



**Hodgson Quarries
and Plant Pty Ltd**

**ROBERTS ROAD QUARRY
MODIFICATION 4**

Statement of Environmental Effects

FINAL

December 2019

Hodgson Quarries and Plant Pty Ltd

ROBERTS ROAD QUARRY MODIFICATION 4

Statement of Environmental Effects

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Hodgson Quarries and Plant Pty Ltd

Project Director: Gabrielle Allan
Project Manager: Alex Irwin
Report No. 4465/R02
Date: December 2019



Newcastle

75 York Street
Teralba NSW 2284

T | 1300 793 267
E | info@umwelt.com.au

www.umwelt.com.au



Quality
ISO 9001

This report was prepared using
Umwelt's ISO 9001 certified
Quality Management System.

Disclaimer

This document has been prepared for the sole use of the authorised recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that for which it was supplied by Umwelt (Australia) Pty Ltd (Umwelt). No other party should rely on this document without the prior written consent of Umwelt.

Umwelt undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. Umwelt assumes no liability to a third party for any inaccuracies in or omissions to that information. Where this document indicates that information has been provided by third parties, Umwelt has made no independent verification of this information except as expressly stated.

©Umwelt (Australia) Pty Ltd

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Alex Irwin	5 November 2019	Alex Irwin	5 November 2019
Final	Alex Irwin	4 December 2019	Alex Irwin	4 December 2019

Executive Summary



Background

Hodgson Quarries and Plant Pty Ltd (the Applicant) operates the Roberts Road Quarry (the Quarry) located on Roberts Road at Maroota, NSW. Development consent (DA 267-11-99), which provides for the extraction and on-site processing of sand and pebbles for a period of 25 years, was originally granted to the Quarry by the Minister for Urban Affairs and Planning in 2000.

The Applicant is seeking to modify DA 267-11-99 to allow for the importation of Virgin Excavated Natural Material (VENM) and Excavated Natural Material (ENM) which would be used predominantly to backfill the extraction area to construct a free-draining final landform. Selective processing and blending of VENM and ENM with high sand content is also proposed.

The Proposed Modification

The key components of the Proposed Modification are as follows.

- The importation of VENM and ENM, principally to backfill the extraction area and create a final landform which better integrates with the surrounding landforms.
- On-site processing of selected, high sand content VENM and ENM for sale or blending with sand produced from the in situ resources prior to sale.
- While back loading of trucks would be encouraged, the proposed importation of VENM and ENM would require an increase in the number of traffic movements permitted each day (from 100 to 140).
- An extension to the period of approval of DA 267-11-99, from 2025 to 2030, to reflect the remaining sand resource to be extracted from within the existing approved extraction footprint.
- Removal of a condition limiting the area of exposed and active quarry extents in order to allow for backfill and rehabilitation of the completed sections of the Quarry with VENM and ENM.

Approval for the proposed changes is being sought by under Section 4.55(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act)

Need for the Proposed Modification

The benefits of the Proposed Modification are as follows.

- The modified final landform, to be constructed using the imported VENM and ENM, would allow for a return to natural drainage to the north and provide a landform more sympathetic to the surrounding landforms and more conducive to future agricultural or horticultural land use.
- The Quarry provides an alternative location, with a beneficial use, for the disposal of VENM and ENM to licensed waste management facilities (thereby increasing the storage capacity of these for general solid waste).
- Blending imported VENM and ENM with extracted materials would extend the life of the Quarry and assist in the supply of high quality construction materials into the Sydney local and regional markets. This supply is needed to replace supply from existing quarries that are nearing the end of their resources and will contribute to the security and economic viability of the Sydney construction industry along with supply to other key sand markets.
- Providing for the complete extraction of the sand resource (through extension to the period of the development consent) for which approval has been granted.

The Proposed Modification would therefore provide for improved environmental outcomes for the Quarry, through the construction of a final landform which returns environmental flows and better integrates with the surrounding topography, whilst providing added security of supply for construction materials to Sydney.

Environment Impacts

This Statement of Environmental Effects (SEE) includes a detailed assessment of the potential environmental and social impacts of the Proposed Modification and identifies the management and mitigation measures that will be implemented as part of the Proposed Modification. A brief summary of the key findings of the assessment process is provided in **Table ES1**.

Table ES1 Summary of the Key Environmental Impact Assessment Findings

Environmental issues	Overview of Potential Impacts
Surface Water	<p>The Water Management System (WMS) for the Quarry will remain largely unchanged from the existing Quarry WMS, with the main change being an increase in the potential for discharge of sediment laden water from the Quarry Site as backfilling creates the free-draining landform.</p> <p>Additional erosion and sediment controls will be implemented to minimise erosion from the imported VENM/ENM and to control any sediment entrained in runoff. Water treatment measures would also be implemented to ensure discharges from the final landform do not exceed any proposed limit conditions. Therefore, the impacts to downstream water quality are considered to be negligible during the final landform establishment period.</p> <p>Prior to the establishment of the final landform, the Applicant will apply to vary EPL 6535. This will include a licenced discharge point to allow surplus water to be discharged from a sediment basin constructed at the discharge point of the Quarry Site during the period between the construction of the final landform and the completion of rehabilitation. The sediment basin would be converted to a final water storage, allowing for the capture of surface water up to the landowners licensed allocation and discharge to the Coopers Creek catchment to the north.</p>

Environmental issues	Overview of Potential Impacts
<p>Noise</p>	<p>Road traffic noise modelling was undertaken and the results indicate the predicted increase in road traffic noise would be below 1dB(A). This increase in road traffic noise associated with increased truck movements is considered to be negligible.</p> <p>While the Applicant does not intend on introducing any new noise sources on the Quarry Site, noise modelling has been undertaken to review likely performance against the existing noise criteria of DA 267-11-99 when VENM/ENM management activities are undertaken. Assuming the implementation of the operational controls and management measures currently implemented and identified in the Quarry's Operational and Road Noise Management Plan, this modelling confirmed that compliance with noise criteria can be achieved at the receivers surrounding the Quarry.</p>
<p>Air quality</p>	<p>Dust emissions as a result of the modified operations have been estimated for worst-case operating scenarios and meteorological conditions.</p> <p>Compliance with annual average criteria for PM₁₀, total suspended particulates and dust deposition is predicted. Noting annual average PM_{2.5} background concentrations already exceed the 8 µg/m³ assessment criteria, the predicted incremental increase as a result of the Proposed Modification of between 0.4 µg/m³ and 0.5 µg/m³, are unlikely to impact significantly on surrounding receivers.</p> <p>With respect to maximum 24-hour average emissions, a small number of additional exceedances of PM₁₀ have been predicted at the receivers closest to the Quarry Site. No additional exceedances of PM_{2.5} were predicted. These results indicate that the Proposed Modification is unlikely to significantly increase emissions from the Quarry, however, operations should implement additional measures to:</p> <ol style="list-style-type: none"> 1. minimise site contributions during days of elevated background PM₁₀ concentrations, and 2. review the conditions when extractive and emplacement activities take place towards the perimeter of the Quarry.
<p>Traffic and transport</p>	<p>The Proposed Modification would result in an increase to the daily traffic volumes for the Quarry from 100 to 140 trucks per day. No increase is proposed for the existing hourly maximum of 20 trucks per hour.</p> <p>A Traffic Impact Assessment was undertaken to include an additional 140 trucks per day along Old Northern Road. As the Proposed Modification includes an extension to the period of operation from 2025 to 2030, background growth to 2030 was included in the assessment. The results indicate the increase to the total traffic flows represent an increase of less than 2% of the total traffic flows and are well within the capacity of the road network. No change to the level of service provided by the Roberts Road / Old Northern Road intersection is predicted.</p> <p>The assessment also concludes that the proposed increase in truck movements would not impact adversely on overall road safety, including on local bus services.</p>
<p>Waste Management</p>	<p>Existing waste generated during operation of the Quarry includes general solid waste (putrescible, non-putrescible and recyclable), waste oils and greases, tyres and screened waste. The Proposed Modification would require management of VENM and ENM (classified waste materials for which exemptions from licensing apply where applied to land).</p> <p>Existing waste would be managed in accordance with current Quarry management and contingency methods and VENM/ENM would be accepted and applied to land or stockpiled in accordance with the relevant Resource Recovery Exemption. Therefore, the potential for pollution at the Quarry was determined to be low.</p> <p>A biosecurity risk assessment was also undertaken and the results indicate that the biosecurity hazards associated with the importation of VENM/ENM to the Quarry would be low.</p>

Environmental issues	Overview of Potential Impacts
Visual Amenity, Rehabilitation and Land Use	<p>The Proposed Modification seeks to remove Condition 29(c) of DA 267-11-99 which requires the quarry to provide for <i>'a planting and watering regime to ensure that no more than 3 hectares of the site are exposed and active at any one time'</i>. While this would result in larger areas being 'active and exposed' at any given time over the remaining life of the Quarry, existing views of Quarry operations are unlikely to increase when viewed from vantage points surrounding the Quarry Site. Impacts on visual amenity would be further mitigated by:</p> <ul style="list-style-type: none"> • progressive rehabilitation of the backfilled extraction area, • construction, vegetation and maintenance of bund walls along the Roberts Road and Old Northern Road perimeter of the Quarry Site, • dust suppression measures, and • focus on general housekeeping and waste management on the Quarry Site. <p>The Proposed Modification provides for an improved final landform which has a reduced slope and returns environmental flows to the north. The modified landform would better integrate with surrounding topography and result in a positive impact on visual amenity, reduce the risk of erosion and would support agricultural and horticultural activities in the long term.</p>
Socio-Economic Impacts	<p>The principal issue of concern for the local community relates to heavy vehicle traffic and additional impacts identified include noise, visual, dust, water and land use. Positive impacts identified for the community involves economic contributions made by quarry operators to local businesses and employment opportunities for local residents.</p> <p>The proposed importation of VENM/ENM to the Quarry would allow the Quarry to operate over a longer time period, providing benefits for the local community and the broader Sydney region (in the provision of sand products). The socio-economic impact assessment considered potential direct and indirect benefits and assessed there would be a net socio-economic benefit from the Proposed Modification.</p>

Further details of the predicted environmental and social impacts of the Proposed Modification are provided in the main text of this SEE and associated technical reports. The SEE includes commitments by the Applicant to the implementation of management, mitigation and offset measures to minimise the predicted impacts of the Proposed Modification.

Conclusion

The Proposed Modification has been evaluated against the principles of Ecologically Sustainable Development (ESD), section 1.3 (Objects) and section 4.15 (Evaluation) of the EP&A Act and relevant clauses and requirements of local, regional and state planning instruments. This assessment confirms the Proposed Modification to be consistent with the relevant principles and requirements in each case.

On considering the balance of the potential impacts of the Proposed Modification on the environment and community, and the benefits of and the need for the proposed changes, it would be reasonable to consider that with the implementation of the management, mitigation and offset measures proposed by the Applicant, the benefits of the Proposed Modification outweigh the impacts.

Table of Contents

Executive Summary	i
1.0 Introduction	1
1.1 Scope	1
1.2 The Applicant	1
1.3 Site Location, Property Description and Ownership	3
1.4 Planning Approval History	3
1.5 Environmental Assessment Requirements	3
1.6 Management of Investigations	6
1.7 Structure of the Document	6
2.0 Site Context	8
2.1 Land Use and Zoning	8
2.2 Topography and Drainage	8
2.3 Geology	10
2.4 Groundwater	10
2.5 Biodiversity	13
2.6 Sensitive Receivers	13
3.0 Existing Operations	14
3.1 Existing Approvals	14
3.2 Description of Existing Operations	14
3.2.1 Resource, Product and Markets	14
3.2.2 Extraction	16
3.2.4 Processing	17
3.2.5 Transportation	17
3.2.6 Site Infrastructure and Equipment	19
3.2.7 Operating Hours and Workforce	21
3.2.8 Services and Utilities	21
3.2.9 Rehabilitation	21
3.3 Environmental Management	23
3.4 Environmental Performance	24
4.0 Proposed Modification	25
4.1 Summary of the Proposed Modification	25
4.2 Description of the Proposed Modifications	26
4.2.1 Overview	26
4.2.2 VENM and ENM Management	26
4.2.3 Processing Operations	28
4.2.4 Exposed and Active Area Management	29

4.2.5	Traffic Management	29
4.2.6	Quarry Life	29
4.2.7	Final Landform and Rehabilitation	31
4.3	Justification and Alternatives	35
4.3.1	Justification	35
4.3.2	Alternatives	35
5.0	Statutory and Planning Framework	37
5.1	Commonwealth Legislation	37
5.1.1	Environmental Protection and Biodiversity Conservation Act 1999	37
5.2	State Legislation	37
5.2.1	Environmental Planning and Assessment Act, 1979	37
5.2.2	Protection of the Environment Operations Act 1997	39
5.2.3	Water Management Act 2000	39
5.2.4	Other State Legislation	40
5.3	State Environmental Planning Policies	42
5.3.1	State Environmental Planning Policy (State and Regional Development) 2011	42
5.3.2	State Environmental Planning Policy (Infrastructure) 2007	42
5.3.3	State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007	42
5.3.4	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development	43
5.4	Regional Planning Instruments	43
5.4.1	Sydney Regional Environmental Plan No 9-Extractive Industry (No 2-1995)	43
5.5	Local Planning Instruments	44
5.5.1	The Hills Local Environment Plan 2012	44
5.5.2	The Hills Development Control Plan	45
6.0	Stakeholder Engagement	46
6.1	Authority Consultation	46
6.1.1	Department of Planning and Environment	46
6.1.2	Other Agencies	46
6.2	Community Consultation	48
7.0	Environmental Impact Assessment	50
7.1	Identification of Key Environmental and Community Issues	50
7.2	Preliminary Risk Analysis	50
7.3	Surface Water	53
7.3.1	Existing Environment	53
7.3.2	Potential Impacts	62
7.3.3	Water Management	62
7.3.4	Surface Water Entitlement and Licensing	69

	7.3.5	Monitoring	69
	7.3.6	Impact Assessment and Mitigation Measures	70
7.4		Air Quality	71
	7.4.1	Scope	71
	7.4.2	Existing Environment	71
	7.4.3	Air Quality Criteria	72
	7.4.4	Assessment Methodology	73
	7.4.5	Impact Assessment	74
	7.4.6	Monitoring and Management	78
7.5		Noise	78
	7.5.1	Scope	78
	7.5.2	Existing Environment	79
	7.5.3	Noise Criteria	79
	7.5.4	Assessment Methodology	80
	7.5.5	Results	82
	7.5.6	Noise Management and Mitigation	83
	7.5.7	Monitoring	83
7.6		Traffic and Transport	84
	7.6.1	Scope	84
	7.6.2	Existing Traffic Environment	84
	7.6.3	Proposed Changes to Traffic	87
	7.6.4	Impact Assessment	87
	7.6.5	Monitoring and Management	88
7.7		Waste Management	88
	7.7.1	Waste Types	88
	7.7.2	Waste Management Measures	88
	7.7.3	Impact Assessment	91
7.8		Visual Amenity	94
	7.8.1	Existing Visual Environment	94
	7.8.2	Proposed Changes to the Visual Environment	98
	7.8.3	Management Measures	98
	7.8.4	Impact Assessment	99
7.9		Rehabilitation and Final Landform	99
	7.9.1	Introduction	99
	7.9.2	Rehabilitation Objectives and Completion Criteria	99
	7.9.3	Assessment of Impact	102
7.10		Land Use	102
	7.10.1	Existing Land Use	102
	7.10.2	Impacts to Land Use	102
7.11		Socio-economic Impacts	103

7.11.1	Introduction	103
7.11.2	Methodology	103
7.11.3	Social Profile	105
7.11.4	Social Impact Management and Community Enhancement Strategies	108
7.11.5	Assessment of Impacts	109
7.11.6	Conclusion	110
8.0	Statement of Commitments	111
9.0	Evaluation and Justification of the Proposed Modification	113
9.1	Introduction	113
9.2	Evaluation	113
9.2.1	Residual Environmental Impacts	113
9.2.2	Ecologically Sustainable Development	113
9.2.3	Environmental Planning & Assessment Act 1979 Considerations	115
9.3	Justification	117
9.3.1	Suitability of the Site	117
9.3.2	Benefits of the Proposed Modification	118
9.3.3	Need for the Proposed Modification	118
9.3.4	Consequences of Not Proceeding	119
9.4	Conclusion	120
10.0	References	121

Figures

Figure 1.1	Locality Plan	2
Figure 1.2	Quarry Site Location and Application Area	4
Figure 2.1	Local Setting and Land Use	9
Figure 2.2	Local Geology and Groundwater	12
Figure 2.3	Conceptual Hydrogeological Model – Maroota Sands and Hawkesbury Sandstone	13
Figure 3.1	Approved Extraction Area and Sequence	15
Figure 3.2	Processing Operations	18
Figure 3.3	Quarry Infrastructure	20
Figure 3.4	Approved Final Landform	22
Figure 4.1	Indicative Quarry Extraction Stages	30
Figure 4.2	Proposed Final Landform – 1,200,000 m ³ Fill	32
Figure 4.3	Proposed Final Landform – 2,000,000 m ³ Fill	33
Figure 6.1	Consultation Coverage	49
Figure 7.1	Catchment Context	55
Figure 7.2	Surface Water Quality Monitoring Locations	59
Figure 7.3	Existing Surface Water Management System	63
Figure 7.4	Sensitive Receivers	76
Figure 7.5	Local Road Network	85
Figure 7.6	Photo Locations	96

Plates

Plate 7.1	View from Roberts Road (towards south-west)	95
Plate 7.2	View from Roberts Road (towards north-east)	95
Plate 7.3	View from Old Northern Road (North-western Corner of the Extraction Area – Sunrise Nursery)	95
Plate 7.4	View from Old Northern Road (Roberts Road Intersection) featuring vegetated bund wall	97
Plate 7.5	View from 100 Old Telegraph Road	97
Plate 7.6	View from (opposite) 149 Old Telegraph Road	97

Tables

Table 1.1	Property Description and Ownership	3
Table 1.2	Approval History Timeline	3
Table 1.3	Environmental Assessment Requirements	5
Table 1.4	Environmental Assessment Structure	6
Table 3.1	Water Licences Summary	14
Table 3.2	Current Mobile Equipment	19
Table 4.1	Comparison of Approved Operations and Proposed Modification	25
Table 4.2	Modified Mobile Equipment Schedule	28
Table 5.1	Objects of the EP&A Act	37
Table 5.2	Summary of State Legislation	41
Table 6.1	Agency Consultation	46
Table 7.1	Preliminary Environmental Risk Analysis	51
Table 7.2	Water Access Licences	53

Table 7.3	Soil Characteristics	54
Table 7.4	Annual Rainfall for years 1926 to 1953 and 1963 to 2018	56
Table 7.5	Average Daily Pan Evaporation for Years (1973 to 2019)	56
Table 7.6	Default Trigger Values for Physical And Chemical Stressors For South-East Australia for Slightly Disturbed Ecosystems ANZECC (2000)	58
Table 7.7	Stream Surface Water Quality (SW19 Monitoring Location July 2003 to July 2005)	58
Table 7.8	Surface Water and Groundwater Quality 2017 - 2019	60
Table 7.9	Surface Water and Groundwater Quality 2017 - 2019	61
Table 7.10	Sediment Basin 1 Preliminary Design	66
Table 7.11	Gross Water Balance	67
Table 7.12	Controlled Discharge Days	67
Table 7.13	Controlled Discharge Volumes	68
Table 7.14	Sediment Basin 1 Spill Events	68
Table 7.15	Sediment Basin 1 Spill Volumes	68
Table 7.16	Proposed Baseline Water Quality Monitoring Program	69
Table 7.17	Proposed Discharge Water Quality Monitoring	70
Table 7.18	Annual Statistics from Meteorological Data Collected at the Quarry (2014 to 2018)	71
Table 7.19	NSW EPA Impact Assessment Criteria for Key Emissions	73
Table 7.20	Estimated Emissions from the Quarry	74
Table 7.21	Average Two-Way Traffic Volumes	81
Table 7.22	Predicted Noise Levels at Receivers LAeq,15 min dB(A)	82
Table 7.25	Sidra Analysis Old Northern Road – Roberts Road (2018 Survey Traffic)	86
Table 7.26	Sidra Analysis Old Northern Road – Roberts Road (Maximum Quarry Traffic)	87
Table 7.27	Sidra Analysis Old Northern Road – Roberts Road (2030/Maximum Quarry Traffic)	87
Table 7.28	Waste Controls, Safeguards and Contingency Management	89
Table 7.29	Consequence Rating	91
Table 7.30	Risk Rating	92
Table 7.31	Biosecurity Risk Rating	92
Table 7.32	Rehabilitation Objectives and Impact of Proposed Modification	100
Table 7.33	Preliminary Closure and Rehabilitation Completion Criteria	101
Table 7.34	Engagement Mechanisms	104
Table 7.35	Summary of Social Profile	106
Table 7.36	Potential Positive and Negative Social Impacts of the Proposed Modification	108
Table 7.37	Impact Management and Community Enhancement Strategies	108
Table 8.1	Summary of Environmental Management Commitments	111
Table 9.1	Section 4.15 Matters for Consideration	116
Table 9.2	Objects of the EP&A Act	116

Appendices

Appendix 1	Statement of Authorship
Appendix 2	Environmental Assessment Requirements
Appendix 3	Resource Assessment – Sand Resources
Appendix 4	Resource Assessment – Clay Resources
Appendix 5	Figure Three – Landscape and Rehabilitation Plan
Appendix 6	Community Information Sheet
Appendix 7	Air Quality Impact Assessment
Appendix 8	Noise Impact Assessment
Appendix 9	Traffic Impact Assessment

1.0 Introduction

1.1 Scope

The Roberts Road Quarry (the Quarry) is operated by Hodgson Quarries and Plant Pty Ltd (the Applicant) on Lots 1 and 2 DP 228308, and Lot 2 DP 312327, at Maroota within The Hills Shire Council Local Government Area (LGA). The Quarry has approval for the extraction and on-site processing of sand from the Maroota Sand geological formation located on the Hornsby Plateau, north-west of Sydney. Access to the Quarry is from Roberts Road which intersects with Old Northern Road from which quarry products are distributed (both to the north-west towards Wisemans Ferry Road and south-east towards Pennant Hills Road) (refer to **Figure 1.1**).

The Quarry has been in operation since the 1990s supplying a range of sand and pebble products to the building and construction industry. It has been operated under the current development consent (DA 267-11-99) as State Significant Development following approval by the Minister for Urban Affairs and Planning in 2000 under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Applicant is seeking to modify DA 267-11-99 under section 4.55(2) of the EP&A Act to allow for the following additions and modifications to Quarry operations (the Proposed Modification).

- The importation of Virgin Excavated Natural Material (VENM) and Excavated Natural Material (ENM), principally to backfill the extraction area and create a final landform which better integrates with the surrounding landforms.
- On-site processing of selected VENM and ENM for sale or blending with sand produced from the in situ resources prior to sale.
- An increase in the number of traffic movements permitted each day (from 100 to 140) to reflect the proposed importation of VENM and ENM.
- An extension to the period of approval of DA 267-11-99 (to May 2030) to reflect the remaining sand resource to be extracted (from 2025 to 2030).
- Removal of a condition limiting the area of exposed and active quarry extents in order to allow for backfill and rehabilitation of the completed sections of the Quarry with VENM and ENM.

Further details of the Proposed Modification are provided in **Section 4.0**.

The Applicant has engaged Umwelt (Australia) Pty Ltd (Umwelt) to undertake the assessment of environmental impacts of the Proposed Modification, which forms the basis of this Statement of Environmental Effects (SEE).

1.2 The Applicant

Hodgson Quarries and Plant Pty Ltd is a private company established to operate quarries, market the materials produced and maintain mobile equipment for hire. The principal of Hodgson Quarries and Plant Pty Ltd, Mr Martin Hodgson has been involved in extractive industries for over 40 years. Mr Martin Hodgson is assisted on-site by Mr Stuart Reed, Compliance Manager, himself with many years' experience in extractive industries. The Applicant has operated the Quarry since 2004.

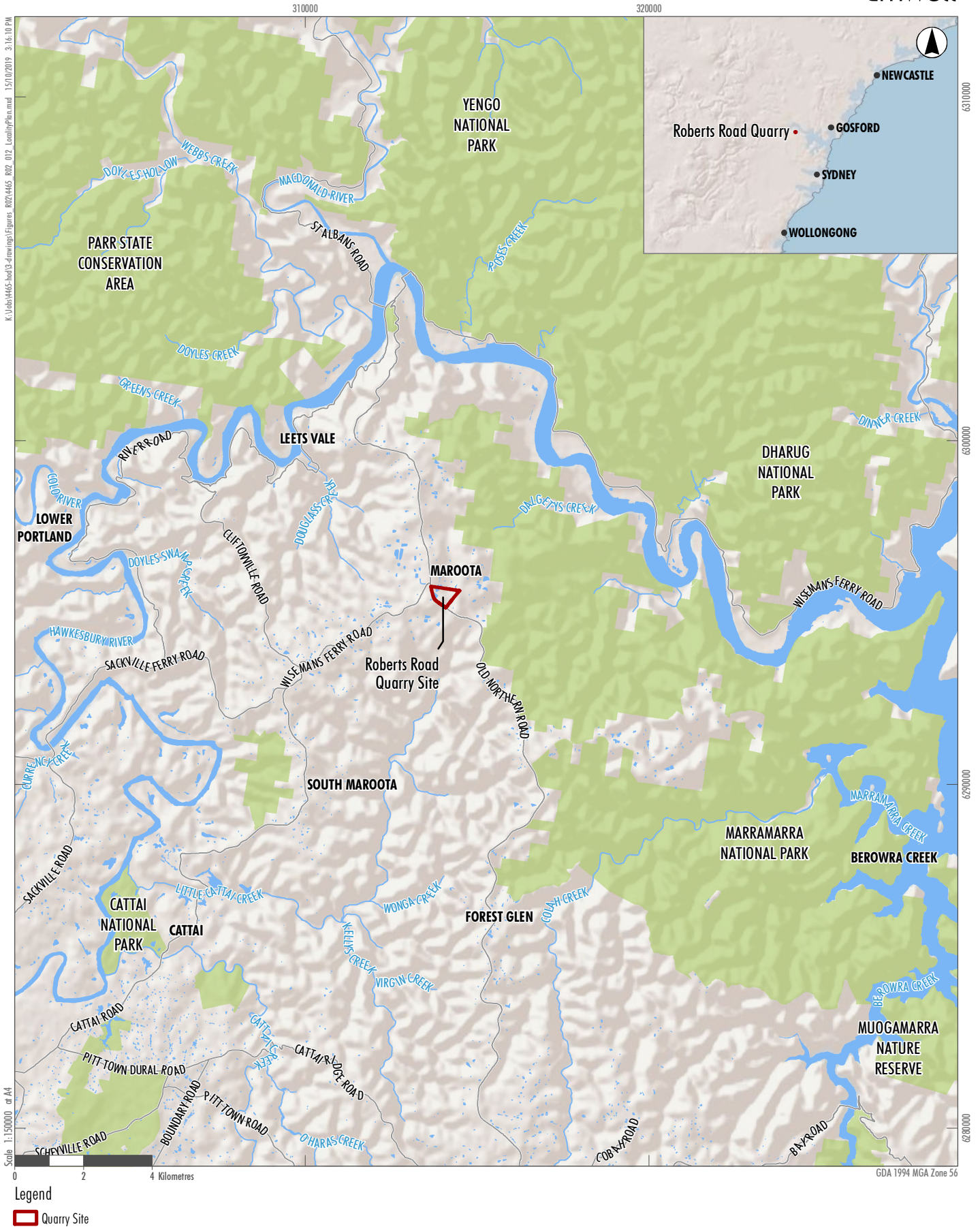


FIGURE 1.1
Locality Plan

1.3 Site Location, Property Description and Ownership

The Quarry is located at Maroota NSW, in the outer north-western suburbs of Sydney, approximately 50 kilometres (km) from the Sydney CBD within The Hills Shire Council LGA. The Quarry is located on three lots as described in **Table 1.1** at the corner of Roberts Road and Old Northern Road, Maroota (refer to **Figure 1.2**).

Table 1.1 Property Description and Ownership

Lot	Deposited Plan	Ownership
1	DP 228308	M. Hodgson
2 (part)	DP 228308	Dr L. S. Martin
2	DP 312327	G. Hodgson

The Applicant operates the Quarry with the landowners who consent to the lodgement of the Proposed Modification and operations as described in this document.

The Quarry Site covers an area of approximately 27.8 hectares (ha), of which approximately 22.5 ha comprises the approved extraction area (refer to **Figure 1.2**). The majority of the Quarry Site infrastructure and processing plant is located within the footprint of the extraction area. An area of 0.9 ha in the north-western corner of the site is occupied by a commercial nursery (Sunrise Nursery).

1.4 Planning Approval History

A timeline of approval history for quarrying operations on the site is provided in **Table 1.2**.

Table 1.2 Approval History Timeline

Approval date	Description
31 May 2000	Original Quarry Development Application DA 267-11-99
29 November 2000	Modification 1 for an amendment to the method of extraction and construction of an acoustic bund wall
18 August 2015	Modification 3 for an interim extension to the approved life of the Quarry of one year
18 March 2016	Modification 2 for an amendment to the dam construction process and modification of the sequence, process of extraction and extension of the life of extraction until 31 May 2025

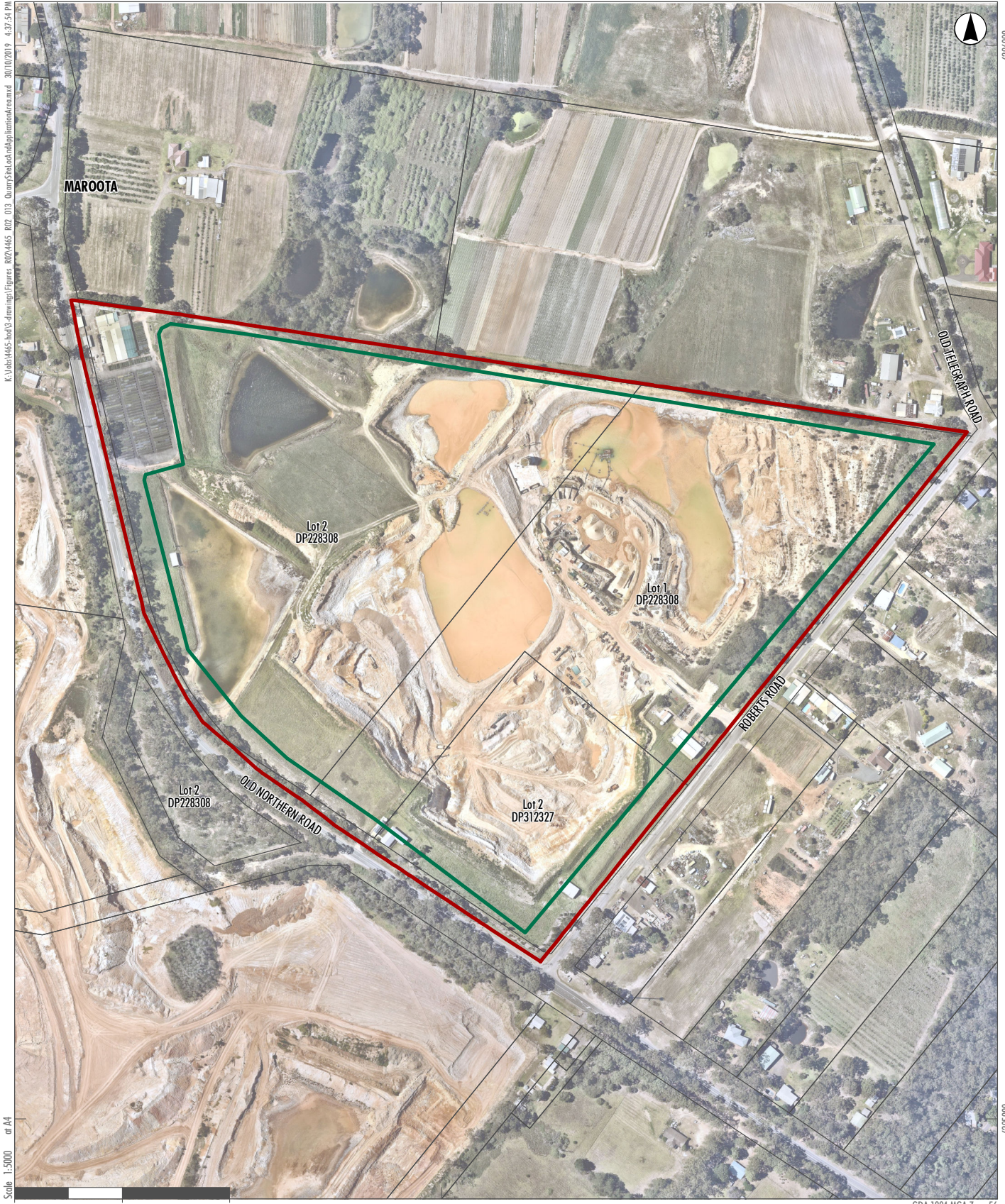
1.5 Environmental Assessment Requirements

The Applicant has consulted with the Department of Planning, Infrastructure and Environment (DPIE) in relation to the Environmental Assessment Requirements (EARs) for the Proposed Modification. The DPIE confirmed the EARs in a letter dated 18 March 2019. A copy of this correspondence is provided in **Appendix 2** and the requirements are summarised in **Table 1.3**.

314000

K:\Jobs\4465-hud\3-drawings\Figures_R02\4465_R02_013_QuarrySiteLocationApplicationArea.mxd 30/10/2019 4:37:54 PM

6296000



Scale 1:5000 or A4

0 100 200 Metres

GDA 1994 MGA Zone 56

6295000

Legend

- Quarry Site
- Approved Extraction Area

FIGURE 1.2

Quarry Site Location and Application Area

Table 1.3 Environmental Assessment Requirements

Requirement	Relevant SEE Section
<p>Ensure that the assessment is prepared in accordance with the following:</p> <ul style="list-style-type: none"> • <i>NSW Noise Policy for Industry</i> (2017) • <i>NSW Road Noise Policy</i> (2011) • <i>Approved Methods for the Modelling and Assessment of Air Pollutants in NSW</i> (2016) • <i>Voluntary Land Acquisition Mitigation Policy</i> (2018). 	<p>Section 7.4 and Section 7.5.1</p>
<p>Air Quality and Noise</p> <ul style="list-style-type: none"> • Demonstrate that the modification and any potential increase to the quarry's production capacity would not produce exceedances in the quarry's noise and air quality criteria, and that assessments of both noise and air quality sufficient to demonstrate this outcome are provided with the SEE. 	<p>Section 7.4 and Section 7.5.1</p>
<p>Permissibility</p> <ul style="list-style-type: none"> • Provide detail regarding the permissibility of the Proposed Modification under <i>The Hills Local Environmental Plan 2012</i>. • Specifically, demonstrate if the Proposed Modification is considered ancillary to the existing quarry or whether it constitutes a new development. 	<p>Section 5.4 and Section 5.2.1</p>
<p>VENM/ENM Fill</p> <p>Provide the following with respect to VENM/ENM fill:</p> <ul style="list-style-type: none"> • Likely sources of VENM/ENM for the site, including a description of any potential contaminants and a description on how the VENM/ENM would be stored and handled on site. • Quantity of imported material which would be blended with on-site material to produce saleable products. • Proportion of the imported material which would be VENM and ENM. • Procedures and protocols proposed to safeguard potential impacts from the imported ENM on the Maroota Sands aquifer. 	<p>Section 4.2.2 and Section 4.2.7 and Section 7.3</p>
<p>Rehabilitation</p> <ul style="list-style-type: none"> • Outline how the proposed final landform of the quarry site will be achieved if the required quantity of VENM/ENM cannot be sourced. • Provide information regarding the proposed changes to the final landform of the quarry site, including drainage lines and any onsite detention ponds. • Detail the measures that will be implemented to reduce erosion and sedimentation associated with runoff leaving the quarry site. 	<p>Section 7.3 and Section 7.9</p>
<p>Consultation</p> <ul style="list-style-type: none"> • Undertake consultation with all relevant stakeholders, such as government agencies and affected residents, including relevant landholders downstream of the drainage lines. • Fully document the outcomes of the proposed Community Engagement Strategy. 	<p>Section 6.0</p>

1.6 Management of Investigations

The SEE has been prepared by Mr Alex Irwin (B.Sc(Hons)), Principal Environmental Consultant of Umwelt (Australia) Pty Ltd (Umwelt) on behalf of the Applicant. Mr Irwin was assisted in the preparation of the SEE by Ms Ruth Tapp (B.Nat.Res.(Hons)), Environmental Scientist, and the following Umwelt specialist personnel.

- Mr Chris Bonomini (B.Eng.(Chem)(Hons)) prepared the surface water assessment (refer to **Section 7.3**).
- Mr David Davis (B.Eng.(Mech)(Hons)) prepared the noise impact assessment (refer to **Section 7.4**).
- Dr Anne Schneider (PhD, M.Sc., B.Sc.) assisted in the assessment of rehabilitation (refer to **Section 7.9**).

The following external specialist consultancies were engaged by the Applicant and managed by Umwelt to provide specialist environmental assessments.

- Air Quality Impact Assessment – Jacobs Pty Ltd (Jacobs)
Mr Luke Spencer (B.Eng.(Hons)(Env), CPEng).
- Traffic Impact Assessment – Seca Solution Pty Ltd (Seca)
Mr Shaun Morgan (N.Dip (C.Eng) (UK), Road Safety Auditor (Level 3 – Lead Auditor).

Community Consultation was undertaken by Mr Martin Hodgson and Mr Stuart Reed of Hodgson Quarries & Plant, who also provided technical information on current and proposed operations. Environmental monitoring data was obtained through the Roberts Road Quarry website hosted by VGT Environmental Compliance Solutions Pty Ltd (VGT). Ms Lisa Thomson and Ms Sinead Kelly of VGT also provided supplementary environmental data on request.

1.7 Structure of the Document

This SEE has been prepared in accordance with the EP&A Act and Regulation (refer to SEE Statement of Authorship in **Appendix 1**) and the Environmental Assessment Requirements for Modification 4 provided by the DPIE (refer to **Appendix 2**). The SEE comprises a main text component and supporting studies, which are included as appendices. An overview of the layout of the main text is presented in **Table 1.4** below.

Table 1.4 Environmental Assessment Structure

SEE Section	Environmental Assessment Details
Executive Summary	Provides a brief overview of the Proposed Modification, the major outcomes of the environmental assessment and key project commitments to mitigate potential impacts.
Section 1.0	Provides the background for the Proposed Modification, key Proposed Modification details, the Applicant and the assessment team.
Section 2.0	Provides the site context and details about the existing environment.
Section 3.0	Identifies the existing approvals, describes the existing operations and identifies the activities to be modified.
Section 4.0	Describes the Proposed Modifications to approved activities. The need for the Proposed Modification is justified along with a review of alternatives considered in the development of the Proposed Modification.
Section 5.0	Provides a description of the current planning context for the Proposed Modification.

SEE Section	Environmental Assessment Details
Section 6.0	Describes the stakeholder consultation process undertaken as part of the Proposed Modification and environmental assessment process.
Section 7.0	Provides a comprehensive analysis and assessment of the potential environmental and community impacts of the Proposed Modification.
Section 8.0	Provides a summary of proposed management and mitigation commitments for the Proposed Modification.
Sections 9.0	Provides a conclusion and justification for the Proposed Modification.
Section 10.0	References

2.0 Site Context

The following provides an overview of key environmental features of the Quarry Site and surrounds as relevant to the assessment of the Proposed Modification. Key features of the local setting are identified on **Figure 2.1**.

2.1 Land Use and Zoning

The site and adjacent land area is zoned RU1 – Primary Production under *The Hills Local Environmental Plan 2012*. The zone has among its objectives the facilitation of the economic extraction of materials from land and the subsequent rehabilitation of that land. Extractive industries are permissible with consent on land zoned RU1 – Primary Production.

