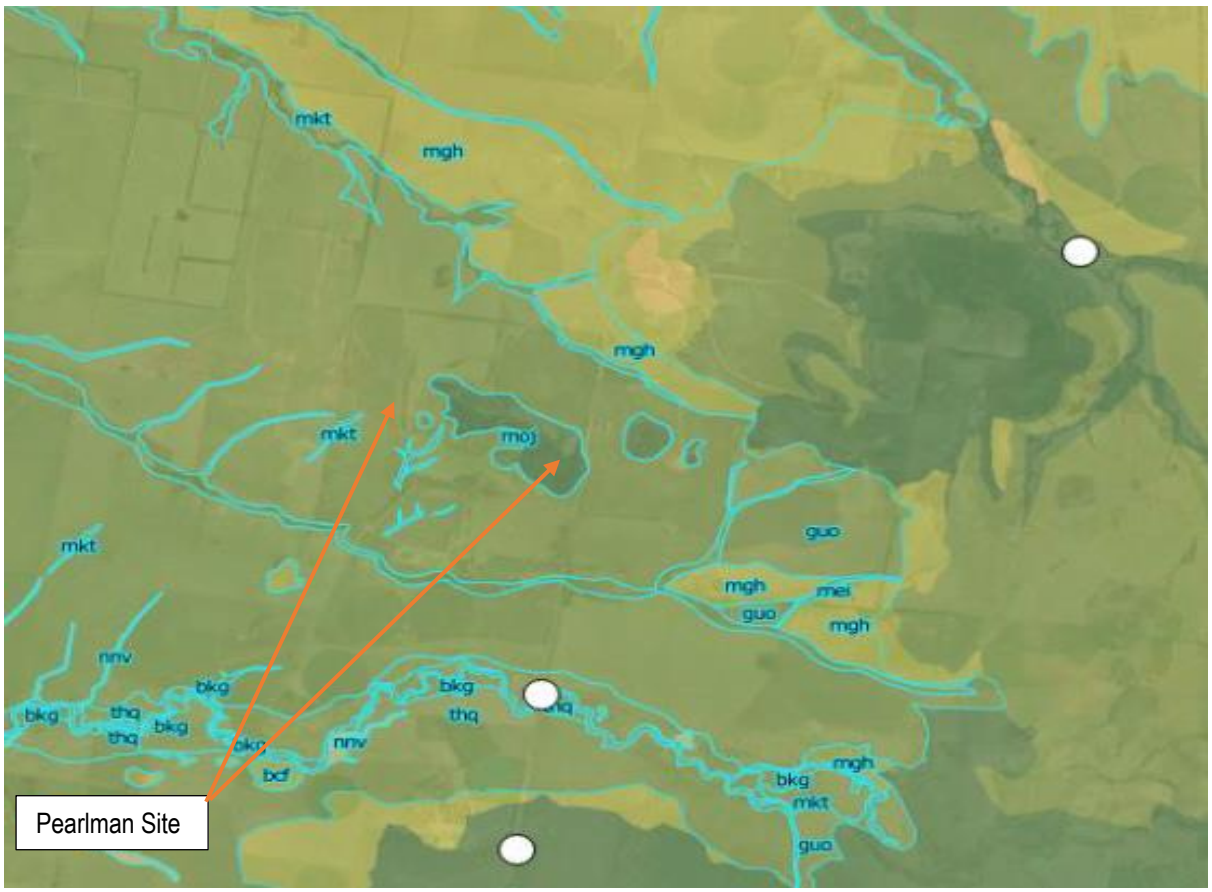


Figure 15 – Soil Distribution (source eSPADE 2018)

Manamoi Soil – Quarry site	**Landscape** - Rectilinear to concave footslopes and gently undulating rises to low hills on Tertiary basalt. Slopes range from 3 - 10 %, local relief varies between 5 - 50 m and elevation ranges between 200 - 330 m. Drainage is by overland flow; natural drainage lines were not observed, although contour banks and grassed waterways have been constructed to control runoff.

	Geology - Geology mapping identifies this area being dominated by Tertiary Volcanics/Nandewar Volcanic Complex (Tnt1) consisting of hawaiite, trachyandesite, tristanite, trachyte, minor peralkaline trachyte and tuff. **Soils** - Soils are generally Vertosols with high shrink-swell properties. Deep to very deep (>150 cm), moderately well-drained, self-mulching Black Vertosols (Black Earths) on slopes and imperfectly to poorly-drained self-mulching Grey Vertosols (Grey Clays) on lower slopes. Moderately deep (50 - 150 cm) Brown Dermosols (Chocolate Soils/Brown Clays) expected on steeper slopes associated with in situ development on bedrock. **Qualities and limitations** - localised foundation hazard, widespread productive arable land, widespread recharge zone, localised discharge zone, localised gully erosion hazard, widespread sheet erosion hazard, widespread high run-on.
Gurley Soil – Stockpile site	**Landscape** - Extensive level plains to undulating rises of Pleistocene alluvium adjacent to bedrock hills in the eastern Moree Plains. Slopes are level to gently inclined, with gradients between 1 - 3%, local relief varies from 1 - 9 m, and elevation ranges between 180 - 320 m. The landscape consists of a large remnant sheet-flood fan system with elevation and local relief rising to the east. Surfaces are locally weakly gilgaied. Drainage is by surface flow and contemporary alluvial processes are absent. These are the eroded fifth terraces of Ward W.T. (1999). These fans are discernible from more recent fan systems by radiometric imagery (low Potassium response). **Geology** – These are the oldest alluvial/sheet flood fans of the north-west plains fans systems (the eroded fifth terraces of Ward et al. (1999), distinguished by a low Potassium radiometric response. Gravel lenses outcrop in some locations, particularly around the edge of the unit where it adjoins the Bellata (btj) soil landscape. In some locations a strongly-structured bright reddish brown subplastic clay, believed to be parna, occurs as prior channel infill deposits. Geological mapping indicates the dominant geological units include an unnamed Quaternary sheet wash (Qc), consisting of often gilgaied clayey colluvium. Also occurring is the Quaternary colluvium (Qrhs3) unit, consisting of often gilgaied clayey substrate, and Unnamed Quaternary Alluvium/Piedmont plain or bajada 3 (Qs3) consisting of texture-contrast soils with sand dominating at the surface. **Soils** – The soils are generally all Vertosols with high shrink-swell properties and consist of very deep (>150 cm), moderately well-drained to imperfectly drained, Epipedal to self-mulching, Brown and Grey Vertosols (Grey Clays) on crests and slopes with occasional Black Vertosols (Black Earths). Very deep (>150 cm), imperfectly drained Grey Vertosols (Grey Clays) on lower slopes. **Qualities and limitations** – Widespread foundation hazard, localised seasonal water logging, localised sheet erosion, Widespread woody weeds, Widespread productive arable land, low salt stores.

The proposed quarry is largely contained within the Manamoi Soil group, the description of which accords well with observations made during the site inspections and resource investigations. Stockpiling and processing areas are likely to be located on the Gurley Soil group.

In addition to the above soil characteristics, other considerations with regard to soil resources have been assessed, specifically Acid Sulfate Soils and Biophysical Strategic Agricultural Land (BSAL). The following information is provided regarding these aspects:

- The site is not mapped as containing Acid Sulfate Soils (ASS), and given its location and geological characteristics, these would not be present in this region.
- The proposed Pearlman Quarry site is partly mapped as containing Biophysical Strategic Agricultural Land (BSAL). BSAL is mapped within the wider site on land including the stockpile area, as shown below in **Figure 16 – BSAL Distribution.** The extraction and operational areas are not proposed to be undertaken in areas of BSAL.

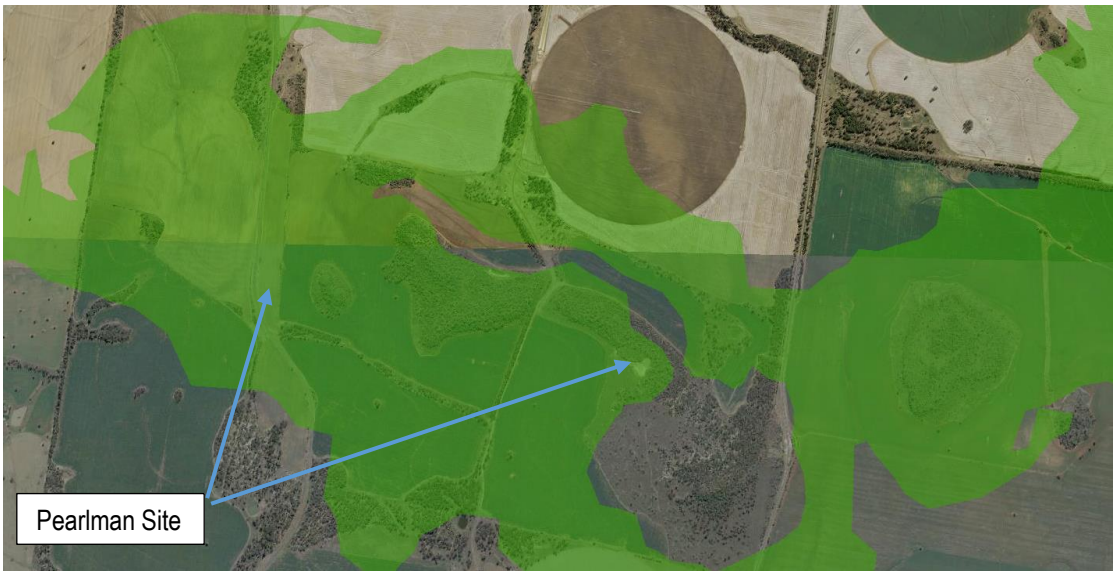


Figure 16 – BSAL Distribution (Adapted from NSW Planning Portal)

The area of mapped BSAL generally correlates with both the Manamoi and Gurley Soil distribution within the site. Majority of the soil type that the Pearlman Quarry footprint is located on areas mapped as BSAL. As such the Pearlman Quarry does propose to disturb areas mapped as BSAL, however as per the photos below (refer **figure 17**) it appears that where this BSAL is mapped in areas of in the upper hill slope the soil profile in these locations are constrained with a large number of basalt floaters in the upper horizons of the soil profile. Based on this the areas of the quarry footprint mapped as BSAL are likely to have limitations in supporting agriculture which is further demonstrated in the land capability mapping shown in figure 18.

Figure 17 – Soil conditions in areas of mapped BSAL

3.5.3 Existing Environment – Geology

The geology of the site comprises ridgelines of remnant undifferentiated Tertiary basalt flows which overlie Jurassic sandstones and siltstones of the Warialda Sandstone. The ridgeline to the west of the site is considered as a localised volcanic vent due to its limited lateral extent, varying depth profile (>30m in the central portion) and occurrence of pumice breccia on the margins. The site of the proposed Pearlman Quarry occupies a relatively thin but laterally extensive basalt ridge and considered to be a remnant flow, possibly sourced from the nearby vent further to the west.

3.5.4 Potential Impacts

Potential impacts on topography, geology and soils predominantly relates to secondary impacts to soil resources such as loss through erosion, surface water and groundwater quality degradation, geotechnical stability and air quality impacts. Quarrying activities by their very nature result in disturbance to land, resulting in exposure of soil which may result in dust generation and sediment loss from stormwater overland flow.

A summary of potential impacts is as follows:

- Change to topography characteristics that redirects or retains overland flow.
- Loss of soil resource because of wind erosion.
- Loss of soil resource because of water erosion.
- Impacts on waterways associated with sediment loss.
- Impact on air quality as a result of dust generation.
- Erosion of soil surface as a result of concentrated stormwater flows.

As noted above, impacts from disturbance of problematic soils (i.e. ASS) won't occur. Likewise, there will be impacts will be contain within areas of non-productive agricultural land that are limited by topography, vegetation and bedrock. The impacts identified can be readily managed by implementing appropriate soil conservation, erosion and sediment control, and air quality management measures.

3.5.5 Management and Mitigation Measures

Conservation of soil resources will be required during the operation of the site, and for those areas requiring disturbance, management of the soil resource and associated potential impacts will be required to be undertaken. Likewise, at the cessation of quarrying activities the site will be required to be rehabilitated to restore the cultivation capacity of the disturbance areas.

Table 5 – Soil Management

Aspect	Control
Erosion and Sediment Controls	• See **Section 4.8 Surface Water.**
Soil Management	<u>*Topsoil Stripping*</u> • A nominal stripping depth of 100 mm has been allowed for the proposed quarry area. • The operator shall remove topsoil from within the limits of disturbance to a depth of 100 mm unless determined otherwise through the site validation. • All grass, root fibre, decayed vegetable matter and any other organic or deleterious material shall be removed and stockpiled for reuse in the rehabilitation of the site. <u>*Prior to Stripping Commencing*</u> • Topsoil stripping depths will be determined and marked on site for earthmoving plant operators to follow. • Earthmoving plant operators are to be made aware of stripping depths and the topsoil stripping management plan. • Prior to stripping activities, Aboriginal cultural heritage clearance approvals will need to be in place (see **Section 4.11)**. • Suitable stockpile areas (as required) will be nominated. • Suitable areas for direct return of topsoil (if available) will be nominated.

Aspect	Control
	Stripping • The topsoil removed shall be applied directly on to a prepared rehabilitation area. If no rehabilitation areas exist topsoil shall be stockpiled at appropriate locations. • Topsoil will be recovered using appropriate equipment. Depending on compaction and recovery rates, deep ripping may be required to maximise topsoil recovery with care taken not to mix topsoil with problematic subsoil. • It is preferable for material to be stripped when it is in a lightly moist condition. • Contractors bringing machinery onto the site will be required to present such machinery in a weed-free condition (ss **Section 4.15**). • Disturbance areas will be stripped progressively, as required, in order to reduce erosion and sediment generation, to reduce the extent of topsoil stockpiles and to utilise stripped topsoil as soon as possible for rehabilitation. • Rehabilitation of disturbed areas, such as roads, embankments and batters, will be undertaken as soon as practicable after these structures are completed / no longer required or as areas are no longer required for quarrying purposes. *Stockpiling* • Topsoil shall be stockpiled in low mounds. • The side slopes of stockpiles shall not be steeper than 1 vertical in 4 horizontals. • Surface drainage of the stockpiles shall be managed to minimise loss of material through erosion. Stockpiles shall not be located so as to impede the drainage from upstream catchment areas. • Stockpile locations will be subject to the following management actions. • Grazing stock, machinery and vehicles will be excluded. • Overland water flow onto or across stockpile site will be kept to a practical minimum. • Where possible, stockpile sites will be selected to maximise protection from `the prevailing winds, particularly if the material is friable in nature (e.g. sand or silt). • Drainage from higher areas will be diverted around stockpile areas to prevent erosion. • As required, sediment controls will be installed downstream of stockpile areas to collect any run-off. • Topsoil stockpile locations will be strategically located to assist the sequence of future rehabilitation. *Respreading of Topsoil* • Topsoil shall be respread evenly over the rehabilitated area and access tracks on completion of operations. • Balance the topsoil requirement for rehabilitation areas against stored stockpile inventories and proposed stripping volumes. • Maximise the opportunities for direct placement of topsoil from pre-strip to rehabilitation areas. • During removal of soils from the stockpiles, take care to minimise structural degradation of the soils. • Respread topsoil material in even layers at a thickness appropriate for the landform and land capability of the area to be rehabilitated. • Contour rip to encourage rainfall infiltration and minimise run-off. • Soon after respreading, plant cotton, to return the disturbance area to the pre-disturbance use (cotton cultivation). • Construct contour banks in accordance with the applicable landform design criteria to limit slope lengths and control run-off. • Construct collection drains and sedimentation dams to collect run-off and remove suspended sediment. • Regularly inspect and maintain rehabilitation areas to facilitate sediment and erosion control and revegetation success. • Regularly inspect rehabilitated areas for declared plants and environmental weeds, and control significant weed outbreaks using chemical or mechanical control methods.

Aspect	Control
Rehabilitation	• See Management and Mitigation Measures detailed in **Section 4.3 Land Capability**
Commitments	• Quarry Environmental Management Plan to include Erosion and Sediment Control Plan (prepared in accordance with DECC, 2008 *Managing Urban Stormwater Soils and Construction vol 2E*). • The Quarry Environmental Management Plan will include a Rehabilitation Management Strategy.

3.5.6 Assessment of Impacts

Whilst the proposal will disturb the land, appropriate mitigation measures will manage the potential impacts. Erosion and sediment controls will minimise potential impacts to water and air quality, and rehabilitation of the site as a free draining landform suitable for the continuation of agricultural activities will also ensure that the land capability is restored.

3.6 Land Capability

3.6.1 Existing Environment

Land and soil capability assessment is a function of the biophysical aspects of the subject land, including the parameters - slope, wind hazard, soil pH, surface structural stability, salinity, rocky outcrop, water logging, potential and existing erosion of a landform. Land capability is classified into a numerical system with 1 being the land with the fewest limitations for agricultural uses, and 8 being land with extreme limitations and the least capability to support agricultural activities. The NSW Soil and Land Information Database, eSPADE, managed by OEH, has been referred to for assessing the mapped land capability of the site, which is shown below in **Figure 17 – Land Capability**. **Table 6 – Land Capability Summary**, details the land capability classification for the site. It is important to note that the all quarrying activities **will be wholly contained** within the area mapped as Land Capability Class 4.

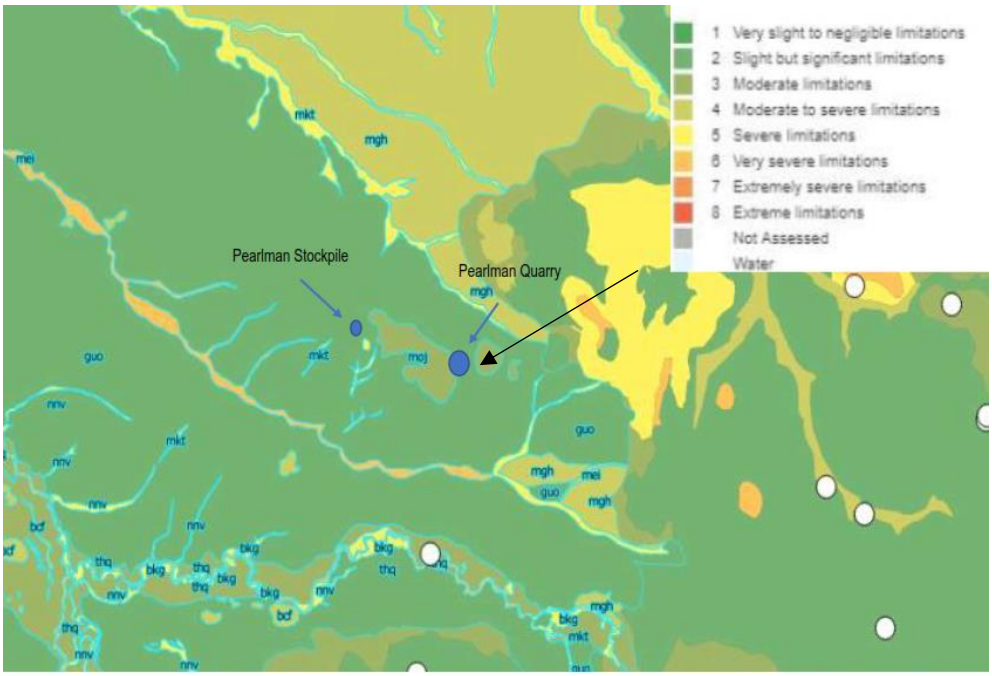


***Figure 18 – Land Capability** (Source: eSPADE)*

Table 6 – Land Capability Summary

Area on site	Land Capability	Comment
Proposed Quarry Site	4 - Moderate/Severe Limitations	The proposed quarry is contained within the Death Adder Hill which is class 4 land. Limitations are likely owing to topographical and geological constraints such as existing erosion, shallow soils, steep slopes and rock outcrops resulting in the inability to effectivity utilise the land for cultivation for high value crops.

