



Appendix G

Traffic impact assessment





Balranald Mineral Sands Project - Modification of Consent (SSD-5285)

Traffic impact assessment

Prepared for Iluka Resources Limited
April 2022





Servicing projects throughout Australia and internationally

SYDNEY

Ground Floor, 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE

Level 3, 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE

Level 1, 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

ADELAIDE

Level 4, 74 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE

Ground Floor, 188 Normanby Road
Southbank VIC 3006
T 03 9993 1905

PERTH

Suite 9.02, Level 9, 109 St Georges Terrace
Perth WA 6000
T 02 9339 3184

CANBERRA

Level 2, Suite 2.04, 15 London Circuit
Canberra City ACT 2601

Balranald Mineral Sands Project - Modification of Consent (SSD-5285)

Traffic impact assessment

Report Number

S200529 RP9

Client

Iluka Resources Limited

Date

28 April 2022

Version

v5 Draft

Prepared by



Baqir Husain
Traffic Engineer
28 April 2022

Approved by



Abdullah Uddin
Associate Traffic Engineer
28 April 2022

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

© Reproduction of this report for educational or other non-commercial purposes is authorised without prior written permission from EMM provided the source is fully acknowledged. Reproduction of this report for resale or other commercial purposes is prohibited without EMM's prior written permission.

Table of Contents

1	Introduction	1
1.1	Project background	1
1.2	Description of modification	3
1.3	Summary of the 2015 transport assessment	5
2	Existing conditions	8
2.1	Road hierarchy	8
2.2	Existing road network	8
2.3	Key intersections	16
2.4	Baseline traffic volumes	21
3	Traffic generation and distribution for proposed modification	24
3.1	Construction traffic	24
3.2	Operations traffic	36
4	Traffic impact assessment	43
4.1	Warrants for intersection turn treatments	43
4.2	Warrant for rural road upgrades	47
5	Traffic management and mitigation	49
6	Conclusion	63
	References	64

Tables

Table 2.1	Sturt Highway (named Market Street within Balranald township)	9
Table 2.2	Balranald-Ivanhoe Road (known as Mayall Street within Balranald)	10
Table 2.3	Balranald-Tooleybuc Road (also known as Mallee Highway & Yanga Way)	11
Table 2.4	McCabe Street	12
Table 2.5	Piper Street	13
Table 2.6	O'Connor Street	14
Table 2.7	Moa Street	15
Table 2.8	Sturt Highway (Market Street)/Balranald-Ivanhoe Road (Mayall Street) intersection	16
Table 2.9	Balranald-Ivanhoe Road/McCabe Street intersection	18
Table 2.10	Sturt Highway/Tooleybuc Road (Mallee Highway) intersection	19

Table 2.11	Predicted baseline traffic volumes for commencement of construction (2023)	21
Table 2.12	Predicted baseline traffic volumes for commencement of operations (2025)	22
Table 2.13	Tronox construction and operations traffic volumes	23
Table 3.1	MOD1 construction traffic movements	25
Table 3.2	MOD1 construction traffic distribution percentages (to the external Major Roads)	27
Table 3.3	MOD1 construction daily and peak hour traffic movements	31
Table 3.4	Cumulative construction traffic movements	34
Table 3.5	Comparison of EIS and MOD1 construction traffic movements	35
Table 3.6	Product haulage traffic (daily)	36
Table 3.7	Workforce traffic (daily)	37
Table 3.8	MOD1 daily delivery traffic movements	38
Table 3.9	MOD1 daily and peak hour operations traffic movements	38
Table 3.10	Cumulative operations traffic movements	41
Table 3.11	Comparison of EIS and MOD1 operations traffic movements	42
Table 4.1	Intersection turn treatment warrant for Balranald-Ivanhoe Road/McCabe Street (cumulative construction)	45
Table 4.2	Intersection turn treatment warrant for Balranald-Ivanhoe Road/McCabe Street (cumulative operations)	45
Table 4.3	Intersection turn treatment warrant for Balranald-Ivanhoe Road/West Balranald mine access (construction)	46
Table 4.4	Intersection turn treatment warrant for Balranald-Ivanhoe Road/West Balranald mine access (operations)	46
Table 4.5	Intersection turn treatment warrant for Sturt Highway/Tooleybuc Road	47
Table 4.6	Austroads road design for rural roads	47
Table 4.7	Cumulative construction and operations daily traffic volumes and corresponding design standards	48
Table 5.1	SSD-5285 conditions of consent - traffic	49

Figures

Figure 1.1	Regional setting and EIS approved Balranald project area (SSD-5285)	2
Figure 1.2	Proposed modification study area and conceptual site layout	4
Figure 1.3	Approved EIS construction routes	6
Figure 1.4	Approved EIS operations haulage route	7
Figure 3.1	MOD1 construction daily traffic movements	33
Figure 3.2	MOD1 operations daily traffic movements	40

Figure 4.1	Austroads warrant design charts for rural intersection turning lanes	44
Figure 5.1	Proposed MOD1 traffic management and mitigation	60
Figure 5.2	Proposed MOD1 traffic management and mitigation	61
Figure 5.3	Proposed MOD1 traffic management and mitigation	62

Plates

Plate 2.1	Sturt Highway (looking westbound near Endeavour Drive)	9
Plate 2.2	Balranald-Ivanhoe Road (looking north from Moa Street)	10
Plate 2.3	Balranald-Tooleybuc Road (looking southbound, 650 m from Sturt Highway)	11
Plate 2.4	McCabe Street (looking west towards Balranald-Ivanhoe Road)	12
Plate 2.5	Piper Street (looking south towards Sturt Highway)	13
Plate 2.6	O'Connor Street (looking east from Piper Street/O'Connor Street intersection)	14
Plate 2.7	Moa Street (looking north-east towards Balranald-Ivanhoe Road)	15
Plate 2.8	Sturt Highway (Market Street)/Balranald-Ivanhoe Road (Mayall Street) intersection	17
Plate 2.9	Balranald-Ivanhoe Road/McCabe Street intersection	18
Plate 2.10	Sturt Highway/Tooleybuc Road intersection	20

1 Introduction

EMM Consulting Pty Limited (EMM) was commissioned by Iluka Resources Limited (Iluka) to undertake a traffic impact assessment of the proposed modification (MOD1) to the approved Balranald Mineral Sands Project (the Balranald Project) in south-western New South Wales (NSW).

The purpose of this traffic assessment is to provide a comparison of predicted traffic impacts of the proposed modification against the traffic impacts estimated for the approved Balranald Project, as follows:

- a comparison of previous and current proposals;
- a description of the current development consent conditions (SSD-5285);
- an estimation of the revised construction and operational traffic generation and distribution; and
- identification of the potential road and intersection upgrades required as per the revised traffic generation.

This report will support a modification report which will be submitted to the NSW Department of Planning and Environment (DPE) under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.1 Project background

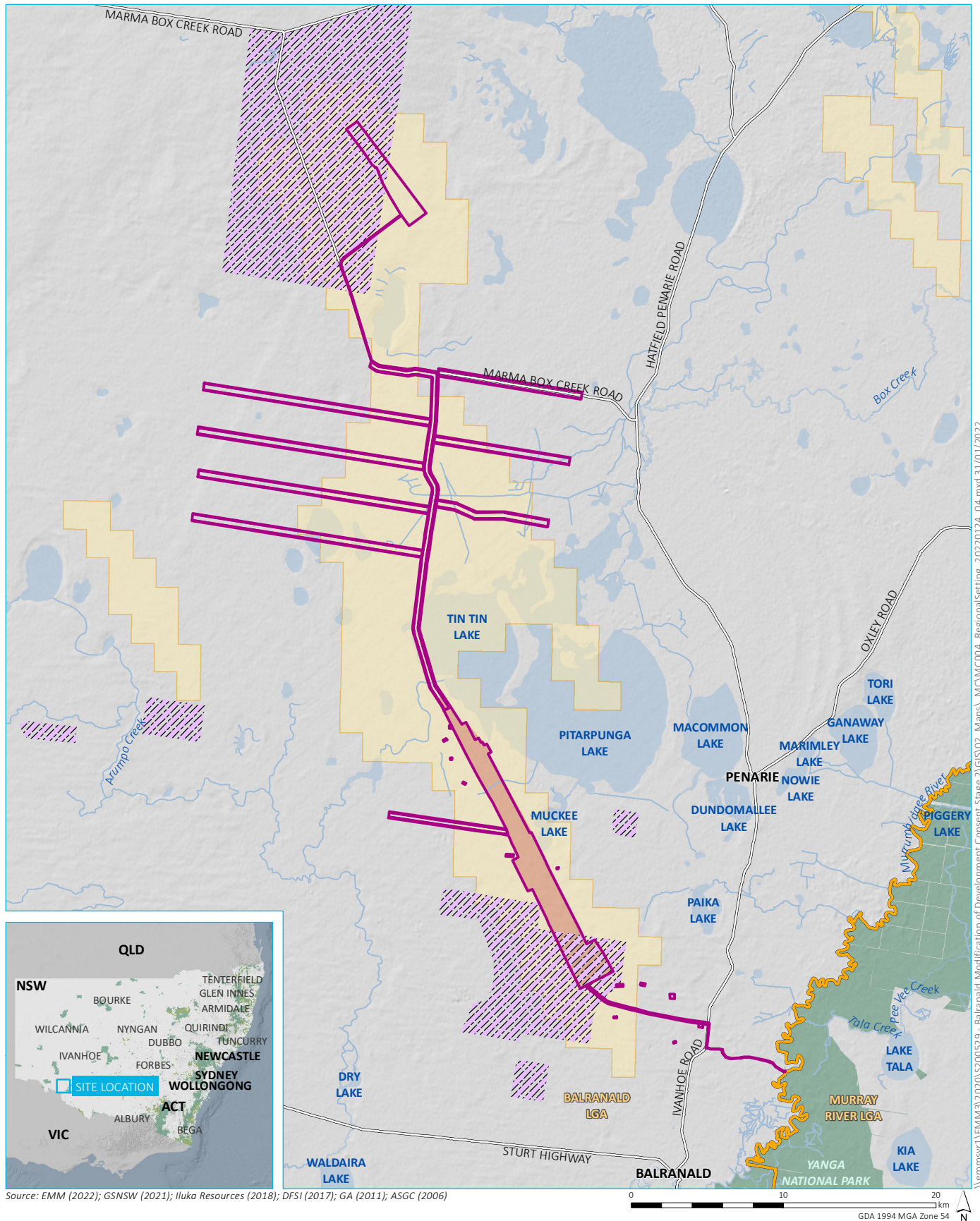
Iluka have approval to develop a mineral sands mine in south-western (NSW), known as the Balranald Project. It includes construction, mining, primary processing, and rehabilitation of two linear mineral sand deposits, known as the West Balranald and Nepean deposits, located approximately 12 kilometres (km) and 66 km north-west of the town of Balranald (Balranald town), respectively.

An environmental impact statement (EIS) was prepared and submitted in 2015 to accompany a State Significant Development (SSD-5285) application under Part 4 of the EP&A Act for an open cut, truck and shovel mining method. Development consent was granted by DPIE under Part 4 of the EP&A Act on 5 April 2016. The Balranald Project also included undertaking a bulk sampling activity at the West Balranald mine to test the removal of ore using underground mining methods.

The regional setting and approved EIS project area are shown on Figure 1.1.

Since development consent was granted in April 2016, Iluka has undertaken the approved bulk sampling activity involving the extraction of mineralised material or ore, from depth within the approved disturbance area of the West Balranald mine.

The outcome of the bulk sampling activities confirmed the effectiveness of the underground mining method, validated key elements of the mining unit design and have been used to help guide the proposed modification to inform the potential suitability (ie commerciality and reduced environmental impacts) of underground mining as an alternative method for resource extraction for the Project.



KEY

- EIS Approved Balranald Project Area (SSD-5285)
- Exploration Licence (EL7450)
- Mining Lease (ML1736)
- Southern Mallee Conservation Area (2015)
- Major road
- Watercourse/drainage line
- Waterbody
- NPWS reserve

INSET KEY

- NPWS reserve
- State forest

Regional setting and EIS approved Balranald project area (SSD-5285)

Balranald Mineral Sands Project
Traffic impact assessment
Figure 1.1

1.2 Description of modification

The proposed MOD1 would involve:

- continuing underground mining within a portion of the approved disturbance footprint of the West Balranald deposit pursuant to the consent (ie mining area); and
- development of approved mineral processing infrastructure within a proposed new area of disturbance (ie surface infrastructure).

The construction of infrastructure approved under the development consent would be undertaken to support the construction and operations for proposed underground mining, including mineral processing infrastructure, access roads, upgrade of external roads and intersections, gravel extraction, monitoring infrastructure, accommodation facility, road transport of ore offsite for downstream processing and other infrastructure as required.

The majority of this infrastructure would be required regardless of the mining method (ie open cut as approved under the development consent, or underground). For all other land located outside of the proposed modification area, ie other areas of the West Balranald mine and the Nepean mine, Iluka proposes no change to the currently approved open cut mining method at this stage.

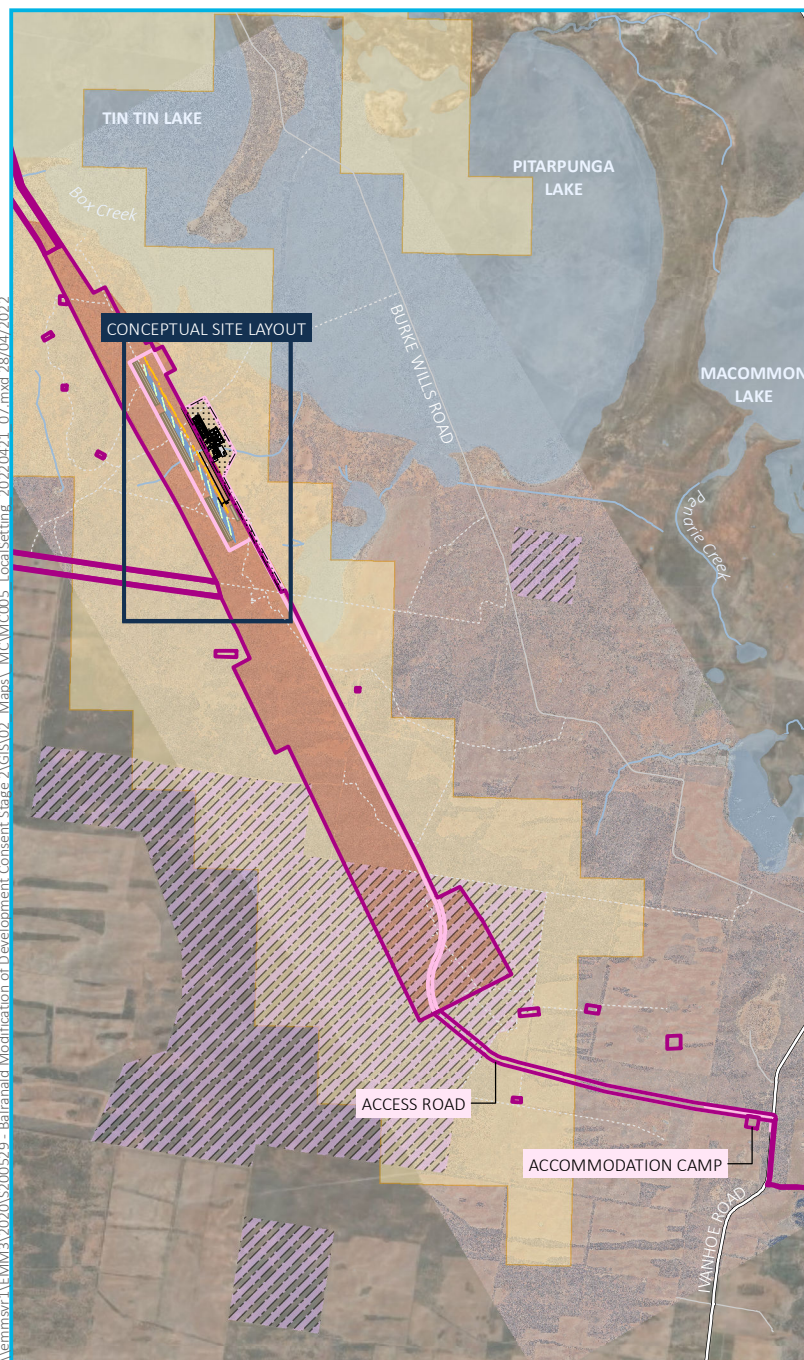
The underground mining process would involve:

- clearing the footprint directly above the mining area – the area will be stripped of topsoil, subsoil and non-saline overburden to a nominal depth of 2 metres (m);
- surface placement of treated sand tails and overburden/subsoil ahead of mining into the space created by the above stripping;
- underground mining of the ore;
- processing of the mined ore to separate the heavy mineral concentrate (HMC) from sand tails, sand fines and oversize;
- stockpiling of the HMC;
- backfilling of sand fines underground;
- replacement of subsoil and topsoil for rehabilitation and final landform; and
- environmental monitoring activities (including groundwater, geochemistry, subsidence, air quality and noise).

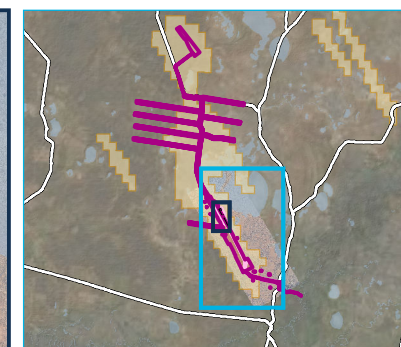
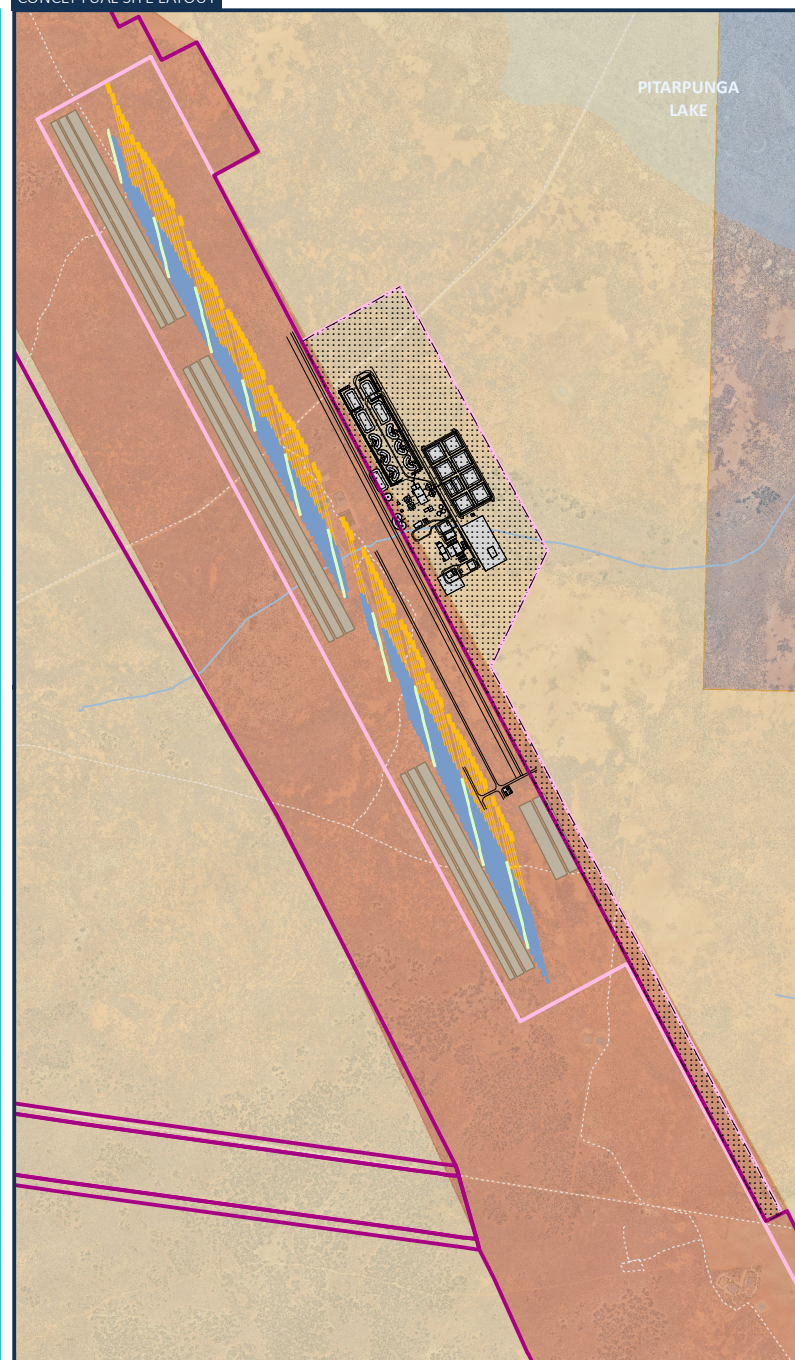
Ore is expected to be produced and processed at a rate no greater than approved under the development consent. The processing plant on site will produce a HMC to generate two primary product streams; magnetic HMC and non-magnetic HMC.

The product would be stockpiled and transported off-site for downstream processing with underground mining operations to be undertaken for a period of 6 years.

\\lemmsvr1\EMM3\2020\S200529 - Balranald Modification of Development Consent Stage 2\GIS\02 Maps\ MCMC005 LocalSetting_20220421_07.mxd 28/04/2022



CONCEPTUAL SITE LAYOUT



KEY

- EIS Approved Balranald Project Area (SSD-5285)
- Proposed modification study area
- Proposed modification extension to Balranald Project Area boundary
- Processing area infrastructure
- Subsoil stockpile
- Drill pad and string to underground stope
- Underground stope
- Underground pillar
- Major road
- Minor road
- Existing track
- Watercourse/drainage line
- Waterbody
- Southern Mallee Conservation Area (2015)
- Exploration Licence (EL7450)
- Mining Lease (ML1736)

Proposed modification study area and conceptual site layout

Balranald Mineral Sands Project
Traffic impact assessment
Figure 1.2

1.3 Summary of the 2015 transport assessment

EMM prepared a transport assessment report¹ (EMM 2015) as part of the EIS, assessing the construction and operations traffic impacts of the project. The transport assessment also considered potential traffic impacts associated with the proposed Tronox Mineral Sands mine² (previously referred to as Atlas-Campaspe mineral sands mine) to the north and included a feasibility road safety audit (RSA) report prepared by Traffic Works Pty Ltd.

1.3.1 Approved EIS conditions of consent

The traffic and transport related SSD-5285 conditions of consent for the Balranald Project are presented in Schedule 3 Condition 22 to 27 (Appendix A).

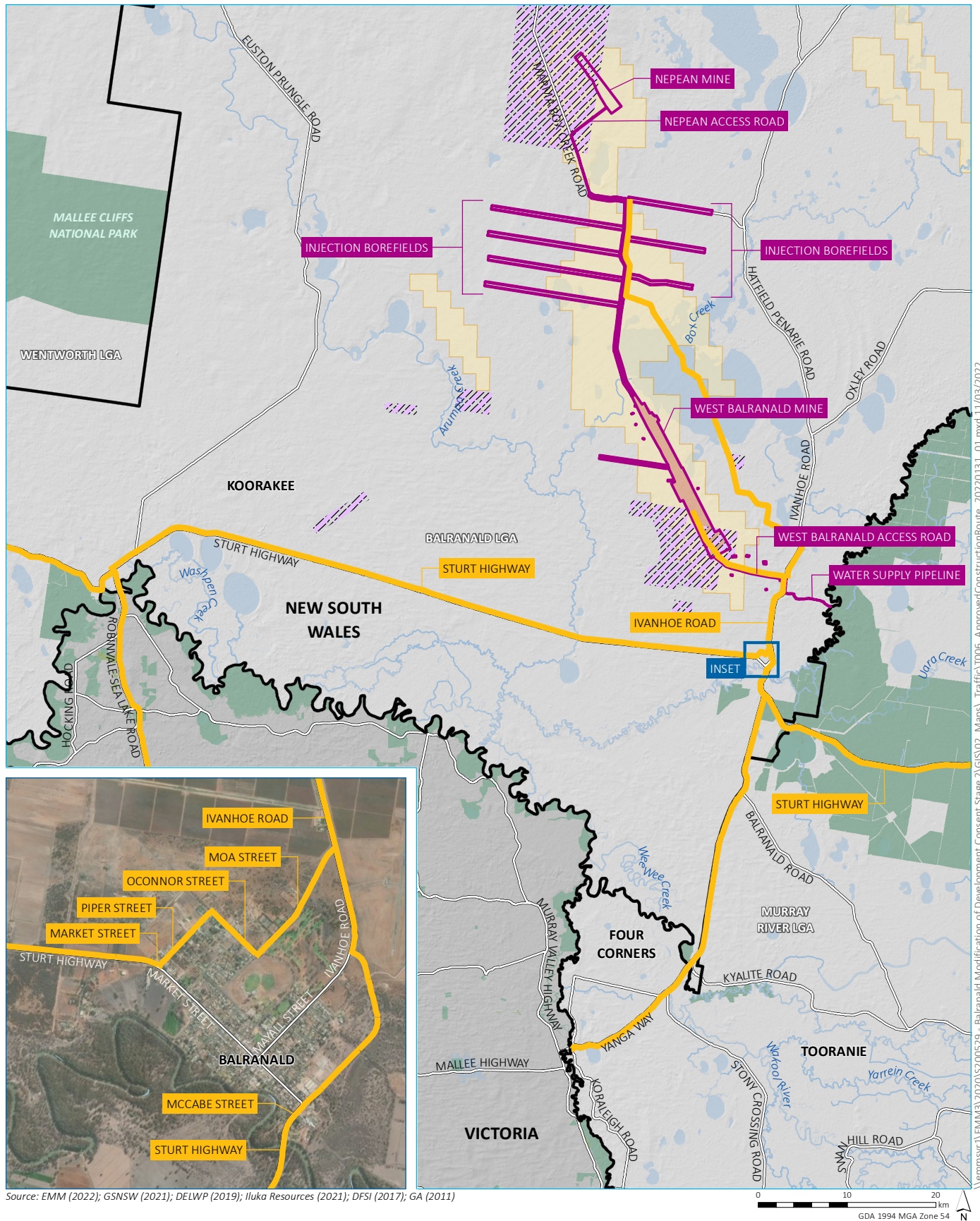
The approval conditions for transport generally fall under the following categories:

- road upgrades;
- intersection upgrades;
- RSA report conditions; and
- Over Size Over Mass (OSOM) vehicles.

The EIS approved construction and operations haulage routes for the Balranald Project are shown in Figure 1.3 and Figure 1.4 with MOD1 proposing to use the same routes (Section 4).

¹<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-5285%2120190227T001331.340%20GMT>

²<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-5012%2120190226T124914.789%20GMT>

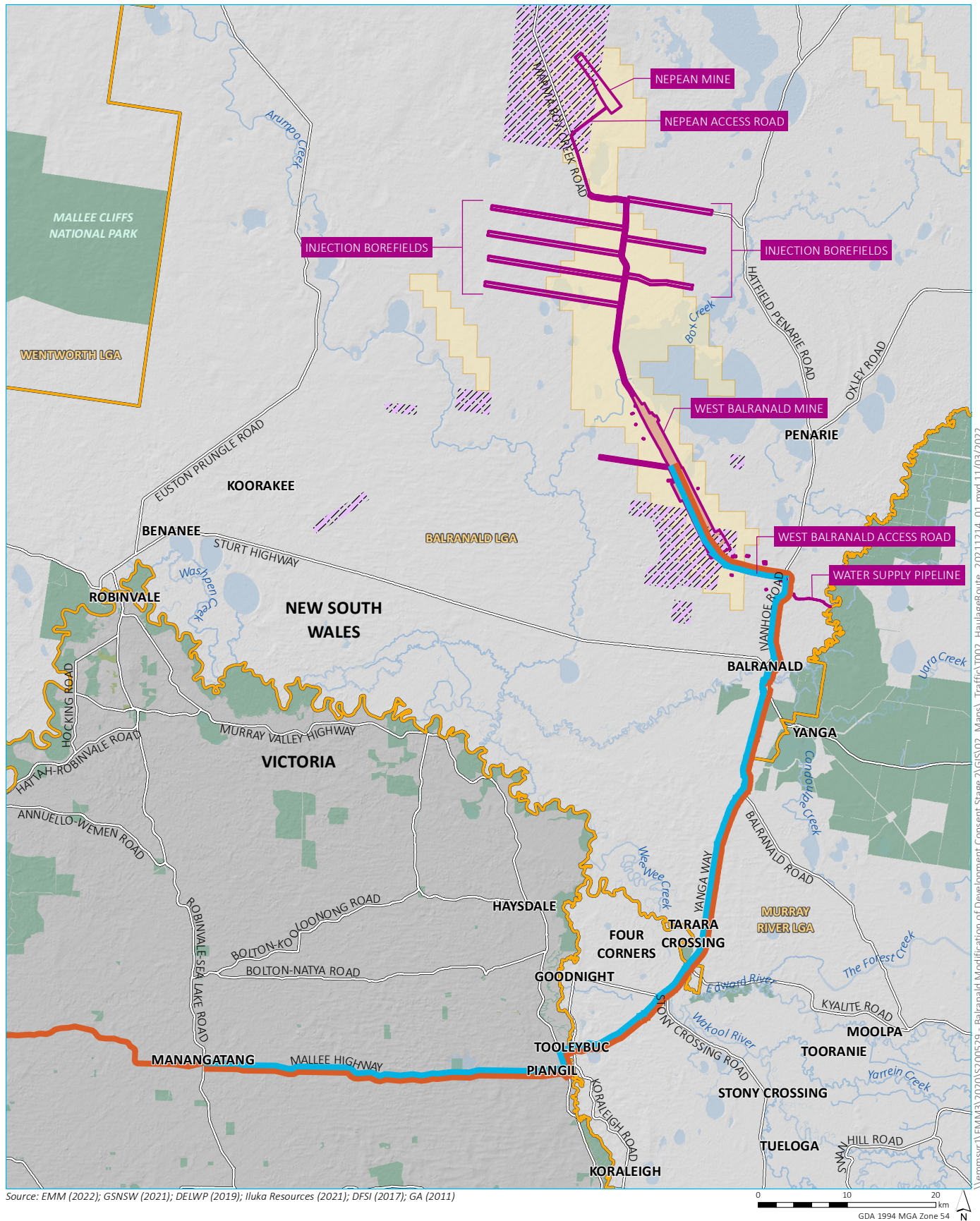


KEY

- EIS Approved Balranald Project Area (SSD-5285)
- Approved EIS construction route
- Exploration Licence (EL7450)
- Mining Lease (ML1736)
- Southern Mallee Conservation Area (2015)
- Major road
- Named watercourse
- Waterbody
- NPWS reserve
- State forest
- Local government area

Approved EIS construction routes

Balranald Mineral Sands Project
Traffic impact assessment
Figure 1.3



KEY

- | | |
|--|--|
| EIS Approved Balranald Project Area (SSD-5285) | Major road |
| HMC transport to Hopetoun or Hamilton | Named watercourse |
| Ilmenite transport to Manangatang | Waterbody |
| Exploration Licence (EL7450) | NPWS reserve |
| Mining Lease (ML1736) | State forest |
| Southern Mallee Conservation Area (2015) | Local government area |

Approved EIS operation haulage route

Balranald Mineral Sands Project
Traffic impact assessment
Figure 1.4

2 Existing conditions

This section outlines the existing road network and the existing traffic volumes.

2.1 Road hierarchy

The NSW administrative road hierarchy comprises the following road classifications, which align with the generic road hierarchy are as follows:

- State roads – freeways and primary arterials (managed by Transport for New South Wales (TfNSW)).
- Regional roads – secondary or sub arterials (managed by Balranald Shire Council (BSC) and part funded by the State).
- Local roads – collector and local access roads (managed by BSC).

2.2 Existing road network

The existing road network is shown in Figure 1.3 and Figure 1.4 with the key roads including:

- Sturt Highway (named Market Street within Balranald township);
- Balranald-Ivanhoe Road (known as Mayall Street within Balranald);
- Balranald-Tooleybuc Road (also known as Mallee Highway and Yanga Way);
- McCabe Street;
- Piper Street;
- O'Connor Street; and
- Moa Street.

2.2.1 Sturt Highway

A summary of the key traffic aspects for Sturt Highway is outlined in Table 2.1 with a photograph provided as Plate 2.1.