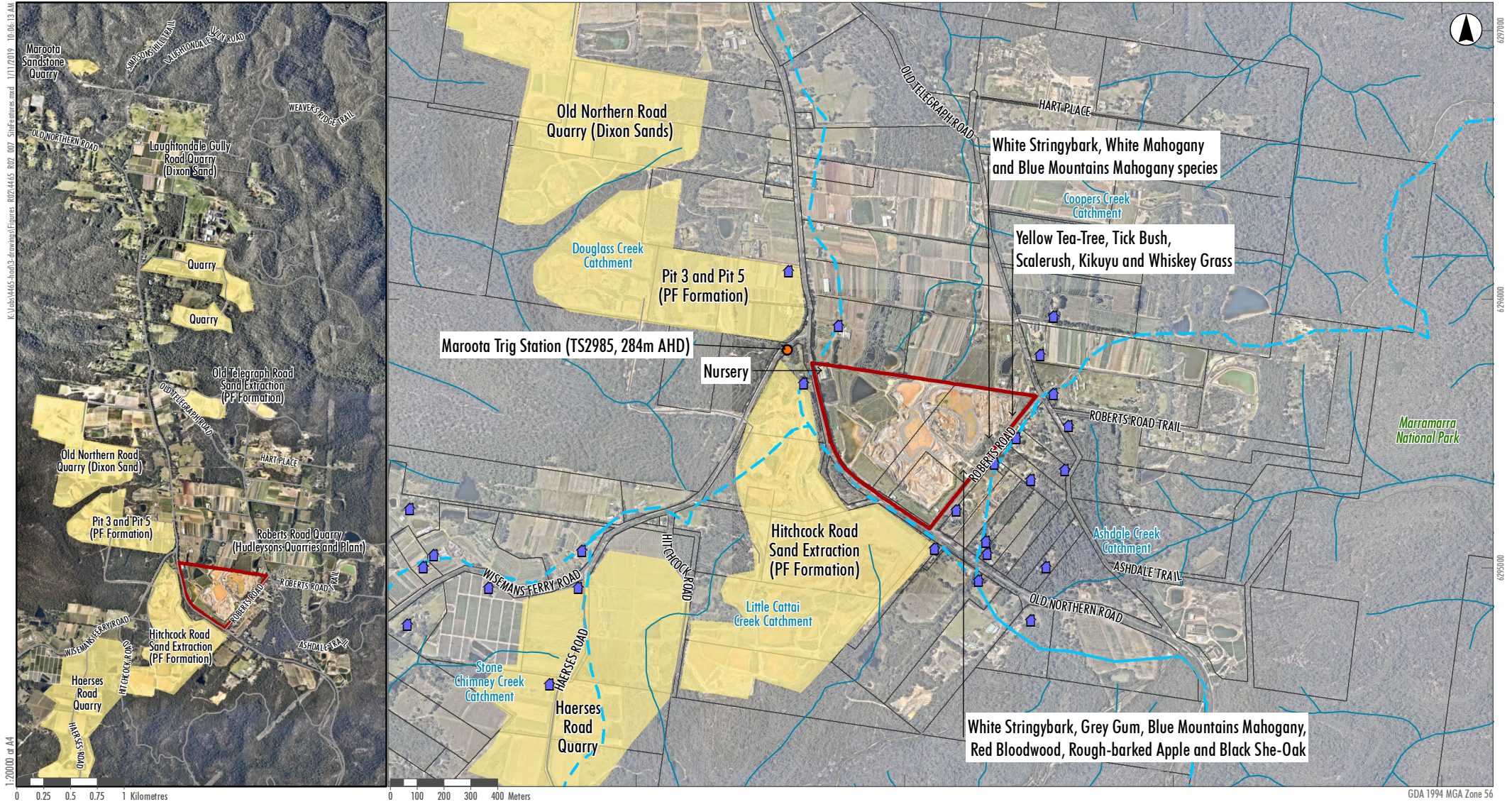
The site has been operated as a quarry since the 1990s. Prior to this the site was used for agricultural purposes and in particular as an orchard and plant nursery. The north-western corner of the site remains in use as a commercial plant nursery.

The surrounding area is dominated by agriculture, extractive industry, rural-residential land and National Parks, the closest of which is Marramarra National Park just over 1 km to the east of the site (refer to **Figure 2.1**). The surrounding region is a significant area for quarrying, with at least nine quarries located within the local area, as shown in **Figure 2.1**.

2.2 Topography and Drainage

The topography of the local setting is typical of the Hawkesbury Sandstone plateau and is surrounded by steep valleys and massive cliff faces. The relief ranges from 170 m Australian Height Datum (AHD), south of the Quarry Site to 240.7 m AHD at the Maroota Trig Station (approximately 440 m west of the Quarry Site). Within the Quarry Site elevations range from approximately 226 m at the south-western end along Old Northern Road to approximately 192 m AHD on the northern boundary. The existing landform of the Quarry Site has been highly disturbed by the approved Quarry operations (refer to **Figure 2.1**).

The general drainage pattern of the site is in a northerly direction along a natural creek line which joins a tributary of Coopers Creek approximately 2 km to the north, before eventually flowing into the Hawkesbury River. Further information on local drainage is provided in **Section 7.3.1**.



Legend

- Quarry Site
- Catchment Boundary (see also Figure 7.3)
- 🏠 Residential Receivers
- Local Quarries
- Roads
- Watercourse
- Topographic contours (2m)

FIGURE 2.1
Local Setting and Land Use

2.3 Geology

The Maroota area is known for its production of sand, which represents a valuable resource to the building industry. The sand is obtained from two main geological sources: the Tertiary aged Maroota Sands and the weathered profiles of the underlying Triassic Hawkesbury Sandstone.

The Maroota Sands comprise a sequence of interbedded and poorly sorted sands, gravels and clays derived from the eroded and reworked material of the Hawkesbury Sandstone and Permian conglomerates. The Maroota Sands occur as a channel system of fluvial and alluvial origin and were deposited by a Tertiary-age river system cut into the Triassic sandstone bedrock, giving rise to the highly irregular surface on the Hawkesbury Sandstone. The irregularity of the surface of the Hawkesbury Sandstone bedrock results in the thickness of the Maroota Sand formation being not directly related to the present topography. The Maroota Sand formation attains maximum thickness of 39 m at the Maroota Trig Station, while north of Maroota the thickness is variable and commonly not more than 5 m.

The Hawkesbury Sandstone is a widespread formation occupying a large portion of the Sydney Basin, comprising a thick sequence of cemented quartz sandstone with well-developed shale layers and bands. The weathered profile of the Hawkesbury Sandstone, which is the primary target of other quarrying operations in the area, is of variable thickness and can be as much as 15 m deep.

As illustrated by **Figure 2.2**, the Quarry occurs over the Tertiary Maroota Sands formation and encounters layers of predominantly clay material within the larger sand resource.

2.4 Groundwater

Groundwater is present within the Maroota Sands and the underlying Hawkesbury Sandstone. Groundwater in each of these two formations is regionally extensive and forms a regional water table in each. Localised groundwater is also present in perched aquifers within the Maroota Sands, as well as on top of or within the Hawkesbury Sandstone, above the regional water tables. Thus, localised groundwater may be intersected at a number of elevations above the regional water table levels.

The management of groundwater resources is controlled by the *Water Management Act 2000* (WM Act) and *The Greater Metropolitan Region Groundwater Sources Water Sharing Plan 2011* (GMRGS WSP) (NOW, 2011). The GMRGS WSP defines two water sources for the locality.

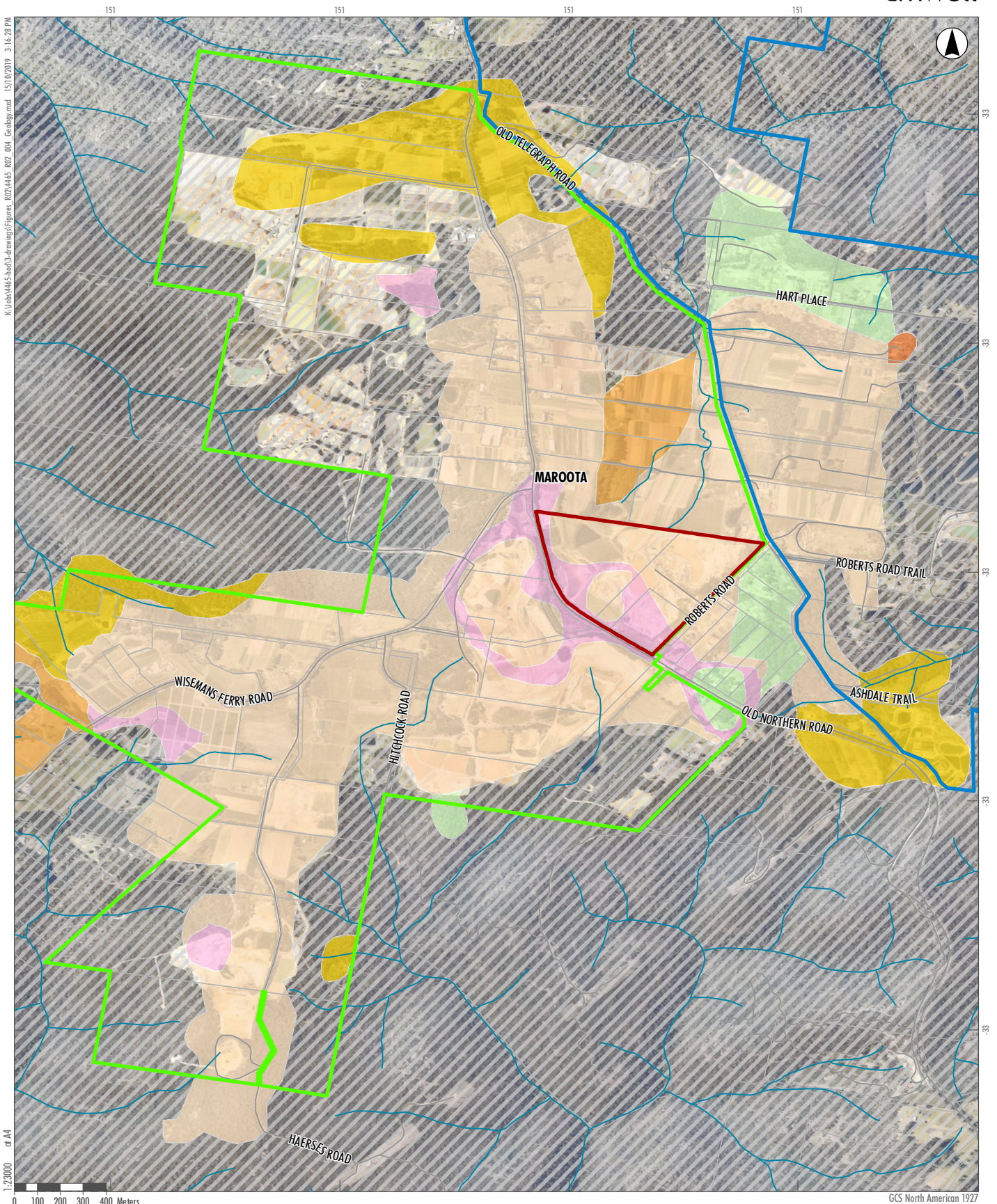
- The Maroota Tertiary Sands Groundwater Source (MTSGS) which occurs in the Maroota Sands deposit and in the upper (weathered) part of the Hawkesbury Sandstone (eluvial sands).
- The Hawkesbury Sandstone, a regional fractured rock aquifer that forms part of the Sydney Central Basin Groundwater Source (SCBGS).

A schematic representation of these aquifers, which references the geological formation of **Figure 2.2**, is provided in **Figure 2.3**.

The MTSGS is directly recharged by infiltration of rainfall and local runoff, and downward percolation to the water table, or to any perched water table present. The SBCGS is recharged by infiltration of rainfall and runoff in areas where fresh rock outcrops at the ground surface, or through downward leakage from overlying Maroota Sands, alluvium or eluvium. Groundwater levels in both units display fluctuations that relate to episodic recharge associated with major rainfall events. The recharge responses are particularly marked in the Maroota Sands (Dundon, 2018).

The water level of the MTSGS has been monitored and recorded at the Quarry (from 13 monitoring bores) since 2005 with a strong relationship between rainfall and groundwater level confirmed (Dundon, 2018). Based on this monitoring data, Dundon (2018) established that the Maroota Sands regional water table is only present within the central part of the Quarry Site, as the top of the Hawkesbury Sandstone rises above this water table level across the western and eastern flanks of the paleovalley. Dundon (2018) also established a Wet Weather High Groundwater Level (WWHGL) for the aquifers below the Quarry where Condition 17 of DA 267-11-99 defines the WWHGL as the *'rolling average of all recorded groundwater level measurements at any monitoring location on the site, as first recorded following any rainfall event of at least 50 mm over any 24-hour period, and as contour mapped using this data'*.

Below the Quarry, the WWHGL has been calculated using the water level data from the historical monitoring records for all available monitoring bores on the site, taken immediately after any rainfall exceeding 50mm in any day (as recorded at the BoM Maroota (Old Telegraph Road) meteorological station). The WWHGL of the Maroota Sands deposit rises from 184 m AHD in the north to 186 m AHD in the south. The WWHGL of the Hawkesbury Sandstone occurs below this elevation rising from 175 m AHD to 179 m AHD in a north-west to south-east direction (Dundon, 2018).



K:\U\abs\4465-hca\3-drawings\Figures_R02\4465_R02_004_Geology.mxd 15/10/2019 3:16:28 PM

1:23000 at A4
0 100 200 300 400 Meters

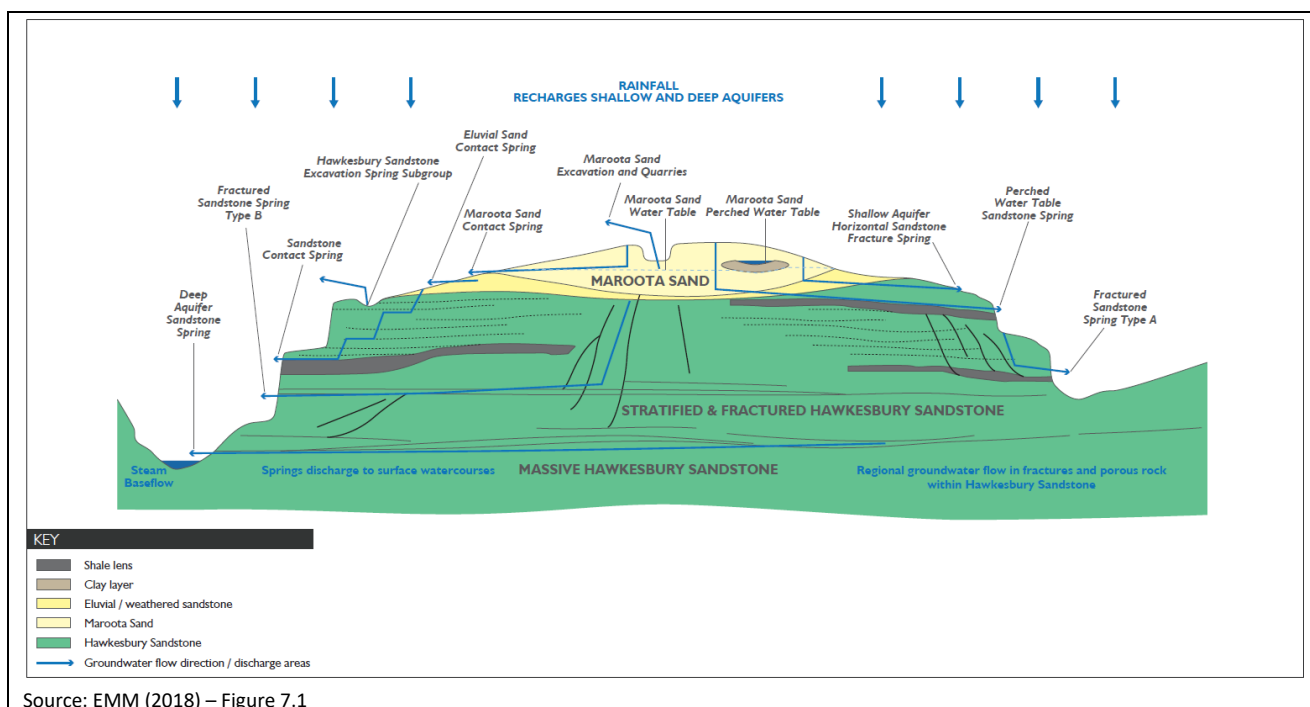
GCS North American 1927

Legend

- | | | |
|-----------------------------------|------------------------------------|--|
| Quarry Site | Surface Geology | Maroota sand - Clayey gravel, gravelly sand, clayey sand, pebbly sand and sand |
| SREP9-2 area within Hornsby LGA | Holocene | Maroota sand - Ferruginised sand and silty clay |
| SREP9-2 area within The Hills LGA | Eluvial sand | Triassic |
| Cadastral boundary | Basalt | Ashfield shale - Shale and laminate |
| Watercourse | Tertiary | Hawkesbury sandstone - Quartzose sandstone with shale lenses |
| Roads | Maroota sand - Clay and silty clay | |

FIGURE 2.2

Local Geology and Groundwater



Source: EMM (2018) – Figure 7.1

Figure 2.3 Conceptual Hydrogeological Model – Maroota Sands and Hawkesbury Sandstone

In accordance with DA 267-11-99 and the Quarry *Groundwater Management Plan* (Dundon, 2018), the WWHGL will continue to be reviewed based on groundwater monitoring data and extraction will remain at least 2 m above this level. Direct impact on local groundwater is therefore not expected.

2.5 Biodiversity

The Quarry Site represents a mostly cleared and highly disturbed environment dominated by introduced pasture and herbs. As noted in the Quarry *Flora and Fauna Management Plan* (VGT Compliance Solutions Pty Ltd and NGH Environmental, 2016), and identified on **Figure 2.1**, the most notable remnant native vegetation remaining includes:

- a strip of trees along the southern fence line including white stringybark, grey gum, blue mountains mahogany, red bloodwood, rough-barked apple and black she-oak
- a stand of white stringybark, white mahogany and a few blue mountains mahogany species to the north of the Quarry entrance
- a scrubby area and stand of trees containing yellow tea-tree, tick bush, scale-rush, kikuyu and whisky grass also north of the Quarry entrance.

Suitable habitat for native fauna is very limited on the Quarry Site with no suitable tree hollows for bats, birds and arboreal mammals. The dams on the Quarry Site provide limited habitat for waterfowl and frogs.

2.6 Sensitive Receivers

A number of private residences are located within close proximity to the Quarry Site, along Roberts Road, Old Telegraph Road and Old Northern Road, as shown in **Figure 2.1**. Extraction is currently approved to within 30 m of Old Northern Road and Roberts Road and 10 m of the northern boundary of Lots 1 and 2 DP 228308.

3.0 Existing Operations

3.1 Existing Approvals

In addition to DA 267-11-99, which has been modified three times since approval in May 2000, the Applicant holds Environment Protection Licence (EPL) 6535 for the scheduled activities of crushing, grinding or separating and extractive activities (as listed in Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act)). EPL 6535 establishes conditions relating to air, water and noise emissions from the site.

The site also holds a number of licences issued under the *Water Management Act 2000*, for the operation of groundwater bores and dams. Locations of these bores and dams are shown on **Figure 3.1** and a summary of licences and their current status is provided in **Table 3.1**.

Table 3.1 Water Licences Summary

Licence No.	Identification	Allocation	Purpose	Expiry
Surface Water Access and Use				
WAL 26163	Nursery Dam	264.0 ML per year	Irrigation	16/02/2026
Groundwater Access and Use				
WAL 24163	PB1	45.0 ML per year	Extraction	14/06/2025
WAL 24157	PB2	6.0 ML per year	Extraction	Continuing

3.2 Description of Existing Operations

3.2.1 Resource, Product and Markets

3.2.1.1 Resources

A recent resource assessment of the Quarry completed by VGT Environmental Pty Ltd identified 2,900,000 m³ of combined sand, sandstone and clay remaining within the approved extraction area (see **Appendix 3**). Further analysis by VGT identified that this included approximately 235,000 m³ of clay (see **Appendix 4**). Excluding the clay and applying an average density of 2.0 t/m³, approximately 5.3 million tonnes (Mt) of sand and sandstone remain to be extracted.

The in situ resource to be extracted will remain unchanged by the Proposed Modification.

The Applicant is proposing to import VENM and ENM, both as a backfill material to assist in the rehabilitation of the Quarry, as well as a feed stock for crushing, screening and washing to produce sand products. Section 4.2.2 provides a description of the VENM and ENM importation and management.

3.2.1.2 Products and Market

The Quarry currently produces a range of coarse, fine and ultra-fine sand and pebble products to the Sydney construction and landscaping market.

No change to the current product range or key markets is proposed.



K:\Jobs\4465-hud\3-drawings\Figures_R07\4465_R07_006_ApprovedExtractionAreaSequence_E3_1.mxd 15/10/2019 3:15:24 PM

1:4647.87x A4



- Legend**
- Quarry Site
 - Approved Extraction Area
 - Processing Plant and Product Stockpile
 - Land Being Prepared for Rehabilitation
 - Water Management
 - Nursery
 - Bundwalls (including topsoil)
 - Extraction Sequence Stages
 - Production Bores

GDA 1994 MGA Zone 56

FIGURE 3.1
Approved Extraction Area and Sequence

3.2.2 Extraction

3.2.2.1 Extraction Area

Extraction is approved to within 30 m of Old Northern Road and Roberts Road and 10 m of the northern boundary of Lots 1 and 2 DP 228308 (refer to **Figure 3.1**).

Extraction is also required to remain at least 2 m above the wet weather high groundwater level of the regional Maroota Sands aquifer (185 m AHD as identified by Dundon Consulting Pty Ltd as part of a Groundwater Study Report in 2018 (Dundon, 2018)).

No modification to the approved extraction area is proposed.

The proposed importation and use of VENM and ENM as a backfill material would require additional areas of the extraction area to remain exposed for longer periods of time. Section 4.2.4 provides a description of the proposed modified management of active and exposed areas of the Quarry.

3.2.2.2 Extraction Operations

Following the stripping of topsoil for future reapplication over the final landform, the sand, clay and pebble material is extracted using an excavator and either stockpiled for in-pit dry screening or loaded onto a dump truck and transported to the processing area.

Extraction of sand is contingent upon a water supply dam in order to wash the clay from the material won.

Extraction takes place across the site in a staged manner, as defined in the site *Environmental Management Strategy* (VGT, 2018).

No modification to the method of extraction is proposed.

3.2.2.3 Extraction Sequence

The current sequence of extraction involves progressive development to the south and west from the currently central extraction area (refer to **Figure 3.1**). Eventually, Dams 3 and 4 are to be drained and sand resource extracted, followed finally by the relocation of the processing plant and extraction from this area.

While the extraction sequence is not prescribed by DA 267-11-99, *Condition 29(c)* limits the area of active extraction which can be operated at any one time requiring “... *that no more than 3 hectares of the site are exposed and active at any one time*”.

A modified extraction sequence is proposed to allow for more effective backfilling with VENM and ENM. It is also proposed to remove the limitation on exposed and active areas to allow for the proposed backfilling operations. The Proposed Modification to extraction sequence and management of active areas is described in Section 4.2.4.

3.2.4 Processing

The excavated material is, as required, fed to a dry screen operated within the extraction area to remove large rocks and organic material prior to transfer to the processing plant (refer to **Figure 3.1**). The raw or dry screened feedstock is then delivered to the primary processing plant which incorporates the following components.

- A loading hopper which feeds a vibrating wet screen and log washer.
- A second vibrating screen which separates the larger diameter pebble from the sand and clay. Pebble is subsequently delivered by conveyor to stockpile, while the sand and clay is delivered via belt feeder to a mixing tank where the fines component (silt and fine clay) is removed. An electric pump at the water storage dam (Process Dam 1) pumps water to the mixing tank via a pipeline. The mixing of sand and water in the wash plant allows for the heavier sand to fall to the bottom of the tank with the smaller diameter silts and clays remaining suspended in the water.
- The heavier sands are then screened into various size fractions and stockpiled adjacent to the plant area for drying and sale.
- The water/silt mixture (tailings) is pumped to a tailings bin before being pumped to a thickener for dewatering, with the water returned to the processing circuit and dewatered tailings pumped to silt ponds constructed within the extraction area where it is spread in thin layers to dry. Liberated water is drained to the water dam for re-use in the processing plant.
- Water is periodically drawn off the silt ponds and returned to the washing circuit. The consolidated tailings are to be incorporated as a backfill material in the preparation of the final landform.

Figure 3.2 presents (schematically) the layout of the primary processing plant, in its current arrangement, noting that this may be subject to variation in arrangement and specific equipment over the life of the Quarry to satisfy changes to the characteristics of the raw feed and product specific requirements.

For every tonne of raw feed (sand/silt), approximately 5.4 kL of water is required to remove the silt which represents between 20 and 30% of the raw feed by volume. Approximately 4 to 8% of the water added is retained within the product sand (and reduced to a product sand moisture content of 4 to 5% as a result of evaporation and seepage from stockpile). A further 5 to 15% is lost to evaporation or seepage from the Drying Pond, although this has been reduced through the operation of the thickener which minimise the volume of water sent to the Drying Pond. The water is ultimately recycled from the Drying Pond as the silt settles and is periodically excavated and used to backfill the completed areas of the extraction area as part of Quarry rehabilitation (refer to **Section 3.2.9**).

Other than the possibility of VENM and ENM feed stock being processed, no modification to the processing operations of the Quarry are proposed.

3.2.5 Transportation

The Quarry is accessed via a sealed driveway which intersects with the northern side of Roberts Road, approximately 290 m to the east of the junction between Roberts Road and Old Northern Road (refer to **Figure 3.1**). Road registered trucks are directed to the sales stockpile where they are loaded by front-end-loader before dispatch from the Quarry via weighbridge and the same entrance.

K:\Jobs\4465-head3-drawings\Figures_R02\4465_R02_022_Image.mxd 16/10/2019 9:24:12 AM

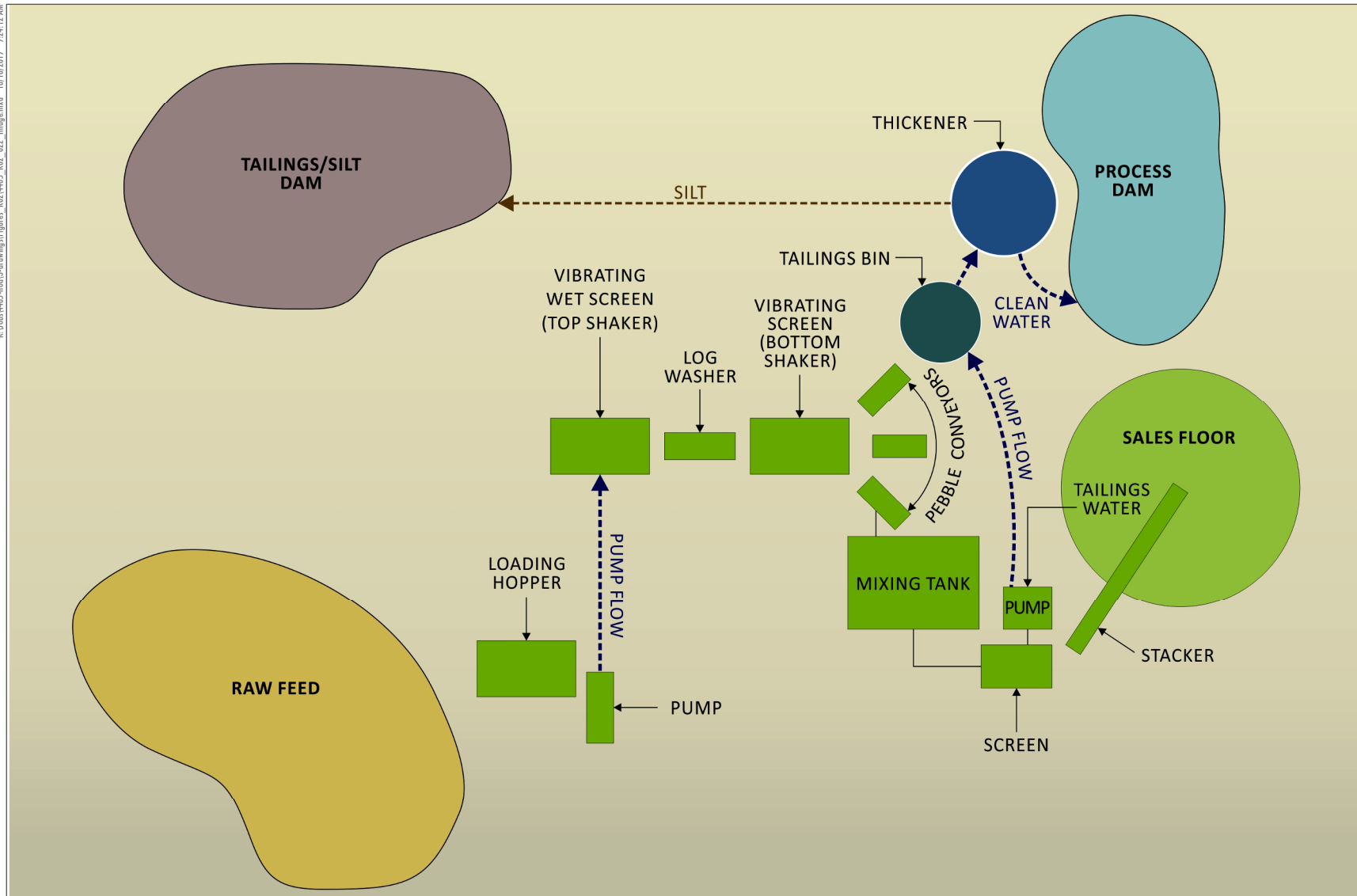


FIGURE 3.2
Operations Schematic

DA 267-11-99 allows for the movement of up to 50 laden trucks (100 movements) per day and a maximum of 20 movements per hour. The trucks deliver sand and other quarry products principally to the Sydney construction market with approximately 20% heading south-east on Old Northern Road towards Pennant Hills Road and the majority (approximately 80%) heading north-west before turning onto Wisemans Ferry Road 900 m north of Roberts Road.

To account for the importation of VENM and ENM, the Applicant proposes an increase in the number of daily traffic movements generated by the Quarry. The Proposed Modification and management of traffic movements is described in Section 4.2.5.

3.2.6 Site Infrastructure and Equipment

The following key infrastructure of the Quarry is identified on **Figure 3.3**.

- Site office and parking. The main Quarry office is located within a converted residence and adjoining demountable structure located adjacent to the Quarry entrance. Car parking for 1 to 2 vehicles is provided at the Quarry office, with parking for a further 3 to 4 vehicles provided in a designated visitor car parking area on the opposite site of the Quarry entrance driveway.
- A calibrated weighbridge is located opposite the main Quarry office.
- A bunded fuel and oil storage area provides for the storage of 21,000 L of diesel fuel and up to 5,000 L of oil. The bunded area includes space for IBCs which contain any waste oil collected from mobile equipment operating at the Quarry.
- Internal roads are maintained as required to allow for efficient movement of mobile equipment, haul trucks and road-registered trucks. As far as practicable, these roads are managed to avoid interaction between the on-site and road-registered fleets.
- A series of water storage dams are maintained on the Quarry Site. Dams 1 and 2 are managed primarily for the collected and clarification of water discharged from the processing operations. Dams 3 and 4 are managed preferentially for the containment of clean water runoff which is drawn on by the processing operations (as described in **Section 3.2.3**).

In addition to the above infrastructure, **Table 3.2** identifies the mobile fleet currently operated at the Quarry, noting that this may change over the life of the Quarry.

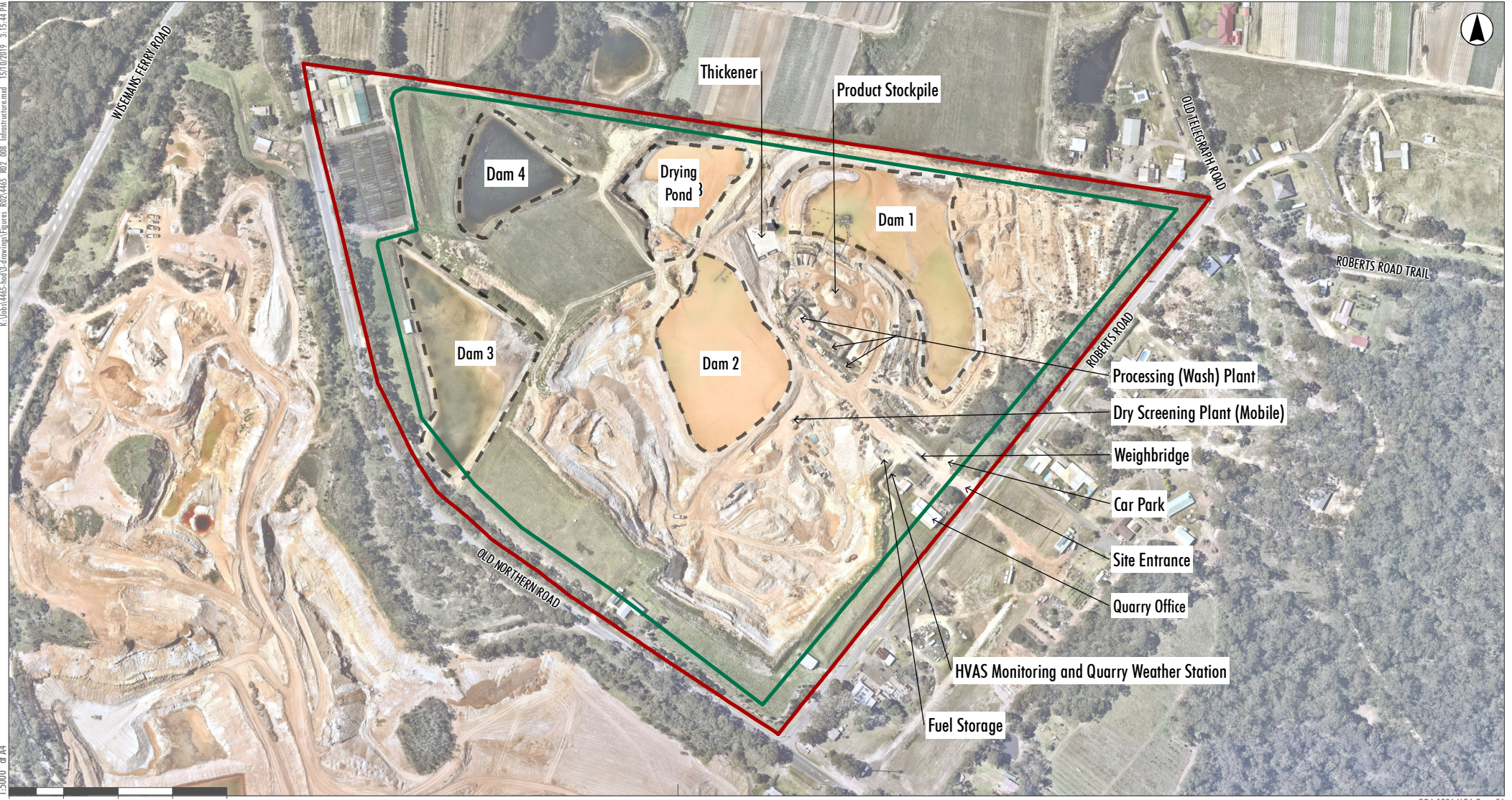
Table 3.2 Current Mobile Equipment

Equipment	Use	No. used on site	Usage (h/day)
Excavator - PC350 Komatsu	Sand excavation	1	8
Excavator - ZX240 Hitachi	Sand excavation	1	2
Excavator - ZX330 Hitachi	Sand excavation	1	8
Front-end Loader - L180G Volvo	Loading trucks (raw feed, reject and products)	2	8
Bulldozer - 375A Komatsu	Surface stripping, landform creation and miscellaneous earthmoving tasks	1	1
Dump Truck A40D - Volvo	Transfer of raw feed and reject	2	8
Water Cart	Dust minimisation	1	3



K:\Jobs\4465-head\GIS-drawings\Figures_R07\4465_R02_008_Infrastructure.mxd 15/10/2019 3:15:44 PM

314000



1:5000 of A4

- Legend
- Quarry Site
 - Approved Extraction Area

GDA 1994 MGA Zone 56

FIGURE 3.3
Quarry Infrastructure

The Proposed Modification would require an increase in the utilisation of the quarry's mobile fleet, as well as modified use of the Quarry front-end loaders, for management of the VENM and ENM. This is described in Section 4.2.2.4.

3.2.7 Operating Hours and Workforce

The current approved hours of operation for the Quarry are as follows:

- Construction: 7.00 am to 6.00 pm Monday to Friday
- Extraction and Processing: 7.00 am to 6.00 pm Monday to Friday and 7.00 am to 1.00 pm Saturdays
- Vehicle loading: 6.00 am to 6.00 pm Monday to Friday and 6.00 am to 1.00 pm Saturdays.

No works are undertaken on Sundays or Public Holidays. The Quarry has a current workforce of 10 full-time employees.

No modification to hours of operation or workforce is proposed.

3.2.8 Services and Utilities

The Quarry Site is serviced by electricity and telecommunications networks but is not connected to potable water or sewerage services. Operational water used for dust suppression and product washing is sourced from water captured and stored on site in the water storage dam.

Water for drinking and washing is drawn from rainwater tanks sited near the office, workshop and lunch-room. Wastewater from showers and toilets is treated via an onsite wastewater treatment system.

No modification to the services and utilities of the Quarry is proposed.

3.2.9 Rehabilitation

Rehabilitation of the Quarry is approved to be undertaken in accordance with the Quarry *Landscape and Rehabilitation Plan* (LRP) (VGT, 2017). The overall objective of Quarry rehabilitation is to produce a final landform that is safe, stable and non-polluting, is integrated with surrounding landforms as far as is reasonable and feasible and to minimise visual impacts when viewed from surrounding land.

The current approved plan for the final landform is to create an internally draining basin with perimeter slopes of approximating 3 Horizontal : 1 Vertical (3H:1V) (refer to **Figure 3.4**). The final landform, which will retain the various vegetated bund walls surrounding the extraction area, is approved to be revegetated as a predominantly native grassland with an intended final land use for future agricultural activities. The bund walls, extraction area perimeter and current stands of woodland vegetation around the Quarry Site are to be maintained as native woodland to provide visual screening and habitat for native fauna.

The landform is to be constructed using the silts washed from the sand and consolidated in the Drying Pond (Dam 2) or thickener. The clay bands which are present through the sand resource (refer to **Appendix 4**) also provide a source of backfill material for landform construction. The LRP provides for a variety of revegetation methods, dependent on final slope and proximity to drainage, including:

- hydromulch application (flat or very shallow slopes)
- tubestock planting (on slopes of <3H:1V)
- application of jute mesh and pocket planting of tubestock (on slopes of ≥3H:1V).



K:\Jobs\4465_had\3-drawings\Figures_R02\4465_R02_011_ApprovedFinalLandform.mxd 15/10/2019 3:15:59 PM

1:4679.7 @ A4



- Legend**
- Quarry Site
 - 5m contour
 - Native Vegetation
 - Native Woodland
 - Retained Infrastructure
 - Retained/Undisturbed Vegetation
 - Nursery
 - Water Storage
 - Native Grassland

GDA 1994 MGA Zone 56

FIGURE 3.4
Approved Final Landform

Image Source: Neotmap (2019) Data source: Umwelt (2019), NSW LPI DTDB/DCOR (2018)

Figure Three of the LRP (included as **Appendix 5**), provides further detail on the final landform revegetation strategy.

The floor of the constructed basin will remain above the WWHGL and fall very gently to the east to form a dam. The battered faces will be constructed with clay overburden and interburden, as well as the consolidated silt collected in the silt ponds, and vegetated primarily with endemic native vegetation.

As a result of the proposed importation VENM and ENM and application of these materials to land, the final landform to be constructed would be modified. Section 4.2.7 provides a description of the proposed modified final landform. Section 7.9 provides a review of the proposed rehabilitation of the Quarry against objectives.

3.3 Environmental Management

The Quarry has an established environmental management system (EMS) which comprises of an *Environmental Management Strategy*, a range of environmental management plans (EMPs) and an environmental monitoring program. The *Environmental Management Strategy* provides the strategic context for the environmental management of the quarry, while the EMPs provide detail on the management of key environmental issues. The EMS and EMPs have been developed in accordance with the conditions of the current development consent.

As the Proposed Modification would be a continuation of the existing Quarry operations, ongoing implementation of the EMS would be the most efficient and effective way to manage site operations. The existing EMS will therefore be updated to reflect the changes associated with the Proposed Modification and implemented for the ongoing operations, pending approval of the modification.