Area on site	Land Capability	Comment
Proposed Stockpile Site	2 – Slight but Significant Limitations	The Pearlman Quarry will utilise the existing stockpile area already established for the Tikitere site. This area avoids remnant vegetation and areas under cultivation.

3.6.2 Potential Impacts

The quarrying activity will alter the topography and soil resource because of the disturbance activities. This impact will be limited to the area mapped as Land Capability Class 4. The potential impacts include the erosion of disturbed areas, the mobilisation of rock, further shallowing of the soil resources and formation of a benched landform. The management of these potential impacts are outlined in the table below.

3.6.3 Management and Mitigation Measures

The area disturbed for the quarrying activity will be rehabilitated to a suitable standard for supporting ongoing rural activities. The mitigation and management measures used to conserve soil during the works are provided below.

Table 7 – Soil Management

Aspect	Control
Erosion and Sediment Controls	• See **Section 4.8 Surface Water.**
Weeds	• See **Section 4.15 Biosecurity**
Rehabilitation	*Removal of Infrastructure* • Site buildings, plant and equipment will be removed at the cessation of the extraction activities. • There are no site services that will require rehabilitation at closure as these services will be made available through alternative means (i.e. generator for power, rainwater or bore water for water use, satellite phones for communications etc.). • Roadways and haul roads that are not required post quarrying land use will be decommissioned and rehabilitated. These areas will be reprofiled to match surrounding rehabilitation profile, ripped and seeded to encourage vegetation regrowth. • All refuelling will be done via service truck to eliminate the need to store large quantities of fuel onsite. If necessary, any contaminated soils will be preferentially treated on-site in accordance with the recommendations of a Site Based Management Plan (SBMP) or any recommendations from the site-specific contaminated land assessment. *Rehabilitation of Sediment Basins* • Any sediment basins will be retained as agricultural dams • Alternatively, sediment basins may be filled to a level consistent with the surrounding landform. *Landform Shaping* • When the floor level for a working area has been excavated to its final extraction level and is no longer required for ongoing quarry activities, the floor will be graded to encourage water drainage in the appropriate direction. • Once desired landform shape has been achieved the area will be top soiled and seeded to achieve ground cover and stable landform. *Soil Preparation* • Remove any weed species which may be present in the overburden and topsoil stockpiles prior to using in the rehabilitation works. • Carry out soil tests to determine whether any soil ameliorants (e.g. nutrients, lime, gypsum) are required to improve the quality of the topsoil and overburden for supporting vegetative growth. • Spread topsoil a minimum depth of 0.1 m. The topsoil should be moist but not wet when spread. • Incorporate any required soil ameliorants during the spreading works. • Topsoil is to be levelled to achieve an even but roughened surface.

Aspect	Control
	• If the operational requirements permit, topsoil and overburden materials can be placed directly over quarry floor areas as an alternative to stockpiling these materials. *Revegetation* • Return the land to a condition capable of sustaining the ongoing rural land uses. *Stockpile areas* • Areas that have been used for stockpiling with be deep ripped and treated with an ameliorant if required. These areas will be restored to a condition suitable for supporting agricultural production.
Commitments	• Quarry Environmental Management Plan to include a: ○ Erosion and Sediment Control Plan (prepared in accordance with DECC, 2008 *Managing Urban Stormwater Soils and Construction vol 2E*); and ○ Rehabilitation Management Strategy; and ○ Pest and Weed Management Strategy.

3.6.4 Assessment of Impacts

The quarrying activity will alter the topography and soil resource as a result of the disturbance activities. The extractive activities will be limited to the area mapped as Land Capability Class 4, and not in areas that are suitable for supporting high value agriculture. Rehabilitation of the quarry will be progressive as areas become available for restoration. All disturbed areas will be rehabilitated to a final condition suitable of continuing the agricultural activities in the area. This includes the area to be utilised as the stockpile area.

3.7 Land Use Conflict

3.7.1 Surrounding Land Uses

The surrounding land uses in the local setting of the site are dominated by similar agricultural land uses comprised by broadacre crop production. Sensitive receptors in the area are rural dwellings on the surrounding farms. The locations of the nearest sensitive receptors are identified in **Figure 19 - Closest Sensitive Receptors**.

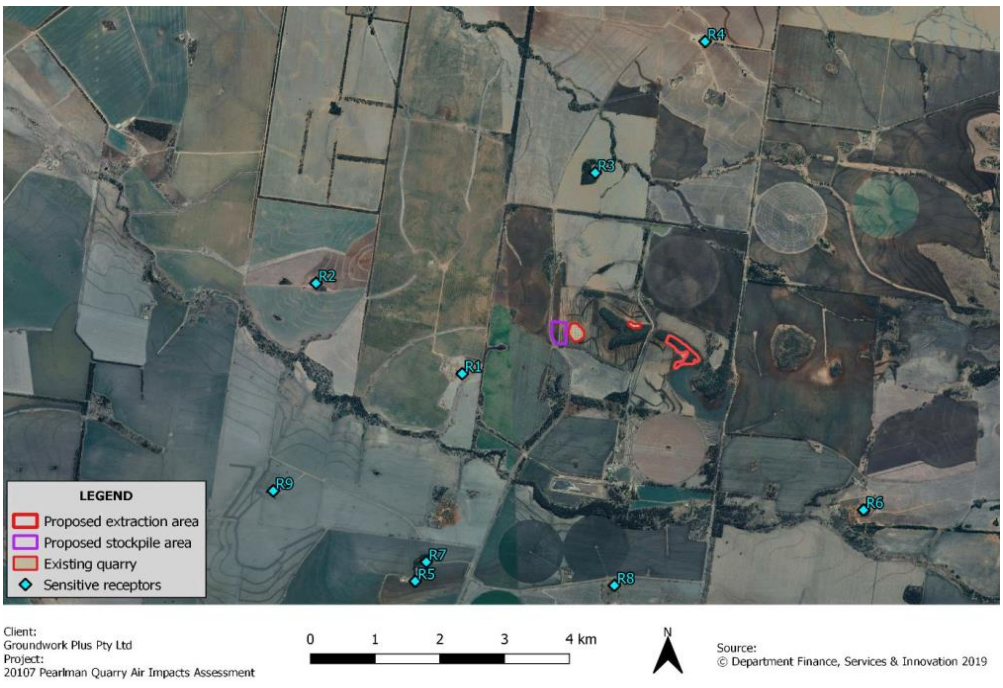


Figure 19 - Closest Sensitive Receptors (adapted from Advitech 2019)

The distances of each receptor to the proposed quarry have been included in **Table 8 - Separation Distances from Sensitive Receptors.**

Table 8 - Separation Distances from Sensitive Receptors

Receptor	Address	Direction from Proposed Quarry	Distance (m)
R1	1137 Croppa Creek Road	W	1500
R2	473 Birrahlee Road	W	3700
R3	1176 Oaklands Road	N	2900
R4	1835 Croppa Creek Road	N	4300
R5	391 Boonery Park Road (Lot 1 DP1080910)	SSW	3400
R6	1216 Croppa Creek Road	ESE	3400
R7	391 Boonery Park Road (Lot 54 DP751116)	S	3400
R8	141 Boonery Park Road	S	3500
R9	391 Boonery Park Road (Lot 1 DP751134)	SSW	4200

3.7.2 Potential Impacts

The potential impacts for land use conflicts with sensitive receptors are typically caused by environmental nuisance in the form of dust, noise, odour and visual impacts. These aspects have been assessed and the table below provides an overview of the management and mitigation measures that will be adopted to minimise these impacts.

3.7.3 Management and Mitigation Measures

Quarries should be separated from sensitive receptors by maintaining a suitable buffer distance to help minimise the potential impacts of environmental nuisance. **Table 9 - Recommended Minimum Buffer Distances** below outlines minimum buffer distances recommended for mining, petroleum production and extractive industries.

Table 9 - Recommended Minimum Buffer Distances

Mining, Petroleum Production & Extractive Industries		
Receptor	**Normal Operations (m)**	**Blasting (m)**
Residential areas & urban development	500	1000
Rural dwellings	500	1000
Educational facilities & pre-schools	500	1000
Rural tourist accommodation	500	1000
Watercourses & wetlands	SSD	SSD
Bores & wells	SSD	SSD
Potable water supply/catchment	SSD	SSD
Property boundary	SSD	SSD
Roads (public)	SSD	SSD

SSD: Site Specific Determination.
Source: Department of Primary Industries (2007) Living and Working in Rural Area Handbook.

As blasting is required as part of the proposed quarry the buffers required for operations the proposed separation distances have been compared with the recommended industry standard. As the closest sensitive receptor is located approximately 1.5 kilometres to the south-west of the proposed quarry site the available separation distance exceeds the minimum buffer distance requirements identified in **Table 9 - Recommended Minimum Buffer Distances**. It is therefore considered that the proposed quarry is sufficiently separated from any of the sensitive land uses surrounding the site and therefore the risk of land use conflict and adverse amenity impacts associated with the development is minimal.

The Tikitere Quarry is located on the same land as the Pearlman Quarry which are separated by a minimum distance of 850m. As these quarries will be operated by the same quarry operator quarry impacts can be managed at both sites. Cumulative impacts assessment of these sites is described in further details in later section of this report (refer to section 6).

Management and mitigation measures to reduce the potential impacts for land use conflicts with sensitive receptors (i.e. caused by environmental nuisance such as dust, noise, vibration, odour or visual impacts), is detailed in their respective sections in this EIS.

3.7.4 Assessment of Impacts

The development is considered permissible within the current zoning and complies with all recommended separation distances. With the implementation of the proposed mitigation and management measures, the proposed development will not introduce any new impacts, to such an extent as to unacceptably reduce the amenity of surrounding sensitive land uses and rural residents. The proposed development is therefore not considered to pose a significant risk to any land use conflict within the locality.

3.8 Visual Amenity

3.8.1 Existing Environment

The Pearlman Quarry is located atop Death Adder Hill. The surrounding area is rural, the closest receptor is located approximately 1.5 kilometres to west south-west of the quarry site (see **Section 4.4.1**).

In addition, the following measures are recommended to improve the visual amenity of the development:

- Retain and protect vegetation located outside of the identified extraction zone.
- Where possible, retaining and enhancing vegetation along riparian margins.
- Revegetation the site with appropriate species.

3.8.2 Potential Impacts

The potential for visual impacts from the proposed quarry is limited to the presence of equipment and stockpiles that may be visible from nearby residences, public places or roads. Key potential impacts to visual amenity that may result from the operation of the Pearlman Quarry include:

- Increased visual permeability.
- Change in landscape from cultivated land to quarry operation.
- Impacts to air quality (i.e. dust generation) during operations.
- Increased traffic on the haul roads.

3.8.3 Management and Mitigation Measures

The proposed quarry footprint is set back approximately 550 metres from Croppa Creek Road and will be screened from view by an existing tree line on site. The nearest sensitive receptor is 1.8 kilometres to the west south-west and will be screened from the operations by the existing topography of the hill and an existing tree line running along the western boundary of the adjoining lot. Sensitive receptors located to the south east of the quarry may have line of sight to the disturbance area. In addition to the adequate separation distances, the following management measures are proposed to be adopted to minimise the visual impact of the proposed development:

Table 10 – Visual Amenity management

Aspect	Control
Quarry Design	• The quarry design utilises the receding rim technique to minimise the extent of the quarry that will be visible.
Vegetation	• Retain vegetation located outside the identified extraction zone to screen and soften visual appearance. • Where possible clear the site in stages to minimise disturbance including the retention of vegetation until areas are required to meet operational requirements. • Where perimeter bunds or stockpiles are formed these areas are to be seeded to minimise the amount of exposed areas.
Rehabilitation	• Undertake the rehabilitation of disturbed areas when they are available and no longer required by the operation.

Aspect	Control
Quarry Design	• The quarry design utilises the receding rim technique to minimise the extent of the quarry that will be visible.
Air Quality	• See **Section 4.6 Air Quality.**

3.8.4 Assessment of Impacts

The Pearlman Quarry would not be visible from the Croppa Creek-North Star Road as a natural woodland corridor extends along the side of the highway. This established vegetation covers a width of approximately 40m, providing a natural screen for the site. The plant and associated quarry equipment will be located on the eastern side of the primary quarry, hidden from view of the receptor. Similarly, the receiver (R3) to the north west is over 2.9 km from the extraction area. It is considered that visual impacts to this receiver are expected to be minimal as there are a number of mature vegetation corridor between the residence and the extraction area.

3.9 Air Quality

3.9.1 Existing Environment

In assessment of the ambient air quality of the area surrounding Pearlman Quarry, monitoring data was obtained from the NSW Office of Environment and Heritage. The data available closest to the subject site consisted of Narrabri and Tamworth stations. A summary of the ambient particulate data applied to this assessment is provided in **Table 11 – Ambient Air Quality**, below.

Table 11 – Ambient Air Quality

Station	Pollutant	Averaging Time	Ambient (µg/m³)		Source
Regional Station Tamworth	PM10	Annual Average	15.3		Clearing the Air New South Wales Air Quality Statement 2017
	PM2.5	Monthly Average	17.8		
Local Station Narrabri	PM10	Monthly Average	Dec 17	11.9	Narrabri PM10 monthly average derived from 1h average (µg/m³)
			Jan 18	15.4	
			Feb 18	12.6	
			Mar 18	10.9	
			Apr 18	14.8	
			May 18	14.9	
			Jun 18	10.9	
			Jul 18	9.5	
	PM2.5	Monthly Average	Dec 17	5.4	Narrabri PM2.5 monthly average derived from 1h average (µg/m³)
			Feb 18	6.6	
			Mar 18	5.1	
			Apr 18	4.4	
			May 18	5.8	
			Jun 18	4.7	
			Jul 18	4.4	
			Dec 17	4.4	
			Jan 18	5.4	
General	Dust deposition	Annual average	40 mg/m²/day 1.2 g/m²/month		Assumption based upon typical data

3.9.2 Potential Impacts

The main sources of air emissions generated through the operation of the Pearlman Quarry are identified as follows;

- Vehicles driving along unsealed internal haul roads and access roads leading to the site.

- Topsoil stripping and overburden removal and placement.
- Extraction will result in the disturbance to in-situ rock and soil which will require the use of heavy machinery equipment to remove and relocate the material.
- Haulage of material from the extraction areas to processing plant.
- Loading and unloading of quarry products
- Haulage of final product off-site.
- Dust generation caused by blasting.
- Combustion engines (i.e. exhaust smoke).

Considering the above, the following air emissions at the Pearlman Quarry require management techniques:

- Particulate emissions
- Greenhouse gas emissions.

Each of the identified sources of air emissions can be reasonably managed through proactive site management measures as identified in table 12. Emissions of airborne pollutants, specifically particulates, if not controlled and managed, may have the following impacts to the surrounding environment:

- Environmental impacts
    - Reduction in visibility in atmosphere
    - Smothering of vegetation
    - Degradation of water quality leading to aquatic impacts

Similarly, particulates also have impacts on human health quarry workers and surrounding residents as follows;

- Short-term exposure (hours to days) can lead to:
    - Irritated eyes, nose and throat
    - Worsening asthma and lung diseases such as chronic bronchitis (also called chronic obstructive pulmonary disease or COPD)
    - Heart attacks and arrhythmias (irregular heart beat) in people with heart disease
    - Increases in hospital admissions and premature death due to diseases of the respiratory and cardiovascular systems
- Long-term exposure (many years) can lead to:
    - Reduced lung function
    - Development of cardiovascular and respiratory diseases
    - Increased rate of disease progression
    - Reduction in life expectancy

Mitigation measures have been nominated to control the emissions of particulates from the Pearlman Quarry to ensure these impacts do not occur.

3.9.3 Management and Mitigation Measures

The following table provides the proposed management and mitigation measures to be adopted to manage air quality and dust emissions as part of the proposed development.

Table 12 – Air Quality Management

Aspect	Control
General	• Ensuring all vehicles are to a road registered standard which includes exhaust systems that minimise gaseous and particulate emissions meeting vehicle design standards. • Training of site personnel to include awareness for dust minimising behaviours and practises will be provided to the workforce personnel including any subcontractors. • Signage will be erected around the site to remind workers of suitable dust minimising behaviours. • A complaint management system will be used to ensures that complaints are recorded, investigated and responded to within a reasonable timeframe. • Burning of vegetation waste, waste tyres or any other waste products is not permitted on site at any time.

Aspect	Control
	• Ensure all access roadways, material storage areas and vehicle entry points have appropriate dust mitigation. • Routinely monitor site conditions to ensure that mitigation measures are being implemented and are suited to the conditions. Records can also be reviewed in the event of a complaint or report of a safety concern.
Site Establishment	• Limiting vegetation and soil clearing to areas only necessary for operations, minimising the total area of exposed dust generating surfaces. • All active work areas and haulage roads will be routinely treated with water sprays, or suitable dust suppressant additive as required. • Reducing disturbance activities during periods of excessive wind or periods where dust generation and dispersal is more likely to occur.
Plant and Equipment	• Clearing spillages from side rails, tailgates and draw bars of trucks (following loading and tipping). • Levelling loads prior to truck exit from the site • Securing tailgates of all haulage vehicles prior to loading to prevent material loss along access roads. • Haulage vehicles transporting products to and from the site must have their loads covered and secured at all times, apart from loading and unloading in the processing areas. • Quarry performance to be monitored to prevent trucks queuing, unnecessary idling of plant and equipment in order to minimise unnecessary fuel burn. • Vehicles and equipment must be fitted with appropriate emission control equipment and routinely maintained. Plant should be switched off when not in use. • All plant, equipment and vehicles are to be regularly serviced according to the manufacturer's specifications. This will include daily prestart checklists to identify any faults that may lead to excessive emissions. A maintenance schedule will be established prior to commencement of works and all maintenance records will be kept on site. • Air emissions from plant, vehicles and equipment should be visually monitored throughout construction. • Site speed limits are to be clearly displayed upon entry to the site. Drivers are to obey on-site speed limits and adopt driving practices that minimise dust generation.
Disturbed Areas	• All disturbed areas such as excavations, processing areas, haulage routes, stockpile area and other disturbed areas will be treated with a water spray or suitable dust suppressant (i.e. tackifier or soil binder) as required. • Vegetation clearing and topsoil stripping will be staged to minimise disturbance of the quarry footprint until areas are required by the operation. This also includes restricting vehicles access to these areas until necessary for operations. • Monitoring meteorological forecasts when planning dust generating activities to ensure these can activities can be timed with favourable weather conditions. • Where possible integrate dust suppressants into the use of the mobile crushing and screening plants or other dust generating equipment on the site.
Stockpiles	• Using water sprays as required during winds likely to generate dust releases. • Stabilising and revegetating topsoil stockpiles where possible. • Using dust suppressants and shielding/wind breaks/screens where possible. • Stabilise surface area of stockpile pad to ensure dust promoted through material handling processes are minimised.
Internal Trafficable Areas	• Enforce a maximum speed on internal roads. • Keep trafficable areas well maintained, at a reasonable grade and free of loose dust generating material. • Dampen down trafficable areas using water sprays and/or dust suppressants. (i.e. chemical additive used in conjunction with water truck). Watering of all haul roads and access roads at a rate of at least 2 litres/m^2/hour at times when dust emissions are visible from vehicle movements • If dust emissions are still visible on internal haul roads after the above management measures have been adopted, then specialist advice will be sought for a suitable road stabiliser / binder to further reduce emissions to air.
Odour	• The use of odorous substances or particulates, which create or are likely to create objectionable conditions for the public are not permitted for use on the site.