Table 2.1 Sturt Highway (named Market Street within Balranald township)

Aspect	Description
Road classification and connectivity	State road between Hume Highway Tarcutta (east) and bridge over the Murray River at Mildura (west)
Alignment	East-west
Number of lanes	One lane each direction and sealed shoulders
Carriageway type	Sealed road
Carriageway width	9 m sealed pavement width including sealed shoulder width
Posted speed limit	110 km/h in rural areas, reducing to 50 km/h in urbanised areas and townships
Heavy vehicle access	Yes, approved 25/26 m B-double and Type 1 A-double route
Existing traffic function	Carries regional and local traffic
Proposed function for MOD1	Carry construction traffic (including OSOM vehicles)



Plate 2.1 Sturt Highway (looking westbound near Endeavour Drive)

2.2.2 Balranald-Ivanhoe Road

A summary of the key traffic aspects for Balranald-Ivanhoe Road is outlined in Table 2.2 with a photograph of provided as Plate 2.2.

Table 2.2 Balranald-Ivanhoe Road (known as Mayall Street within Balranald)

Aspect	Description
Road classification and connectivity	Local road between Sturt Highway at Balranald (south) and Cobb Highway at Ivanhoe (north)
Alignment	North-south
Number of lanes	One lane each direction with no edge markings and no sealed shoulders
Carriageway type	Sealed road
Carriageway width	Sealed pavement width including shoulders varies between 6.2 m to 7.4 m
Posted speed limit	100 km/h outside Balranald town (rural areas), reducing to 50 km/h along Mayall Street (urbanised areas)
Heavy vehicle access	Yes, approved 25/26 m B-double route
Existing traffic function	Carries regional and local traffic
Proposed function for MOD1	Carry construction (including OSOM vehicles) and operations traffic (eg product haulage)



Plate 2.2 Balranald-Ivanhoe Road (looking north from Moa Street)

2.2.3 Balranald-Tooleybuc Road

A summary of the key traffic aspects for Balranald-Tooleybuc Road is outlined in Table 2.3 with a photograph provided as Plate 2.3.

Table 2.3 Balranald-Tooleybuc Road (also known as Mallee Highway & Yanga Way)

Aspect	Description
Road classification and connectivity	State road between Sturt Highway, 2.8 km south of Balranald (north) and existing Tooleybuc Bridge over the Murray River at Tooleybuc (south)
Alignment	Generally north-south
Number of lanes	Generally has two lanes with marked edge lines which define narrow sealed shoulders
Carriageway type	Sealed road
Carriageway width	Sealed pavement width including shoulders varies between 7.1 m to 8.2 m
Posted speed limit	100 km/h outside Tooleybuc town, reducing to 50 km/h within Tooleybuc township
Heavy vehicle access	Yes, approved 25/26 m B-double route
Existing traffic function	Carries regional and local traffic
Proposed function for MOD1	Carry construction traffic and operations traffic (eg product haulage)
Additional comments	Tooleybuc bridge over Murray River is 3.7 m wide and restricted to B-doubles and one direction of traffic at any given time. Traffic speed on the bridge is restricted to 40 km/h. OSOM vehicles via this bridge is not permitted due to the narrowness of the bridge.



Plate 2.3 Balranald-Tooleybuc Road (looking southbound, 650 m from Sturt Highway)

2.2.4 McCabe Street

A summary of the key traffic aspects for McCabe Street is outlined in Table 2.4 with a photograph provided as Plate 2.4.

Table 2.4 McCabe Street

Aspect	Description
Road classification and connectivity	Local road between Balranald-Ivanhoe Road (north) and Sturt Highway (south)
Alignment	North-south
Number of lanes	One lane each direction with no lane markings or sealed shoulders
Carriageway type	Sealed road
Carriageway width	Sealed width including shoulders varies between 6.6 m to 7.0 m
Posted speed limit	80 km/h
Heavy vehicle access	Yes, approved 25/26 m B-double route
Existing traffic function	Carries local traffic
Proposed function for MOD1	Carry construction traffic (including OSOM vehicles) and operations traffic (eg product haulage)



Plate 2.4 McCabe Street (looking west towards Balranald-Ivanhoe Road)

2.2.5 Piper Street

A summary of the key traffic aspects for Piper Street is outlined in Table 2.5 with a photograph provided as Plate 2.5.

Table 2.5 Piper Street

Aspect	Description
Road classification and connectivity	Local road between O'Connor Street (north) and Sturt Highway (south)
Alignment	North-south
Number of lanes	Narrow two-lane seal with no road markings and vegetation growing along its shoulders
Carriageway type	Sealed road
Carriageway width	6 m sealed pavement width including sealed shoulder width
Posted speed limit	50 km/h
Heavy vehicle access	Yes, approved 25/26 m B-double route
Existing traffic function	Carries local traffic
Proposed function for MOD1	Carry construction traffic (including OSOM vehicles)



Plate 2.5 Piper Street (looking south towards Sturt Highway)

2.2.6 O'Connor Street

A summary of the key traffic aspects for O'Connor Street is outlined in Table 2.6 with a photograph provided as Plate 2.6.

Table 2.6 O'Connor Street

Aspect	Description
Road classification and connectivity	Local road between Piper Street (west) and Moa Street (east)
Alignment	East-west
Number of lanes	Narrow two-lane wide seal with no road markings or sealed shoulders
Carriageway type	Sealed road
Carriageway width	6.1 m sealed pavement width including sealed shoulder width
Posted speed limit	50 km/h
Heavy vehicle access	Yes, approved 25/26 m B-double route
Traffic function	Carries local traffic
Proposed function for MOD1	Carry construction traffic (including OSOM vehicles)



Plate 2.6 O'Connor Street (looking east from Piper Street/O'Connor Street intersection)

2.2.7 Moa Street

A summary of the key traffic aspects for Moa Street is outlined in Table 2.7 with a photograph provided as Plate 2.7.

Table 2.7 Moa Street

Aspect	Description
Road classification and connectivity	Local road between Balranald-Ivanhoe Road (north) and Turandurey Street (south)
Alignment	North-east and south-west
Number of lanes	Two lanes wide with a variable sealed width. It is wider at its southern end towards the Sturt Highway. There are generally no road markings or sealed shoulders.
Carriageway type	Sealed road
Carriageway width	5.9 m sealed pavement width including sealed shoulder width
Posted speed limit	50 km/h
Heavy vehicle access	Yes, approved 25/26 m B-double route
Traffic function	Carries local traffic
Proposed function for MOD1	Carry construction traffic (including OSOM vehicles)
Additional comments	Moa Street, south of Sturt Highway predominately carries residential traffic.



Plate 2.7 Moa Street (looking north-east towards Balranald-Ivanhoe Road)

2.3 Key intersections

The three key intersections for the Balranald Project include:

- Sturt Highway (Market Street)/Balranald-Ivanhoe Road (Mayall Street) intersection;
- Balranald-Ivanhoe Road/McCabe Street intersection; and
- Sturt Highway/Tooleybuc Road (Mallee Highway) intersection.

2.3.1 Sturt Highway (Market Street)/Balranald-Ivanhoe Road (Mayall Street) intersection

The existing condition of the Sturt Highway (Market Street)/Balranald-Ivanhoe Road (Mayall Street) intersection is outlined in Table 2.8 with a photograph provided as Plate 2.8.

Table 2.8 Sturt Highway (Market Street)/Balranald-Ivanhoe Road (Mayall Street) intersection

Aspect	Description
Distance from the site	11 km south of the site access road
Intersection control	Priority controlled (give-way) intersection
Major road	Sturt Highway
North approach	One lane on approach and one lane on departure with kerbside parking
South approach	One lane on approach and one lane on departure with kerbside parking
East approach	One lane on approach and one lane on departure separated by short central median and kerbside parking
West approach	One lane on approach and one lane on departure with kerbside parking
Pedestrian connectivity	A refuge island is provided on the north-west approach. Pedestrian ramps are provided on all approaches. Channelised line marking is provided on Sturt Highway to reduce the speed along the retail and shopping precinct.
Traffic function	Predominantly carries regional and local traffic
Speed limit	50 km/h on all approaches
Additional comments	To improve intersection safety and reduce pedestrian exposure on the road surface, blister islands are provided on the north-west approached (both sides).



Plate 2.8 **Sturt Highway (Market Street)/Balranald-Ivanhoe Road (Mayall Street) intersection**

2.3.2 Balranald-Ivanhoe Road/McCabe Street intersection

The existing condition of the Balranald-Ivanhoe Road/McCabe Street intersection is outlined in Table 2.9 with a photograph provided as Plate 2.9.

Table 2.9 Balranald-Ivanhoe Road/McCabe Street intersection

Aspect	Description
Distance from the site	10 km south of the site access road
Intersection control	Priority controlled (give-way) intersection where Ivanhoe Road obtains the priority
Major road	Balranald-Ivanhoe Road
North approach	One lane on approach and one lane on departure
South approach	One lane on approach and one lane on departure
East approach	One lane on approach and one lane on departure, no lane markings
Pedestrian connectivity	No pedestrian connectivity on any approach
Traffic function	Predominantly carries local traffic
Speed limit	100 km/h on Ivanhoe Road and 80 km/h on McCabe Street



Plate 2.9 Balranald-Ivanhoe Road/McCabe Street intersection

2.3.3 Sturt Highway/Tooleybuc Road (Mallee Highway) intersection

The existing condition of the Sturt Highway/Tooleybuc Road (Mallee Highway) intersection is outlined in Table 2.10 with a photograph provided as Plate 2.10.

Table 2.10 Sturt Highway/Tooleybuc Road (Mallee Highway) intersection

Aspect	Description
Distance from the site	14 km south of the site access road
Intersection control	Priority controlled (give-way) intersection
Major road	Sturt Highway
North approach	One full lane and one acceleration lane on approach and two lanes on departure (see additional comments)
South approach	One full lane and one deceleration lane on approach and two lanes on departure (see additional comments)
East approach	One lane on approach and one lane on departure
Pedestrian connectivity	No pedestrian connectivity on any approach
Traffic function	Predominantly carries regional traffic
Speed limit	90 km/h on Sturt Highway and 100 km/h on Mallee Highway
Additional comments	On Sturt Highway (A20), a dedicated left turn lane (deceleration lane) is provided onto Mallee Highway. Similarly, an acceleration lane is provided on the north-west approach. However, for the south-eastbound traffic on Sturt Highway, no dedicated right turn bay is provided. Two lanes south-eastbound means the middle lane acts as a defacto axillary right turn bay (AUR), however, the kerbside lane continues to the south which becomes a left turn bay onto Duryea Street.

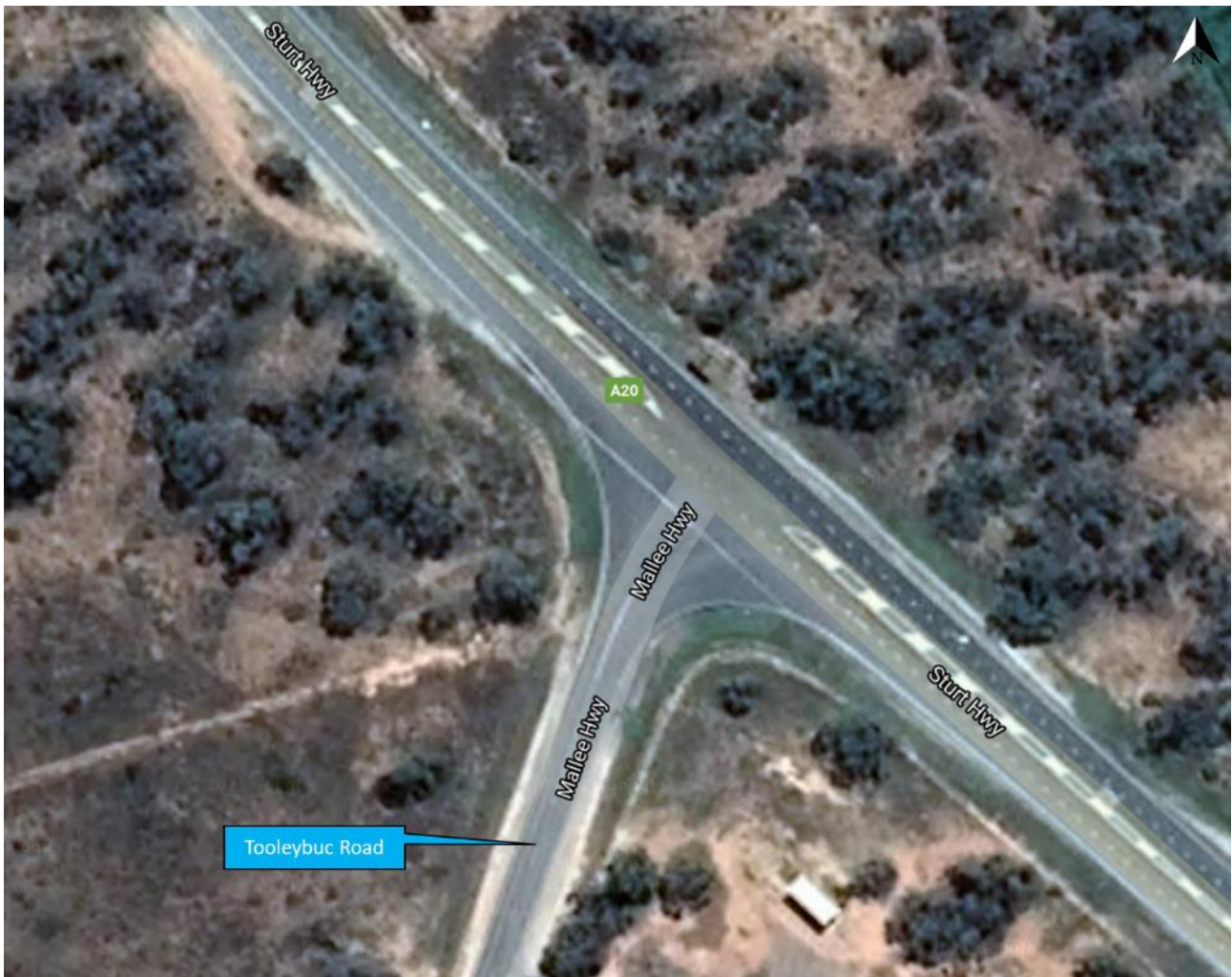


Plate 2.10 **Sturt Highway/Tooleybuc Road intersection**

2.4 Baseline traffic volumes

Baseline traffic volumes (daily and peak hourly) have been extracted from the transport assessment report (EMM 2015). A linear growth rate of 2.5% per annum has been applied to estimate the predicted baseline volumes at the commencement of construction (in 2023) and commencement of operations (in 2025).

For road sections where peak hour traffic volumes were not available, it has been assumed that peak hour volumes would be 10% of the daily traffic volumes.

The baseline daily traffic volumes, heavy vehicles, and peak hours for the assessment of 2023 construction and 2025 operations traffic for the proposed MOD1 are presented in Table 2.11 and Table 2.12.

Table 2.11 Predicted baseline traffic volumes for commencement of construction (2023)

Road	Daily traffic volumes		Peak hourly traffic volumes ³	
	All traffic	Heavy vehicles	AM	PM
Balranald-Ivanhoe Road (north of Oxley Road)	72	18	7	7
Balranald-Ivanhoe Road (5 km north of Sturt Highway)	371	92	37	37
Balranald-Ivanhoe Road (north of Moa Street)	506	120	35	49
Mayall Street (north of Market Street)	859	86	72	98
McCabe Street (southern end)	166	68	14	13
Sturt Highway (1 km south of Balranald)	1,786	601	98	128
Sturt Highway (east of Balranald-Tooleybuc Rd)	1,386	485	139	139
Sturt Highway (Euston, east of Murray Bridge Road)	1,738	608	174	174
Balranald-Tooleybuc Road (northern section)	677	164	40	52
Balranald-Tooleybuc Road (southern section)	466	111	25	39
Balranald-Tooleybuc Road (at existing Tooleybuc Bridge)	1,199	218	93	90
Arumpo Road (western section)	36	3	4	4
Arumpo Road (eastern section)	24	2	2	2
Burke and Wills Road (northern end)	12	1	1	1
Burke and Wills Road (southern end)	24	2	2	2
Piper Street (at Sturt Highway)	85	9	8	8
Moa Street (at Sturt Highway)	436	22	44	44
Moa Street (north of O'Connor Street)	121	12	12	12
O'Connor Street (west of Moa Street)	145	14	15	15
Market Street Sturt Highway (west of Mayall Street)	3,575	660	250	341

³ Throughout this report peak hours are 8.00 am – 9.00 am (AM peak) and 4.00 pm – 5.00 pm (PM peak).

Table 2.12 Predicted baseline traffic volumes for commencement of operations (2025)

Road	Daily traffic volumes		Peak hourly traffic volumes	
	All traffic	Heavy vehicles	AM	PM
Balranald-Ivanhoe Road (north of Oxley Road)	75	18	7	7
Balranald-Ivanhoe Road (5 km north of Sturt Highway)	388	97	39	39
Balranald-Ivanhoe Road (north of Moa Street)	529	125	37	51
Mayall Street (north of Market Street)	898	90	75	103
McCabe Street (southern end)	174	71	15	13
Sturt Highway (1 km south of Balranald)	1,868	628	102	134
Sturt Highway (east of Balranald-Tooleybuc Rd)	1,449	507	145	145
Sturt Highway (Euston, east of Murray Bridge Road)	1,817	636	182	182
Balranald-Tooleybuc Road (northern section)	707	171	42	54
Balranald-Tooleybuc Road (southern section)	488	116	26	40
Balranald-Tooleybuc Road (at existing Tooleybuc Bridge)	1,254	228	97	94
Arumpo Road (western section)	38	3	4	4
Arumpo Road (eastern section)	25	2	3	3
Burke and Wills Road (northern end)	13	1	1	1
Burke and Wills Road (southern end)	25	2	3	3
Piper Street (at Sturt Highway)	89	9	9	9
Moa Street (at Sturt Highway)	455	23	46	46
Moa Street (north of O'Connor Street)	127	13	13	13
O'Connor Street (west of Moa Street)	152	15	15	15
Market Street Sturt Highway (west of Mayall Street)	3,738	690	260	355

2.4.1 Tronox traffic

There is the potential for cumulative traffic impacts associated with the Tronox Mineral Sands project, which is currently in the construction phase. These impacts would comprise increased traffic on certain roads, primarily on Balranald-Ivanhoe Road and Sturt Highway.

Traffic volumes associated with the construction and operations of the Tronox Mineral Sands project have been extracted from the Transport Planning Partnership (TPPP) report⁴ as presented in Table 2.13.

⁴ <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-5012-MOD-1%2120190802T011738.319%20GMT>

Table 2.13 **Tronox construction and operations traffic volumes**

Road	Tronox traffic volumes (construction)			Tronox traffic volumes (operations)		
	Daily	AM peak	PM peak	Daily	AM peak	PM peak
Balranald-Ivanhoe Road (north of Oxley Road)	58	29	29	64	39	25
Balranald-Ivanhoe Road (5 km north of Sturt Highway)	58	29	29	64	39	25
Balranald-Ivanhoe Road (north of Moa Street)	58	29	29	64	39	25
Mayall Street (north of Market Street)	58	29	29	64	39	25
Sturt Highway (Euston, east of Murray Bridge Road)	2	1	1	2	1	1

3 Traffic generation and distribution for proposed modification

The proposed MOD1 will generate traffic during the construction phase (associated with workforce movements and delivery of construction materials) as well as during the operations phase (associated with workforce movements, product haulage and delivery of mine supplies, consumables, waste removal and other miscellaneous deliveries).

This section outlines the predicted MOD1 related changes in traffic movements. As previously stated, the construction and operations haulage routes for the proposed MOD1 are the same route that were approved for the EIS.

3.1 Construction traffic

Construction traffic will typically travel from Balranald, Mildura, Swan Hill, and Hay to the site (and back) with the proposed MOD1 vehicle movements⁵ as shown in Table 3.1.

Note, in Table 3.1 one movement equates to one vehicle travelling inbound (ie two movements constitute a round trip).

⁵ Traffic movements were extracted from the Construction Planning – Traffic Volumes report (2020 Wave International) (Appendix B).

Table 3.1 **MOD1 construction traffic movements**

No.	Type of vehicle	Duration (months)	Total movements during the whole construction period	Peak monthly movements	Average daily movements for peak month	Peak daily movements for peak month
1	Work vehicles					
1.1	Utes (between camp to site)	16	12,060	900	26	36
1.2	Utes to Balranald town	16	4,800	300	10	30
1.3	Buses and vans	14	6,500	680	15	23
1.4	Trucks	12	3,000	240	8	8
1.5	Personal vehicles	16	4,200	376	9	39
2	Deliveries – general					
2.1	Potable water	16	640	56	1	2
2.2	Food, laundry and kitchen supplies	16	2,560	226	5	8
3	Deliveries – construction equipment					
3.1	Tooling and storage	16	56	-	0	0
3.2	Lifting and handling	16	256	16	1	1
4	Deliveries – construction materials					
4.1	Gravel	11	10,700	973	34	34
4.2	Ag Lime and Limestone	4	330	83	3	3
4.3	Concrete	3	188	-	2	0
4.4	Rebar/mesh grating and sheet piles	2	40	-	1	0
4.5	Fencing/posts and Wire	12	80	8	0	0
5	Mobile plant (heavy equipment)					

Table 3.1 MOD1 construction traffic movements

No.	Type of vehicle	Duration (months)	Total movements during the whole construction period	Peak monthly movements	Average daily movements for peak month	Peak daily movements for peak month
5.1	Cranage	6	32	4	0	0
5.2	Concrete pumping truck	2	4	-	0	0
5.3	Excavators	13	20	-	0	0
5.4	Grades/scrapers and tipper trucks	13	36	-	0	0
5.5	Dozers/front-end loaders	11	20	1	0	0
6	Deliveries – offices and demountable					
6.1	Deliveries of site offices	4	80	-	1	0
6.2	Deliveries of camp demountable(s)	4	160	-	1	0
7	Deliveries – plant and equipment					
7.1	Deliveries of plant (New)	5	160	40	1	1
7.2	Deliveries of plant (Relocated)	1	12	-	0	0
8	Waste removal					
8.1	Sewerage	16	192	17	0	1
8.2	General waste/rubbish	16	160	6	0	0
8.3	Tracked waste	14	28	2	0	0
8.4	Metal recycling	10	10	1	0	0
8.5	Cardboard collection	14	56	2	0	0
8.6	Servicing waste and tyres	16	128	8	0	0

Note: - means no data available

The MOD1 construction traffic distribution percentages are shown in Table 3.2. Necessary assumptions have been made where information is unavailable, for example the peak hour construction traffic volumes are assumed to be 30% of the daily traffic volumes.

Table 3.2 MOD1 construction traffic distribution percentages (to the external Major Roads)

No.	Type of vehicle movements	Direction of vehicle movements	Balranald	Mildura	Swan Hill	Hay (via Sturt Highway)	Tooleybuc	Hay (via Oxley Road)
1	Work vehicles/personnel							
1.1	Utes	Between site and accommodation facility camp (Internal Roads Only)	0%	0%	0%	0%	0%	0%
1.2	Utes to Balranald town	Between Balranald township and site	100%	0%	0%	0%	0%	0%
1.3	Buses and vans	Within project area between accommodation facility camp and site (Internal Roads Only)	0%	0%	0%	0%	0%	0%
1.4	Trucks	Within project area (Internal Roads Only)	0%	0%	0%	0%	0%	0%
1.5	Personal vehicles	Between site and Balranald, Mildura, Hay, and Swan Hill	50%	30%	10%	10%	0%	0%
2	Deliveries – general							
2.1	Potable water	Between Balranald and site/accommodation facility camp	100%	0%	0%	0%	0%	0%
2.2	Food, laundry & kitchen supplies	Between site and Mildura, Swan Hill, and Hay	0%	50%	25%	25%	0%	0%
3	Deliveries – construction equipment						0%	0%
3.1	Tooling and storage	From Hay, Swan Hill, Mildura, and Balranald	50%	30%	10%	10%	0%	0%
3.2	Lifting and handling	From Mildura	0%	100%	0%	0%	0%	0%

Table 3.2 MOD1 construction traffic distribution percentages (to the external Major Roads)

No.	Type of vehicle movements	Direction of vehicle movements	Balranald	Mildura	Swan Hill	Hay (via Sturt Highway)	Tooleybuc	Hay (via Oxley Road)
4	Deliveries – construction materials							
4.1	Gravel	Initially along the Balranald-Ivanhoe Road between the Burke and Wills Road and the site access road, and then via the Tooleybuc bridge from Victoria to the construction site.	0%	0%	0%	0%	100%	0%
4.2	Ag lime and limestone	The source of the lime/limestone is expected to be Forbes, 495 km away. Trucks would use the Newell Highway (A39), Mid-Western Highway to Hay, and then Market Street to access Sturt Highway to Balranald, and then McCabe Street to Balranald-Ivanhoe Road to the site access road	0%	0%	0%	100%	0%	0%
4.3	Concrete	Balranald or Hay, via Balranald-Ivanhoe Road (Balranald) or Oxley Road (Hay)	50%	0%	0%	0%	0%	50%
4.4	Rebar/mesh grating and sheet piles	-	50%	30%	10%	10%	0%	0%
4.5	Fencing/posts and wire	From Mildura	0%	100%	0%	0%	0%	0%
5	Mobile plant (heavy equipment)							
5.1	Cranage	Mildura via Sturt Highway and Balranald-Ivanhoe Road	0%	100%	0%	0%	0%	0%
5.2	Concrete pumping truck	Mildura via Sturt highway and Balranald-Ivanhoe Road	0%	100%	0%	0%	0%	0%

Table 3.2 MOD1 construction traffic distribution percentages (to the external Major Roads)

No.	Type of vehicle movements	Direction of vehicle movements	Balranald	Mildura	Swan Hill	Hay (via Sturt Highway)	Tooleybuc	Hay (via Oxley Road)
5.3	Excavators	Mildura via Sturt Highway and Ivanhoe Road or Hay via Sturt Highway and Balranald-Ivanhoe Road	0%	100%	0%	0%	0%	0%
5.4	Grades/scrapers and tipper trucks	These are likely supplied from Mildura via Sturt Highway and Ivanhoe Road to the site access road or from Hay via Sturt Highway and Balranald-Ivanhoe Road to the site access road.	0%	50%	0%	50%	0%	0%
5.5	Dozers/front-end loaders	-	-	-	-	-	-	-
6	Deliveries – offices and demountable							
6.1	Deliveries of site offices	-	-	-	-	-	-	-
6.2	Deliveries of camp demountable(s)	-	-	-	-	-	-	-
7	Deliveries – plant and equipment							
7.1	Deliveries of plant (new)	This will predominantly be new equipment transported from Adelaide (via Sturt Highway, Mildura to Balranald and to site via Ivanhoe Road) or Melbourne (via 2, M79/A79/A790 and the Murray Valley Highway to Robinvale, and then via Sturt Highway to Balranald and to site via Balranald-Ivanhoe Road), with additional sources from Mildura/Buronga, utilising the Sturt Highway and Ivanhoe Road to site	0%	100%	0%	0%	0%	0%

Table 3.2 MOD1 construction traffic distribution percentages (to the external Major Roads)

No.	Type of vehicle movements	Direction of vehicle movements	Balranald	Mildura	Swan Hill	Hay (via Sturt Highway)	Tooleybuc	Hay (via Oxley Road)
8	Waste removal							
8.1	Sewerage	The collection trucks will travel from Hay or Swan Hill an average of 6 times per month for 12 movements, peaking at 9 a month for August 2023	0%	0%	50%	50%	0%	0%
8.2	General waste/rubbish	General refuse will be transported to the Balranald landfill facility from both the site and accommodation facility camp	100%	0%	0%	0%	0%	0%
8.3	Tracked waste	-	-	-	-	-	-	-
8.4	Metal recycling	Metal recycling will be transported to the Balranald landfill facility from site	100%	0%	0%	0%		
8.5	Cardboard collection	Cardboard recycling will be transported to the Balranald landfill facility from site	100%	0%	0%	0%		
8.6	Servicing waste and tyres	-	-	-	-	-		

Note: - means no data available

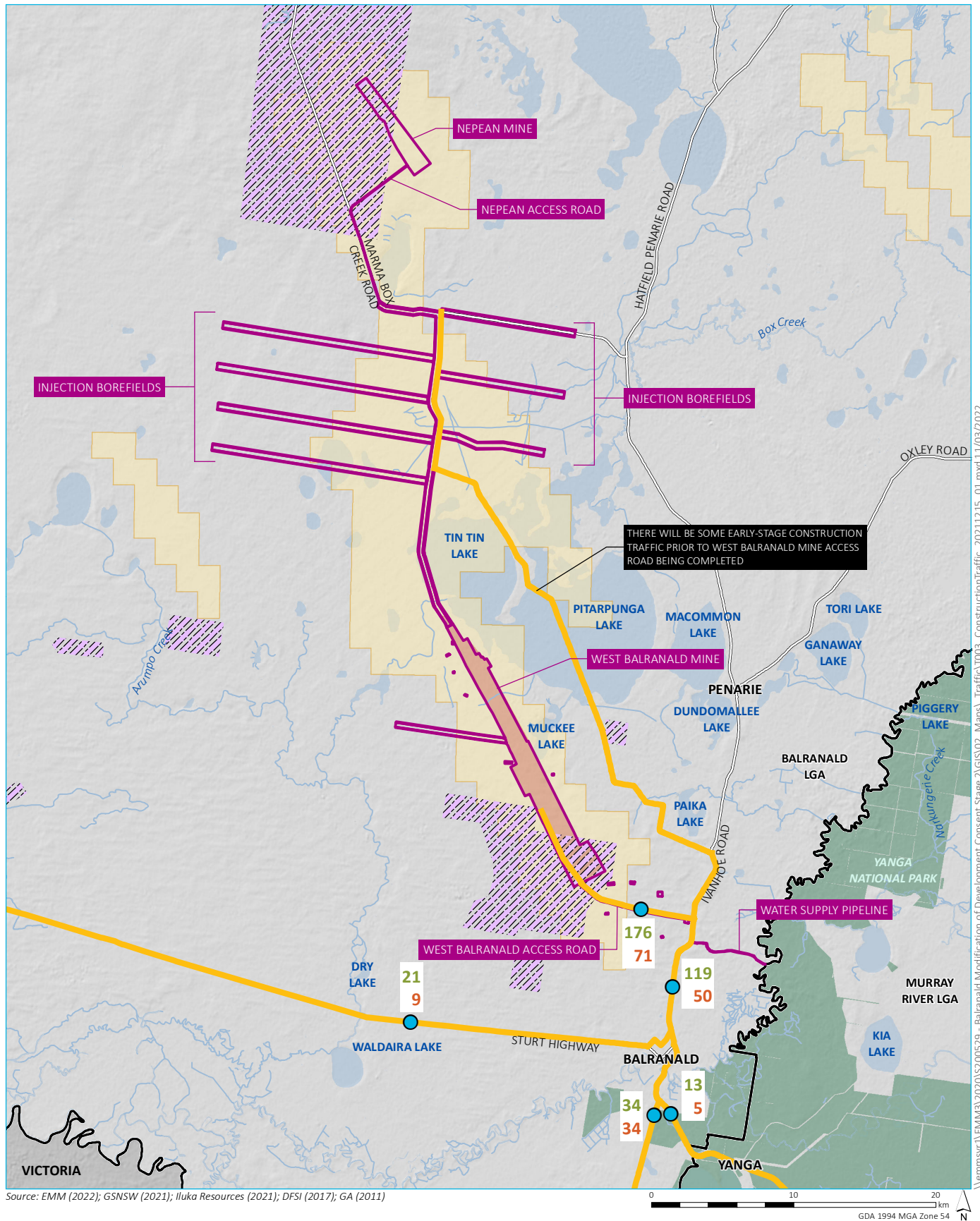
The MOD1 construction daily and peak hour traffic movements are shown in Table 3.3 and Figure 3.1.

Table 3.3 MOD1 construction daily and peak hour traffic movements

Road	Daily		Peak hour	
	All traffic	Heavy vehicles	AM	PM
Balranald-Ivanhoe Road (north of Oxley Road)	-	-	-	-
Balranald-Ivanhoe Road (5 km north of Sturt Highway)	119	50	36	36
Balranald-Ivanhoe Road (north of Moa Street)	119	50	36	36
Mayall Street (north of Market Street)	2	2	1	1
McCabe Street (southern end)	50	42	15	15
Sturt Highway (1 km south of Balranald)	47	39	14	14
Sturt Highway (east of MR 67 Balranald-Tooleybuc Rd)	13	5	4	4
Sturt Highway (Euston, east of Murray Bridge Road)	21	9	6	6
Balranald-Tooleybuc Road (northern section)	34	34	10	10
Balranald-Tooleybuc Road (southern section)	34	34	10	10
Balranald-Tooleybuc Road (at existing Tooleybuc Bridge)	34	34	10	10
Arumpo Road (western section)	-	-	-	-
Arumpo Road (eastern section)	-	-	-	-
Burke and Wills Road (northern end)	-	-	-	-
Burke and Wills Road (southern end)	-	-	-	-
Piper Street (at Sturt Highway)	6	6	2	2
Moa Street (at Sturt Highway)	12	0	4	4
Moa Street (north of O'Connor Street)	18	6	5	5

Table 3.3 MOD1 construction daily and peak hour traffic movements

Road	Daily		Peak hour	
	All traffic	Heavy vehicles	AM	PM
O'Connor Street (west of Moa Street)	6	6	2	2
Market Street Sturt Highway (west of Mayall Street)	-	-	-	-
Balranald West Mine Access Road	176	71	53	53



KEY

- EIS Approved Balranald Project Area (SSD-5285)
- Projected construction traffic movements
all traffic / heavy vehicles
- Construction access routes
- Exploration Licence (EL7450)
- Mining Lease (ML1736)
- Southern Mallee Conservation Area (2015)
- Major road
- Watercourse/drainage line
- Waterbody
- NPWS reserve
- Local government area

MOD1 construction daily
traffic movements

Balranald Mineral Sands Project
Traffic impact assessment
Figure 3.1

3.1.1 Over size over mass vehicles

MOD1 will require the use of oversize and overmass (OSOM) vehicles for the delivery of large plant and equipment during construction, typically along the Sturt Highway via Robinvale/Euston, west of Balranald.