The key existing EMPs that will assist in the management of operations undertaken as part of the Modification include:

- Operational Environmental Management Plan
- Air Quality Management Plan
- Water Management Plan, incorporating sub-plans for both groundwater and surface water
- Noise Management Plan
- Flora and Fauna Management Plan
- Construction Environmental Management Plan
- Landscape and Rehabilitation Plan
- Pollution and Incident Response Management Plan.

Details of how these plans will be updated and applied to the Proposed Modification, are discussed in the relevant environmental assessment section of this report (refer to **Section 7.0**).

3.4 Environmental Performance

The latest Annual Review and Compliance Report for the Quarry covers the period January to December 2018 and was prepared by VGT Environmental Compliance Solutions Pty Ltd (VGT) in 2019 (VGT 2019) as required under Condition 6 (Conditions Compliance Report) and 66 (Annual Review) of the consolidated development consent (DA267-11-99).

The review assessed the performance of the Quarry against the conditions of the consolidated consent, EPL and water management licences. The main findings of the review are outlined below:

- There were no complaints received by the Quarry during the reporting period.
- Dust deposition (insoluble solids), total suspended particulates (TSP), and particulate matter less than 10 µm in diameter (PM₁₀) were all compliant with consolidated consent criteria and predictions from environmental assessments.
- The particulate matter less than 2.5 µm in diameter (PM_{2.5}) exceeded the NEPM advisory guideline (25 µg/m³ for 24 hours) six times in the reporting period. On each occasion, the reported PM_{2.5} concentration was higher than the corresponding PM₁₀ concentration indicating an error in reporting. If the respective results for PM_{2.5} and PM₁₀ were reversed, the number of exceedances would be reduced to four. On analysis of each exceedance, it was determined these were most associated with hot, dry windy conditions and periods of clearing and ploughing on an adjacent property.
- No uncontrolled surface water discharges occurred during the reporting period.
- Water depth monitoring showed that all surface water bodies were above the level of the groundwater in both Maroota Sands and Hawkesbury Sandstone aquifers during the reporting period.
- Attended noise monitoring identified that operational and road noise emissions generated by the Quarry complied with relevant statutory noise limits during the reporting period. Furthermore, project related noise emissions are generally masked by extraneous non-quarry sources.

Limited rehabilitation has been undertaken on the site due to the cell staging that has been required. As a result, and following receipt of the 2018 Annual Review, the DPIE requested clarification of the calculation of active and exposed areas and, if non-compliant, a commitment and timing for a return to compliance.

The Applicant subsequently provided the DPIE with the requested information, and a return to compliant operations was completed by 31 March 2019. In light of the Proposed Modification to import and use VENM and ENM as backfill material on the Quarry Site, restricting 'exposed and active' areas to 3 ha will be impractical. The Proposed Modification therefore seeks a modification to Condition 29(c) to remove reference to the limit on 'exposed and active' areas.

4.0 Proposed Modification

4.1 Summary of the Proposed Modification

A summary of the key components of the Proposed Modification compared to the existing approved operations is provided in **Table 4.1**.

Table 4.1 Comparison of Approved Operations and Proposed Modification

Aspect	Approved Operations	Proposed Modification
Limits of production	Not specified (limited by transport movements)	480,000 tpa
Extraction method	Manual excavation (no blasting)	No change
Maximum depth of extraction	Restricted to 2 m above the wet weather high groundwater level of the regional aquifer	No change
Quarry footprint	Restricted by 30 m buffer to Old Northern Road and Roberts Road and 10 m to northern property boundary	No change
Material importation	None	Up to 40 truck movements per day for the importation of VENM and ENM (refer to Section 4.2.2)
Material processing	In-pit dry screening, wet screening and sand washing	In-pit dry screening, wet screening and sand washing plus selected blending with imported VENM and ENM (refer to Section 4.2.3)
Exposed and active areas	3 hectares	No limits (refer to Section 4.2.4)
Overburden management	Bund and dam construction and void backfill (rehabilitation)	No change
Product transport	Maximum of 100 truck movements per day at a maximum rate of 20 truck movements per hour	Maximum of 140 truck movements per day at a maximum rate of 20 truck movements per hour (refer to Section 4.2.5)
Site access	Via sealed driveway on Roberts Road	No change
Employment	Up to 10 full time employees	No change
Hours of operations	As described in Section 3.2.7	No change
Quarry life	31 May 2025	31 May 2030 (refer to Section 4.2.6)
Rehabilitation and final landform	Internally draining basin (depth 187 mAHD) constructed using clay overburden/interburden and consolidated silts	Free draining basin (subject to availability of VENM and ENM) to the north constructed using clay overburden, imported VENM and ENM and consolidated silts (refer to Section 4.2.7)

A description of the proposed changes is provided in the following sections.

4.2 Description of the Proposed Modifications

4.2.1 Overview

As identified through **Section 3.0**, Quarry operations are to continue generally in accordance with the current limits and restrictions imposed by DA 267-11-99. The following provides a description of the key changes to Quarry operations proposed by this modification.

4.2.2 VENM and ENM Management

4.2.2.1 Classification

The material to be used for filling will consist of material classified as VENM or ENM. The *Protection of the Environment Operations Act 1997* (POEO Act) defines VENM as:

‘virgin excavated natural material means natural material (such as clay, gravel, sand, soil or rock fines):

- (a) that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities, and
- (b) that does not contain any sulfidic ores or soils or any other waste,

and includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA Gazettal notice.’

The *Excavated Natural Material Exemption 2014* (ENM Exemption) under Part 9, Clause 91 and 92 of the *Protection of the Environment Operations (Waste) Regulation 2014* (POEO (Waste) Reg.) defines ENM as:

‘Excavated natural material is naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:

- a) been excavated from the ground, and
- b) contains at least 98% (by weight) natural material, and
- c) does not meet the definition of Virgin Excavated Natural Material in the Act.

Excavated natural material does not include material located in a hotspot; that has been processed; or that contains asbestos, Acid Sulfate Soils (ASS), Potential Acid Sulfate soils (PASS) or sulfidic ores.’

4.2.2.2 Volume

While subject to availability and market, the Applicant has targeted the importation of between 800 and 1,200 t of VENM and ENM daily. This equates to between 200,000 and 320,000 tpa and between 2,000,000 and 3,000,000 t over the remaining life of the Quarry. While subject to some variability, an average density of the loose material to be imported has been estimated as 1.67 t/m³.

To account for possible fluctuation in the availability of VENM and ENM over the life of the Quarry, the final landform has been considered based on the availability of 1,200,000 m³ (2,000,000 t) and 2,000,000 m³ (3,000,000 t) backfill material. Backfill material includes VENM, ENM, clay overburden and consolidated silts.

4.2.2.3 Importation Management and Control

A VENM/ENM Importation Protocol would be developed and implemented prior to the commencement of material importation. The VENM/ENM Importation Protocol would specify the relevant requirements in relation to:

- source material
- site validation and tracking procedures
- method of transportation
- stockpiling of fill material
- placement and certification of fill material.

The VENM/ENM Importation Protocol would require that for each potential source of fill material an assessment report is prepared to confirm that the potential fill material is suitable for use within the Quarry. The assessment report would, as a minimum, include:

- a description of the source material
- the anticipated volume of the material to be imported from the site
- the fill source location
- photographs showing the condition of the site
- NATA stamped laboratory analysis certificates (where required), including Quality Assurance/Quality Control Data
- an assessment of whether the material is VENM or ENM in accordance with the requirements of the POEO Act and POEO (Waste) Reg.

Where the material imported is ENM, the assessment report must include a validation certificate that complies with the requirements of the ENM Exemption. The validation certificate must demonstrate that the fill material is free from contaminants and weeds, that it is suitable for its intended purpose and land use, and that it will not pose an unacceptable risk to human health or the environment.

A material tracking register is to be maintained to ensure that only VENM or ENM is imported to the site. A Quarry staff member would be assigned during importation campaigns to verify loading dockets and record delivery details. Site access will be locked after hours to prevent unauthorised dumping of material.

4.2.2.4 Application to Land

On exhaustion of the sand resource from sections of the approved extraction area, the Applicant would excise these from extraction operations and create an access road and tipping point for trucks delivering the VENM and ENM.

The Quarry bulldozer and one of the front-end loaders would be used to load, push and profile the VENM and ENM material to:

- create a flat surface for tipping
- profile the tipped VENM and ENM into the preferred landform.

While no additional equipment would be required to enable the additional backfill operations to be completed, utilisation of the current mobile fleet would increase (refer to **Table 4.2**). Specifically, the bulldozer would potentially be fully utilised each day for the pushing and profiling of the VENM and ENM to create the final landform.

Table 4.2 Modified Mobile Equipment Schedule

Equipment	Used for	No	Usage (hr per day)
Excavator - PC350 Komatsu	Excavation	1	8
Excavator - ZX240 Hitachi	Excavation	1	2
Excavator - ZX330 Hitachi	Excavation	1	8
Front-end Loader - L180G Volvo	Loading trucks and management of imported VENM and ENM prior to profiling	2	8
Bulldozer - 375A Komatsu	Surface stripping, VENM and ENM profiling and miscellaneous earthmoving tasks	1	8
Dump Truck A40D - Volvo	Transfer of raw feed and reject	2	8
Water Cart	Dust minimisation	1	6

Note: **bold** references modification from existing operations

The Applicant is targeting a final landform which is free-draining, thereby reinstating natural drainage and catchments at the conclusion of Quarry operations (refer to **Section 4.2.7**).

4.2.3 Processing Operations

A portion of the imported VENM or ENM, which is of high sand content, may be used to blend with on-site sand to produce additional material for sale. The likely source of such material would be friable sandstone from tunnelling or construction projects where the material is able to make up at least 30% of the final product.

This material would be identified prior to delivery to the Quarry and placed in stockpiles either adjoining the raw feed sand stockpiles or within the extraction area away from active extraction or backfill activities.

From stockpiles, the material would be screened to either remove large rocks and organic material, or produce a specific size fraction. Screened material unsuitable for this purpose would be managed as backfill material (refer to **Section 4.2.2.4**).

The screened sandstone/sand would then be stockpiled along with the extracted in situ sand for sale or further blending with the extracted in situ sand resources. Blending may be undertaken by manual combination using available mobile equipment, e.g. front-end loader or excavator, or as a supplementary feedstock to the processing circuit as described in **Section 3.2.3**.

It is noted that prior to processing and sale of the imported ENM in this way, the Applicant would:

- ensure that EPL 6535 has been varied to include Resource Recovery and Waste Storage as activities,
- provide for the payment of the relevant waste levy in accordance with the *Protection of the Environment Operations (Waste) Regulation 2014* (POEO (Waste) Reg), or
- obtain a specific Resource Recovery Exemption for the processed material.

This would extend, and therefore maximise, the life of the extractable resource within the Quarry.

4.2.4 Exposed and Active Area Management

Condition 29(c) of DA 267-11-99 requires the Quarry to provide for ‘a planting and watering regime to ensure that no more than 3 hectares of the site are exposed and active at any one time’. The proposed importation and use of VENM and ENM as backfill material on the Quarry Site makes this limitation impractical as the Applicant will be required to operate an extraction area as well as a VENM/ENM backfill area concurrently. The Applicant also notes that the composition and properties of the sand also varies across the site. As a result, the Applicant undertakes extraction from different extraction areas with the Quarry to allow for concurrent extraction of coarser (low clay content) and finer (higher clay content) sand which allows for optimal blending and production to suit a variety of customers.

Figure 4.1 provides an indicative illustration of the proposed active and exposed areas of the Quarry considering the importation and land application of the VENM and ENM and operation of separate coarse sand and fine sand extraction area (noting this sequence may be subject to variation over the life of the Quarry). As illustrated in **Figure 4.1**, the active and exposed areas would be much larger than the current 3 ha limit.

The potential impact on the increased active and exposed areas on air emissions and visual amenity are assessed in **Sections 7.5** and **7.8** respectively.

4.2.5 Traffic Management

To accommodate the importation of VENM and ENM, the Proposed Modification also includes an increase to the approved daily truck movements from 100 movements (50 laden trucks) to 140 movements.

Where possible, the Applicant would seek to undertake ‘double trucking’ whereby an inbound laden truck (VENM/ENM) would unload and then be reloaded with Quarry product for despatch.

No change to the approved hours of operation is proposed, nor any increase to the maximum number of hourly traffic movements (20 movements).

4.2.6 Production Limit and Quarry Life

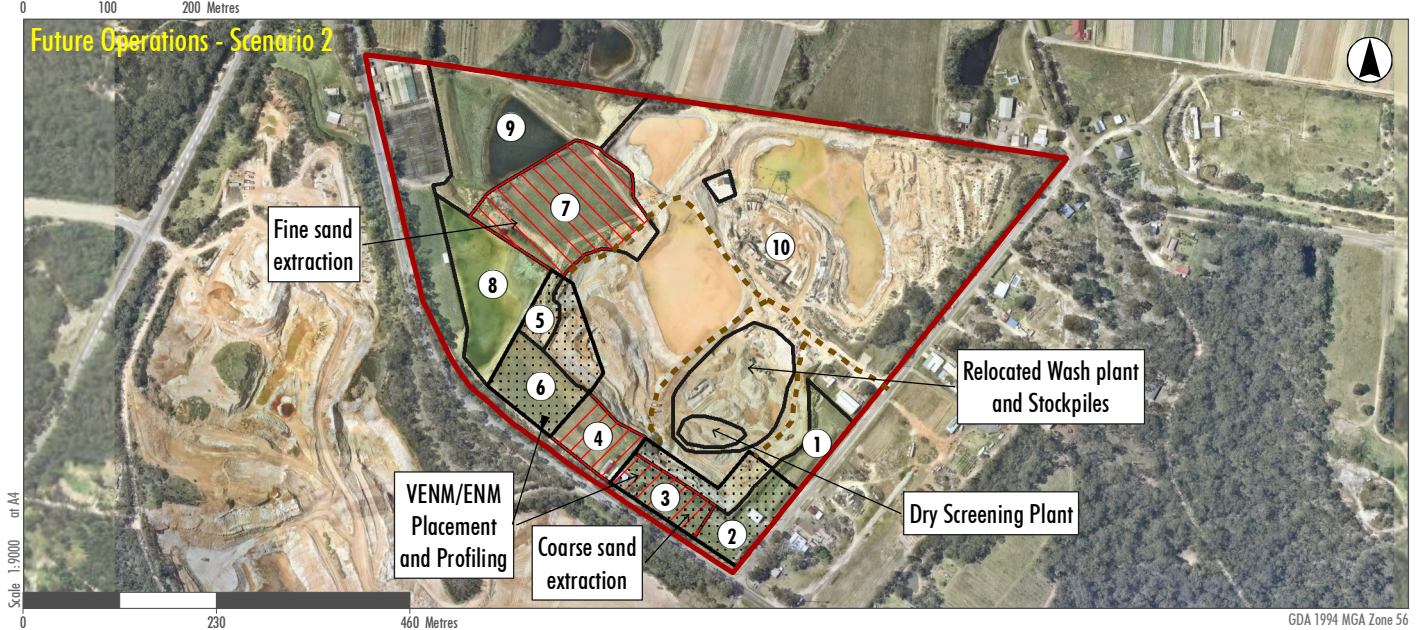
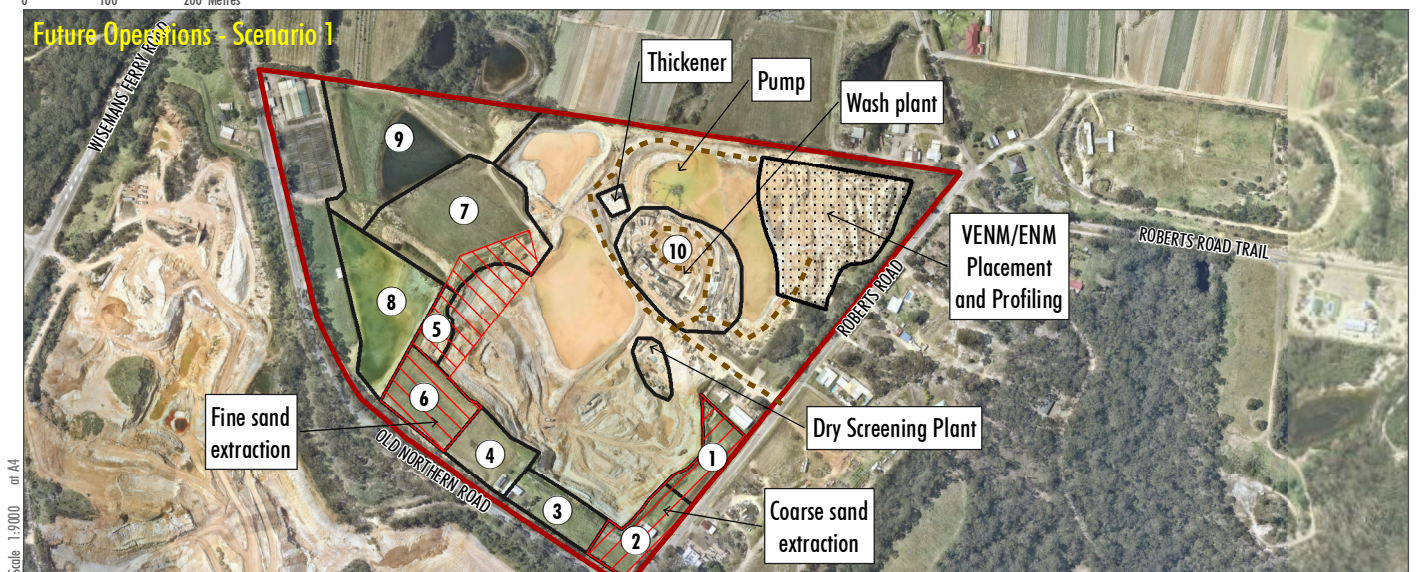
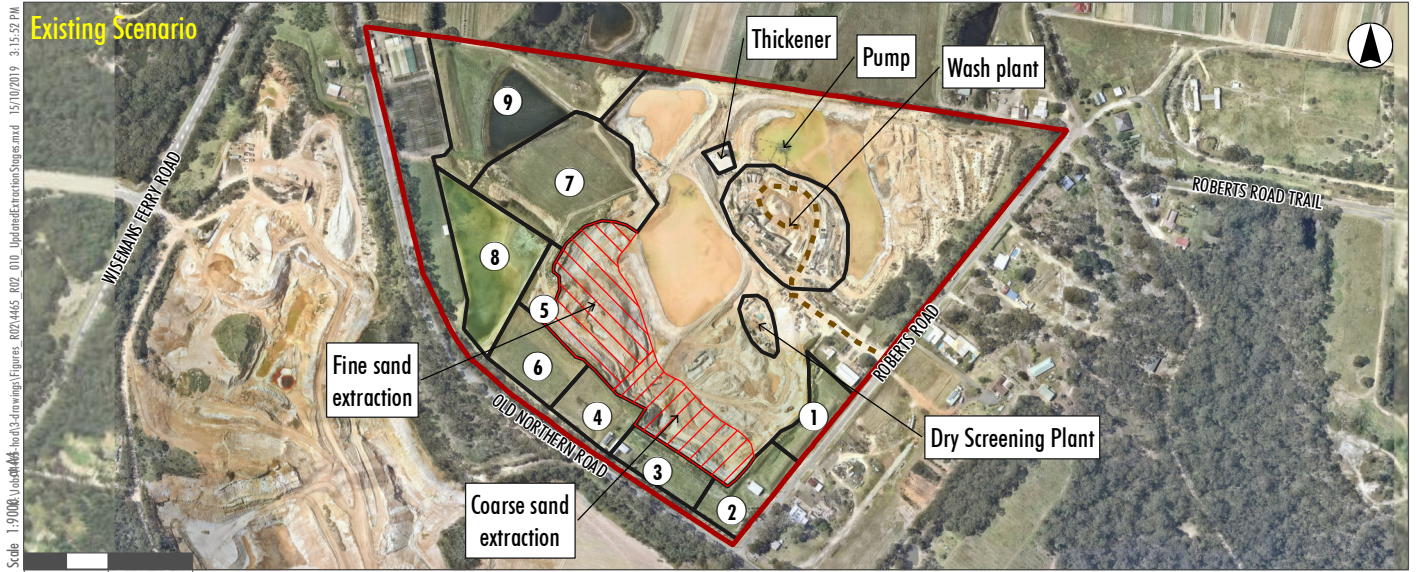
4.2.6.1 Production Limit

There is currently no limit on the production rate imposed by DA 267-11-99, with production being effectively limited by the number of laden trucks which may be dispatched from the Quarry. Based on the delivery of the maximum 50 laden trucks per day, six days per week, with an average payload of 32 t and operations 50 weeks per year, a practical maximum of 480,000 tpa is imposed. Noting the proposed increase in daily truck movements or an increase in the average payload of trucks would allow for an increase in this theoretical production limit, the Applicant proposes to retain 480,000 tpa as a production limit for the Quarry.

4.2.6.2 Quarry Life

Based on the recent assessment of available resource (refer to **Appendix 3**), incorporation of a small proportion of imported VENM/ENM into Quarry products, and production at the maximum rate of 480,000 tpa, the Quarry would continue to operate for a further 11 years.

An extension to the period of approved operations of 5 years (to 31 May 2030) is therefore proposed.



- Legend**
- Quarry Site
 - Quarry Features
 - Coarse sand extraction
 - Fine sand extraction
 - VENM/ENM Placement and Profiling
 - Road Truck Routes

Image Source: Nearmap (2018) Data source: DFSI (2017, 2019)

FIGURE 4.1

Indicative Quarry Operating Sequence

4.2.7 Final Landform and Rehabilitation

4.2.7.1 Final Landform and Land Use

Two conceptual final landforms have been developed to account for possible variability of available backfill material. The two landforms are based on

- 1,200,000 m³ available backfill material (refer to **Figure 4.2**)
- 2,000,000 m³ available backfill material (refer to **Figure 4.3**).

Both conceptual final landscapes are designed to be free draining. A final dam that drains to the Cooper Creek Catchment to the north would be retained in the vicinity of the current Processing Area Dam 1. The dam would be located at 190 m RL and therefore will be above the wet weather high groundwater level (185m RL) and the required 2 m freeboard mark. All other dams as well as any existing tracks and all infrastructure items, besides the existing Nursery in the north, would be removed and rehabilitated.

The landform reshaped with 1,200,000 m³ fill material would have slopes ranging from 6° (approximately 9.5 Horizontal: 1 Vertical (9.5H: 1V)) in the eastern sections to 11° (approximately 5H: 1V) in the western sections of the final landform over a flat floor and dam which drains to the north. The landform reshaped with 2,000,000 m³ fill material would produce slopes of approximately 6° to 8° across the whole landform over a final dam which drains to the north.

Currently, the proposed final landform includes the retention of the amenity bunds to be constructed along Old Northern Road and Roberts Road. It is expected these are to be located in the 30 m buffer strip between the final landform and Old Northern Road and are expected to have established native woodland vegetation at the completion of Quarry operations. Subject to the preparation of a Quarry closure plan, these bunds could be removed and the replanted with native woodland species.

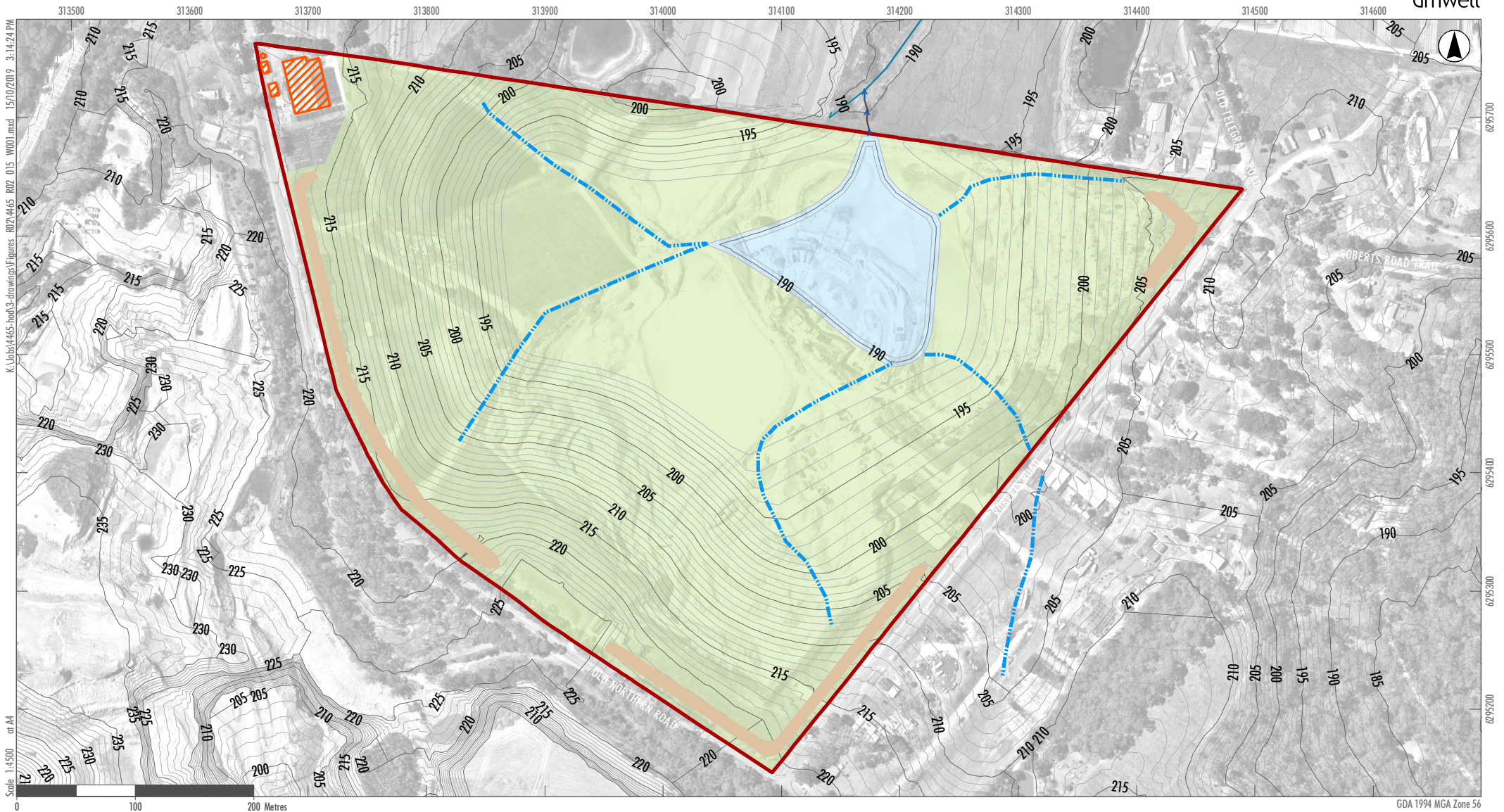
The final land use of the site remains to be established, however, it would be suitable for native biodiversity conservation, the current approved rehabilitation strategy, as well as recommencement of agricultural or horticultural activities. Rehabilitation objectives and completion criteria are discussed further in **Section 7.9**, while future land use options are assessed in **Section 7.10**.

4.2.7.2 Rehabilitation Methods and Procedures

Progressive rehabilitation of areas no longer required for extraction, silt/water management or backfill would be undertaken as soon as reasonably practicable. Rehabilitation will commence in the south east and continue in accordance with the extraction sequence (refer to **Figure 3.1**).

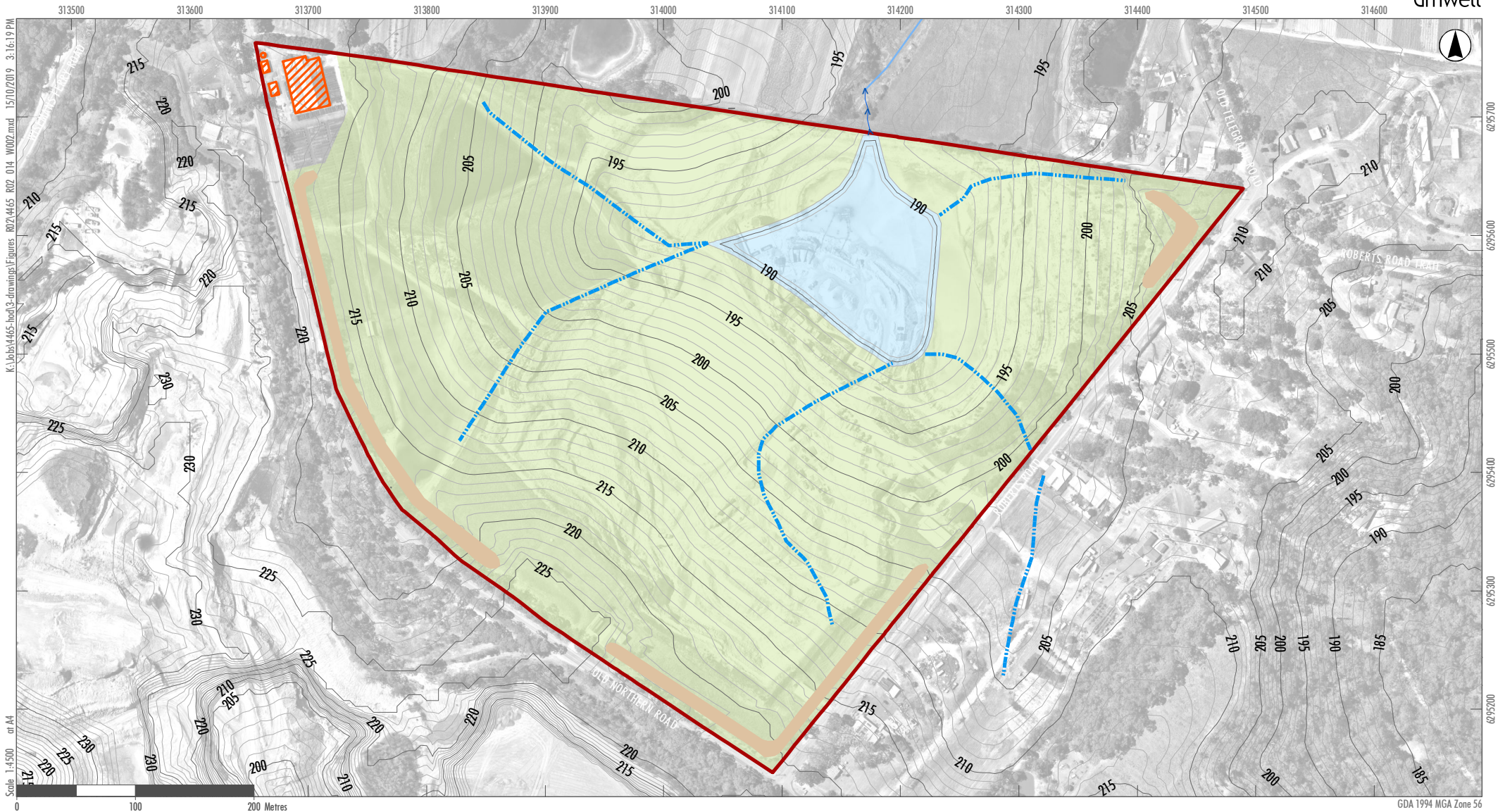
Reshaping of the area will occur in the following general sequence:

- backfill with VENM and ENM
- overlain by consolidated silts
- overlain by clay overburden
- overlain by subsoil (up to 300 mm)
- overlain by topsoil (approximately 100 mm).



- Legend**
- | | | |
|--------------------------------------|--------------------------|---------------------------|
| Quarry Site | Final Landform / landuse | Option 1 - Final Landform |
| Sediment Dam 1 Discharge Drain | Revegetated Area | Major Countours (5m) |
| Existing Watercourse | Final Dam | Minor Countours (1m) |
| Retained Nursery Infrastructure | | |
| Bundwall (indicative) | | |
| Internal Drainage Lines (indicative) | | |

FIGURE 4.2
Proposed Final Landform – 1,200,000 m³ Fill



- Legend**
- | | | |
|--------------------------------------|--------------------------|---------------------------|
| Quarry Site | Final Landform / landuse | Option 2 - Final Landform |
| Sediment Dam 1 Discharge Drain | Revegetated Area | Major Countours (5m) |
| Existing Watercourse | Final Dam | Minor Countours (1m) |
| Retained Nursery Infrastructure | | |
| Bundwall (indicative) | | |
| Internal Drainage Lines (indicative) | | |

FIGURE 4.3
Proposed Final Landform – 2,000,000 m³ Fill

It is noted that some variation from this sequence may occur subject to the particular VENM/ENM disposed, availability of silts or clays, and/or quality or available quantity of subsoil/topsoil.

All materials would be delivered through back end dumping and levelled through dozer push. The consolidated silts will be weed free, without large rocks or debris and ripped to 300 mm depth before application of subsoil.

Shaping of the final landform would initially be aimed at achieving the final landform with 2,000,000 m³ fill (refer to **Figure 4.3**). Should volumes of ENM/VENM received be less than anticipated over the initial years of operations placement and profiling would revert to the landform with 1,200,000 m³ fill (refer to **Figure 4.2**).

There are a variety of rehabilitation treatments proposed to achieve revegetation.

1. Direct seed application to the topsoil layer of the gently sloping landform. An application of water and fertilizer may be applied (depending on seasonal conditions), however, irrigation of the landform will be discouraged to avoid habituation of the vegetation to higher moisture levels.
2. Hydromulching may be undertaken around the final dam and any other areas of steeper slopes or subject to more concentrated water flows. Spraying of hydromulch is to occur immediately after topsoil has been placed or the surface has been prepared.
3. Tubestock planting on retained bunds, extraction area perimeter and other select areas to promote diverse vegetation communities. Organic mulch would be added immediately after spreading of topsoil and the tubestock would be planted into depressions of approximately 100 mm deep. Fertiliser, water retention crystals and protective mattering would be applied as necessary depending on seasonal conditions and/or potential for grazing.
4. Tubestock planting in jute matting for steep finished slopes. Where slopes in excess of 2.5H:1V are to be retained, the spread topsoil would be secured with the jute matting. Organic mulch would be added immediately after spreading of topsoil and the tubestock would be planted into depressions of approximately 100 mm deep. Fertiliser, water retention crystals and protective mattering would be applied as necessary depending on seasonal conditions and/or potential for grazing.

Vegetation composition, application rates and planting densities are carried out in accordance with the sites landscapes and rehabilitation plan.

4.2.7.3 Rehabilitation Monitoring and Maintenance

A rehabilitation monitoring program will be implemented to include the aspects outlined below.

Rehabilitation Monitoring

Annual inspections of rehabilitated areas will be undertaken over the life of the Project to assess soil conditions and erosion, drainage and sediment control structures, runoff water quality, revegetation germination success, plant health and weed infestation. Where necessary, remediation measures will be implemented and rehabilitation procedures will be amended accordingly with the aim of continually improving rehabilitation standards.

The objective of this monitoring is to evaluate the progress of rehabilitation towards fulfilling long term land use objectives and criteria. The monitoring program will be continued until it can be demonstrated that rehabilitation has satisfied the rehabilitation and closure criteria. Information from this monitoring program will also be used to refine rehabilitation and closure criteria as required.

Rehabilitation Care and Maintenance

Dependent upon the outcomes of the rehabilitation monitoring as outlined above, the scope of the rehabilitation care and maintenance may include the following:

- weed and feral animal control
- erosion and sediment control works
- re-seeding of rehabilitation areas that may have failed
- maintenance fertilising
- repair of fence lines, access tracks and other general related land management activities.

Watering of selected areas may be carried out as required.

4.3 Justification and Alternatives

4.3.1 Justification

There are many major infrastructure projects and private development sites within the Sydney Metropolitan, western and northern Sydney areas that generate VENM/ENM and the Quarry will provide an alternative destination for the placement of this material. The NSW government and specifically the EPA currently operate a 5 yearly Waste Avoidance Resource Recovery Strategy (WARR). The WARR outlines future directions and supports investment in infrastructure, encourages innovation and improvements in recycling behaviour (EPA 2017). The Project will contribute to achieving a key element of the WARR, which is increasing waste diverted from landfill to 75%.

Furthermore, the approved final landform for the Quarry Site currently provides for a water holding basin which interrupts natural drainage to the northeast (within the Coopers Creek catchment). The placement of imported VENM and ENM within completed sections of the Quarry would promote the reinstatement of natural drainage in the final landform and a more productive final land use of the Quarry area consistent with surrounding land uses.

The Proposed Modification would assist in extending the life of the in situ sand resource through selective blending with imported VENM and ENM feed stock. This would extend the life of the Quarry which provides a long-term, high quality supply of construction materials into the Sydney local and regional markets. This supply is needed to replace supply from existing quarries that are nearing the end of their resources and will contribute to the security and economic viability of the Sydney construction industry along with supply to other key sand markets.

4.3.2 Alternatives

The key alternative considered to the Proposed Modification is one of doing nothing; that is, continuing to operate in accordance with the existing consent and quarry plan. The 'do nothing' option is considered undesirable as it does not allow the Applicant to maximise the efficient use of an existing resource nor to divert a considerable quantity of VENM and ENM from landfill. It would result in the under-utilisation of a site already subject to quarrying and a final landform that does not maximise the future agricultural use of the site.

It is acknowledged that the Quarry could continue without the proposed changes, however, the changes provide benefits to the Sydney region construction industry and they can be undertaken without resulting in significant environmental impacts on the community, as identified in this SEE. In these circumstances, it is considered that the 'do nothing' option is not an appropriate alternative.

5.0 Statutory and Planning Framework

5.1 Commonwealth Legislation

5.1.1 Environmental Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), approval from the Commonwealth Minister for the Environment is required for any action that may have a significant impact on Matters of National Environmental Significance (MNES). These matters are:

- World Heritage Places
- National Heritage Places
- Wetlands of International Significance (listed under the Ramsar Convention)
- Listed threatened species and ecological communities
- Migratory species protected under international agreements
- Commonwealth Marine Parks
- Nuclear actions (including uranium mines)
- A water resource, in relation to coal seam gas development and large coal mining development.

The Proposed Modification will not have a significant impact on any of the above matters therefore no further consideration under the EPBC Act is required.

5.2 State Legislation

5.2.1 Environmental Planning and Assessment Act, 1979

The EP&A Act is administered by the DPIE and local government. It is the primary legislation governing environmental planning and assessment in NSW.

Section 1.3 Objects of the Act

The objects of the EP&A Act, and how these are addressed in the SEE, are identified in **Table 5.1**.

Table 5.1 Objects of the EP&A Act

Object	Addressed in Section
to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,	Section 7.7 (Waste Management) Section 7.11 (Socio-economic Impacts)
to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	Section 9.1.4 (Ecological Sustainable Development)

Object	Addressed in Section
to promote the orderly and economic use and development of land,	Section 7.9 (Rehabilitation) Section 7.10 (Land Use), Section 7.11 (Socio-economic Impacts)
to promote the delivery and maintenance of affordable housing,	Not Applicable
to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,	Not Relevant (refer to Section 7.2)
to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	Not Relevant (refer to Section 7.2)
to promote good design and amenity of the built environment,	Not Applicable
to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,	Not Applicable
to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,	Not Applicable
to provide increased opportunity for community participation in environmental planning and assessment.	Section 6.2 (Community Consultation), Section 7.11 (Socio-economic Impacts)

It is considered that the Proposed Modification addresses the relevant objects of the EP&A Act. Critically, the Proposed Modification will facilitate the future development of land by rehabilitating the site to a landform suitable for agricultural pursuits. Measures to protect the environment are described throughout **Section 7.0**, summarised in **Section 8.0**, with application of the principles of Ecological Sustainable Development discussed in **Section 9.1.4**. The public have been consulted regarding the Proposed Modification and have been given the opportunity to provide input to the SEE process (refer to **Section 6.2**), with impacts on local amenity and the social setting considered in detail in **Section 7.11**, and will be provided the opportunity to make a submission during the exhibition process.

Section 4.55 Modification of consents—generally (Substantially the Same Development)

As DA 267-11-99 was granted under Part 4 of the EP&A Act in May 2000 and classified as State Significant Development (SSD), modification to the development consent is sought under Section 4.55(2) of the EP&A Act. Modification under Section 4.55(2) requires that the consent authority is *“satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all)”*.

With respect to the Proposed Modification, while the importation of VENM and ENM represents an additional development activity on the Quarry Site, i.e. operation of a waste management facility, the proposed importation and application of the VENM and ENM represents an ancillary operation to that of the extractive industry and one which provides for a net environmental benefit (both in relation to the creation of a final landform more sympathetic to the surrounds and providing a beneficial use for material which otherwise could be sent to a licensed landfill).