Aspect	Control
Blasting	• Unless prior approval is obtained from the administering authority; blasting is only permitted during the hours of 9am to 3pm Monday to Friday, and from 9am to 1pm on Saturdays. Blasting is not permitted at any time on Sundays or public holidays. • Handling, transport and use of explosives shall be carried out in accordance with the requirements of AS 2187.2-2006 Explosives - Storage and use - Use of explosives, and the Mining and Quarrying Safety and Health Act 1999 (MQSH Act) and associated Regulation. • Only suitably experienced and qualified blasting personnel shall be employed or contracted to provide blasting services. • The maximum instantaneous charge or charge mass per delay will be limited to the lowest possible level. • A blast plan shall be prepared for each blast, containing blast hole layout, initiation sequence, charging, stemming type and height, charge weight and any other design element, required for good blasting practice. • Blast areas may be dampened down prior to blasting to minimise dispersion of dry and fine materials where practicable, or where it is identified as a source of potential dust nuisance. • Each blast will be monitored, and the blast plan and design reviewed in the event where excessive dust in generated. • As the Pearlman and Tikitere sites are operated by the same organisation safety for workers will be managed through the usual blast exclusion zones coordinated between both sites.
Mobile equipment	• Where possible integrate dust suppressants such as water sprays around the working areas of all dust generating mobile equipment.

The operation of the Quarry with plant and equipment will result in the production of greenhouse gas emissions. By limiting greenhouse gases production through implementing the following management measures such that the impacts to air quality can be minimised.

Table 13 – Greenhouse Gas Management

Aspect	Control
Procurement:	• Procurement guidelines will consider a suite of environmental sustainability requirements prior to product acceptance at the site which may include but not limited to: - Consideration of the energy efficiency ratings of equipment. - Fit for purpose plant and equipment - Sustainability to be adopted into whole of lifecycle asset management strategy - Identification of waste streams and quantities of waste being generated through the sourcing of imported materials. - Waste minimisation strategy which has developed targets commitment to reducing waste. - Opportunities to source hybrid plant and equipment or those that use alternative fuels such as biodiesel or electricity. - Sourcing of materials from local suppliers to minimise traveling time.
Vehicles, Traffic and Transport Planning	• Implementation of vehicle operating guidelines to encourage correct and efficient operation of vehicles that seeks to; • Reduce the number of vehicles and/or trips required for transport • Uses buses for transportation of large numbers of personnel to minimise number of vehicles operating • Implementation of a wider fuel management strategy which encourages use of more efficient plants and vehicles, planning, logistics, driver education and maintenance • Driver and operator training in relation to efficient operation of vehicles, plant and equipment. • Sustainability to be adopted into whole of lifecycle asset management strategy • Workforce awareness to be raised around driver behaviour that minimises diesel consumption and wear and tear on parts. • Undertake daily prestart checks to flag any faults with the plant and equipment that may lead to excessive air quality pollutants. • Regularly service vehicles, plant and equipment such that exhaust systems and fuel consumption comply with manufacturers' specifications. • Minimise transportation distances within the site wherever possible.

Aspect	Control
	• Operate and maintain air conditioning systems in accordance with manufacturer's instructions and Guide to Best Practice Maintenance & Operation of HVAC Systems for Energy Efficiency (Council of Australian Governments National Strategy on Energy Efficiency January 2012 • Provide workforce bus to ensure carpooling between nearest township and the worksite can occur.
Waste	• The site will be planned to ensure products such as overburden and topsoil are stockpiled efficiently around the site to ensure that onsite reuse can occur with the minimum of fuel consumption and product handling subsequently reducing the amount of vehicle movements and overall fuel usage during the quarry lifecycle. • Offsite disposal of waste is unlikely however the nearest lawful place of disposal will be identified based on the waste streams being generated from the site. • See **Section 4.14**.
Communications	• Use of teleconferencing and video conferencing will be used to reduce travel to and from offices and therefore reducing the contribution of greenhouse gaseous emissions associated with travel.
Vegetation Clearing	• Vegetation clearing will be restricted to the areas required for extraction, internal haul roads ancillary and stockpile areas and erosion and sediment control measures. Clearing for these areas will completed progressively in a staged approach to meet the operation needs of the quarry whilst maintaining groundcover across the site.

3.9.4 Assessment of Impacts

The air quality management practices outlined in **Table 12** and **13** are considered industry best practise for the prevention and/or minimisation of particulate matter for extractive activities. It is considered that this suite of management practices will be sufficient to control dust emissions from the quarry site. An Air Quality Management Plan will be developed to ensure the above management practices are implemented as part of the approved development. An Air Quality Impact assessment has been prepared by Advitech as part of this EIS (refer **Attachment 7 – Air Quality Impact Assessment**). This assessment has considered the operation of the Pearlman Quarry operating at 490,000 tonnes per annum against the NSW EPA air quality criteria. The assessment has also considered the cumulative impacts of operating the both the Pearlman and Tikitere Quarries within the same area. The assessment has concluded that the proposed Pearlman Quarry operating exclusively or simultaneously with the Tikitere site will maintain compliance with all NSW EPA air quality criteria through the adoption of the mitigation and management measures described in tables 12 and 13 above.

3.10 Noise and Vibration

3.10.1 Existing Environment

The site and surrounding environment are comprised by rural land comprised mostly by agricultural activities. As such the ambient background noise is comprised by the following noise sources:

- Agricultural equipment.
- Traffic on public and private roads, including sealed and unsealed roads.
- Livestock and other fauna (birds, insects etc.).
- Wind in vegetation.
- Occasional aircraft movements.

Advitech was engaged to undertake a noise impact assessment of the site to determine the existing environment and predict the impact that the proposed development would have of the locality. As part of this report the ambient noise levels were determined for the site and haulage route through attended monitoring. The results are shown below in Table 14.

The results of the attended noise monitoring are reflective of the rural setting however In lieu of completing a long-term monitoring campaign, the Rating Background Levels (RBL) of the Noise Policy of Industry (NSW) were adopted for the purposes of this assessment. These values are considered to be more conservative than the conditions that may be present at the site. The sensitive receptors in the locality surrounding the site are predominately rural dwellings. The locations of the nearest sensitive receptors are identified in **Figure 21 – Closest Sensitive Receptors**.

Table 14 – Details of operator attended monitoring

Location	Date	Measured Noise dB(A)			Observations
		LA90	LA1	LAeq	
Southern boundary of the site	8/1/19	31	38	34	Birds, Wind gusts, Farm activities, road maintenance, road traffic
Southern boundary of the site	8/1/19	37	49	38	Wind gusts, Birds, distant road noise

Notes: Table adapted from Advitech Pearlman Noise Impact Assessment 2019.

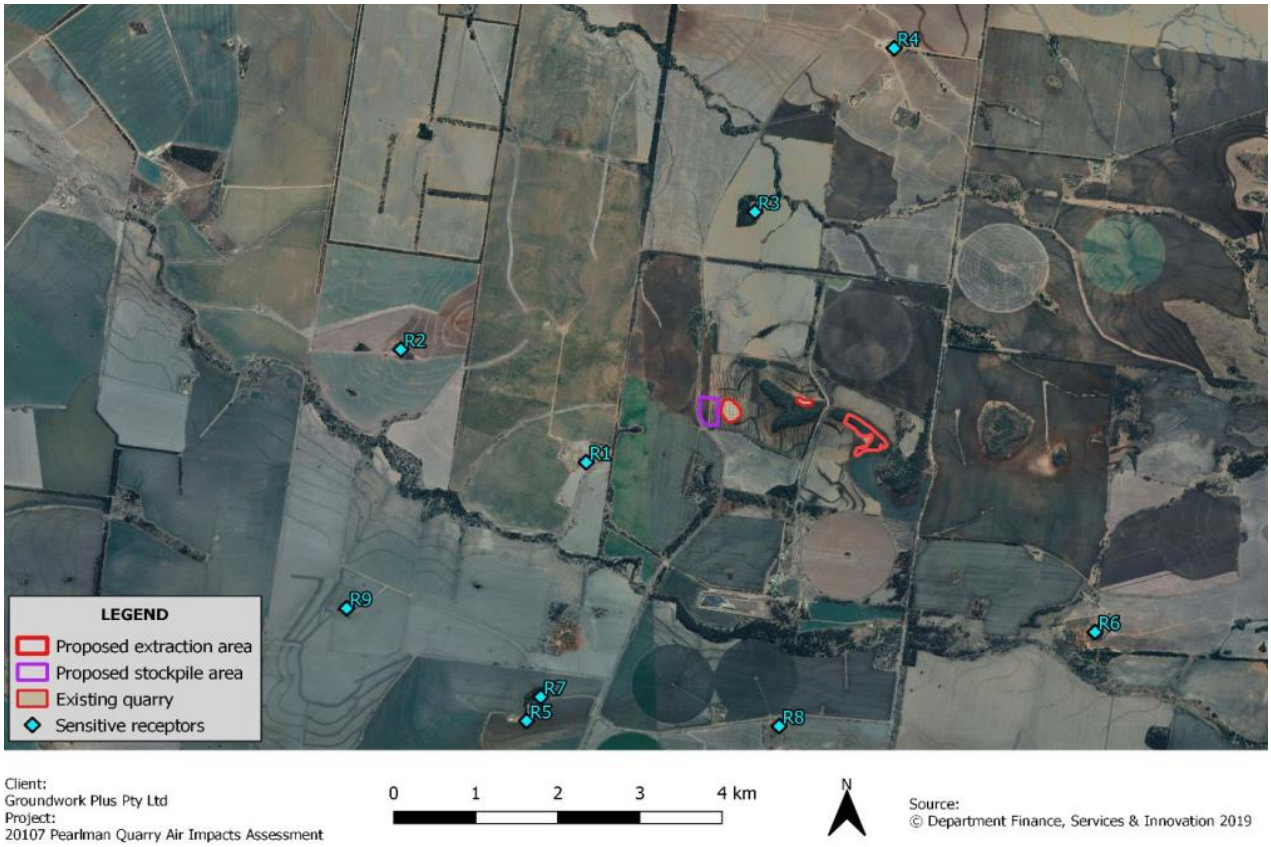


Figure 20 – Closest Sensitive Receptors

The distances of each receptor to the Pearlman Quarry have been summarised in **Table 15 - Separation Distances from Sensitive Receptors.**

Table 15 - Separation Distances from Sensitive Receptors

Receptor	Address	Direction from Proposed Quarry	Distance (m)
R1	1137 Croppa Creek Road	W	1500
R2	473 Birrahlee Road	W	3700
R3	1176 Oaklands Road	N	2900
R4	1835 Croppa Creek Road	N	4300
R5	391 Boonery Park Road (Lot 1 DP1080910)	SSW	3400
R6	1216 Croppa Creek Road	ESE	3400
R7	391 Boonery Park Road (Lot 54 DP751116)	S	3400
R8	141 Boonery Park Road	S	3500
R9	391 Boonery Park Road (Lot 1 DP751134)	SSW	4200
North Star	Small Rural Township	North - east	10,448
Croppa Creek	Small Rural Township	South South West	12,578

Given the operation of the Pearlman Quarry will involve use of existing roads for site vehicles and haulage, the existing environment in relation to traffic noise has been assessed with reference to the NSW Road Noise Policy (RNP) DECCW, 2011). In accordance with this policy, Croppa Creek Road would likely be regarded as a "local road" under this policy, and subsequently the criteria summarised in **Table 16 – Criteria for Traffic Noise and Roadside Residences** would apply.

Table 16 – Criteria for Traffic Noise and Roadside Residences

Road Category	Type of development	Noise Level Criterion	
		Day	Night
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments.	$L_{Aeq\ (1hr)}$ 55 dB (A)	$L_{Aeq\ (1hr)}$ 50 dB (A)

3.10.2 Potential Impacts

Noise from extraction, processing and transportation associated with the Pearlman Quarry may result in noise impacts. The potential noise impacts from the Pearlman Quarry may include:

- Disturbance to the public during work activities, recreational activities, sleep and relaxation.
- Disturbance to native fauna nesting adjacent to the site.

This may result from site activities including:

- Clearing and Grubbing
- Topsoil stripping and stockpiling
- Drilling and Blasting
- Extraction
- Handling of materials, plant and equipment use (e.g. transfer of materials, processing materials)
- Use of plant and equipment
- Haulage and Vehicle Movements to and from the site
- Other associated workforce and subcontractor activities

3.10.3 Management and Mitigation Measures

The following measures are recommended to ensure noise emissions caused by the proposed development remain at reasonable levels:

Table 17 – Noise Management

Aspect	Control
General	• Scheduling high noise generating activities for less sensitive times of the day (for example: scheduling the maintenance and repair of plant during more sensitive periods of the early morning, lunchtime and late afternoon. • Operating only during approved operating hours. • Noisy operations and equipment shall be located as far away as possible from a sensitive place or places. • All plant and equipment to be regularly maintained and fitted with high efficiency mufflers. • Maintaining access roads in good condition. • Operating the site with well-maintained plant, vehicles and equipment, and ensure all plant, vehicles and equipment are serviced in accordance with manufacturers' specifications. • Avoiding unnecessary idling of plant and equipment and the unnecessary revving of engines. • Raise awareness amongst workforce about noise minimising behaviours, i.e. no shouting driver behaviour, avoiding metal on metal contact or dropping load from unnecessary heights during load and haul operations. • Ensuring that equipment at the site is used for the intended purpose. • Avoiding the use of compression braking on product delivery trucks.

Aspect	Control
Plant and Equipment	• All equipment must be fitted with appropriate noise reduction devices (e.g. mufflers) and comply with any relevant Australian Standards. Equipment and noise reducing devices should be maintained in good working order as per manufacturer's instruction. • All compressors and generators must be "sound reduced" models fitted with properly lined and sealed acoustic covers or enclosures, which must remain closed whenever the machines are in use. • All plant must be switched off when not in use, or where this is not practicable, throttled down to a minimum. • Plant and equipment must be regularly serviced according to the manufacturers specifications to minimise screeching and squealing. • Where possible, plant and equipment must be located away from residences to reduce noise. • Plant in fixed locations such as generators or lighting towers will be located with consideration to proximity to sensitive noise receptors. Noise attenuation devices will be implemented at these locations if necessary.
Traffic and transportation	• Suitable haulage routes travel times must be identified prior to commencement of the haulage operation to reduce disturbance to the residents and other sensitive land uses. • Carryout regular inspection of the haulage route to identify surface conditions that may require maintenance to reduce road noise. • Enter into an agreement with the council for the ongoing repair and maintenance of the haulage route. • Include noise mitigating behaviour in the driver code of conduct.
Blasting	The following control measures may be implemented to assist in mitigating potential noise and vibration nuisance from blasting associated with the Site activities: • Unless prior approval is obtained from the administering authority; blasting is only permitted during the hours of 9am to 3pm Monday to Friday, and from 9am to 1pm on Saturdays. Blasting is not permitted at any time on Sundays or public holidays • Handling, transport and use of explosives shall be carried out in accordance with the requirements of *AS 2187.2-2006 Explosives - Storage and use - Use of explosives*, and the *Mining and Quarrying Safety and Health Act 1999* (MQSH Act) and associated Regulation. • Only suitably experienced and qualified blasting personnel shall be employed or contracted to provide blasting services. • The maximum instantaneous charge or charge mass per delay will be limited to the lowest possible level. • A blast plan shall be prepared for each blast with consideration of the surrounding sensitive receivers. The blast plan will contain blast hole layout, initiation sequence, charging, stemming type and height, charge weight and any other design element, required for good blasting practice. • Any complaint received following blasting will trigger a review of the blast plan and its parameters to identify necessary corrective actions in order to reduce noise.
Commitments	Quarry Environmental Management Plan to include Noise Management Strategy

3.10.4 Assessment of Impacts

The extractive activities proposed at the Pearlman Quarry site have been assessed against the NSW noise guidelines. The noise levels are not expected to be at a level that would result in an environmental nuisance in these locations. A full noise impact assessment has been prepared by Advitech which is included in as part of this assessment (refer **Attachment 8 Noise Impact Assessment**). This assessment has considered all aspects of the proposed development including cumulative impacts of both sites. The assessment concludes that the proposed development will maintain compliance with the EPA noise requirements during construction, road haulage activities and operation of the quarry. As such the mitigation and management measures as set out in Table 17 will be implemented to ensure that noise impacts are minimised.

3.11 Surface Water

3.11.1 Existing Environment

The site is located within the Boarder Rivers Catchment. The Croppa Creek begins on the western water shed of the Great Dividing Range of northern New South Wales and flows westwards through steep valleys and out onto the wide alluvial plains. The river splits into many anabranches and creeks on the floodplain, where wetlands and swamps soak up much of the flow of the river. During a flood, water flows across the floodplain to the Barwon River.

As discussed in **Section 4.2.1**, the proposed Pearlman Quarry drains primarily in a north easterly direction towards an unnamed tributary of Mungle Creek. The unnamed tributary is 1.8km from the site and drains approximately 2.5 km to connect with Mungle Creek where it drains in a north then north westerly direction. Mungle Creek is an uncontrolled stream, whose flow patterns are largely natural. Flows occur in these streams from local runoff. Uncontrolled streams are typically ephemeral (flowing only during floods). Frequently, they open into or flow through wetlands and billabongs.