Oversize vehicles are vehicles over 19 m in length, 2.5 m in width and 4.3 m high. Overmass vehicles are vehicles with a gross mass over 42.5 tonnes.

MOD1 does not propose to change volumes and routes of OSOM vehicles from those approved in the EIS.

3.1.2 Cumulative construction traffic

The cumulative traffic for the construction period is outlined in Table 3.4 and comprises:

- baseline construction traffic (Table 2.12);
- Tronox construction traffic (Table 2.13); and
- MOD1 construction traffic (Table 3.3).

Table 3.4 Cumulative construction traffic movements

Road	Daily		Peak hour	
	All traffic	Heavy vehicles	AM	PM
Balranald-Ivanhoe Road (north of Oxley Road)	130	26	36	36
Balranald-Ivanhoe Road (5 km north of Sturt Highway)	481	102	82	82
Balranald-Ivanhoe Road (north of Moa Street)	616	130	80	94
Mayall Street (north of Market Street)	919	96	102	128
McCabe Street (southern end)	216	110	29	28
Sturt Highway (1 km south of Balranald)	1,786	601	98	128
Sturt Highway (east of MR 67 Balranald-Tooleybuc Rd)	1,386	485	139	139
Sturt Highway (Euston, east of Murray Bridge Road)	1,740	610	175	175
Balranald-Tooleybuc Road (northern section)	711	198	50	62
Balranald-Tooleybuc Road (southern section)	466	111	25	39
Balranald-Tooleybuc Road (at existing Tooleybuc Bridge)	1,199	218	93	90
Arumpo Road (western section)	36	3	4	4
Arumpo Road (eastern section)	24	2	2	2
Burke and Wills Road (northern end)	12	1	1	1

Table 3.4 Cumulative construction traffic movements

Road	Daily		Peak hour	
	All traffic	Heavy vehicles	AM	PM
Burke and Wills Road (southern end)	24	2	2	2
Piper Street (at Sturt Highway)	91	15	10	10
Moa Street (at Sturt Highway)	448	22	47	47
Moa Street (north of O'Connor Street)	139	18	18	18
O'Connor Street (west of Moa Street)	151	20	16	16
Market Street Sturt Highway (west of Mayall Street)	3,575	660	250	341
Balranald West Mine Access Road	176	71	53	53

3.1.3 Comparison of construction traffic

MOD1 will generate less construction traffic than was approved in the EIS. A comparison between the approved EIS and proposed MOD1 construction traffic volumes is presented in Table 3.5.

Table 3.5 Comparison of EIS and MOD1 construction traffic movements

Road	EIS cumulative daily traffic volumes		MOD1 cumulative daily traffic volumes		Change in traffic volumes	
	All traffic	Heavy vehicles	All traffic	Heavy vehicles	All traffic %	
Balranald-Ivanhoe Road (north of Oxley Road)	179	24	130	26	-49	-27
Balranald-Ivanhoe Road (5 km north of Sturt Highway)	755	264	481	102	-274	-36
Balranald-Ivanhoe Road (north of Moa Street)	878	289	616	130	-262	-30
Mayall Street (north of Market Street)	913	100	919	96	6	1
McCabe Street (southern end)	309	193	216	110	-93	-30
Sturt Highway (1 km south of Balranald)	1,782	677	1,786	601	4	0
Sturt Highway (east of MR 67 Balranald-Tooleybuc Rd)	1,282	449	1,386	485	104	8
Sturt Highway (Euston, east of Murray Bridge Road)	1,710	580	1,740	610	30	2
Balranald-Tooleybuc Road (northern section)	751	272	711	198	-40	-5
Balranald-Tooleybuc Road (southern section)	560	224	466	111	-94	-17
Balranald-Tooleybuc Road (at existing Tooleybuc Bridge)	1,226	321	1,199	218	-27	-2

Table 3.5 Comparison of EIS and MOD1 construction traffic movements

Road	EIS cumulative daily traffic volumes		MOD1 cumulative daily traffic volumes		Change in traffic volumes	
	All traffic	Heavy vehicles	All traffic	Heavy vehicles	All traffic %	
Arumpo Road (western section)	33	3	36	3	3	9
Arumpo Road (eastern section)	22	2	24	2	2	9
Burke and Wills Road (northern end)	33	13	12	1	-21	-64
Burke and Wills Road (southern end)	44	14	24	2	-20	-45
Piper Street (at Sturt Highway)	102	33	91	15	-11	-11
Moa Street (at Sturt Highway)	501	22	448	22	-53	-11
Moa Street (north of O'Connor Street)	241	38	139	18	-102	-42
O'Connor Street (west of Moa Street)	157	38	151	20	-6	-4
Market Street Sturt Highway (west of Mayall Street)	3,274	606	3,575	660	301	9

3.2 Operations traffic

Operations traffic will comprise product haulage, workforce traffic and receipt of deliveries.

3.2.1 Product haulage

Product haulage traffic volumes for the approved EIS and for the proposed MOD1 are outlined in Table 3.6.

Table 3.6 Product haulage traffic (daily)

Details	Approved EIS		MOD1		A-Doubles (for comparison purposes only) ⁶	
	B-Doubles		B-Doubles			
	HMC	Ilmenite	HMC	Ilmenite	HMC	Ilmenite
TPA	500,000	600,000	200,000	300,000	200,000	300,000
Trucking distance – one way	To Hopetoun – 270 km	To Manangatang – 125 km	To Hopetoun – 270 km	To Hopetoun – 270 km	To Hopetoun – 270 km	To Hopetoun – 270 km
	To Hamilton MSP – 520 km		To Hamilton MSP – 520 km	To Hamilton MSP – 520 km	To Hamilton MSP – 520 km	To Hamilton MSP – 520 km
Round Trips per annum	12,500	15,000	5,000	7,500	3,571	5,357
Round Trips per day (movements)	35 (70)	40 (80)	14 (28)	20 (40)	10 (20)	15 (30)

⁶ A-doubles are not allowed via Tooleybuc as per the TfNSW Road Train Network [Map](#) v1.0

Whilst not proposed for MOD1, Table 3.6 includes product haulage via A-doubles to demonstrate the reduction in daily traffic movements compared to B-Doubles.

3.2.2 Workforce traffic

Operational workforce-generated traffic volumes for the approved EIS and for the proposed MOD1 are outlined in Table 3.7.

As the proposed MOD1 will require a smaller workforce (ie 124) than the workforce in the approved EIS (ie 385) (ie a 67% reduction), workforce-generated traffic will be reduced. This comprises a reduction from 89 trips per day to 41 trips per day (over a 50% reduction).

Table 3.7 Workforce traffic (daily)

Details	Approved EIS			MOD1		
	Workforce	Bus ⁷	Car ⁸	Workforce	Bus	Car
Total workforce	385			124		
Workforce in accommodation facility camp	366			118		
Workforce from outside	19		19	6		6
Bus from accommodation facility camp to/from West Balranald mine		8			3	
Bus from accommodation facility camp to/from other parts of the project area		4			2	
Light vehicles from accommodation facility camp to/from site			20			10
DIDO ⁹			37			19
FIFO ¹⁰		1			1	
Total trips		13	76		6	35

3.2.3 Deliveries

Delivery-related traffic volumes for the approved EIS and for the proposed MOD1 are outlined in Table 3.8. Given the scale of the MOD1, the delivery traffic is assumed to 44% less than the number of deliveries expected in the approved EIS.

⁷ Throughout this report it is assumed that each bus will carry an average of 30 persons per trip.

⁸ Throughout this report it is assumed that each car will carry an average of 1.2 persons per trip.

⁹ Drive In Drive Out (DIDO)

¹⁰ Fly In Fly Out (FIFO)

Table 3.8 MOD1 daily delivery traffic movements

Type of delivery	Approved EIS	MOD1
	Daily trips (vehicle movements)	Daily trips (vehicle movements)
Hydrated lime	1 (2)	1 (2)
Diesel	3 (6)	2 (4)
Limestone	3 (6)	2 (4)
Potable water supply and wastewater transport	8 (16)	4 (8)
Miscellaneous deliveries and waste removal	10 (20)	5 (10)
Gravel	Included as backloaded with product haulage	Haulage/A
Total trips per day (vehicle movements)	25 (50)	14 (28)

3.2.4 Daily and peak traffic movements

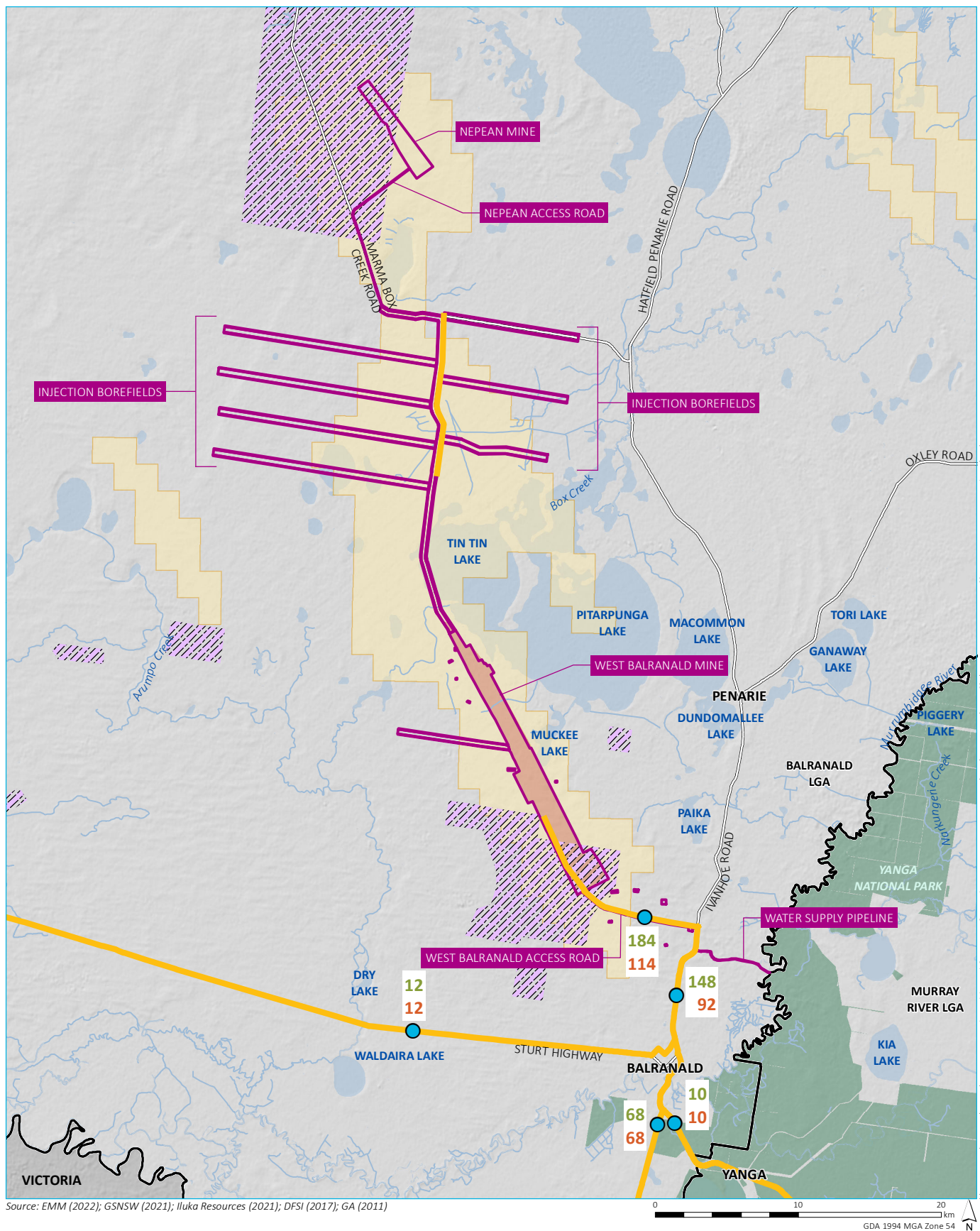
The MOD1 operations daily and peak hour traffic movements are outlined in Table 3.9 and Figure 3.2.

Table 3.9 MOD1 daily and peak hour operations traffic movements

Road	Daily		Peak hour	
	All traffic	Heavy vehicles	AM	PM
Balranald-Ivanhoe Road (north of Oxley Road)	-	-	-	-
Balranald-Ivanhoe Road (5 km north of Sturt Highway)	148	92	44	44
Balranald-Ivanhoe Road (north of Moa Street)	148	92	44	44
Mayall Street (north of Market Street)	80	24	24	24
McCabe Street (southern end)	92	78	28	28
Sturt Highway (1 km south of Balranald)	78	78	23	23
Sturt Highway (east of MR 67 Balranald-Tooleybuc Rd)	10	10	3	3
Sturt Highway (Euston, east of Murray Bridge Road)	12	12	4	4
Balranald-Tooleybuc Road (northern section)	68	68	20	20
Balranald-Tooleybuc Road (southern section)	68	68	20	20
Balranald-Tooleybuc Road (at existing Tooleybuc Bridge)	68	68	20	20

Table 3.9 **MOD1 daily and peak hour operations traffic movements**

Road	Daily		Peak hour	
	All traffic	Heavy vehicles	AM	PM
Arumpo Road (western section)	-	-	-	-
Arumpo Road (eastern section)	-	-	-	-
Burke and Wills Road (northern end)	-	-	-	-
Burke and Wills Road (southern end)	-	-	-	-
Piper Street (at Sturt Highway)	-	-	-	-
Moa Street (at Sturt Highway)	-	-	-	-
Moa Street (north of O'Connor Street)	-	-	-	-
O'Connor Street (west of Moa Street)	-	-	-	-
Market Street Sturt Highway (west of Mayall Street)	6	6	2	2
Balranald West Mine Access Road	184	114	55	55



KEY

- EIS Approved Balranald Project Area (SSD-5285)
- Projected operational traffic movements
all traffic / heavy vehicles
- Operational access routes
- Exploration Licence (EL7450)
- Mining Lease (ML1736)
- Southern Mallee Conservation Area (2015)
- Major road
- Watercourse/drainage line
- Waterbody
- NPWS reserve
- Local government area

MOD1 operation daily traffic movements

Balranald Mineral Sands Project
Traffic impact assessment
Figure 3.2

3.2.5 Cumulative operations traffic

The cumulative traffic for the operation period is outlined in Table 3.10 and comprises:

- baseline operations traffic (Table 2.12);
- Tronox operations traffic (Table 2.13); and
- MOD1 operations traffic (Table 3.3).

Table 3.10 Cumulative operations traffic movements

Road	Daily		Peak hour	
	All traffic	Heavy vehicles	AM	PM
Balranald-Ivanhoe Road (north of Oxley Road)	139	26	46	32
Balranald-Ivanhoe Road (5 km north of Sturt Highway)	600	197	122	108
Balranald-Ivanhoe Road (north of Moa Street)	741	225	120	121
Mayall Street (north of Market Street)	1,042	122	138	152
McCabe Street (southern end)	266	149	42	41
Sturt Highway (1 km south of Balranald)	1,946	706	125	157
Sturt Highway (east of MR 67 Balranald-Tooleybuc Rd)	1,459	517	148	148
Sturt Highway (Euston, east of Murray Bridge Road)	1,831	650	186	186
Balranald-Tooleybuc Road (northern section)	775	239	62	74
Balranald-Tooleybuc Road (southern section)	556	184	46	61
Balranald-Tooleybuc Road (at existing Tooleybuc Bridge)	1,322	296	117	115
Arumpo Road (western section)	38	3	4	4
Arumpo Road (eastern section)	25	2	3	3
Burke and Wills Road (northern end)	13	1	1	1
Burke and Wills Road (southern end)	25	2	3	3
Piper Street (at Sturt Highway)	89	9	9	9
Moa Street (at Sturt Highway)	455	23	46	46
Moa Street (north of O'Connor Street)	127	13	13	13
O'Connor Street (west of Moa Street)	152	15	15	15
Market Street Sturt Highway (west of Mayall Street)	3,744	696	262	357
Balranald West Mine Access Road	184	114	55	55

3.2.6 Operations

MOD1 will generate less operations traffic movements than was approved in the EIS as presented in Table 3.11.

Table 3.11 Comparison of EIS and MOD1 operations traffic movements

Road	EIS cumulative daily traffic volumes		MOD1 cumulative daily traffic volumes		Change in traffic volumes	
	All traffic	Heavy vehicles	All traffic	Heavy vehicles	All traffic %	
Balranald-Ivanhoe Road (north of Oxley Road)	186	37	139	26	-47	-25
Balranald-Ivanhoe Road (5 km north of Sturt Highway)	798	298	600	197	-198	-25
Balranald-Ivanhoe Road (north of Moa Street)	929	324	741	225	-188	-20
Mayall Street (north of Market Street)	956	104	1,042	122	86	9
McCabe Street (southern end)	354	226	266	149	-88	-25
Sturt Highway (1 km south of Balranald)	1,893	732	1,946	706	53	3
Sturt Highway (east of MR 67 Balranald-Tooleybuc Rd)	1,334	465	1,459	517	125	9
Sturt Highway (Euston, east of Murray Bridge Road)	1,753	600	1,831	650	78	4
Balranald-Tooleybuc Road (northern section)	813	310	775	239	-38	-5
Balranald-Tooleybuc Road (southern section)	613	261	556	184	-57	-9
Balranald-Tooleybuc Road (at existing Tooleybuc Bridge)	1,310	362	1,322	296	12	1
Arumpo Road (western section)	59	16	38	3	-21	-36
Arumpo Road (eastern section)	47	14	25	2	-22	-47
Burke and Wills Road (northern end)	12	1	13	1	1	8
Burke and Wills Road (southern end)	23	2	25	2	2	9
Piper Street (at Sturt Highway)	105	32	89	9	-16	-15
Moa Street (at Sturt Highway)	503	23	455	23	-48	-10
Moa Street (north of O'Connor Street)	228	38	127	13	-101	-44
O'Connor Street (west of Moa Street)	162	38	152	15	-10	-6
Market Street Sturt Highway (west of Mayall Street)	3,401	630	3,744	696	343	10

4 Traffic impact assessment

The key intersections associated with proposed MOD1 are:

- Sturt Highway (Market Street)/Balranald-Ivanhoe Road (Mayall Street) intersection;
- Balranald-Ivanhoe Road/McCabe Street intersection;
- Balranald-Ivanhoe Road/West Balranald mine site access intersection; and
- Sturt Highway/Tooleybuc Road (Mallee Highway) intersection.

This section assesses the need for intersection and road upgrades as a result of proposed MOD1.

4.1 Warrants for intersection turn treatments

For the purpose of this report, intersection operations were assessed using a combination of the peak hourly volumes through the intersection plus turning traffic movements at the intersection.

The objective of the assessment was to determine the need for additional intersection turning lanes (eg basic, auxiliary lane and channelised) in accordance with the current intersection design standards (Austroads 2017b) *Guide to Road Design Part 4, Intersections and Crossings General* (Figure 4.1), where:

- Curve 1 (red line) represents the boundary between a basic right turn (BAR) and a channelised short right turn (CHR(S)) turn treatment and between a basic left turn (BAL) and an auxiliary short left turn (AUL(S)) turn treatment.
- Curve 2 (blue line) represents the boundary between a CHR(S) and a full length CHR treatment and between an AUL(S) and a full length AUL or CHL treatment. The choice of CHL over an AUL will depend on factors such as the need to change the give way rule in favour of other manoeuvres at the intersection and the need to define more appropriately the driving path by reducing the area of bitumen surfacing.

Figure 4.1 presents the graphs for the selection of turn treatments on roads with a design speed greater than or equal to 100 km/h (top graph), and design speed lower than 100 km/h (bottom graph), which is appropriate for high-speed rural roads.

TfNSW recommends intersections should be designed for a travel speed 10 km/h greater than the posted speed limit.

For a design speed of 100 km/h or greater, the requirements for additional left or right turn traffic lanes are measured from graph (a) within Figure 4.1.

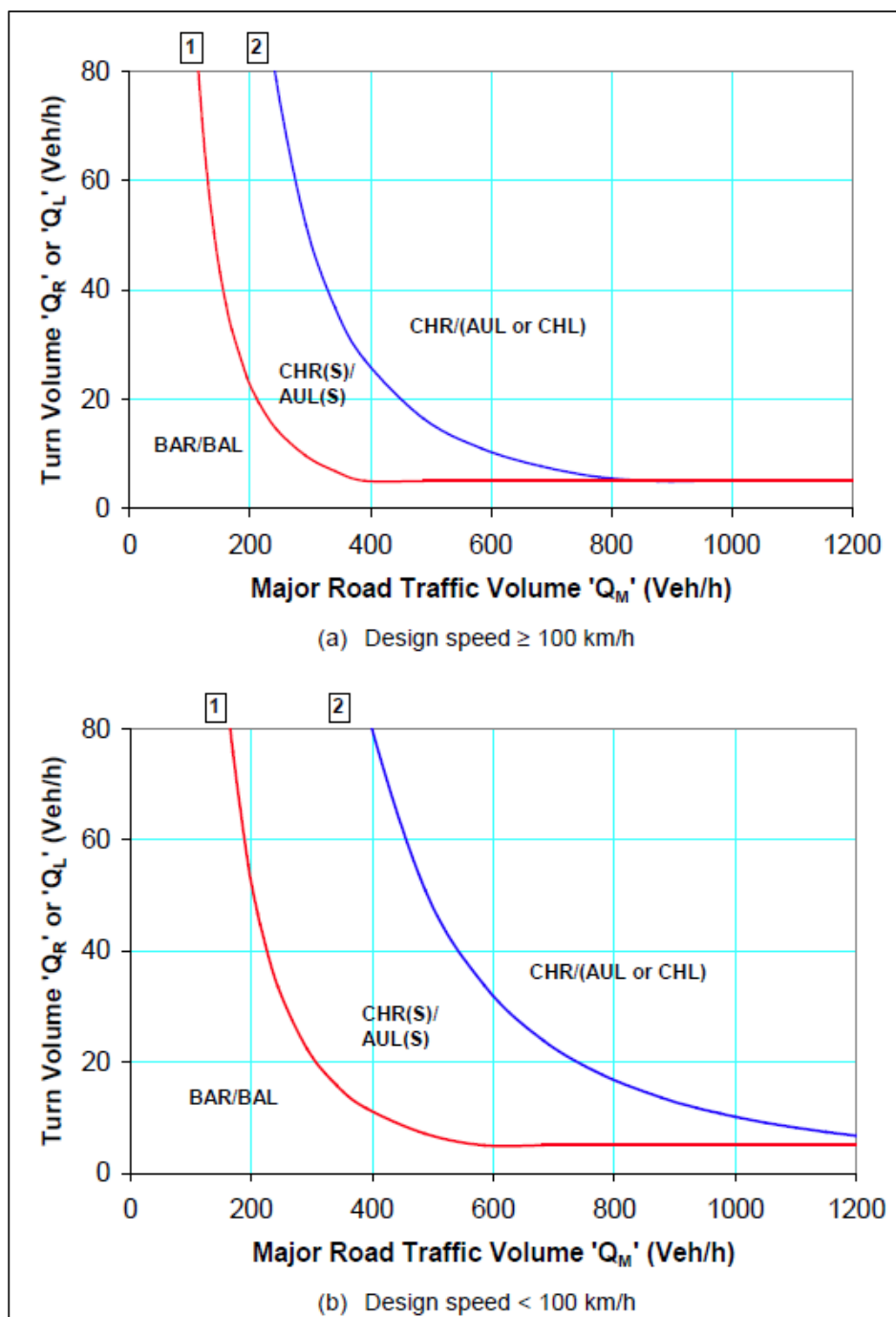


Figure 4.1 Austroads warrant design charts for rural intersection turning lanes

4.1.1.1 Sturt Highway (Market Street)/Balranald-Ivanhoe Road (Mayall Street) intersection

The Sturt Highway (Market Street)/Balranald-Ivanhoe Road (Mayall Street) intersection is not proposed to be used by MOD 1 traffic movements in line with the approved EIS. As per the approved EIS, traffic from the west (Mildura) will travel from Piper Street, O'Connor Street and Moa Street and traffic from the east (Hay, Tooleybuc and Swan Hill) will travel from McCabe Street which provides an eastern heavy vehicle bypass route around the township of Balranald. Hence, a turn treatment assessment has not been done for this intersection.

4.1.2 Balranald-Ivanhoe Road/McCabe Street intersection

The Balranald-Ivanhoe Road/McCabe Street intersection is shown in Plate 2.9.

The current configuration of the Balranald-Ivanhoe Road/McCabe Street intersection is 110 km/h design speed T-junction with no intersection turn treatment. The existing intersection has no turn treatment for either northbound or southbound traffic on Balranald-Ivanhoe Road. Based on the proposed MOD1 cumulative construction and operations traffic volumes for the Balranald-Ivanhoe Road/McCabe Street intersection (Table 4.1 and Table 4.2), the following turn treatments, consistent with the approved EIS, will be required for the project construction and operations traffic:

- a basic right turn treatment (Austroads Type BAR) on the Balranald-Ivanhoe Road northbound approach; and
- a basic left turn treatment (Austroads Type BAL) on the Balranald-Ivanhoe Road southbound approach.

Table 4.1 Intersection turn treatment warrant for Balranald-Ivanhoe Road/McCabe Street (cumulative construction)

Movement	Peak hour	Major road traffic volume	Turning traffic volume	Turn treatment required
Left turn from major road	AM	51	29	BAL
	PM	64	28	BAL
Right turn from major road	AM	131	0	BAR
	PM	156	0	BAR

Table 4.2 Intersection turn treatment warrant for Balranald-Ivanhoe Road/McCabe Street (cumulative operations)

Movement	Peak hour	Major road traffic volume	Turning traffic volume	Turn treatment required
Left turn from major road	AM	69	42	BAL
	PM	76	41	BAL
Right turn from major road	AM	180	0	BAR
	PM	193	0	BAR

4.1.3 Balranald-Ivanhoe Road/West Balranald mine access intersection

The Balranald-Ivanhoe Road/West Balranald mine access intersection does not exist and would be developed as part of the approved Balranald Project.

As the Balranald-Ivanhoe Road has posted speed limit of 100 km/h, the intersection should be designed for 110 km/h.

Based on the project cumulative construction and operations traffic volumes (Table 4.3 and Table 4.4) for the Balranald-Ivanhoe Road/West Balranald mine access intersection, the following turn treatments, consistent with the approved EIS, will be required for the project construction and operations traffic:

- a basic right turn treatment (Austroads Type BAR) on the Balranald-Ivanhoe Road southbound approach; and
- a basic left turn treatment (Austroads Type BAL) on the Balranald-Ivanhoe Road northbound approach.

Table 4.3 Intersection turn treatment warrant for Balranald-Ivanhoe Road/West Balranald mine access (construction)

Movement	Peak hour	Major road traffic volume	Turning traffic volume	Turn treatment required
Left turn from major road	AM	41	26	BAL
	PM	41	26	BAL
Right turn from major road	AM	108	0	BAR
	PM	108	0	BAR

Table 4.4 Intersection turn treatment warrant for Balranald-Ivanhoe Road/West Balranald mine access (operations)

Movement	Peak hour	Major road traffic volume	Turning traffic volume	Turn treatment required
Left turn from major road	AM	61	28	BAL
	PM	54	28	BAL
Right turn from major road	AM	150	0	BAR
	PM	136	0	BAR

4.1.4 Sturt Highway/Tooleybuc Road (Mallee Highway) intersection

The Sturt Highway/Tooleybuc Road (Mallee Highway) intersection is shown in Plate 2.10.

As the Sturt Highway has posted speed limit of 90 km/h, the intersection should be designed for 100 km/h.

The intersection peak hourly turning traffic volumes for the warrant assessment for the MOD1 cumulative construction and cumulative operations is summarised in Table 4.5.

The existing intersection has AUL/AUR turn treatment for northbound and southbound traffic on Sturt Highway. Based on the MOD1 cumulative construction and operations traffic volumes (Table 4.5) for the Sturt Highway/Balranald-Tooleybuc Road intersection, a channelized right turn (short) treatment (Austroads Type CHR(S)) will be required prior to operations stage for right turning traffic on the Sturt Highway southbound approach.

Table 4.5 Intersection turn treatment warrant for Sturt Highway/Tooleybuc Road

Movement	Peak hour	Major road traffic volume	Turning traffic volume	Turn treatment required
Right turn from major road (construction)	AM	98	50	BAR
	PM	128	62	BAR
Right turn from major road (operations)	AM	125	62	BAR
	PM	157	74	CHR(S)

4.2 Warrant for rural road upgrades

To determine the need for rural road upgrades (eg road widening), EMM considered whether the predicted daily traffic movements would exceed the design standard in terms of road width, as per the *Austroads Guide to Road Design Part 3: Geometric Design* (Austroads 2016) (Table 4.6).

Table 4.6 Austroads road design for rural roads

Threshold band (daily traffic volumes)	Design standard
1–150	8.7 m wide total carriage (if unsealed; or minimum 3.7 m wide (if sealed)
150–500	Minimum 7.2 m wide seal
500–1,000	Minimum 7.2 m – 8 m wide seal
1,000–3,000	Minimum 9 m wide seal
> 3,000	Minimum 10 m wide seal

The existing road widths, predicted daily traffic movements for the proposed MOD1 and warrant for rural road upgrades are outlined in Table 4.7.

Table 4.7 Cumulative construction and operations daily traffic volumes and corresponding design standards

Road	Description of road	Cumulative construction daily traffic volume	Cumulative operations daily traffic volume	Existing road width (approximate)	Austrroads Guide to Road Design standard in accordance with daily traffic volume	Will meet Austrroads design standard?
Sturt Highway	State road between Hume Highway Tarcutta (east) and bridge over the Murray River at Mildura (west)	1,786	1,946	9 m sealed pavement width including sealed shoulder width	Minimum 9 m wide seal	Yes
Balranald-Ivanhoe Road	Local road between Sturt Highway at Balranald (south) and Cobb Highway at Ivanhoe (north)	616	741	Sealed pavement width including shoulders varies between 6.2 m to 7.4 m	Minimum 7.2 m – 8 m wide seal	Yes
Balranald-Tooleybuc Road	State road between Sturt Highway, 2.8 km south of Balranald (north) and existing Tooleybuc Bridge over the Murray River at Tooleybuc (south)	711	775	Sealed pavement width including shoulders varies between 7.1 m to 8.2 m	Minimum 7.2 m – 8 m wide seal	Yes
McCabe Street	Local road between Balranald-Ivanhoe Road (north) and Sturt Highway (south)	216	266	Narrow two-lane seal approximately 6.6 m to 7 m	Minimum 7.2 m wide seal	No
Piper Street	Local road between O'Connor Street (north) and Sturt Highway (south)	91	89	6 m sealed pavement width including sealed shoulder width	8.7 m wide total carriage (if unsealed); or minimum 3.7 m wide (if sealed)	Yes
O'Connor Street	Local road between Piper Street (west) and Moa Street (east)	151	152	6.1 m sealed pavement width including sealed shoulder width	8.7 m wide total carriage (if unsealed); or minimum 3.7 m wide (if sealed)	Yes
Moa Street	Local road between Balranald-Ivanhoe Road (north) and Turandurey Street (south)	139	127	5.9 m sealed pavement width including sealed shoulder width	8.7 m wide total carriage (if unsealed); or minimum 3.7 m wide (if sealed)	Yes

For MOD1, based on the cumulative construction and operations traffic volumes, a minimum 7.2 m sealed width, consistent with the approved EIS, will be required on McCabe Street.

5 Traffic management and mitigation

As outlined in Section 1.3, SSD-5285 for the approved Balranald Project included conditions of consent relating to transport (Appendix A). An evaluation of the validity of the approval conditions as they relate to the proposed MOD1 is outlined in Table 5.1 and shown on Figure 5.1 to Figure 5.3.