With respect to the intensity of operation at the Quarry, the maximum approved production level would remain the same and no increase in the maximum approved disturbance footprint of the Quarry is proposed. A small increase in truck movements is proposed, however, this has been assessed as not significantly impacting on road condition, capacity or performance (refer to **Section 7.6**). The management

of VENM and ENM would require the operation of equipment on the Quarry Site for longer periods, however, this increase in activity has been assessed and are to be managed by implementation of operational and environmental controls to ensure that these modifications do not impact on 'material and essential' elements of the development as originally approved.

On the basis that the additional development activity (VENM and ENM management) is ancillary and beneficial to the extractive industry development, does not require any significant intensification of operations and would be managed to limit impacts on the environment and surrounding landholders, it is concluded that the modified development will be substantially the same as the Quarry development and can be modified under section 4.55(2) of the EP&A Act.

The Minister for Planning and Public Spaces (or as delegated) is the consent authority.

5.2.2 Protection of the Environment Operations Act 1997

The objectives of the POEO Act are to protect, restore and enhance the quality of the environment, in recognition of the need to maintain ecologically sustainable development. The POEO Act provides for an integrated system of licensing and contains a core list of activities requiring Environment Protection Licences (EPL) from the Environment Protection Authority (EPA). These activities are called 'scheduled activities' and are listed in Schedule 1 of the POEO Act.

Application of waste to land is considered a scheduled activity in accordance with Clause 39 of Schedule 1 of the POEO Act. However, under the *Protection of the Environment Operations (Waste) Regulation 2014* (2014 Waste Regulation), the EPA has the power to grant exemption from the requirement for an EPL and to pay the waste levy, where it can be demonstrated that the use of the waste is bona-fide, fit-for-purpose and causes no harm to the environment or human health, rather than a means of waste disposal.

The *Excavated Natural Material Resource Recovery Order 2014* (ENM Resource Recovery Order) and *Excavated Natural Material Resource Recovery Exemption 2014* (ENM Resource Recovery Exemption) applies to ENM that is intended to be applied to land as engineering fill or in earthworks and exempts the requirement to obtain an EPL for a scheduled activity, to track waste, pay the waste levy and miscellaneous reporting requirements to the EPA.

All fill material entering the site which will be applied to land as part of the proposed backfill operation will meet the requirements of the ENM Resource Recovery Order or a specific resource recovery order issued by the EPA for the site.

In order to process the VENM or ENM imported to the Quarry for sale, and as noted in **Section 4.2.3**, the Applicant will either:

- obtain a specific Resource Recovery Order for the processed product, or
- vary the Environment Protection Licence (EPL) held by the Quarry to include Resource Recovery and Waste Storage as activities.

The Applicant currently holds EPL 6535 for the approved Quarry activities. Should the Proposed Modification be approved, the EPL may need to be modified to accommodate the proposed changes.

5.2.3 Water Management Act 2000

The *Water Management Act 2000* (WM Act) controls the extraction and use of water, the construction of works such as dams and weirs, and the carrying out of activities in or near water sources in NSW. 'Water

sources' are defined very broadly to include any river, lake, estuary or place where water occurs naturally on or below the surface of the ground and NSW coastal waters.

Part 2 of the WM Act applies to the requirement to obtain a licence for the 'taking of water' from a water source. An access licence entitles its holder to specified shares in the available water within a specified water management area or from a specified water source. It enables the licence holder to take water from the environment in accordance with specified rates and conditions under the terms of the licence. The licensing provisions apply to areas of NSW that have a water sharing plan (WSP).

For surface water, the site is located within the *Greater Metropolitan Region Unregulated River Water Sources Water Sharing Plan*, which became operational in July 2011. This WSP covers six water sources which are made up of a total of 87 management zones. The Project is located within the Hawkesbury and Lower Nepean Rivers Water Source and the Lower Hawkesbury River Management Zone.

For groundwater, the site falls within the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources* which become operational in July 2011. This WSP covers 13 groundwater sources on the east coast of NSW. The Project is located within the Maroota Tertiary Sands groundwater source.

The Applicant currently holds two water access licences for the Roberts Road site, as described in detail in **Table 3.1**. No additional water licences are expected to be required under the WM Act to cater for the Proposed Modification.

Part 3 of the WM Act specifies approval requirements for water use, water management works approvals and activity approvals. There are two kinds of activity approvals including controlled activity approvals and aquifer interference approvals.

Controlled activity approvals confer a right for the holder to carry out a specified controlled activity on waterfront land which is defined as land within 40 m of a river, lake, estuary or shoreline. The definition of controlled activities includes the deposition of material (whether or not extractive material) on land and the definition of a river includes 'any watercourse, whether perennial or intermittent and whether comprising a natural channel or a natural channel artificially improved'.

The Proposed Modification involves emplacing clean fill material within 40 m of an intermittent drainage channel and therefore triggers the need for a controlled activity approval under section 91(2) of the WM Act.

The Proposed Modification will not trigger the need for an aquifer interference approval as the Quarry will remain at least 2 m above the wet weather high groundwater level of the regional Maroota Sands aquifer.

5.2.4 Other State Legislation

A summary of the other State environmental and planning legislation potentially relevant to the Proposed Modification is provided in **Table 5.2**.

Table 5.2 Summary of State Legislation

Act	Comment	Further approval required?
<i>National Parks & Wildlife Act 1974 (NP&W Act)</i>	An Aboriginal Heritage Impact Permit is required under Section 90 of the NP&W Act to harm an Aboriginal object. The site does not contain any identified Aboriginal archaeological sites and as such there is currently no requirement to obtain specific approvals relating to Aboriginal cultural heritage.	No
<i>Water Act 1912</i>	This Act has been repealed by the <i>Water Management Act 2000</i> ; however, some of the licensing provisions remain in force where the water source is not covered by a water sharing plan. The Quarry is within an area covered by a water sharing plan and is therefore administered under the <i>Water Management Act 2000</i> (refer to Section 5.2.3).	No
<i>Heritage Act 1977</i>	No heritage sites will be affected and no excavation permits are required under this Act for works associated with the Proposed Modification.	No
<i>Environmentally Hazardous Chemicals Act 1985</i>	The EPA is granted power under the <i>Environmentally Hazardous Chemicals Act 1985</i> to assess and control chemicals and declare substances to be chemical wastes. A licence is required for any storage, transport or use of prescribed chemicals. The Proposed Modification will not result in any changes to the storage, transport or use of prescribed chemicals.	No
<i>Roads Act 1993</i>	The <i>Roads Act 1993</i> determines the rights of the public and adjacent landowners to use public roads, and establishes procedures for the opening and closing of public roads. Under the Act applications are required to be made for the closure of roads and for works in road reserves. No road closures or road works are proposed as part of the modification.	No
<i>Crown Land Management Act 2016</i>	The <i>Crown Land Management Act 2016</i> commenced on 1 July 2018 to improve the way that Crown reserves are managed and to strengthen community involvement. As noted above, no road closures or road works are proposed as part of the Modification and no areas of Crown land would be affected.	No
<i>Biodiversity Conservation Act 2016 (BC Act)</i>	A licence under this Act is not required for any activity undertaken in accordance with a development consent granted under the EP&A Act and therefore no approvals are required.	No

5.3 State Environmental Planning Policies

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

The State and Regional Development (SRD) SEPP commenced on 1 October 2011, on the date Part 3A of the EP&A Act was repealed, to identify development that is State significant development, State significant infrastructure and critical State significant infrastructure, or regionally significant development. While the Quarry was identified as State Significant Development (SSD) prior to this date, Clause 11 of the SRD SEPP is relevant in that it identifies that development control plans do not apply to SSD.

5.3.2 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across NSW and, amongst other things, allows for development for the purpose of recycling of construction and demolition material or the disposal of virgin excavated natural material or clean fill to be permitted with consent anywhere mining or extractive industries are permitted to be undertaken.

The policy recognises the enhanced rehabilitation outcomes that can be achieved through importation of clean fill to sites previously disturbed by extractive operations. The project is consistent with the aims and objectives of the policy and will allow for the recycling and beneficial reuse of fill material.

Division 23 of the ISEPP includes definitions and consent requirements of Waste or Resource Management facilities. In accordance with Clause 121 (3) of the Infrastructure SEPP:

Development for the purpose of the recycling of construction and demolition material, or the disposal of virgin excavated natural material (as defined by the POEO Act) or clean fill, may be carried out by any person with consent on land on which development for the purpose of industries, extractive industries or mining may be carried out with consent under any environmental planning instrument.

Extractive industries are permissible with consent in the RU1 Primary Production zone of *The Hills Local Environmental Plan 2012*. Therefore, importing of VENM, ENM and other clean fill material for the purpose of site rehabilitation is considered permissible with consent in accordance with the ISEPP.

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

The *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (EISEPP)* regulates the permissibility and assessment requirements for mining, petroleum production, extractive industries and related development. The EISEPP outlines where various extractive industry activities are permissible both with and without development consent. The EISEPP also defines mining, petroleum production and extractive industries developments that are prohibited, exempt or complying developments.

Part 3 of the EISEPP requires specific matters to be considered in relation to development applications. These include:

- Compatibility with other surrounding land-uses (including other extractive industries) (refer to **Section 7.10**)

- Natural resource and environmental management (refer to **Section 3.3** and **3.4**)
- Resource recovery (refer to **Section 4.2.3**)
- Transport (refer to **Section 7.6**)
- Rehabilitation (refer to **Section 7.9**).

5.3.4 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) requires the consent authority to consider whether an industrial proposal is a potentially hazardous industry or a potentially offensive industry. The aim of this policy is to link the permissibility of a proposal to its safety and pollution control performance. The assessment process establishes whether the proposal is potentially hazardous or offensive and if this is not the case, SEPP 33 is not applicable.

Existing operations within the Quarry are not considered as hazardous or offensive. The Proposed Modification will not result in any changes to the existing operations which would alter either of these classifications, therefore no further assessment has been undertaken.

5.4 Regional Planning Instruments

5.4.1 Sydney Regional Environmental Plan No 9-Extractive Industry (No 2-1995)

Sydney Regional Environmental Planning Policy No. 9 - Extractive industries (SREP 9) aims to:

- facilitate the development of extractive resources in proximity to the population of the Sydney Metropolitan Area by identifying land which contains extractive material of regional significance, and
- permit, with the consent of the council, development for the purpose of extractive industries on land described in Schedule 1 or 2, and
- ensure consideration is given to the impact of encroaching development on the ability of extractive industries to realise their full potential, and
- promote the carrying out of development for the purpose of extractive industries in an environmentally acceptable manner, and
- prohibit development for the purpose of extractive industry on the land described in Schedule 3 in the Macdonald, Colo, Hawkesbury and Nepean Rivers, being land which is environmentally sensitive.

Roberts Road Quarry is located within the land identified in Schedule 2 of SREP 9. As such, development for the purposes of extractive industries is to be permitted with council consent taking into account relevant environmental issues. However, as identified in **Section 5.2.1** the Minister for Planning and Public Spaces is the consent authority for the Proposed Modification.

5.5 Local Planning Instruments

5.5.1 The Hills Local Environment Plan 2012

The Quarry Site lies entirely within The Hills Shire LGA with local environmental planning provisions undertaken in accordance with The Hills Local Environment Plan 2012 (The Hills LEP). Notwithstanding the fact that Clause 5 of the EI SEPP that the planning provisions of the SEPP prevail over those of The Hills LEP, the following sections consider the key planning provisions which apply to the Proposed Modification.

Permissibility

The Quarry is located on land zoned RU1 Primary Production. Extractive industries are permissible with development consent within land zoned RU1.

Heritage Conservation

Miscellaneous provision 5.10 of The Hills LEP provides for the conservation of:

- a) environmental heritage of The Hills Shire
- b) the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views
- c) archaeological sites
- d) Aboriginal objects and Aboriginal places of heritage significance.

A review of The Hills LEP Heritage Map Sheets HER_010 and HER_018 confirm there are no identified sites of environmental heritage on or adjoining the Quarry Site. As the Proposed Modification does not seek to increase the disturbance footprint of the Quarry, no further assessment of impacts on heritage are warranted.

Acid Sulfate Soils

Additional local provision 7.1 of The Hills LEP requires the potential for development on acid sulfate soils to be considered prior to determination.

A review of The Hills LEP Acid Sulfate Soils Terrestrial Biodiversity Map Sheets CL1_010 and CL1_018 confirm there is no mapped acid sulfate soils on or surrounding the Quarry Site.

Earthworks

Additional local provision 7.2 of The Hills LEP has the noted objective to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.

The impact of earthworks associated with the Proposed Modification are considered throughout **Section 7.0** to address the requirements of Clause 7.2(3).

Flood Planning

Additional local provision 7.3 of The Hills LEP has the noted objectives to:

- a) minimise the flood risk to life and property associated with the use of land

- b) allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change
- c) avoid significant adverse impact on flood behaviour and the environment.

Noting there are no flood planning maps for the Hills LEP, the Quarry is located high in the catchment and would be unaffected by flooding generated by a 1:100 average recurrence interval (ARI) event. A detailed flood impact assessment to address the requirements of Clause 7.3(3) is therefore not required.

Terrestrial Biodiversity

Additional local provision 7.4 of The Hills LEP has the noted objective to maintain terrestrial biodiversity by:

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

The proposed disturbance footprint of the Quarry is not located over environmentally sensitive biodiversity, as nominated by The Hills LEP Acid Sulfate Soils Terrestrial Biodiversity Map Sheets CL1_010 and CL1_018. Noting the Proposed Modification does not involve any additional disturbance to vegetation beyond that already approved, no further assessment of biodiversity is warranted.

5.5.2 The Hills Development Control Plan

Clause 11 of the SRD SEPP confirms that development control plans do not apply to SSD.

6.0 Stakeholder Engagement

Consultation has been undertaken to inform stakeholders about the Proposed Modification, to obtain their views and identify any issues of concern to be investigated and addressed as part of the SEE.

6.1 Authority Consultation

6.1.1 Department of Planning and Environment

In regard to the Proposed Modification, the Applicant has consulted with DPIE regarding the proposed changes to operations, the planned approval pathway and approach to the environmental assessment. The DPIE confirmed the key environmental issues for the Proposed Modification in a reply dated 18 March 2019 (refer to **Appendix 2**). The DPIE was generally satisfied with the proposed approach to this assessment and based on the information provided in the Preliminary Environmental Assessment (PEA) (Umwelt, 2019) did not issue formal Environmental Assessment Requirements (EARs). However the matters listed in **Table 1.3** were requested for consideration in the environmental assessment.

6.1.2 Other Agencies

Feedback on the Proposed Modification was sought from seven other NSW government departments and The Hills Shire Council, and their responses are detailed in **Table 6.1** below.

Table 6.1 Agency Consultation

Agency	Assessment requirements	Addressed in
The Hills Shire Council	<p><i>Council raised concerns regarding the proposed importation of VENM and ENM to the site. The importation of these materials would partially change the use of the site from an 'extractive industry' to a 'waste and resource management facility'. As such, it is considered that a new Development Application is required to substantiate the proposed change in activities on the site and the change in definition of the use.</i></p> <p><i>The proposed increase in vehicle movements and extension to the timeframe for extraction may also potentially impact on amenity to adjoining property owners and further add to the need for a new DA.</i></p>	<p>Section 5.2.1</p> <p>Sections 7.6 and 7.11</p>
Environment Protection Authority	<p>Air Quality - Undertake an air assessment in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW and Approved Methods for the Sampling and Analysis of Air Pollutants in NSW, including:</p> <ul style="list-style-type: none"> • a description of the existing air quality and meteorology using existing information and site representative ambient monitoring data; • an outline of the point and fugitive sources of all pollutant emissions and the resulting ground level concentrations of all pollutants at all sensitive receivers; • a description of the effects and significance of resulting pollutant concentrations on the environment, human health, amenity and regional ambient air quality standard and goals; and • details of the mitigation measures proposed in managing the any additional impacts of air emission from the Proposed Modification. 	<p>Section 7.4 and Appendix 8</p>

Agency	Assessment requirements	Addressed in
Department of Industry – Water and Natural Resources Access Regulator	<i>The identification of an adequate and secure water supply for the life of the project. This includes confirmation that water can be sourced from an appropriately authorised and reliable supply. This is also to include an assessment of the current market depth where water entitlement is required to be purchased.</i>	Sections 3.1 and 7.3
	<i>A detailed and consolidated site water balance.</i>	Section 7.3.3
	<i>Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.</i>	Section 7.3.6
	<i>Proposed surface and groundwater monitoring activities and methodologies.</i>	Section 7.3.6
	<i>Consideration of relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and the relevant Water Sharing Plans.</i>	Section 5.2.3 and 7.3
Department of Primary Industries – Agriculture	<i>A biosecurity (pests and weeds) risk assessment outlining the likely plant, animal and community risks from imported material.</i>	Section 7.7.3.2
	<i>A biosecurity response plan to manage identified weed/pest animal risks.</i>	

6.2 Community Consultation

The key mechanism used for community involvement in relation to the Proposed Modification was the distribution of a Community Information Sheet (CIS) to residents surrounding the Quarry. The Community Information Sheet, attached as **Appendix 6**, provided details of the proposal and the environmental assessment process to be undertaken. The CIS also contained contact details so that members of the community could raise issues or request further information about the Proposed Modification.

Approximately 20 copies of the CIS were distributed in the immediate local area in July 2019. Copies were left in the letterbox of residences along Roberts Road, Old Northern Road and Old Telegraph Road.

Between 23 July and 10 August, Mr Martin Hodgson and Mr Stuart Reed of the Applicant visited residents at the locations identified on **Figure 6.1**. These one-on-one discussions focussed on the residents understanding of current operations, any concerns held and any concerns or questions regarding the Proposed Modification. In each case, no issues were raised regarding current operations nor concerns regarding the Proposed Modification. Overall the Quarry is viewed positively by those residing around it with an understanding that it is an existing feature of the Maroota locality and impacts positively on the lives of those employed at the Quarry and in related industries. This neutral to positive response to consultation is supported by the complaints register of the Quarry which is managed by VGT Environmental Compliance Solutions. Since January 2011, there has not been a single complaint lodged against the Quarry.

Further review and discussion on issues that could potentially impact on the local socio-economic setting are discussed in **Section 7.11**.

7.0 Environmental Impact Assessment

7.1 Identification of Key Environmental and Community Issues

The key environment and community issues that need to be assessed in this SEE have been identified through consideration of:

- The existing approved operations and description of the Proposed Modification (refer to **Sections 3.0 and 4.0**).
- The findings of the original environmental assessments for the operation (Nexus Environmental Planning Pty Ltd (Nexus), 1999; Nexus, 2000; Nexus, 2015a; and Nexus, 2015b) and the Project Overview and Preliminary Environmental Assessment (Umwelt, 2019) prepared for this modification.
- The planning and environmental context for the locality (refer to **Sections 1.2, 1.4, 2.0, 5.0 and 7.0**).
- The environmental risk analysis of potential environmental impacts associated with the Proposed Modification (refer to **Section 7.2**).
- Feedback from the community and government agencies on the issues that they felt were relevant to the Proposed Modification and Roberts Road Quarry more generally (refer to **Section 6.0**).
- The findings of baseline studies completed as part of preparation of the SEE and the issues that were identified as requiring further assessment.

The issues identified as being relevant to the Proposed Modification are assessed in detail in the following sections.

7.2 Preliminary Risk Analysis

A preliminary environmental risk analysis was undertaken for the Proposed Modification to identify, from a technical perspective, the key environmental and community issues and the level of assessment required as part of the SEE process.

The method used for the environmental risk analysis encompassed the following key steps:

- Identify each element of the Proposed Modification.
- Identify the environmental and community aspects and potential impacts/risks associated with each element of the Proposed Modification in the context of the existing approved operations (that is, whether or not there is a change to the impacts approved as part of the existing approvals for the quarry).
- Assess the potential scope of the impact/risk to determine the key issues requiring further assessment and the level of assessment required.

The outcomes of the preliminary environmental risk analysis are detailed in **Table 7.1**.

Table 7.1 Preliminary Environmental Risk Analysis

Environmental Aspect	Preliminary Risk Analysis	Further Assessment Required?
Surface water	Management of surface water is proposed to remain largely unchanged from that described in the existing Surface Water Management Plan however the proposed importation of VENM and ENM would introduce a potential source of contamination to surface water runoff, with the potential change in the final landform to a free draining basin increasing the risk of a pollution event to downstream catchments. A surface water impact assessment has therefore been undertaken.	Yes, refer to Section 7.3
Noise	The Proposed Modification has the potential to result in changes to noise emissions from the Quarry and a detailed noise impact assessment has been undertaken.	Yes, refer to Section 7.5
Air quality	The Proposed Modification has the potential to change the impact of the Quarry on local air quality and a detailed assessment has been undertaken.	Yes, refer to Section 7.4
Traffic	Increased traffic movement associated with the Proposed Modification has the potential to impact local traffic and a detailed traffic assessment has been undertaken.	Yes, refer to Section 7.6
Waste	<p>While the importation and application of the VENM and ENM to land is exempt from licensing as a waste disposal activity, the proposed reprocessing of the VENM and ENM would require a variation to the existing EPL to include Resource Recovery activities. A review of waste management practices has also been undertaken.</p> <p>DPI Agriculture has raised the issue of likely plant, animal and community risks from imported VENM/ENM material and a biosecurity risk assessment has therefore been undertaken.</p>	Yes, refer to Section 7.7
Visual	The proposed importation of VENM and ENM will require modification to the final landform and rehabilitation of the Quarry Site. While considered to be of an overall positive impact, these modifications could result in some Quarry areas remaining exposed for longer as the void is filled to establish the proposed modified final landform. An assessment of visual impacts has therefore been undertaken.	Yes, refer to Section 7.8
Rehabilitation and final landform	The proposed importation of VENM and ENM will require modification to the final landform and rehabilitation of the Quarry Site. While considered to be of an overall positive impact, these modifications will require consideration of surface water management during and following landform construction. The integration of the Proposed Modification into the existing rehabilitation and landscape management strategy is therefore addressed in this EA.	Yes, refer to Section 7.9
Land use	There will be no change to the extraction area, extraction depth or extraction method as a result of the Proposed Modification. While the Proposed Modification would introduce a new activity, being the importation and use of VENM and ENM to backfill and rehabilitate the extraction area, this effectively complements the existing operations and land use. A review of impact on land use and land resources has been undertaken.	Yes, refer to Section 7.10

Environmental Aspect	Preliminary Risk Analysis	Further Assessment Required?
Biodiversity	A flora and fauna assessment of the site was undertaken as part of studies for the original development consent for the Quarry (AES Environmental Consultancy, 1999). The study identified three threatened species that either occurred, or were likely to occur, on the site (<i>Acacia bynoeana</i> , turquoise parrot and glossy black cockatoo). An eight-part test of significance was undertaken for each species (as required under the <i>Threatened Species Conservation Act 1995</i>) and concluded that the original development would not have a significant impact on any of the three species. The Proposed Modification does not require any additional vegetation clearing, therefore no additional field survey or biodiversity assessment has been undertaken.	No
Aboriginal and Historic Heritage	An archaeological survey of the site was undertaken as part of studies for the original development consent for the Quarry (Corkhill, 1999). No Aboriginal archaeological sites or areas of potential archaeological deposit were identified. Additionally, given the past and current extractive activities, previous clearing and its relatively small size, the archaeological report concluded that there are unlikely to be any significant undetected, undisturbed Aboriginal sites or areas of potential archaeological deposit in the area surveyed. No increase in the approved impact footprint is proposed and no additional impact on heritage is likely therefore no further assessment has been undertaken.	No
Groundwater	The Proposed Modification would not result in any change to the potential interception of the groundwater table with the limit on depth of extraction to remain in place. The potential for contamination of the regional aquifer as a result of leachate from imported VENM and ENM would be managed to such an extent that the risk is considered low and no further assessment of groundwater has been undertaken.	No, refer to Sections 4.2.2 and 7.7
Soils and agriculture	There will be no additional disturbance area as a result of the Proposed Modification. The proposed importation of VENM/ENM and the resultant change in final landform will be beneficial for possible future agricultural use as it will provide a free-draining landform that is more similar to the pre-existing condition of the site than that currently approved. Soil erosion issues are addressed as part of the surface water assessment (see below) and no further assessment of soil/agricultural impacts has been undertaken.	No
Hazards	Existing operations within the Quarry are not considered as hazardous or offensive, according to the definitions in SEPP 33. The Proposed Modification will not result in any changes to the existing operations which would alter this classification, therefore no further assessment has been undertaken.	No
Public infrastructure	The Proposed Modification will not result in any changes to public infrastructure.	No
Socio-economic	The socio-economic impacts of the Quarry will remain substantially unchanged, with no significant changes to the scope or scale of impacts on the community. However, noting local amenity could be affected by the proposed changes, there is the potential for impacts (actual or perceived) on the social setting.	Yes, refer to Section 7.11

7.3 Surface Water

7.3.1 Existing Environment

7.3.1.1 Catchment

The Quarry is located approximately 5 km west-south west of the Hawkesbury River and lies within the Hawkesbury-Nepean catchment, a large coastal catchment covering a total area of 21,400 km² (NSW Office of Water, 2010).

Water licencing in this catchment is governed by the *Water Management Act 2000* under the Water Sharing Plan (WSP) for Greater Metropolitan Region Unregulated River Water Sources, which commenced on 1 July 2011. The WSP is divided into six water sources with each water source containing a number of management zones. The Quarry is located within the Lower Hawkesbury River Management Zone of the Hawkesbury and Lower Nepean Rivers Water Sources.

7.3.1.2 Licensing

7.3.1.2.1 Environment Protection Licence

The Quarry holds Environmental Protection Licence (EPL) 6535 for quarrying operations, however, no licenced discharge point (LDP) for site water and no water quality monitoring requirements are specified in the licence. The only condition specifically relating to pollution of waters is contained in *Section 3 Limit conditions* of the EPL:

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

7.3.1.2.2 Water Access Licences

As identified in **Section 3.1**, three water access licences (WALs) are held by the Quarry Site landowners (refer to **Table 7.2**). These include surface water licence WAL 26163 and groundwater licences WAL 24157 and WAL 24163 (for extraction of groundwater via production bores PB1 and PB2). Water sourced under WAL 26163 and WAL 24157 is used for irrigation by the on-site nursery operation which is owned and operated separately to the Quarry. No water for Quarry operations is sourced under WAL 26163 and WAL 24157. Water sourced from bore PB1 under WAL 24163 is used to supplement surface water captured within the Quarry WMS for quarrying operational water demands.

Table 7.2 Water Access Licences

WAL Number	Associated Works Approval	Land Holdings	Works	Extraction Limit (ML/yr) ¹	Site Identification
Surface Water					
26163	10CA104888	Lot 2, DP 228308	Work 1 65mm centrifugal pump Work 2 Bywash dam	264	NA
Groundwater					
24163	10WA114817	Lot 1, DP228308	Work 1 Bore (168.3mm)	45	Bore PB1
24157	10CA114819	Lot 2, DP 228308	Work 1 Bore (168.3mm)	6	Bore PB2

¹ Extraction limit assuming a full allocation of 1 ML for each unit share

7.3.1.3 Drainage

The Quarry Site sits at a high point along the Hornsby Plateau and is bordered by Old Northern Road to the south and west, Roberts Road to the east and farmland along the northern boundary. Elevations range from 226 m AHD at the south-western boundary at Old Northern Road to 192 m AHD at the northern boundary.

Prior to development, the site and upslope areas drain in a northerly direction via natural drainage lines into Cooper's Creek approximately 2 km north of the site (refer to **Figure 7.1**). Cooper's Creek flows in an easterly direction to the confluence with Dalgety's Creek which drains to the Hawkesbury River approximately 5 km to the east-north east of the Quarry (refer to **Figure 7.1**). Since development, site runoff and runoff from a relatively small upslope catchment is captured in the site water storages.

7.3.1.4 Soils

Soils at the Quarry Site are classified on eSPADE, NSW Soil and Land Information's online mapping tool (accessed 29 March 2019), as 'Disturbed Terrain' with areas adjacent to the Quarry classified as the 'Maroota Soil Landscape'. The soils of the Maroota Soil Landscape are up to 1 m deep on crests and slopes, with high permeability at the heads of drainage lines that pose a high erosion hazard. They are strongly acidic soils with low fertility and have potential for localised water logging. Soils are classified as soil hydrological group B, having low to moderate runoff potential. Other soil characteristics relating to erosion hazard and sediment transport are included in **Table 7.3**.

Table 7.3 Soil Characteristics

Characteristic	Value
Soil hydrologic group	B
Soil erodibility	Moderate to high
Soil loss class	1 to 7
Soil texture group	Type F

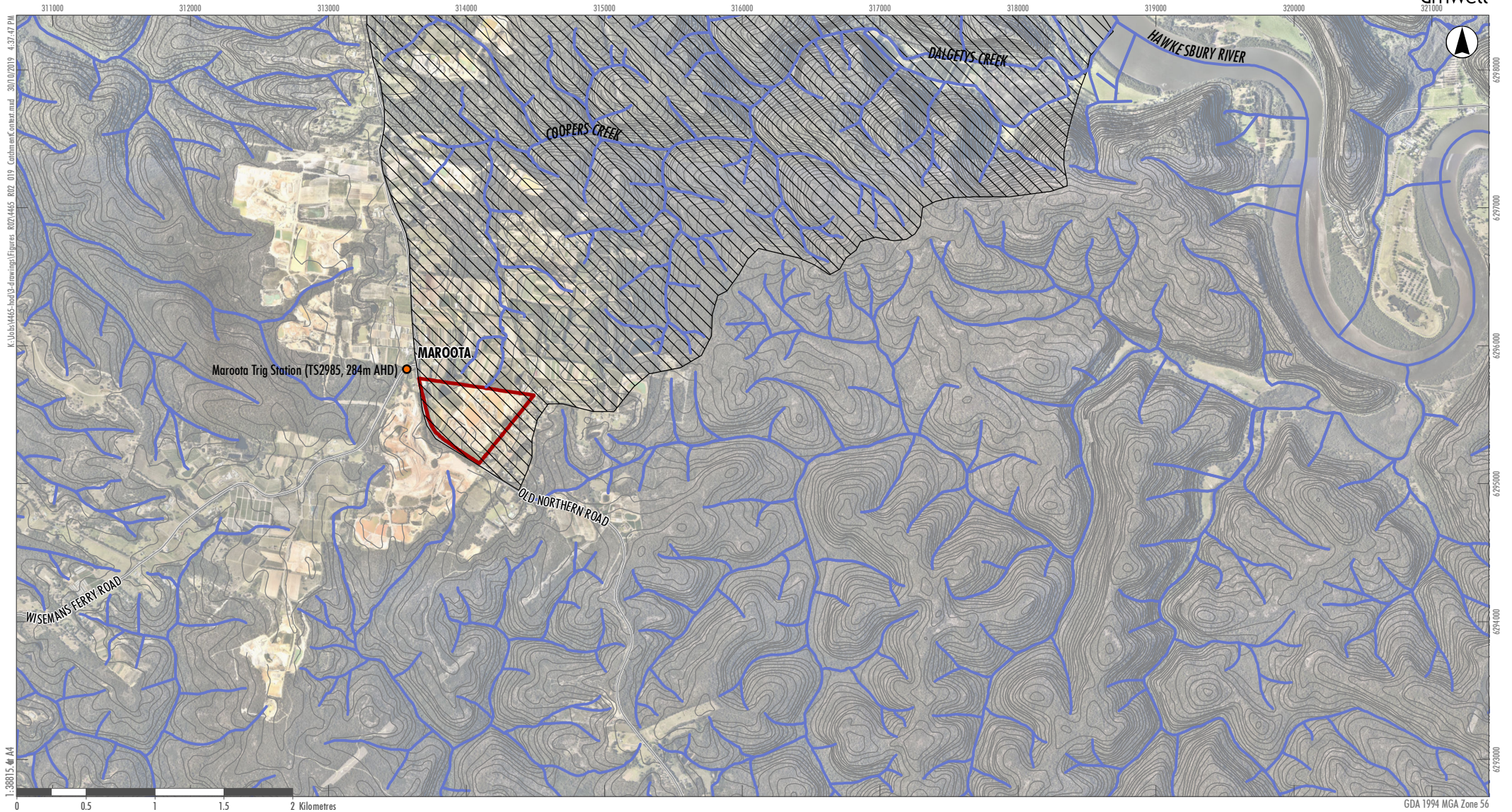
Source: Surface Water Management Plant, Maroota Quarry (VGT, 2018b)

7.3.1.5 Rainfall and Evaporation

There are several Bureau of Meteorology (BoM) stations recording daily rainfall within 10 km of the Quarry with the three nearest and most recent being:

- Maroota (Old Telegraph Road) station (station 067014) approximately 0.4 km to the north
- Gunderman (Wisemans Ferry Road) station (station 067040) approximately 6.4 km to the east, and the
- Wisemans Ferry (Old Post Office) station (station 061119) approximately 8.8 km to the north.

Given the proximity to the Quarry, the Maroota (Old Telegraph Road) station (station 067014) is considered to have the rainfall data set most representative of rainfall at the Quarry. Rainfall data records begin in September 1925 for station 067014, but a data gap exists for the period 1953 to 1962. Nearby stations, Gunderman (Wisemans Ferry Road) (station 067040) and the Wisemans Ferry (Old PO) (station 061119) do not provide sufficient data to fill this gap but have been used to fill other gaps to prepare a more daily record for the years 1926 to 1953 and 1963 to 2018. The statistics for the infilled rainfall data set for the Old Telegraph Road BoM station are summarised in **Table 7.4**.



- Legend
- Quarry Site
 - Coopers Creek Dalgety's Creek Catchment
 - Topographic Contours
 - Watercourse

FIGURE 7.1
Catchment Context

Table 7.4 Annual Rainfall for years 1926 to 1953 and 1963 to 2018

Statistic	Annual Rainfall (mm)
10 th percentile	604
50 th percentile	918
90 th percentile	1267

Source: Maroota (Old Telegraph Road) BoM station (station 067014), Gunderman (Wisemans Ferry Road) (station 067040) and Wisemans Ferry (Old Post Office) (station 061119)

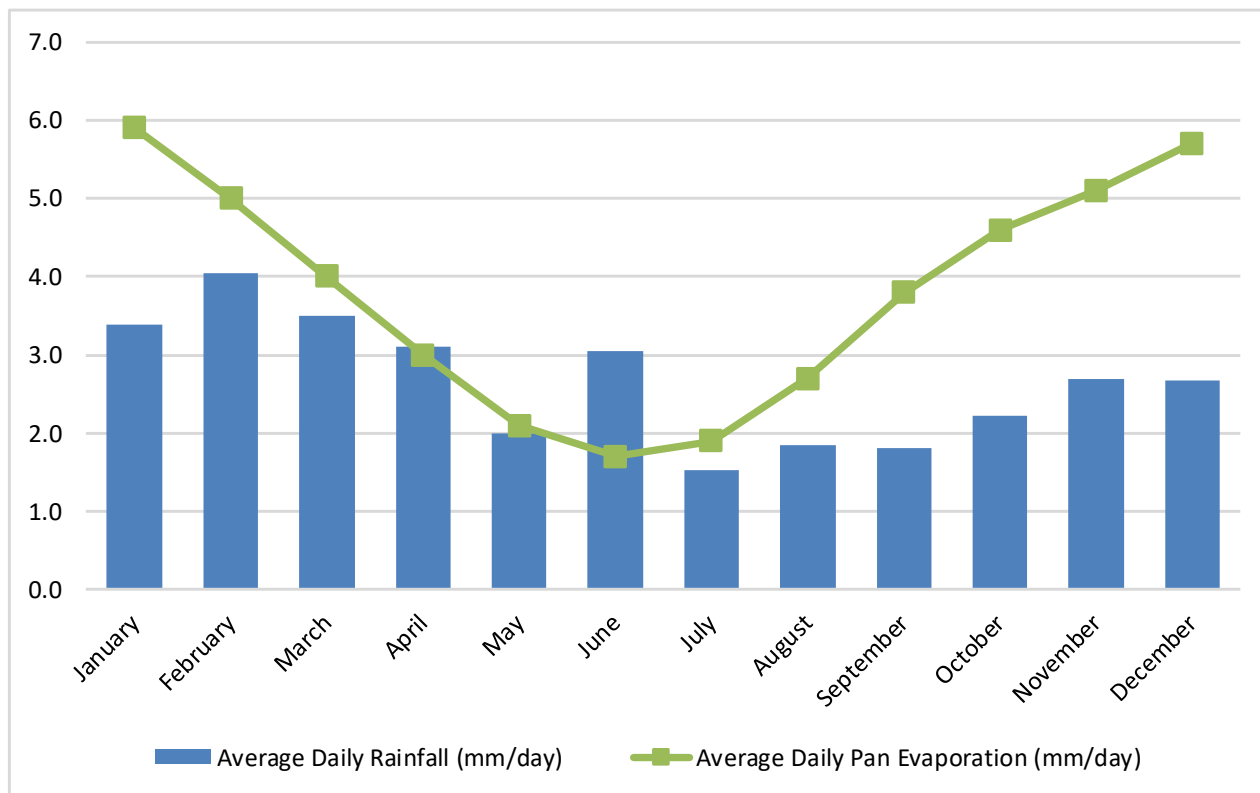
The BoM station recording daily evaporation nearest to the Quarry is the University of Western Sydney (UWS) Hawkesbury Campus BoM station (station 067021) (station 067021), located approximately 26 km south-west of the Quarry. Average daily pan evaporation recorded at station 067021 for the period 1973 to 2019 is presented in **Table 7.5**.

Table 7.5 Average Daily Pan Evaporation for Years (1973 to 2019)

Month	Average Daily Pan Evaporation (mm/day)
January	5.9
February	5.0
March	4.0
April	3.0
May	2.1
June	1.7
July	1.9
August	2.7
September	3.8
October	4.6
November	5.1
December	5.7
Annual	3.8

Source: University of Western Sydney (UWS) Hawkesbury Campus BoM station (station 067021)

Results show the minimum average daily pan evaporation of 1.7 mm/day occurs in June, while the maximum average of 5.9 mm/day occurs in January. The average daily pan evaporation across all months is 3.8 mm/day. **Chart 7.1** presents the average daily rainfall for the infilled daily rainfall data set for the Old Telegraph Road BoM station (station 067014) and the average daily pan evaporation recorded at station UWS Hawkesbury station (067021).



Source: (Maroota (Old Telegraph Road) station (station 067014), Gunderman (Wisemans Ferry Road) station (station 067040) and the Wisemans Ferry (Old PO) station (station 061119)) and average daily pan evaporation for Richmond UWS Hawkesbury station (station 067021)

Chart 7.1 Average Daily Rainfall and Pan Evaporation

© Umwelt, 2019

7.3.1.6 Water Quality Objectives and Baseline Water Quality

NSW Water Quality Objectives

NSW Water Quality Objectives (WQOs) are agreed environmental values and long-term goals for NSW's surface waters used across NSW to guide catchment management. No WQOs have been specified by the NSW Office of Environment and Heritage (OEH) for the Hawkesbury-Nepean catchment. As such, the water quality parameters presented in **Table 7.6**, which are the default trigger values for slightly disturbed ecosystems in south-east Australia from the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Environment and Conservation Council (ANZECC, 2000), could be applied as preliminary WQOs for the receiving water quality in the drainage line to the north of the quarry. While the revised *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG) (Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia) were released in 2018, the default trigger values for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems are yet to be updated. As such, the ANZECC 2000 guidelines have been presented.

Table 7.6 Default Trigger Values for Physical And Chemical Stressors For South-East Australia for Slightly Disturbed Ecosystems ANZECC (2000)

Parameter	Units	WQO
pH	pH Units	6.5 – 8.5
Electrical Conductivity	µS/cm	125 – 2200
Turbidity	NTU	6 – 50

Baseline Receiving Water Quality

As the Quarry has not undertaken any baseline water quality monitoring in receiving waters, a search of nearby quarry operations websites for publicly available receiving water quality data was undertaken. The Soil and Water Management Plan for the Old Northern Road Quarry of Dixon Sand (Penrith) Pty Ltd (Dixon Sand), located approximately 2.2 km northwest of the Quarry, contains water quality data for a local stream with the monitoring point identified as SW19 (refer to **Figure 7.2**). The water quality monitoring in the stream at SW19 was undertaken between July 2003 and July 2005 by Dixon Sand and the results are presented in **Table 7.7**. The pH values recorded in the stream at SW19 are generally much lower than the ANZECC 2000 default trigger value range.