Water quality information is not available for Mungle Creek, or the unnamed tributary. The site is within the upland region of the Boarder Rivers Catchment. Based on the DPI Water publication Assessment of the Murray-Darling Basin Plan water quality targets in NSW 2007-2012, the surface water in the upland section of the Boarder Rivers Catchment is reported to be of a good quality. The finding of this report are summarised in the table below suggests;

Turbidity (Lab)	Turbidity (field)	Total P	Total N	Dissolved Oxygen	pH
Very Good	Good	Very Good	Good	No data	Very Good

Table 18 – Water Quality Results (aggregate of 28 sites (Adapted from DPI 2015))

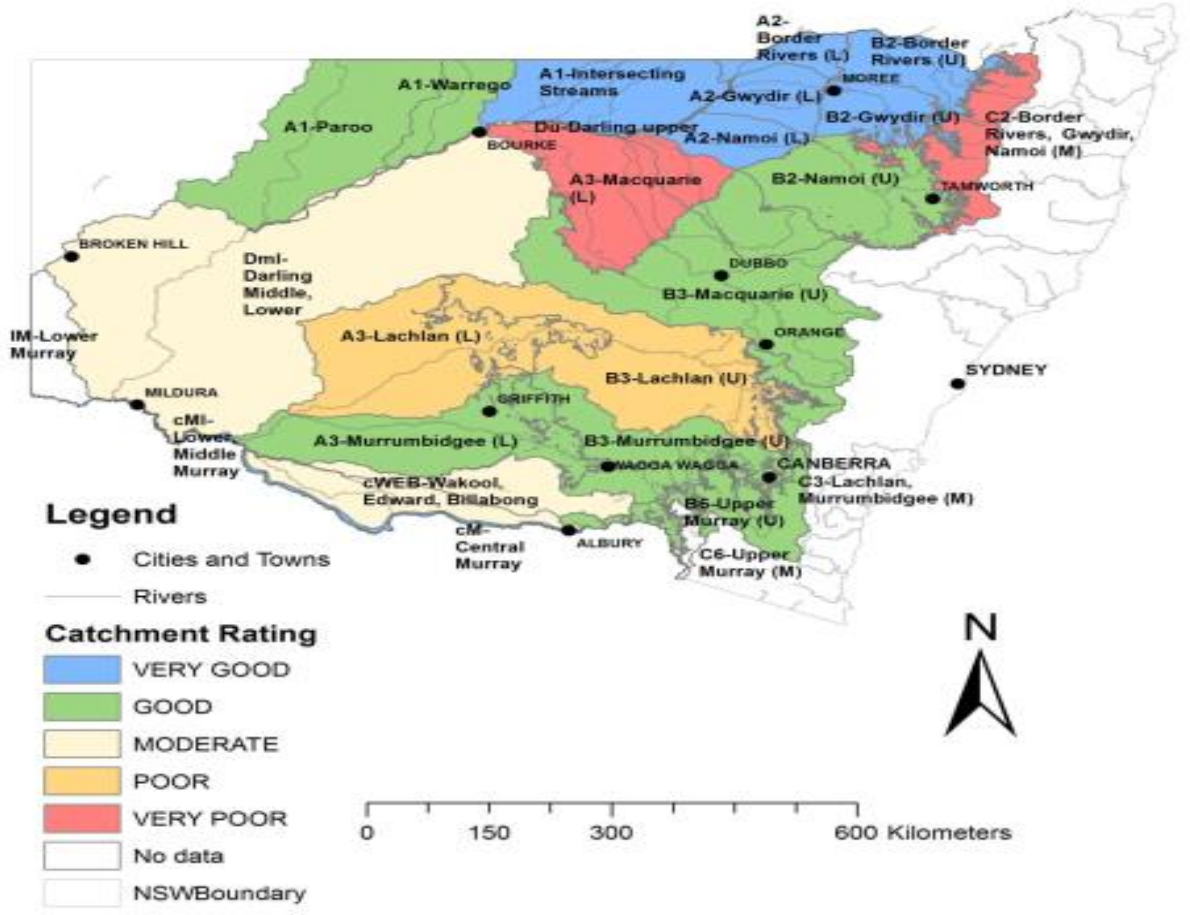


Figure 21 – Catchment Water Quality Ratings Map (Adapted from DPI 2015)

3.11.2 Potential Impacts

Environmental impacts on water quality as a result of the operation of the Pearlman Quarry may include:

- Erosion and subsequent degradation of water quality.
- Release of sediment to water through erosive processes.
- Changes in downstream flows.
- Spills and leaks and subsequent degradation of water quality.
- Large spills of environmentally hazardous materials, or leaks that continue over extended periods contaminating the groundwater and surface water.

No watercourses will be required to be crossed in order to access the quarry.

These impacts may result from the following:

- Vegetation clearing.
- Topsoil stripping.
- Overburden removal.
- Construction and maintenance of internal roads and hardstands.
- Stockpiling of topsoil and Quarry product.
- Accidental spillage during handling of materials.
- Storage, handling and use of hydrocarbons and other environmentally hazardous substances.

3.11.3 Management and Mitigation Measures

The following measures are recommended to ensure impacts to water quality are managed and minimised.

Table 19 – Water Quality Management

Aspect	Control
Storing fuels, chemicals, wastes and other potentially environmentally hazardous substances	• Chemicals and fuels in containers of greater than 25 litres must be stored within a secondary containment system. • All waste will be stored in a suitable receptacle and removed from site as required. • All hazardous chemicals, corrosive substances, toxic substances, gases, dangerous goods, flammable and combustible liquids must be stored and handled in accordance with the relevant legislative requirements and Australian Standards including but not limited to the provisions of: o AS 1692-2006 – Steel tanks for flammable and combustible liquids o AS 3780:2008 – The storage and handling of corrosive substances o AS 1940:2004 – The storage and handling of flammable and combustible liquid o AS 3833:2007 – Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers • Bunding will be constructed of material which is impervious to the material that is to be stored in the bunded area. • Bunds will be kept in good condition (e.g. no cracks, gaps or leaks). • Roofed storage facilities are to be provided where possible. • Stormwater captured within bunding is to be removed as soon as practicable and appropriately disposed of as contaminated water. • Empty hydrocarbon and chemical containers are to be stored closed, in place on a concrete hardstand or within a bunded area. • A collection sump or valve must be provided in the floor of the bunding to facilitate the removal of liquids. • Where vehicle access to the bunded area is required, access must be by way of a rollover bund. • Develop site-specific procedures for storing hazardous materials including details on: o Quantities of hazardous materials will be kept to a minimum, commensurate with their usage and shelf life. o Safety Data Sheets of stored hazardous materials will be readily accessible at the place of storage. o Permanent and temporary containers that hold hazardous materials will be labelled with the relevant safety and risk phrases.

Aspect	Control
	○ The volume and types of hazardous materials stored will be known, current and documented and will not exceed the design capacity of the storage area. ○ Hazardous materials that may degrade in storage and thus become more dangerous will be identified and managed. ○ Storage and containment areas (including secondary containment) will be inspected for signs of loss or damage and any deficiencies will be addressed. ○ Hazardous materials no longer in use will be identified and assessed to determine if they should be removed from site. ○ Dangerous goods will not be held in transport storage areas for longer than five consecutive working days. Where they are required to be stored for longer periods, they will be moved to permanent hazardous materials storage areas.
Refuelling	• Temporary bunding, drip trays or impermeable matting must be used to prevent spillage from any in field refuelling or maintenance of plant and equipment, or any other activity that could result in spillage of a chemical, fuel or lubricant to soil. • Refuelling of plant and vehicles must be conducted in designated areas away from sensitive receptors and at least 100 m away from watercourses, water holes, lakes or wetlands. All in field refuelling must include the use of a temporary bund to contain any spills. • Refuelling will utilise auto shut off valves. • Maintain appropriate spill kits and PPE at designated locations on site (e.g. refuelling locations, chemical storage facilities, mobile equipment). • Ensure employees are familiar with, and trained in the use of, proper spill clean-up procedures.
Vehicles and Equipment	• All vehicles, plant and equipment must be maintained in accordance with manufacturer's specifications and kept in good working order. • Routine maintenance and inspections of earthmoving equipment must be conducted. • All scheduled maintenance activities must be undertaken at designated workshop areas. Any in field maintenance or refilling should utilise small volumes to limit the quantity of material that could be potentially spilt. Vehicle, plant and equipment maintenance activities will be undertaken off site where possible.
Dewatering of Stormwater	• Quarrying activities impacted waters are to be captured within on-site temporary sediment basins. Sediment basins are to be designed and installed in accordance with DECC (2008) *Managing Urban Stormwater - Soils and Construction (Volume 2E).* • Water collected within sediment basins, and the receiving environment will be monitored prior to release. • Water quality monitoring will be undertaken to determine if water is fit for discharge or reuse on site for dust suppression. • Only water meeting discharge requirements will be released and be undertaken in a controlled manner to ensure that no scouring of the bed and banks of the receiving watercourse occurs.
Erosion and Sediment Control	**Installation** • Erosion and sediment controls will be installed prior to, and during, initial clearing and grading works, and regularly inspected as part of the day-to-day tasks. • Strategies / mitigation measures for the management of surface water runoff and erosion and sediment transport from the site will be implemented in accordance the relevant approval conditions. • The sediment basin must be designed assuming the full catchment is going to be disturbed. The associated inflow catch drains must be constructed also prior to earthworks commencing on site. **Site Management** • Land-disturbing activities must be undertaken in such a manner that allows all reasonable and practicable measures to be undertaken to: ○ Allow stormwater to pass through the site in a controlled manner and at non-erosive flow velocities up to the specified design storm discharge.

Aspect	Control
	○ Consider a staged approach to clearing to ensure that ground covers remain in place and that unnecessary disturbance does not contribute to sediment loss. ○ Minimise soil erosion resulting from rain, water flow and/or wind. ○ Minimise adverse effects of sediment runoff, including safety issues. ○ Prevent, or at least minimise, environmental harm resulting from work-related soil erosion and sediment runoff. ○ Ensure that use of land/properties adjacent to the development are not diminished as a result of the adopted ESC measures. **Site Access** • Site exit points must be appropriately managed to minimise the risk of sediment being tracked onto public roadways. **Drainage Control** • Wherever reasonable and practicable, all stormwater runoff entering the site from external areas must be diverted around or through disturbed areas in a manner that minimises soil erosion. All site water from contaminated or sediment laden areas is required to be collect in a sediment basin specifically designed for the site's catchment and climatic characteristics. • Within the internal drainage area reporting to the sediment basin, silt traps and sediment control devices will be implemented to slow the velocity of the water, ensuring no unnecessary erosion occurs and that the sediment basin remains efficient in settling out sediments within a 5-day period. **Sediment Control** • Efforts shall be employed to trap sediment within the site, and as close as practicable to its source. • Sediment traps must be installed and operated to both collect and retain sediment. • Where sediment basins and other sediment control devices pose a safety risk to workers these areas should be isolated (fenced) from commonly accessible areas to maintain site safety. • All reasonable and practicable measures must be taken to prevent, the release of sediment from the site. • Suitable all-weather maintenance access must be provided to all sediment control devices. • Sediment control devices must be de-silted and made fully operational as soon as reasonable and practicable after a sediment-producing event, whether natural or artificial, if the device's sediment retention capacity falls below 75% of its retention capacity. **Site Maintenance** • All erosion and sediment control measures, including drainage control measures, must be maintained in proper working order at all times during their operational lives. • Sediment removed from sediment traps and places of sediment deposition must be disposed of in a lawful manner that does not cause ongoing soil erosion or environmental harm. **Soils Management** *Topsoil* • Topsoils will be stockpiled separately and not mixed with subsoils, mulch or other materials. • Topsoils must be stripped and handled with care to minimise compaction and structural degradation and where practicable, stripped topsoil should be re-used by application to areas where a similar soil type is required for rehabilitation. • Topsoils stockpiled for extended periods (>28 days) must be evaluated and treated to prevent erosion and weed infestation, stockpiles may be vegetated, covered or sprayed with a soil binder. • Topsoil stockpiles height must be not greater to 3 m. • All reasonable and practicable measures must be taken to obtain the maximum benefit from existing topsoil. • Topsoils are to be stripped and stockpiled separately to subsoil and overburden materials for use in the rehabilitation process.

Aspect	Control
	Stockpiling • Excavated materials will be stockpiled in designated areas and stored separately from other materials (e.g. vegetation, mulch, water tyres, topsoil, overburden). Signage and/or survey plans will be used to delineate the separate stockpiles. • Stockpiles will be located to minimise loss of material from water and wind erosion and avoid subsequent sediment release. The stockpiles will also be contained by the use of erosion and sediment measures. • Stockpiles must not be located where there is the potential to result in sedimentation or acidification of land or surface water. Soil containment measures (e.g. berms) should be used as necessary. • Stockpiled soil must be placed in a designated area, which does not impede the movement of fauna and or vehicles. • Stockpiles should not impede natural or constructed surface drainage channels or access tracks. Stockpiles must be located above flood level. • Stockpiles will be visually monitored for erosion and or weeds and appropriate controls implemented when required. • All soil and vegetation or other stockpiles will be stored within the approved construction area. Stockpiles will be located away from discharge zones and placed in locations where they will not be disturbed by other activities. Stockpiles will not be located against fence lines, or within vegetation to be retained including the tree protection zones of vegetation to be retained. • Stockpiles of erodible material that has the potential to cause environmental harm if displaced, must be: o Adequately protected from wind, rain, concentrated surface flow and excessive upslope stormwater surface flows. o Located at least 5 m from any hazardous area, retained vegetation or concentrated drainage line. o Located up-slope of an appropriate sediment control system. o A suitable flow diversion system must be established immediately up-slope of a stockpile. o Prior to wet season (Nov - March) soil stockpiles should be managed or located out of concentrated stormwater flow paths.
Commitments	• Quarry Environmental Management Plan to include a: • Soil and water management strategy including Erosion and Sediment Control Plan (prepared in accordance with DECC (2008) *Managing Urban Stormwater - Soils and Construction (Volume 2E).* • Rehabilitation Management Plan

3.11.4 Assessment of Impacts

While the proposed development has the potential to generate sediment an adequately sized sediment basin designed to capture site run off will be installed at the site. This provides a controlled environment where the site can capture and treat water prior to discharge thus minimising the impacts to the receiving environment. A full surface water assessment has been undertaken as part of this study (refer **Attachment 6 - Soil and Water Assessment**). This assessment sets out the required sediment controls and operation and maintenance requirements of these controls. Based on the adoption of the management measures outlined in the assessment and the table above the site can be managed to minimise the impacts on water quality.

3.12 Groundwater

3.12.1 Existing Environment

The site is located within the Gwydir River Catchment which has a number of applicable water sharing plans. The relevant water sharing plans for the site are as follows:

- Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources 2008
- Water Sharing Plan for the NSW Border Rivers Unregulated and Alluvial Water Sources 2012

The site is also within the Surat Groundwater Source. The Surat Groundwater Source underlies the catchment west of Moree. The Surat Groundwater Source covers an area of 73,418 km^2 and the water is primarily used for stock, domestic, commercial purposes such as spa bath industries and mining. The area is characterised by a high density of bores, particularly in the south, and high flowing bores with numerous bore drains in the north.

The Groundwater Aquifer is described as Inland Alluvial, as per the NSW Office of Water resources and management overview – Gwydir catchment 2011, which further broadly describes the are as being of moderate quality, ranging from 500 – 1,500 Total Dissolved Solids mg/L, suitable for domestic, stock and some irrigation purposes. **Figure 22 – Groundwater Aquifer Type – Gwydir Catchment** shows the approximate site location in relation to the aquifer type.

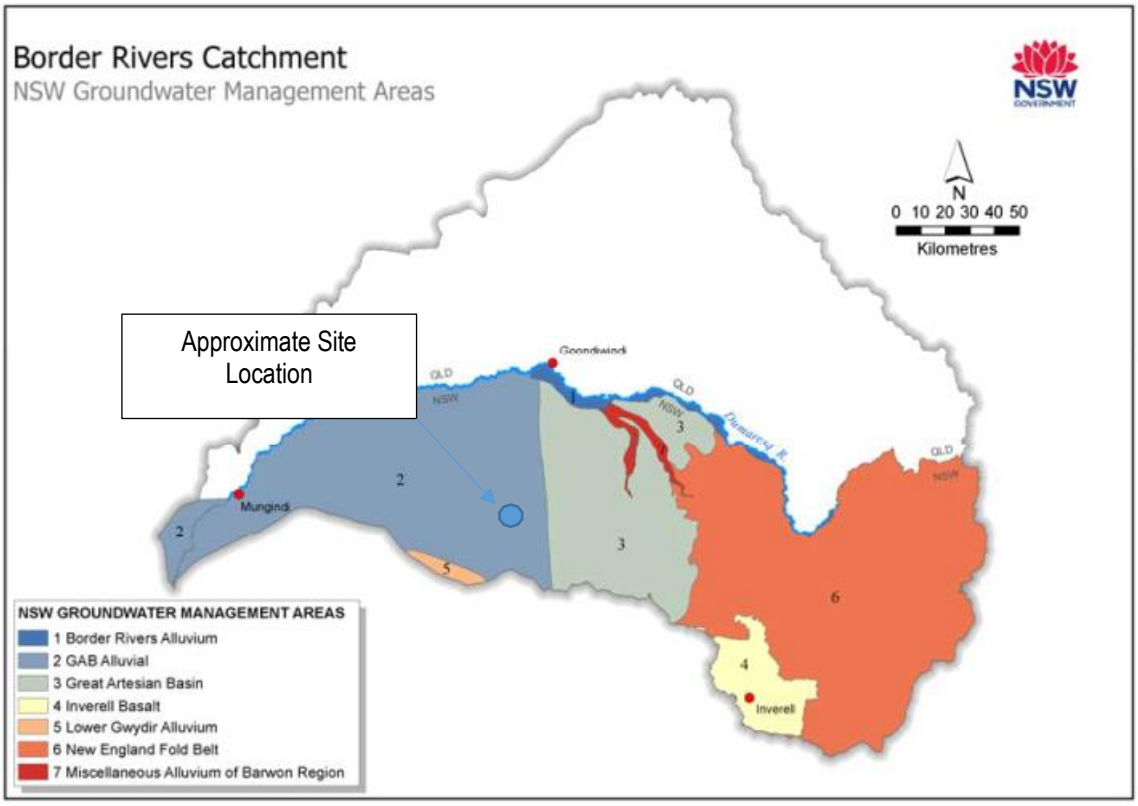


Figure 22 – Groundwater Aquifer Type – Boarder Rivers Catchment
(source https://www.industry.nsw.gov.au/water/basins-catchments/snapshots/border-rivers)

There are no active groundwater monitoring stations in reasonable proximity to the site. A number of bores have been identified from the Water NSW database. These are shown below in **Figure 23 – Groundwater Bores**.

Figure 23 – Groundwater Bores.

A summary of available information from these groundwater bores is provided below in **Table 20 – Groundwater Data Summary.** The bores are used for a range of uses and have been installed to target deep aquifers suitable for supporting high yields. Should the site require supplementary water use in addition to the onsite dams, the irrigation and water supply bore could provide a supplementary water source during dry periods. A search has been undertaken to determine if any shallower aquifers exist in close proximity to the site as these may be more susceptible to impacts from site operations.

Table 20 – Groundwater Data Summary

Bore ID	Date	Depth	Standing Water Level	Salinity Description	Purpose
GW006090.1.1	1936	158.3 m	Unknown	Unknown	Stock
GW900924.1.1	1994	386 m	Unknown	Unknown	Irrigation
GW11114.1.1	1955	234.6 m	Unknown	Unknown	Water Supply

Groundwater dependent ecosystems (GDEs) are defined as ecosystems which have their species composition and their natural ecological processes determined by groundwater. A search of the GDE Atlas (Source: BoM) has been undertaken for the three types of GDEs:

- **Aquatic ecosystems** that rely on the surface expression of groundwater - this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands and springs. Marine and estuarine ecosystems can also be groundwater dependent, but these are not mapped in the Atlas.
- **Terrestrial ecosystems** that rely on the subsurface presence of groundwater–this includes all vegetation ecosystems.
- **Subterranean ecosystems** which includes cave and aquifer ecosystems.