Table 5.1 SSD-5285 conditions of consent - traffic

Consent condition no.	Approval condition	Upgrade	Stage	SSD-5285 condition of consent still valid for MOD1?	Proposed amendment to approval condition	Proposed MOD1 mitigation and management
22 a	Upgrade Sturt Highway (HW14) and Murray Valley Highway intersection by gravel shoulder widening to accommodate oversize vehicles.	Intersection	Construction	Yes, as this consent condition relates to OSOM vehicles (Figure 5.3).	NA	Apply condition of consent no 22a.
b	Upgrade Piper, O'Connor and Moa Streets and associated intersection by gravel shoulder widening to accommodate oversize vehicles.	Road	Construction	Yes, as this consent condition relates to OSOM vehicles (Figure 5.3).	NA	Apply condition of consent no 22b.
c	Upgrade McCabe Street/Balranald-Ivanhoe Road (MR67) intersection to include: - Auxiliary Left Turn (AUL) and Basic Right Turn (BAR) treatment in accordance with Austroads intersection design standard. - Intersection located, constructed, and maintained to provide the required Safe Intersection Sight Distance (SISD), to be certified by appropriately qualified person. - Installation of modified advance intersection signage. - Intersection design to accommodate road train heavy vehicles (but only if these vehicles are to be used).	Intersection	Construction	Partially. As per Table 4.1 and Table 4.2, BAR and BAL treatment is required. However, AUL treatment is no longer required (Figure 5.3).	Remove requirement for AUL treatment.	Apply condition of consent no 22c (except for the AUL treatment).

Table 5.1 **SSD-5285 conditions of consent - traffic**

Consent condition no.	Approval condition	Upgrade	Stage	SSD-5285 condition of consent still valid for MOD1?	Proposed amendment to approval condition	Proposed MOD1 mitigation and management
d	Construct West-Balranald mine access road/Balranald-Ivanhoe Road intersection to an AUL/BAR.	Intersection	Construction	Partially. As per Table 4.3 and Table 4.4, BAR/BAL treatment is required. However, AUL treatment is not required (Figure 5.3).	Remove requirement for AUL treatment.	Apply condition of consent no 23d (except for the AUL treatment).
e	Construct two-way access road from Balranald-Ivanhoe Road to the West Balranald Mine including: - sealing of the first 100 m from the Balranald-Ivanhoe Road intersection; and - an entry gate located at least 40 m from the Balranald-Ivanhoe Road intersection.	Road	Construction	Yes. This condition is related to the construction and operations of West Balranald Mine and is still valid.	NA	Apply condition of consent no 22e.
f	Road maintenance to ensure a minimum 8 m wide two-lane unsealed road along Burke & Wills Road (12 km section) – to continue during the life of the consent (unless the mine is placed on care and maintenance).	Road	Construction	Yes. Maintenance would need to continue for the duration of MOD1 construction work. This applies as long as construction traffic is using Burke and Wills Road (Figure 5.3).	NA	Apply condition of consent no 22f.
g	Implement recommendations 1.1, 1.2, 1.3, 1.4, 1.5, 2.1 and 2.2 as identified in the Road Safety Audit prepared by Traffic works Pty Ltd dated December 2012, unless otherwise agreed by the applicable roads authority. 1.1 That two public lights be installed at the mine access road/ BIR intersection, one on each of the north and south approaches to the intersection. 1.2. That the mine access road/ BIR intersection be designed so that B-doubles turning to/ from the mine access road can do so without	Intersection and Road	Construction	Yes. Lighting will be required as night-time traffic movements are proposed. These conditions are road safety related and are still valid.	No change	Apply condition of consent no 22g.

Table 5.1 **SSD-5285 conditions of consent - traffic**

Consent condition no.	Approval condition	Upgrade	Stage	SSD-5285 condition of consent still valid for MOD1?	Proposed amendment to approval condition	Proposed MOD1 mitigation and management
	encroaching onto opposing traffic lanes on each of the mine access road and the BIR. 1.3. The mine access road/ BIR intersection be accompanied by advance and position intersection signs. 1.4. That the delineation system along BIR be reviewed and enhanced to ensure it complies with AS1742.2. This will require improvements to the guidepost system and may require provision of curve warning signs, edge lines and raised reflective pavement markers (RRPMs). 1.5. That the existing A size W2-4(L) Side Road Intersection warning sign north of the McCabe Street intersection be replaced with a B size W2-9I warning sign. 2.1. That a detailed review of the design and layout of the McCabe Street/ BIR intersection be undertaken with an objective to: a) Provide appropriate right and left turn lanes at the intersection; b) Provide approximate intersection advance warning signs; c) Provide approximate signs within the intersection; d) Remove the "see through effect" between McCabe Street and the BIR north approach to the intersection; and e) Provide street lighting at the intersection. 2.2. That the delineation system along McCabe Street be reviewed and enhanced to ensure it complies with AS1742.2. This will require provision of edge and centre line markings, improved provision of CAMs, delineation of the lateral shift of the road nearest of the McCabe Street/ Sturt Highway intersection, use of B size warning signs and may require provision of raised reflective pavement					

Table 5.1 **SSD-5285 conditions of consent - traffic**

Consent condition no.	Approval condition	Upgrade	Stage	SSD-5285 condition of consent still valid for MOD1?	Proposed amendment to approval condition	Proposed MOD1 mitigation and management
	markers and modifications to the curve warning signs and the guidepost system.					
23 a	Upgrade the two intersections on Murray Street in Tooleybuc to an asphalt wearing course, unless RMS agrees this upgrade is not required	Intersection	Operational	If not completed, the new asphalt wearing course will be required (Figure 5.3).	No change	Apply condition of consent no 23a, if required.
b	Upgrade the Sturt Highway (HW14)/Balranald-Tooleybuc Road intersection to a CHR (channelised right turn)	Intersection	Operational	Partially. Only a CHR (Short) turn treatment is required, as per Table 4.5 (Figure 5.3).	Revise CHR requirement to a CHR (Short) requirement.	Apply condition of consent no 23b but applying CHR (Short) rather than CHR.
c	Upgrade McCabe Street with asphalt resurfacing and shoulders to Austroads road design standards including a minimum sealed width of 7 m and pavement upgrades as required	Road	Operational	Yes. Even though the MOD1 traffic volumes have reduced, the upgrades are still required as the traffic volumes are within the 150-500 daily volume limit. Refer to Table 4.7 (Figure 5.3).	No change	Apply condition of consent no 23c.

Table 5.1 SSD-5285 conditions of consent - traffic

Consent condition no.	Approval condition	Upgrade	Stage	SSD-5285 condition of consent still valid for MOD1?	Proposed amendment to approval condition	Proposed MOD1 mitigation and management
d	Implement recommendations 3.1, 3.3, 4.1 and 4.2 as identified in the Road Safety Audit prepared by Traffic works Pty Ltd dated December 2012, unless otherwise agreed by the applicable roads authority. 3.1. That the operating conditions of the Sturt Highway/ McCabe Street intersection be reviewed to ensure suitable sight distances are available for truck drivers entering the intersection from the southwest and northeast bound approaches to the intersection. This will require removal of vegetation on the nature strip northwest of McCabe Street, relocation of direction signs on the south corner of the intersection and duplication of the Give Way sign on McCabe Street. 3.3 That a Type CHR right turn treatment be provided at the Sturt Highway/ BTR intersection. 4.1. That the delineation system along BTR be reviewed and enhanced to ensure it complies with AS1742.2. This will require improvements to the guidepost system, particularly through curvilinear and undulating sections, additional curve warning signs, width marker signs at the Wakool River bridges, use of B size signs as a minimum and may require provision of advisory speed signs, additional CAMs and raised reflective pavement markers. 4.2 That all signing on the Victoria bound approach to the BTR/ Murray Street (south) intersection and the NSW approach to the Murray River.	Road and Intersection	Operational	Yes. These conditions are road safety related and are still considered valid. Austroads CHR(Short) turn treatment is required for the Sturt Highway / Balranald-Tooleybuc Road intersection (Figure 5.3).	Include requirement for CHR (Short) on the Sturt Highway/Balranald-Tooleybuc Road intersection.	Apply condition of consent no 23d and include requirement for CHR (Short) on the Sturt Highway/ Balranald-Tooleybuc Road intersection.

Table 5.1 **SSD-5285 conditions of consent - traffic**

Consent condition no.	Approval condition	Upgrade	Stage	SSD-5285 condition of consent still valid for MOD1?	Proposed amendment to approval condition	Proposed MOD1 mitigation and management	
	Bridge be reviewed and modified with the following objectives: a) removal of unnecessary signs; b) provision of advance intersection direction signs north of the intersection; c) provision of a suitable Give Way Ahead sign; and d) ensure conspicuity of the Give Way sign and markings on the bridge approach.						
24	a	Upgrade intersection of Haul Road/Burke and Wills Road in accordance with Austroads intersection design standard. Intersection located, constructed, and maintained to provide the required SISD. Install appropriate signage and lighting (if required).	Intersection	Construction	No. This condition is not applicable as Nepean mine is not to be developed as part of MOD1.	No change	Not applicable for MOD1.
	b	Road maintenance to ensure a minimum 8 m unsealed pavement width with 1.5 m shoulders along: - Burke & Wills Road (12 km section). - Marma Box Creek Road (Arumpo Road) (10 km section). Maintenance to continue during the life of the consent (unless the mine is placed on care and maintenance)	Road	Construction	Partially. Road maintenance of Marma Box Creek Road (Arumpo Road) is not applicable as Nepean mine is not to be developed as part of MOD1 (Figure 5.3).	Road maintenance of Burke & Wills Road applicable for MOD1 construction subject to agreement with Council.	Apply condition of consent no 24b for Burke & Wills Road subject to agreement with Council.
	c	Upgrade Burke and Wills and Marma Box Creek Road (Arumpo Road) intersection – sealed for 100 m on the two major road intersection approaches and 50 m on the minor intersection approach with appropriate SISD. Install appropriate signage and lighting (if required).	Intersection	Construction	No. This condition is not applicable as Nepean mine is not to be developed as part of MOD1.	No change	Not applicable for MOD1.

Table 5.1 **SSD-5285 conditions of consent - traffic**

Consent condition no.	Approval condition	Upgrade	Stage	SSD-5285 condition of consent still valid for MOD1?	Proposed amendment to approval condition	Proposed MOD1 mitigation and management
d	Construct new Marma Box Creek Road (Arumpo Road)/Nepean Mine intersection to an AUL/Basic Right Turn in accordance with Austroads intersection design standard. Intersection located, constructed, and maintained to provide the required SISD. Install appropriate signage and lighting (if required).	Intersection	Construction	No. This condition is not applicable as Nepean mine is not to be developed as part of MOD1.	No change	Not applicable for MOD1.
e	Construct two way access road from West Balranald Mine to Burke and Wills Road intersection including: • sealing of the first 100 metres from any intersection; and • gate located at least 40 metres from any intersection.	Road	Construction	Yes. This condition is applicable for main mine haul road intersection onto Balranald-Ivanhoe Road (Figure 5.3).	No change	Apply condition of consent no 24e.
f	Construct a two way access road from Marma Box Creek Road (Arumpo Road) to Nepean Mine in accordance with Austroads intersection design standard. Intersection located, constructed, and maintained to provide the required SISD. Install appropriate signage and lighting (if required).	Road	Construction	No. This condition is not applicable as Nepean mine is not to be developed as part of MOD1.	No change	Not applicable for MOD1

Table 5.1 **SSD-5285 conditions of consent - traffic**

Consent condition no.	Approval condition	Upgrade	Stage	SSD-5285 condition of consent still valid for MOD1?	Proposed amendment to approval condition	Proposed MOD1 mitigation and management
25	Prior to the commencement of construction of the West Balranald Mine, unless the Secretary agrees otherwise, the Applicant shall enter into a road maintenance agreement with Council to provide contributions towards the maintenance of local roads relative to the proportion of project-related traffic on the roads. The contributions shall be calculated generally in accordance with Council's Road Maintenance Costing Model Framework (see Appendix 7 of the development consent). If there is a dispute between the Applicant and Council about the implementation of this condition, then either party may refer the matter to the Secretary for resolution. Note: Local roads subject to the road maintenance agreement include Balranald-Ivanhoe Road (Main Road 67) and McCabe Street. Burke and Wills Road and Marma Box Creek Road (Arumpo Road) to be maintained as per the requirements in Tables 8-10, and these requirements continue to have effect during the life of the consent. The Applicant and Council have agreed to calculate the annual contributions for the maintenance of Balranald-Ivanhoe Road (Main Road 67) and McCabe Street along the haulage route using Council's Road Maintenance Costing Model Framework, which is reproduced in Appendix 7 of the development consent.	Road and Intersection	Construction and operations	Yes.	Road maintenance agreement condition of consent applicable for MOD1 operations subject to agreement with Council.	Apply condition of consent no 25.

Table 5.1 **SSD-5285 conditions of consent - traffic**

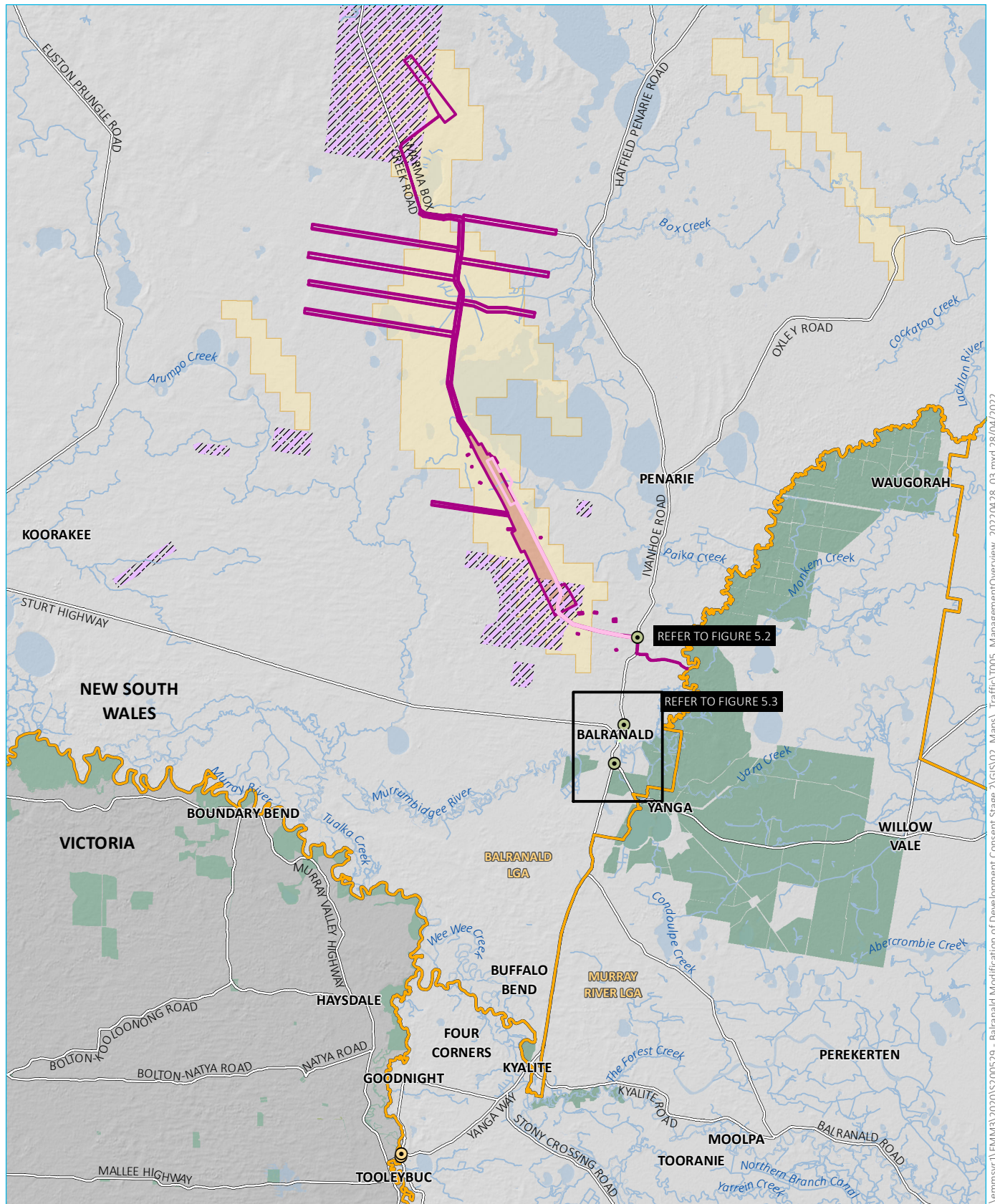
Consent condition no.	Approval condition	Upgrade	Stage	SSD-5285 condition of consent still valid for MOD1?	Proposed amendment to approval condition	Proposed MOD1 mitigation and management
26	The Applicant shall ensure that no project-related traffic uses local roads to access or egress the site, other than those roads that form part of the designated access routes, except: (a) in an emergency to avoid loss of life, property and/or to prevent environmental harm; (b) infrequent use of the roads for consultation, environmental monitoring and/or inspection and maintenance of nearby infrastructure; (c) for any employees or contractors that may reside on a local road that does not form part of the haulage route; or (d) infrequent and temporary use during construction of the development, where this use has been approved as part of the traffic management plan (see condition 27 below). Note: The designated haulage routes during construction and operation of the development are shown on the figures in Appendix 8 of the development consent.	-	-	Yes.	No change	Apply condition of consent no 26.
27	Prior to the commencement of construction of the West Balranald mine, the Applicant shall prepare a Traffic Management Plan for the development to the satisfaction of the Secretary. This plan must: (a) be prepared in consultation with RMS and Council; (b) include: (i) details of all transport routes and traffic types to be used for project-related traffic; (ii) a program to monitor and report on the: – amount of mineral concentrate transported from the site; and – amount of MSP process waste returned to the site;	-	-	Yes.	No change	Apply condition of consent no 27.

Table 5.1 **SSD-5285 conditions of consent - traffic**

Consent condition no.	Approval condition	Upgrade	Stage	SSD-5285 condition of consent still valid for MOD1?	Proposed amendment to approval condition	Proposed MOD1 mitigation and management
	(iii) a description of the measures that would be implemented to address the relevant requirements in the Code of Practice for the Safe Transport of Radioactive Materials (ARPANSA, 2001, or its latest version); (iv) details of reasonable and feasible measures that would be implemented to minimise traffic safety issues and disruption to local users of the transport route/s during construction and decommissioning of the development, including: – temporary traffic controls, including detours and signage; – notifying the local community about project-related traffic impacts; – a traffic management system for managing over-dimensional vehicles; – measures to ensure loose surface road material generated by project-related traffic does not cause nuisance or hazard to other road users; and – provision of hard stand areas for parking of transport vehicles if required; and (v) a Road Transport Protocol for all drivers transporting materials to and from the site with measures to ensure: – heavy vehicles adhere to the designated haulage routes; – all vehicles transporting mineral concentrate are completely covered whilst in transit; – the staggering of heavy vehicle departures to minimise impacts on the road network, where practicable; – no disruption to school bus timetables;					

Table 5.1 **SSD-5285 conditions of consent - traffic**

Consent condition no.	Approval condition	Upgrade	Stage	SSD-5285 condition of consent still valid for MOD1?	Proposed amendment to approval condition	Proposed MOD1 mitigation and management
	– the management of worker fatigue during trips to and from the site; – appropriate driver behaviour including adherence to speed limits, safe overtaking and maintaining appropriate distances between vehicles (i.e. a Driver Code of Conduct); – adherence to drug and alcohol policies; – appropriate vehicle maintenance and safety; – contingency plans when the haulage route is disrupted due to low visibility or closed due to wet weather; – emergency response plans; – the safe transportation of MSP process wastes; and – compliance with and enforcement of the protocol. Following approval, the Applicant shall carry out the development in accordance with this plan.					



Source: EMM (2022); GSNSW (2021); DELWP (2019); Iluka Resources (2021); DFSI (2017); GA (2011); ASGC (2006)

KEY

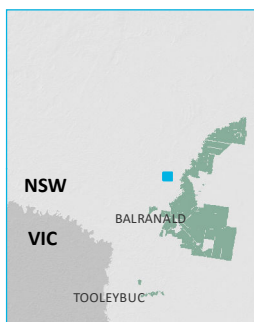
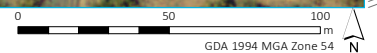
- | | |
|--|--|
| EIS Approved Balranald Project Area (SSD-5285) | NPWS reserve |
| Proposed modification study area | State forest |
| Exploration Licence (EL7450) | Local government area |
| Mining Lease (ML1736) | Intersection upgrade |
| Southern Mallee Conservation Area (2015) | Asphalt wearing course |
| Major road | Turn treatment |
| Watercourse/drainage line | Road upgrade |
| Waterbody | 100 m seal |
| | Asphalt resurfacing 7m sealed width |

Proposed MOD1 mitigation and management

Balranald Mineral Sands Project
Traffic impact assessment
Figure 5.1



Source: EMM (2022); Iluka Resources (2021); DCS-SS (2021); DFSI (2017); GA (2011); ASGC (2006)



- KEY**
- EIS Approved Balranald Project Area (SSD-5285)
 - Major road
 - Vehicular track
 - Cadastral boundary
 - Intersection upgrade
 - Turn treatment
 - Road upgrade
 - 100 m seal

West-Balranald mine access
road/Balranald-Ivanhoe Road intersection

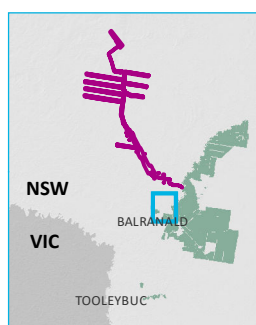
Balranald Mineral Sands Project
Traffic impact assessment
Figure 5.2



\\emmsvr1\EMM3\2020\5200529 - Balranald Modification of Development Consent Stage 2\GIS\02_Maps_Traffic\T001a_RoadIntersectionDDP_20220428_05.mxd 28/04/2022



Source: EMM (2022); ESRI (2021); Iluka Resources (2021); DCS-SS (2021); DFSI (2017); GA (2011); ASGC (2006)



KEY

 EIS Approved Balranald Project Area (SSD-5285)

— Rail line

— Major road

— Minor road

..... Vehicular track

— Watercourse/drainage line

■ NPWS reserve

Intersection upgrade

● Turn treatment

Road upgrade

— Asphalt resurfacing 7m sealed width

Gravel shoulder widening for Piper, O'Connor and Moa Streets; McCabe Street/Balranald-Ivanhoe Road (MR67) intersection; Sturt Highway (HW14) / Balranald-Tooleybuc Road intersection

Balranald Mineral Sands Project
Traffic impact assessment
Figure 5.3

6 Conclusion

EMM has completed a traffic impact assessment of the proposed MOD1 associated with construction and operational traffic. A comparison of traffic impacts related to the proposed modification against the predicted impacts of the approved Balranald Project (2015 transport assessment) was also completed.

The key assessment findings for proposed MOD1 include:

- the haulage route for the proposed MOD1 is the same route that was approved for the EIS;
- the following intersection upgrades which are required for the MOD1:
 - McCabe Street/Balranald-Ivanhoe Road (MR67) intersection requires BAR and BAL treatment;
 - West-Balranald mine access road/Balranald-Ivanhoe Road intersection requires BAR and BAL treatment; and
 - Sturt Highway/Balranald-Tooleybuc Road intersection requires CHR (Short) treatment;
- the following road upgrades which are required for the MOD1:
 - McCabe Street to be widened to at least 7.2 m (sealed).

With the proposed modification to approved operations, this assessment has demonstrated that traffic levels from MOD1 (construction, operational) are predicted to be lower or similar to predictions in the 2015 transport assessment.

Traffic management and mitigation measures for the approved Balranald Project (SSD-5285) will be implemented during construction and operations for MOD1.

References

EMM, Balranald Mineral Sands Project – Environmental Impact Statement, prepared for Iluka Resources Limited, May 2015.

EMM, Balranald Mineral Sands Project – Transport Assessment, prepared for Iluka Resources Limited, May 2015.

NSW Department of Planning and Environment, Development Consent (SSD-5285) for the Balranald Mineral Sands Project, approved 5 April 2016.



Appendix A

EIS development consent



Development Consent

Section 89E of the *Environmental Planning and Assessment Act 1979*

As delegate of the Minister for Planning, I approve the development application referred to in Schedule 1, subject to the conditions in Schedules 2 to 5.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the development.



David Kitto
Executive Director
Resource Assessments and Business Systems

Sydney

5 APRIL

2016

SCHEDULE 1

Application Number:	SSD-5285
Applicant:	Iluka Resources Limited
Consent Authority:	Minister for Planning
Land:	See Appendix 1
Development:	Balranald Mineral Sands Project

TABLE OF CONTENTS

DEFINITIONS	3
ADMINISTRATIVE CONDITIONS	5
Obligation to Minimise Harm to the Environment	5
Terms of Consent	5
Limits on Consent	5
Notification of Department	6
Structural Adequacy	6
Demolition	6
Protection of Public Infrastructure	6
Operation of Plant and Equipment	6
Updating & Staging of Strategies, Plans or Programs	6
Community Enhancement	7
ENVIRONMENTAL PERFORMANCE CONDITIONS	8
Acquisition Upon Request	8
Additional Noise Mitigation Upon Request	8
Noise	8
Air Quality	9
Meteorological Monitoring	10
Water	10
Biodiversity	13
Heritage	14
Transport	16
Visual	18
Bushfire Management	18
Dangerous Goods	19
Waste	19
Rehabilitation	19
ADDITIONAL PROCEDURES	21
Notification of Landowners/Tenants	21
Independent Review	21
Land Acquisition	21
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING	23
Environmental Management	23
Reporting	24
Auditing	24
Access to Information	25
APPENDIX 1: SCHEDULE OF LAND	26
APPENDIX 2: GENERAL LAYOUT OF DEVELOPMENT	27
APPENDIX 3: GENERAL TERMS OF VPA	32
APPENDIX 4: RECEIVER LOCATION PLAN	33
APPENDIX 5: NOISE COMPLIANCE ASSESSMENT	34
APPENDIX 6: ABORIGINAL HERITAGE SITES AND SUBSURFACE EXCAVATION AREAS	35
APPENDIX 7: ROAD MAINTENANCE COSTING MODEL FRAMEWORK	42
APPENDIX 8: ROAD HAULAGE ROUTES	43
APPENDIX 9: REHABILITATION PLAN	46

DEFINITIONS

Aboriginal stakeholders	Aboriginal stakeholders registered for cultural heritage consultation for the development
Applicant	Iluka Resources Limited, or any other person/s who rely on this consent to carry out the development that is subject to this consent
ARI	Average Recurrence Interval
BCA	Building Code of Australia
Bulk Sampling Activity	The activity described in the EIS (specifically the supplementary information provided by EMGA Mitchell McLennan dated 12 November 2015), involving extraction of up to 100,000 tonnes of mineral ore within the disturbance area for the West Balranald Mine (as shown on the applicable figure in Appendix 2)
BVT	Biometric Vegetation Type, as defined in OEH's <i>Framework for Biodiversity Assessment</i> (2014, or as updated)
Conditions of this consent	Conditions contained in Schedules 1 to 5 inclusive
Council	Balranald Shire Council
Day	The period from 7.00 am to 6.00 pm on Monday to Saturday, and 8.00 am to 6.00 pm on Sundays and Public Holidays
Department	Department of Planning & Environment
Development	The development as described in the EIS
DPI	Department of Primary Industries
DPI Water	The Division of Water within DPI
DRE	Division of Resources and Energy within the NSW Department of Industry
EIS	Environmental Impact Statement titled <i>Balranald Mineral Sands Project Environmental Impact Statement</i> , dated May 2015, associated response to submissions titled <i>Balranald Mineral Sands Project Response to Submissions</i> , dated November 2015, and supplementary information provided by EMGA Mitchell McLennan dated 12 November 2015
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	Environment Protection Licence issued under the POEO Act
Evening	The period from 6.00 pm to 10.00 pm
Exploration activities	Prospecting operations, as defined under the <i>Mining Act 1992</i>
Feasible	Feasible relates to engineering considerations and what is practical to build or to implement
Fisheries NSW	Fisheries NSW, within DPI
Ha	Hectare
Heritage item	An item as defined under the <i>Heritage Act 1977</i> and/or an Aboriginal object or Aboriginal place as defined under the <i>National Parks and Wildlife Act 1974</i>
HMC	Heavy mineral concentrate
Incident	A set of circumstances that: - causes or threatens to cause material harm to the environment; and/or - breaches or exceeds the limits or performance measures/criteria in this consent
Land	As defined in the EP&A Act, except for where the term is used in the noise and air quality conditions in Schedules 3 and 5 of this consent where it is defined to mean the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this consent
Material harm to the environment	Actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial
Mine water	Water that accumulates within active mining and infrastructure areas
Mining operations	Includes the removal of overburden and extraction, processing, handling, storage and transportation of ore on site
Minister	Minister for Planning, or delegate
Minor	Not very large, important or serious
Mitigation	Activities associated with reducing the impacts of the development prior to or during those impacts occurring
MSP	Hamilton mineral separation plant
Negligible	Small and unimportant, such as to be not worth considering
Nepean mine	The Nepean mineral sands mine and associated infrastructure as

Night	described in the EIS and shown on the applicable figure in Appendix 2 The period from 10pm to 7am on Monday to Saturday, and 10.00 pm to 8.00 am on Sundays and Public Holidays
NP&W Act	<i>National Parks & Wildlife Act 1974</i>
OEH	Office of Environment and Heritage
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
Privately-owned land	Land that is not owned or leased by a public agency, or a mining company (or its subsidiary)
Public infrastructure	Linear and related infrastructure and the like that provides services to the general public, such as roads, railways, water supply, drainage, sewerage, gas supply, electricity, telephone, telecommunications, etc
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Rehabilitation	The restoration of land disturbed by the development to a good condition to ensure it is safe, stable and non-polluting
RFS	Rural Fire Service
RMS	Roads and Maritime Services
Secretary	The Secretary of the Department, or nominee and/or delegate
Secretary Industry	The Secretary of NSW Department of Industry, or equivalent position
Site	All land to which the development application applies, including the land listed in Appendix 1 and shown in Appendix 2
SMCA	Southern Mallee Conservation Area
TSC Act	<i>Threatened Species Conservation Act 1995</i>
VPA	Voluntary Planning Agreement
West Balranald mine	The West Balranald mineral sands mine and associated infrastructure as described in the EIS and shown on the applicable figure in Appendix 2, but excluding the Bulk Sampling Activity

SCHEDULE 2 ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. In addition to meeting the specific performance measures and criteria established under this consent, the Applicant shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.

TERMS OF CONSENT

2. The Applicant shall carry out the development:
 - (a) generally in accordance with the EIS; and
 - (b) in accordance with the conditions of this consent.

Note: The general layout of the development is shown in Appendix 2.

3. If there is any inconsistency between the above documents, the more recent document shall prevail to the extent of the inconsistency. However, the conditions of this consent shall prevail to the extent of any inconsistency.
4. The Applicant shall comply with any reasonable requirement/s of the Secretary arising from the Department's assessment of:
 - (a) any strategies, plans, programs, reviews, audits, reports or correspondence submitted in accordance with this consent;
 - (b) any reports, reviews or audits commissioned by the Department regarding compliance with this consent; and
 - (c) the implementation of any actions or measures contained in these documents.

LIMITS ON CONSENT

Mining Operations

5. The Applicant may carry out mining operations on the site for 16 years from the date of the commencement of the construction of the West Balranald mine.

Note: Under this consent, the Applicant is required to rehabilitate the site and perform additional undertakings to the satisfaction of either the Secretary or the Secretary Industry. Consequently this consent will continue to apply in all other respects other than the right to conduct mining operations until the rehabilitation of the site and these additional undertakings have been carried out satisfactorily.

Ore Extraction & Transport – Bulk Sampling Activity

6. The Applicant shall not extract more than 100,000 tonnes of mineral ore as part of the bulk sampling activity, and shall not transport this material offsite until the necessary road upgrades have been completed, unless otherwise agreed by the Secretary.

On-site Mineral Concentrate Production

7. In any calendar year, the Applicant shall not:
 - (a) produce more than 500,000 tonnes of HMC; and/or
 - (b) produce more than 600,000 tonnes of ilmenite; on the site.

Off-site Mineral Concentrate Transport

8. In any calendar year, the Applicant shall not:
 - (a) transport more than 500,000 tonnes of HMC; and/or
 - (b) transport more than 600,000 tonnes of ilmenite; from the site.

Workforce Accommodation Facility

9. The Applicant may only construct the workforce accommodation facility on the site if it has demonstrated to the satisfaction of the Secretary that constructing an accommodation facility in Balranald town is not reasonable or feasible.