Table 7.7 Stream Surface Water Quality (SW19 Monitoring Location July 2003 to July 2005)

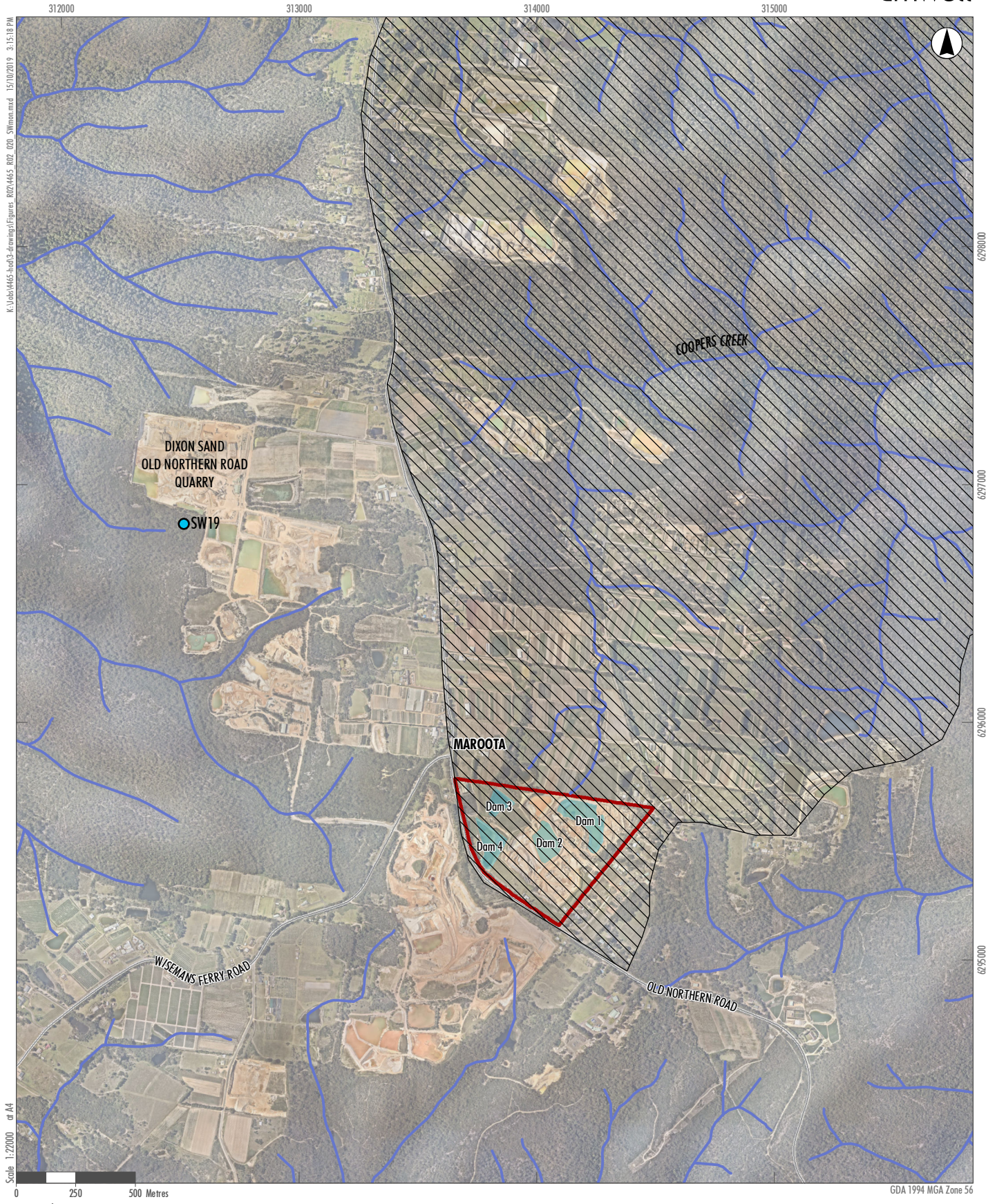
Parameter	Minimum	20th Percentile	50th Percentile	80th Percentile	Maximum
pH	<2.0	4.0	4.2	4.8	7.1
TSS (mg/L)	<2.0	2.0	2.0	8.0	17
Turbidity (NTU)	0.1	0.1	0.3	3.8	21

Source: Old Northern Road Quarry Soil and Water Management Plan (Dixon Sand, 2018)

Site Water Quality

The results for site water quality monitoring undertaken by the Quarry on 27 July 2017 and from January 2018 to January 2019 are presented in **Table 7.8** and **Table 7.9**. The site water sources monitored include groundwater bore PB1 (screened in the Hawkesbury Sandstone groundwater source), groundwater monitoring wells MW1, MW5, MW6, MW8, MW10, MW11 and MW 13 (screened in the Maroota Sands groundwater source), groundwater monitoring wells PB1, MW7, MW9 and MW12 (screened in the Hawkesbury Sandstone groundwater source) and the four water storage dams, Dam 1 (Processing Dam), Dam 2 (Holding Dam), Dam 3 (North Nursery Dam) and Dam 4 (South Nursery Dam). Inflows to Dam 1 and Dam 2 include runoff from disturbed Quarry catchments, groundwater sourced from PB1 and recirculated water from the Processing Plant. Inflows to Dam 3 and Dam 4 include runoff from the upslope undisturbed catchment and the Nursery operation.

The water quality monitoring data presented in **Table 7.8** and **Table 7.9** shows pH levels for Dam 1 and Dam 2 are below the ANZECC 2000 default trigger range (refer to **Table 7.6**). The low pH results correspond with the pH of groundwater (except for MW6) as well as the pH of the stream to the northwest of the Quarry monitored by Dixon Sand. However, the pH for Dam 3 and Dam 4 suggests that runoff from undisturbed areas around the Quarry catchment is likely to have a pH that is within or just above the ANZECC 2000 default trigger range (refer to **Table 7.6**).



K:\Vabs\4465-head\3-drawings\Figures_R02\4465_R02_020_S\Wmon.mxd 15/10/2019 3:15:18 PM
 Scale 1:27000 at A4

- Legend**
- Quarry Site
 - Quarry Water Storages
 - Coopers Creek Dalgety's Creek Catchment
 - Watercourse
 - Water Monitoring Location (SW19)

FIGURE 7.2

Surface Water Quality Monitoring Locations

Table 7.8 Surface Water and Groundwater Quality 2017 - 2019

Parameter	Units	Dam 1			Dam 2			Dam 3		
		Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum
pH	pH units	4.38	4.58	4.94	4.29	4.47	4.70	6.61	7.24	7.80
Electrical Conductivity (EC)	µS/cm	100	167	229	112	190	254	133	184	223
Total Dissolved Solids (TSS)	mg/L	63	106	143	70	117	159	77	114	139
Chlorine	mg/L	23	38	57	24	38	57	20	31	36
Sulphate	mg/L	2	3	4	2	4.5	8	9	15	21
Total Alkalinity (CaCO ₃)	mg/L	. ¹	. ¹	. ¹	. ¹	. ¹	. ¹	13	13	13
Calcium	mg/L	0.5	0.7	0.8	0.5	0.7	0.9	3.5	4.3	5.3
Magnesium	mg/L	1.1	2.3	3.7	1.2	2.3	3.7	3.3	4.3	5.3
Sodium	mg/L	11.0	20.2	29.0	12.0	20.6	30.0	13.0	16.0	17.0
Potassium	mg/L	1.8	2.8	4.3	1.6	2.8	4.1	3.6	5.2	6.0

¹ All results less than the limit of detection

Source: VGT (2019)

Table 7.9 Surface Water and Groundwater Quality 2017 - 2019

Parameter	Units	Dam 4			Maroota Sands Groundwater ¹			Hawkesbury Sandstone Groundwater ²		
		Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum
pH	pH units	6.62	7.88	9.00	4.03	5.30	10.31 ³	4.03	5.09	5.89
Electrical Conductivity (EC)	µS/cm	116	153	188	103	219	424	94	157	322
Total Dissolved Solids (TSS)	mg/L	63	94	117	55	137	265	59	104	215
Chlorine	mg/L	20	27.4	32	18	44	84	13	27	50
Sulphate	mg/L	3	7	8	1	7	61	2	10	23
Total Alkalinity (CaCO ₃)	mg/L	15	15	15	5	50	87	11	23	35
Calcium	mg/L	1.7	2.1	2.8	0.6	2.5	7	1	2.1	3.6
Magnesium	mg/L	2.7	3.4	4.4	0.8	5.0	18	0.5	2.7	12
Sodium	mg/L	13.0	15.6	18.0	12.0	28.2	110.0	12.0	26.1	59.0
Potassium	mg/L	2.2	2.7	3.2	0.5	1.9	4.6	0.5	1.6	4.5

¹ Groundwater water quality statistics include results for MW1, MW5, MW6, MW8, MW10, MW11 and MW 13

² Groundwater water quality statistics include results for PB1, MW7, MW9 and MW12

³ High pH value was recorded at MW6. All MW6 pH results were significantly higher than the results recorded for all other groundwater samples.

Source: VGT (2019)

Annual compliance reviews confirm that no controlled or uncontrolled discharges have occurred at the Quarry. No LDP exists for the Quarry and it is unlikely that one will be included in the licence for the extraction phase of the Quarry operation based on results of the water balance (VGT, 2018b).

7.3.2 Potential Impacts

The potential impacts to surface water resources associated with the Proposed Modification to Quarry operations are:

- Rainfall runoff with poor water quality discharging from the operational Quarry or final landform to the downstream environment.
- Surface water take associated with the final landform exceeding the land holding entitlement.

7.3.3 Water Management

7.3.3.1 Existing Water Management System

The existing water management system (WMS) at the Quarry Site (refer to **Figure 7.3**) is comprised of four (4) primary catchments, each with an associated water storage. Quarry operations occur within Catchment 1 and 2, while the Nursery operation is located within Catchment 3 and 4. The Existing Quarry WMS operates independently of the Nursery WMS and inflows from Catchment 3 and 4 would only occur in extremely high rainfall events resulting in spills from Dam 3 and/or Dam 4 to the Existing Quarry WMS.

Catchment 1 has an area of approximately 26 ha, comprising both disturbed (extraction areas and Processing Plant) and undisturbed areas including a large undisturbed off site area southeast of Roberts Rd. Catchment 1 drains to Dam 1 (the Processing Dam), the lowest point on the Quarry Site. Dam 1 also receives water transfers from Dam 2 (the Holding Dam). Water captured in Dam 1 is used for material processing in the Processing Plant and site wide dust suppression activities (stockpiles, haul roads, exposed areas). Dam 1 has an estimated total capacity of 119 ML but typically operates with much lower inventories, with inventories expected to vary with climatic conditions.

Catchment 2 has an area of approximately 5.3 ha and is primarily comprised of disturbed areas (stockpiles and extraction areas) with a small portion of undisturbed land to the west of Dam 2. Inflows to Dam 2 include runoff from Catchment 2 and tailings slurry from the Processing Plant. Water is decanted from Dam 2 to Dam 1 for reuse via a riser pipe. Dam 2 has an approximate capacity of 24.4 ML. As the extraction area is developed, the area of Catchment 2 will increase, with the areas of Catchments 3 and 4 reducing by an equivalent amount.

Existing Water Balance

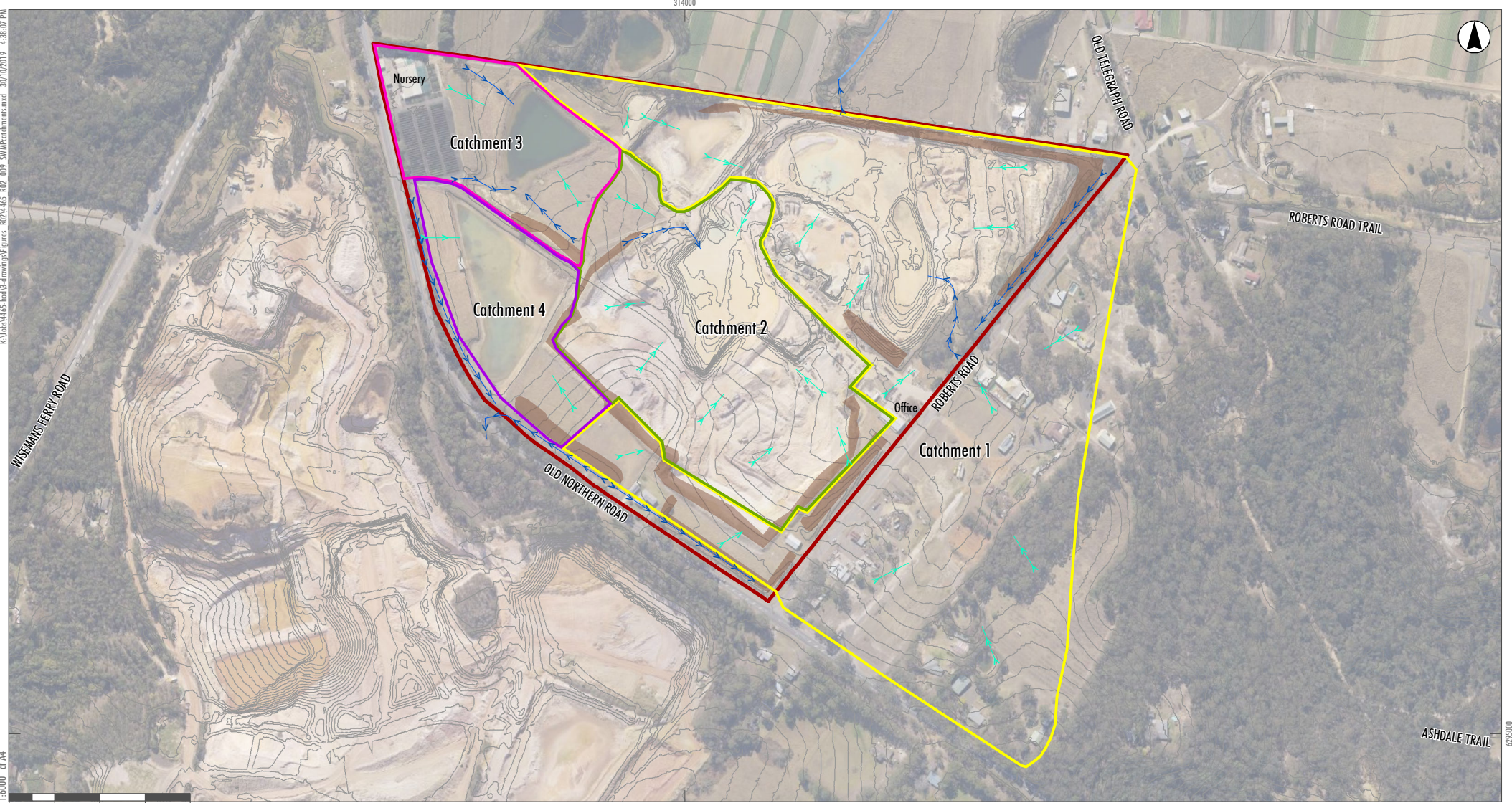
The Quarry Environmental Impact Statement (EIS) (Nexus, 1999) presented a predictive water balance that indicated the Quarry would have adequate operational water security during dry periods and sufficient storage capacity to ensure there would be no spills to the environment from the Quarry WMS.

Further water balance assessment work has been undertaken since the original Quarry EIS and is presented in the Quarry *Surface Water Management Plan* (SWMP) (VGT, 2018b). The water balance assessment undertaken by VGT and presented in the SWMP suggests that water deficits may arise during dry periods.



K:\Jobs\44465-head\3-drawings\Figures_R07\44465_R02_009_SWMP\Attachments.mxd 30/10/2019 4:38:07 PM

1:6000 of A4



GDA 1994 MGA Zone 56

Legend

- Quarry Site
- Flow Direction
- Catchment**
- Drainage line
- Catchment 1
- Catchment 2
- Catchment 3
- Catchment 4
- Existing watercourse
- Bundwalls (including topsoil)
- Topographic contours (2m)

Image Source: Nearmap (2019) Data source: Umwelt (2019), NSW LPI DTDB/DCOR (2018)

FIGURE 7.3
Existing Surface Water Management System

The Quarry relies on a secure source of water to meet operational demands. Water for Quarry operations is sourced from:

- rainfall runoff captured within the WMS (in Dam 1 and Dam 2)
- groundwater sourced from PB1 under WAL 24163
- potable water import for amenities use

The Quarry operational water demands and losses are:

- haul road dust suppression
- stockpile and exposed area dust suppression
- Processing Plant demands, i.e. product moisture losses
- evaporative losses from water storage surfaces
- irrigation of areas undergoing rehabilitation
- water storage seepage losses (considered negligible in the SWMP water balance (VGT, 2018b))

Should water supply be limited as a consequence of low rainfall conditions, the Quarry will curtail extraction and processing operations to ensure sufficient water is available to maintain ambient air quality controls (i.e. dust suppression) as a priority. Water for dust suppression will also be supplied from off-site water sources as required (e.g. potable water delivered by tanker).

Given the WMS and water sources and demands/losses for the extraction phase of the Quarry operation will not change substantially, the existing water balance has not been revised (refer to **Section 7.3.3.2**)

7.3.3.2 Proposed Water Management System

The WMS for the Quarry during the operational phase will remain generally unchanged from the Existing Quarry WMS (refer to **Section 7.3.3.1**). Extractive operations at the Quarry are planned to generally progress in a westerly direction and through Dam 3 and then Dam 4.

Imported VENM/ENM will be stockpiled in areas where extraction has been completed to the maximum depth and, where possible, shaping and planting of the final landform will commence. The final stages of extraction also include accessing the resource under the current Processing Plant location with the Processing Plant and stockpiles to be relocated to the immediate south west of the Office (between Dam 2 and Roberts Road). **Figure 4.1** presents an indicative sequence of extraction, VENM/ENM management and processing plant relocation over the life of the Quarry.

The conceptual final landform designs presented in **Figure 4.2** and **4.3** have been developed with consideration of the planned staging of extractive operations. Backfilling and shaping will generally progress from the eastern side of the Quarry, around the southern boundary and then into the western side in the later stages of extractive operations. As discussed in **Section 4.2.7.1**, the final landform has been considered for a lower and upper volume VENM/ENM available to construct the final landform. In both cases (refer to **Figures 4.2** and **4.3**), gradients across the final landform would range from 6° up to 11° providing a stable and free draining landform.

Throughout the Quarry's extraction phase, the water storage capacity within the Quarry WMS will be maintained and therefore the likelihood of off-site discharge will remain unchanged and low. However, the stockpiling and handling of VENM/ENM will introduce additional material to the site that could contribute to an increase in entrained sediment in runoff. Additional erosion and sediment controls will be implemented to firstly minimise erosion from the imported VENM/ENM and secondly control any sediment entrained in runoff. All erosion and sediment controls (ESCs) will be implemented in accordance with Landcom's *Managing Urban Stormwater Volume 1* (Landcom, 2004) and *Volume 2e Mines and Quarries* (DECC, 2008). The Quarry SWMP will be updated to include appropriate ESCs to address the additional erosion and sediment risks associated with VENM/ENM importation, handling and final landform development. The following ESCs are typical of the measures that are likely to be implemented during VENM/ENM importation, handling and final landform development:

- Ensure stockpiles of erodible material that have the potential to cause environmental harm if displaced are:
 - Appropriately protected (for example, seeded or covered) from wind, rain, concentrated surface flow and excessive up-slope stormwater surface flows.
 - Constructed on the contour at least 2 m (preferably 5 m) away from hazard areas, particularly areas of likely concentrated water flows, e.g. roads, slopes steeper than 10% etc.
 - Stabilised (provided with an appropriate protective cover (synthetic, mulch, or vegetative)) if they are to be in place for more than 10 days.
- Stockpiles are to have sediment fencing installed on the downslope side and a diversion bund installed on the upslope side as per Standard Drawing SD4-1 Stockpiles to protect from run-on water.
- Appropriate protection of reworked landform (for example, seeded, mulched or other covering) from wind, rain, concentrated surface flow and excessive up-slope stormwater surface flows will be provided.
- Energy dissipation will be installed on slopes at 80 m intervals where required.

Following the completion of extraction from areas of the Quarry imported VENM/ENM will be used to backfill the void area with the landform shaped (to achieve the landform of **Figure 4.2** or **Figure 4.3**) and planted. Placement of VENM/ENM would initially be aimed at the final landform provided by **Figure 4.2**, however, should volumes of VENM/ENM received be less than anticipated over the initial years of operations placement and profiling would revert to the landform of **Figure 4.3**).

As filling of the Quarry void progresses the WMS water storage capacity will be reduced and the likelihood of spills from the WMS will increase. As extraction is completed, Quarry water demands will be further reduced as sand processing is ceased. As such, the landform will incorporate Sediment Basin 1 which will be designed, constructed and operated in accordance with the Blue Book to manage a 5 day 95th percentile rainfall event. Sediment Basin 1 is represented as the water storage on **Figures 4.2** and **4.3**. All ESCs will be managed and maintained until full stabilisation of the landform is achieved, i.e. > 70% ground cover across the whole of the disturbed area within the catchment. As illustrated in **Figures 4.2** and **4.3**, Sediment Basin 1 will remain as a site water storage after the final landform has been adequately rehabilitated subject to the landholder maintaining sufficient surface water licence entitlement (refer to **Section 7.3.4**).

Table 7.10 presents the Sediment Basin 1 design basis and minimum design capacities. Given the uncertainty with respect to the soil characteristics of the VENM/ENM to be imported, the design calculations have conservatively assumed the soils will be hydrologic group D. In reality, the surface is likely to be more permeable and therefore the volumetric runoff coefficient (C_v) less (with resultant reduction in runoff). Allowing for a sediment zone capacity equal to 50% of the required settling zone volume, the total capacity of Sediment Basin 1 is required to be 30.3 ML (refer to **Table 7.10**).

Table 7.10 Sediment Basin 1 Preliminary Design

Dam	Soil Hydrologic Group	Runoff Coefficient (C _v)	5-Day Rainfall, 95 th Percentile (mm)	Catchment Area (ha)	Settling Zone Volume (ML)	Sediment Storage Volume (ML)	Total Basin Volume (ML)
Dam 1 (Final Landform)	D	0.79	69.4	36.9	20.2	10.1	30.3

Water drawn from Sediment Basin 1 would be used for dust suppression and irrigation of the rehabilitating final landform. However, the water demands associated with rehabilitation are unlikely to consume all of the water captured in Sediment Basin 1 during wet periods. As such, for a period between final landform construction and completion of rehabilitation to produce a non-polluting, free-draining landform, the Quarry would be required to discharge water from Sediment Basin 1 to the downstream environment so as to maintain the minimum settling and sediment storage volumes.

Therefore, at some time in the future, prior to the establishment of the proposed free draining landform, the Applicant will apply to vary EPL 6535 to include an LDP to allow surplus water captured in Sediment Basin 1 to be discharged to the drainage line immediately to the north of the Quarry (refer to **Figure 7.3**). It is noted this discharge will only be required on the landform becoming free-draining. The predicted Sediment Basin 1 discharge volumes and frequencies are provided in **Section 7.3.3.3**.

7.3.3.3 Final Landform Water Balance

7.3.3.3.1 Model Description

A daily time step water balance model (the Model) for the final landform was prepared using GoldSim modelling software to estimate the rehabilitation irrigation demands and the volumes and frequency of discharges from Sediment Basin 1. The bases and assumptions are listed below:

- Rainfall inflows were based on rainfall data sourced from the Maroota (Old Telegraph Road) BoM station (station 067014) with data gaps infilled with rainfall records from the Gunderman (Wisemans Ferry Road) (station 067040), Wisemans Ferry (Old Post Office) (station 061119) and UWS Hawkesbury Campus BoM station (station 067021). A total of 85 years of daily rainfall data was modelled.
- Evaporation outflows were based on UWS Hawkesbury Campus BoM station (station 067021).
- Runoff was estimated using the Australian Water Balance Model (AWBM). The AWBM was initially calibrated to the average regional runoff (ARR) at the Quarry Site of 0.8 ML/ha/year (NSW Farm Dam Calculator, 2019). Given the final landform is likely to be constructed from fill that is not endemic to the local catchment, the AWBM parameters were then adjusted to predict a higher average annual runoff of 0.9 ML/ha/year to ensure discharge volume and frequency estimates were by the Model were conservative.
- The catchment area to be irrigated is 25 ha.
- A maximum watering rate of 20 mm per day including rainfall. i.e. Irrigation demand is equal to 20 mm minus daily rainfall depth.
- A minimum annual irrigation demand (including rainfall) of 183 ML/year. This has been based on an average watering rate of 2 mm/day (731 mm/year) which approximately equates to a 25th percentile rainfall year for the modelled historical rainfall data set.

- Controlled discharges occur when irrigation demands are lower than the required Sediment Basin 1 dewatering rate (i.e. the minimum dewatering rate to restore the settling zone capacity within five days following a rainfall event). The volume of controlled discharge on a particular day is estimated as the minimum Sediment Basin 1 dewatering rate minus the calculated irrigation volume on that day.

7.3.3.3.2 Results

The following water balance results are based on the minimum Sediment Basin 1 settling zone volume to accommodate a 5 day 95th percentile rainfall event. Should Sediment Basin 1 be installed with a settling zone volume in excess of the minimum required capacity, the frequency and volume of discharges could be expected to be lower and water shortfalls during dry conditions could be smaller.

Table 7.11 presents the gross water balance for the final landform during the period prior to the establishment of adequate vegetative cover. The gross water balance accounts for the minimum irrigation demand (refer to **Section 7.3.3.3.1**) and excludes controlled discharges.

Table 7.11 Gross Water Balance

Statistic	Result (ML/year)
10 th Percentile	-11.8
50 th Percentile	4.3
90 th Percentile	24.8

Water balance modelling indicates that the final landform WMS will operate with neutral to small surplus median water balance and have a need to discharge surplus water for median to wet rainfall years. The modelling results also indicate that water imports may be required during dry years if the assumed minimum irrigation rates are to be maintained.

Table 7.12 presents the predicted number of days that controlled discharges from Sediment Basin 1 will be required and **Table 7.13** presents the predicted annual controlled discharge volumes from Sediment Basin 1. **Table 7.14** presents the predicted number of spill events (events may occur over consecutive days) from Sediment Basin 1 and **Table 7.15** presents the predicted annual spill volumes from Sediment Basin 1.

Table 7.12 Controlled Discharge Days

Statistic	Result (days/year)
Minimum	3
10 th Percentile	8
50 th Percentile	15
90 th Percentile	27
Maximum	51

Table 7.13 Controlled Discharge Volumes

Statistic	Result (ML/year)
Minimum	0.0
10 th Percentile	0.4
50 th Percentile	4.3
90 th Percentile	24.8
Maximum	81.9

Table 7.14 Sediment Basin 1 Spill Events

Statistic	Result (events/year)
Minimum	0
10 th Percentile	0
50 th Percentile	0
90 th Percentile	0
Maximum	2

Table 7.15 Sediment Basin 1 Spill Volumes

Statistic	Result (ML/year)
Minimum	0.0
10 th Percentile	0.0
50 th Percentile	0.0
90 th Percentile	0.0
Maximum	20.9

Controlled discharge frequency ranges from a minimum of three days per year to a maximum of 51 days per year. During dry years, controlled discharges are predicted to be minimal while discharge volumes are expected to range from 4 to 82 ML/year during median and wet years. It is proposed that controlled discharges will be regulated by the site EPL which will include water quality discharge concentration limits (refer to **Section 7.3.5.2**). Controlled discharges are expected to be required until adequate vegetative cover (approximately 70%) is achieved over the final landform and final landform catchment runoff can be considered clean.

Spills from Sediment Basin 1 are only predicted during wet rainfall years in high or prolonged rainfall events. This is a consequence of the relatively low runoff yield for the local catchment and the modelled maximisation of captured runoff reuse for irrigation. The predicted maximum annual spill volume of 20.9 ML presented in **Table 7.15** occurred across three days for a modelled historical rainfall period (4/8/1986 to 10/8/1986) where there was approximately 486 mm of rainfall preceding and throughout the spill event.

7.3.4 Surface Water Entitlement and Licensing

All water extraction in NSW, apart from some exemptions for government authorities and basic landholder rights extractions, must be authorised by a water licence. Harvestable rights, which are a basic landholder right under the *Water Management Act 2000*, allow a landholder to capture and use up to 10% of the average regional runoff from a landholding. Basic landholder rights are exempt from volumetric licensing requirements, however, water extracted under basic landholder rights must be taken into consideration when assessing licensing requirements. Water take under harvestable rights is typically managed by sizing site dams to the Maximum Harvestable Rights Dam Capacity (MHRDC) which equates to 10% of the average regional runoff for the landholding area.

Based on a total landholding of 28 ha and an average regional runoff of 0.8 ML/ha, the landholding has a MHRDC of 2.24 ML which is less than the proposed Sediment Basin 1 capacity of 30.3 ML.

However, the existing surface water licence WAL 26163 and works approval 10CA104888, which apply to the Quarry Site landholding, allows the capture of up to 264 ML/year of surface water runoff in Dam 3 and Dam 4. As extraction progresses Dam 3 and Dam 4 will be quarried through and all runoff on site will be directed to the Quarry WMS water storages (i.e. Dam 1 and Dam 2). As such, a variation will be required to allow continued surface water take under WAL 26163 and use of the captured water for operational Quarry water demands. Another variation to works approval 10CA104888 may be required as the final landform is developed with all surface water runoff from the site being captured in Sediment Basin 1.

7.3.5 Monitoring

7.3.5.1 Receiving Waters

Currently, the Applicant does not intend on discharging water from the Quarry Site. Prior to the cessation of Quarry operations, when a return to a free draining landform would be established, or in the event the Applicant wishes to establish an LDP, water quality monitoring would be undertaken in the drainage line directly to the north of the Quarry. Given the Quarry has not discharged to this drainage line, and is unlikely to do so for the operational life of the Quarry (VGT, 2018b), the data collected would be considered to be representative of the drainage line water quality in the absence of quarry impacts.

Monitoring would initially be undertaken on a monthly basis for a period of 24 months to prepare a data set that can be used to define site specific trigger values in accordance with ANZECC 2000. Once trigger values are established monitoring could be reduced in frequency or ceased, reverting to monthly when the Quarry ceases extraction and processing operations when discharges from the final landform WMS are expected. Monthly water quality monitoring will continue until adequate vegetation coverage of approximately 70% of the final landform has been established and runoff from the site can be considered clean. **Table 7.16** presents the proposed water quality monitoring program.

Table 7.16 Proposed Baseline Water Quality Monitoring Program

Parameter	Units	Initial Frequency
pH	-	Monthly*
EC	µS/cm	
TSS	mg/L	
Turbidity	NTU	

*Monitoring will be undertaken quarterly after an initial 24 month period but revert to monthly when extraction and processing operations at the Quarry cease.

7.3.5.2 Discharges

As discussed in **Section 7.3.3.2** controlled discharges from the proposed final landform sediment basin (Sediment Basin 1) are predicted to be required and an EPL variation will be required to incorporate a LDP. Discharge water quality and volume monitoring will be undertaken as presented in **Table 7.17**. Any future discharge concentration limit conditions for the parameters presented in **Table 7.17** will be informed by the proposed baseline water quality monitoring data (refer to **Section 7.3.5.1**). Controlled discharge volumes will be either directly measured using a flow meter or estimated based on the discharge pump duty flow rate and run time.

Table 7.17 Proposed Discharge Water Quality Monitoring

Parameter	Units	Frequency
pH	-	Monthly during discharge
EC	µS/cm	
TSS	mg/L	
Turbidity	NTU	
Volume	ML	During discharge

7.3.5.3 Erosion and Sediment Controls

Monitoring and maintenance of all erosion and sediment controls will be undertaken in accordance with the Blue Book. The site WMP will be updated to include procedures and checklists for erosion and sediment control monitoring and maintenance.

7.3.6 Impact Assessment and Mitigation Measures

When importing VENM/ENM during the extraction phase of the Quarry operation the WMS water storage capacity will remain unchanged. Given previous predictive water balances indicated the Quarry would have sufficient storage capacity to ensure no spills to the environment from the Quarry WMS (refer to **Section 7.3.3.1**), the risk of discharge from the Quarry WMS is considered to be unchanged in the extraction phase. Therefore the impacts to downstream water quality are considered to be negligible during the extraction phase of Quarry operations.

As the final landform is established the WMS water storage capacity will gradually be diminished. The final landform will, however, incorporate Sediment Basin 1 which will be designed, constructed and operated to manage a five day 95th percentile rainfall event in accordance with the Blue Book. Runoff captured in Sediment Basin 1 will be used for irrigation of the final landform catchment.

To ensure Sediment Basin 1 is managed to maintain sufficient capacity to accommodate the 5 day 95th percentile rainfall event within five days following rainfall, it is proposed to vary site EPL 6535 to include an LDP allowing for surplus water from the final landform WMS to be discharged off-site (refer to **Sections 7.3.3.2** and **7.3.5.2**). It is expected that EPL 6535 will include discharge concentration limit conditions for a range of pollutants including pH, EC and TSS. Hodgson's Quarry Products will implement any required water treatment measures to ensure discharges do not exceed any proposed limit conditions. Water quality management in Sediment Basin 1 will continue until adequate vegetative cover (approximately 70%) is achieved over the final landform and final landform catchment runoff can be considered clean. Therefore the impacts to downstream water quality are considered to be negligible during the final landform establishment period.

The Quarry currently operates in accordance with a *Surface Water Management Plan* (SWMP) (VGT, 2018b) which describes the diversion and storage of clean and dirty water flows within the Quarry Site, management of seepage and potential water contamination, and erosion and sediment control. The management measures nominated in the SWMP will continue to be implemented with the SWMP to be reviewed and updated following approval of the Proposed Modification to account for any changes resultant from the proposed importation of VENM and ENM, expanded active operating areas and modifications to the final landform.

The estimated surface water entitlement (surface water licence and harvestable rights) for the final landform (refer to **Section 7.3.4**) land holding will exceed the surface take associated with Sediment Basin 1. In fact, the final landform design will result in an increase in flows to the downstream environment when compared to the extraction phase operation. Given the surface water entitlement for the final landform land holding is considered adequate, no impacts associated with loss of catchment yield are expected. Rather a positive impact is expected as a result of the final landform design returning water to the downstream environment.

7.4 Air Quality

7.4.1 Scope

An assessment of the air quality impacts of the Proposed Modification has been prepared by Jacobs Group (Australia) Pty Limited (Jacobs) in general accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (Approved Methods) (EPA, 2016). The Air Quality Impact Assessment (AQIA) (Jacobs, 2019) is provided in **Appendix 7** and a summary of findings is presented below.

7.4.2 Existing Environment

7.4.2.1 Meteorology

Meteorological conditions are important for determining the direction and rate at which emissions from a source will disperse. The key meteorological requirements of air dispersion models are, typically, hourly records of wind speed, wind direction, temperature, and atmospheric stability.

A meteorological station is operated onsite at the Quarry adjacent to the Site Entrance and office area (refer to **Figure 3.3**). Annual statistics from meteorological wind data collected at the Quarry from 2014 to 2018 are provided in **Table 7.18**.

Table 7.18 Annual Statistics from Meteorological Data Collected at the Quarry (2014 to 2018)

Statistic	2014	2015	2016	2017	2018
Per cent complete (%)	85.1	97.6	99.9	91.6	99.9
Mean wind speed (m/s)	1.0	0.9	1.1	1.0	1.1
99 th percentile wind speed (m/s)	4.9	4.0	5.4	4.9	5.8
Percentage of calms (%)	46.0	49.7	46.0	49.2	49.9
Percentage of winds >6 m/s (%)	0.3	0.1	0.3	0.3	0.6

Source: Jacobs (2019)

For air quality assessments, a minimum one year of hourly data is required, which means that almost all possible meteorological conditions, including seasonal variations, are considered in the model simulations.

For the purpose of modelling impacts on local air quality, the 2018 calendar year was selected as the meteorological modelling year for the following reasons:

- 2018 had a higher data capture rate compared with 2017, 2016 and 2015.
- A higher frequency of calm conditions was recorded in 2018. Calm conditions typically lead to higher predictions of ground-level concentrations as these conditions are often associated with poor dispersion whereby any dust emissions disperse more slowly and allow higher concentrations to exist for extended periods of time.
- Contemporaneous background data is available for 2018, to allow a more detailed review of changes in the number of exceedances.

7.4.2.2 Background Air Quality Levels

Emissions to air will occur from a variety of activities including material extraction, material handling, material transport, processing, and wind erosion of stored materials and exposed surfaces. These emissions would mainly comprise of particulate matter in the form of total suspended particulates (TSP), particulate matter with equivalent aerodynamic diameter of 10 microns or less (PM₁₀) and particulate matter with equivalent aerodynamic diameter of 2.5 microns or less (PM_{2.5}). There would also be relatively minor emissions from machinery exhausts such as carbon monoxide (CO), oxides of nitrogen (NO_x) and particulate matter.

Jacobs (2019) reviewed data collected from three deposited dust gauges and a high volume air sampler (HVAS) on the Quarry Site, as well as a tapered element oscillating microbalance (TEOM) at the nearby Maroota Public School, and estimated background levels that apply at sensitive receptors are as follows:

- annual average PM₁₀ concentrations of 17 µg/m³
- annual average PM_{2.5} concentrations of 13 µg/m³
- annual average TSP concentrations of 32 µg/m³
- annual average dust deposition of 2.1 g/m²/month.

A more detailed review of available monitoring data and establishment of background levels is provided by Jacobs (2019) (refer to **Appendix 7**).

7.4.3 Air Quality Criteria

The EPA has developed assessment criteria for:

- TSP, to protect against nuisance amenity impacts
- PM₁₀ and PM_{2.5} to protect against health impacts
- deposited dust, to protect against nuisance amenity impacts.

Most of the EPA criteria are drawn from national standards for air quality set by the National Environmental Protection Council of Australia (NEPC) as part of the National Environment Protection Measures (NEPM). These criteria are outlined in **Table 7.19** and apply to existing and potential sensitive receptors such as such as residences, schools and hospitals.

Table 7.19 NSW EPA Impact Assessment Criteria for Key Emissions

Pollutant	Averaging Period	Criteria	Source
PM ₁₀	24-hour	50 µg/m ³	EPA (2016)/DoE (2016)
	Annual	25 µg/m ³	
PM _{2.5}	24-hour	25 µg/m ³	EPA (2016)/DoE (2016)
	Annual	8 µg/m ³	
TSP	Annual	90 µg/m ³	EPA (2016)/NHMRC (1996)
Deposited dust (insoluble solids)	Annual (maximum increase)	2 g/m ² /month	EPA (2016)/NERDDC (1998)
	Annual (maximum total)	4 g/m ² /month	
Nitrogen dioxide (NO ₂)	1-hour	246 µg/m ³	EPA (2016)/NEPC (1998)
	Annual	62 µg/m ³	

In accordance with the NSW Voluntary Land Acquisition and Mitigation Policy (VLAMP) (2018), voluntary mitigation or acquisition rights may apply where, even with best practice management, the development contributes to exceedances of the particulate matter criteria specified in **Table 7.19**. The applicability of the VLAMP has been reviewed by Jacobs (2019) in the context of the certainty of potential air quality risks of the Proposed Modification.

7.4.4 Assessment Methodology

7.4.4.1 Approach

The AQA has been prepared in consideration of the NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (Approved Methods) (2016) using a Level 2 assessment approach, and with an emphasis on emissions of particulate matter (PM), the key pollutant typically associated with quarrying operations. The approach included three key elements as follows:

1. Identification of key representative operational scenarios and development of emissions inventories for each scenario.
2. Development and running of a dispersion model based on the local terrain, meteorological conditions and proposed locations of key emission sources of the Proposed Modification.
3. Assessment of the predicted emission and deposition levels at sensitive receivers generated by the modified Quarry operations and prediction of cumulative impacts when background air quality is accounted for.

A summary of these three key components of the methodology is provided below, with a full description included in **Appendix 7**.

7.4.4.2 Emissions Inventories

Total dust emissions for the Quarry were estimated based on material handling schedule, equipment listing and Quarry plans and identifying the location and intensity of dust generating activities.

As part of the assessment, dust emission inventories were developed for the following modelled scenarios:

- Existing operations, at the approved extraction rate, for comparison with future operations.

- Proposed Modification with VENM/ENM filling at northeast corner of the Quarry.
- Proposed Modification with VENM/ENM filling at southeast corner of the Quarry.