The presence of the Aquatic and Terrestrial GDE's in relation to the site is provided below in **Figures 19** and **20** respectively. Note that there are also no Subterranean GDE's in the region. It is noted that given the position in the landscape, atop Death Adder Hill, the site is well above the groundwater table it is unlikely to contain any GDEs. Furthermore, during field work for the biodiversity assessment it has been confirmed that no GDEs exist in the site **(**refer **to attachment 3 Biodiversity Development Report Assessment).**

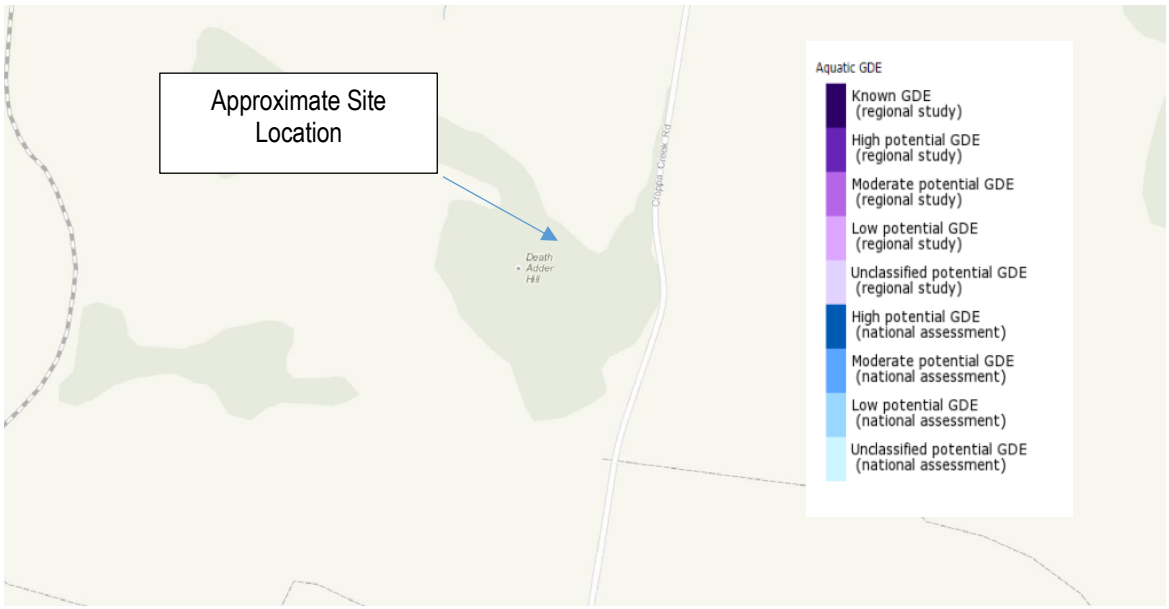


Figure 24 – Aquatic GDE

Figure 25 – Terrestrial GDE

3.12.2 Potential Impacts

It is noted that groundwater was not intercepted as part of the initial geological drilling program conducted at the site. The resource proposed to be extracted is limited to approximately 30 m below surface, which is above the height of the groundwater levels as identified in Table 19. It is unlikely that groundwater will be intercepted as part of site activities. Nevertheless, if groundwater was to be intercepted potential impacts may include the following:

- Drawdown of groundwater from sourced aquifer(s) for operations needs such as dust suppression.
- Drawdown of groundwater in overlying and underlying units of sourced aquifer(s).
- Reduction in piezometric head, within aquifers sourced for operational purposes, which could result in the reduction of landholder bore yields.
- The reduction in baseflow to surface water systems.
- Impacts on groundwater dependant ecosystems in the context of groundwater quality, quantity and flow characteristics.
- Impacts on groundwater quality as a result of surficial impacts in the form of leaks, spills, surface runoff and seepage into shallow aquifers.

3.12.3 Management and Mitigation Measures

The following measures are recommended to ensure potential impacts to groundwater are managed and minimised.

Table 21 – Groundwater Management

Aspect	Control
General	• Include groundwater management as part of any EMP prepared for the site.
Groundwater Quality	• Chemicals and fuels in containers of greater than 25 litres must be stored within a secondary containment system. • All hazardous chemicals, corrosive substances, toxic substances, gases, dangerous goods, flammable and combustible liquids must be stored and handled in accordance with the relevant legislative requirements and Australian Standards including but not limited to the provisions of: o AS 1692-2006 – Steel tanks for flammable and combustible liquids. o AS 3780:2008 – The storage and handling of corrosive substances. o AS 1940:2004 – The storage and handling of flammable and combustible liquid. o AS 3833:2007 – Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers. • Ensure any groundwater bore and properly encased to minimise deterioration of water quality.
Groundwater Quantity and Use	• Obtain the relevant permit and water allocation for the taking or use of groundwater at the site. • Install flow meter of the bore to ensure ground water quantity can be monitored.
Groundwater Intersection	• Maintain quarry floor and extraction areas above the groundwater table. • If groundwater becomes noticeable during the exaction activities, cease work and discuss with DPI Water to identify appropriate mitigation measures
Commitments	• Quarry Environmental Management Plan to include groundwater management procedures

3.12.4 Assessment of Impacts

As the proposal will be contained above the groundwater levels, groundwater impacts from the proposed development are unlikely. By implementing the proposed management measures in the table above the site can managed to have minimal impact to groundwater resources.

3.13 Biodiversity

3.13.1 Existing Environment

An assessment of the biodiversity values in and around the proposed development footprint of the project has been undertaken by Advitech (refer **to Attachment 3 - Biodiversity Development Assessment Report**) to inform decision making regarding the avoidance and mitigation of impacts on significant biodiversity values resulting from the project. The exiting native vegetation in the proposed extraction area has a number of existing tracks which service the sites agricultural activities. On this basis, the assessment by Advitech has determined that the extent of the vegetation to be impacted by the proposed quarry site is 8.79 Ha. The condition of vegetation in this area is described to be of a good to very good condition. A review of available vegetation mapping has identified the Plant Community Types surrounding the Pearlman Quarry, this is shown in **Figure 26 – Plant Community Type.** Existing vegetation mapping indicates the potential of four plant community types (PCTs) to be present on the site, which are listed as follows;

- PCT 418 - White Cypress Pine - Silver-leaved Ironbark - Wilga shrub grass woodland of the Narrabri-Yetman region, Brigalow Belt South Bioregion.
- PCT 147 - Mock Olive - Wilga - Peach Bush - Carissa semi-evergreen vine thicket (dry rainforest) mainly on basalt soils in the Brigalow Belt South Bioregion.

A small proportion of the disturbance area (1.73Ha) is mapped as PCT 418 which conforms to the Endangered Semi Evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions under both the BC Act and the EPBC Act. The combined geographic and habitat search revealed 22 threatened terrestrial fauna species and 7 threatened flora species that could potentially occur within or near the proposed quarry site. The significant grass species Belson's Panic (*Homopholis belsonii*) have been recorded in close proximity to the site. Belson's Panic is known to be associated with all of the PCTs identified above.

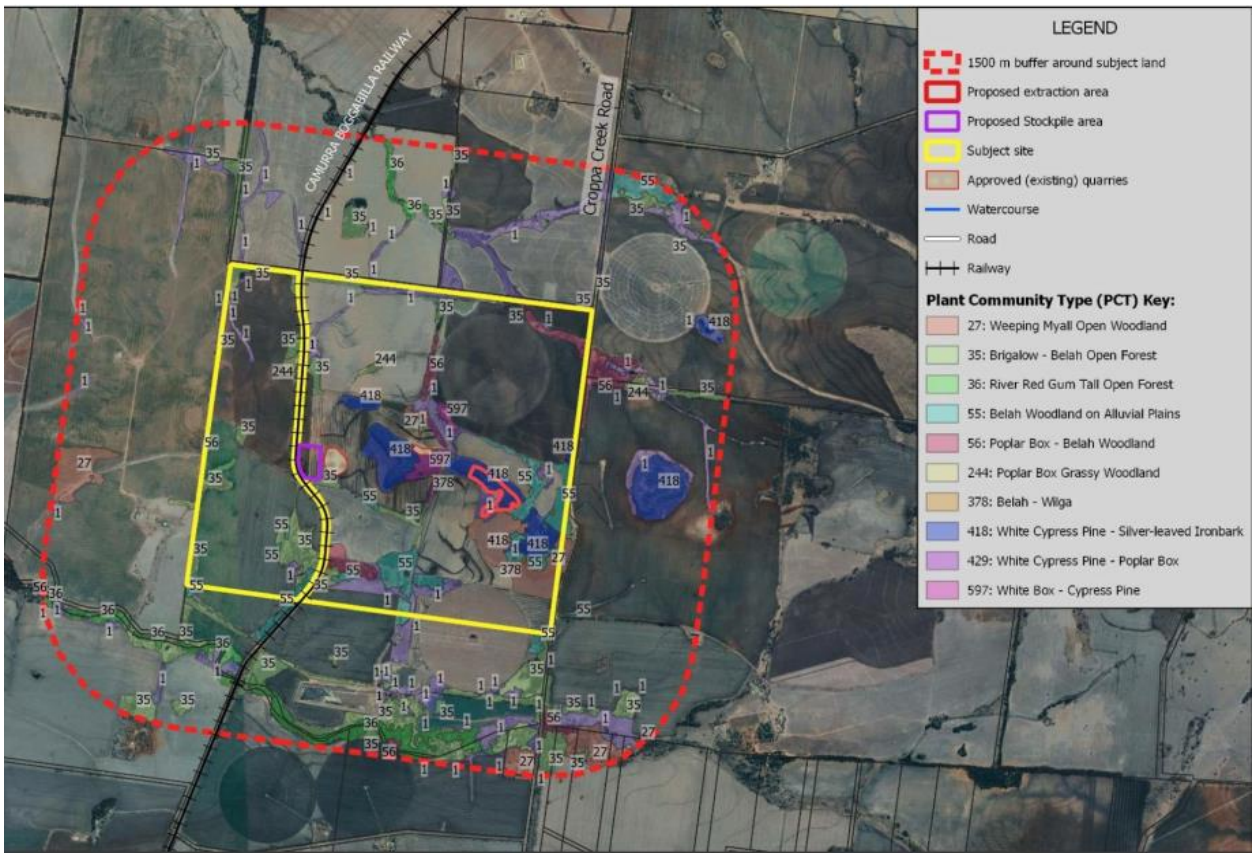


Figure 26 – Site vegetation (Adapted from Advitech 2019)

3.13.2 Potential Impacts

The proposed extraction activities will result in the removal of native vegetation present within the proposed quarry area. As the proposed clearing exceeds clearing of more than 2 Ha and the site is also larger than 1000 Ha the assessment under the Biodiversity Assessment Method (BAM) is triggered. Based on this Advitech have carried out a Biodiversity Development Assessment Report to identify the biodiversity values of the site the subsequent offset required under NSW requirements. Based on the proposed clearing the potential impacts to biodiversity may result from the following:

- Removal of vegetation contributing to the loss of ecological values of the site and edging effects with remaining areas of remnant vegetation communities.
- Vegetation removal may also impact the local fauna in the area by detracting from habitat, nesting and foraging areas.
- Increased movement of people, vehicles, machinery, vegetation waste and soil may contribute to the onset of weeds at, and near, the Pearlman Quarry which could detract from agricultural productivity and native ecosystems.

3.13.3 Management and Mitigation Measures

The following mitigation measures are proposed to ensure that biodiversity impacts are minimised to the lowest extent practical.

Table 22 – Biodiversity Management

Aspect	Control
Flora	• A vegetation assessment must be undertaken prior to work commencing to determine the presence of weed outbreaks, hollow baring trees, threatened species, communities or their habitat. Any significant areas would be mapped, and areas not approved for clearing would be delineated with exclusion fencing or flagging to prevent over clearing occurring.

Aspect	Control
	• All machinery operators would be briefed in a toolbox talk about site specific vegetation clearing to unsure the task and associated risks are well understood. This may include the use of GPS guidance to verify clearing limits and also flagged markers placed by the surveyor in the field. • All machinery to be used during land clearing operations is required to be weed free prior to arriving at site. Weed hygiene practices in the site based EMP are to be followed to ensure the spread of weeds are minimised. • Significant features of the landscape that could be reused on site during rehabilitation to create habitat structures will be identified and salvaged prior to land clearing operations. • Prior to each stage of the quarry footprint expansion the clearing limits will be checked based on the approved clearing limit. • Survey pegs or bunting flags will establish the full extent of the approved clearing limit to ensure no over clearing or encroachment occurs. • Existing fallen timber and woody debris in the disturbance zone will be removed with care and relocated to other areas of retained vegetation to improve the habitat values in these areas. • A 50m vegetation corridor will be maintained between the northern boundary of the quarry footprint and the cultivation areas in the paddock below the quarry site to ensure wildlife have sufficient area to travel between retained habitat on the escarpment and the riparian corridor below. • Weed spread as a result of edging effects of the proposed clearing are to be addressed as part of the QEMP and implemented as part of the ongoing management of the site. • Site induction to include awareness of the threatened species that could be found in the area. Should any of these species be discovered as part of the construction or operation of the site the works will cease and the project ecologist will attend site to confirm the next actions.
Fauna	• Vegetation clearing must be undertaken in a staged manner to allow ground dwelling and avian fauna to disperse away from areas being cleared on their own accord. • For any approved clearing of areas that include habitat features, a spotter-catcher will be used to assess hollows are relocate any species that are identified to be at risk during clearing operations • Prior to the commencement of clearing operations, the nearest wildlife carer would be identified, and all workers made aware of native wildlife can be taken to in the unlikely event of injury. • Habitat features such as hollows and log piles will be salvaged, where possible, and placed in nearby (retained) habitat areas and used in the rehabilitation of the quarry site. • Work areas are to be checked regularly for fauna that may have entered the work area or become trapped. The sediment dam should remain fenced to exclude native fauna from watering from this area where they could potentially become trapped. • If fauna species require relocation a qualified spotter catcher will be required to handle wildlife. • All waste receptacles should remain sealed and covered at all time to prevent attaching native wildlife into the operational areas of the site. Pest animals such as pigs, goats, foxes, rabbits, wild dogs feral cats and rodents will be controlled as required. • No pet animals will be allowed to be brought to the construction site. • The quarry manager is to be notified immediately of any incident resulting in the harm, injury or death of a fauna species. • Speed limits will be enforced as part of the drive code of conduct which include safety around wildlife that may cross haul roads on occasion.
Pests and Weeds	*Site Awareness* • Site inductions for all staff must include information regarding the local weed and pest species that may be present, and protocols required to be undertaken for control of these species. • Training must be provided to all staff regarding the weed identification and management procedures, protocols and restrictions placed on bringing domestic animals onto the site. *Prior to Construction.* • Prior to construction, a baseline weed survey would be undertaken to identify the extent of the weed populations across the site, weed management of these areas would be planned prior to disturbance to ensure the spread is minimised. All areas of the site would be regularly monitored to identify any new outbreaks occurring that would require treatment.

Aspect	Control
	• Vehicles and equipment are to be cleaned before being brought to site and inspected on arrival at the site. All visitors should be advised of the nearest weed wash down facility in the region. • Vehicles and earthmoving equipment imported interstate for project use will be thoroughly cleaned at their point of origin and accompanied by a weed hygiene declaration certificate to ensure that biosecurity laws are maintained. *Infested Areas* • Signage is to be installed at weed hot spots identified through the baseline survey. • Weed control will be undertaken in areas that are very heavily infested or where WONS or Class 1 or 2 weeds present prior to disturbance. • Where weed or other pest and disease infestations are identified the infested area should be assessed and appropriate treatment measures prior to any disturbance in the area. Access to these areas will be restricted with exclusion fencing and signage. • If infestations of weeds continue following treatment advice form a pest plant expert should be sought. *Chemical Control* • In the event that chemical control is required, personnel undertaking chemical weed control measures must be qualified to store, transport and apply chemicals • All chemicals must arrive at site with the corresponding material safety data sheet and be risk assessed and approved by the Quarry Manager or delegate. The storage guidelines should be followed, and all chemicals should be kept in a bunded area with appropriate labelling. *Earthmoving* • All materials including gravel, mulch, packing materials, sand and soil must be inspected and be certified weed and pest free before being accepted at site. • Soil stripped and stockpiled from areas containing known weed infestations, particularly of declared weeds, are to be stored separately and are not to be moved to areas free of weeds. • Where applicable and appropriate, disturbed topsoil and vegetative material will be returned as close as possible to the original sites in order to limit the potential spread of weeds and pathogens. • Vegetation and soil waste should not be moved to areas of lower weed infestation. *Pest Animals* • All waste receptacles should remain sealed and covered at all time to prevent attracting pest animals into the operational areas of the site. • Pest animal populations will be monitored during operations. Strategies will be implemented to discourage pest animals to access the site, however if pest animals are noticed in increasing number the relevant abatement programs will be established.
Commitments	• Quarry Environmental Management Plan to include a Pest and Weed management strategy. • Quarry Environmental Management Plan to include a Biodiversity Management strategy. • Quarry Environmental Management plan to include a site Rehabilitation strategy.

3.13.4 Assessment of Impacts

The biodiversity assessment undertaken by Advitech (refer **to Attachment 3 - Biodiversity Development Assessment Report**) concludes that no matters of national environmental significance or threatened species would be affected by the proposal. The proposed development will result in the removal of 1.73 Ha of the PTC 147 vegetation type conforming to the Semi Evergreen Vine Thicket community. A five-part test under the Biodiversity Conservation Act 2016 was undertaken to determine the impact that the clearing would have on the wider distribution of this vegetation community. The assessment concludes that the proposed development would not have a significant impact on this community.

Throughout the design phase of the proposal all reasonable and feasible avoidance to the impacts of vegetation have been considered. This has included the following measures;

- Avoiding areas of higher value vegetation and in turn paying higher biodiversity offset credits for impacting less valued vegetation communities.
- Modifying the quarry footprint to maintain a wildlife corridor along the northern boundary of the site.
- Maintain all haulage roads to the existing farm roads to ensure that vegetation removal is only for the purposes of accessing the required geological resources.

- Similarly locate stockpile areas in areas of previous cultivated paddock to further reduce the need to impact native vegetation.
- Modifying the quarry footprint to retain culturally significant vegetation.

The assessment of the biodiversity values within the surveyed community, has revealed that the integrity of the ecosystem values in the area of disturbance range from poor quality (0.19 Ha) good quality (1.36 Ha) to very good quality (7.23 Ha). Accordingly, to ensure that there is no net loss of biodiversity value arising from the proposed development, the project proponent will seek to retire the ecosystem and species credits generated under the BDAR assessment. Through the adoption of the mitigation measures proposed in Table 21, the site can be managed to minimise impacts on biodiversity.

The proposed vegetation clearing will generate biodiversity credits required to be retired by way of offset stewardship site or lump sum payment into the Biodiversity Conservation Trust Fund. Further assessment will be completed the final credits to be paid and the viability of establishing a biodiversity stewardship site. For the purposes of the assessment all targeted species are assumed to be present on site.

3.14 Archaeological Heritage

3.14.1 Existing Environment - Non-Indigenous Heritage

Heritage places and landscapes can include natural resources, objects, customs and traditions that individuals and communities have inherited and wish to conserve for future generations. Cultural heritage comprises places and items that may have historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance at a local, State, National or International level. As part of this EIS such matter were assessed by researching the following data bases; NSW State Heritage Register (SHR), NSW State Heritage Inventory (SHI), Gwydir Local Environmental Plan 2013 (GLEP), Relevant Section 170 Registers (S170), Relevant section of the National Parks and Wildlife Act 1974, and Commonwealth Heritage list and National Trust List (NT) listed under the EPBC Act 1999. The result of these searches revealed that there are no items of heritage at either Local, State or National level within 1 kilometre of the study area. 1 item on the National Estate Register is present within the wider area beyond the 1km search area of the site.

A full assessment of Historical Heritage is attached in later sections of the report (refer **Attachment 5 - Historical Heritage Assessment Report**).

3.14.2 Existing Environment Indigenous Heritage

Many of the local Aboriginal people in the areas surrounding Croppa Creek and North Star area identify as being part of the Gamilaroi nation. The Moree Gamilaroi Local Aboriginal Land Council members are the Aboriginal custodians of the study area. It must also be considered that Aboriginal Cultures were not static and that clan and tribal boundaries, language groups and dialects most likely changed over many thousands of years. The native title claim is registered under the name of the Gomeroi People with the National Title Tribunal. This claim was registered in 2012.

An AHIMS search was conducted as part of the preliminary assessment which revealed that there is one registered site located to the west of the site located within the adjacent rail corridor. Potential Archaeological Deposit (PAD)' and area(s)' of archaeological sensitivity' are used to describe areas likely to contain subsurface cultural deposits. An aboriginal archaeological assessment was carried out by Advitech to verify if any culturally sensitive areas were present of the site. The assessment was carried out in accordance with the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (OEH 2011). A further Aboriginal Cultural Heritage Assessment (ACHA) was also completed across the site. As part of this assessment two registered Aboriginal party representatives were in attendance during the field work undertaken across the site.