In seeking this approval, the Applicant must:

- (a) demonstrate that it has:

- consulted with Council on the options for constructing a town-based accommodation facility;
 - considered the engineering and economic implications of the various options; and
 - used its reasonable endeavours to secure the necessary land tenure, access agreements and/or approvals for a town-based accommodation facility; and
- (b) justify why it is not reasonable or feasible to construct a town-based accommodation facility.

10. Prior to constructing the workforce accommodation facility on the site, the Applicant shall prepare detailed plans of the facility in consultation with Council and to the satisfaction of the Secretary.

Note: These plans should include architectural, civil, stormwater, services and landscaping plans.

NOTIFICATION OF DEPARTMENT

11. The Applicant shall notify the Department prior to the:
- (a) commencement of the bulk sampling activity;
 - (b) construction or commissioning of the West Baranald mine; and
 - (c) construction or decommissioning of the Nepean mine.
12. If the carrying out of the development is to be staged, then the Applicant must notify the Department in writing prior to the commencement of the relevant stage, and clearly identify the development that would be carried out in the relevant stage.

STRUCTURAL ADEQUACY

13. The Applicant shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures that are part of the development, are constructed in accordance with the relevant requirements of the BCA.

Notes:

- Under Part 4A of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works.
- Part 8 of the EP&A Regulation sets out the requirements for the certification of the development.

DEMOLITION

14. The Applicant shall ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.

PROTECTION OF PUBLIC INFRASTRUCTURE

15. Unless the Applicant and the applicable authority agree otherwise, the Applicant shall:
- (a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the development; and
 - (b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development.

This condition does not apply to the upgrade and maintenance of the road network, which is expressly provided for in the conditions of this consent.

OPERATION OF PLANT AND EQUIPMENT

16. The Applicant shall ensure that all plant and equipment used on site, or in connection with the development, is:
- (a) maintained in a proper and efficient condition; and
 - (b) operated in a proper and efficient manner.

UPDATING & STAGING OF STRATEGIES, PLANS OR PROGRAMS

17. With the approval of the Secretary, the Applicant may submit any strategy, plan or program required by this consent on a progressive basis.

To ensure these strategies, plans or programs are updated on a regular basis, the Applicant may at any time submit revised strategies, plans or programs to the Secretary for approval.

With the agreement of the Secretary, the Applicant may prepare any revised strategy, plan or program without undertaking consultation with all the parties referred to under the relevant condition of this consent.

Notes:

- *While any strategy, plan or program may be submitted on a progressive basis, the Applicant must ensure that all development being carried out on site is covered by suitable strategies, plans or programs at all times.*
- *If the submission of any strategy, plan or program is to be staged, then the relevant strategy, plan or program must clearly describe the specific stage to which the strategy, plan or program applies, the relationship of this stage to any future stages, and the trigger for updating the strategy, plan or program.*

COMMUNITY ENHANCEMENT

18. Prior to the commencement of construction of the West Balranald Mine, unless the Secretary agrees otherwise, the Applicant enter into a VPA with the Council in accordance with:
- (a) Division 6 of Part 4 of the EP&A Act; and
 - (b) the terms of the Applicant's offer in Appendix 3.
-

SCHEDULE 3 ENVIRONMENTAL PERFORMANCE CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from an owner of the land listed in Table 1, the Applicant shall acquire the land in accordance with the procedures in conditions 3 and 4 of Schedule 4.

Table 1: Land subject to acquisition upon request

Acquisition Basis	Property
Noise	R5

Note: To interpret the land referred to in Table 1, see the figure in Appendix 4.

ADDITIONAL NOISE MITIGATION UPON REQUEST

2. Upon receiving a written request from an owner of the land listed in Table 1 (unless the landowner has requested acquisition), the Applicant shall implement additional noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the development on the residence commensurate with the level of impact in accordance with the *Voluntary Land Acquisition and Mitigation Policy* (November 2014).

If within 3 months of receiving this request from the owner, the Applicant and the owner cannot agree on the measures to be implemented, or if there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

NOISE

Operational Noise Criteria

3. Except for the noise-affected land in Table 1, the Applicant shall ensure that the noise generated by the development does not exceed the noise criteria in Table 2.

Table 2: Noise criteria dB(A)

Location	Day	Evening	Night	
	<i>L_{Aeq(15min)}</i>	<i>L_{Aeq(15min)}</i>	<i>L_{Aeq(15min)}</i>	<i>L_{A1(1min)}</i>
Any residence on privately-owned land	35	35	35	45
Mungo National Park and Mungo State Conservation Area (when in use)	50	50	50	-

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy* (as may be updated or replaced from time to time). Appendix 5 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the owner/s or leaseholders of the residence to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Operating Conditions

4. The Applicant shall:
 - (a) implement all reasonable and feasible measures to minimise the construction, operational and road noise of the development;
 - (b) minimise the noise impacts of the development during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 5); and
 - (c) undertake regular attended monitoring of the noise of the development, to ensure compliance with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying any development under this consent, the Applicant shall prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
 - (a) be prepared in consultation with the EPA;

- (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions of this consent;
- (c) include a noise monitoring program for evaluating and reporting on:
 - compliance against the noise criteria in this consent; and
 - compliance against the noise operating conditions; and
- (d) defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

Following approval, the Applicant must carry out the development in accordance with this plan.

AIR QUALITY

Odour

- 6. The Applicant shall ensure that no offensive odours are emitted from the site, as defined under the POEO Act.

Air Quality Criteria

- 7. The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria listed in Tables 3, 4 and 5 at any residence on privately owned land.

Table 3: Long term impact assessment criteria for particulate matter

Pollutant	Averaging period	^d Criterion
Total suspended particulate (TSP) matter	Annual	^a 90 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	Annual	^a 30 µg/m ³

Table 4: Short term impact assessment criterion for particulate matter

Pollutant	Averaging period	^d Criterion
Particulate matter < 10 µm (PM ₁₀)	24 hour	^a 50 µg/m ³

Table 5: Long term impact assessment criteria for deposited dust

Pollutant	Averaging period	Maximum increase ² in deposited dust level	Maximum total ¹ deposited dust level
^c Deposited dust	Annual	^b 2 g/m ² /month	^a 4 g/m ² /month

Notes to Tables 3-5

- ^a Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).
- ^b Incremental impact (i.e. incremental increase in concentrations due to the development on its own).
- ^c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.
- ^d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.

Operating Conditions

- 8. The Applicant shall:
 - (a) implement all reasonable and feasible measures to minimise the:
 - off-site odour and dust emissions of the development; and
 - release of greenhouse gas emissions from the development;
 - (b) minimise any visible off-site air pollution generated by the development;
 - (c) minimise the surface disturbance of the site;
 - (d) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d to Tables 3-5); and
 - (e) assess air quality monitoring data to determine whether the development is complying with the relevant conditions of this consent and, if necessary, adjust the scale of operations on site to meet the criteria in this consent.

Air Quality Management Plan

9. Prior to carrying out any development under this consent, the Applicant shall prepare an Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with the EPA;
 - (b) describe the measures that would be implemented to ensure compliance with the relevant air quality criteria and operating conditions of this consent;
 - (c) include an air quality monitoring program for evaluating and reporting on:
 - compliance against the air quality criteria in this consent;
 - compliance against the air quality operating conditions;
 - compliance with the applicable emissions criteria for the Ilmenite Separation Plant; and
 - (d) defines what constitutes an air quality incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any air quality incidents.

Following approval, the Applicant must carry out the development in accordance with this plan.

METEOROLOGICAL MONITORING

10. During the life of the development, the Applicant shall ensure that there is a suitable meteorological station operating in the vicinity of the site that complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline.

WATER

Water Supply

11. The Applicant shall ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of mining operations to match its available water supply.

Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain the necessary water licences for the development.

Water Pollution

12. Unless an EPL authorises otherwise, the Applicant shall comply with Section 120 of the POEO Act.

Compensatory Water Supply

13. The Applicant shall provide a compensatory water supply to the owner or leaseholder of any privately-owned land whose basic landholder water rights (as defined in the *Water Management Act 2000*) are adversely and directly impacted as a result of the development. This supply must be provided in consultation with DPI Water, and to the satisfaction of the Secretary.

The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent to the loss attributable to the development. Equivalent water supply should be provided (at least on an interim basis) as soon as practicable from the loss being identified, unless otherwise agreed with the landowner.

If the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

If the Applicant is unable to provide an alternative long-term supply of water, then the Applicant shall provide alternative compensation to the satisfaction of the Secretary.

Note: The Water Management Plan (see condition 15) is required to include trigger levels for investigating potentially adverse impacts on water supplies.

Water Management Performance Measures

14. The Applicant shall comply with the performance measures in Table 6, to the satisfaction of the Secretary.

Table 6: Water Management Performance Measures

Feature	Performance Measure
Water management – General	Minimise the use of clean water (i.e. water not in contact with disturbed areas) on site Minimise the need for make-up water from external supplies
Loxton Parilla Sands and Shepparton alluvial aquifers	Negligible environmental consequences to the alluvial aquifer beyond those predicted in the EIS, including: • negligible change in groundwater levels beyond those predicted; • negligible change in groundwater quality beyond those predicted; and • negligible impact to other groundwater users levels beyond those predicted
Construction and operation of infrastructure	Design, install and maintain erosion and sediment controls generally in accordance with the series <i>Managing Urban Stormwater: Soils and Construction</i> including <i>Volume 1</i>, <i>Volume 2A – Installation of Services</i> and <i>Volume 2C – Unsealed Roads</i> Design, install and maintain infrastructure within 40 m of watercourses generally in accordance with the <i>Guidelines for Controlled Activities on Waterfront Land (DPI 2007)</i>, or its latest version Design, install and maintain any creek crossings generally in accordance with the <i>Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013)</i> and <i>Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings (NSW Fisheries 2003)</i>, or their latest versions
Clean water diversion & storage infrastructure	Design, install and maintain the clean water system to capture and convey the 100 year ARI flood. Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site
Sediment dams	Design, install and/or maintain the dams generally in accordance with the series <i>Managing Urban Stormwater: Soils and Construction – Volume 1 and Volume 2E Mines and Quarries</i>
Mine water storages	Design, install and/or maintain mine water storage infrastructure to ensure no discharge of mine water or saline water off-site (except in accordance with an EPL) On-site storages (including mine infrastructure dams, groundwater storage and treatment dams) are suitably designed, installed and/or maintained to minimise permeability, where practicable
Flood mitigation measures	Design, install and maintain flood mitigation measures including bunds to exclude flows from inundating the mining areas for all flood events up to and including the Probable Maximum Flood level Manage any residual downstream impacts in an appropriate manner
Overburden emplacements	Design, install and maintain emplacements to encapsulate and prevent any off-site migration of tailings, acid forming and potentially acid forming materials, and saline and sodic material Design, install and maintain emplacements to prevent off-site migration of saline groundwater seepage
Chemical and hydrocarbon storage	Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standards

Water Management Plan

15. Prior to carrying out any development on site, the Applicant shall prepare a Water Management Plan for the development to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with DPI Water and the EPA;
 - (b) include a:
 - (i) Site Water Balance, that:
 - includes details of:
 - o sources and security of water supply, including contingency planning for future reporting periods;
 - o water use and management on site;
 - o reporting procedures, including the preparation of a site water balance for each calendar year; and
 - investigates and implements all reasonable and feasible measures to minimise clean water use and to recycle water;
 - (ii) Surface Water Management Plan, that includes:
 - baseline data on water flows and quality in the watercourses that could be affected by the development (if available);
 - a detailed description of the water management system on-site, including the:
 - o clean water diversion systems;
 - o erosion and sediment controls; and
 - o mine water management system, including a description on the measures that would be implemented to manage drilling fluids and muds;
 - detailed plans, including design objectives and performance criteria for the:
 - o emplacement areas for tailings, acid forming and potentially acid forming materials, and saline and sodic materials;
 - o reinstatement of drainage lines on the rehabilitated areas of the site; and
 - o final void;
 - surface water assessment criteria, including trigger levels for investigating any potentially adverse impacts associated with:
 - o the water management system;
 - o surface water users supplies;
 - o downstream surface water quality;
 - o downstream flooding impacts; and
 - a program to monitor and report on:
 - o the effectiveness of the water management system; and
 - o surface water flows and water quality (if any); and
 - o downstream flooding impacts;
 - reporting procedures for the results of the monitoring program; and
 - a plan to respond to any exceedances of the surface water assessment criteria, and mitigate any adverse impacts of the development;
 - (iii) Groundwater Management Plan, that includes:
 - detailed baseline data on groundwater levels, yield and quality in the region and privately-owned groundwater bores that could be affected by the development;
 - a detailed description of the groundwater management system on site;
 - detailed plans, including design objectives and performance criteria for the:
 - o emplacement areas for tailings, acid forming and potentially acid forming materials, and saline and sodic materials;
 - o groundwater dewatering and reinjection system; and
 - o final void;
 - groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts associated with:
 - o alluvial aquifers including the Loxton Parilla and Shepparton aquifers;
 - o groundwater users bores;
 - o groundwater dewatering and reinjection system;
 - o seepage/leachate from water storages, emplacements, backfilled voids and the final void;
 - o groundwater dependent ecosystems;
 - a program to monitor and report on:
 - o groundwater inflows to the mining operations;
 - o background changes in groundwater yield/quality against mine-induced changes;
 - o the impacts of the development on the regional and local (including alluvial) aquifers;
 - o impacts on the groundwater supply of potentially affected landowners/leaseholders;

- o groundwater levels and quality at the dewatering and reinjection sites;
- o seepage/leachate from water storages, emplacements, backfilled voids and the final void;
- o groundwater dependent ecosystems; and
- o post-mining groundwater recovery;
- a program to validate the groundwater model for the development, and compare the monitoring results with modelled predictions; and
- a plan to respond to any exceedances of the groundwater assessment criteria, and mitigate any adverse impacts of the development.

Following approval, the Applicant shall carry out the development in accordance with this plan.

BIODIVERSITY

Retirement of Credits

16. The Applicant shall retire the biodiversity offset credits of a number and class specified in Table 7 below to the satisfaction of OEH. Unless the Secretary agrees otherwise, the credits:

- (a) for the West Balranald mine must be retired within 3 years of the commencement of construction of the West Balranald mine; and
- (b) for the Nepean mine must be retired prior to the commencement of construction of the Nepean mine.

Prior to retiring the credits, the Applicant shall convert the relevant land-based credit requirements to suitable ecosystem credit requirements in consultation with OEH. If there is any dispute in the calculation of these credit requirements, either party may refer the matter to the Secretary for resolution.

The retirement of these credits must be carried out in accordance with the *NSW Biodiversity Offsets Policy for Major Projects*, and can be achieved by:

- (a) acquiring or retiring credits under the biobanking scheme in the TSC Act;
- (b) making payments into an offset fund that has been established by the NSW Government; or
- (c) providing supplementary measures.

Table 7: Ecosystem credit requirements

Vegetation Community	Code (BVT)	Credits Required	
		West Balranald Mine	Nepean Mine
Black Bluebush Low Open Shrubland	LM102	10,014	-
Black Box Grassy Chenopod Open Woodland	LM105	276	-
Belah – Pearl Bluebush Woodland	LM107	5,366	272
Belah – Chenopod Woodland	LM108	9,694	13,863
		-	207 hectares
Bladder Saltbush Low Open Shrubland	LM110	14,929	-
Chenopod Sandplain/Swale Mallee Woodland	LM116	89,097	7,152
		1,424 hectares	139 hectares
Flat Open Claypan / Derived Sparse Shrubland/Grassland	LM124	2,412	-
Old Man Saltbush Shrubland	LM137	831	-
Pearl Bluebush Low Open Shrubland	LM138	39,452	-
Spinifex Dune Mallee Woodland	LM130	15,239	8,194
		167 hectares	104 hectares

Biodiversity Management Plan

17. Prior to carrying out any development on site, the Applicant shall prepare a Biodiversity Management Plan for the development to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with OEH;
 - (b) describe the short, medium, and long term measures that would be implemented to:
 - manage the remnant vegetation and fauna habitat on the site;
 - integrate the implementation of biodiversity management to the greatest extent practicable with the rehabilitation of the site;
 - (c) include a detailed description of the measures that would be implemented over the next 3 years for:
 - minimising the amount of clearing within the approved development footprint as far as practicable;
 - rehabilitating and revegetating temporary disturbance areas;
 - protecting vegetation and fauna habitat outside the approved disturbance area on-site;
 - enhancing the quality of existing vegetation and fauna habitat on the site;
 - maximising the salvage of resources within the approved disturbance area – including vegetative and soil resources – for beneficial reuse on site;
 - collecting and propagating seed;
 - minimising the impacts on fauna on site, including undertaking pre-clearance surveys (with an emphasis on tree hollows, raptor nests and Malleefowl mounds) and implementing a fauna rescue strategy;
 - managing salinity using best practice dryland salinity management revegetation measures;
 - controlling weeds and feral pests;
 - controlling erosion;
 - controlling access; and
 - bushfire management;
 - (d) include a specific Malleefowl management and monitoring plan, consistent with the *'National Manual for the Malleefowl Monitoring System'* and the *'National Recovery Plan for Malleefowl'*;
 - (e) include a seasonally-based program to monitor and report on the effectiveness of these measures;
 - (f) identify the potential risks to the successful implementation of the biodiversity management plan, and include a description of the contingency measures that would be implemented to mitigate against these risks; and
 - (g) include details of who would be responsible for monitoring, reviewing, and implementing the plan.

Following approval, the Applicant shall carry out the development in accordance with this plan.

HERITAGE

Protection of Aboriginal Sites

18. The Applicant shall ensure that the development does not cause any direct or indirect impact on the identified Aboriginal heritage sites located outside the approved disturbance area for the project.

Notes:

- Identified Aboriginal heritage items and risk areas are shown on the figures in Appendix 6.
- This condition does not preclude the Applicant from applying to impact the sites under a separate approvals process.

Aboriginal Cultural Heritage Working Group

19. The Applicant shall establish and maintain an Aboriginal Cultural Heritage Working Group for the development to the satisfaction of the Secretary. This group must:
- (a) be established in consultation with OEH and local Aboriginal stakeholders prior to the construction of the West Balranald mine;
 - (b) be comprised of a range of Aboriginal cultural heritage experts/stakeholders from the local Aboriginal groups, the Applicant (and its heritage experts) and government (if available), whose appointments have been approved by the Secretary;
 - (c) meet at least 2 times a year, unless the Secretary agrees otherwise; and
 - (d) provide advice on project-related Aboriginal cultural heritage management issues, including:
 - preparation and/or implementation of the Aboriginal Cultural Heritage Management Plan (see condition 20 below);
 - Aboriginal heritage site monitoring; and
 - Aboriginal heritage site salvage, excavation, storage and management.

Note: The Aboriginal Cultural Heritage Working Group is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this approval.

Aboriginal Cultural Heritage Management Plan

20. Prior to carrying out any development under this consent, the Applicant shall prepare an Aboriginal Cultural Heritage Management Plan for the development to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with OEH, local Aboriginal stakeholders and the Aboriginal Cultural Heritage Working Group (if established), and be approved by the Secretary prior to the undertaking any development on site;
 - (b) include:
 - (i) a Geomorphic Assessment to assist in the development of the Subsurface Archaeological Testing Program and other management plan components (see below);
 - (ii) a Subsurface Archaeological Testing Program, that includes provisions for:
 - sub-surface investigation of the excavation areas identified in Appendix 6 prior to any development within 250 metres of the excavation areas;
 - assessment of the archaeological and cultural heritage significance of any Aboriginal sites or megafauna assemblages (found in conjunction with cultural heritage values) identified during the sub-surface investigations, including consideration of cumulative impact;
 - involvement in the survey and investigation works by local Aboriginal stakeholders and the Aboriginal Cultural Heritage Working Group (if established);
 - (iii) an Archaeological Salvage Program for Aboriginal sites/objects within the project disturbance area (including those identified following the additional testing program above), including methodology and procedures/protocols for:
 - salvage, excavation and/or management of sites within the disturbance area;
 - site assessment and reporting;
 - research objectives to inform knowledge of Aboriginal occupation;
 - protection, storage and management of salvaged Aboriginal objects;
 - addressing relevant statutory requirements under the NP&W Act; and
 - long term protection of salvaged Aboriginal objects;
 - (iv) Trigger Action Response Plans (including stop work provisions, notification protocols and significance assessment protocols) for managing key risks to Aboriginal heritage, including:
 - the discovery of any potential human remains;
 - the discovery of previously unidentified Aboriginal objects or megafauna assemblages (found in conjunction with cultural heritage values) on site; and
 - managing unauthorised ground disturbance;
 - (v) a Cultural Heritage Management Program, including a description of the measures that would be implemented for:
 - protecting, monitoring and managing Aboriginal sites outside the project disturbance area;
 - maintaining and managing reasonable access for Aboriginal stakeholders to cultural heritage items on site;
 - ongoing consultation with the Aboriginal Cultural Heritage Working Group and other local Aboriginal stakeholders in the conservation and management of Aboriginal cultural heritage on-site;
 - ensuring any workers on site receive suitable heritage inductions prior to carrying out any activities which may disturb Aboriginal sites, and that suitable records are kept of these inductions; and
 - the long term management of the Aboriginal cultural heritage values of the site.

Following approval, the Applicant shall carry out the development in accordance with this plan.

Note: For the purposes of condition 21 below, the plan will need to define what constitutes an Aboriginal site of high and very high cultural heritage significance.

Additional Aboriginal Heritage Approval

21. The Applicant shall not disturb any site/s of high or very high cultural heritage significance identified during the implementation of the programs/plans identified in condition 20(b) or during the carrying out of the development without the prior written approval of the Secretary.

In seeking this approval, the Applicant shall submit a report to the Secretary. This report must:

- (a) be prepared in consultation with OEH and the Aboriginal Cultural Heritage Working Group;
- (b) assess the heritage significance of the site/s and their context;
- (c) justify why impacts to the site cannot be avoided; and
- (d) describe in detail the proposed salvage and/or management measures that would be implemented during any disturbance of the site, and incorporated into the Aboriginal Cultural Management Plan.

Note: For the avoidance of doubt, this condition does not apply to sites identified in the EIS.

TRANSPORT

Road Upgrades

22. Prior to the commencement of construction of the West Balranald Mine, the Applicant shall implement the road upgrade works detailed in Table 8 to the satisfaction of the applicable roads authority.

Table 8: Road Upgrade Works (Prior to Construction of West Balranald Mine)

Measures	Applicable Roads Authority
Upgrade Sturt Highway (HW14) and Murray Valley Highway intersection by gravel shoulder widening to accommodate oversize vehicles	RMS
Upgrade Piper, O'Connor and Moa Streets and associated intersection by gravel shoulder widening to accommodate oversize vehicles	RMS, Council
Upgrade McCabe Street/Balranald-Ivanhoe Road (MR67) intersection to include: - Auxiliary Left Turn (AUL) and Basic Right Turn (BAR) treatment in accordance with Austroads intersection design standard - Intersection located, constructed and maintained to provide the required Safe Intersection Sight Distance (SISD), to be certified by appropriately qualified person - Installation of modified advance intersection signage - Intersection design to accommodate road train heavy vehicles (but only if these vehicles are to be used)	RMS, Council
Construct West-Balranald mine access road/Balranald-Ivanhoe Road intersection to an AUL/BAR.	RMS, Council
Construct two way access road from Balranald-Ivanhoe Road to the West Balranald Mine including: - sealing of the first 100 metres from the Balranald-Ivanhoe Road intersection - an entry gate located at least 40 metres from the Balranald-Ivanhoe Road intersection	-
Road maintenance to ensure a minimum 8 m wide two lane unsealed road along Burke & Wills Road (12km section) – to continue during the life of the consent (unless the mine is placed on care and maintenance)	Council
Implement recommendations 1.1, 1.2, 1.3, 1.4, 1.5, 2.1 and 2.2 as identified in the Road Safety Audit prepared by Trafficworks Pty Ltd dated December 2012, unless otherwise agreed by the applicable roads authority	RMS, Council

23. Prior to the commencement of haulage of any mineral concentrate, the Applicant shall implement the road upgrade works detailed in Table 9, to the satisfaction of the applicable roads authority.

Table 9: Road Upgrade Works (Prior to Haulage of Mineral Concentrate)

Measures	Applicable Roads Authority
Upgrade the two intersections on Murray Street in Tooleybuc to an asphalt wearing course, unless RMS agrees this upgrade is not required	RMS
Upgrade the Sturt Highway (HW14) / Balranald-Tooleybuc Road intersection to a CHR (channelised right turn)	RMS
Upgrade McCabe Street with asphalt resurfacing and shoulders to Austroads road design standards including a minimum sealed width of 7m and pavement upgrades as required	Council
Implement recommendations 3.1, 3.3, 4.1 and 4.2 as identified in the Road Safety Audit prepared by Trafficworks Pty Ltd dated December 2012, unless otherwise agreed by the applicable roads authority	RMS, Council

24. Prior to the commencement of construction of the Nepean Mine, the Applicant shall implement the road upgrade works detailed in Table 10, to the satisfaction of the applicable roads authority.

Table 10 Road Upgrade Works (Prior to Construction of Nepean Mine)

Measures	Applicable Roads Authority
Upgrade intersection of haul road/Burke and Wills Road in accordance with Austroads intersection design standard. Intersection located, constructed and maintained to provide the required SISD. Install appropriate signage and lighting (if required).	Council
Road maintenance to ensure a minimum 8 m unsealed pavement width with 1.5 m shoulders along: - Burke & Wills Road (12km section) - Marma Box Creek Road (Arumpo Road) (10km section) Maintenance to continue during the life of the consent (unless the mine is placed on care and maintenance)	Council
Upgrade Burke and Wills and Marma Box Creek Road (Arumpo Road) intersection – sealed for 100 m on the two major road intersection approaches and 50 m on the minor intersection approach with appropriate SISD. Install appropriate signage and lighting (if required).	Council
Construct new Marma Box Creek Road (Arumpo Road)/Nepean Mine intersection to an AUL/Basic Right Turn in accordance with Austroads intersection design standard. Intersection located, constructed and maintained to provide the required SISD. Install appropriate signage and lighting (if required).	Council
Construct two way access road from West Balranald Mine to Burke and Wills Road intersection including: - sealing of the first 100 metres from any intersection - gate located at least 40 metres from any intersection	-
Construct a two way access road from Marma Box Creek Road (Arumpo Road) to Nepean Mine in accordance with Austroads intersection design standard. Intersection located, constructed and maintained to provide the required SISD. Install appropriate signage and lighting (if required).	-

Road Maintenance

25. Prior to the commencement of construction of the West Balranald Mine, unless the Secretary agrees otherwise, the Applicant shall enter into a road maintenance agreement with Council to provide contributions towards the maintenance of local roads relative to the proportion of project-related traffic on the roads. The contributions shall be calculated generally in accordance with Council's Road Maintenance Costing Model Framework (see Appendix 7).

If there is a dispute between the Applicant and Council about the implementation of this condition, then either party may refer the matter to the Secretary for resolution.

Note: Local roads subject to the road maintenance agreement include Balranald-Ivanhoe Road (Main Road 67) and McCabe Street. Burke and Wills Road and Marma Box Creek Road (Arumpo Road) to be maintained as per the requirements in Tables 8-10, and these requirements continue to have effect during the life of the consent. The Applicant and Council have agreed to calculate the annual contributions for the maintenance of Balranald-Ivanhoe Road (Main Road 67) and McCabe Street along the haulage route using Council's Road Maintenance Costing Model Framework, which is reproduced in Appendix 7.

Restriction on Transport Routes

26. The Applicant shall ensure that no project-related traffic uses local roads to access or egress the site, other than those roads that form part of the designated access routes, except:
- in an emergency to avoid loss of life, property and/or to prevent environmental harm;
 - infrequent use of the roads for consultation, environmental monitoring and/or inspection and maintenance of nearby infrastructure;
 - for any employees or contractors that may reside on a local road that does not form part of the haulage route; or
 - infrequent and temporary use during construction of the development, where this use has been approved as part of the traffic management plan (see condition 27 below).

Note: The designated haulage routes during construction and operation of the development are shown on the figures in Appendix 8.

Traffic Management

27. Prior to the commencement of construction of the West Balranald mine, the Applicant shall prepare a Traffic Management Plan for the development to the satisfaction of the Secretary. This plan must:
- (a) be prepared in consultation with RMS and Council;
 - (b) include:
 - (i) details of all transport routes and traffic types to be used for project-related traffic;
 - (ii) a program to monitor and report on the:
 - amount of mineral concentrate transported from the site; and
 - amount of MSP process waste returned to the site;
 - (iii) a description of the measures that would be implemented to address the relevant requirements in the *Code of Practice for the Safe Transport of Radioactive Materials* (ARPANSA, 2001, or its latest version);
 - (iv) details of reasonable and feasible measures that would be implemented to minimise traffic safety issues and disruption to local users of the transport route/s during construction and decommissioning of the development, including:
 - temporary traffic controls, including detours and signage;
 - notifying the local community about project-related traffic impacts;
 - a traffic management system for managing over-dimensional vehicles;
 - measures to ensure loose surface road material generated by project-related traffic does not cause nuisance or hazard to other road users; and
 - provision of hard stand areas for parking of transport vehicles if required; and
 - (v) a Road Transport Protocol for all drivers transporting materials to and from the site with measures to ensure:
 - heavy vehicles adhere to the designated haulage routes;
 - all vehicles transporting mineral concentrate are completely covered whilst in transit;
 - the staggering of heavy vehicle departures to minimise impacts on the road network, where practicable;
 - no disruption to school bus timetables;
 - the management of worker fatigue during trips to and from the site;
 - appropriate driver behaviour including adherence to speed limits, safe overtaking and maintaining appropriate distances between vehicles (i.e. a Driver Code of Conduct);
 - adherence to drug and alcohol policies;
 - appropriate vehicle maintenance and safety;
 - contingency plans when the haulage route is disrupted due to low visibility or closed due to wet weather;
 - emergency response plans;
 - the safe transportation of MSP process wastes; and
 - compliance with and enforcement of the protocol.

Following approval, the Applicant shall carry out the development in accordance with this plan.

VISUAL

Operating Conditions

28. The Applicant shall:
- (a) implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the development;
 - (b) ensure that all external lighting associated with the development complies with *Australian Standard AS4282 (INT) 1995 - Control of Obtrusive Effects of Outdoor Lighting*; and
 - (c) take all practical measures to shield views of mining operations from users of public roads and privately-owned residences.

BUSHFIRE MANAGEMENT

29. The Applicant shall:
- (a) ensure that the development is suitably equipped to respond to any fires on site; and
 - (b) assist the RFS, emergency services and National Parks and Wildlife Service as much as practicable in response to fires in the vicinity of the site.

DANGEROUS GOODS

30. The Applicant shall ensure that the storage, handling, and transport of dangerous goods is done in accordance with the relevant *Australian Standards*, particularly AS1940 and AS1596, and the *Australian Code for the Transport of Dangerous Goods by Road and Rail*.

WASTE

31. The Applicant shall:
- implement all reasonable and feasible measures to minimise the waste generated by the development;
 - classify all waste in accordance with the EPA's *Waste Classification Guidelines*;
 - ensure that the waste generated by the development is appropriately stored, handled and disposed of at appropriately licensed waste facilities;
 - manage on-site sewage treatment and disposal in accordance with the requirements of Council and EPA; and
 - manage any radioactive waste on site in accordance with the detailed requirements of any EPL for the development, and the *NSW Radiation Control Act 1990*, *NSW Protection of the Environment Operations (Waste) Regulation 2014* and *Code of Practice and Safety Guide on Radiation Protection and Radioactive waste Management in Mining and Mineral Processing (ARPANSA 2005)*.

REHABILITATION

Rehabilitation Objectives

32. The Applicant shall rehabilitate the site to the satisfaction of the Secretary Industry. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EIS (and depicted conceptually in the figure in Appendix 9), and comply with the objectives in Table 11.

Table 11: Rehabilitation Objectives

Feature	Objective
Mine site (as a whole)	- Safe, stable & non-polluting - Materials (including topsoils, substrates and seeds of the disturbed areas) are recovered, appropriately managed and used effectively as resources in the rehabilitation of the site - Final landforms to: - restore native vegetation communities and ecosystem function (in the applicable domains); - sustain the intended land use for the post-mining domains; - minimise the visual impacts of the development; - be generally in keeping with the natural terrain features of the area; - incorporate micro-relief; and - incorporate drainage lines consistent with topography and natural drainage where reasonable and feasible
Water quality	- Water retained on site is fit for the intended land use(s) for the post-mining domains - Water discharged from site is consistent with the baseline ecological, hydrological and geomorphic conditions of the creeks prior to mining disturbance - Water management is consistent with the applicable regional catchment strategy
Final void	- Minimise: - the size and depth of the final void - the drainage catchment of the final void - risk of flood interaction for all flood events up to and including the 1% AEP
Surface infrastructure	To be decommissioned and removed, unless DRE agrees otherwise
Agriculture	Land capability classification for the relevant nominated agricultural pursuit for each domain is established and self-sustaining within a reasonable timeframe
Community	- Ensure public safety - Minimise the adverse socio-economic effects of mine closure

Progressive Rehabilitation

33. The Applicant shall rehabilitate the site progressively, that is, as soon as is practicable following disturbance, to the satisfaction of the Secretary Industry.