The locations of the various emission sources for each scenario are provide by *Figures 7-1 to 7-3* of the AQIA (refer to **Appendix 7**).

The total estimated emissions for the above scenarios are provided in **Table 7.20** and the full inventories are presented in **Appendix 7**. The increase in estimated emissions for the two Proposed Modification scenarios compared to the existing scenario are associated with the hauling, unloading and placement of VENM/ENM materials.

Table 7.20 Estimated Emissions from the Quarry

Pollutant	Estimated Annual Emission (kg/y)		
	Existing	Proposed Modification (North)	Proposed Modification (South)
TSP	36,612	47,282	47,826
PM ₁₀	13,770	17,256	17,373
PM _{2.5}	960	1,459	1,465

7.4.4.3 Dispersion Modelling

The CALPUFF computer-based air dispersion model has been used to predict ground-level concentrations and deposition levels due to the identified emission sources, and the model predictions have been compared with relevant air quality criteria. The choice of model has considered the expected transport distances for the emissions, as well as the potential for temporally and spatially varying flow fields due to influences of the locally complex terrain, non-uniform land use, and potential for stagnation conditions characterised by calm or very low wind speeds with variable wind directions.

The CALPUFF model, through the CALMET meteorological pre-processor, simulates complex meteorological patterns that exist in a particular region. The effects of local topography and changes in land surface characteristics are accounted for by this model.

7.4.4.4 Cumulative Impacts

Recognising that the Quarry currently exists and that the Proposed Modification represents the continuation of quarrying activities up to the same maximum approved rate of extraction, albeit with an increase in activity arising from the importation of VENM/ENM products, assessment of the predicted incremental change from existing to proposed operations has been assessed. To provide this assessment of cumulative impact, Jacobs (2019) define “Cumulative” as the “Project” (as modelled) minus “Existing” (as modelled) plus “Background”. This approach provides for the cumulative impacts of neighbouring quarries and other industry as the contributions from these are contained in the background levels.

7.4.5 Impact Assessment

The incremental and cumulative concentrations of airborne particulate matter and deposited dust were predicted at the receivers RR01 to RR13 surrounding the Quarry Site (refer to **Figure 7.4**). The following provides a summary of the modelling predictions and assessment of impacts provided by Jacobs (2019) (refer to **Appendix 7**).

7.4.5.1 Annual average PM₁₀, TSP, and deposited dust

The results of the modelling indicate that the predicted annual average PM₁₀, TSP and dust deposition at the nearest sensitive receiver locations all comply with the impact assessment criteria.

7.4.5.2 Annual average PM_{2.5}

The annual average PM_{2.5} background concentration in 2018 (13.5 µg/m³) already exceeded the 8 µg/m³ assessment criteria in the Approved Methods. Increases of up to 0.5 µg/m³ (i.e. around 4%) and 0.4 µg/m³ (i.e. approximately 3%) were predicted for the Proposed Modification with VENM/ENM filling in the north and south of the Quarry Site respectively. The contribution of the existing Quarry to PM_{2.5} concentrations is less than 1 µg/m³ at all nearest receivers. This means that the existing (and proposed) Quarry operation is not likely to be the cause of background annual average PM_{2.5} concentrations which exceed the 8 µg/m³ criterion.

7.4.5.3 24-hour average PM₁₀ and PM_{2.5}

The 24-hour averaged PM₁₀ (2018) background air quality data already exceeded the EPA's 50 µg/m³ assessment criteria on up to six days per year. For these types of situations where background concentrations are already elevated, the Approved Methods requires the determination of whether "additional exceedances of the impact assessment criteria will occur as a result of the proposed activity". This analysis was performed at the four nearest receivers in different directions from the site.

24-hour average PM₁₀

With VENM/ENM importation taking place at the northeast corner of the Quarry Site, no additional exceedances were predicted to occur at RR01. One additional exceedance per year was predicted at RR03 and RR08. Four additional days where concentrations exceeded 50 µg/m³ in the year were predicted at RR12.

For the alternative option involving VENM/ENM importation occurring in the southeast corner, no additional instances of daily PM₁₀ concentrations above 50 µg/m³ were predicted at RR01, RR03 and RR08. One additional exceedance per year was predicted at RR12. On this day it is noted that the background concentration was 47 µg/m³ and contributions from the site were 5 µg/m³.

24-hour average PM_{2.5}

Daily background PM_{2.5} concentrations in 2018 were also measured to occasionally exceed the 25 µg/m³ impact assessment criteria. The same assessment approach was applied, with the average ratio of PM₁₀ to PM_{2.5} measured at the HVAS used to scale the daily PM₁₀ to estimate daily PM_{2.5} at the TEOM. Since PM_{2.5} data from the HVAS were only available to April 2018, the June and December 2018 gaps in the TEOM dataset were filled using the annually averaged PM_{2.5} concentration (13 µg/m³).

With VENM/ENM importation taking place at the northeast corner of the site no additional exceedances were predicted to occur at RR01, RR03, RR08 and RR12. For the alternative option involving VENM/ENM importation occurring in the southeast corner, no additional instances of daily PM_{2.5} concentrations above 25 µg/m³ were predicted at receivers RR01, RR03, RR08 and RR12).



314000

K:\Jobs\4465-hnd\3-drawings\Figures RR2\4465 RR2 017 ResidentialReceivers.mxd 15/10/2019 3:14:46 PM

Scale 1:6000 at A4



GDA 1994 MGA Zone 56

Legend

- Quarry Site
- Residential Receivers

FIGURE 7.4
Sensitive Receivers

7.4.5.4 Greenhouse Gas Emissions

The Quarry generates emissions of greenhouse gases associated with:

- electricity use on site
- burning of fuel by plant and equipment on site
- burning of fuel associated with the transport of products to market.

With respect to the Proposed Modification, a small increase in greenhouse gas emissions is likely as a result of the increased movement of trucks to and from the Quarry Site and increased operation of some mobile equipment associated with the placement and profiling of VENM and ENM. Overall, however, the increase in diesel consumption would result in a very minor increase in emissions when considered in the context of national and global emissions. Furthermore, the transport and management of these materials would be required, i.e. at another location, regardless of the Proposed Modification and as such the impact on net greenhouse gas emissions could be reduced if the transport distance between source and disposal site is reduced.

Notwithstanding the above, the Applicant will investigate and where feasible, implement initiatives to reduce energy consumption and greenhouse gas emissions throughout the life of the Project.

7.4.5.5 Summary and Interpretation

While Jacobs (2019) predicts some additional exceedances of criteria as a result of the Proposed Modification, in most cases, these additional exceedances were primarily the result of elevated background concentrations. In the only case where Quarry operations were identified as the major contributor to the exceedance, the primary source of emissions was extraction, i.e. an activity which is already approved.

The results indicate that the Proposed Modification is unlikely to significantly increase emissions from the Quarry, however, operations should implement additional measures to:

1. minimise site contributions during days of elevated background PM₁₀ concentrations, and
2. review the conditions when extractive and emplacement activities take place towards the perimeter of the Quarry.

Such measures are nominated in **Section 7.4.6**. On the basis of the implementation of these, it is assessed that the Proposed Modification would not have an unacceptable impact on local air quality.

With respect to the VLAMP, while it is assessed that while additional exceedances of daily PM₁₀ criteria could occur, direct application of acquisition or mitigation rights to receivers is not considered appropriate on the basis that these predictions are:

- based on conservative modelling which displays high sensitivity to meteorological conditions, and
- generally reflect high background concentrations of PM₁₀.

To ascertain whether operations present an actual rather than potential risk, the Applicant will continue to monitor the concentration of deposited dust and airborne particulate matter in accordance with the *Air Quality Management Plan* for the Quarry. The particulate matter monitoring in particular will illustrate whether the Quarry poses a real risk to neighbouring landowners of increased airborne particulate matter concentrations, or whether environmental factors associated with the local and regional setting will continue to be the primary cause of any elevated concentrations.

7.4.6 Monitoring and Management

Exceedances of air quality criteria are more likely when background concentrations are elevated, i.e. $\geq 40 \mu\text{g}/\text{m}^3$. Such conditions are most likely during hot, dry and windy conditions. To proactively identify and appropriately plan for these conditions before they occur, local meteorological forecasts should be reviewed each day. Where unfavourable meteorological conditions are forecast, the intensity (including number of trucks), types and location of activities and the controls to be implemented should be reviewed and adjusted.

Routine inspections to review whether the planned intensity, types, location and level of activities and the levels of controls in place remain adequate, or whether operations need to be scaled back or temporarily suspended should be undertaken. These inspections should review and record factors such as whether:

- dust is emanating from Quarry operations,
- the efficacy of control measures is being impaired, and
- meteorological conditions have changed so that wind is blowing dust in the direction from the Quarry to the nearest surrounding receivers.

The Applicant will also continue to monitor the concentration of deposited dust and airborne particulate matter in accordance with the *Air Quality Management Plan* for the Quarry. This monitoring data will allow the Applicant to review relative concentrations of PM_{10} and $\text{PM}_{2.5}$ and assess whether additional monitoring at receivers identified as potentially effected by additional exceedance of daily maximum criteria is required. The *Air Quality Management Plan* should be updated to include trigger levels for such supplementary monitoring.

7.5 Noise

7.5.1 Scope

An assessment of the potential noise impacts of the Proposed Modification has been completed by quantifying the difference in noise levels expected at receivers between those assessed and approved for the existing operations (by Wilkinson Murray Pty Ltd as part of a noise assessment for Modification 2 (WMPL, 2015)) and those of the proposed modification. The modified Quarry operations would remain substantially the same as those currently approved, with the relevant acoustic differences between the Quarry, as assessed by the MOD2 noise assessment, and the proposed modification as follows.

- The increased use of the Quarry bulldozer and front-end Loader to profile the VENM and ENM imported to the Quarry (currently these plant are utilised only occasionally for landform construction and profiling activities when sufficient clay waste or consolidated silt is available).
- An increase in the number of trucks accessing the site per day.

As identified in **Section 3.2.6**, the bulldozer and front-end loader to be used for VENM and ENM management are currently already in use at the Quarry. These noise sources were included in the modelling of noise completed by WMPL (2015), however, have been assessed as separate noise sources for the purpose of the noise assessment.

The Noise Impact Assessment (NIA) has been undertaken in accordance with the requirements of the NSW Noise Policy for Industry (EPA, 2017) (NPfI) and the NSW Road Noise Policy (DECC, 2011) (RNP) and can be reviewed in full as **Appendix 8**. The following provides a summary of the methods, results and assessment of impacts of the NIA.

7.5.2 Existing Environment

7.5.2.1 Local Setting

The noise climate in the area surrounding the Quarry Site, as measured annually at three residential receivers surrounding the Quarry Site (MAC 2016, 2017, 2018, 2019) is dominated by traffic, wind, birds and other ambient rural sources as the main noise sources in the local setting.

7.5.2.2 Sensitive Receivers

No sensitive locations such as schools, churches or major urban development are located near the Quarry Site. However, there are 13 residential receivers immediately surrounding the Quarry Site (refer to **Figure 7.4**).

7.5.2.3 Quarry Noise

The noise monitoring completed annually by Muller Acoustic Consulting (MAC) at three residential locations (refer to **Figure 7.4**), has confirmed that the Quarry contribution to local noise levels (averaged over a 15 minute period, $L_{Aeq,15\ min}$) at these receivers varies as follows.

- From inaudible to 40 dB(A) between 6am and 7am.
- From inaudible to 41 dB(A) between 7am and 6pm.

7.5.3 Noise Criteria

7.5.3.1 Operational Noise Criteria

Operational noise criteria are prescribed for the Quarry by *Condition 47* of DA 267-11-99 and Condition L2 of EPL 6535. Noting these criteria are not consistent, the Quarry has adopted the criteria of the development consent for assessment of compliance purposes which are as follows.

For typical operations, noise from the premises must not exceed:

- an $L_{Aeq,15\ min}$ of 43dBA (7am to 6pm) Monday to Saturday,
- an $L_{Aeq,15\ min}$ of 40dBA (6am to 7am) Monday to Saturday, and
- an $L_{A1,1\ min}$ of 50dBA (6am to 7am) Monday to Saturday.

It is noted these criteria do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Applicant has advised the DPIE in writing of the terms of this agreement.

Annual noise compliance monitoring has confirmed operations have complied with these criteria.

7.5.3.2 Road Noise Criteria

Traffic noise limits are provided by Condition 48 of DA 267-11-99 MOD 3. Traffic noise from the development is not to exceed the following noise limits at any affected residence on minor roads:

- an $L_{Aeq, 1 \text{ hour}}$ of 55 dB(A) between 7am and 10pm, and
- an $L_{Aeq, 1 \text{ hour}}$ of 50 dB(A) between 10pm and 7am.

Where existing L_{Aeq} traffic noise levels already exceed these criteria, the development is to ensure that traffic noise from the development does not result in an increase of more than 2 dB(A).

Annual noise compliance monitoring has confirmed operations have complied with these criteria.

With respect to the Proposed Modification, no change to the maximum number of hourly truck movements are proposed. As a result, the road noise criteria provided in the RNP (DECC, 2011) is relevant to assessment of road noise impacts associated with the Proposed Modification.

*For existing residences and other sensitive land uses affected by **additional traffic on existing roads generated by land use developments**, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding ‘no build option’.*

The NSW EPA Application Note “Applying the NSW Road Noise Policy” further states:

The 2 dB increase applies to both the relevant day and night assessment criteria.

The time periods for the day and night assessment criteria are defined in the RNP as:

- $L_{Aeq, (15 \text{ hour})}$ represents the L_{Aeq} noise level for the period 7.00am to 10.00pm.
- $L_{Aeq, (9 \text{ hour})}$ represents the L_{Aeq} noise level for the period 10.00pm to 7.00am.

7.5.4 Assessment Methodology

7.5.4.1 VENM and ENM Importation and Application

Noise levels associated with the proposed modification have been predicted using the same modelling software and the same prediction method used by WMPL (2015), that is the Cadna/A proprietary noise modelling software using the ISO 9613 noise prediction method. The ISO 9613 noise prediction method (using the default parameters) calculates the long-term average noise levels from noise sources under moderate noise-enhancing meteorological conditions.

Existing Noise Sources (Extraction and Processing) Modelling

The noise level predictions of WMPL (2015) considered the following noise sources considered typical of operations at the Quarry, i.e. equipment as described in **Table 3.2**.

- 1 × excavator at base of excavation.
- 2 × dump trucks continuously between face and processing area.
- 1 × loader feeding processing plant managing stockpiles.
- 1 × diesel screen/conveyers.

- 1 × processing and washing plant/conveyers.
- 1 × loader loading haul trucks/managing stockpiles.
- 3 × road trucks in 15 minutes taking product off site.
- 1 x bulldozer located at the highest elevation within the extraction or emplacement area closest to surrounding receivers.

These noise sources were modelled for each of the approved extraction stages identified in **Figure 3.1**, assuming the adoption of the noise management measures nominated in **Section 7.5.6**.

VENM/ENM Management Noise Sources Modelling

While noting that the Applicant intends on using existing equipment (loader and bulldozer) for the management of VENM and ENM, the NIA considered these as separate noise sources to those of the approved operations and modelled by WMPL (2015). The NIA placed these on the existing Emplacement Area at the north-eastern corner of the Quarry Site (refer to *Figure 4.2* of the NIA) to assess the effect of these activities on the noise levels received at the closest receivers to these activities (RR03, RR06, RR08 and RR10).

Predicted noise levels from the VENM/ENM management activities were combined with the predicted noise levels of WMPL (2015) and compared against the existing Quarry noise limits of DA 267-11-99.

Section 3.0 of the NIA provides further detail on the assessment methodology.

7.5.4.2 Road Traffic Increase

The modification proposes an increase from a maximum of 100 to 140 truck movements per day. The modification does not propose to increase the maximum number of truck movements per hour of operation. Consequently the only impact will be the change in the total number of truck movements during the daytime period (7.00 am to 10.00 pm).

The potential road traffic noise impact of the proposed modification has been assessed by estimating the relative increase in $L_{Aeq(15\text{ hour})}$ traffic noise levels during the daytime period 7.00 am to 10.00 pm as a result of the increased numbers of truck movements in and out of the quarry during the hours of operation 7.00 am to 6.00 pm.

The projected traffic (2020) for Old Northern and Wisemans Ferry Roads are shown in **Table 7.21**. The traffic projections were based on a growth rate of 2% as advised by traffic consultants SECA (2019) (refer to **Appendix 9**) from the data collected by Nexus (1999).

Table 7.21 Average Two-Way Traffic Volumes

Average Daily Vehicles (7 days)	Old Northern Road (Receiver RR12)		Wisemans Ferry Road (1700 Wisemans Ferry Road)	
	1999	2020	1999	2020
Total Vehicles	2026	3071	1769	2681
Light Vehicles	1844	2795	1589	2408
Heavy Vehicles	183	277	180	273

The relative increase in noise levels associated with the increased truck movements was assessed at the reference locations nominated in **Table 7.21**. In order to estimate the increase in the daytime 7.00 am to 10.00 pm period noise levels $L_{Aeq(15 \text{ hour})}$ the relative proportion of this projected traffic was estimated to be 75% of total 24-hour volumes. The existing distribution of Quarry trucks has been assumed, i.e. 80% of trucks will access the Quarry from the north, turning left onto Roberts Road from Old Northern Road, and 20% from the south, turning right onto Roberts Road from Old Northern Road.

All vehicles were assumed to be travelling at the sign-posted speed limit for each of the roads.

7.5.5 Results

7.5.5.1 VENM and ENM Importation and Application

The predicted noise levels at receivers are presented in **Table 7.22**.

Table 7.22 Predicted Noise Levels at Receivers $L_{Aeq,15 \text{ min}}$ dB(A)

Receiver	Existing Noise Source Modelling (Location of Typical activities + Dozer Location) ¹	Noise Prediction (WMPL, 2015)	Noise Prediction (VENM/ENM Noise Sources)	Combined Operations
RR03	1A + emplacement area	37	35	39
RR10	1A + emplacement area	42	39	44
	5A + extraction area	43	39	44
RR02	6b + extraction area	38	38	41
RR12	5A + extraction area	40	39	43
RR01	6b + extraction area	35	35	38
RR06	1A + emplacement area	38	32	39
RR08	1A + emplacement area	41	38	43

Note 1: Refer to **Figure 3.1**

The predicted noise levels from the proposed modification would comply with the noise limit of 43 dB(A) $L_{Aeq(15 \text{ minute})}$ at all receivers, except for minor 1 dB(A) exceedances at Receiver RR10. As the noise predictions of **Table 7.22** are based on worst-case site noise emissions, it is expected that compliance with noise limits will be achievable by adherence to the ongoing noise control strategies in the Quarry Operational and Road Noise Management Plan (ORNMP) (MAC, 2016). These are discussed further in **Section 7.5.6**.

7.5.5.2 Road Traffic Increase

The maximum increase in $L_{Aeq(15 \text{ hour})}$ road traffic noise levels, as a result of the increase truck movements, is predicted to be 0.3 dB(A). This is well below the RNP (DECC, 2011) assessment criteria (2dB(A)) increase) and consequently the increased truck movements is expected to result in negligible noise impact.

7.5.6 Noise Management and Mitigation

The Applicant would continue to implement the operational controls and management measures currently implemented and identified in the Quarry's ORNMP (MAC, 2016). These measures, and modifications relevant to the proposed modification which are identified in underlined italics, are summarised as follows:

- All approved hours of operation will be strictly adhered to.
- Prior to the commencement of extraction or VENM and ENM placement and profiling, in each new stage, a bund will be pushed up around the stage perimeter, i.e. between the operational area and noise receivers.
- Other temporary bunds are to be established when extraction and/or VENM and ENM placement and profiling occurs in close proximity to the property boundary of neighbouring receivers. Prior to constructing the bunds, consultation with the neighbouring residence is sought which provided clear lines of communication between the quarry and community.
- All excavators used on site are fitted with acoustic mufflers that achieve a noise level of 76dBA at 7m.
- On addition of any replacement or upgrade of equipment, these will be screen tested for noise emissions when introduced to site. The screening tests are designed to ensure new or modified equipment operates with a sound power level equivalent to or less than identified in the ORNMP.
- All employees and contractors working at the Quarry will undergo a project induction, during which personnel will be made aware of the location of noise sensitive receivers and the mitigation measures to be implemented to reduce noise impact to the community. Records of noise training and awareness for all staff and contractors will be held on site.
- Signage is to be placed at the front entrance advising truck drivers of their requirement to minimise noise both on and off-site.

Other noise management measures to be applied as necessary will include.

- Operations at exposed locations and under unfavourable weather conditions, e.g. winds blowing towards noise receivers, will be modified, where necessary, to reduce potential noise-related impacts.
- All relevant equipment will be regularly serviced to ensure sound power levels of each item remains equivalent to or less than the SPLs nominated in the ORNMP (MAC, 2016).
- The internal road network will be maintained to the current standard and if any new roads are proposed these will be constructed to similar standards to limit body noise from empty trucks.
- Maintenance work on all plant and equipment will only be undertaken outside the standard hours of operation if these are inaudible at all residential premises surrounding the Quarry Site.

7.5.7 Monitoring

In accordance with the ORNMP, attended noise monitoring is currently undertaken at three locations annually to measure operational and road traffic noise. The monitoring includes a contingency monitoring program in the event non-compliant noise levels are recorded as follows.

If attended noise monitoring indicates that noise generated from the Quarry is higher than noise limit criteria the following actions will occur:

- On observation of an exceedance, the person undertaking the monitoring will contact the Quarry Manager and inform them of the noise level and location of the noise exceedance.
- The Quarry Manager will immediately investigate the source of the noise and make necessary arrangements to alter operations to reduce noise levels.
- The Quarry Manager will inform the person undertaking the noise monitoring when site operations have been altered.
- The person undertaking the monitoring will recheck and confirm noise levels with the Plant Manager.

The proposed method, locations and frequency of noise monitoring will be reviewed

On the basis of ongoing compliance (2016-2019), annual monitoring is considered adequate. However, should a trend for increasing noise levels be identified, it is recommended the monitoring frequency increase to six monthly or quarterly until noise levels reduce again.

7.6 Traffic and Transport

7.6.1 Scope

A Traffic Impact Assessment has been prepared for the Proposed Modification by Seca Solution and is summarised below. The full report is presented in **Appendix 9**. The assessment was undertaken to determine the traffic impacts of the proposed increase in daily truck movements in accordance with the requirements of Austroads Guidelines and Section 2.3 of the *RMS Guide to Traffic Generating Developments* (NSW Roads and Traffic Authority, 2002), which provides the structure for the reporting of key issues to be addressed when determining the impacts of traffic associated with a development.

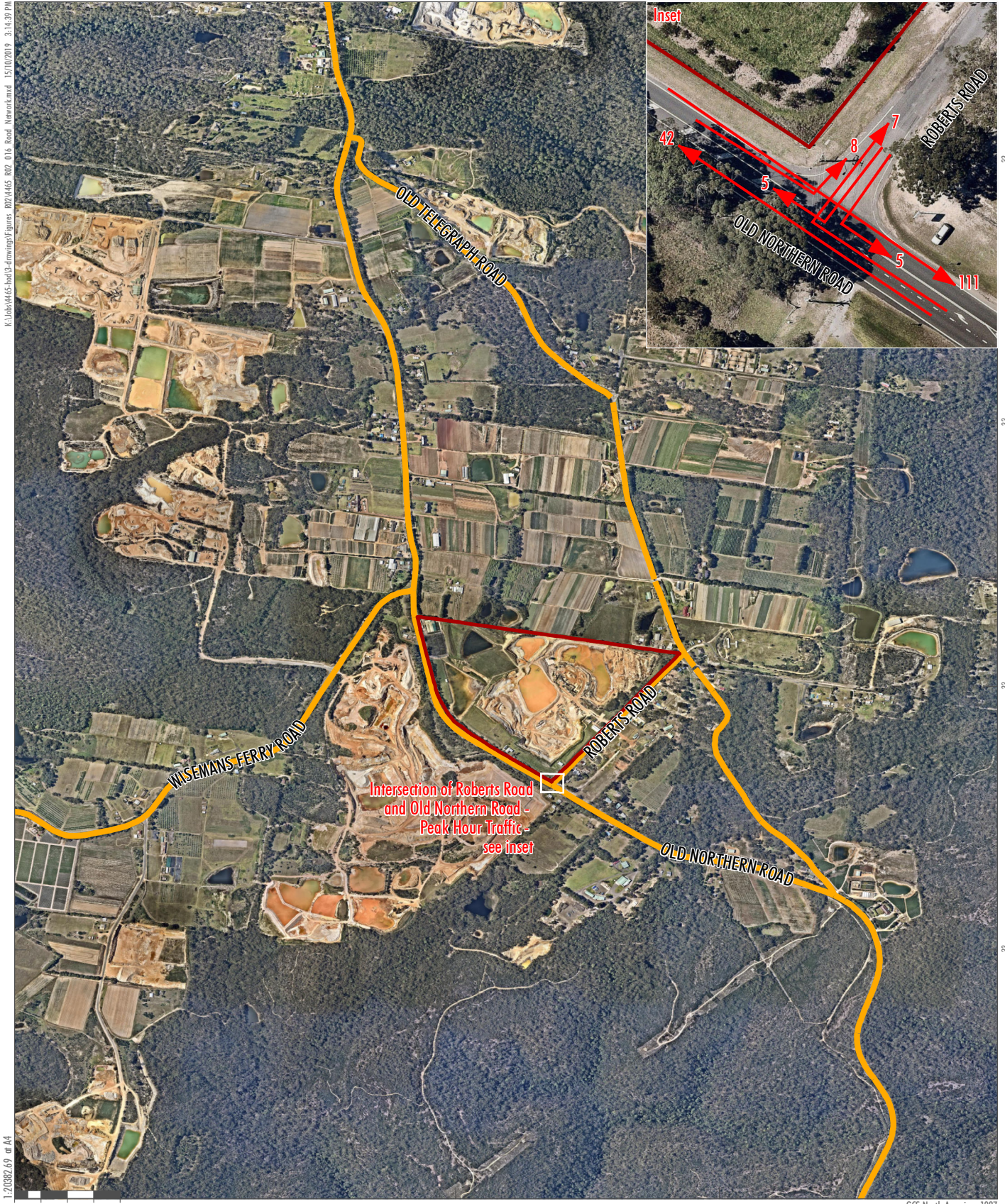
7.6.2 Existing Traffic Environment

Access to the Quarry is available via a single vehicle access directly off Roberts Road, as shown in **Figure 7.5**. Roberts Road is a local rural road which provides access to the Quarry and several other land holdings and intersects with Old Telegraph Road to the east which provides access to further landholdings and another unrelated quarry operation. To the west, Roberts Road intersects with Old Northern Road. Old Northern Road is a collector road which originates at Wisemans Ferry on the Hawkesbury River and travels through north-western Sydney before terminating at Windsor Road on approach to the M2 Motorway.

DA 267-11-99 allows for the movement of up to 50 laden trucks (100 movements) per day and a maximum of 20 movements per hour. The trucks deliver sand and other quarry products principally to the Sydney construction market with approximately 20% heading south-east on Old Northern Road towards Pennant Hills Road and the majority (approximately 80%) heading north-west before turning onto Wisemans Ferry Road 900 m north of Roberts Road.

The site access is located on the northern side of Roberts Road, approximately 290 m east of the intersection with Old Northern Road. Roberts Road in this location offers a straight horizontal alignment allowing for good visibility in each direction along its length. Sight distance to the right (south-west) is 290 m with clear visibility to Old Northern Road, whilst sight distance to the left (north-east) is 220 m. These distances are in compliance with the sight distances for access driveways to commercial vehicle facilities as outlined in *Australian Standard AS 2890.2-2002 Parking facilities - Off-street commercial vehicle facilities*.

K:\Jobs\4465-head\3-drawings\Figures_R02\4465_R02_016_Road_Network.mxd 15/10/2019 3:14:39 PM



Intersection of Roberts Road
and Old Northern Road -
Peak Hour Traffic -
see inset

0 100 200 300 400 Meters

GCS North American 1927

- Legend**
- Quarry Site
 - Local Road Network
 - Traffic Movements (peak hour)

FIGURE 7.5
Local Road Network

The intersection of Old Northern Road and Roberts Road was also assessed, with visibility to the left out of Roberts Road being 300 metres, whilst visibility to the right is 278 m. Sight distance requirements at intersections are outlined in the *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (Austroads, 2017), with safe intersection sight distance (SISD) being the critical requirement. For the posted speed limit of 90km/hr along Old Northern Road a SISD of 214 m is required. As such, the intersection satisfies Austroads requirements in regard to sight distance.

The layout of the Old Northern Road – Roberts Road intersection also includes a channelised right turn lane for turning movements into Roberts Road, which has a storage length of approximately 35 m with approximately 20 m of additional storage available within the painted median. This allows storage for at least two quarry trucks with through traffic still able to pass along Old Northern Road. Given the relatively low traffic flows and minimal delays for turning movements observed during the site work this turn lane is considered to have sufficient capacity (Seca Solution, 2019).

Seca Solution undertook a traffic survey at the intersection of Old Northern Road and Roberts Road to determine the current peak hour traffic flows in this location. This survey was completed on 4 December 2018 between 7.00 am and 9.00 am, with the peak hour determined as 7.15 am to 8.15 am. The survey established the peak traffic volumes through the Roberts Road – Old Northern Road intersection as follows:

- The two-way movements along Roberts Road during the intersection AM peak hour were 25 vehicles.
- The two-way flows on Old Northern Road were 166 vehicles during the intersection AM peak hour.
- Heavy vehicles represented 18% (32 vehicles) of the total flows recorded through the intersection.

The *Guide to Traffic Generating Developments* (RTA, 2002) notes that peak hourly flows typically represent 8 to 12% of daily flows, and based on this proportion the daily flows on Old Northern Road and Roberts Road would be in the order of 1,660 vehicles per day and 250 vehicles per day respectively. Using the Sidra Intersection 8 modelling package, the intersection was identified as operating with a Level of Service (LoS) A, with minimal delays or queuing for all turning movements (refer to **Table 7.23**).

Table 7.23 Sidra Analysis Old Northern Road – Roberts Road (2018 Survey Traffic)

Movement	Level of Service	Average Delay (s)	Back of Queue (m)
Right turn into Roberts Road	A	5.9	0.1
Left turn out of Roberts Road	A	6.2	0.4
Right turn out of Roberts Road	A	7.3	0.4
Left turn into Roberts Road	A	6.2	0.0

Quarry-generated truck movements currently show significant hourly and day to day variation, depending on market demands. During the December 2018 survey the quarry was not operating at its approved capacity of 20 vehicles per hour. To assess the operation of the Old Northern Road – Roberts Road intersection during maximum operations (up to 20 truck movements) during the peak hour, the Sidra analysis was repeated including an allowance for an additional 10 inbound and 10 outbound trucks. This is in addition to the truck flows already recorded during the traffic survey which accounted for the movements of trucks associated with the quarry operating on that day and also included other background traffic. The resulting LoS remained as A, with very minor increases to average delay and queuing (refer to **Table 7.24**). The intersection will continue to operate at the highest LoS allowing for the maximum hourly truck movements for the site.

Table 7.24 Sidra Analysis Old Northern Road – Roberts Road (Maximum Quarry Traffic)

Movement	Level of Service	Average Delay (s)	Back of Queue (m)
Right turn into Roberts Road	A	6.3	0.2
Left turn out of Roberts Road	A	6.6	1.2
Right turn out of Roberts Road	A	8.4	1.2
Left turn into Roberts Road	A	6.4	0.0

7.6.3 Proposed Changes to Traffic

The Proposed Modification seeks to increase the daily traffic volumes from 100 to 140 trucks per day, with no increase proposed for the existing hourly maximum of 20 trucks per hour. Instead the project shall see the additional heavy vehicle movements spread over the course of the day during periods of high demand.

All truck access will remain via the existing site access direct onto Roberts Road, with the existing distribution of vehicles onto Old Northern Road to be maintained.

The Proposed Modification is also seeking to extend the life of quarry operations by an additional five years to 2030.

7.6.4 Impact Assessment

To allow for assessment of the potential daily traffic flows in 2030, an annual increase of 2% per annum was applied for through movements along Old Northern Road. This rate accounts for increased flows associated with the growth of other quarry operations in the area. Along Roberts Road an allowance for growth of 1% per annum was applied to cater for other quarry operations, including the quarry located on Old Telegraph Road off Roberts Road, which recently began operation. The above growth rates were applied to the intersection flows through to 2030 with the results outlined in **Table 7.25**.

It can be seen from **Table 7.25** that the intersection will continue to operate at the highest LoS allowing for the maximum hourly truck movements and background growth through to 2030.

Table 7.25 Sidra Analysis Old Northern Road – Roberts Road (2030/Maximum Quarry Traffic)

Movement	Level of Service	Average Delay (s)	Back of Queue (m)
Right turn into Roberts Road	A	6.4	0.3
Left turn out of Roberts Road	A	6.7	1.4
Right turn out of Roberts Road	A	9.0	1.4
Left turn into Roberts Road	A	6.4	0.0

Based on the traffic survey completed in December 2018, the current two-way daily traffic flows along Old Northern Road (to the north of Roberts Road) are in the order of 1,660 vehicles per day. It is known that the quarry was operating at the time of the survey, with some of these movements therefore relating to the existing quarry operations. However, in order to ensure a worst-case assessment of the impact of the Proposed Modification on daily traffic flows, an allowance for an additional 140 vehicles per day associated with the modified quarry has been included.

Based on the 80/20 (north/south) distribution of quarry traffic this equates to:

- 112 vehicles moving to the north along Old Northern Road
- 28 vehicles moving to the south along Old Northern Road.

These increases represent less than 2% of the total traffic flows and are well within the capacity of the road network.

Allowing for background growth to 2030, flows on Old Northern Road (north of Roberts Road) could be in the order of 2,200 including the Proposed Modification to the quarry. This is still well within the capacity of the road.

With regards to impacts on road safety, it is noted that there is an existing school bus stop along Roberts Road. During the December 2018 survey two buses were observed (at approximately 7.15 am and 8.30 am). Both turned left into and left out of the intersection of Old Northern Road and Roberts Road.

Given the low traffic flows along Roberts Road and the good visibility for quarry trucks, it is considered the proposed increase in daily truck movements will not impact upon the operation of these buses. The hourly approval for the site will not change and as such the existing situation will remain with no identifiable safety issues for Roberts Road. Similarly as there is no proposed change to hourly operations the TIA concluded that there would be no impact on school bus operations.

7.6.5 Monitoring and Management

Based on the findings of the TIA presented in **Appendix 9**, no change to the existing traffic management measures implemented by the quarry are considered necessary for the Proposed Modification.

7.7 Waste Management

7.7.1 Waste Types

Waste would be both generated by operations on the Quarry Site as well as the VENM and ENM accepted to the Quarry Site before either being:

- applied to land in accordance with the relevant Resource Recovery Exemption; or
- further processed and blended with in situ sand resources to produce sand products.

No special waste, liquid waste, hazardous waste or putrescible solid waste would be accepted by the Quarry.

7.7.2 Waste Management Measures

7.7.2.1 Quarry Generated Waste

Table 7.28 provides a summary of the waste types, controls and safeguards that would be applied to the waste generated on the Quarry Site. **Table 7.28** also identifies contingency management in the event of incidents which have the potential to result in pollution to the surrounding environment.

Table 7.26 Waste Controls, Safeguards and Contingency Management

Waste Type	Storage	Disposal	Contingency
General solid waste (putrescible)	Covered bins will be located within the general area of the quarry office and amenities. Where bins would be located in open areas, they would be fitted with animal-proof lids.	Bins would be collected and the contents disposed at a licensed waste disposal facility.	In the event waste volumes exceed that able to be managed by local waste collection service, the Applicant would arrange for private delivery of waste to licensed landfill facility.
General solid waste (recyclables)	Covered bins located within general area of the Quarry infrastructure for the collection of recyclable materials.	Bins would be collected and transported to an appropriate recycling facility.	
General solid waste (non-putrescible)	Bin and designated adjoining area within general processing, stockpiling and office area for the collection of scrap metals, wood waste, empty containers not containing contaminated.	Bins and scrap material would be collected and the contents disposed at a licensed waste disposal facility or licenced scrap metal recycling facility.	
Waste oils and greases	Placed within bunded storage area.	Collected as required by a licensed waste contractor and transported to an appropriately licensed facility for recycling.	Any leakage, spillage or ground contamination would be managed in accordance with the Quarry's Pollution Incident Response Management Plan (PIRMP).
Tyres	Tyres would be securely stored until removed from site or used for another purpose.	Tyres would be removed from site for re-use elsewhere or recycling in accordance with the RRO and RRE for types issued under Part 9 of POEO (Waste) Reg.	N/A
Screened waste	Temporarily stockpiled within the extraction area.	As sufficient volumes are stockpiled, these would be returned to the quarry as backfill and incorporated into the final landform.	In the event of runoff from these stockpiles creating a sedimentation hazard, additional bunds and other controls would be implemented in accordance with the Blue Book.

7.7.2.2 Imported VENM and ENM

In addition to waste produced on site, the Proposed Modification aims at introducing two new waste streams to the site, namely VENM and ENM. The classifications of these waste materials is provided in **Section 4.2.2.1**.

Key features for the management of VENM and ENM are as follows.

- VENM would only be accepted after the generator supplies Virgin Excavated Natural Material Certification in accordance with the requirements of the NSW EPA.
- ENM would only be accepted in accordance with the ENM Resource Recovery Order. The ENM would only be accepted after the generator supplies a written statement of compliance with the ENM criteria.
- In order to avoid the introduction of waste that does not fall under the VENM or ENM classification, the following will be implemented.
 - Development of a material tracking register that stores as a minimum
 - Location of source site
 - Contact person at the source site
 - Volume and description of material received
 - Log of vehicles delivering the material
 - Reference number of sighted paperwork
 - GIS co-ordinates of the location where VENM/ENM is transported to on site.
 - Before accepting VENM/ENM to site all relevant paperwork proving that the material is VENM/ENM will be sighted and stored on site. Acceptable documentation must be in accordance with the relevant Order or requirements for VENM.
 - The material tracking register must be filled out every time VENM/ENM is accepted to site.
- ENM applied to land (as backfill) would be undertaken in accordance with the ENM Resource Recovery Exemption. To avoid any potential confusion over application practices, VENM would also be applied to land in accordance with the ENM Resource Recovery Exemption.
- For VENM or ENM not immediately disposed of to land, a database would be maintained to ensure that materials subject to further processing or blending, or retained in stockpile for 12 months, are identified for the purpose of identification and payment of any waste levy applicable in accordance with the *Protection of the Environment Operations (Waste) Regulation 2014* (POEO (Waste) Reg).
- Prior to any screening or blending of the accepted ENM, relevant application would be made to the EPA, in accordance with the *Guidelines on Resource Recovery Exemptions (Land Application of Waste Materials as Fill)* (DECCW, 2011), for a specific resource recovery order and exemption for the material to be produced.
- Should an applicable Resource Recovery Exemption not be obtained, the Applicant would ensure that the relevant activity type (Resource Recovery and Waste Storage) and scale is included on EPL 6535 and the appropriate waste levy is paid in accordance with the POEO (Waste) Reg.

7.7.3 Impact Assessment

7.7.3.1 Pollution Potential

Waste generated by on-site extraction and other activities would be managed appropriately and assuming adherence to the management and contingency measures nominated in **Table 7.28**, should not pose significant risk of pollution to the surrounding environment.

VENM and ENM would be accepted under relevant Resource Recovery Orders and therefore may be applied to land (in accordance with the relevant Resource Recovery Exemption) or stockpiled for future sale and despatch from the Project Site without significant potential for pollution.

It is therefore assessed that the Proposal provides for appropriate waste management which reduces the risk of pollution or contamination to acceptably low levels. It is recommended, however, that a Waste Reveal and Handling Management Plan is prepared to further describe waste management procedures, protocols, monitoring and response to pollution incidents. The *Waste Management Plan* should be prepared in conjunction with the *Quarry Pollution Incident Response Management Plan*.

7.7.3.2 Biosecurity Risk

A biosecurity risk assessment was undertaken, in accordance with the DPI Task Risk Assessment. **Table 7.28** outlines the risk ratings which were applied during the risk assessment based on the classification of consequence (severity) described in **Table 7.27**.