3.14.3 Potential Impacts

Ground disturbance activities such as land clearing and excavation can potentially result in direct and indirect impacts to items of heritage value. The direct impacts can result from direct contact with objects that are unexpectedly found during ground distributing activities. Indirect impacts can occur where the contextual setting of artefacts is impacted as a result of nearby activities such as blasting, drilling and the operation of machinery. Based on the nature of these impacts the risk remain present during construction and operational phases of the quarry.

3.14.4 Management and Mitigation Measures

While one culturally sensitive aboriginal heritage item was found during the site assessment, the quarry design has been able to be remodified to exclude this area from ground disturbing activities. All other areas of the proposed quarry footprint were considered to have a low likelihood of containing any additional sites. To ensure the proposed development has the minimal impact on Indigenous and Non-indigenous cultural heritage present at the site the following management and mitigation measures are proposed to be implemented:

Table 23 – Management and Mitigation Measures – Indigenous and Non-Indigenous Cultural heritage.

Aspect	Control
Aboriginal Cultural heritage	• The quarry has been redesigned to excise the scar tree from the quarry operations. A buffer of 15m will be maintain around the scar tree site to ensure that impacts are minimised. This area will be fenced off and signposted as a no-go area. • The site induction process will include training on aboriginal cultural heritage awareness and will make reference the no-go zones at the site. • Only undertake ground disturbing activities in areas of the site that have been assess and approved for ground disturbance. • Ensure that project staff and contractors and their employees are advised of their legal responsibilities under the National Parks and Wildlife Act 1974 and the Heritage Act 1977. • In the event that any Aboriginal artefacts, items or sites of cultural heritage are found during quarry operations, the following management procedures will be carried out: o Work will cease in the immediate area the project archaeologist will be required to attend site and assess the significance of the site/artefact/relic. Once the significance is known the relevant notifications will be made to the Office of Environment and Heritage (OEH) Heritage Division, Moree Local Aboriginal Land Council and Gwydir Shire Council to determine the next steps. o In the event that human remains are found during the quarry operations, all works are to be cease, the site secured and the NSW police, the coroner, OEH heritage and the Aboriginal Community will be notified if it is suspected or confirmed that the remains are of aboriginal origin. o Consultation will be carried out as appropriate in accordance with the following documents: ▪ Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010; ▪ The Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW 2010. Please refer to the Quarry Environmental Management Plan for the full unexpected find protocol.
Non-Indigenous Heritage	• Site inductions for all staff are to include education sessions regarding Historical Heritage. It is understood that examples of unexpected finds in the Croppa Creek region may consist of a surveyor's mark on a woodland tree. • Unexpected Finds awareness training sessions with all site personnel as part of site induction. • In the event that an unexpected find of potential heritage significance is uncovered during quarry activities (i.e. a suspected relic, or human remains) works will cease, the site will be made secure and the quarry manager notified for further investigation. The project archaeologist will be contacted to attend site to determine the significance of the site/artefact/relic. Once the significance of the find is known the relevant notifications will be made to the Office of Environment and Heritage (OEH) Heritage Division and Gwydir Shire Council to determine if any relevant permits are required prior to salvage and return to work. • Advice will be sought from the consulting heritage specialist to determine whether further action is required for archaeological assessment and/or salvage and notification to regulatory bodies prior to the recommencement of works.
Commitments	• Quarry Environmental Management Plan to include a cultural heritage management strategy including unexpected finds protocol, inductions training and incident reporting processes.

3.14.5 Assessment of Impacts

Based on the findings from the field assessment completed by Advitech one culturally significant item was present on the proposed quarry site. As such the quarry footprint was modified to ensure the appropriate buffer area can be provided around this area to ensure that impact minimised to this area. Based on this the site does not require to be salvaged and will remain intact for the enjoyment of future generations.

As such the proposed development is unlikely to result in the disturbance of any Indigenous and Non-Indigenous Heritage objects. In the event any Heritage objects or human remains are discovered as a result of construction or operations, all ground-disturbing activities would cease, and the unexpected find procedure implemented. Ground-disturbing works would only recommence following clearance from the relevant authorities. Following the implementation of the mitigation measures proposed in Table 22 the site can be managed to minimise impacts on cultural heritage.

The findings of Aboriginal Cultural Heritage Assessment concluded that the registered AHIMS site referred to above is not considered to be a site containing any significance and is therefore recommended to be updated on the AHIMS database. The assessment did however reveal that a scar tree site was present in the east of the original quarry footprint. Given the significance of this find the proponent has considered to redesign the quarry footprint to enable this site to remain insitu rather than being salvaged.

A full assessment of Indigenous Heritage is attached in later sections of the report (refer **Attachment 4 - Aboriginal Cultural Heritage Assessment Report**).

3.15 Natural Hazards

3.15.1 Existing Environment - Flood Hazard Areas

The site is not within the Gwydir Valley Floodplain (Floodplain Management Plan for the Gwydir Valley Floodplain 2016). Similarly, the site is not mapped for "Flood Planning" under the NSW Planning Portal. Based on the quarry location on Death Adder Hill, there is limited risk of the site being inundated by flooding.

3.15.2 Existing Environment - Bushfire Hazard

The proposed quarry is located within the jurisdiction of the Namoi/Gwydir Bush Fire Management Committee (BFMC) and is therefore covered by the Namoi/Gwydir Bush Fire Risk Management Plan. The fire season in the Namoi/Gwydir BFMC area generally runs from October through to March, however ongoing drought conditions means that the fire danger period has the potential to extend outside the normal timeframe. The area has on average 440 bush fires per year, of which 10 on average are considered major fires. For larger fires, the main source of ignition in the Namoi/Gwydir BFMC area is lightning. Other less frequent causes of large fires are farming machinery, arson and escaped fires from both legal and illegal burning. Bushfire Prone Land as land that has been identified by local Council which can support a bushfire or is subject to bushfire attack. The NSW Rural Fire Service's Online Mapping Tool was accessed in May 2019, to assess whether the site is located on Bushfire Prone Land. Results of the search indicate that the site is not located in Bushfire Prone Land however advice received from the Rural Fires NSW as part of the SEARs consultation suggest that the site is partially mapped therefore Rural Fire Service (RFS) guideline "Planning for Bush Fire Protection 2006" (RFS 2006). Results of the search result is provided below as **Figures 28 and 29**. Potential ignition sources are present on both the proposed development site and neighbouring rural areas. Potential ignition sources for bush fire risk include the following:

- High Risk Activities such as hot works and welding
- Engine exhaust
- Malfunction of electrical infrastructure or portable machinery (internal combustion engines)
- Combustion of flammable materials
- Discarded cigarettes
- Lightning
- Deliberate acts

Figure 28 – Bushfire Hazard Map
https://www.planningportal.nsw.gov.au/find-a-property/751753_10

Mapped as - Category 3 Vegetation

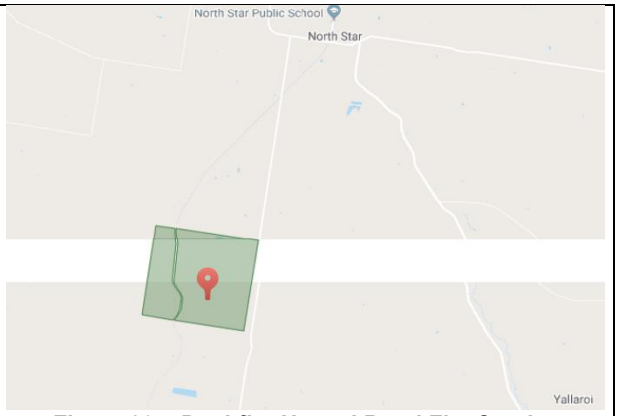


Figure 29 – Bushfire Hazard Rural Fire Service
https://www.rfs.nsw.gov.au/plan-and-prepare/building-in-a-bush-fire-area/planning-for-bush-fire-protection/bush-fire-prone-land/check-bfpl

Mapped as - Confirmed as not a bushfire hazard.

3.15.3 Potential Impacts

Based on the likelihood of the hazards that will impact the site bushfire risk has only been considered. The table below identifies potential impacts for bushfire hazard.

Table 24 – Potential Impacts

Receptor	Specifics
People:	• Staff and contractors. • Rural landowners. • Rural residential areas including interface areas. • Travellers.
Property	• Agricultural/grazing land. • Commercial/industrial land. • Public infrastructure. • Construction equipment. • Support infrastructure. • Primary infrastructure.
Environment	• Threatened species, populations and ecological communities. • Locally important species and ecological communities, such as species and ecological communities especially sensitive to fire. • Indigenous significance. • Non-indigenous heritage. • Other cultural assets.
Community & Reputation	• Reputation. • Contractors reputation. • Industry reputation.

3.15.4 Management and Mitigation Measures

The following management and mitigation measures should be implemented to ensure that the proposal has minimal potential impacts to bushfire hazards.

Table 25 – Management and Mitigation Measures – Bushfire

Aspect	Control
Objectives	The objectives outlined within the RFS 2006 have been considered. The objectives are as follows: • Afford occupants of any building adequate protection from exposure to a bushfire; • Provide for a defendable space to be located around buildings; • Provide appropriate separation between hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;

Aspect	Control
	• Ensure that safe access and egress for emergency service personnel and residents is available; • Provide ongoing management and maintenance of bushfire protection measures; and • Ensure that utility services are adequate for firefighting needs.
Controls	*Risk Controls* • Management procedures for protection against fire will include: • Consulting with landowners and fire services for implementing fire control management on site in accordance with district/area fire control plans. • Providing fire breaks around the site, and in particular, fuelling areas, workshop areas and other areas where hydrocarbons might be present. • Ensuring all staff on site and other personnel are aware of evacuation procedures and the location and the use of firefighting equipment. • Keeping relevant agencies contact numbers in the event of a fire, namely Rural Fire Service. • Ensuring that extinguishers, fire hoses, fire blankets, sand buckets and other such equipment is regularly inspected and maintained in accordance with Australian Standard AS 1851-2005 (A4), Maintenance of Fire Protection Systems and Equipment. • Providing ready access to water storages on site for use in the fighting of fire. • Providing fire breaks around operations and in particular workshop and chemical storage areas. • Ensuring welding and other hot works is undertaken in controlled areas. *Ignition Sources* • Appropriate signage is to be erected near flammable and combustible areas e.g. 'No smoking stop engine', hazard symbols (explosive, flammable, combustible). • Any cigarette butts must be free of embers and discarded into site bins. Cigarette butts are not permitted to be thrown out of vehicle or plant windows or onto ground surface. • Vehicles and/or plant must be turned off during refuelling. • Mobile phones must be switched off when refuelling. *Fire Protection* • All vehicles and plant must be provided with fire protection equipment (e.g. fire extinguisher, fire blanket) that meets applicable Australian Standards. • Staff should be trained in the correct use of fire protection equipment. • An adequate water source must be kept on site at all times in the event of a fire e.g. sediment basin, recycled water tanker or the like. • All fire extinguishers must be clearly signed and their purpose clearly visible for the user. *Evacuation Plan* • A site Evacuation Plan must be prepared prior to the commencement of works. It is to be displayed in site offices and all staff trained in the event an evacuation of the site is required. *Site Preparation and Maintenance* • Plan, create and/or maintain strategic fire trails. • Construct and maintain perimeter fencing to prevent unauthorized access where necessary. • Incorporate fire safety management system for chemical fires. *Reduce the Hazard* • Assess fire risk each day and evacuate where necessary as per the Evacuation Plan. • Ensure no fuel load is available around work sites. • Preferable burn season is summer to winter and aim for a low to moderate intensity burn. • Create firebreaks around the site and all temporary facilities and infrastructure on site.
Commitments	• Quarry Environmental Management Plan to include a Bush Fire Management Strategy

3.15.5 Assessment of Impacts

The proposed development would increase the number and type of ignition sources in the local area. However, the proposed management and mitigation measures, in conjunction with general clearing activities associated with the proposal development would ensure that an acceptable bushfire hazard is maintained as part of the proposed development. The temporary plant and equipment required at the site will be located within the quarry floor where an appropriate buffer would be achieved through the development of the quarry thus minimising the vegetation require to be removed.

3.16 Traffic and Access

3.16.1 Existing Environment

Croppa Creek Road provides access from the site to I.B Bore Road, North Star Rd, Croppa Moree Rd which in turn lead to the Newell Highway. All roads are sealed and services the farming community surrounding the site. Croppa Creek Road is a bitumen sealed road. From site to Newell Highway is approximately 27km to the north west and 50km to the south west. The road supports the transportation of agricultural supplies and goods, and public use for access to residential properties.

Internal haul roads within the site are comprised by black cracking clay soils will require improvements to ensure access remains available in all weather conditions. The site will require to establish internal haulage roads within the quarry footprint and between the quarry and the stockpile area. These roads would be constructed to a suitable grade and treated with gravel. Croppa Creek Road is trafficable in all weather conditions and the existing access to the property includes a rumble pad and hardstand treatment to prevent mud tracking or damage to the public road network refer to **Figure 30** below. The existing access was constructed in accordance with the requirements from Council for the Tikitere Quarry. **Figure 31** shows the proposed haulage route for the operation of the Pearlman Quarry which is the same as the approved haul routes for the Tikitere Quarry. The nearest residences are summarised in **Section 4.4**. A full traffic assessment is provided (refer **Attachment 7 – Traffic Impact Assessment).**

Figure 30 – Existing Site Access.

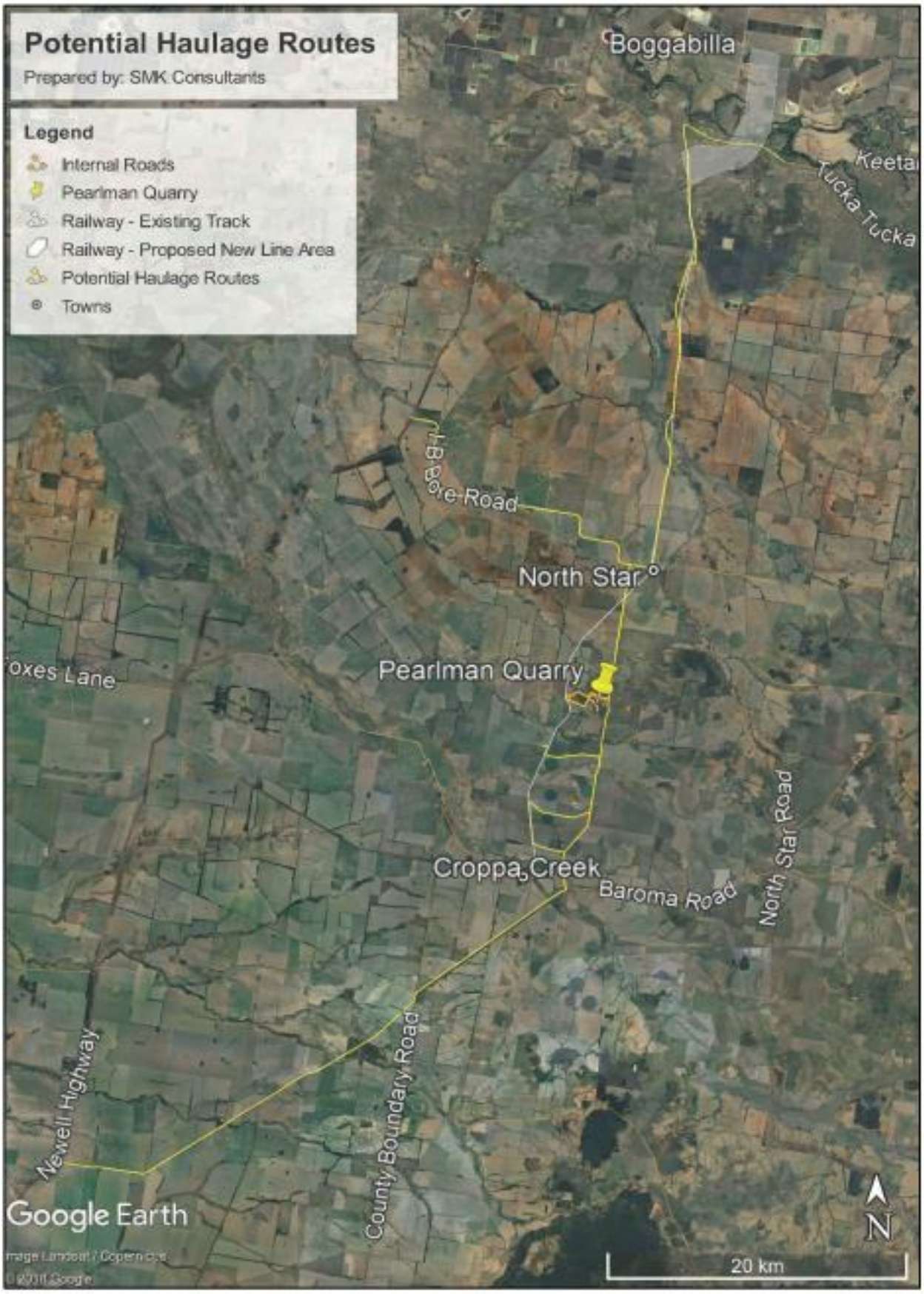


Figure 30 – Proposed Haulage Routes

3.16.2 Potential Impacts

The existing traffic volumes experienced along the haulage routes are shown below in table 26 (refer **Table 26 Background Traffic Volumes**). The table highlights the proportion of counts comprised by heavy vehicles. The recent traffic counts reflect the current levels of haulage from the adjacent Tikitere Quarry. The cumulative impacts of both sites operating are discuss further in later sections of the report. The expected traffic volume generated from the Pearlman Quarry is shown in table 26 (refer **Table 27 Proposed Traffic Volumes**).

Road	Date of Observation	Average Daily Traffic (ADT)	Heavy Vehicles
Croppa Creek Road	March 2011	143	29.5 (20%)
	Dec/Jan 2017	138.0	28 (20.3%)
	July 2019	161	50 (31%)
I B Bore Road	October 2014	32	6.39 (19.9%)
	March 2017	18	2.43 (13.5%)
North Star Road	September 2011	330	51.45 (15.6%)
	June/July 2013	788.43	644.54 (82%)
	March 2014	240	49.3 (20.5%)
	March 2017	297	55.69 (18.8%)
	July 2019	159	27 (17%)
Bruxner Way	June/July 2013	190.57	23.49 (12%)
	July 2019	194	31.04 (16%)
Croppa Moree Road	September 2014	153	23.9 (15.6%)
	March/April 2015	142.86	37.14 (26%)
	March/April 2017	106	21.10 (19.9%)
	July 2019	158	31.6 (20%)
Newell Highway	2015	3,911	1,329.74 (34%)
	2016	3,858	1,234.56 (32%)
	2017	4,051	1,336.83 (33%)
	2018	3,852	1,271.16 (33%)
	2019	3,825	1,185.75 (31%)

Table 266 – Background Traffic Volumes (adapted from SMK).

Traffic Calculations	
Tonnes Processed	490,000 tonnes/year
	9,800 tonnes/week
	1,782 tonnes/day
Trucks	12,895 trucks/year
	258 trucks/week
	47 trucks/day
Truck Movements	25,790 truck movements/year
	516 truck movements/week
	94 truck movements/day

Table 27 – Proposed Traffic Volumes (adapted from SMK).

The main impacts associated with increase in traffic from the Pearlman Quarry is as follows:

- Increased number of vehicles on the haulage routes as shown in tables above (refer to **Tables 26 and 27**).
- Increased deterioration of the road pavement as a result of heavy vehicle usage.
- Tracking of material / sediment onto the road.

The following is noted:

- Increased heavy haulage may require an increase in maintenance and repair requirements for the haulage route.
- Increase in noise associated with the heavy vehicle movements (see **Section 4.7**).
- Increase in dust generation from unsealed roads (see **Section 4.6**).