Rehabilitation Management Plan

34. Prior to carrying out any development on site, the Applicant shall prepare a Rehabilitation Management Plan for the development to the satisfaction of the Secretary Industry. This plan must be:
- (a) prepared in consultation with the Department, OEH, DPI and Council;
 - (b) be prepared in accordance with relevant guidelines and consistent with the rehabilitation objectives in the EIS and in Table 12;
 - (c) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, and triggering remedial action (if necessary);
 - (d) describe the measures that would be implemented to ensure compliance with the relevant conditions of this consent, and address all aspects of rehabilitation including timeframes for achieving specified rehabilitation objectives;
 - (e) include a mine closure strategy, that details measures to minimise the long term impacts associated with mine closure, including final landform and the final void, final land use and socio-economic issues;
 - (f) include interim rehabilitation where necessary to minimise the area exposed for dust generation;
 - (g) include a program to monitor, independently audit and report on the effectiveness of the measures, and progress against the detailed performance and completion criteria; and
 - (h) build to the maximum extent practicable on the other management plans required under this consent.

Following approval, the Applicant shall carry out the development in accordance with this plan.

Note: The Applicant is not required to carry out the consultation required under this condition if the plan is being prepared only for the rehabilitation of the Bulk Sampling Activity.

SCHEDULE 4 ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS/TENANTS

1. Within 1 month of the commencement of development under this consent, the Applicant shall notify in writing the owners of the land listed in Table 1 of Schedule 3 that they have the right to require the Applicant to:
 - (a) acquire their land in accordance with the procedures in conditions 3 and 4 below at any stage during the development; and
 - (b) implement additional noise mitigation measures at their residence at any stage during the development.

INDEPENDENT REVIEW

2. If an owner of privately-owned land considers the development to be exceeding the criteria in Schedule 3 at his/her land, then he/she may ask the Secretary in writing for an independent review of the impacts of the development on his/her land.

If the Secretary is satisfied that an independent review is warranted, then the Applicant shall:

- (a) commission a suitably qualified, experienced and independent expert, whose appointment has been approved by the Secretary, to:
 - consult with the landowner to determine his/her concerns;
 - conduct monitoring to determine whether the development is complying with the relevant impact assessment criteria in Schedule 3; and
 - if the development is not complying with these criteria then:
 - o determine if the more than one mine is responsible for the exceedance, and if so the relative share of each mine regarding the impact on the land;
 - o identify the measures that could be implemented to ensure compliance with the relevant criteria; and
- (b) give the Secretary and landowner a copy of the independent review within 2 months of the Secretary's decision, unless the Secretary agrees otherwise.

LAND ACQUISITION

3. Within 3 months of receiving a written request from a landowner with acquisition rights, the Applicant shall make a binding written offer to the landowner based on:
 - (a) the current market value of the landowner's interest in the land at the date of this written request, as if the land was unaffected by the development, having regard to the:
 - existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and
 - presence of improvements on the land and/or any approved building or structure which has been physically commenced at the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements or reasonable costs that have resulted from the implementation of the additional noise mitigation measures in condition 2 of Schedule 3;
 - (b) the reasonable costs associated with:
 - relocating within the Balranald local government area, or to any other local government area determined by the Secretary; and
 - obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is to be acquired; and
 - (c) reasonable compensation for any disturbance caused by the land acquisition process.

However, if at the end of this period, the Applicant and landowner cannot agree on the acquisition price of the land and/or the terms upon which the land is to be acquired, then either party may refer the matter to the Secretary for resolution.

Upon receiving such a request, the Secretary shall request the President of the NSW Division of the Australian Property Institute to appoint a qualified independent valuer to:

- consider submissions from both parties;
- determine a fair and reasonable acquisition price for the land and/or the terms upon which the land is to be acquired, having regard to the matters referred to in paragraphs (a)-(c) above;
- prepare a detailed report setting out the reasons for any determination; and
- provide a copy of the report to both parties.

Within 14 days of receiving the independent valuer's report, the Applicant shall make a binding written offer to the landowner to purchase the land at a price not less than the independent valuer's determination.

However, if either party disputes the independent valuer's determination, then within 14 days of receiving the independent valuer's report, they may refer the matter to the Secretary for review. Any request for a review must be accompanied by a detailed report setting out the reasons why the party disputes the independent valuer's determination. Following consultation with the independent valuer and both parties, the Secretary will determine a fair and reasonable acquisition price for the land, having regard to the matters referred to in paragraphs (a)-(c) above, the independent valuer's report, the detailed report of the party that disputes the independent valuer's determination and any other relevant submissions.

Within 14 days of this determination, the Applicant shall make a binding written offer to the landowner to purchase the land at a price not less than the Secretary's determination.

If the landowner refuses to accept the Applicant's binding written offer under this condition within 6 months of the offer being made, then the Applicant's obligations to acquire the land shall cease, unless the Secretary determines otherwise.

4. The Applicant shall pay all reasonable costs associated with the land acquisition process described in condition 3 above, including the costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of this plan at the Office of the Registrar-General.
-

SCHEDULE 5

ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. Prior to carrying out any development on site, the Applicant shall prepare an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must:
 - (a) be approved by the Secretary prior to the commencement of any development under this consent;
 - (b) provide the strategic framework for environmental management of the development;
 - (c) identify the statutory approvals that apply to the development;
 - (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;
 - (e) describe the procedures that would be implemented to:
 - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
 - receive, handle, respond to, and record complaints;
 - resolve any disputes that may arise;
 - respond to any non-compliance;
 - respond to emergencies; and
 - (f) include:
 - copies of any strategies, plans and programs approved under the conditions of this consent; and
 - a clear plan depicting all the monitoring to be carried out in relation to the development.

Following approval, the Applicant shall carry out the development in accordance with this plan.

Adaptive Management

2. The Applicant shall assess and manage development-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedule 3. Any exceedance of these criteria and/or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.

Where any exceedance of these criteria and/or performance measures has occurred, the Applicant must, at the earliest opportunity:

- (a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
- (c) implement remediation measures as directed by the Secretary, to the satisfaction of the Secretary.

Management Plan Requirements

3. The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:
 - (a) detailed baseline data;
 - (b) a description of:
 - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
 - any relevant limits or performance measures/criteria;
 - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;
 - (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
 - (d) a program to monitor and report on the:
 - impacts and environmental performance of the development;
 - effectiveness of any management measures (see c above);
 - (e) a contingency plan to manage any unpredicted impacts and their consequences;
 - (f) a program to investigate and implement ways to improve the environmental performance of the development over time;
 - (g) a protocol for managing and reporting any:
 - incidents;
 - complaints;

- non-compliances with statutory requirements; and
 - exceedances of the impact assessment criteria and/or performance criteria; and
- (h) a protocol for periodic review of the plan.

Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.

Annual Review

4. By the end of March each year, the Applicant shall review the environmental performance of the development for the previous calendar year to the satisfaction of the Secretary. This review must:
- (a) describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the current calendar year;
 - (b) include a comprehensive review of the monitoring results and complaints records of the development over the past year, which includes a comparison of these results against the:
 - relevant statutory requirements, limits or performance measures/criteria;
 - monitoring results of previous years; and
 - relevant predictions in the EIS;
 - (c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
 - (d) identify any trends in the monitoring data over the life of the development;
 - (e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
 - (f) describe what measures will be implemented over the next year to improve the environmental performance of the development.

Revision of Strategies, Plans and Programs

5. Within 3 months of the submission of:
- (a) annual review under condition 4 above;
 - (b) incident report under condition 6 below;
 - (c) audit under condition 8 below; or
 - (d) any modification to the conditions of this consent (unless the conditions require otherwise),
- the Applicant shall review and, if necessary, revise the strategies, plans, and programs required under this consent to the satisfaction of the Secretary.

Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted to the Secretary for approval.

Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the development.

REPORTING

Incident Reporting

6. The Applicant shall immediately notify the Secretary and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the development, the Applicant shall notify the Secretary and any other relevant agencies as soon as practicable after the Applicant becomes aware of the incident. Within 7 days of the date of the incident, the Applicant shall provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

Regular Reporting

7. The Applicant shall provide regular reporting on the environmental performance of the development on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent.

AUDITING

8. Within 1 year of the commencement of construction, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:
- (a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;
 - (b) include consultation with the relevant agencies;

- (c) assess the environmental performance of the development and assess whether it is complying with the requirements in this consent, and any other relevant approvals, EPL/s; and/or mining lease/s;
- (d) review the adequacy of any approved strategy, plan or program required under the abovementioned approvals; and
- (e) recommend measures or actions to improve the environmental performance of the development, and/or any strategy, plan or program required under these approvals.

Note: This audit team must be led by a suitably qualified auditor, and include experts in water resources, ecology, Aboriginal heritage and/or any other fields specified by the Secretary.

9. Within 3 months of commissioning this audit, or as otherwise agreed by the Secretary, the Applicant shall submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report.

ACCESS TO INFORMATION

10. The Applicant shall:
 - (a) make the following information publicly available on its website as relevant to the stage of the development:
 - the EIS;
 - current statutory approvals for the development;
 - approved strategies, plans or programs required under the conditions of this consent;
 - a comprehensive summary of the monitoring results of the development, which have been reported in accordance with the various plans and programs approved under the conditions of this consent;
 - a complaints register, which is to be updated on a monthly basis;
 - minutes of meetings of the Aboriginal Cultural Heritage Working Group;
 - any independent environmental audit, and the Applicant's response to the recommendations in any audit; and
 - any other matter required by the Secretary; and
 - (b) keep this information up to date, to the satisfaction of the Secretary.
-

APPENDIX 1 SCHEDULE OF LAND

Lot number	Deposited plan number	Lot number	Deposited plan number
4727	767893	6654	769427
1229	762714	99	751245
1226	762711	1184	762595
1	751182	5501	768410
4808	762298	5332	768243
1224	762709	128	760747
1225	762710	6615	769405
4	751182	5331	768242
1175	762586	5326	768237
5	751182	1174	762585
1227	762712	43	751217
1223	762708	40	751217
88	760470	1	751232
103	751245	31	751217
98	751245	39	751217
73	751245	4812	769046
4864	769099	20	751232
100	751245	4809	762298
104	751214	5325	768236
102	751214	41	751217

APPENDIX 2 GENERAL LAYOUT OF DEVELOPMENT

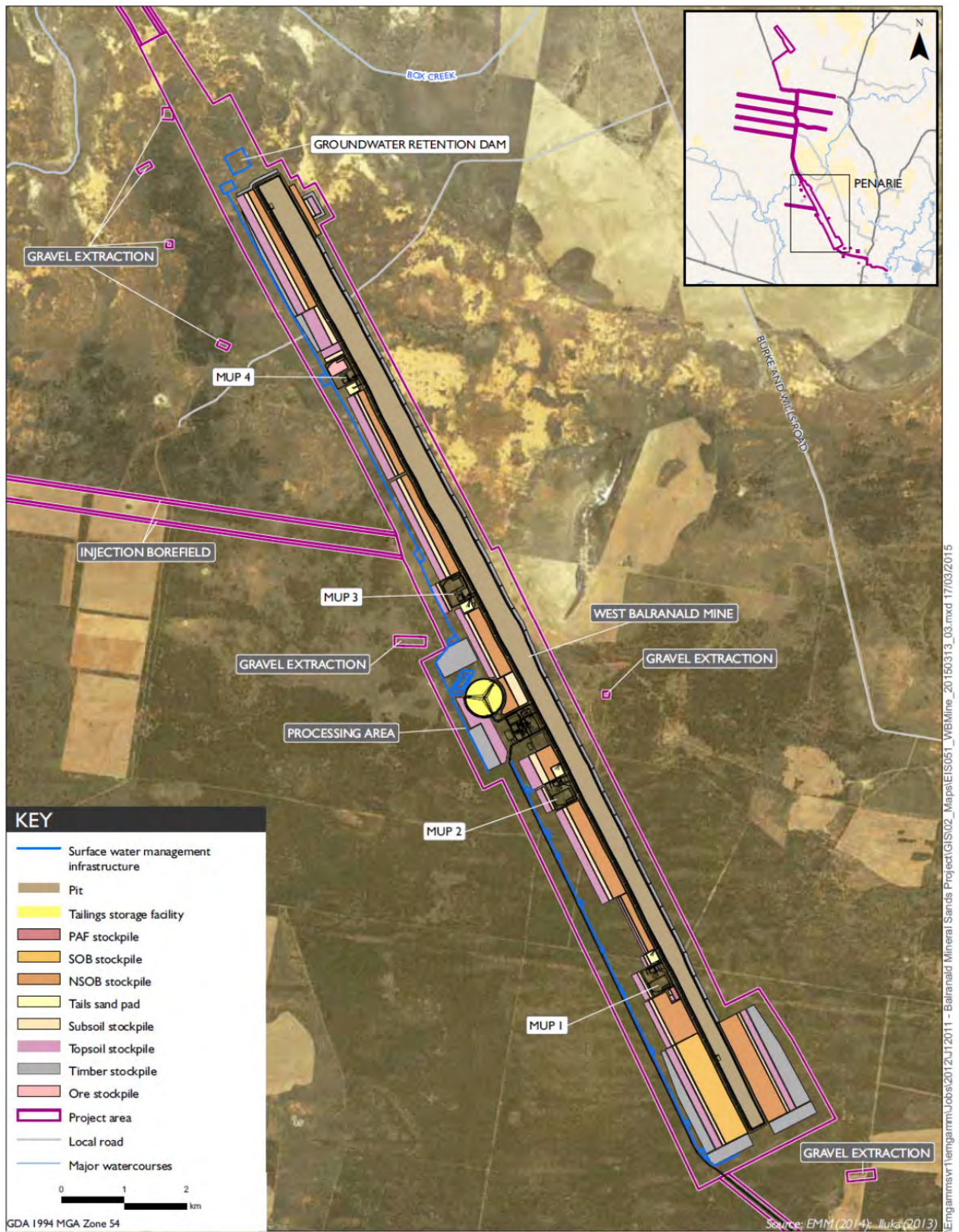
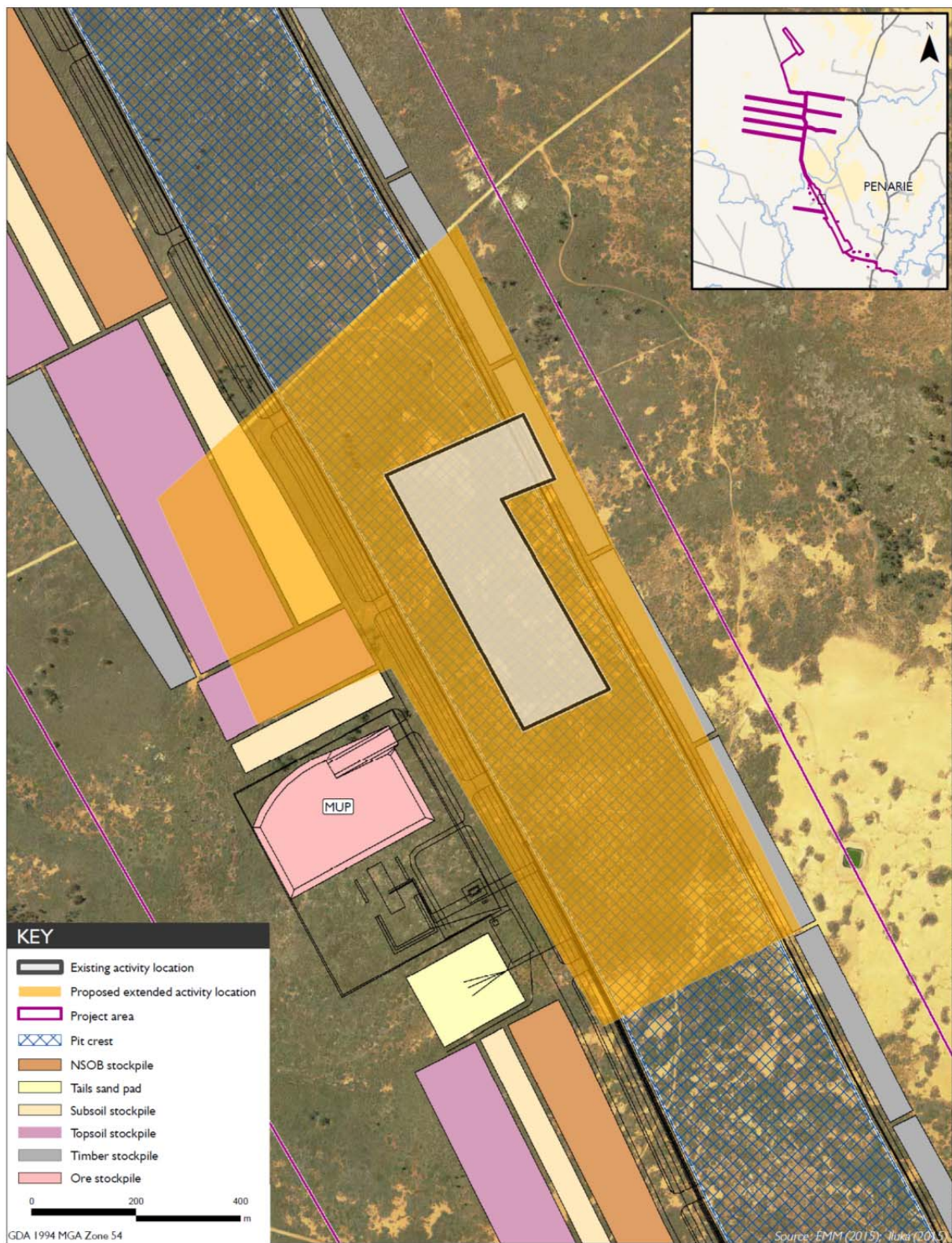


Figure 1: West Balranald Mine and Gravel Extraction Areas



Proposed extended activity location
 Balranald Mineral Sands Project
 Change to project description
 Figure 5

Figure 2: Bulk Sampling Activity Location

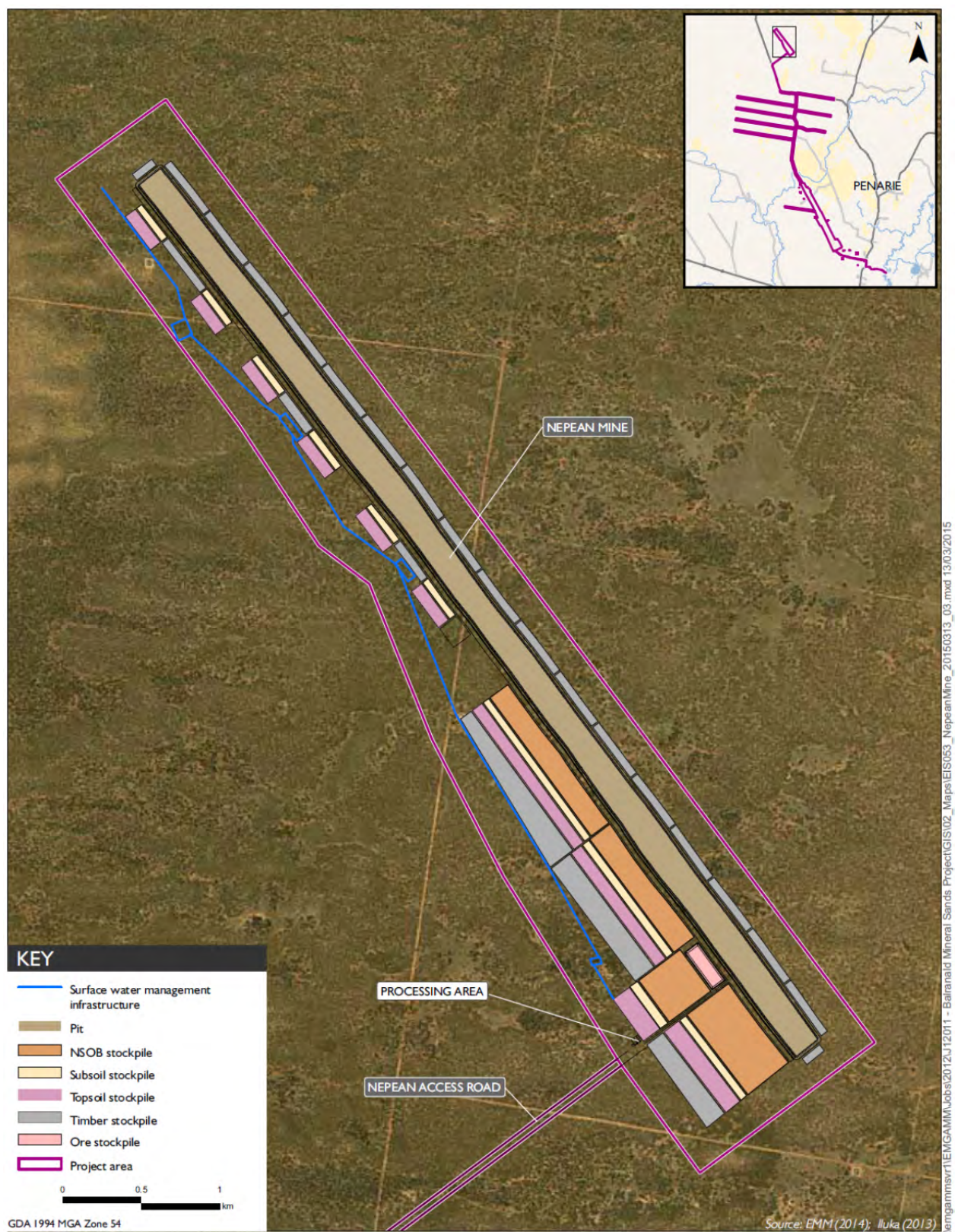


Figure 3: Nepean Mine

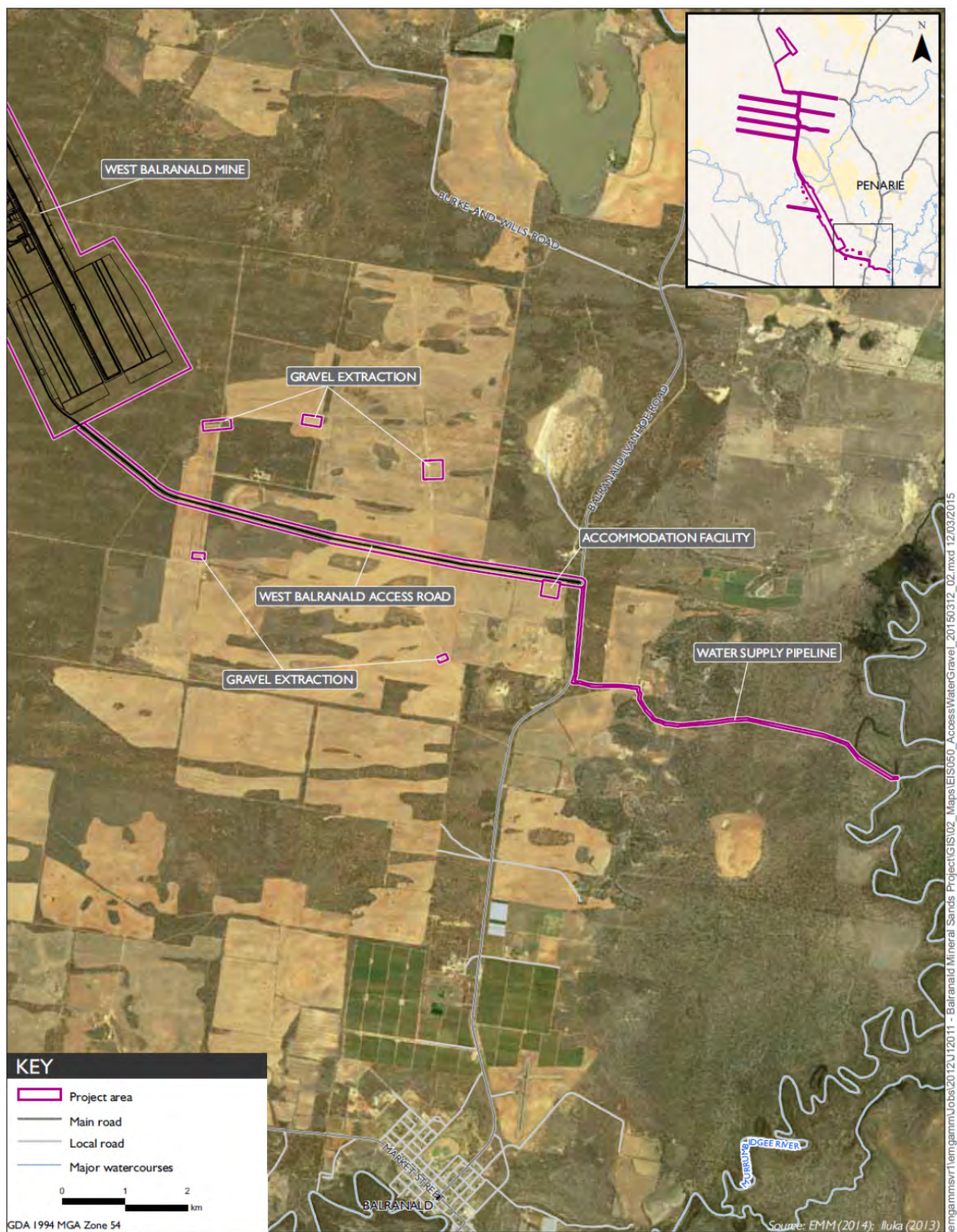


Figure 4: West Balranald Access Road, Water Supply Pipeline and Gravel Extraction Areas

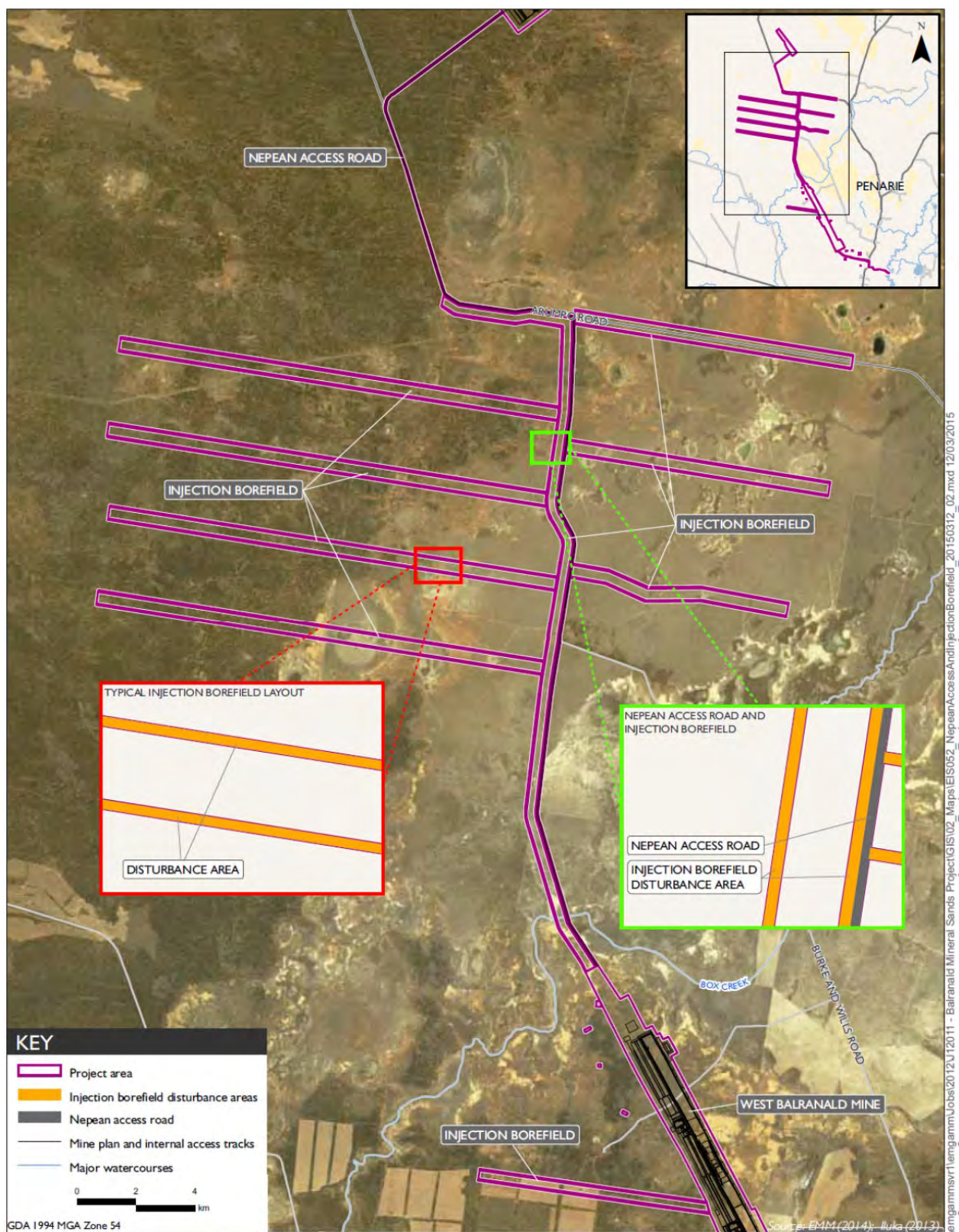


Figure 5: Nepean Access Road and Injection Borefields

**APPENDIX 3
GENERAL TERMS OF VPA**

Funding Area	Applicant Contribution	Timeframe	Responsibility for Administration
Community Support	\$50,000 per year, for up to 10 years	Annually (for each year of construction and operations)	Community Partnerships Committee
	50% of funding for a local project, up to a maximum of \$150,000	Within two years of the commencement of construction of the West Balranald mine	Applicant & Council
Local Employment	Aspirational local employment target of 5% of the total full time equivalent site workforce	To be publically reported annually	Applicant
Youth Training (higher education scholarship fund)	\$4,500 per year, for up to 8 years, with potential for work experience opportunities	Annually (for each year of operations)	Community Partnerships Committee
Employment Study	50% of funding for employment study, up to a maximum of \$50,000	Two years prior to the cessation of mining activities under this consent (as can be reasonably forecasted)	Applicant & Council

Notes:

- *The general terms of the offer are outlined in the Applicant's letter to Council dated 7 December 2015;*
- *The Community Partnerships Committee is to be an independent body to be established under the VPA with equal representation from the Applicant, Council and the Community, and chaired by the Applicant;*
- *Contributions are to be suspended when construction and/or operations cease, and the development is placed on care and maintenance; and*
- *Contributions are to be made by the Applicant as per the relevant timeframes, unless otherwise agreed by the parties.*

APPENDIX 4 RECEIVER LOCATION PLAN

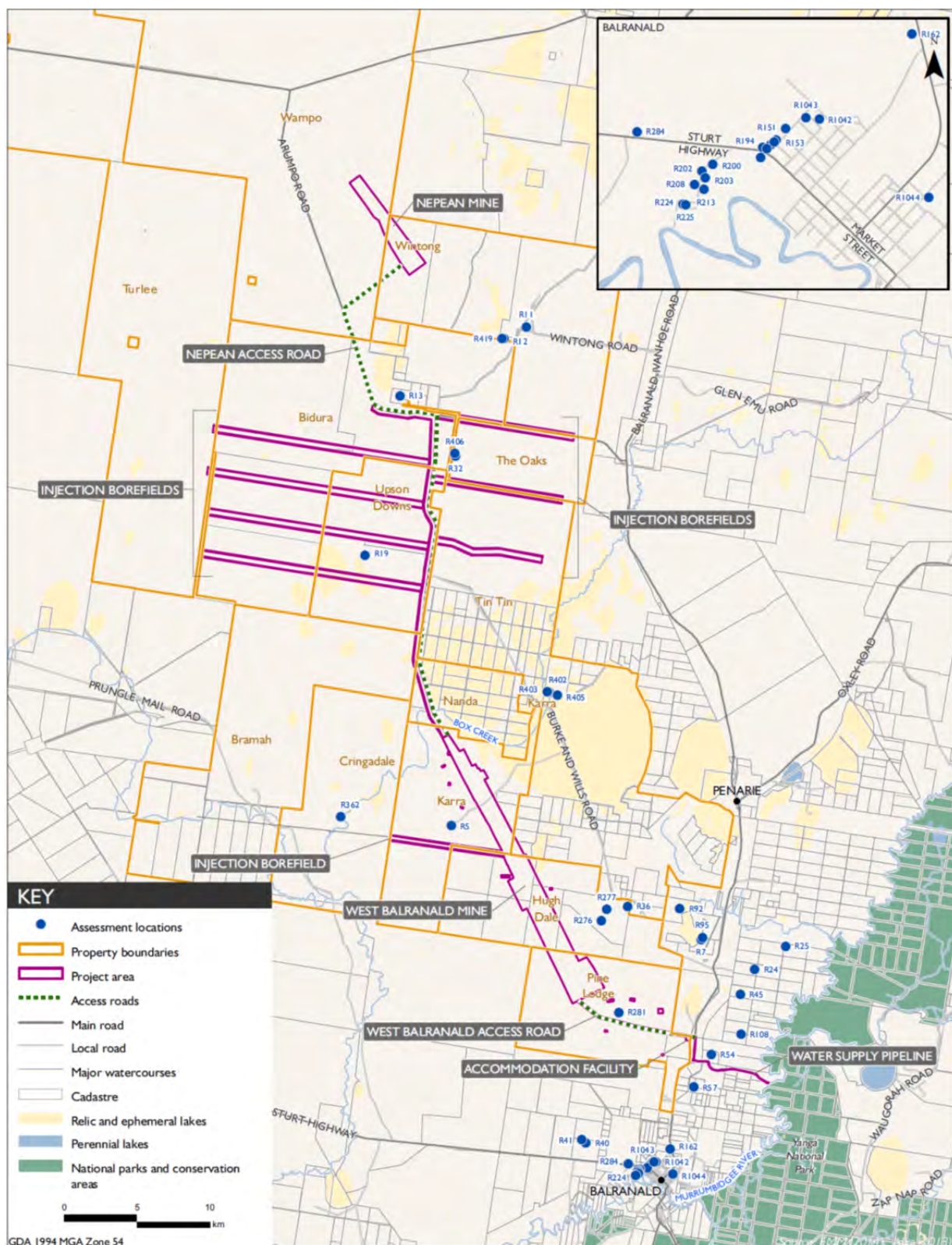


Figure 6: Land Ownership and Receiver Location Plan

APPENDIX 5 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in condition 3 of Schedule 3 apply under all meteorological conditions except the following:
 - (a) wind speeds greater than 3 m/s at 10 metres above ground level; or
 - (b) stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 8°C/100m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station on or in the vicinity of the site.