Table 7.27 Consequence Rating

Severity Level	Area of consequence		
	Animal health and welfare Plant health	Human health, safety and well-being	Environmental
1 Insignificant	Isolated impact on a single enterprise	Medical treatment only	Change from normal conditions within environmental regulatory limits Environmental effects are within site boundaries.
2 Minor	Limited animal or plant impacts on single enterprise.	Loss-time injury	Short-term and/or well-contained environmental effects. Minor remedial actions probably required.
3 Moderate	Some animal or plant impacts on multiple properties across a region. Animal welfare impacts across a region	1-10 major injuries requiring hospitalisation and numerous days lost or medium-term occupational illness	Impacts external ecosystems and considerable remediation is required
4 Major	Considerable animal or plant impacts on multiple properties across a region. Animal welfare impacts across multiple regions.	Single fatality and/or 10-20 major injuries/ permanent disabilities/ chronic diseases.	Long-term environmental impairment in neighbouring or valued ecosystems. Extensive remediation required.
5 Extreme	Significant animal or plant impacts on multiple regions. Widespread animal welfare issues.	Multiple fatalities and/or >20 major injuries/ permanent disabilities/ chronic disease.	Irreversible large scale environmental impact with loss of valued ecosystems.

Source: Modified after Task risk assessment template V4 (DPI, 2018)

Table 7.28 Risk Rating

		Likelihood				
		E. Rare (e.g. once every 100 to 1000 years)	D. Unlikely (e.g. once every 10 to 100 years)	C. Possible (e.g. once every 1 to 10 years)	B. Likely (e.g. 2 - 10 times a year; could occur monthly or quarterly)	A. Almost certain (e.g. >10 times per year; could occur daily or weekly)
Consequence	5 Extreme	Medium	High	High	Very high	Very high
	4 Major	Low	Medium	High	High	Very high
	3 Moderate	Low	Medium	Medium	High	High
	2 Minor	Low	Low	Medium	Medium	Medium
	1 Insignificant	Low	Low	Low	Low	Medium

Source: Modified after Task risk assessment template V4 (DPI, 2018)

The risk rankings shown in **Table 7.28** are considered to be:

- Low: Broadly acceptable, ongoing monitoring is required
- Medium: Tolerable, active management is required
- High: Undesirable, intervention is required
- Very high: Generally intolerable, urgent attention is required

Identified biosecurity hazards applicable for the Proposed Modification are plant diseases being imported onto the Quarry Site, the introduction of weeds to the Quarry and dust from the Quarry affecting the health of people on neighbouring properties. The risk assessment ranked the risks of the biosecurity hazards as low (**Table 7.29**).

Table 7.29 Biosecurity Risk Rating

Risk	Risk Management Measure	Likelihood	Consequence	Rating
Introduction of disease onto site or exporting disease from site	<p>Biomass (e.g. mulch) will not be accepted to site.</p> <p>Implement “Clean in - Clean out” principles for all vehicles/personnel moving onto and off the Quarry Site including:</p> <ul style="list-style-type: none"> • changing/cleaning footwear; • maintaining personal hygiene; and • cleaning of vehicle and equipment. <p>The vegetation of the quarry will be regularly inspected and any signs of disease will be referred to the relevant Government Agency for review.</p>	D	2	Low

Risk	Risk Management Measure	Likelihood	Consequence	Rating
Introduction, propagation and spread of weed species.	VENM/ENM will not include significant soil materials which may contain weed seeds. VENM/ENM will be inspected on arrival to the Quarry Site. Regular weed surveys will be carried out and reported in the Annual Review. Weed spraying will be undertaken as required.	C	1	Low
Dispersal of dust or other particulate matter VENM/ENM	Use water for dust suppression as required	B	1	Low

7.7.3.3 NSW Waste Avoidance and Resource Recovery Strategy 2014–21

The following considers the Proposed Modification against the targets of the NSW Waste Avoidance and Resource Recovery Strategy 2014–21 (EPA, 2014).

Key Result Area 1: Avoid and reduce waste generation

Target: By 2021–22, reduce the rate of waste generation per capita

The Proposed Modification would import waste materials which could otherwise report to landfill and either utilise as part of site rehabilitation, i.e. use of VENM and ENM to create a final landform more amenable to future agriculture, or production of materials for use elsewhere, i.e. sand products. As a result, this would reduce the overall waste generated within NSW.

Key Result Area 2: Increase recycling

Target: By 2021–22, increase recycling rates for:

- *municipal solid waste from 52% (in 2010–11) to 70%*
- *commercial and industrial waste from 57% (in 2010–11) to 70%*
- *construction and demolition waste from 75% (in 2010–11) to 80%.*

By providing a location for specific low risk wastes to be processed and recycled (either as specialty soil and gravel products or in rehabilitation), the net volume delivered to municipal waste facilities would be reduced. Furthermore, the Proposed Modification provides for the acceptance and re-use of ENM, a form of construction and demolition waste, thereby providing an additional location for recycling this form of waste.

Key Result Area 3: Divert more waste from landfill

Target: By 2021–22, increase the waste diverted from landfill from 63% (in 2010–11) to 75%

As noted above, the Proposed Modification provides an alternative to landfill for the nominated low risk waste materials.

Key Result Area 4: Manage problem wastes better

Target: By 2021–22, establish or upgrade 86 drop-off facilities or services for managing household problem wastes statewide

This area and target has no relevance to the Proposal.

Key Result Area 5: Reduce litter

Target: By 2016–17, reduce the number of litter items by 40% compared with 2011–12 levels and then continue to reduce litter items to 2021–22

The Proposed Modification has identified the quarry generated wastes and provided for appropriate methods of managing these to prevent litter (refer to **Section 7.7.2.1**).

Key Result Area 6: Reduce illegal dumping

Target: From 2013–14, implement the NSW Illegal Dumping Strategy 2014–16 to reduce the incidence of illegal dumping statewide. As part of this strategy, by 2016–17:

- establish baseline data to allow target-setting in other parts of the state.

On approval, the Quarry Site would provide a location for specific low risk waste materials to be accepted. This could reduce the possibility of illegal dumping of these wastes.

7.7.3.4 Conclusion

No significant impacts are expected as a result of the Proposed Modification which would allow for low risk waste materials to be imported to the Quarry (subject to confirmation as VENM or ENM) and either applied to land in accordance with the ENM Resource Recovery Exemption or processed for sale as sand after obtaining a specific Resource Recovery Order or payment of the relevant waste levy. The strategies outlined in **Section 7.7.2**, will minimise the risk that any material that could cause pollution will be accepted into the Quarry. The biosecurity risk assessment ranked all biosecurity hazards as low (refer to **Section 7.7.3**).

7.8 Visual Amenity

7.8.1 Existing Visual Environment

Bounded by Old Northern Road to the west, Roberts Road to the south and Old Telegraph Road to the east, the Quarry operations are visible from these roads. The following reviews the current and potential future views of the approved Quarry operations from these roads and properties located along these. The locations of the six photos referenced in the following sub-sections are identified on **Figure 7.6**.

7.8.1.1 Roberts Road

Views of the Quarry from Roberts Road, as well as the residential properties on the eastern side of Roberts Road, are largely obscured by the vegetated bund wall to the south of the Site Entrance and a combination of a bund wall and remnant native vegetated to the north of the Site Entrance. Quarry buildings and limited views into the Quarry Site are available at the Site Entrance. **Plates 7.1** and **7.2** present views from Roberts Road which illustrate the effectiveness of the vegetated bund.



Plate 7.1 View from Roberts Road (towards south-west)

© Umwelt, 2018



Plate 7.2 View from Roberts Road (towards north-east)

© Umwelt, 2018

Plates 7.1 and **7.2** illustrates that the vegetated bund wall provides an effective screen of activities at the southwestern corner preventing views of Quarry operations. Notably, the vegetated bund wall featured in **Plate 7.1** is to extend to the north-western corner to screen views as extraction progresses to the north.

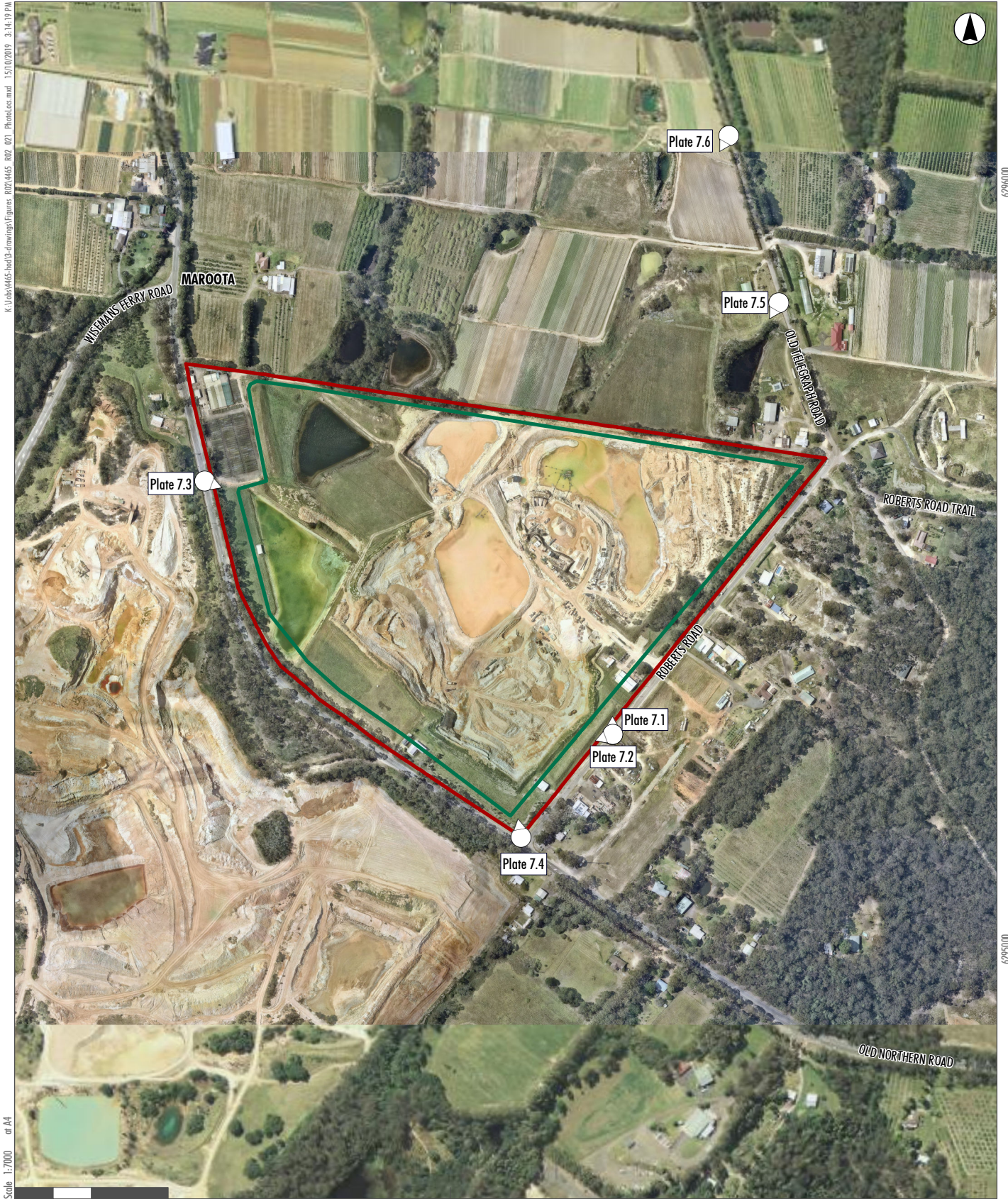
7.8.1.2 Old Northern Road

A vegetated bund wall which extends from Roberts Road and established trees in the road easement currently obscures views of Quarry Operations. **Plates 7.3** and **7.4** present panorama photos from the north-western corner (at the commercial nursery) and south-western corner (at Roberts Road) of the Quarry.



Plate 7.3 View from Old Northern Road (North-western Corner of the Extraction Area – Sunrise Nursery)

© Umwelt, 2018



- Legend**
- Quarry Site
 - Approved Extraction Area
 - Viewpoint Location and direction

FIGURE 7.6
Photo locations



Plate 7.4 View from Old Northern Road (Roberts Road Intersection) featuring vegetated bund wall

© Umwelt, 2018

In **Plate 7.3**, Dam 4 (which will be incorporated into the extraction area) is visible in the foreground with the active extraction face just visible behind this. In the background, the current emplacement area at the north-eastern corner of the Quarry Site is visible, as are feedstock sand stockpiles associated with the processing plant.

With the exception of the nursery, there are no residences or other buildings accessed from Old Northern Road which have direct views of the Quarry.

7.8.1.3 Old Telegraph Road

Local topography slopes to the north and northeast from Old Northern Road and Roberts Road and as a result the greatest exposure of the Quarry operations is from Old Telegraph Road and the properties accessed from Old Telegraph Road to the north and northeast of the Quarry Site. **Plates 7.5** and **7.6** provide indicative views of the Quarry Site from Old Telegraph Road.



Plate 7.5 View from 100 Old Telegraph Road

© Umwelt, 2018



Plate 7.6 View from (opposite) 149 Old Telegraph Road

© Umwelt, 2018

Notably, the current views of the Quarry represent the most exposed the operations are likely to be with further extraction to be screened by retained vegetation visible on the right hand side of the background of both photos.

It is evident that the visual impact of these views of Quarry operations are enhanced by the colour contrast of the exposed sand and clay. It is also evident that vegetated bunds would be of limited effect given rising topography and distance between the vantage points and the extraction area. Progressive rehabilitation to be undertaken in accordance with Quarry RLMP (*Figure Three* of which is provided as **Appendix 5**) will reduce the visual effect of the Quarry over time with this limiting the area of the Quarry Site which is 'active and exposed' at any given time.

Notably, the Applicant has not received any complaints from local landowners and residents regarding the visual impact of the Quarry operations. It is considered likely that this is a result of various factors including:

- general good performance of the Applicant in managing air emissions, noise and other factors with the potential to impact on the amenity of local landowners
- community acceptance of land uses that result in ground disturbance, e.g. extractive industry, agricultural/horticultural operation
- relatively small scale of the Quarry operations.

7.8.2 Proposed Changes to the Visual Environment

The Proposed Modification involves a request to remove Condition 29(c) of DA 267-11-99 which requires the quarry to provide for '*a planting and watering regime to ensure that no more than 3 hectares of the site are exposed and active at any one time*'. The proposed importation and use of VENM and ENM as backfill material on the Quarry Site makes this limitation impractical as the Applicant will be required to operate an extraction area as well as a VENM/ENM backfill area concurrently. The Applicant also notes that the composition and properties of the sand also varies across the site. As a result, the Applicant undertakes extraction from different extraction area with the Quarry (as illustrated by **Figure 4.1**) to allow for concurrent extraction of coarser (low clay content) and finer (higher clay content) sand which allows for optimal blending and production to suit a variety of customers.

As a result, the Applicant proposes that larger areas of the Quarry extraction area would be 'active and exposed' than the current 3 ha limit. This larger area of active and exposed operations notwithstanding, and as illustrated by **Plates 7.5** and **7.6**, views of extraction activities are unlikely to get any larger than those currently available from Old telegraph Road. As such, the increase in active and exposed area should have limited effect on local views.

It should also be noted that with the proposed importation of VENM and ENM to the Quarry Site, the final landform will be constructed with a significantly reduced slope. This would make the final landform more amenable to the quicker establishment of vegetation and transition to a landform and land use more sympathetic to the local surrounds. **Section 7.9** discusses the changes to rehabilitation and the final landform and **Section 7.10** considers impacts on land use as a result of the Proposed Modification in further detail.

7.8.3 Management Measures

The key management measures required to minimise impacts on local visual amenity are as follows.

- Retain and maintain stands of native vegetation along the boundary of the Quarry Site with Old Northern, Roberts and Old Telegraph Roads.
- Extend the bund wall along Old Northern Road and vegetate with native grasses, shrub and tree species.

- Implement progressive rehabilitation of the constructed landform.
- Implement dust suppression as nominated in **Section 7.5**.
- Continue engagement with surrounding landowners to ensure extraction and rehabilitation is being undertaken to the satisfaction of these landowners (to minimise impact on local visual amenity).

7.8.4 Impact Assessment

In the short to medium term, the removal of or modification to Condition 29(c) of DA 267-11-99 may result in an increase in the area of active and exposed operations. However, this impact would be mitigated given that:

- The views from Old telegraph Road and properties to the north and northeast of the Quarry are unlikely to be larger than currently available.
- The maintenance and extension of vegetated bund wall between the extraction area and Old Northern and Roberts Roads.
- The retention of stands of native vegetation within or adjoining the Old Northern, Old Telegraph and Roberts Roads easements.
- Implementation of dust suppression as described in **Section 7.5**.

It is not anticipated that the proposed Modification, including the removal of Condition 29(c) of DA 267-11-99 would result in any significant change in local visual amenity in the short to medium term.

In the long term, the change to the final landform due to the proposed importation of VENM and ENM is assessed as likely to have a positive impact on local visual amenity. Noting the modified operations do not propose any increase to the total disturbance footprint of the Quarry, do not propose to alter the overall revegetation strategy of the final landform, and would provide for a reduced slope of the final landform (likely to lead to better integration with surrounding topography, improved revegetation and final land use outcomes), the impact of the proposed Modification in the long-term is assessed to be positive.

7.9 Rehabilitation and Final Landform

7.9.1 Introduction

Section 4.2.7 reviews the proposed rehabilitation of the Quarry in light of the Proposed Modification. This section considers the implications of the nominated changes to the final landform on the established rehabilitation objectives and completion criteria approved by DA 267-11-99.

7.9.2 Rehabilitation Objectives and Completion Criteria

7.9.2.1 Rehabilitation Objectives

Noting the Proposed Modification to the final landform described in **Section 4.2.7** and presented on **Figures 4.2** and **4.3**, the rehabilitation objectives as approved by DA 267-11-99 have been reviewed (refer to **Table 7.30**).

Table 7.30 Rehabilitation Objectives and Impact of Proposed Modification

Feature	Objective	Impact of Proposed Modification
Site (as a whole)	<ul style="list-style-type: none"> • Safe, stable and non-polluting 	No change as overarching rehabilitation goals remain the same
	<ul style="list-style-type: none"> • Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land 	Positive impact. Backfilling the site with additional VENM and ENM will create a free draining landform which will result in better integration with surrounding land.
Surface Infrastructure	<ul style="list-style-type: none"> • Decommissioned and removed, unless the Secretary agrees otherwise 	No change, surface infrastructure will be removed unless otherwise agreed. Dam storage capacity of Lot 2 DP228308 will be reinstated.
Quarry Benches	<ul style="list-style-type: none"> • Landscaped and vegetated using native tree and understorey species 	The modified final landform will remove the requirement for benches in the final landform.
Quarry Pit Floor	<ul style="list-style-type: none"> • Landscaped and revegetated using improved pasture species, native trees and understorey species 	No change to revegetation strategy. Backfilling with additional VENM and ENM will create a free draining landform which will result in better integration with surrounding land.
Final Void	<ul style="list-style-type: none"> • Minimise the height and slope of batters 	Backfilling with additional VENM and ENM will create a free draining landform and removal of a 'void'. The slope of the final landform will be reduced resulting in a landform which is better integrated with surrounding land. No change to final void batters
Community	<ul style="list-style-type: none"> • Ensure public safety 	No change. The reduced slopes and removal of a final void will generate a positive impact for future public safety.
	<ul style="list-style-type: none"> • Minimise the adverse socio-economic effects of quarry closure 	No change. The gentler slopes and free draining nature of the final landform will allow for post-quarry use of the landform for agricultural, horticultural or residential activity or development.

7.9.2.2 Preliminary Completion Criteria

Completion criteria will be utilised to demonstrate achievement of rehabilitation objectives/performance standards. The preliminary closure and rehabilitation completion criteria for the Modification are outlined in **Table 7.33**, along with the likely effect of the Proposed Modification on these criteria.

Table 7.31 Preliminary Closure and Rehabilitation Completion Criteria

Aspect	Preliminary Completion Criteria	Effect of Proposed Modification
Decommissioning	<p>All infrastructure which does not have a potential future use associated with the post-quarrying land use will be removed, unless such removal has a greater environmental impact than rehabilitating the area with the infrastructure remaining in place.</p> <p>Removal of all services which do not have a potential future use associated with the post-quarrying land use (power, water, communications).</p>	<p>No change.</p> <ul style="list-style-type: none"> • surface infrastructure will be removed unless otherwise agreed. • Dam storage capacity of Lot 2 DP228308 will be reinstated.
Landform	No significant erosion is present that would constitute a safety hazard or compromise the capability of supporting the final land use.	<p>The proposed modified landform would promote the achievement of these criteria given:</p> <ul style="list-style-type: none"> • the reduced slope and free-draining nature of the landform proposed, and • reduced reliance on contour banks.
	Contour banks are stable and there is no evidence of overtopping or significant scouring as a result of runoff.	
	Surface is free of any hazardous materials.	
Soil	Topsoil or a suitable alternative has been spread uniformly over the rehabilitation surface.	No change. Refer to Section 4.2.7.2.
Water	Runoff water quality from the site does not pose a threat to downstream water quality.	Reduced slope of the final landform resulting in improved stability and reduced erosion hazard would promote achievement of this criteria.
Vegetation	There is no significant weed infestation.	No change. Refer to Section 4.2.7.2.
	Native vegetation areas have established within the rehabilitated proposed extraction area.	
	Trees planted as part of rehabilitation have reached maturity, maturity being defined as when trees are capable of producing fruits and flowers.	
Bushfire Hazard	Appropriate bushfire controls are implemented.	No change.

The Quarry closure criteria will be reviewed and revised throughout the Quarry life and used as the basis for further refinement following:

- the commencement of rehabilitation activities
- consideration of the results of rehabilitation monitoring programs
- consideration of any stakeholder feedback.

7.9.3 Assessment of Impact

Importing VENM and ENM will provide for a free-draining landform with slopes reduced from between 3H: 1V (18°) and 2.5H: 1V (22°) as currently approved to < 11° (5H: 1V or less).

Surface water runoff speed decreases with decreasing slope angles and thus the risk of erosion is reduced and infiltration into the growth medium increases. This is likely to result in a reduction of revegetation failure.

A reduction in slope is will result in a better corporation of the final landform into the surrounding land, as slopes between 6° to 11° are generally in better accordance with natural slopes compared to slopes between 18° and 22°.

Impacts to final land use as a result of this Proposed Modification are discussed in **Section 7.10**.

7.10 Land Use

7.10.1 Existing Land Use

The existing land uses of the Roberts Road Quarry Site are quarrying, water capture and storage for a commercial nursery, a nursery operation and a rural residential dwelling.

The predominant land uses within the immediate vicinity of the site are as follows.

- Residential properties along Roberts Road, Old Telegraph Road, Old Northern Road and Wisemans Ferry Road.
- Agricultural (grazing), horticultural (orchards) and market garden activities on these properties.
- Bushland, including remnant vegetation on private properties and national park, the closest of which is Marramarra National Park just over 1 km to the east of the site.
- Quarrying operations, with at least five sand/sandstone quarries located within 5 km of the site (refer to **Figure 2.1**).

7.10.2 Impacts to Land Use

The Proposed Modification would not result in any additional disturbance to that currently approved. As a result, the Proposed Modification is not predicted to result in any adverse impacts on the surrounding land uses over the life of the Quarry. The direct impacts of the Modification will be limited to the Quarry Site and assessment of amenity issues such as noise, air quality and visual have identified that the quarry operations will not result in significant impacts on surrounding land uses.

The Quarry is a substantial distance from any major residential areas. The closest being Windsor located approximately 21 km to the south west, Rouse Hill located approximately 24 km to the south south-west and Hornsby located approximately 27 km to the south east. There would be no impact to major residential areas as a result of the Modification.

As the Quarry is rehabilitated in accordance with the modified final landform, the Proposed Modification is likely to provide for a beneficial impact on the final land use of the Quarry Site by leaving a landform more conducive to a continuation of agricultural and horticultural activities. Furthermore, by creating a free draining landform, the availability of water to land downstream of the Quarry Site would be improved which would generate a beneficial effect on land uses downstream.

7.11 Socio-economic Impacts

7.11.1 Introduction

Social impact assessment (SIA) is an approach to predicting and assessing the likely consequences of a proposed action in social terms and developing options and opportunities to improve social outcomes. Best practice SIA is participatory and involves understanding impacts from the perspectives of those involved in a personal, community, social or cultural sense to provide a complete picture of potential impacts, their context and meaning.

The generally agreed international principles relating to SIA (Vanclay, 2003) identify social impacts as the matters affecting, directly or indirectly:

- People's way of life, that is: how they live, work, play and interact with one another on a day to day basis.
- Their culture, that is: their shared beliefs, customs, values and language or dialect.
- The community, that is: its cohesion, stability, character, services and facilities.
- Their political system, such as: the extent to which people are able to participate in decisions that affect their lives, the level of democratisation that is taking place, and the resources provided for this purpose.
- Their environment, such as: the quality of the air and water people use, the availability and quality of the food they eat, the level of hazard or risk, dust and noise they are exposed to, the adequacy of sanitation, their physical safety, and their access to and control over resources.
- Their health and wellbeing: health is a state of complete physical, mental, social and spiritual wellbeing and not merely the absence of disease or infirmity.
- Their personal and property rights: particularly whether people are economically affected or experience personal disadvantage which may include a violation of their civil liberties.
- Their fears and aspirations, that is: their perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children.

As is the case with any type of change, some individuals or groups within the community may benefit, while others may experience negative impacts. If negative impacts are predicted, it is the role of the SIA to determine how such impacts may be addressed effectively to reduce the degree of social disruption to those affected. If positive impacts are predicted, the aim of the SIA is to maximise these opportunities and identify how they might be further enhanced.

7.11.2 Methodology

7.11.2.1 Approach

The SIA for the project has involved a number of key phases:

- Developing a profile of the social context in which the Proposed Modification is located and summarising the issues of relevance to the communities of interest.
- Identifying the impacts and opportunities that are most important to the local community in relation to the Proposed Modification.

- Assessing and predicting the significance of impacts associated with the Proposed Modification through the application of a 'risk-based approach'; integrating both perceived and technical assessment of risk. This approach affords greater integration with the broader environmental assessment work so that impacts of relevance to technical specialists and community members are adequately discussed and considered in the impact assessment process.
- Developing strategies that address and manage the predicted social impacts associated with the Proposed Modification and those which may enhance opportunities in a manner that values existing community aspirations and assets.
- Identifying what will require monitoring should the project be approved and how any unanticipated social impacts that may result from the project will be identified.

7.11.2.2 Project Stakeholders

Social impact assessment involves the cooperation and coordination of a number of 'social partners' or 'stakeholders'. Stakeholders may be affected groups or individuals that:

- live nearby the resource/project
- have an interest in the proposed action or change
- use or value a resource
- are interested in its use, or
- are forced to relocate.

As part of the SIA for the Proposed Modification, the key stakeholders have been identified as follows.

- Landowners and residents of properties surrounding the Quarry Site.
- The Hills Shire Council.
- Other government agencies and regulatory authorities.
- Employees and prospective employees of the Quarry.
- Residents of The Hills Shire LGA.

7.11.2.3 Mechanisms for engagement

A number of mechanisms have been utilised to obtain the input of various stakeholder groups. The mechanisms to engage with local landholders, key stakeholders and the wider community during the preparation of the SIA are outlined in **Table 7.34**.

Table 7.32 Engagement Mechanisms

Stakeholder Group	Engagement
Local Community	<ul style="list-style-type: none"> • Distribution of a Community Information Sheet (CIS) with information on the Proposed Modification to eight properties surrounding the Quarry Site. • One on one meetings with the eight property owners provided with a CIS. • Ad hoc correspondence between individual property owners and the Applicant and consultants. <p>Refer also to Section 6.2</p>

Stakeholder Group	Engagement
Maroota Community	<ul style="list-style-type: none"> The Broader Maroota community has been provided with various opportunities over the last few years to comments on the operations of local quarries, either through community consultative committees, representation to individual quarry operators or forums created for recent or ongoing modifications to other quarry operations.
The Hills Shire Council	<ul style="list-style-type: none"> A Preliminary Environmental Assessment issued to Council in April 2019 outlining the key components and inviting comment and identification of key assessment requirements. <p>Refer also to Section 6.1.2</p>
Other Government Agency	As above
Employees	<ul style="list-style-type: none"> Employee briefings provided.

7.11.3 Social Profile

7.11.3.1 Demographic and Economic Profile of Maroota

Analysis of key demographic data from the 2016 Census found that:

- the population of Maroota was 617 people with the median age of 39 years
- approximately a quarter (24.5%) of the houses in Maroota were rentals, approximately a third of the houses were owned with a mortgage (32.4%) and the remainder was owned outright (36.7%)
- the majority of the households in Maroota were families (80.2%)
- most households had children either as a family household (45.5%) or single parent family (16.0%)
- the median weekly household income in Maroota (\$1,761), which is below the median weekly household income of The Hills Shire LGA (\$2,363) but above the median weekly household income of NSW (\$1,486)
- unemployment in Maroota is low (2%), below the unemployment rate of The Hills Shire LGA (4.6%) and NSW (6.3%)
- the top industries of employment in Maroota are vegetable growing (outdoors) (9.0%), road freight transport (6.3%), mineral sand mining (5.0%) and nursery production (3.6%).

Key characteristics of Maroota and The Hills LGA more broadly are as follows.

- The LGA comprises a diverse range of land uses, including suburban, rural residential, industrial/commercial and bushland. The area around Maroota is predominantly bushland and rural residential, while the more southern areas of the LGA are more suburban in nature.
- These land uses are also reflected in the key industries of employment in Maroota, namely vegetable growing, road freight transport, mineral sand mining and nursery production.
- Population projections suggest that the population will grow rapidly over the next two decades and also age, with the proportion of persons aged over 75 years expected to also increase over this timeframe.
- Maroota is seen to have a higher than average level of socio-economic advantage.

- Maroota has lower costs of living (rental prices) compared with NSW, however this is not consistent throughout the LGA, where the average rental costs are higher than NSW.
- For Maroota and the LGA, unemployment rates are below the State, while workforce participation rates are above the State average.

Table 7.33 summarises the findings of the social profile indicating the strengths and vulnerabilities of Maroota and The Hills Shire LGA.

Table 7.33 Summary of Social Profile

	Strengths	Vulnerabilities
Environment	Abundant and diverse natural resources, including sand resources, agricultural lands and bushland	Potential land use conflicts Housing developments and industry impacting on environment
Community	Significant population growth Lower proportions of lone person households	Low levels of cultural diversity Limited community services and facilities in Maroota
Infrastructure	Metro-Northwest train line increasing connection of the LGA to the Sydney metropolitan area Road upgrades	Disparity in infrastructure between northern and southern suburbs Limited public transport in Maroota Housing developments concentrated in the southern suburbs
Economic	Lower costs of living Above State average household income	Importance of extractive industry as a key employer
Industry	Diverse economy Low unemployment	Industry dependent on natural resources (e.g. sand quarries, agriculture)

The analysis suggests that the Maroota area is a socially robust community.

7.11.3.2 Community Issues Analysis

Roberts Road Residents

Those residents consulted as part of community engagement for the Proposed Modification did not identify any issues of concern with respect to the current or proposed future operations of the Quarry.

Maroota

The responses to various community forums associated with local quarry operations have been reviewed to provide an indication as to the issues of greatest significance to the Maroota community (including the Maroota Public School).

The minutes of Community Consultative Committees (CCC) for quarries operated by PF Formation (Hitchcock Road Quarry and Old Telegraph Road Quarry) and Dixon Sand Pty Ltd (Haerses Road Quarry and Old Northern Road Quarry) held over the last several years have been reviewed and indicated the principal issue of concern raised relates to heavy vehicle traffic.

On review of other community forums associated with the surrounding quarries, most notably the Proposed Modification to Haerses Road Quarry (Umwelt, 2019), the key issues raised by the local community relate to impacts on social amenity associated with the following:

- Traffic: in particular the potential impact on road safety, road conditions and congestion.
- Noise: associated with both truck movements on local roads and on-site quarry operations.
- Visual: associated with changes to views within the local setting.
- Dust: and effect on local amenity.
- Water: and the potential to impact on surrounding land uses.
- Land use: as it impacts on current and potential future use of resident properties and surrounds.
- Economic: principally in relation to the positive opportunities that may be created by local contribution and investment by quarry operators.

7.11.3.3 Analysis and Prediction of Social Impacts

This section provides an assessment of the perceived and predicted social impacts that may occur as a result of the Proposed Modification. This section provides an overview of the potential issues affecting social amenity, expected as a result of the Proposed Modification, addressed via analysis and assessment of outcomes of consultation (refer to **Section 6.2**), review of the predicted effects on the biophysical environment (refer to **Sections 7.3 to 7.10**) and the effects of similar projects of this size and magnitude.

Prioritisation of the potential social impacts and the development of impact mitigation, amelioration and enhancement strategies are assessed on the severity of outcomes reflected during technical analysis. Relevant social impact characteristics that have been considered include:

- **Extent** – geographical area affected by the impact (or the proportion of people or population groups affected).
- **Duration** – the timeframe over which the impact occurs.
- **Severity** – scale or degree of change from the existing condition as a result of an impact.
- **Sensitivity** – Susceptibility or vulnerability of people, receivers or receiving environments to adverse changes caused by the impact, including value or importance to the community.

The assessment is undertaken using a consequence and likelihood framework i.e. assessing the consequence of a given social impact factor (e.g. catastrophic, major, negligible) against the likelihood that it will occur (e.g. almost certain, likely, possible), to determine the overall risk assessment of the social impact as 'low', 'moderate' or 'high'. Both positive and negative impacts are considered in this regard, with slight adjustments made to the approach to reflect positive impacts e.g. level of concern becomes level of interest, severity become scale of improvement or benefit, sensitivity becomes importance of the improvement or benefit and the equity of its distribution etc.

In consideration of limited primary data pertaining to potential positive and negative impacts of the Proposed Modification, **Table 7.34** provides a summary of impacts and the social impact ranking assessed using the criteria outlined above.

Table 7.34 Potential Positive and Negative Social Impacts of the Proposed Modification

Social Amenity		Affected Parties	Duration	Potential Social Impact	Social Impact Ranking
Noise	Increased Quarry and road traffic noise	Local Residents	Life of the Quarry	Social amenity Effect on health and wellbeing	Moderate
Air quality	Dust emissions	Local Residents	Life of the Quarry	Nuisance/amenity impacts of dust Effect on health and wellbeing	Moderate
Traffic	Driver Behaviour/ Safety	Road Users Local Residents	Long term	Potential for accident and increased danger to road users.	Low
Visibility	Impact on views from external vantage points	Local Residents Road Users	Short term over the Life of the Quarry	Reduced amenity of landholdings Reduced property values	Low
Water resources	Adverse impact on quality or availability of water	Water Users	Life of the Quarry	Negative effect on landholder business or use	Low
Land Use	Modified final landform	Local Residents	Life of Quarry and beyond	Improved final landform and greater post Quarry land use options	High (Positive)
Economic	Employment	Local and Regional Residents	Long term	Extended employment opportunities	High (Positive)

7.11.4 Social Impact Management and Community Enhancement Strategies

Considering the potential positive and negative social impacts of the Proposed Modification, **Table 7.37** identifies impact management and community enhancement strategies to be applied.

Table 7.35 Impact Management and Community Enhancement Strategies

Issue	Potential Impacts to stakeholders	Management or Enhancement Strategies
Way of life Culture Community	Reduced amenity as a result of increased active disturbance area visible to surrounding properties and minor changes to noise and dust emissions	<ul style="list-style-type: none"> Operational controls, safeguards and practices to ensure ongoing compliance with criteria. Promote and enforce safe driving practices. Progressive rehabilitation of completed sections of the Quarry. Improvement to final landform (more sympathetic to surrounding landforms). Final landform to provide for return to agricultural and horticultural land use.

Issue	Potential Impacts to stakeholders	Management or Enhancement Strategies
Environment	Potential increase in impacts e.g. traffic, noise, air emissions, and visibility	<ul style="list-style-type: none"> Extraction and rehabilitation sequence to provide for progressive rehabilitation Operational controls and safeguards to be implemented to minimise noise and dust emissions of the Quarry received at surrounding residences. Final landform provides for return to free draining landform and improved environmental flows. Ongoing monitoring of impacts to be continued with appropriate contingency strategies included in EMS.
Health and wellbeing	Potential health related impacts including air and noise pollution	<ul style="list-style-type: none"> Operational controls and safeguards to be implemented to minimise noise and dust emissions of the Quarry received at surrounding residences. No increase in production or change to approved methods of on-site operations. Promote and enforce safe driving practices.
Personal and property rights	Increased active disturbance area and traffic with the potential to reduce local amenity	<ul style="list-style-type: none"> Management of impacts associated with traffic, noise, air quality and visibility as above. Final landform provides for return to agricultural and horticultural land use.
Fears and aspirations	Reduced amenity impacting on the value held by residents of their property and local setting.	<ul style="list-style-type: none"> Management of impacts associated with traffic, noise, air quality and visibility as above. Final landform provides for return to agricultural and horticultural land use.
Economic contribution	Local employment and regional economic benefits of a sustainable extractive industry.	<ul style="list-style-type: none"> Continue to employ locally and invest in the local and regional economy. Final landform provides for return to agricultural and horticultural land use.

7.11.5 Assessment of Impacts

After considering the possible impacts of the Proposed Modification on the socio-economic environment and proposed management strategies to address these, the residual adverse and beneficial impacts are considered as follows:

Adverse Impacts

- (i) A small number of properties would be subject to minor changes in noise and air emissions received.
- (ii) The area of active disturbance visible from a small number of properties would increase until progressive rehabilitation completed.
- (iii) The life of the Quarry, and therefore period over which surrounding properties are subject to quarry impacts, could be increased as the in situ resource is blended with selected imported sandstone VENM and ENM materials and to enable the maximum backfill of the landform and complete rehabilitation of the Quarry Site.

Beneficial/Positive Impacts

- (i) The Proposed Modification would provide a location for the disposal of VENM and ENM generated by Sydney construction and allow for the creation of an improved final landform. The Project will contribute to achieving a key element of the EPA's Waste Avoidance Resource Recovery Strategy (WARR), which is increasing waste diverted from landfill to 75%.
- (ii) The Proposed Modification would allow for the sustainment of employment opportunities within The Hills Shire LGA.
- (iii) The Proposed Modification would allow for continued investment in equipment upgrade and maintenance associated with the introduction of VENM/ENM management at the Quarry.
- (iv) The Proposed Modification would provide for flow-on benefits to the economy through the expenditure of wages paid to employees, profits made on the sale of quarry profits and through the purchase of goods and services for the ongoing operation of the Quarry.
- (v) The Quarry would continue to supply important construction materials to local and Sydney markets.

7.11.6 Conclusion

In terms of the impact of the Proposed Modification to residents and local community, it is unlikely that the broader community will be greatly impacted by the Proposed Modification above and beyond current levels, given that change to current operations is not likely to greatly change the offsite impacts of the quarry operations from that which is currently approved. The assessment of impacts presented throughout this report illustrates that as a result of the proposed design features, operational safeguards, controls and management measures, the impacts on local amenity associated with the Proposed Modification have been appropriately considered and addressed.

Employment opportunities would be sustained and increased which has potential to have a positive impact for local businesses through incidental spending in the local area. Furthermore, the proposed incorporation of the VENM/ENM importation, selective processing and disposal to the completed extraction area would enable the benefits associated with the Quarry to be continued over a longer period of time.

The impact of the Proposed Modification on current and future land uses on and surrounding the Quarry Site has been considered. Importantly, as impacts would be restricted to the Quarry, the Proposed Modification would not adversely impact on the current land use(s) of surrounding properties. Furthermore, the Proposed Modification would provide for a landform more sympathetic and therefore of greater aesthetic appeal and allow for more productive future use of the landform.

The broader economic impact of the Modification will be the provision of high quality sand materials for the Sydney and regional markets which will largely be used in the construction of new homes. The Proposed Modification would also provide an additional and alternative location for the disposal of VENM and ENM from Sydney construction projects which depending on the location of the construction site may be more cost effective than other existing locations.

Considering the potential direct and indirect socio-economic benefits against those deemed to be adverse, it is assessed that there would be a net socio-economic benefit resultant from the approval of the Proposed Modification.