A full traffic and access impact assessment has been undertaken by SMK consultants to determine the impact of traffic generated from the proposed development (refer **Attachment 7 - Traffic Impact Assessment**).

3.16.3 Management and Mitigation Measures

The following management and mitigation measures should be implemented to ensure that the proposal has minimal potential impacts on traffic.

Table 278 – Management and Mitigation Measures – Traffic

Aspect	Control
Other Users	• Liaise with North Star and Croppa Creek Public School any school bus operators using North Star Road, IB Bore Rd and Buckie Rd to ensure that any issues or complaints that affect school bus services are addressed. • Liaise with residents on in Croppa Creek and North Star who will be most impacted by the increase in transportation and traffic
Fleet Management System	Quarry Solutions manages their haulage fleet through an advanced GPS tracking system. The system provides several key operational features to enable maximum control and surveillance over the haulage fleet at any time. Features of the system include; • GPS monitoring of each truck for full duration of shift • Live monitoring of truck speed against road speed limits • Notifications to quarry management of erratic driving or speed limit violations • Proximity detector to advise driver separation distance to school bus • Driver fatigue / behaviour monitoring • Electronic load sheets for material tracking • Load count reporting to help maintain compliance with consent conditions • Quarry Solutions successfully implemented the system for the RMS Pacific Highway (Woolgoolga to Ballina) Upgrade Project.
Drivers	• Implement driver monitoring program including use of monitoring software and GPS tracking to ensure all vehicles used as part of the project are obeying road rules and driver code. • Prepare and enforce a driver's code of conduct, ensuring the code provides for the following minimum requirements: o All loads to be covered prior to leaving the quarry o All loads to be weighed prior to exit o Minimise exhaust fumes and compression breaking o Education on school bus routes and pick up / drop off times o Obeying all road rules. o Speed limits and communication requirements o Operational hours
Noise	• See **Section 4.7.3**.
Air Quality	• See **Section 4.6.3**
Surface Water	• See **Section 4.8.3**
Wet Weather	• Minimise truck movements on internal haulage roads immediately following rainfall events. Put measure in place to prevent mud tracking on public roads

Aspect	Control
Maintenance	The haul route maintenance will be via road user development contributions and agreements with Gwydir Shire Council at 80c/tonne and Moree Plains Shire Council at 50c/tonne.
Internal Haul Road	The internal haul roads will be gravelled or graded on natural surface to ensure that all weather access is achieved.
Commitment	• Traffic Management Plan to be development in accordance with Driver Code of Conduct.

3.16.4 Assessment of Impact

Based on the findings of the traffic impact assessment it has been concluded that the proposed development would result in a net increase in traffic generation from the subject site, but that this traffic increase would not significantly impact upon road safety, traffic density, road utility or general amenity within the region. Road condition of designated routes to be utilised will be maintained through road user development contributions made to both Gwydir and Moree Plains Shire Councils. Consultation has taken place between with both councils. A rate of 80c/tonne has been offered to Gwydir Shire Council and 50c/tonne has been offered to Moree Plains Shire Council in order to cover the additional use of the roads in each shire. Overall through the adoption for the proposed mitigation measures identified in Table 28 the site can be managed to minimise impacts associated with traffic and access.

3.17 Waste, Chemicals and Hazardous Materials

3.17.1 Existing Environment

The site is currently cultivated for cotton production. As such there are no significant waste generating activities associated with the current use of the site. The proposed quarry site is expected to produce larger amount of waste than the existing land use. The waste that may be generated from the site during construction and operation of the quarry are identified as follows:

- Paper and general wastes from the offices, workshops and amenities facilities
- Packaging wastes
- Scrap metals
- Rubber tyres from Heavy Machinery and Equipment
- Waste oil, lubricants and coolants
- Chemical or herbicide drums
- Contaminated soils from any clean-up of any hydrocarbon spills
- Food scraps and liquid wastes
- Vegetation wastes
- Used Batteries
- Building wastes for the erection of site offices and crib sheds
- Wastewater and sewerage (portable toilets)
- Excess soil material.

3.17.2 Potential Impacts

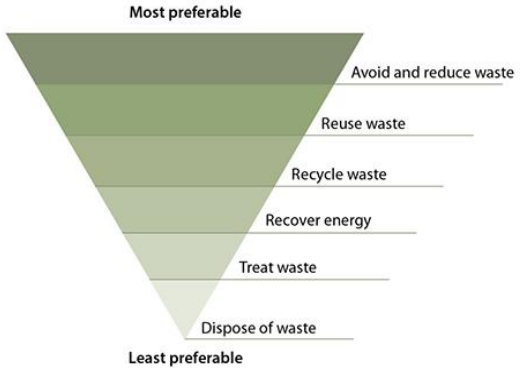
Potential impacts from waste generation, incorrect storage and disposal can include the following:

- Visual impacts
- Production of odour
- Fire hazards
- Attraction vermin and pest animals
- Contamination to land
- Contamination of surface waters
- Contamination of groundwater
- Human exposure to contaminants and hazardous substances causing harm.

3.17.3 Management and Mitigation Measures

Table 26 – Management and Mitigation Measures – Waste and **Table 27 – Management and Mitigation Measures – Hazardous Waste** outline the mitigation measures proposed to manage impacts from waste on the environment.

Table 288 – Management and Mitigation Measures – Waste

Aspect	Control
General	• All waste generated by the development will be managed in accordance with the waste management hierarchy as shown in **Figure 32** below. • Appropriate waste receptacles must be provided for the segregation and storage for waste. This includes recycle bin for bottles/cans vs general bin for food scraps/wrappers. • All wastes will be segregated onsite and disposed of with specific waste services providers • Waste storage areas should be free from bush fire risk. Waste tyres will be stored in accordance with the NSW Fire and Rescue *Guideline for bulk storage of rubber tyres 2014.* • Bins and storage areas must be maintained so they are free of vermin (mice, rats, cockroaches, flies). • Littering is not permitted. All worksites must be free of litter, including cigarette butts. • No waste is to be burnt on site or removed from site and burnt at another place. • All waste streams are to be removed off site by a licensed waste contractor to a lawful point of disposal.  ***Figure 32. Waste Management Hierarchy (adapted from NSW EPA waste classification guideline).***
Waste Storage of Chemicals	• Bins and/or drums will be designated for the storage of used chemicals, empty chemical/paint/solvent containers, used filters, oily rags, batteries • Bins and/or drums will be sealed, labelled and stored within appropriately bunded areas and where required in accordance with AS1940 – 2004 and located within waste management areas. • Spill kits will be strategically located throughout the project area and maintained as necessary. • Wherever possible recycle waste chemicals, liquid waste, drums, used filters, oily rags, batteries and dispose at a licensed waste facility.
Waste Avoidance	• Waste avoidance strategies to be embedded in the procurement process for the site. Including supply chain management, consideration of packaging by-products and the ability to buy in bulk to minimise waste. • Increased efficiency in the use of raw materials, energy, water such as fitting out the temporary site facilities with energy efficient fittings and fixtures. • Aim to accurately estimate and order quantities of materials required to avoid over supply.
Waste Reuse	• Consider the reuse of operational by products elsewhere in the operation i.e. regrading of solvents and hydrocarbons to degrease equipment when servicing, reuse of waste water for dust suppression, reuse habitat features logs bush rock in the rehabilitation of the site, reuse of IBC pod for the mixing of flocculants for sediment dam treatment. • All topsoil that has been stripped will be stockpiled separately and reused to rehabilitate the site. • Any surplus overburden materials are reused onsite for constructing safety bunds and ERSED controls, internal roads. • Reusing silt/sediment on site to the maximum practicable extent.

Aspect	Control
Waste Recycling	• Segregate recyclable wastes from non-recyclable. • Recovering oils, greases and lubricants for collection by a licensed oil recycling contractor, recovering, separating and recycling packaging (including paper, cardboard, steel and recyclable plastics) • Recycling used plant and equipment to the maximum practicable extent.
Waste Disposal	• Where waste cannot be reused on site and is required to be disposed, recycled or treated offsite all waste will be transferred to a location that can lawfully except the waste product. • The waste generator (The Quarry) will undertake due diligence on waste disposal sites to ensure the waste receiver can lawfully except the waste based on its classification.
Waste Storage	• Waste storage containers or areas are to be provided and located at safe and convenient locations. Each container will be identified with the type of wastes which may be disposed of in each container. Each container or area will be designed to prevent waste materials from being lost.

Table 29 – Management and Mitigation Measures – Hazardous Waste

Aspect	Control
General	• Hydrocarbon spills are to be cleaned up immediately by controlling the source of the leak, containing the spill, and using spill kit materials to absorb all materials. Following a spill, the hydrocarbon contaminated material will be placed in the regulated waste and the spill kit material restocked. • Ensure employees are familiar with, and trained in the use of, proper spill clean-up procedures. • Refuelling, equipment maintenance and cleaning of vehicles is to be undertaken within a designated area such as a hardstand, capable of capturing and containing contaminants to prevent release to land. • Maintain the chemical storage areas in a neat and tidy condition. • Bunds / spill trays are to be used during refuelling and equipment maintenance. • Safety Data Sheets (SDS) of chemicals used on site shall be kept in a register at the site office. • An Emergency Response Procedure has been prepared for spill events. • If applicable, hazardous materials signage must be erected at the entrance to the site and display the quantity, type and location of hazardous material stored and handled at the site. • Maintain appropriate spill kits and Personal Protective Equipment (PPE) at designated locations on site (e.g. refuelling locations, chemical storage facilities, mobile equipment).
Bunding and Storage	• Chemicals and fuels in containers must be stored within a bunded area at all times. • When jerry can are being used in the field consider temporary bunding equipment. • All hazardous chemicals, corrosive substances, toxic substances, gases, dangerous goods, flammable and combustible liquids must be stored and handled in accordance with the relevant legislative requirements and Australian Standards including but not limited to the provisions of: o AS 1692-2006 - Steel tanks for flammable and combustible liquids o AS 3780:2008 – The storage and handling of corrosive substances o AS 1940:2004 – The storage and handling of flammable and combustible liquid o AS 3833:2007 - Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers • Bunding will be constructed of material which is impervious to the material that is to be stored in the bunded area. • Bunds will be kept in good condition (e.g. no cracks, gaps or leaks). • Roofed storage facilities are to be provided where possible. • Stormwater captured within bunding is to be removed as soon as practicable and appropriately disposed of as contaminated water. This will be checked prior to and following rainfall events. All bunder areas exposed to the weather will be covered in plastic to prevent the ingress of clean water into the bunds. • A collection sump or valve must be provided in the floor of the bunding to facilitate the removal of liquids.

Aspect	Control
	• Develop site-specific procedures for storing hazardous materials including details on: o Quantities of hazardous materials will be kept to a minimum, commensurate with their usage and shelf life. o SDS's of stored hazardous materials will be readily accessible at the place of storage. o Permanent and temporary containers that hold hazardous materials will be labelled with the relevant safety and risk phrases. o The volume and types of hazardous materials stored will be known, current and documented and will not exceed the design capacity of the storage area. o Hazardous materials that may degrade in storage and thus become more dangerous will be identified and managed. o Storage and containment areas (including secondary containment) will be inspected for signs of loss or damage and any deficiencies will be addressed. o Hazardous materials no longer in use will be identified and assessed to determine if they should be removed. o Dangerous goods will not be held in transport storage areas for longer than five consecutive working days. Where they are required to be stored for longer periods, they will be moved to permanent hazardous materials storage areas. o Hazardous materials storage areas will be kept clear of combustible material, vegetation and refuse by a minimum of three metres.
Refuelling	• Temporary bunding, drip trays or impermeable matting must be used to prevent spillage from any in field refuelling or maintenance of plant and equipment, or any other activity that could result in spillage of a chemical, fuel or lubricant to soil. • Refuelling of plant and vehicles must be conducted in designated areas away from sensitive receptors and at least 100 m away from watercourses, water holes, lakes or wetlands. All in field refuelling must include the use of a temporary bund to contain any spills. • Refuelling will utilise auto shut off valves. • Refuelling trucks and designated refuelling areas will include ample spill kit material in the event of an emergency spill. • One dedicated smoking area will be established away from the refuelling and hydrocarbon storages areas. Signage will be implemented to remind workers not to smoke around area where hydrocarbons are being used.
Plant / equipment / vehicle maintenance	• All vehicles, plant and equipment must be maintained in accordance with manufacturer's specifications and kept in good working order. • Routine maintenance and inspections of earthmoving equipment must be conducted including daily prestart and regular maintenance. • All scheduled maintenance activities must be undertaken at designated workshop areas. • For major plant and equipment maintenance activities works will be undertaken off site.
Disposal	• Hydrocarbon and chemical contaminated materials are to be appropriately disposed of at a licensed facility. • If the material is a trackable waste, it will be transported and disposed of by a licensed contractor. • A waste register for the disposal of waste will be maintained and the corresponding weighbridge dockets verifying the volumes of waste and truck rego will be maintained.
Contaminated Land	• A hydrocarbon management procedure detailing the management of spills is to be developed and the workforce train on this procedure. The procedure will refer to the Pollution Incident Response Plan which will verify the process to follow in the event of a spill resulting in a pollution event. • If widespread contamination occurs as a result of the construction activities, then management will be carried out in accordance with the contaminated land provisions of the EP Act, National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM, 1999). Broadly, the management measures will include the following:

Aspect	Control
	• A site contamination assessment (SCA) will be undertaken in accordance with the NEPM. • Management and remediation will adhere to any Site Management Plan or Remediation Action Plan that has been approved by the administering authority. • Validation sampling will be conducted to verify that remediation is successful, and any further remedial actions implemented as required.
Commitments	• Quarry Environmental Management Plan to include a Waste Management Strategy • Pollution Incident Response Plan (PIRMP) to be developed

3.17.4 Assessment of Impact

Waste generated by the quarry operations is generally moderate and can be managed appropriately and assuming adherence to the management measures nominated in **Section 4.14.3.** Based on the adoption of these mitigation measures the site can minimise waste management impacts to an acceptable level. It is recommended that a Waste Management Plan (WMP) is prepared to further describe waste management procedures, protocols, monitoring and response to pollution incidents. The WMP should be prepared in conjunction with a Pollution Incident Response Management Plan as required.

3.18 Biosecurity

3.18.1 Existing Environment

The Gwydir Shire Council has a number of declared weeds identified within the LGA. Based on the biodiversity inspection undertaken by Advitech it has confirmed that two significant weeds were identified on site as follows;

- *Lycium ferocissimum* (African boxthorn) – Weed of national significance
- *Opuntia Stricta* (Prickly Pear) – Weed of national significance

The presence of these weeds is expected to be associated with the existing agricultural land use of the site.

3.18.2 Potential Impacts

The potential impact that weeds can have on the area surrounding Pearlman Quarry include;

- Spread of weeds along access and haulage routes of the site through the movement of vehicles, machinery, and waste.
- Increasing the prevalence of weeds on the site which may contribute to the reduction in quality of habitats for some flora and fauna species, particularly by replacing native plants. This can apply to both the areas of vegetation being retain and also the quality of the rehabilitation of the site.
- Site management practises that could result in an increase in the population of pest animals.

To reduce the risk of these potential impacts occurring, the proposed mitigation measures are detailed in table 28 below.

3.18.3 Management and Mitigation Measures

Table 28 – Management and Mitigation Measures – Biosecurity outline the mitigation measures proposed to manage impacts from biosecurity matters.

Table 30 – Management and Mitigation Measures – Biosecurity

Aspect	Control
Awareness	• Site inductions for all staff must include information regarding the local weed and pest species that may be present, and protocols required to be undertaken for control of these species. • Training must be provided to all staff regarding the weed management procedures, protocols and restrictions placed on bringing domestic animals onto the site. • All personnel entering the site must be advised of their responsibilities for declared weed management, cleaning procedures for vehicles and equipment, weed identification and weed reporting.

Aspect	Control
	• Make all personnel aware of The General Biosecurity Duty (section 22 of the Biosecurity Act 2015).
General	• In times of drought or in dry conditions, wildlife and pest animals traveling looking for food and water sources. The following needs to be considered during construction; o Fence or secure general waste areas (food scrap bins). o Reduce access to water sources such as sediment basins and areas of quality fresh feed such as newly rehabilitated areas. This may involve erecting exclusion fencing around the permitter of these areas. o Refuse workers bringing domestic animals to site.
Prior to Construction.	• Prior to construction, baseline field surveys to identify initial weed populations and ongoing monitoring of these populations and for any new occurrences are to be undertaken • Signage is to be installed at weed hot spots identified through the survey • Vehicles and equipment are to be cleaned before being brought to site and inspected on entry to site. • Vehicles and earthmoving equipment imported interstate for project use will be thoroughly cleaned at their point of origin to mitigate introduction of foreign seed and soil potentially harmful to Australia's flora and fauna.
Infested Areas	• Signage is to be installed to identify weed affected areas being treated with herbicide • Weed control will be undertaken in areas that are very heavily infested or where WONS or Class 1 or 2 weeds present prior to disturbance. • Where weed or other pest and disease infestations are identified the infested area should be assessed and appropriate treatment measures initiated before any earth moving machinery or vehicles enter the area. • Restricted access to infested areas must be in place until all control measures are implemented. For any substantial outbreak of a declared plant detected in the approved construction area or access tracks the area must be isolated with no access permitted until the area is declared to be controlled for weeds. • All materials including gravel, mulch, packing materials, sand and soil must be inspected and be certified as pest free before being accepted at site. • Plant, equipment or other items that may be moved from one property to another must be visually inspected prior to movement. • A weed hygiene certificate may be required to accompany plant, equipment or other items if requested by the landholder.
Chemical Control	• In the event that chemical control is required, personnel undertaking chemical weed control measures must be trained and qualified to store and handle chemicals • All chemicals must be approved by the Site Manager or representative prior to use.
Soil Material Importation	• All soil and materials of plant origin that are to be imported to site are to be certified as weed free by the supplier • Waste management measures should include containment of food scraps in securely sealed containers.
Earthmoving	• Soil stripped and stockpiled from areas containing known weed infestations, particularly of declared weeds, are to be stored separately and are not to be moved to areas free of weeds. • Where applicable and appropriate - Disturbed topsoil and vegetative material will be returned as close as possible to the original sites in order to limit the potential spread of weeds and pathogens. • Vegetation and soil waste should not be moved to areas of lower weed infestation.
New Infestations	• New weed infestations, breach of vehicle hygiene, feral animal sightings and any suspected plant or animal diseases will be photographed and reported to the Quarry Manager immediately.

Aspect	Control
	• All declared pest plants detected will be fenced out with exclusion fences so treatment can take place.
Pest Animals	• Pest animal occurrence will be monitored during construction. If increased densities of pest animals are observed, or new pest animals are identified, pest abatement program will be established and implemented.
Commitments	• Quarry Environmental Management Plan to include a Weed and Pest Management stratergy

3.18.4 Assessment of Impact

Implementation of the above mitigation measures will minimise potential biosecurity impacts to an acceptable level.

3.19 Land Contamination

3.19.1 Existing Environment

The subject site has historically been used for agricultural purposes. As activities have been limited to grazing, cultivation and other agricultural related activities contamination is also limited to contamination related to mainly fertiliser and herbicide use. Whilst some chemical, including herbicides are typically utilised as part of normal farming practices, these chemicals are general stable, volatile products which biodegrade over time. If these chemicals are present, current concentrations of chemical residue would be negligible and would not impact the quarry site. The contaminated land register has been checked to verify no contamination is present on the subject site in the form of old sheep dips, dump sites or tanneries. It is therefore considered that no further investigation into land contamination is required.