Compliance Monitoring

3. Unless directed otherwise by the Secretary, attended monitoring is to be used to evaluate compliance with the relevant conditions of consent.

Note: The Noise Management Plan (see condition 5 of Schedule 3) is required to include a noise monitoring program for the development, which will include details of the frequency of monitoring. The Secretary may direct that the frequency of monitoring increase or decrease at any time during the life of the development.

4. Unless otherwise agreed with the Secretary, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended or replaced from time to time), in particular the requirements relating to:
 - (a) monitoring locations for the collection of representative noise data;
 - (b) meteorological conditions during which collection of noise data is not appropriate;
 - (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
 - (d) modifications to noise data collected including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

APPENDIX 6 ABORIGINAL HERITAGE SITES AND SUBSURFACE EXCAVATION AREAS

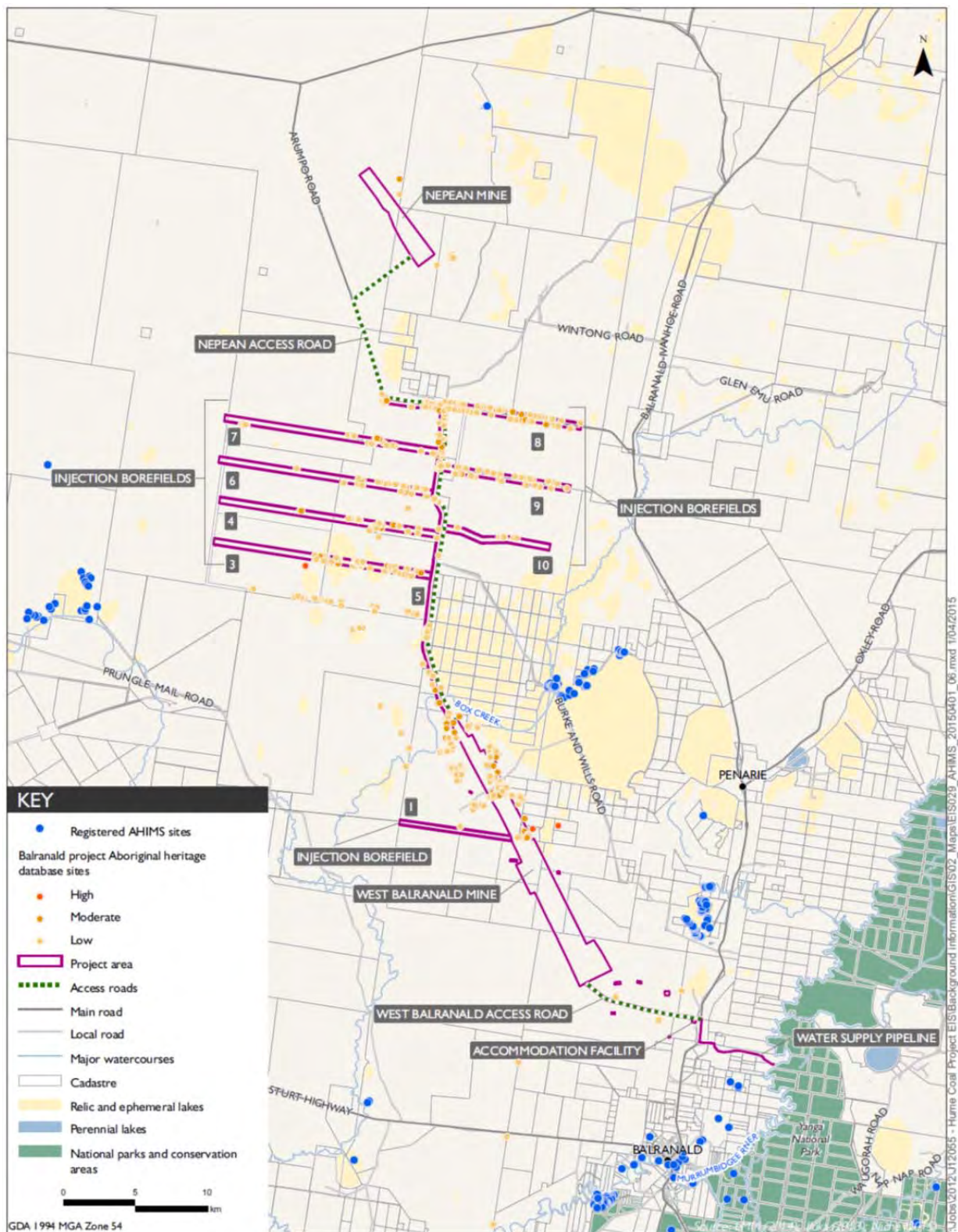


Figure 7: Aboriginal Heritage Sites

Note: Detailed figures and a description of all identified Aboriginal sites is provided in Appendix G of the EIS.

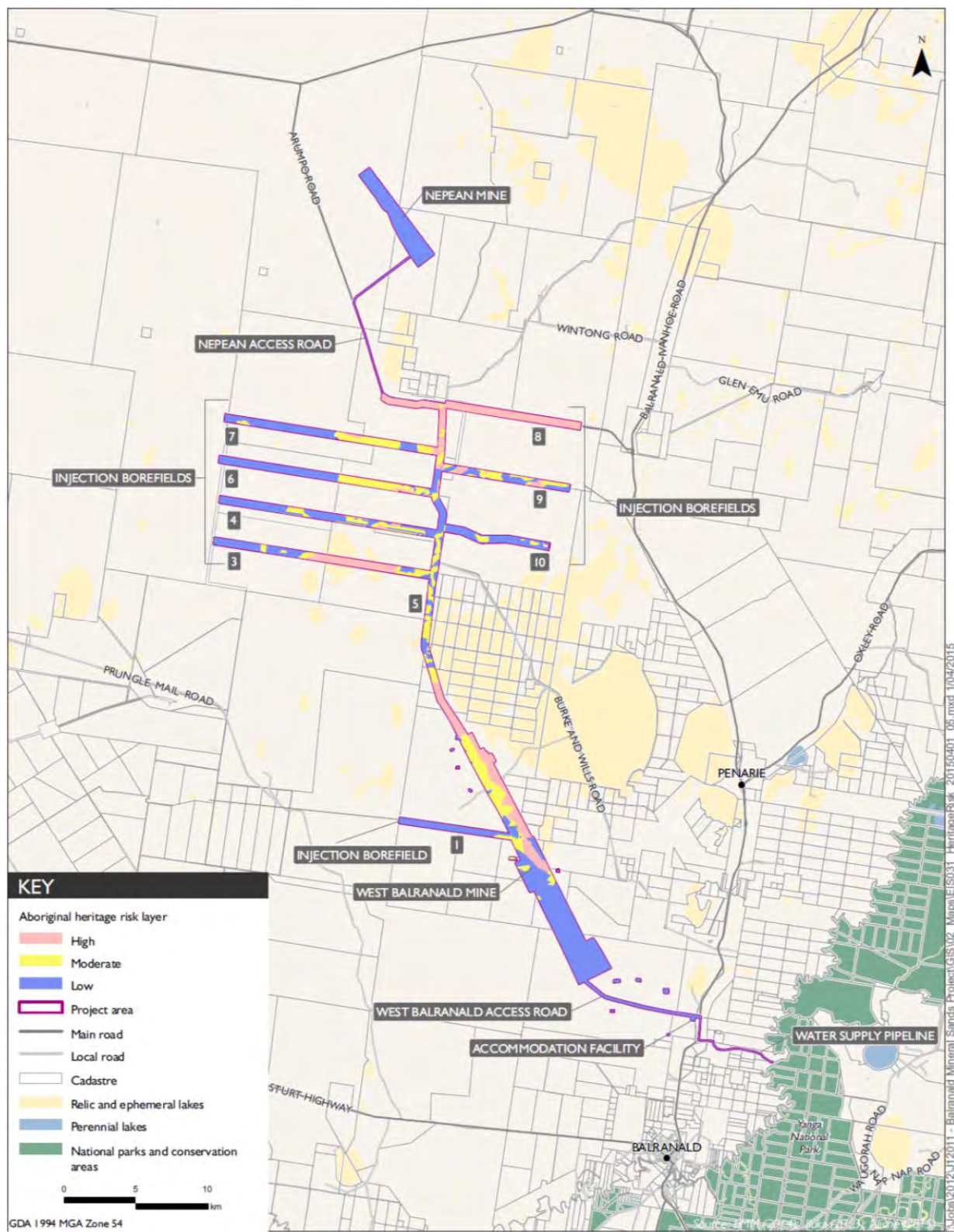


Figure 8: Aboriginal Heritage Risk Layers



Figure 9: Proposed Subsurface Excavation Program – Injection Borefields and Haul Road

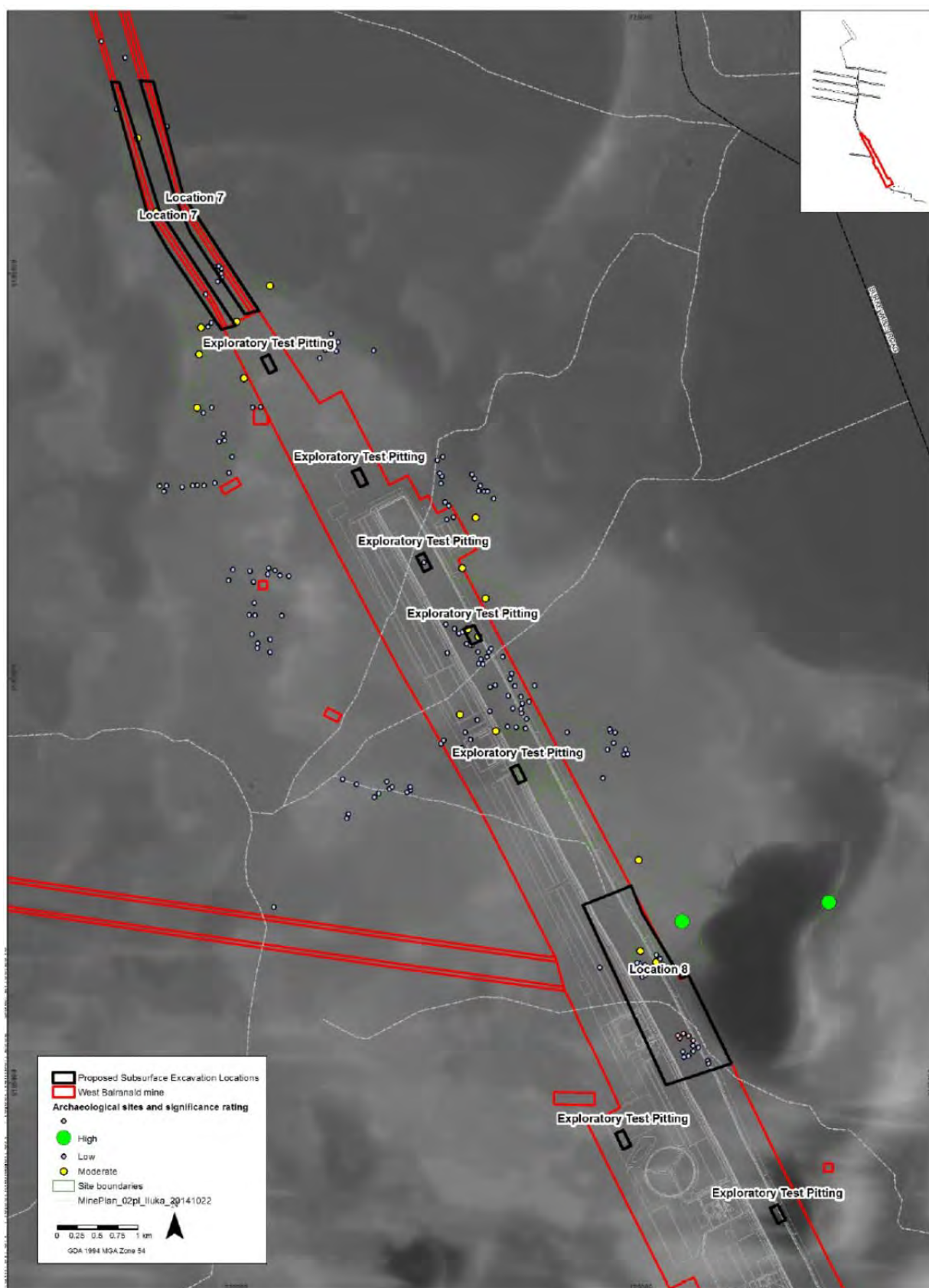


Figure 10: Proposed Subsurface Excavation Program – West Balranald Mine Overview

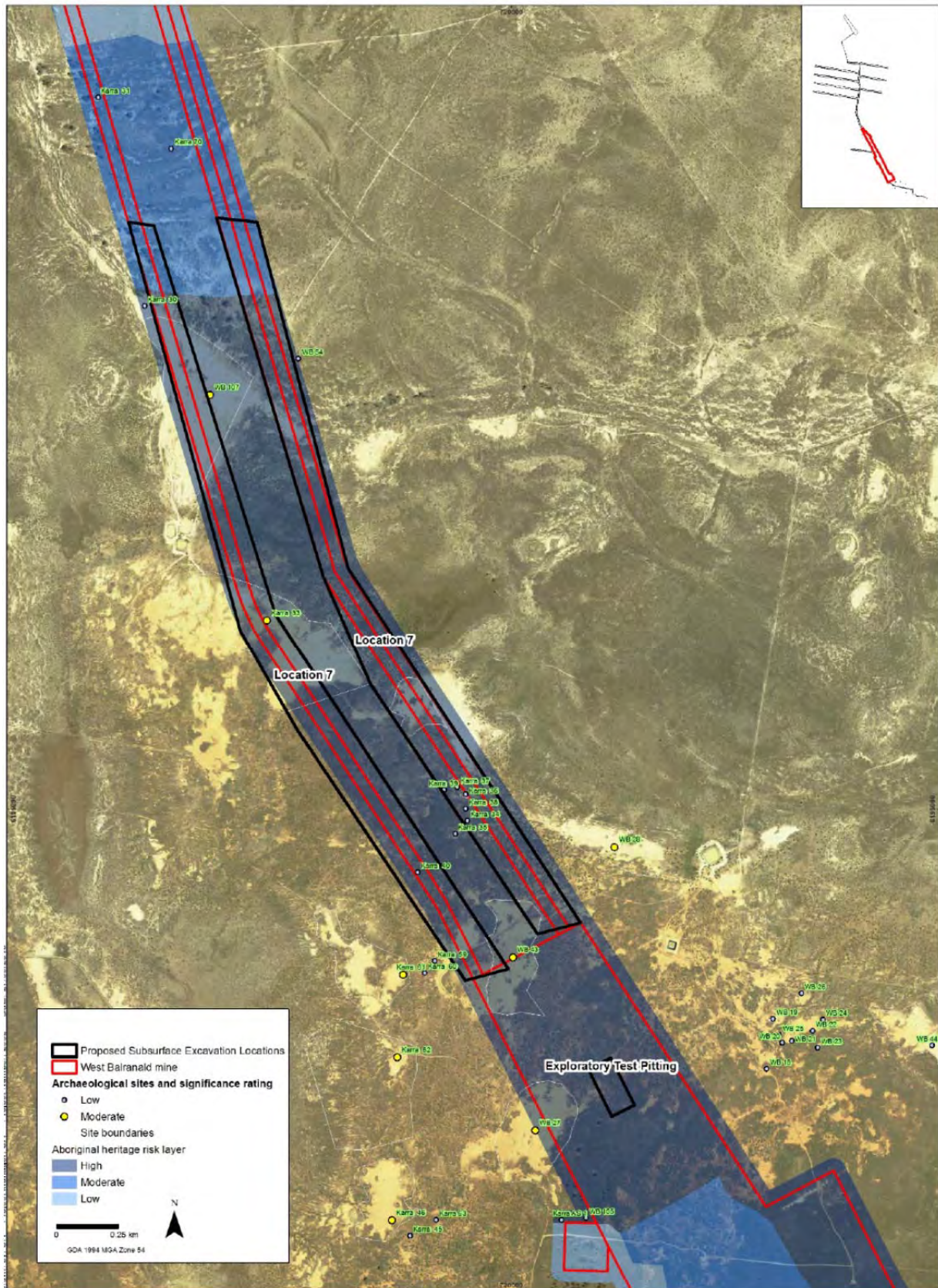


Figure 11: Proposed Subsurface Excavation Program – West Balranald Mine Location 7

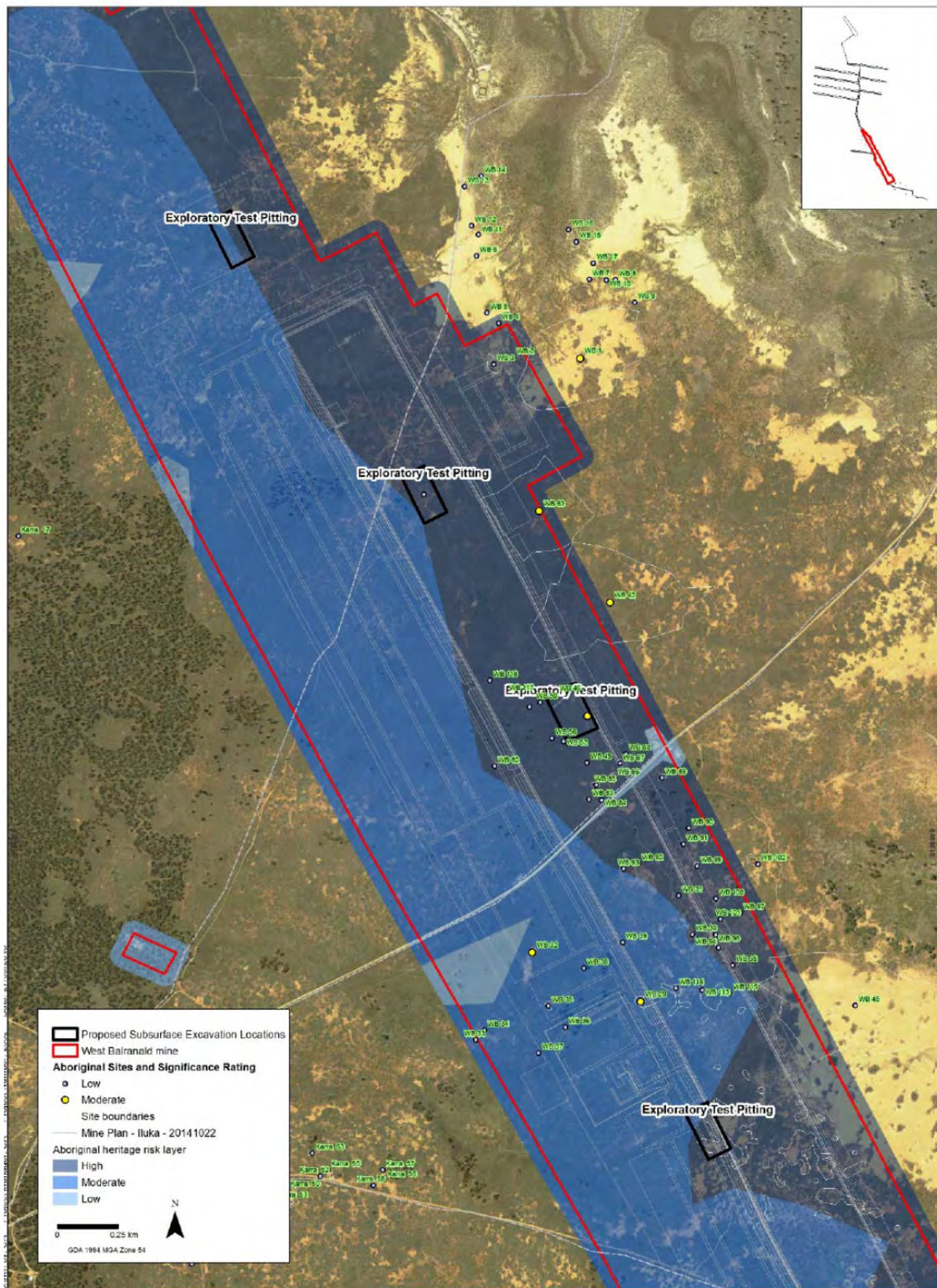


Figure 12: Proposed Subsurface Excavation Program – West Balranald Mine Exploratory Test Pitting

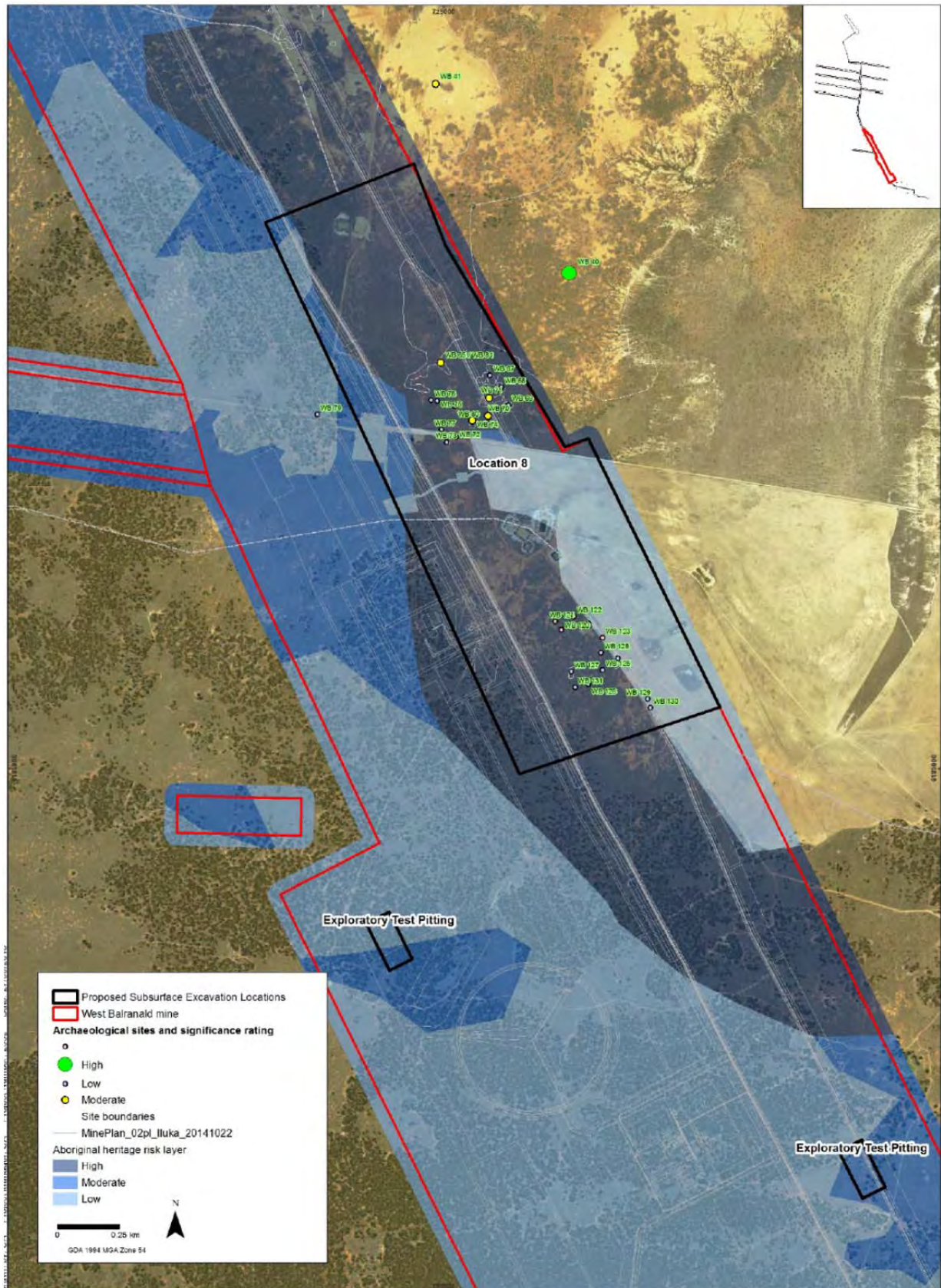
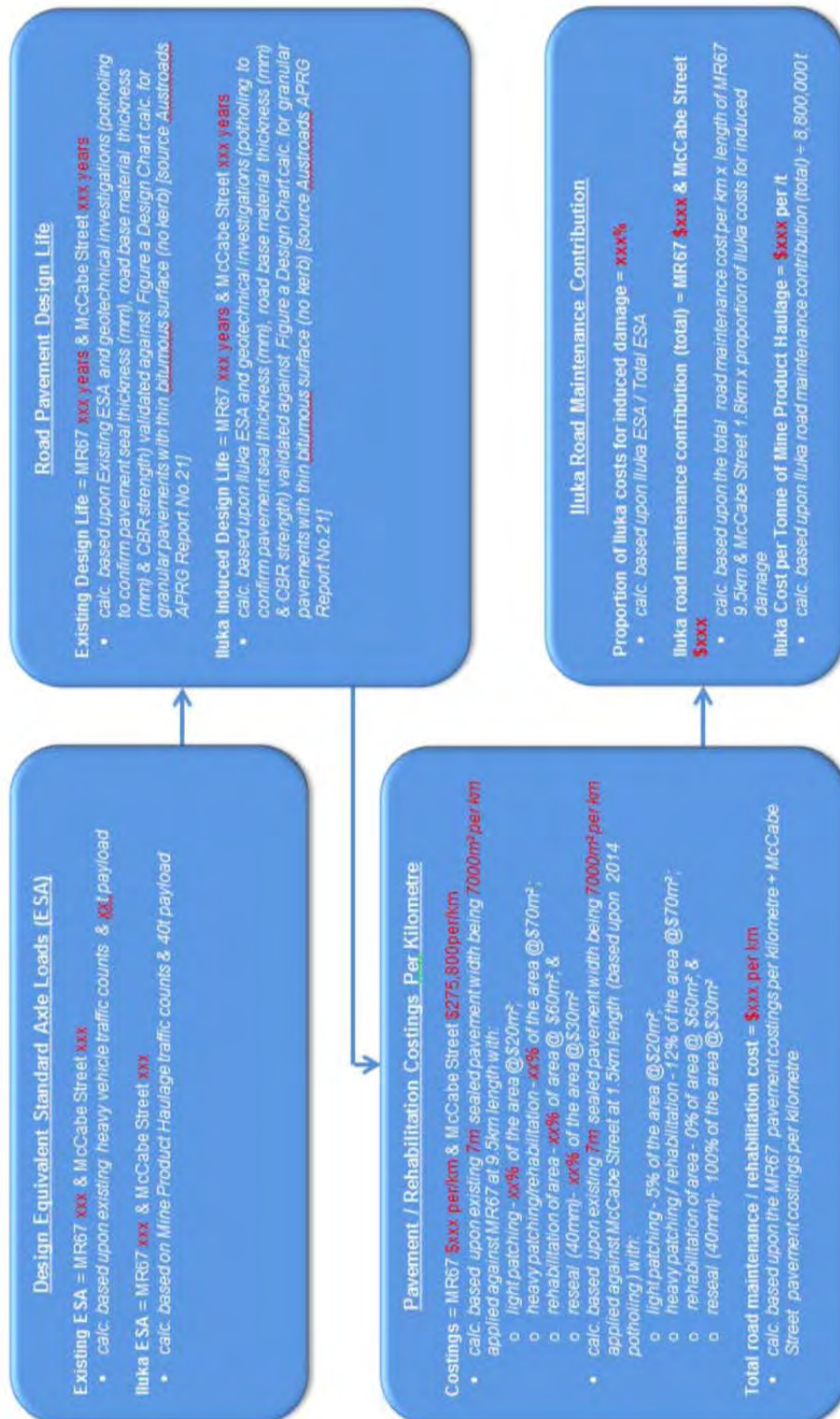


Figure 13: Proposed Subsurface Excavation Program – West Balranald Mine Location 8

APPENDIX 7 ROAD MAINTENANCE COSTING MODEL FRAMEWORK

Flow chart summarising Council's Development Impact Road Costing Framework to derive the road maintenance contribution for MR67 and McCabe Street – 'red' text highlights key input/assumption to be resolved