8.0 Statement of Commitments

The Proposed Modification seeks to import VENM and ENM to backfill the extraction area and to process VENM and ENM on-site for sale or to blend with sand produced from the in situ resources prior to sale. The ongoing implementation of the EMS is the most efficient and effective way to manage the changes associated with the Proposed Modification. Consequently, pending approval of the Proposed Modification, the EMS will be updated to reflect these changes to ensure effective management of ongoing operations.

Table 8.1 summarises the environmental management commitments that will be implemented for the Proposed Modification. It is noted that these commitments exclude those already in place and documented within the various environmental management plans of the Quarry.

Table 8.1 Summary of Environmental Management Commitments

Environmental Management Measures
Traffic and Transport
<ul style="list-style-type: none"> • Continue to abide by and enforce the <i>Maroota Local Traffic Management Policy</i> • Restrict daily truck movements to 140 movements • Continue to cap truck movements at 20 movements per hour
Noise
<ul style="list-style-type: none"> • Continue to implement the <i>Operational and Road Noise Management Plan (MAC, 2016)</i>
Air Quality
<ul style="list-style-type: none"> • Review and update the <i>Air Quality Management Plan (VGT, 2016b)</i> to include: <ul style="list-style-type: none"> ○ Proactive meteorological forecasting to identify and plan for hot, dry and windy conditions, ○ Contingency plans for such conditions, ○ Routine inspections to review whether planned activities and levels of controls are adequate, or whether modifications are required, and ○ Provision of triggers for additional monitoring. • Reviewing opportunities for improvement in diesel use and energy efficiency when purchasing or replacing equipment at the quarry to reduce greenhouse gas emissions.
Groundwater
<ul style="list-style-type: none"> • Maintain the maximum extraction depth at least 2 m above the wet weather groundwater level • The wet weather groundwater level will continue to be reviewed at least every three years and extraction levels modified as required • Continue to implement the <i>Groundwater Management Plan (Dundon, 2018b)</i>, including groundwater monitoring
Surface Water
<ul style="list-style-type: none"> • Update the approved <i>Surface Water Management Plan (VGT, 2018)</i> to account for the modified extraction area and importation of VENM and ENM • Incorporate procedures and checklists for erosion and sediment control monitoring and maintenance of VENM and ENM application areas
Visual Amenity
<ul style="list-style-type: none"> • Retain and maintain stands of native vegetation along the boundary of the Quarry Site with Old Northern, Roberts and Old Telegraph Roads • Extend the bund wall along Old Northern Road and vegetate with native grasses, shrub and tree species • Implement progressive rehabilitation of the constructed landform

Environmental Management Measures
<ul style="list-style-type: none"> • Implement dust suppression in accordance with the Air Quality Management Plan (VGT, 2016b) • Continue engagement with surrounding landowners to ensure extraction and rehabilitation is being undertaken to the satisfaction of these landowners (to minimise impact on local visual amenity) • Review and update the <i>Landscape and Rehabilitation Plan</i> (VGT, 2017) to reflect the modified final landform and sequence of extraction and backfill
Rehabilitation and Final Landform
<ul style="list-style-type: none"> • Construct a free-draining final landform • Review and update the <i>Landscape and Rehabilitation Plan</i> (VGT, 2017) to reflect the modified final landform and sequence of extraction and backfill
Social
<ul style="list-style-type: none"> • Continue engagement with surrounding landowners to ensure extraction and rehabilitation is being undertaken to the satisfaction of these landowners (to minimise impact on local amenity and socio-economic setting)

9.0 Evaluation and Justification of the Proposed Modification

9.1 Introduction

This SEE has been prepared by Umwelt to assist in the assessment of the likely environmental and social impacts associated with the Proposed Modification. The potential impacts have been identified and carefully assessed following consideration of the design features, operational controls and management measures currently in place or proposed.

On the basis of the assessment of each potential impact, the Proposed Modification can be justified as the residual impacts on the biophysical environment are either understood and determined to be acceptable, or can be predicted and appropriately managed, there would be no notable additional socio-economic impacts and the consequences of not proceeding are considered more adverse than proceeding. Each of these factors considered in the justification of the Proposed Modification are presented below.

9.2 Evaluation

9.2.1 Residual Environmental Impacts

The potential environmental impacts of the Proposed Modification have been identified through a process involving:

- assessment of the site characteristics
- consultation with government agencies
- consultation with surrounding landowners
- expert technical assessments.

The key issues identified were the subject of comprehensive technical assessment to identify and assess the potential impacts of the Proposed Modification on the existing environment and community. The results of these assessments are detailed in **Section 7.0** and the appendices of this SEE.

The environmental and social impacts of the Proposed Modification have been minimised through the identification and commitment to various operation controls, safeguards and management measures in consideration of environmental constraints.

With the existing and proposed measures to avoid, minimise or manage impacts associated with the Proposed Modification, it is anticipated that the Quarry can continue to operate within acceptable environmental standards without significantly adversely impacting the environment or local community.

9.2.2 Ecologically Sustainable Development

9.2.2.1 Principles of Ecologically Sustainable Development

The EP&A Act aims to encourage ecologically sustainable development (ESD) within NSW. As outlined in **Section 1.1**, the Proposed Modification requires approval under Section 4.55 of the EP&A Act. As such, the consent authority needs to be satisfied that the quarry is consistent with the principles of ESD. This section provides an assessment of the Proposed Modification in relation to the principles of ESD.

To justify the Proposed Modification with regard to the ESD principles, the benefits of the quarry in an environmental and socio-economic context, with the Proposed Modification, should outweigh any negative impacts. The ESD principles encompass the following:

- The precautionary principle
- Inter-generational equity
- Conservation of biological diversity
- Valuation and pricing of resources.

Essentially, ESD requires that current and future generations should live in an environment that is of the same or improved quality than the one that is inherited.

9.2.2.2 The Precautionary Principle

In making decisions about developments, the application of the precautionary principle is guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and an assessment of the risk-weighted consequences of various options.

In order to achieve a level of scientific certainty in relation to potential impacts associated with the Proposed Modification, this SEE has undertaken an evaluation of all the key components. Detailed assessment of all key issues and necessary management procedures has been conducted and is documented in this SEE.

The assessment process has involved a detailed study of the existing environment and the use of engineering and scientific modelling and study to assess and determine potential impacts as a result of the Proposed Modification. To this end, there has been careful evaluation to avoid, where possible, irreversible damage to the environment.

The decision making process for the design, impact assessment and development of management processes has been transparent in the following respects:

- Relevant government authorities and community representatives were consulted during SEE preparation (refer to **Section 6.0**). This enabled comment and discussion regarding potential environmental impacts and proposed environmental management procedures.
- The approved quarry incorporates environmental management plans, procedures and environmental monitoring that will be revised in regard to the Proposed Modification. In addition, the management controls that will be implemented by the Applicant as part of the Proposed Modification have been clearly specified in **Section 8.0** and DA 267-11-99 for the approved Quarry.
- This SEE has been undertaken on the basis of the best-available scientific information about the Proposed Modification. Where uncertainty in the data used in the assessment has been identified, a conservative worst-case analysis has been undertaken and contingency measures have been identified to manage that uncertainty.

9.2.2.3 Intergenerational Equity

Intergenerational equity refers to equality between generations. It requires that the needs and requirements of today's generations do not compromise the needs and requirements of future generations in terms of health, biodiversity and productivity.

The Proposed Modification would provide ongoing high quality supply of sand and gravel products into the Sydney market. This supply will assist to meet the current and growing demand for high quality sand products. As part of quarrying operations a comprehensive rehabilitation strategy has been developed, including an approved Landscape and Rehabilitation Management Plan (LRMP). The LRMP provides a description of the strategies that will be used to rehabilitate the areas disturbed by quarrying operations and will be updated as part of the implementation of the Proposed Modification.

As detailed in **Section 7.0**, the Proposed Modification can be undertaken without having a significant impact on the local environment or community. The environmental management measures discussed in **Sections 7.0** and **8.0** have been developed to minimise the impact of the Proposed Modification on the environment and community to the greatest extent reasonably practicable.

The management of environmental issues as outlined in this SEE will assist to maintain the health, diversity and productivity of the environment for future generations whilst also realising the benefits of the quarrying operations.

9.2.2.4 Conservation and Biological Diversity

The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them. It is noted that the Proposed Modification would not require any additional disturbance to biodiversity, remaining within the approved impact footprint of DA 267-11-99.

The lack of additional impact notwithstanding, the approved LRMP for the Quarry ensures that native vegetation will be established in the rehabilitated extraction area which will assist in improving the ecological values of the site in the medium to long term. The LRMP is to be reviewed and updated to account for the Proposed Modification following determination.

9.2.2.5 Valuation and Pricing Resources

The goal of improved valuation of natural capital has been included in Agenda 21 of Australia's Intergovernmental Agreement on the Environment. The principle of improved valuation and pricing refers to the need to determine proper values of services provided by the natural environment. The objective is to apply economic terms and values to the elements of the natural environment. This is a difficult task largely due to the intangible comparisons that need to be drawn in order to apply the values.

The Proposed Modification optimises the valuation and pricing of the sand resource with minimal impact by maximising the efficient extraction of the resource at the existing Quarry and extending the life of the resource through blending with VENM/ENM of appropriate quality. The Proposed Modification also optimises the value of the remaining imported VENM/ENM through its use in the Quarry final landform.

Feasibility considerations during the design process for the Proposed Modification have included the costs of integration of effective management measures to minimise potential environmental and social impacts.

9.2.3 Environmental Planning & Assessment Act 1979 Considerations

9.2.3.1 Section 4.15 - Evaluation

In determining an application for the modification of development consent, the consent authority must take into consideration such of the matters referred to in Section 4.15(1) of the EP&A Act (as relevant to the development). These matters for consideration by the consent authority and the sections where they are addressed in this SEE are provided in **Table 9.1**.

Table 9.1 Section 4.15 Matters for Consideration

Matters for Consideration	Relevant SEE Section
(a) the provisions of:	
(i) any environmental planning instrument	Section 5.0
(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and	Section 5.0
(iii) any development control plan,	Not Applicable based on SSD provisions refer to Section 5.3.1
(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4	Not applicable
(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph),	Not applicable as the development does not represent any of the development types nominated by Clause 92 of the EP&A Reg
(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality	Section 7.0
(c) the suitability of the site for the development,	Sections 1.3, 2.3, 7.0 and 9.3.1
(d) any submissions made in accordance with this Act or the regulations	Noted but not yet applicable
(e) the public interest	Sections 4.3, 7.11 and 9.3.3

9.2.3.2 Objects of the EP&A Act

Table 9.2 provides a short description of how the Proposed Modification and this SEE have addressed and satisfy section 1.3 (Objects) of the EP&A Act.

Table 9.2 Objects of the EP&A Act

Object	SEE Coverage
(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,	Socio-economic effects are assessed in Section 7.11 , with the Proposed Modification likely to provide for a net positive socio-economic benefit. The Proposed Modification would incorporate measures to avoid or mitigate impacts to the environment (Section 7.0) and provide for an improved final landform outcome (Section 7.9 and 7.10).
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	The principles of ecologically sustainable development have been considered in Section 9.2.2 .

Object	SEE Coverage
(c) to promote the orderly and economic use and development of land,	<p>The Proposed Modification would promote:</p> <ul style="list-style-type: none"> the continued operation and extension of the Quarry to maintain and extend the supply of construction materials to Sydney, the beneficial use of VENM and ENM (which otherwise could be disposed of to licensed landfill), an improved final landform and land use outcome <p>The Proposed Modification would continue to contribute to the local and regional economy and community for the extended Quarry life.</p>
(d) to promote the delivery and maintenance of affordable housing,	<p>The Proposed Modification would not limit the provision of affordable housing in The Hills LGA. As the Quarry would provide sand, an important construction material for housing, the Proposed Modification does promote this objective.</p>
(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,	<p>The Proposed Modification would be unlikely to have any additional impact on threatened population, species or community.</p>
(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	<p>The Proposed Modification does not require any additional disturbance to that already approved and therefore is unlikely to result in any impact to cultural heritage.</p>
(g) to promote good design and amenity of the built environment,	<p>The Proposed Modification would have no impact on the built environment.</p>
(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,	<p>The Proposed Modification does not require construction of buildings.</p>
(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,	<p>The SEE includes a review of the relevant State, regional and local environmental planning regulations, plans and strategies including how these have been addressed (Section 5.0).</p>
(j) to provide increased opportunity for community participation in environmental planning and assessment.	<p>The Hills Council, various government agencies and local landholders were consulted during the planning of the Proposed Modification and preparation of the SEE (Section 6.0).</p>

9.3 Justification

9.3.1 Suitability of the Site

The Quarry is located within a rural environment in an area dominated by extractive industries, as discussed in **Section 1.0**. The site is considered suitable for the Proposed Modification for the following reasons:

- The site contains extensive sand resources and is located within proximity to markets for these resources.

- No additional disturbance is required to the site which has produced sand for the Sydney market since original approval in May 2000.
- The Quarry Site provides a significant storage capacity for 'clean fill' material generated by the Sydney construction industry and would allow for the construction of a landform more sympathetic to the surroundings and with greater potential for post-Quarry land use.
- Suitable safe access to Roberts Road and old Northern Road is provided from the Quarry Site without impacting adversely on the local road network.
- The site is located within a Primary Production zone and the development is consistent with the objectives of the zone.
- The Proposed Modification is compatible with surrounding land uses and can co-exist with these existing uses.
- The Proposed Modification provides for a modified final landform which would be more stable, non-polluting, more sympathetic to the surrounding landforms and more conducive to post-quarry land uses which contribute to ongoing social and economic well-being of the Maroota community.

9.3.2 Benefits of the Proposed Modification

The key benefits of the Proposed Modification are as follows.

- The efficient extraction of the resource at the existing quarry would be maximised through selective processing and blending of imported materials, thereby delaying or eliminating the need for further quarry development on another less suitable greenfield site.
- The Quarry provides for the beneficial use of VENM and ENM resources that may otherwise be disposed of to waste management facilities.
- The Proposed Modification provides for a final landform which would return environmental (water) flows, be more sympathetic to surrounding topography and maximise the potential for post-quarry beneficial use of the site.
- The Proposed Modification would allow for the continued and additional employment at the Quarry.
- The Proposed Modification would result in ongoing operational expenditure that will have flow-on economic benefits for the region.
- The environmental impact of the Proposed Modification would be managed within acceptable environmental standards.

9.3.3 Need for the Proposed Modification

Furthermore, the approved final landform for the Quarry Site currently provides for a water holding basin which interrupts natural drainage to the northeast (within the Coopers Creek catchment). The placement of imported VENM and ENM within completed sections of the Quarry would promote the reinstatement of natural drainage in the final landform and a more productive final land use of the Quarry area consistent with surrounding land uses.

The need for the Proposed Modification can be justified on two principal grounds:

1. The Quarry Site provides an alternative location for the disposal of VENM and ENM generated by construction projects across Sydney. The application as a backfill to the completed extraction area of the Quarry would allow for the landform of the Quarry to be improved whilst reducing the volume of VENM and ENM which could be sent to landfill (thereby reducing the capacity of these facilities to accept other solid waste which cannot be used for land application purposes). The Proposed Modification would contribute to achieving a key element of the EPA's 5 yearly Waste Avoidance Resource Recovery Strategy (WARR), being an increase in the diversion of waste from landfill by 75%.
2. The Proposed Modification would assist in extending the life of the in situ sand resource through selective blending with imported VENM and ENM feed stock. This would extend the life of the Quarry which provides a long-term, high quality supply of construction materials into the Sydney local and regional markets. This supply is needed to replace supply from existing quarries that are nearing the end of their resources and will contribute to the security and economic viability of the Sydney construction industry along with supply to other key sand markets.

9.3.4 Consequences of Not Proceeding

Should the Proposed Modification not proceed, the consequences are likely to include the following:

- A site for the safe application of clean fill material generated by the Sydney construction market would be lost, with this increasing the potential for these materials to be sent to licensed landfill sites (thereby reducing the capacity of these to accept other solid waste).
- The potential to extend the life of the sand resource through selective processing and blending of imported VENM and ENM, thereby reducing the need for development of other greenfield sites, would be foregone.
- The ability to construct a free-draining landform which promotes a return of environmental flows and provides for a landform more sympathetic to the surrounds and more likely to provide for future economic use of the land would be foregone.
- The ability of the Quarry to contribute to future shortfalls in the production of sand would be foregone. Any shortfall in the production of sand to meet the anticipated demand would have a negative impact on the NSW economy as follows:
 - A reduction in the direct contribution of production to the NSW economy, which was estimated to be \$366 million by DTIRIS (2013) and \$405 million by the Institute of Quarrying Australia (IQA).
 - Increased supply costs as a result of reduced availability (supply) or requirement to source from locations more distant to markets (in particular the Greater Sydney metropolitan area).
 - Indirect impacts on the NSW economy as a result of reduced construction activity in response to either increased cost or reduced supply of concrete and other construction materials.
- The potential for continued employment at the Quarry and flow-on benefits to the economy would be foregone.
- This in turn could prevent the additional employment which would follow an increase in production or lead to a loss in employment should the Quarry cease to operate.

9.4 Conclusion

The Proposed Modification can be justified as the residual impacts on the biophysical environment are understood and where unavoidable can either be managed to reduce the impact as far as practically possible. No significant adverse socio-economic impacts are expected as a consequence of the Proposed Modification, however, various positive contributions to the local economy, regional objectives for waste reduction and construction industry would result.

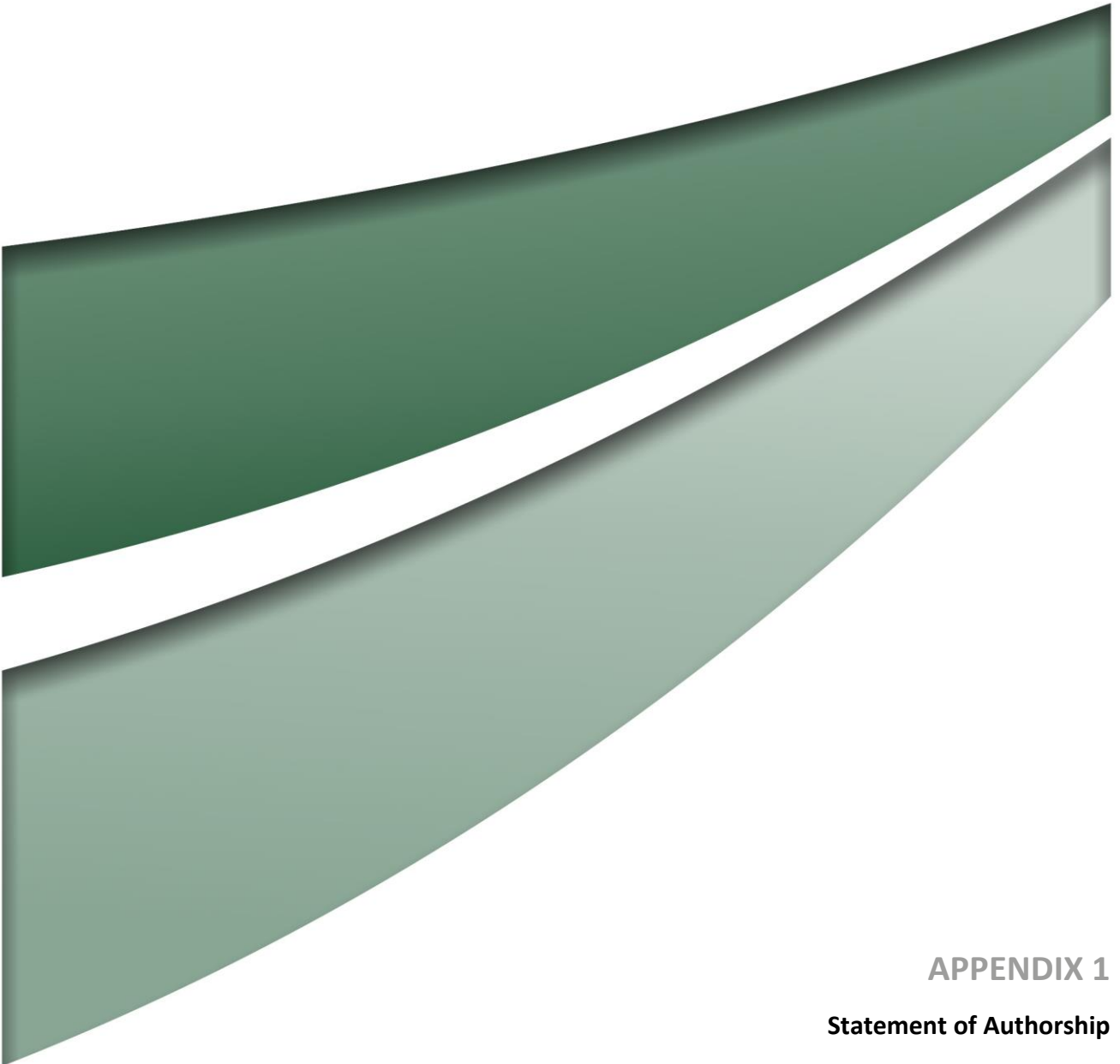
On balance the positive contribution the Proposed Modification would make to the local, regional and State setting indicate that the consequences of not proceeding are considered more adverse than proceeding.

10.0 References

- Austrroads, 2017. *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*.
- Dundon Consulting, 2018. *Roberts Road Maroota Sand Quarry Groundwater Study Report*, 16-0318-R02B.
- Dundon Consulting, 2018b. *Roberts Road Maroota Sand Quarry Groundwater Management Plan*. Dundon Consulting Pty Ltd 2 May 2018 (Re-Issued 30 July 2018) 16-0318-R03g.
- EMM Consulting, 2018. *Maroota Extractive Industry Groundwater Study*. Prepared for Department of Industry - Water | 23 November 2018.
- Jacobs Group Australia Pty Ltd (Jacobs), 2019. *Roberts Road Quarry, Air Quality Impact Assessment for Proposed Modification 4*, version 0.
- NSW Roads and Traffic Authority, 2002. *Guide to Traffic Generating Developments*, version 2.2.
- Nexus Environmental Planning Pty Ltd, 1999. *Environmental Impact Statement Sand, Clay & Pebble Extraction, Lot 1 & 2 DP 228308, Lot 2, DP 312327 Maroota. Volume I – Text*.
- Nexus Environmental Planning Pty Ltd, 2000. *Section 96(2) Application, Modification of Consent No. 267-11-99 Roberts Road Maroota*.
- Nexus Environmental Planning Pty Ltd, 2015a. *Environmental Assessment Section 75W Modification (3) DA 267-11-99 for Hodgson Quarry Products Pty Ltd Roberts Road Maroota*.
- Nexus Environmental Planning Pty Ltd, 2015b. *Volume I Environmental Assessment Section 75W Modification (2) DA 267-11-99 for Hodgson Quarries and Plant Pty Ltd Roberts Road Maroota*.
- NSW Office of Water, 2011. *Water Sharing Plan Greater Metropolitan Region Groundwater Sources Background document, July 2011*.
- Umwelt (Australia) Pty Limited, 2019. *Project Overview and Preliminary Environmental Assessment of Proposed Modification 4 – Roberts Road Quarry for Hodgson Quarries and Plant Pty Ltd*.
- VGT Environmental Compliance Solutions Pty Ltd and NGH Environmental, 2016. *Flora and Fauna Management Plan for the Sand Quarry, Roberts Rd Maroota, NSW*. Prepared by VGT Pty Ltd & NGH Environmental in conjunction with Hodgson Quarries and Plant Hire.
- VGT Environmental Compliance Solutions Pty Ltd, 2016b. *Air Quality Management Plan for the Sand Quarry, Roberts Rd Maroota, NSW*. Prepared by VGT Pty Ltd in conjunction with Hodgson Quarries and Plant Hire Pty Ltd
- VGT Environmental Compliance Solutions Pty Ltd, 2017. *Landscape and Rehabilitation Plan for the Sand Quarry, Roberts Rd Maroota, NSW*. Prepared by VGT Environmental Compliance Solutions Pty Ltd in conjunction with Hodgson Quarries and Plant Pty Ltd.
- VGT Environmental Compliance Solutions Pty Ltd, 2018. *Environmental Management Strategy for Sand Quarry, Roberts Rd, Maroota NSW*.

VGT Environmental Compliance Solutions Pty Ltd, 2018b. *Surface Water Management Plan Maroota Quarry Via Maroota*. Prepared by VGT Environmental Compliance Solutions Pty Ltd for Hodgson Quarries and Plant Pty Ltd.

VGT Environmental Compliance Solutions Pty Ltd, 2019. *Annual Review and Compliance Report 2018 Roberts Road, Maroota Sand Quarry DA 267-11-99*. Prepared by VGT Environmental Compliance Solutions Pty Ltd in conjunction with Hodgson Quarries & Plant Pty Ltd.



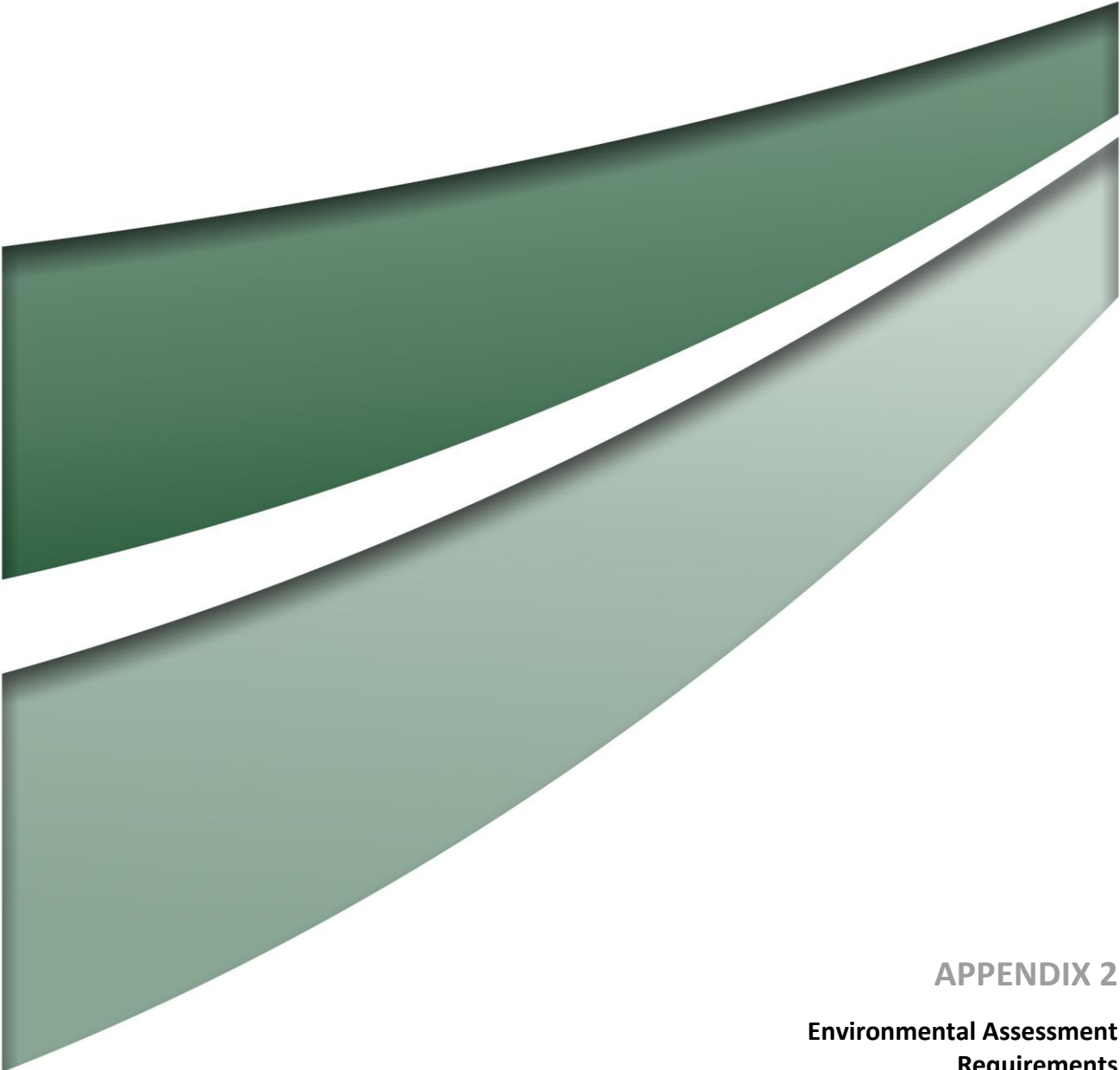
APPENDIX 1

Statement of Authorship

Project Team

Umwelt (Australia) Pty Limited – SEE Preparation	
Alex Irwin, Principal Environmental Consultant – B.Sc (Hons)	Project Director / Project Manager
Ruth Tapp, Environmental Engineer - B.Nat.Res.(Hons)	SEE Preparation
Anne Schneider, Soil Scientist - PhD, M.Sc., B.Sc.	SEE Preparation
Chris Bonomini, Senior Engineer - Water, Process and Risk - B.Eng.(Chem)(Hons)	Surface Water Assessment and Water Balance Assessment
Dave Davis, Principal Acoustician - B.Eng.(Mech)(Hons)	Noise Impact Assessment
Amanda Buckeridge, Senior Acoustician – B.Env.Sc.	Noise Impact Assessment
Thomas Hall, Graduate Acoustician - B.Env.Sc.	Noise Impact Assessment
Roshni Sharma, GIS Specialist – M.Sc.&Tech., M.Sc., B.Env.Sc(Hons).	Drafting, Graphic Design
Leanne Ott, Project Administrator	Report Formatting and Document Control

Other Specialist Investigations	
Jacobs Pty Ltd Luke Spencer Shane Lakmaker	Air Quality Impact Assessment
SECA Solution Sean Morgan	Traffic Impact Assessment



APPENDIX 2

**Environmental Assessment
Requirements**



Alex Irwin
Principal Environmental Consultant
Umwelt (Australia) Pty Ltd
Office 1, 3 Hampden Drive
ORANGE NSW 2800

Via email: airwin@umwelt.com.au

Dear Mr ^{Alex} Irwin

**Roberts Road Sand Quarry - (DA 267-11-99)
Modification 4 – Environmental Assessment Requirements**

I refer to your email dated 11 March 2019 seeking Environmental Assessment Requirements (EARs) for the above proposal. The Department understands that the proposed modification involves:

- importing up to 320,000 tonnes per annum (tpa) of Virgin Excavated Natural Material (VENM) and/or Excavated Natural Material (ENM) for use in landform rehabilitation;
- increasing the maximum allowable daily truck movements from 100 to 140 per day (70 inbound and 70 outbound);
- extending the life of the quarry by 5 years (to 2030);
- amending the final landform to a free-draining basin; and
- removing condition 29(c) from the existing conditions of approval, requiring the quarry to ensure that no more than 3 hectares of the site are exposed and active at any one time.

The Department has reviewed the Preliminary Environmental Assessment (PEA) provided and is generally satisfied with the proposed approach to the preparation of the Statement of Environmental Effects (SEE). Based on the information provided, the Department does not intend to issue formal EARs for the proposed modification. However, you should ensure that the assessment is prepared in accordance with the following:

- *NSW Noise Policy for Industry* (2017);
- *NSW Road Noise Policy* (2011);
- *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2016); and
- *Voluntary Land Acquisition Mitigation Policy* (2018).

The Department also requests that you give particular consideration to the following matters.

Air Quality and Noise

The Department notes that the project currently has no limit on resource extraction, and that production is currently limited by truck movements. The modification seeks approval to increase the maximum allowable truck movements from 100 to 140 per day, which has the potential to increase production from 480,000 tpa to 672,000 tpa. The Department is likely to consider either a maximum resource extraction limit or a maximum production limit. Any proposal that the company wishes to put forward to this regard will be considered.

The Department further notes that the modification seeks to remove a condition which requires the quarry to ensure that no more than 3 hectares of the site are exposed and active at any given time.

Given these issues, the Department considers that the SEE must demonstrate that the modification and any potential increase to the quarry's production capacity would not produce exceedances in the quarry's noise and air quality criteria, and that assessments of both noise and air quality sufficient to demonstrate this outcome must be provided with the SEE.

Permissibility

- Please provide more detail regarding the permissibility of the proposed modification under *The Hills Local Environment Plan 2012*. Specifically, please demonstrate if the proposed modification is considered ancillary to the existing quarry or whether it constitutes a new development.

VEM/ENM Fill

- Please provide additional information on the likely sources of VENM/ENM for the site, including a description of any potential contaminants and a description on how the VENM/ENM would be stored and handled on site.
- Clarify the quantity of the imported material which would be blended with on-site material to produce saleable products.
- Confirm which proportion of the imported material would be VENM and ENM respectively.
- Outline the procedures and protocols proposed to safeguard potential impacts from the imported ENM on the Maroota Sands aquifer.

Rehabilitation

- Please outline how the proposed final landform of the quarry site will be achieved if the required quantity of VENM/ENM cannot be sourced.
- Please provide more information regarding the proposed changes to the final landform of the quarry site, including drainage lines and any onsite detention ponds.
- Please detail the measures that would be implemented to reduce erosion and sedimentation associated with runoff leaving the quarry site.

The Department would like to emphasise the importance of consultation with all relevant stakeholders, such as government agencies and affected residents, including relevant landholders downstream of the drainage lines. The Department requests that you fully document the outcomes of the proposed Community Engagement Strategy in the SEE.

Should you have any questions in relation to the above, please contact Rob Beckett at the details above.

Yours sincerely



Howard Reed 18.3.19
Director
Resource Assessments

From: [Kristine McKenzie](#)
To: [Alex Irwin](#)
Date: Tuesday, 16 April 2019 12:09:49 PM
Attachments: [image002.png](#)

Hi Alex,

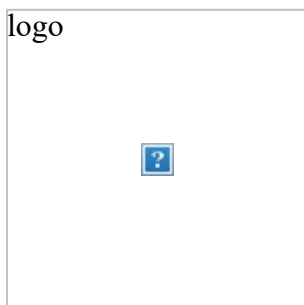
Re: Hodgsons Quarry – existing consent DA 267-11-99 at Roberts Road, Maroota.

I have reviewed the Project Overview and Preliminary Environmental Assessment and raise concerns regarding the proposed importation of VENM and ENM to the site. The importation of these materials would partially change the use of the site from an 'extractive industry' to a 'waste and resource management facility'. As such, it is considered that a new Development Application is required to substantiate the proposed change in activities on the site and the change in definition of the use.

The proposed increase in vehicle movements and extension to the timeframe for extraction may also potentially impact on amenity to adjoining property owners and further add to the need for a new DA.

The final documents submitted must also consider the requirements of Council's DCP requirements under DCP Part B Section 1 – Rural, Part 2 which contains Council's requirements for extractive industry operations.

Regards,



Kristine McKenzie

Principal Executive Planner

+61298430319 | kmckenzie@thehills.nsw.gov.au

Administration Centre, 3 Columbia Court Norwest NSW
2153

PO Box 7064, NORWEST NSW 2153 | DX 9966
Norwest

www.thehills.nsw.gov.au

CONFIDENTIALITY NOTICE

The information contained in this email is strictly confidential and prepared solely for the use of the intended recipient(s).

The copyright of this communication belongs to The Hills Shire Council.

If you are not the intended recipient, please do not read, use, disseminate, distribute or copy this message or attachments.

If you have received this message in error, please notify the sender immediately and delete this message.

Views expressed in this message are those of the individual sender, and are not necessarily the views of The Hills Shire Council

DISCLAIMER

Before opening any attachments, please check them for viruses and defects.

The sender does not accept liability for any viruses, errors or omissions in the contents of this message or attachment, which arise as a result of email transmission.



DOC19/313616-1
Your Ref.

Alex Irwin
Principal Environmental Consultant
Umwelt (Australia) Pty Ltd
Level 3, 50 York Street
Sydney NSW 2000

24 April 2019

Dear Mr Irwin

RE: EPA Response to Roberts Road Quarry Modification 4 (DA267-11-99)

I refer to your correspondence dated 9 April 2019 seeking EPA advise in relation to the environmental impact assessment for the application to modify DA267-11-99 for Hodgson Quarries and Plant Pty Ltd located at Roberts Road on Lots 1 and 2 DP228308 and Lot 2 DP312327 Maroota (the premises).

The EPA understand that the proposed modification involves:

- the importation of up to 320,000t per year of Virgin Excavated Natural Material (VENM) and Excavated Natural Material (ENM) for landform rehabilitation;
- onsite processing of some VENM and ENM for sale through blending with on-site materials;
- increase of the approved daily truck movements from 100 to 140 movements per day;
- an extension to the period of approved operations from May 2025 to May 2035 to reflect the remaining sand resources available for extraction; and
- removal of a current development approval condition limiting the exposed and active areas of the quarry for up to 3 hectares at any one time.

HB Maroota Pty Ltd holds Environmental Protection Licence 6535 (the EPL) to undertake crushing, grinding or separating and extractive industry at the premises. The proposed reprocessing of the VENM and ENM, EPL 6535 will require a variation licence application to include resource recovery and/or waste processing (non-thermal treatment) activities.

The EPA has considered the details of the preliminary environmental assessment and recommends that the following be included in the final environmental assessment.

Air Quality

The additional processing of some VENM and ENM materials, increase in daily truck movements and additional area exposure has the potential to increase the generation of dust (PM10 & PM2.5) and other pollutant emission beyond the boundary of the premises. It is therefore recommended that you undertake an air assessment in accordance with the *Approved Methods for the Modelling and assessment of Air Pollutants in NSW* and *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW*, including:

Phone 131 555	Fax +61 2 9995 5999	PO Box 668	L13, 10 Valentine Ave
Phone +61 2 9995 5555	TTY 133 677	Parramatta	Parramatta NSW
(from outside NSW)	ABN 43 692 285 758	NSW 2124 Australia	2150 Australia
			info@epa.nsw.gov.au
			www.epa.nsw.gov.au

- a description of the existing air quality and meteorology using existing information and site representative ambient monitoring data;
- an outline of the point and fugitive sources of all pollutant emissions and the resulting ground level concentrations of all pollutants at all sensitive receivers;
- a description of the effects and significance of resulting pollutant concentrations on the environment, human health, amenity and regional ambient air quality standard and goals; and
- details of the mitigation measures proposed in managing the any additional impacts of air emission from the proposed modification.

Noise

The additional activities proposed have the potential to increase the generation of noise beyond the boundary of the premises. It is therefore recommended that you undertake a noise assessment in accordance with the *Noise Policy for Industry (2017)*, including:

- details of the existing background (LA90) and ambient (LAeq) noise levels;
- details of all monitoring of existing ambient noise levels, including a statement justifying the choice of monitoring site and the procedure used to choose the site, taking into account the noise sensitive receptors and most affected locations;
- a description of the dominant and background noise sources at the site;
- Day, evening and night assessment background levels for each day of the monitoring period; and
- the final rating background level (RBL) value.

Additionally, the noise assessment report should include:

- a plan showing the assumed location of each noise source for each predicted scenario of the noise impact assessment;
- a list of the number and type of noise sources used in each prediction scenario to simulate all potential significant operating conditions on the site, including the worst case scenario;
- any assumptions made in the predictions in terms of source heights, direct effects, shielding from topography, buildings or barriers etc.
- details of the expected noise level and noise character (e.g. tonality, impulsiveness, vibration etc.) likely to be generated from noise sources upon modification;
- details of the noise levels likely to be received at the most sensitive locations;
- methods used to predict noise impacts including identification of any noise models used;
- an assessment of appropriate weather conditions for the noise predictions including reference to any weather data used to justify assumed conditions;
- discussion of findings from the predictive modelling and where relevant noise criteria have not been met, recommend additional mitigation measures;
- details of the most appropriate mitigation measures and expected noise reduction including noise controls and management of impacts; and
- demonstration that the relevant noise criteria can be met, with the inclusion of mitigation measures in the project, if required.

Water

It is recommended that you undertake an assessment of the impacts on surface and groundwater, including:

- an outline of how the total water cycle considerations are to be addressed as a result of the modification;
- total water balances;
- demonstration of how the impact on water resources are minimised;
- the type, volume, proposed treatment and management and re-use methods for stormwater;
- the type, volume, proposed treatment, and management and re-use methods for wastewater; and

- identification of any impacts on and management of groundwater.

Should you have further questions in relation to this matter, please contact Lilian De Torres at 02 9995 5059 or by email at Lilian.DeTorres@epa.nsw.gov.au.

Yours sincerely



JACQUELINE INGHAM
Unit Head– Sydney Industry
Environment Protection Authority