3.19.2 Potential Impacts

Existing contamination of the site is expected to be limited to residual herbicide and fertiliser which may fluctuate with the rehabilitation of the site. The impact of the quarry operation impacts would most likely arise from spill of hazardous / contaminating substances.

3.19.3 Management and Mitigation Measures

The following measures will be implemented to reduce the likelihood of land contamination occurring, and in the event, contamination does occur, how the land will be restored.

Table 301 – Management and Mitigation Measures – Land Contamination

Aspect	Control
Hazardous Substances Management	• See **Section 4.14.**
Spill Response	*Initial Response* • The spill will be assessed to identify the type of oil (lube oil, diesel or chemical), location of the spill source, the quantity of oil spilled and its environment, community, health and safety impact. The Incident Controller will undertake immediate steps to spill containment/control, recovery of spill material and waste management. • Implement Spill Response Plan. • Cease the spill where reasonable, safe and practical to do so. • Where reasonable, safe and practical to do so prevent spill from entering drainage features or water courses and absorbent material will be placed on spillages which will be collected for disposal and any contaminated soil removed for treatment and disposal. • Contain spill and remove by licensed contractor. *Clean Up* • Clean up spills immediately and dispose of contaminated soil and clean-up materials off site at an appropriate facility. • Undertake water or soil sampling as required. • Undertake an investigation:

Aspect	Control
	• In relation to environmental incidents, reports to the administering authority of the EP Act must include "the event, its nature and the circumstances in which it happened". Environmental incident investigations and reports will cover: • A description of the incident, including witness accounts. • A description of any releases to land, air or water or other environmental harm that may have occurred, including loss of native plants or habitat for native animals. • A description of the environmental values affected or potentially affected. • Whether releases or other harm caused by the incident was in excess of prescribed standards or requirements (for example, whether particulate emissions exceeded compliance levels, or whether vegetation was cleared outside areas where clearing was authorised). • Whether a formal non-compliance with legislative requirements or approval conditions occurred. • Whether the incident constituted serious or material environmental harm • Whether internal procedures or requirements were breached. • Formal and informal reports and notifications made internally and externally. • A review of the causes of the incident or near miss. • Recommendations in relation to actions required to rectify any environmental harm or damage that may have occurred. • Recommendations in relation to preventing a recurrence of the incident or near miss. These may include: o Disciplinary action against individual employees o Revisions to procedures and work methods o Maintenance, repairs or re-design of infrastructure, facilities or equipment. o All recommendations from incident investigations will be included in the corrective action register.
Remediation	• Ideally contaminated land is to be managed at the time of the incident by removing and remediating the impacted area in accordance with the appropriate guidelines and standards. • Prior to decommissioning of temporary disturbance areas, a contaminated land assessment by a suitably qualified person may be required to be completed if spills or potential contamination has occurred. Should it be identified that areas of the temporary disturbance areas have been contaminated, these areas are to be remediated and then validated as contaminant free. • Assessment of site contamination, if required, is to be undertaken and managed in accordance with the following: • National Environmental Protection (Assessment of Site Contamination) Measure 1999 (amended 2013) • Australian Standard (AS4482.1-2005) Guide to the sampling and investigation of potentially contaminated soil. Par 1 – Non-volatile and Semi-volatile compounds. • Australian Standard (AS4482.2-2005) Guide to the sampling and investigation of potentially contaminated soil. Part 2 – Volatile Compounds.
Commitments	• Quarry Environmental Management Plan to include Waste Management strategy • Preparation of a Pollution Incident Response Management Plan (PIRMP)

3.19.4 Assessment of Impacts

Land contamination impacts from the operation of the Pearlman Quarry may occur from spills of hazardous substances / contaminants. By adopting the mitigation measures outlined above minimise potential impacts from land contamination.

3.20 Social Impacts

3.20.1 Existing Environment

Quarries are a use permitted with consent within RU1 Primary Production zoned land under the *Gwydir Local Environmental Plan 2013.* The proposed site and surrounding land are zoned RU1 Primary Production and is therefore consistent with the zoning of the locality. The subject site will continue to be used for agricultural purposes concurrently with the operation of the quarry activities. The proposed location is considered suitable for the purpose of developing and operating a quarry with

respect to land use zoning and the intended purpose of the land. A description of the surrounding land use and sensitive receptors is detailed in **Section 4.4**.

3.20.2 Potential Impacts

An assessment of potential social impacts of the proposed development has been undertaken with regards to scoping methodology outlined in the Social Impact Assessment Guideline (2017) (SIA Guideline), published by the Department of Planning and Environment. The proposed development has the potential result in adverse social impacts (e.g. adverse amenity or sense of community) in the absence of the implementation of any mitigation measures. **Table 30 - Checklist of Matters Assessment** below provides an assessment of the proposed development against the identified social impact assessment checklist matters.

3.20.1 Management and Mitigation Measures

Management and mitigation measures for each of the elements comprising a social impact have been addressed in their relevant sections of the EIS. Based on the implementation of these management measures the net result will relate to social impact being minimised.

Table 312 - Checklist of Matters Assessment

Matters		Key Links to Social Impacts	Risk of Impact Without Mitigation	Nature of Impact	Explanation
Amenity	Acoustic	Way of life;	Likely	Negative	Noise generated from machinery, vehicles and processing equipment may impact on neighbouring properties, however assessments have confirmed the relevant noise criteria can be complied with.
	Visual	Surroundings	Unlikely	Negative	The quarry might be visible from some areas on public and private land; however, mitigation measures are in place to manage this.
	Odour	Surroundings	Unlikely	Negative	Quarry operations will not produce a strong odour.
	Microclimate	Surroundings	N/A	Nil	Quarry operations will not significantly impact microclimate.
Access	Access to property	Way of life;	N/A	Nil	Development will not impact on access to neighbouring properties.
	Utilities and public transport	Access to infrastructure, services and facilities;	Unlikely	Negative	The proposed development will utilise public roads for transportation. This will not result in the reduction of access to public transport services.
	Road and rail	Personal and property rights.	Unlikely	Negative	The proposed development will utilise public roads and rail sidings for transportation. However, this will not preclude the public from access roads and rail facilities as a result of the project. Potential impacts to public roads will be managed and mitigated.
Built Environment	Public domain	Community;	N/A	Nil	The development will not impact the public domain as it will be located on private land.
	Public infrastructure	Access to infrastructure, services and facilities;	N/A	Nil	As per above the proposal will not preclude public access to public infrastructure.
	Other built assets	Surroundings; Personal and property rights.	N/A	Nil	As above.
Heritage	Natural	Way of life;	Unlikely	Negative	The proposed development will not impact on the way of life for the surrounding community.
	Cultural	Community;	Likely	Negative	The subject site does not contain any non-aboriginal cultural heritage values. An unexpected finds procedure will be implemented when undertaking quarry construction / operations.
	Aboriginal culture	Culture;	Likely	Negative	Where Aboriginal cultural heritage values have been identified. These areas have been marked as no-go zones and a buffer area established around the site. An unexpected finds procedure will be also be implemented during construction and operation
	Built	Surroundings.	Unlikely	Negative	The subject site does not contain any built heritage values.

Matters		Key Links to Social Impacts	Risk of Impact Without Mitigation	Nature of Impact	Explanation
Community	Health	Health and wellbeing;	Likely	Negative	Dust and noise emissions are expected to be below NSW guidelines and comply with the relevant EPA criteria, therefore minimising the possibility of health impacts within the community.
	Safety	Surroundings;	Likely	Negative	Increased traffic between Croppa Creek Rd and the Newell Highway presents potential for road safety issues however these aspects are mitigated through a traffic management plan, approval haulage routes and driver behavioural measures.
	Services and facilities	Way of life; Access to infrastructure, services and facilities;	N/A	Nil	The proposed development does not impact on public services or facilities.
	Cohesion, capital and resilience	Way of life; Community; Culture;	Likely	Positive	The proposed development will provide employment opportunities for the region. However, the scale of the quarry operation is not large enough to artificially inflate the cost of housing in nearby townships.
	Housing	Way of life; Personal and property rights.	N/A	Nil	As per above.
Economic	Natural resource area	Way of life;	Likely	Positive	The quarry will utilise available natural resources in a sustainable manner. The natural resources consumed will be supplied to support the construction of the Inland Rail Project and associated road projects which has significant benefit to the region.
	Livelihood	Surroundings;	Likely	Positive	The proposed development will provide employment and training opportunities for the area. The economic activity generated by the proposed development will also relate to the longer-term benefit to the region through the construction of the Inland Rail project and associated road projects.
	Opportunity cost	Personal and property rights	N/A	Nil	The net benefit to the community far outweighs the loss of natural resources in term of vegetation (being offset) and the consumption of geological resources.
Air	Air emissions.	Surroundings	Likely	Negative	The proposed quarry will comply with the NSW EPA air quality criteria. Air quality mitigation measures will be implemented.
Biodiversity	Native vegetation and fauna	Surroundings	Likely	Negative	Vegetation clearing is proposed on site however the net loss of biodiversity impacts is offset by the provision of biodiversity credits under the biodiversity assessment method and associated trading scheme.
Land	Stability/structure, land capability	Surroundings	Likely	Negative	While the quarry operation will disturb the land controls will be in place and at the cessation of quarry activities the site will be rehabilitated.
Water	Quality, availability	Surroundings	Unlikely	Negative	Soil and water management measures will address any potential impact to surrounding water bodies and hydrological flows.

3.21 Rehabilitation Impacts

3.21.1 Rehabilitation measures

As the quarry reaches the end of its lifecycle, areas of the site that are surplus to operational needs will be identified for rehabilitation. The key outcomes sought for the rehabilitation of the site are as follows;

- Produce a stable landform capable of supporting grazing purposes.
- Establish groundcover across all disturbed areas to ensure that erosion is minimised.
- Ensure that all areas drain adequately to prevent water logging and also prevent concentrated flows that may result in scour.
- Maximise biomass of groundcover to provide a resilient and functional landform.

3.21.2 Strategy

The strategy that will guide the approach taken to rehabilitation will consider the following and be incorporated into a site-specific environmental management plan. The broad features of the rehabilitation strategy will include the following;

- Design the final landform design to consider land capability, drainage, and stability.
- Select a productive pasture seed mixture which is suitable the climate and soils type. The pasture mix needs to incorporate a balance of fast establishing ground cover as well as perennial species which can help promote binding of the soil and contribute toward a stable landform
- The landform will be prepared by minor shaping to achieve the desired profile while considering the drainage to provide a water shedding surface.
- Soils will be prepared by spreading out over the landform surface. Samples will be taken to understand the structural and chemical condition of the soil to determine if amelioration is required to achieve successful groundcover.
- Soils will be deep ripped across the contour prior to seeding to help establish surface roughness to reduce runoff velocity, simulate aeration and provide a suitable planting seed bed.
- Timing of the seeding will coincide with warmer months to ensure that new pasture growth is not subject to adverse environmental conditions during early establishment.
  Once seeding has taken place all machinery will be excluded from the rehabilitation areas and pasture will be monitored for weed growth and development. Water will be applied by water cart if required.
  Pasture and soil conditions will be monitored over time to determine when the site is suitable for the introduction of grazing activities.

3.21.3 Resources

To ensure that sufficient financial resources are available to implement the above rehabilitation strategy the proponent has committed to $15,000 to be set aside over the course of the operation for this purpose. As the site approaches the end of its lifecycle, topsoil resources, earth moving equipment and labour will already be available on the site and can be utilised for rehabilitation. Therefore, the costs will be mainly in seed and fertiliser purchases. Based on this it is considered that the proposed funds are adequate to satisfy the rehabilitation objectives.

4. Economic Impacts

The capital investment value of the proposed development is estimated to be less than $23,440 excluding GST consisting of the cost required to treat haulage roads, construct a sediment basin and the rehabilitation of the site following completion of the quarrying. All plant and equipment associated with the quarry have a lifecycle beyond the operational life of the quarry and will be redeployed from the site once the construction activity in the area is complete.

The proposed quarry operations will stimulate economic activity within the local area. This will include the creation of employment opportunities which are targeted at sourcing applicants from within the local area. It is important to note that these opportunities include traineeships for young people to assist in the transition from leaving school to full time employment and skills growth. As the quarry operation has limited staff, local support services are relied upon for secondary functions of the site. These services may include but are not limited to waste service providers, mechanical services, cleaning services, fencing contractors, fuel supply services, weed and pest control services, water supply services and plumbing and building services. The quarry's procurement strategy targets locally sourced services and supplies to ensure sustainable principles are adopted.

Majority of the workforce will be locally sourced, however infrequent site visits from specialist contractors and quarry management staff will also generate indirect employment in the local area in the provision of hospitality services, fuel supply and other miscellaneous items required for short term visits to the area.

Overall, the resources available at the Pearlman Quarry are required to provide construction materials to projects of state and regional significance. In turn these projects have far reaching benefits to the wider community through achieving greater efficiency of interstate freight logistics across the eastern seaboard. To ensure the efficient construction of these projects, locally sourced quarry products are required. Through supporting these infrastructure projects from the local regional setting, the community can benefit from increased demand for labour, resources and services which are beyond the traditional economic base of the region.

5. Cumulative Impacts

The potential environmental impacts resulting from establishment, operation and rehabilitation phases of the proposed quarry have been detailed in the relevant sections above.

Potential cumulative impacts are those which are generated by the combined impacts on the local environment as a consequence of the project, together with other developments of similar nature (both existing and proposed). For the purposes of the EIS, the assessment of cumulative impacts considers the impacts of existing and proposed extractive industry development in the local area.

As described in earlier sections of this report the surrounding land use in the immediate vicinity are predominantly comprised by agricultural activities. The Tikitere Quarry is currently operating at the site however the resource base of is quarry diminishing as it has been operational for a number of years. The Tikitere Quarry will be near expiration after the first year of the Pearlman Quarry becoming operational. As such the cumulative impact of both quarries operating concurrently will be limited. Regardless cumulative impacts of these quarries operating simultaneously have been assessed. Noise, dust and traffic impacts have been modelled based on these assumptions that have determined cumulative impacts are acceptable.

The impacts of the proposed development are mostly confined to the site and haulage route allowing the receiving environment to maintain social, economic and environmental objects. Accordingly, no further cumulative assessment is required.

Despite the impacts, the proposed development does have some social and economic benefits. The operators of the proposed quarry do actively support the local communities that they work within by offering local school's opportunities for educational site visits and other community groups. They also actively support local charities and sporting activities in the region. The employment opportunities mentioned above extend to local community and include trainee programs to target school leavers, university students and local indigenous groups.

Overall the proposed development does include some positive contributions which extend beyond the zone of impacts. Accordingly, cumulative impacts of the proposed development are considered to be compatible with the rural setting of the site and its surrounds.

6. Ecologically Sustainable Development

Ecologically sustainable development (ESD) is defined as:

"Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased" (DMP 1990).

(4) The principles of ecologically sustainable development are as follows:

a) the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

ii) an assessment of the risk-weighted consequences of various options

The proposed quarry will be developed in accordance with the relevant guidelines. As the Pearlman Quarry will be operated as per the measures highlighted in this EIS the proposed development is expected to be a sustainable operation for the duration of its lifecycle without irreversible environmental harm to the environment.

b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

The proposed development is not expected to have any long-term environmental impacts that would impact future generations. The areas subject to ground disturbance will be returned to a functional landscape through quality land rehabilitation treatments. Additionally, the quarry footprint has been modified to retain and preserve a scar tree site for the benefit of future generations.

c) Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

The proposed development has been planned to avoid areas of high-value remnant vegetation. Conservation of biological diversity has been a key component of consideration of the quarry layout. Management measures are in place to ensure that areas of existing ecological integrity are maintained as part of the proposed development.

d) improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:

i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
iii) environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The proposed development includes several development costs associated with environmental factors. These costs are directly proportionate to the scale of the development and costs will not be passed on through the supply chain or market mechanisms.

In conclusion, the proposed development can be supported based on achieving the objectives of ecologically sustainable development.

7. Conclusion and Justification

The proposal by Alan Pearlman to establish a hard rock quarry at Croppa Creek Road, North Star requires consent from Gwydir Shire Council under the *Environmental Planning and Assessment Act 1979*. The assessment of this proposal has found that it is consistent with the provisions of this Act.

The project would extract a maximum of 490,000 tonnes per annum, to supply the Inland Rail Project and associated road projects and thereby support and enhance the economic viability of the region. Consent is being sought for a period of up to ten (10) years, subject to the progress of the construction activity in the area and would not include necessary time for the completion of any rehabilitation works once the resource is exhausted.

The Australian Rail Track Corporation (ARTC) identified the need for structural fill, track capping and ballast material requirements for the Narrabri to North Star section of the inland rail project upgrade project. In the EIS prepared for this project (ARTC, 2017). Specifically, Section 8.5.2 of the EIS identifies that the procurement of these materials would be sourced locally from suitable quarries along the Inland Rail alignment. Similarly, Roads and Maritime Services (RMS) require similar materials for the Newell Highway upgrade works and note in approval documents that there are limited local supplies of gravel and aggregate that conform to suitable standards, requiring such resources to be imported from further afield.

While alternative sites were considered to provide the required construction materials for the Inland Rail and associated road upgrade works, other sites that were assessed included constraints in ecological characteristics, potential heritage items, limited resource accessibility and amenity issues and greater haulage distances to the project area. The subject site was selected based on the absences of constraints, abundance of high-quality resources and proximity to the Inland Rail project site and road upgrade project works.

The consequences of not carrying out the project were also considered, resulting in the ARTC and RMS having to source construction materials from other existing or new greenfield sites which may be at a higher cost based and similar level of disturbance.

The project has been designed to avoid impacts to the areas of environmental significance on the site and minimise any remaining potential impacts through appropriate design and management measures. A thorough and comprehensive assessment of existing environmental values and potential environmental impacts have been undertaken. Environmental aspects considered by this EIS include the following:

- Aboriginal and historic heritage
- Traffic impacts
- Biodiversity impacts
- Noise, dust and blasting impacts
- Surface water management
- Resource characteristics.

These matters were subject to detailed specialist assessments which identified project specific mitigation measures to avoid and minimise potential environmental impacts.

Extractive industries are a significant contributor to the material needs of local and regional communities and to economic activity and development. Extractive resources are site specific, limited in occurrence by geological conditions and are finite. Because they are high-volume, low-cost materials, they need to be located close to the communities that use them as the cost of transport to the end user contributes greatly to the overall cost of the delivered product. Extractive resources underpin all urban and infrastructure development and make a major contribution to the ongoing economic growth of the community through direct and indirect employment opportunities.

The potential environmental impacts of the project have been identified and measures proposed to manage and mitigate those impacts. Therefore, it is considered unlikely that the project would have a significant detrimental impact on the environmental values of the site. The project would provide economic benefits to the local community through additional employment whilst also providing improved material delivery efficiencies to the Inland Rail Project which will benefit the wider region. Accordingly, it is considered that the proposal is justified and its impacts acceptable subject to the implementation of the management and mitigation measures identified by this EIS and supporting specialist assessments.

Drawings

Attachment 1 – Secretary's Environmental Assessment Requirements (SEARs)

Attachment 2 - Environmental Management Plan

Attachment 3 – Biodiversity Impact Assessment

Attachment 4 – Aboriginal Cultural Heritage Impact Assessment

Attachment 5 – European Heritage Impact Assessment

Attachment 6 – Surface Water Management Assessment

Attachment 7 – Air Quality Impact Assessment

Attachment 8 – Noise impact Assessment

Attachment 9 – Traffic impact Assessment

Attachment 10 – Resource Assessment Report