APPENDIX 8 ROAD HAULAGE ROUTES

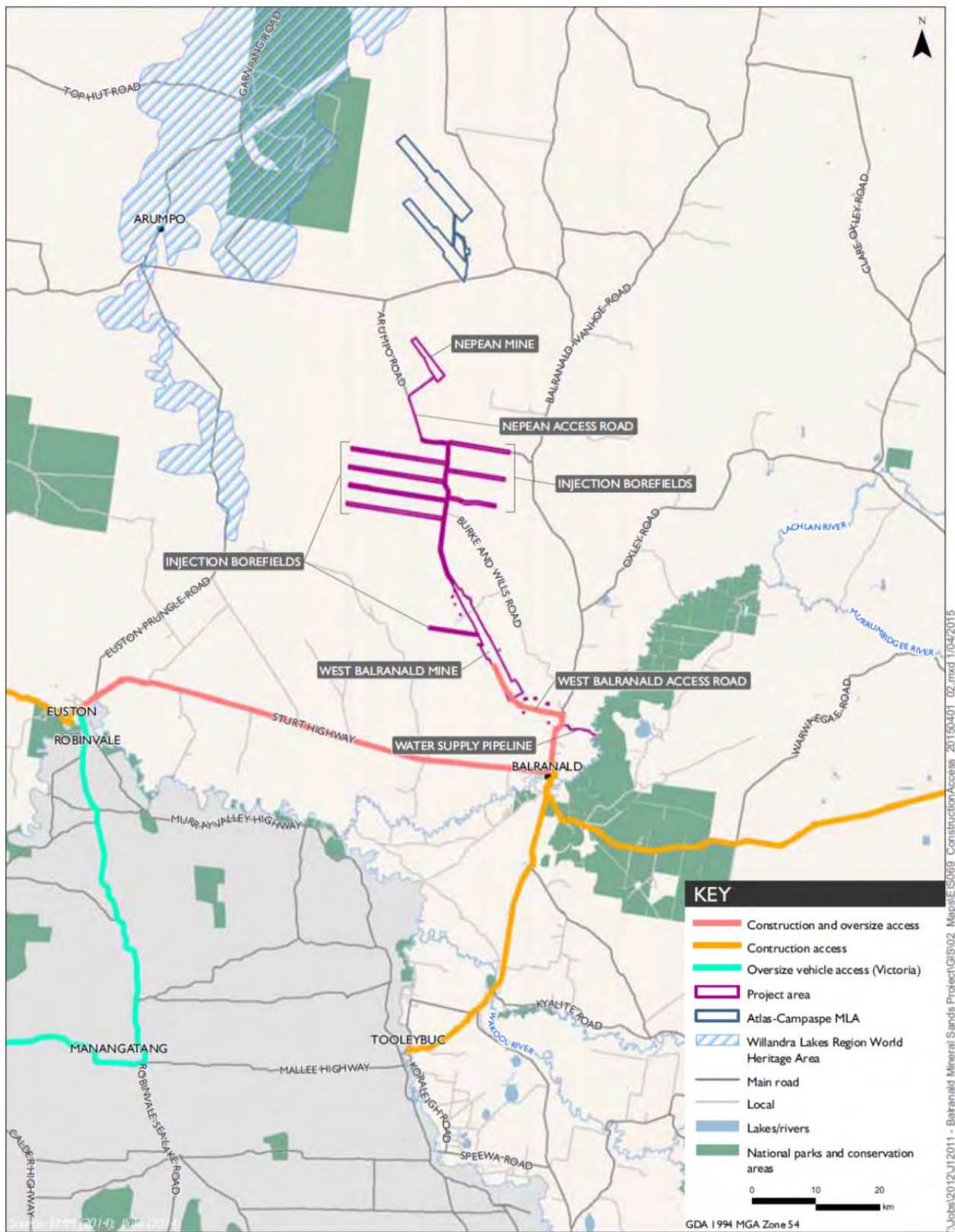


Figure 14: Construction Access Routes

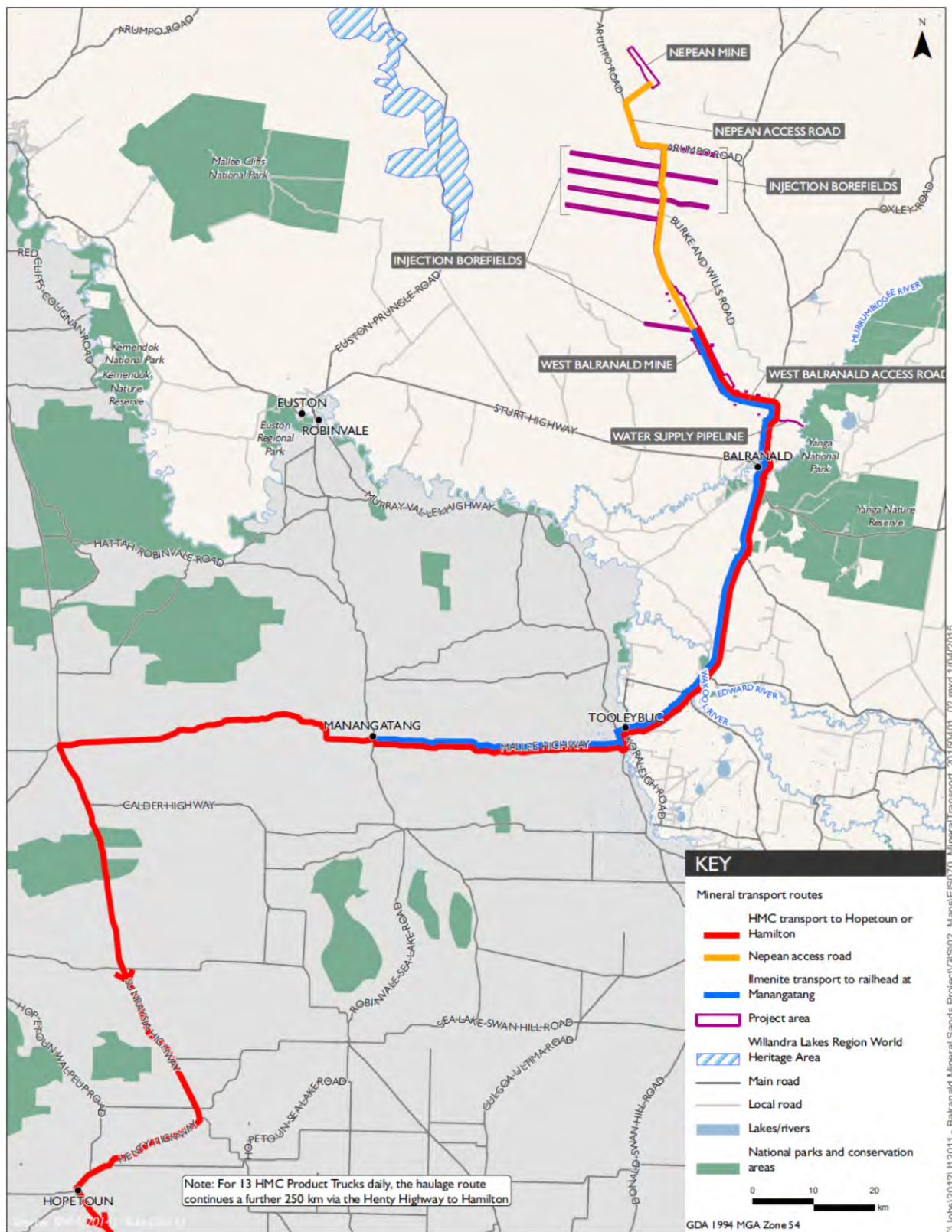


Figure 15: Mineral Transport Routes

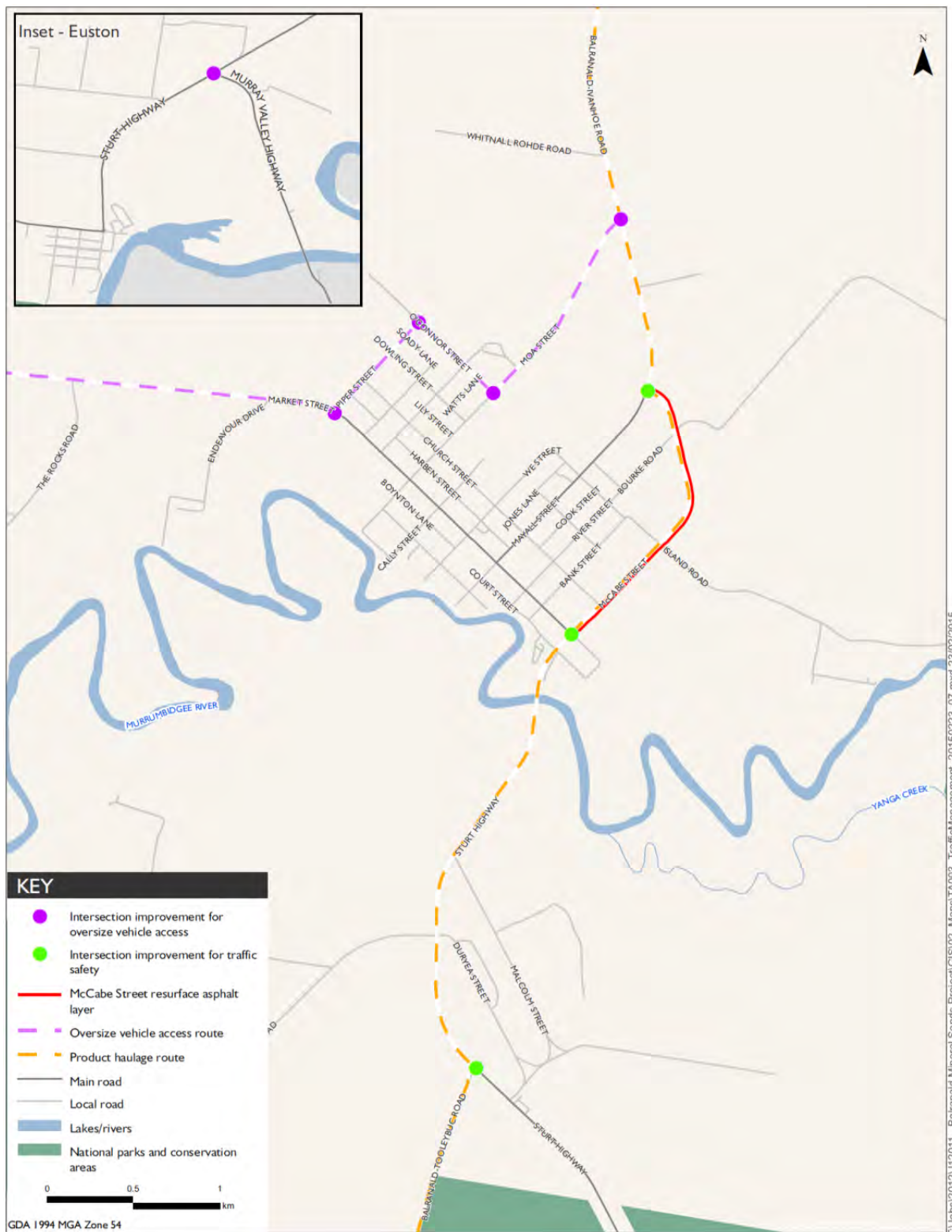


Figure 16: Balranald Town Transport Routes

APPENDIX 9 REHABILITATION PLAN

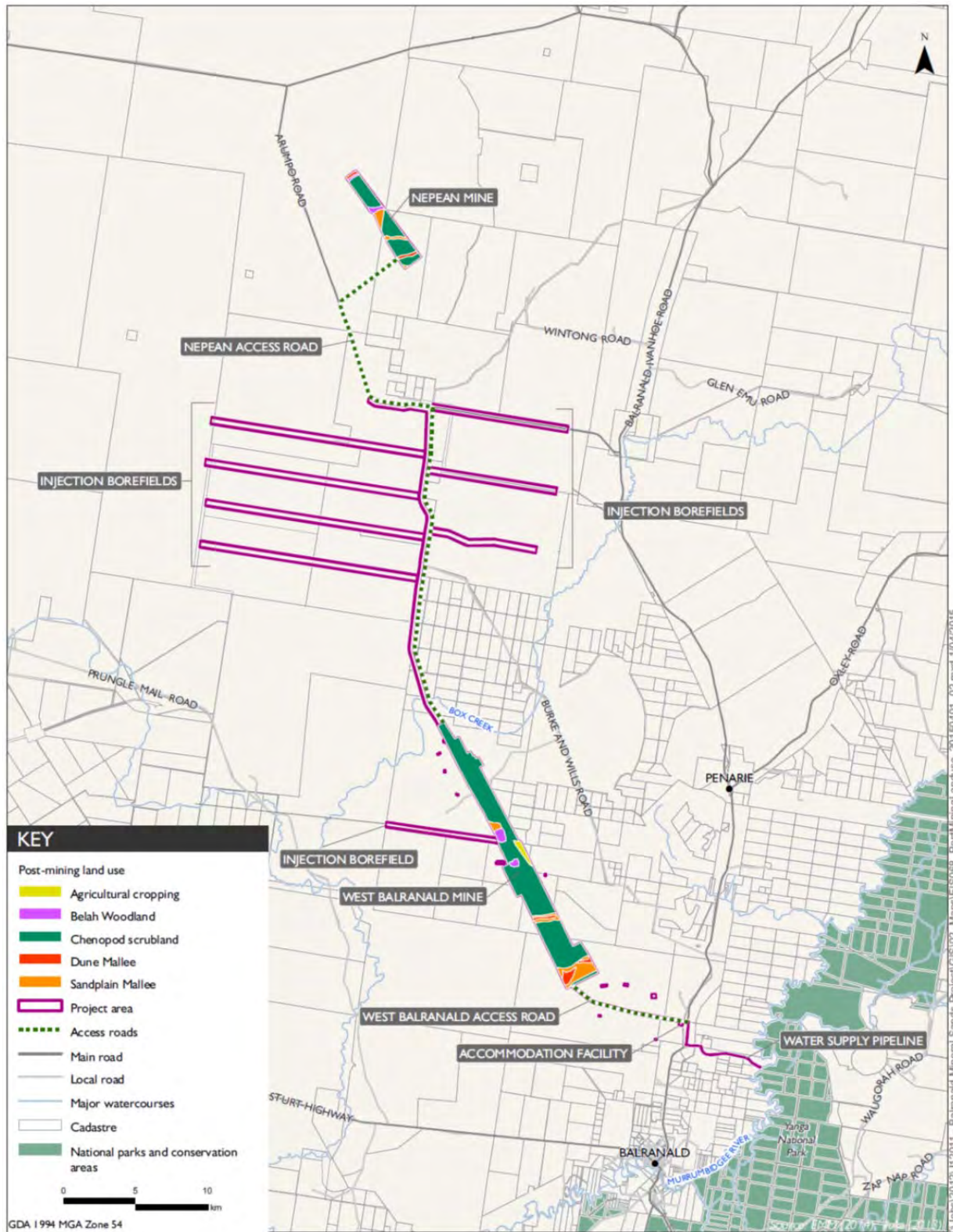


Figure 17: Post Mining Land Use



Appendix B

Construction planning traffic volumes (Wave International 2020)



Project File Note



Client	: ILUKA	Date:	09/07/2020		
Attn	: Alex Pauza	Cc:			
By	Andrew Macpherson	File note:	6040-10-RPT-EV-00003 Rev B		
Subject	: A5800 – Traffic Volumes and Routes				
Project	: WBAL - MOC				
Work Area	☒ PROCESS	☐ CIVIL	☐ MECHANICAL	☐ ELECTRICAL	☒ PROJECT MANAGEMENT
Discipline	: Project Management				
Subject:	Construction Planning – Traffic Volumes				

Attachments / References	
---------------------------------	--

1 Scope

Construction Planning - Identify construction traffic volumes and routes

2 Inputs and Assumptions

16-month construction schedule and personnel as per High level EIS construction Schedule

This assumes a Construction Camp located near site, on the new access road.

Peak Staff numbers from the EIS Construction Schedule is 157 people, it is assumed Balranald residents may not stay in the camp, generating some daily movements between the site and town. See Construction Site personnel Profile below (Figure 1) as from the “High-level Construction Schedule for MOD June 2020 v3” schedule provided.

Deliveries and Equipment Hire outside of Balranald to originate from Mildura, Swan Hill and Hay.

Project File Note

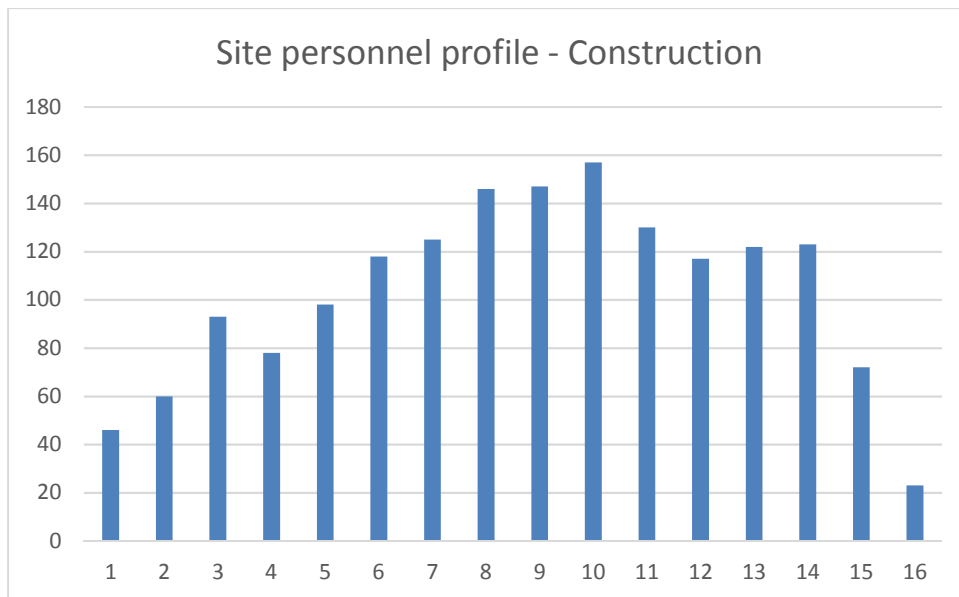


Figure 1: High Level EIS Construction Schedule - Personnel

3 Vehicle Movements

3.1 Work vehicles / Personnel

3.1.1 Utes

To be used to carry 1 - 3 people to and from the site from the camp, with availability key to productivity. 26 movements per day average, peaking at 36.

12060 movements over 16 months, between site and the camp

November 2021 to February 2023

3.1.2 Utes to town (Balranald)

With some personnel being local, 10 movements per day between Balranald and site to be included in road use tally.

4800 movements over 16 months, between site and the Balranald

November 2021 to February 2023

3.1.3 Busses and Vans

These movements would predominantly be within the project area (i.e. not accessing the Ivanhoe road), transporting workers to the site from the accommodation facility. Busses and would be utilised while personnel numbers were greater than 60, for a period of 12 months, carrying at least 20 people, with vans to add flexibility for 6 - 10 passengers, likely for the civil contractors and the mining Contractors.

6500 movements over 14 months, between site and the camp

December 2021 to January 2023

Project File Note



3.1.4 Trucks

Flatbed trucks used by contractors to transport tools and equipment within the project area, not accessing the Ivanhoe road

3000 movements over 12 months, between site and the camp

November 2021 to December 2022

3.1.5 Personal Vehicles

Arriving at the camp and travelling home on a roster will generate traffic, with each contractor / employee operating on a 2 - week roster, arriving and leaving site for 4 movements per month. Deducting the ute movements already travelling to town, and allowing for 1.5 people per vehicle, 4200 movements are expected, between Site and Balranald, Mildura and site, Hay and Site and Swan Hill and Site.

4200 movements over 16 months

November 2021 to February 2023

3.2 Deliveries - General

3.2.1 Potable Water deliveries

Potable water requirements are calculated on an allowance per person per day of 120L, to be supplied from Balranald water supply, either to the camp or the site directly. Delivery loads are estimated based on 20m³ per delivery. An average of 20 loads per month are required, with deliveries between April 2022 and December 2022 higher than 20, up to 28 deliveries per month / 56 movements. This equates to an average of 40 vehicle movements per month between Balranald and the camp / site off the Ivanhoe road.

640 movements over 16 months

November 2021 to February 2023

3.2.2 Food, Laundry and Kitchen supplies

20 deliveries per week are estimated to bring food, kitchen supplies, cleaning supplies, and general equipment to supply the camp, with earlier deliveries building the inventory and stocks to cater for the larger demand during the peak periods. Deliveries are expected to be sourced via Mildura, Swan hill and Hay, amounting to 160 movements per month for 16 months and will include refrigerated loads

2560 movements over 16 months

November 2021 to February 2023

3.3 Deliveries - Construction Equipment

3.3.1 Tooling and Storage

Contractor tools and storage - allow for 4 deliveries of material and tooling per contractor (Civil, Concrete, SMP, field installations - piping, field installations - Dam liners, mining contractors, drillers), for a total of 28 trucks (56 movements), between; Hay, Swan Hill or Mildura and Balranald

56 movements over 16 months

November 2021 to February 2023

Construction Planning – Traffic Volumes

6040-10-RPT-EV-00003

Project File Note



3.3.2 Lifting and handling

Material lifting / handling - Deliveries of telehandlers, forklift, bobcat and small excavators, as well as discipline specific equipment. 8 deliveries per month to keep hire costs under control, deliveries expected to be via flat-bed truck, and to originate from Mildura.

256 movements over 16 months

November 2021 to February 2023

For:

Cranage (see Mobile Plant)

Earth Moving Equipment (see Mobile Plant)

Compacting Equipment (see Mobile Plant)

3.4 Deliveries - Construction Materials

3.4.1 Gravel

Road base and foundations for site access road, site tracks, stacking pads, dams and office areas, car parks (Sub-grade, Sub-base, base-course and bituminising where applicable). An estimated quantity of 215,000 m³, at 40 m³ per tipper truck delivery is 5350 loads over a 11-month period - at estimated 17 per day. The initial volume required will be sourced from borrow pits close to the site, so will utilise the site access road, Burke and Wills Road and the section of the Ivanhoe road in-between.

Supplementary volumes may be sourced from Victoria, travelling via the Tooleybuc bridge to the West-Balranald site.

10700 movements over 11 months, initially along the Ivanhoe road between the Burke and Wills road and the site access road, and then via the Tooleybuc bridge from Victoria to the construction site.

March 2022 to January 2023

3.4.2 Ag Lime and Limestone

Lime (Agricultural Lime for stacking pads, 50mm thick) and Limestone (stacking pad basecourse, 200mm thick) for an estimated 6,500 m³, 165 deliveries based on 40 m³ tipper truck capacity, over a 4-month period. The source of the Lime / Limestone is expected to be Forbes, 495km away. Trucks would use the Newell highway (A39), Mid-Western Highway to Hay, and then Market Street to access Sturt Highway to Balranald, and then McCabe Street to Ivanhoe road to the site access road.

330 movements over 4 months

March 2022 to June 2022

3.4.3 Concrete

Foundations, footings, bunded pads, pathways and kerbing. Concrete would likely source from Balranald or Hay, with access via Ivanhoe Road (Balranald) or Oxley road (Hay). 750 m³ of concrete is estimated, based on 8 m³ concrete per truck this is 94 cement trucks over a 3-month period, approximately 32 per month (January - March 2022)

188 movements over 3 months, from either Balranald or Hay

January 2022 to March 2022

Construction Planning – Traffic Volumes

6040-10-RPT-EV-00003

Project File Note



3.4.4 Rebar / mesh grating and sheet piles

Foundations / slabs - 8 deliveries of materials to cover the requirements of concrete pads, footings, and bundled slabs. 12 deliveries of Sheet Piles and further rebar for the construction of the Rig Anchors.

40 movements over 2 months

January 2022 to September 2022

3.4.5 Fencing / posts and Wire

Fencing posts, fencing wire and chain-wire fencing rolls to line the Access road, Camp and the site footprint, including stacking pad perimeters will be required at the earlier stages of the construction phase. Fencing of the Access road with a sheep fence will continue later in the schedule, with weekly deliveries. 40 deliveries estimated, for 80 movements from Mildura

80 movements over 12 months

January 2022 to December 2022

3.5 Mobile Plant (Heavy equipment)

3.5.1 Cranage

For loading and unloading of deliveries and placement of footings and the assembly of structural members for stick-built structures, unloading and assembly of modular sections for the Primary and Secondary plant, stackers, and the placement of tanks. An estimated 16 mobilisations to be allocated, this will include SPV (oversize class 1) in some instances. These are likely supplied from Mildura via Sturt highway and Ivanhoe road to the site access road.

32 movements over 6 months

March 2022 to August 2022

3.5.2 Concrete pumping Truck

As required for larger concrete pads - 2 trips to site, for Screening and Thickening pads, and then for Primary and Secondary plants. These are likely supplied from Mildura via Sturt highway and Ivanhoe road to the site access road.

4 movements over 2 months

January 2022 to March 2022

3.5.3 Excavators

Delivered on flatbed trucks - required for borrow pits, digging out Process Water and Fines dams, digging foundation areas for sumps, bundled pads, and footings. These are likely supplied from Mildura via Sturt highway and Ivanhoe road to the site access road or from Hay via Sturt highway and Ivanhoe road to the site access road.

20 movements over 13 months

January 2022 to January 2023

3.5.4 Grades / Scrapers and tipper trucks

Required to clear, profile and spread earth and gravel for access road, site footprint, tracks and stacking pads. These are likely supplied from Mildura via Sturt highway and Ivanhoe road to the site access road or from Hay via Sturt highway and Ivanhoe road to the site access road.

36 movements over 13 months

Project File Note



January 2022 to January 2023

3.5.5 Dozers / Front-end loaders

Clearing of vegetation / topsoil for the site access road and OHPL corridor, clearing vegetation / topsoil from the site footprint and creation of pipe traces, windrows and Dam Walls, creation of stockpiles and bulk earth relocations.

20 movements over 11 months

December 2021 to October 2022

3.6 Deliveries - Offices & demountable

3.6.1 Deliveries of site offices

Deliveries of site offices, crib rooms and ablutions for operations, maintenance, administration, construction, and commissioning personnel. Additional deliveries of furniture, IT and office equipment included.

80 movements over 4 months

November 2021 to February 2022

3.6.2 Deliveries of Camp demountable(s)

Deliveries of Camp office, Mess / Kitchen, Storage rooms, ablutions, accommodation, gym and recreation. Additional deliveries of furniture, IT / electronics, water treatment plant, and maintenance equipment allowed for.

160 movements over 4 months

November 2021 to February 2022

3.7 Deliveries - Plant and Equipment

3.7.1 Deliveries of plant (New)

Including screening, thickening, concentration, stacking, HBF, field piping, tanks and pumps. 160 movements estimated, over a period of 5 months. This will predominantly be new equipment transported from Adelaide (via Sturt highway, Mildura to Balranald and to site via Ivanhoe Road) or Melbourne (via 2, M79 / A79 / A790 and the Murray Valley Highway to Robinvale, and then via Sturt highway to Balranald and to site via Ivanhoe Road), with additional sources from Mildura / Buronga, utilising the Sturt Highway and Ivanhoe Road to site.

160 movements over 5 months

March 2022 to July 2022

3.7.2 Deliveries of plant (Relocated)

Flotation plant and related tanks from WRP near Ouyen in Victoria. Estimated 1 oversize load and additional for flotation tank, filter, auxiliary equipment, and tanks. Journey will travel from WRP to Ouyen via A79 to Hattah-Robinvale road (C252) to the Robinvale Sea lake road (C251) onto the Murray Valley highway (B400). Turn onto Sturt highway to Balranald, and Ivanhoe road to the site access road.

12 movements within 1 month

April 2022

Project File Note



3.8 Waste Removal

3.8.1 Sewerage

Sewerage waste to be treated at the site, with a sewerage collection truck required to empty the facilities on the site. The collection trucks will travel from Hay or Swan Hill an average of 6 times per month for 12 movements, peaking at 9 a month for August 2023.

192 movements over 16 months

November 2021 to February 2023

3.8.2 General waste / Rubbish

General refuse will be transported to the Balranald landfill facility for both the camp and the Site. Cans and bottles to be separated to the bins provided and collected for recycling, also to be taken to the Balranald refuse site. This is accessible off the Ivanhoe road. An estimated 80 times for up to 5 skip bins would need to be emptied, (3 at site, 2 and the camp) over a 16-month period, for a total of 160 movements

160 movements over 16 months

November 2021 to February 2023

3.8.3 Tracked Waste

Hydrocarbons, solvents, paints and containers from such, including grease containers, sealant cartridges, filters, paint containers and rags etc are to be collected in a single location at site for disposal by tracked system at the end of the construction period. Monthly collection for 2 vehicle movements per month from March 2022.

28 movements over 14 months

March 2022 to February 2023

3.8.4 Metal recycling

Metal recycling to Balranald refuse site to be completed every 2 months, for 2 movements each time.

10 movements over 10 months

March 2022 to December 2022

3.8.5 Cardboard collection

Cardboard recycling to Balranald refuse site to be twice a month, for 2 movements each time.

56 movements over 14 months

January 2022 to February 2023

3.8.6 Servicing Waste and tyres

Attendance to site by service trucks to maintain on-site hire generators, service mobile plant and work vehicles would occur twice a month, with all filters and fluids to be captured and disposed of by the service vendor. Collection and disposal of tyres will also be completed by a vendor, for site vehicles and plant, with an allowance of 2 trips to site per month.

128 movements over 16 months

November 2021 to February 2023

Project File Note



4 Vehicle Movements Combined

See summary table and Figure 2 below for estimated Monthly vehicle movements, from November 2021 to February 2023.

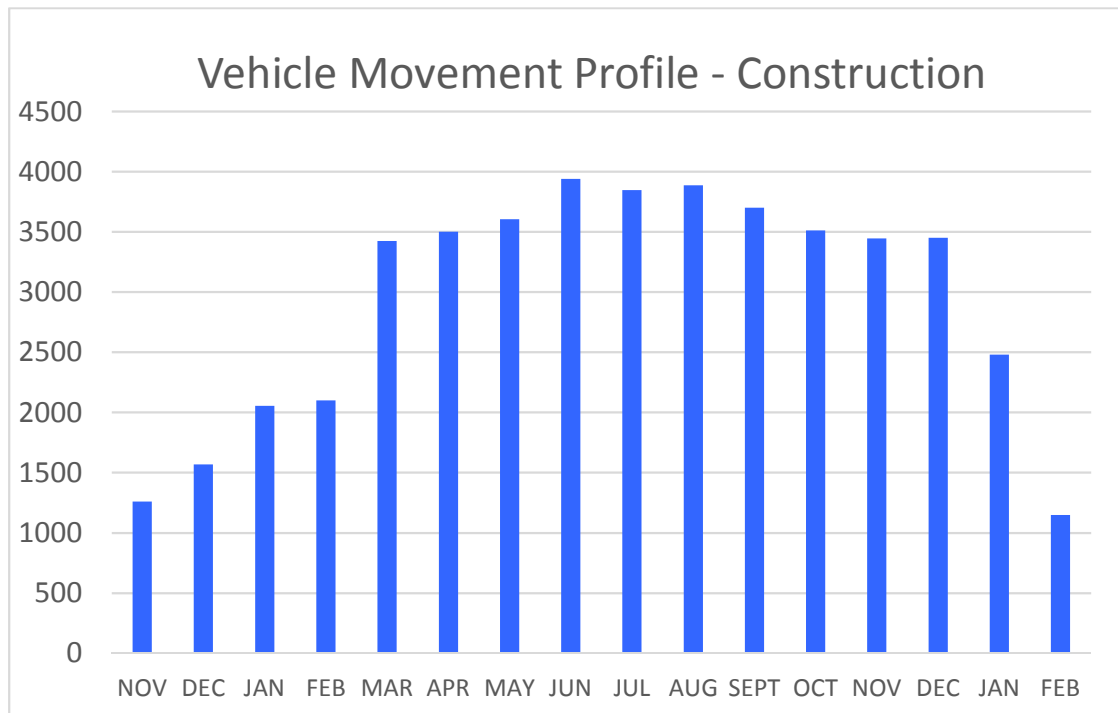


Figure 2; Vehicle Movement Profile

Project File Note



Movement Type	2021		2022												2023		Total	# Months
	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB		
3.1 Work Vehicles and Personnel																	30560	
3.11 UTES	540	540	660	660	660	720	780	900	900	900	840	840	840	840	720	720	12060	16
3.12 UTES (Town)	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	4800	16
3.13 Bus			120	120	240	240	240	360	360	360	360	240	240	240			3120	12
Van		240	240	240	320	320	320	320	320	320	320	320	240	240	120		3380	14
3.14 Trucks	120	120	120	240	240	240	240	240	240	240	240	240	240	240			3000	12
3.15 Personal Vehicles	109	147	235	195	248	301	320	376	379	405	333	299	312	315	179	48	4200	16
3.2 Deliveries - General																	3200	
3.21 Potable Water	18	23	36	30	38	46	48	56	57	61	50	45	47	48	28	9	640	16
3.22 Food Laundry and Kitchen	71	93	144	121	152	183	193	226	227	243	201	181	189	190	111	36	2560	16
3.3 Deliveries - Construction Equipment																	312	
3.31 Tooling and Storage	6	2	4	4	4	6	4				4	6	6	6		4	56	16
3.31 Lifting and Handling	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	256	16
3.4 Deliveries - Construction Materials																	11338	
3.41 Gravel					973	973	973	973	973	973	973	973	973	973	973		10700	11
3.42 AG Lime and Limestone					83	83	83	83									330	4
3.43 Concrete			63	63	63												188	3
3.44 Rebar / Mesh grating and Sheet piles			8	8						12	12						40	2
3.45 Fencing Materials			8	8			8	8	8	8	8	8	8	8			80	2
3.5 Mobile Plant																	112	
3.51 Craneage					4	4	4	4	8	8							32	6
3.52 Concrete Pumping Truck				2	2												4	2
3.53 Excavators			4	2	2	2				2	2	4			2		20	13
3.54 Graders / Scrapers and Tipper Trucks			8	4	8	2					4	4		2	4		36	13
3.55 Dozers /Front-End Loaders		6	2	2	2	1	1	1	1	1	1	2					20	11
3.6 Deliveries - Site Offices																	240	
3.61 Deliveries of Site Offices	20	20	20	20													80	4
3.62 Deliveries of Camp Demountables	40	40	40	40													160	4
3.7 Deliveries - Plant and Equipment																	172	
3.71 Deliveries of New Plant					40	20	40	40	20								160	5
3.72 Deliveries of Relocated Plant						12											12	1
3.8 Waste Removal																	416	
3.81 Sewerage	5	7	11	9	11	14	15	17	17	18	15	14	14	14	8	3	192	16
3.82 General Waste / Rubbish	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	2	160	16
3.83 Tracked Waste / Hydrocarbons				2	2	2	2	2	2	2	2	2	2	2	2	2	26	1
3.84 Metal Recycling					1	1	1	1	1	1	1	1	1	1			10	10
3.85 Cardboard Recycling			1		1	2	2	2	3	3	3	3	3	2	2	1	28	14
3.86 Servicing Waste and Tyres	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	128	16
Movements by Month	1258	1567	2053	2099	3423	3500	3603	3938	3845	3887	3699	3511	3445	3450	2479	1148	46350	16

Project File Note - Appendixes





